ANIMAL EYE CONSULTANTS OF IOWA

Animal Eye Consultants of Iowa *Instituti* *mittee*	
Policy #31	**"Occupational Safety Requirements and Guidelines for the Use of Volatile Liquid Anesthetics"**
Approval Date: 3/12/26 (Replacing Version: 6/14/2021)	

A. Purpose

These guidelines are recommended for limiting occupational exposure to volatile anesthetics including isoflurane, sevoflurane, and desflurane and for maintaining proper function of vaporizers used for administration. Users are advised to follow the manufacturer's recommendations if they vary significantly from those in this document.

B. Background

Occupational exposure to inhaled anesthetics is a hazard to human health. All personnel must be trained in the proper and safe use of the volatile anesthetic and associated devices and vaporizers prior to operation. Anesthetic equipment must be evaluated regularly to ensure its integrity and proper function. Anesthetic vaporizers vaporize volatile liquid anesthetics in a precise and controlled fashion so that useful concentrations of these agents can be more safely administered. The inner mechanisms of vaporizers that regulate carrier gas flow and anesthetic output are subject to wear due to use or misuse and may result in extreme variation of anesthetic output compared to the output indicated by the vaporizer dial. These conditions may result in under- or over-anesthetized subjects.

C. Policy

1. **Vaporizer service:** Accuracy of anesthetic agent delivery must be verified annually, whenever inaccurate vapor output is suspected, or when placing a recently acquired used vaporizer into service. Variance of anesthetic delivery by more than 20% of calibrated values is not acceptable. Anesthetic vaporizers should be serviced by qualified personnel (such as an authorized service center) as recommended by the manufacturer.

2. **Waste Anesthetic Gas Scavenging:** Anesthetic systems must be leak-free and have an effective system to scavenge waste anesthetics. Waste anesthetic contamination of the workplace may result in adverse health effects in personnel. In addition, halogenated anesthetic waste contributes to atmospheric ozone depletion. Waste anesthetic production should be minimized when possible to help protect the environment.
    a. Activated charcoal canisters absorb halogenated waste gases. This method is not effective for scavenging nitrous oxide. Canisters of activated charcoal are generally active for ~12 hours or until they gain 50g depending on the canister (see manufacturer's instructions). A log of the time the canister is in use or of the change in weight of the canister must be maintained.
        i. For effective scavenging, the manufacturer's instructions for the specific activated charcoal canister must be followed. For example, F/AIR canisters must be secured in an upright position without blocking airflow through the bottom. They are not effective if lying on their side or if placed upright directly on a counter.
    b. Passive and active scavenging systems involving capture devices ("pop-off valves"), conducting tubing, breathing circuits, vented induction boxes, low flow vaporizer systems (Somno-suite®), scavenger interfaces, and vacuum systems offer more effective and extensive means for removing waste anesthetic gases from the work area.
    c. Endotracheal tubes, nose cones and facemasks should be correctly sized and snug fitting. The cuff of endotracheal tubes should be checked for sufficient inflation.
    d. Before removing any airway device at the end of surgery wash out the breathing system with non-anesthetic gases.
    e. Fume hoods, downdraft tables, exhaust snorkels and other exhaust/scavenging systems can be used to reduce occupational exposure with any vaporizer system and must be utilized when conducting anesthetic procedures using the "open drop" or "drop jar" method, SOP #37. Proper fume hood function should be tested and certified.
    f. Carbon dioxide absorbers (Sodalime™, Baralyme™) should be changed on a regular basis. Dye indicators in the absorber granules will indicate a color change (usually from white to blue or purple) when the absorbers are no longer removing carbon dioxide. This color change will revert to white overnight but does not replenish the function of the absorber. Absorber granules should be changed when the color change is first identified. Please check manufacturer's

disposal requirements for spent granules as some formulations must be disposed of as hazardous waste.

g. AEC Environmental Health and Safety will monitor occupational exposure to anesthetic waste gas when research requires alternative delivery and exhaust situations. For more information, please contact EH&S.

3. **Documentation:**
    a. Anesthetic machines and vaporizers must have documentation of the date of testing and the initials of the person providing the test. A calibration date certificate should be affixed to the vaporizer after each service.
    b. The use of activated charcoal canisters must be logged with either the total time the canister is used or the change in weight of the canister (see manufacturer's instructions) or both with each use. Most canisters have an area for documenting weights and time on the side of the canister.

4. **Services available:**
    a. Anesthetic Equipment Supply, Inc., 24301 Roberts Dr., Black Diamond, IA 98010; phone: 800-426-5007
    b. Highland Medical, 26111 Ynez Rd, C15, Temecula, CA 92591; phone: 800-826-5951 www.highlandmedical.net
    c. Matrix Medical: Local service representative for vaporizer output certification only, Karen Pfeiffer, Quad Cities, IA; phone: 319-826-6217/319-640-4578.
    d. DRE Veterinary Anesthesia Vaporizer Services: Ginny Philpot, 1800 Williamson Court, Louisville, KY 40223; phone: 877-321-8189.

5. **Minimum STANDARD OPERATING PROCEDURE for ANESTHETIC Vaporizer use**
    a. Check hoses, fittings and rebreathing bag and pressure check the breathing circuit to identify and then repair any leaks. Leaks can result in occupational exposure and less effective anesthesia. Caution is advised when filling vaporizers to avoid spillage of liquid anesthetics.
    b. If applicable, check color and consistency of the carbon dioxide absorber and replace if needed.
    c. Set up the unit to scavenge any waste anesthetic gas:
        i. Unless waste gas is scavenged through a working wall vacuum, snorkel, downdraft table or other scavenging/vacuum system or certified fume hood, then all anesthesia machines must be equipped with an activated charcoal canister.

ii. If using change in canister weight to track adsorbent life span, weigh the activated charcoal canister before the first use and before any subsequent use. The weight should be recorded and dated.
iii. Verify correct positioning of the canister for effective use. For example, F/AIR canisters must be secured in an upright position without blocking airflow through the bottom. The canisters are not effective if lying on their side or if air flow is blocked.
iv. The activated charcoal canister should be changed when it has reached the manufacturer's limits for time or weight.
v. Spent canisters can be thrown in the regular trash.

d. All vaporizers should be serviced by qualified personnel annually. Document any vaporizer maintenance or repair.

D. References

1. Commentary and recommendations on control of waste anesthetic gases in the Workplace, American College of Veterinary Anesthesia and Analgesia. https://acvaa.org/wp-content/uploads/2019/05/Control-of-Waste-Anesthetic-Gas-Recommendations.pdf
2. Waste Anesthetic Gases, Occupational Safety and Health Administration, United States Department of Labor. https://www.osha.gov/waste-anesthetic-gases
3. Anesthetic equipment calibration and maintenance, Veterinary Medical Care, Accreditation Program – FAQs, AAALAC International. https://www.aaalac.org/accreditation-standards/guidance-statements/#AnestheticEquipment