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WASTE ANESTHETIC GASES

Anesthetic gas and vapors that leak into the surrounding room during medical or research procedures are considered waste anesthetic gases (WAGs). The waste anesthetic gases and vapors that create health effects from over-exposure include nitrous oxide and halogenated agents such as isoflurane, halothane, enflurane, trichloroethylene, and chloroform. University faculty, staff and students should be aware of the potential risks of WAGs and be advised to take appropriate precautions to reduce exposures.

Workers acutely exposed to excess amounts of anesthetic gas can experience symptoms of drowsiness, headache, nausea, poor judgement and loss of coordination. Chronic symptoms of over-exposure can include liver, kidney and reproductive effects.

To prevent unnecessary exposures to waste anesthetic gases, the following instructions are designed to help identify the potential for WAG exposure and to provide guidance on leak test procedures, medical surveillance, air monitoring and worker training.

1. The principal source of waste anesthetic gas exposure is the use of an induction chamber, leakage from anesthesia equipment or improper use of gas scavenging systems. University employees who work in hospital operating rooms, dental operatories, exam rooms and animal research areas should take steps to reduce their exposure to WAGS.

1.1 A safe exposure concentration for these chemicals is less than 2 parts per million (ppm) of any halogenated anesthetic agent collected over a one hour period or 25 ppm of nitrous oxide over an 8-hour time weighted average.

1.2 When nitrous oxide is used in combination with the halogenated gases, control of nitrous oxide to 25 ppm during anesthesia should limit concentrations of the halogenated gases to less than 0.5ppm.

2. Engineering Controls:

A scavenging system is the basic engineering control for WAGS. These systems include a collecting device (scavenging adapter) to capture gases and vapors from the breathing system at the site of overflow. Although some gas scavenging systems are elaborate and costly, an inexpensive system consisting of a flexible exhaust duct and Plexiglas hood, if well designed and properly installed, can dramatically reduce gas concentrations in the work area.

The HVAC system for the room should not be relied upon for waste gas scavenging. While it is important to have good supply and exhaust ventilation system to carry WAGS from the room (15 air changes per hour), scavengers should capture and exhaust gas at the point of release.

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Modern anesthesia equipment is manufactured with scavenging systems that include a scavenging nasal mask. Select a compact double chambered mask system with a shroud large enough to capture exhausted anesthetic gas exiting from the subject. The inner mask is contained within a slightly larger outer mask and a slight vacuum is present in the space between the masks.

3. Work Practice Controls

The anesthesia machine owner must implement a routine maintenance program to check for and fix leaking equipment and to assure that general room ventilation requirements are met. Steps taken to reduce gas leakage should include:

- 3.1.1 Making sure that waste gas disposal lines are connected and that fittings and hoses are not defective
- 3.1.2 Not turning on nitrous oxide or halogen vaporizer until the circuit is connected to the subject; and switching off the nitrous oxide and halogen vaporizer when not in use.
- 3.1.3 If an induction chamber is used open it in a laboratory chemical fume hood or using the local exhaust to evacuate the chamber
- 3.1.4 Making sure that the mask properly fits the subject
- 3.1.5 Using the lowest gas flow rates possible
- 3.1.6 Maintaining oxygen flow until scavenging system is flushed.

4. Air Monitoring

EH&S should be contacted to perform worker exposure monitoring as necessary to assure safe exposure levels are being maintained. Air monitoring should be performed to capture both worst case and routine exposures for each job class. Air sampling results are reported to the supervisor within 15 days of receiving monitoring results from the lab and should be shared with the monitored employee.

5. Medical Surveillance

Faculty, staff and students with potential over-exposures to WAGs should be directed to Employee Health Services for a clinical consultation.

6. Personal Protective Equipment

Personal protective equipment is typically not necessary or recommended if an adequate WAG control program is in place. Personal protective equipment should only be utilized as an interim measure when air monitoring shows control measures are currently inadequate to limit worker exposures.

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7. Training

Workers involved with waste anesthetic gases should be trained by their supervisor to recognize, understand and reduce health and safety risks of exposure to WAGs. Training and questions can be supported by the EH&S Department.