

## Guidance for the Control and Monitoring of Waste Anesthetic Gases in Animal Research

### *I. Background*

Many animal research procedures involve the use of anesthetic gases. Isoflurane for example is an anesthetic gas commonly used in animals and humans to achieve a reliable plane of anesthesia that is quickly reversed and is considered safe with few side effects. Other anesthetic gases are also used in animal research, such as sevoflurane and enflurane. These products replaced the use of halothane which had negative side effects.

<p>Waste anesthetic gases are considered a potential reproductive hazard and an irritant. Long term exposure to waste anesthetic gases has been associated with adverse reproductive outcomes in individuals exposed to anesthetic gases. Other adverse effects associated with anesthetic gases include liver and central nervous system impacts. Some anesthetic gases have specific workplace exposure limits such as halothane (50 ppm) and enflurane (75 ppm). However, other anesthetic agents do not have specific national guidelines. The national Occupational Safety and Health Administration (OSHA) does not currently have permissible exposure limits regulating isoflurane and other inhaled anesthetic agents; however, the California Division of Occupational Safety and Health (CAL/OSHA) has instituted a Permissible Exposure Level (PEL) of 2 ppm averaged over an 8-hr. Time Weighted Average (TWA).</p>	
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### *II. Recommendations*

The UW Environmental & Occupational Health Program recommends waste anesthetic gas exposure levels be kept as low as reasonably achievable and when

possible, below the 2 ppm level. Personnel who are considered higher risk (pregnant or planning pregnancy) do not have a recommended exposure level due to uncertainty associated with safe levels of exposure for the fetus. Staff should make a determination on the level of precaution to be taken based on consultation with their personal physician, Environmental & Occupational Health Unit and/or UW Occupational Medicine staff.

### ***III. Procedure:***

- A. The Environmental & Occupational Health (EOH) Unit offers surveys of areas in which isoflurane is utilized. EOH staff will consult with applicable personnel to select which rooms and/or procedures will be monitored.
- B. A written report will be sent to the personnel monitored, PI and/or lab manager.
- C. If the anesthetic gas machine is past the calibration due date or the charcoal scavenger weight indicates it is saturated, the sampling will not be done until the anesthetic gas machine meets these requirements. Scavenging devices should be installed and used as the manufacturer recommends. A new weight tracking system should be used each time a new charcoal canister is used. Weight tracking systems must be maintained and should be easily accessible to users.

When waste anesthetic gas concentrations are found to be above 2 ppm engineering controls will be evaluated. If it is determined that reasonably available controls can further reduce exposure levels, a corrective action request will be submitted to the PI and/or facility manager. The EOH unit shall work with PI and/or facility managers to find a cost-effective means of reducing exposure using readily available technologies or products.

- D. Personal sampling results will be communicated to employees within 15 working days of EOH receiving results. Where exposure results are above 2 ppm, the employee shall be given the option to wear a respirator and enroll in a respiratory protection program to further reduce exposure if engineering controls are unable to be instituted.
- E. Staff who are or may be pregnant should be advised about the uncertainty regarding health effects associated with waste anesthetic gases and the benefits and limitations of respirator use. The decision of what level of exposure to accept during pregnancy is a personal one and should be made in consultation with the employee's personal physician. The Environment & Occupational Health Unit can provide further consultation including workplace exposure monitoring, respiratory protection support and referral to occupational medicine consultation.

### ***IV. Prohibition of Open Bench Work***

Use of anesthetic gases on an open bench shall not occur without the use of properly maintained scavenging equipment or local exhaust. Even with use of this

equipment, exposure may exceed 2 ppm at times. Use of a respirator should be considered in these situations where further reduction in exposure is desired.

#### *V. New Lab Design*

Where lab space is being designed that may involve the use of anesthetic gases, capacity shall be provided for adding local exhaust.

#### *VI. Related Documents*

- A. Waste Anesthetic Gas (WAG) Scavenging System Guidance