

## Waste Anesthetic Gas (WAG) Scavenging System Guidance

### *I. Purpose and Introduction*

The intent of this guidance document is to describe waste anesthetic gas (WAG) scavenging systems and safety precautions. Utilizing anesthetic gases for anesthesia in animals presents an occupational health risk through unintended human exposure. Exposure to second-hand anesthetic gases has been associated with concerns for increased potential risk of adverse reproductive outcomes. Cardiovascular and respiratory effects may result from acute exposure and liver and kidney effects may result from chronic exposure to waste anesthetic gases. To reduce the human health risks, it is necessary to prevent WAG from escaping into the workspace, which can be accomplished by using this guidance.

### *II. Scope*

This guidance document is intended for use by all individuals who administer gas anesthetics to research animals.

### *III. Engineering Controls to Reduce Human Exposure to WAG*

- a. Local Exhaust Ventilation (LEVs)
  - Chemical Fume Hood
  - Ducted Biological Safety Cabinet (BSC)
  - Slot Hood/Downdraft Table/Snorkels
- b. Active WAG Scavenging
  - Building Vacuum System
  - Auxiliary Vacuum Pump (WAG tubing from nose cones, induction chambers, etc. should exhaust into a chemical fume hood, hard-ducted biological safety cabinet, or filtered through an adsorptive charcoal canister.)
- c. Passive WAG Scavenging
  - Activated Charcoal Canisters

**Note:** Local exhaust ventilation and active WAG scavenging devices are preferable to passive scavenging systems as they have been proven to effectively reduce exposure potential. In addition to the listed engineering controls, WAG should only be used in well-ventilated rooms where there is no recirculation of exhaust air.

### *IV. Procedure*

- a. Ensure that all individuals responsible for gas anesthesia use are properly trained. Training

is provided by the Research Animal Resources and Compliance (RARC).

- b. Maintain equipment in good working order and have it inspected/certified annually. Anesthetic gas vaporizers, chemical fume hoods, hard-ducted biological safety cabinets, and other local exhaust ventilation types should be inspected prior to use and certified annually.
- c. Utilize local exhaust ventilation (chemical fume hood, hard-ducted biological safety cabinet, etc.) whenever possible because it is the most effective control method. The induction chamber(s), nose cone(s), gas manifold, and exhaust tubing should all be located within the containment or capture zone of the local exhaust ventilation device.

If a building vacuum system is available, these can be used for rebreather-type gas anesthesia systems. Consult the manufacturer's instructions prior to installation and use. Auxiliary vacuum pumps are available for both rebreather and non-rebreather type gas anesthesia systems. Consult with the Environmental & Occupational Health (EOH) Unit prior to installation and use. Passive scavenging with activated charcoal canisters should only be used when the previously mentioned control methods are not available.

- Charcoal canisters must be used in accordance with the manufacturer's directions.
- Charcoal canister usage logs that track canister weights and usage times must be maintained and kept on file. Canister should be replaced when the total weight or time limit is met.
  - A template charcoal canister tracking log is available from the RARC upon request.
- Canisters should be used upright at all times
- Ensure that the holes on the bottom or top of the canister (depending on manufacturer) are not blocked.
- Positioning canister lower than the vaporizer will assist in passive scavenging.

Gas evacuation units can be added to most passive charcoal canister models to convert them to an active scavenging unit.

**Note:** Activated charcoal canisters only adsorb halogenated anesthetics (e.g. isoflurane). **Nitrous oxide cannot be used with these systems.**

- d. Work in a well-ventilated area (e.g. rooms with 10-15 air changes per hour) with no recirculation of the room exhaust.
- e. Maintain as much distance as possible between the source of the gas (nose cones, induction chambers, etc.) and yourself.
- f. Fill vaporizers in a fume hood, ducted BSC or under other LEVs and utilize an anti-spill adapter on the bottle while filling the vaporizer chamber.

- g. Intubate animals whenever possible. If nose cones must be used, ensure that the device seals tightly around the face of the animal. Nose cone gaskets can be utilized to help obtain a tight seal.
- h. "Drop Method" anesthesia procedures must only be performed within a chemical fume hood or ducted BSC.

Once the animal is anesthetized, induction chambers should be opened in a fume hood or ducted BSC. If benchtop work is being performed induction chambers should be briefly flushed with oxygen prior to opening the chamber top.

#### *V. Safety and Occupational Health*

- a. For medical emergencies: Call 911
- b. For assistance with chemical spills including isoflurane contact Chemical Safety 608.265.5700
- c. Contact the Environmental & Occupational Health (EOH) Unit at 608.890.1992 or [eo@fpm.wisc.edu](mailto:eo@fpm.wisc.edu) for WAG scavenging system consultation or to schedule exposure monitoring.
- d. Personnel who are pregnant or considering pregnancy should consult with their personal physician and UW Occupational Medicine at 608.265.5610 or [occupationalmedicine@fpm.wisc.edu](mailto:occupationalmedicine@fpm.wisc.edu).
- e. Contact the Research Animal Resources and Compliance (RARC) at 608.890.0969 or [help@rarc.wisc.edu](mailto:help@rarc.wisc.edu) [trainer@rarc.wisc.edu](mailto:trainer@rarc.wisc.edu) for anesthesia system training.

