



Suggested Method for Determining Waste Anesthetic Gas Exposure

Some anesthetic procedures (such as recovery of patients) defy the use of a scavenger, so the safety solution is to ensure there is adequate “general or exhaust” ventilation in the area so that the staff is not exposed to the waste anesthetic gasses (WAGs) above the recommended exposure limit (REL). All of the inhalation anesthetic agents currently used in the veterinary profession are classified as “halogenated hydrocarbons.” OSHA has no established Permissible Exposure Level (PEL) for halogenated hydrocarbons; however, they accept the National Institutes of Occupational Safety & Health (NIOSH) REL of no more than 2 parts per million (ppm) in any single hour.

In general, the detection of WAGs by their odor would indicate the existence of very high levels, as these agents do not have a strong odor at low concentrations.

For example, one study (Hallen et al. 1970) found that fewer than 50% of the population can detect the presence of halothane until concentrations are 125 times the acceptable limits. Although no specific information could be found on isoflurane levels, it must be assumed that it would also take excessive levels to be detectable by smell.

The only way to be sure if the ventilation in the anesthetic area is adequate is to perform tests. Because of the nature of anesthetic operations in a veterinary practice, it's more important to test the staff's exposure than it is to test a particular room or area. The preferred method of testing is with analytical equipment operated by an industrial hygienist, however, the most economical and practical way to do this as a screening tool is to use exposure badges similar to the ones shown.

A staff member who is “typical” of the exposure that the entire staff experiences should wear the badge during the testing phase. The testing should occur on a “normal workload” day during the time when exposure is expected to be the greatest. Follow the directions from the manufacturer, but in general, the badge should be worn on the collar so that it represents the “breathing zone” of the person. Even though the staff member may briefly perform duties not related to anesthesia throughout the testing period (such as answer the telephone,) the badges should be worn by a single person for the entire testing time.

The badges should be labeled, sealed in the supplied transport containers and shipped to the designated lab promptly after the sampling occurs since they must be processed within 1 week of



the time they are used . (The processing and instructions for shipping are included in the initial purchase price of the badges.)

If the results of the testing reveals exposure levels below the 2 ppm REL, the procedures and process are considered safe for the staff. If the levels are above the thresholds, then some changes to the equipment or procedures must be made and the testing repeated. When there is an acceptable scavenging system in place, excessive exposures are usually the result of either leaks in the anesthetic circuit or improper procedural steps by the staff.

The manufacturer of the badges indicates that exposure to other chemicals, such as nitrous oxide, or isopropyl alcohol will not affect the accuracy of the testing.

OSHA guidelines suggest testing approximately every six to twelve months, but this is not a requirement. In our experience, if the initial testing was below the REL, if the anesthetic machine is maintained properly, and if the procedures are the same as when the testing was performed, it can probably be assumed that the initial results are still valid. Re-testing is a good idea when a new machine is procured or when the hospital procedure changes.

Monitoring badges are available from a number of sources, including:

Assay Technologies (www.assaytech.com) (800) 833-1258

- Item # W574AT - 1 badge approx \$64 (INCLUDES processing and report)
- Item # X574AT - 5 badges per box Approximately \$232 (INCLUDES processing and report)

Advanced Chemical Sensors (www.acsbadge.com) (888) 338-4230

- Product # H-10-3 – 1 badge for \$60 (INCLUDES processing and report)

Vetamac, Inc (www.vetamac.com) (800) 334-1583

- 1 badge for \$78 (INCLUDES processing and report)

VetEquip, Inc., (www.vetequip.com), (800) 466-6463

- Item # 931443 Approximately \$80 each (INCLUDES processing and report)