

DOHS Fact Sheet and Checklist Waste Anesthetic Gas (WAG)

National Institutes of Health • Division of Occupational Health and Safety (DOHS) • Technical Assistance Branch (TAB)

What is waste anesthetic gas (WAG)?

Waste anesthetic gas, or WAG, is a term commonly used in relation to the occupational (worker) exposure of anesthetic gas during a medical or surgical procedure. Elements that contribute to WAG include:

- Leakage from tubing, seals and gaskets.
- Work practices/lack of training.
- Poor ventilation.
- Ineffective gas scavenging systems.

What are the health effects of being exposed to WAG ?

Some studies have documented adverse health effects (e.g. headaches, fatigue, irritability, birth defects, miscarriages, liver and kidney disease, cancer) from excessive exposure to anesthetic gases. These health effects were mainly noted for older anesthetics (e.g. trichloroethylene, methoxyflurane) that are no longer commonly in use. As one reference on these health effects, see pages 181-187 from Document 77-140 from the National Institute for Occupational Health and Safety, or NIOSH:

<http://www.cdc.gov/niosh/docs/1970/77-140.html>

Studies are inconclusive on the potential health effects from occupational exposure to some of the newer anesthetics (e.g. isoflurane [the most common anesthetic gas used at NIH]). The limited information available has produced little evidence on health effects.

The Occupational Safety and Health Administration (OSHA) currently advises that the risks to some of

the more common, and newer, anesthetics (e.g. isoflurane, desflurane, and sevoflurane) have not been established and that attempts should still be made to minimize occupational exposure to WAG.

Are there any DOHS programs in relation to WAG ?

The DOHS has established a written WAG Surveillance Program, which primarily entails performing surveys and leak tests to quantify exposure levels and provide recommendations to reduce exposure. A survey or leak test may include: monitoring employees for exposure, performing a leak test of the anesthetic breathing circuit, and providing recommendations to further reduce any potential exposure.

A copy of the current WAG Surveillance Program is posted on the DOHS website:

http://www.ors.od.nih.gov/sr/dohs/HealthAndSafety/IH/Pages/industrial_hygiene.aspx#Waste

Does DOHS Perform a survey or leak test at all locations?

DOHS recognizes that it may be infeasible (e.g. unscheduled procedures, infrequent use) to perform a survey or leak test at every location throughout NIH that utilizes anesthetic gas for a procedure. WAG Surveillance Program efforts are focused where there is a greater risk for potential exposure to WAG (active surgical suites, high duration of procedures, etc.).

A survey or leak test may be requested by contacting DOHS at 301-496-3457.

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What good work practices should I implement to further reduce the potential for WAG exposure?

Consider posting this Fact Sheet & Checklist in the work area, and perform the following checks each time anesthetic gas is administered:

- Ensure personnel have received the appropriate documented training on how to use the equipment.
- Review and understand the manufacturer's instructions for operating the equipment.
- Ensure induction chamber lids are closed and locked when anesthetic gas is being delivered.
- Inspect lid gaskets to ensure they have a tight seal to the induction chamber. Replace defective gaskets.
- Ensure all connections are properly secure.
- Inspect tubing, valves and fittings for leaks. Seal all leaks.
- Use the flushing/purge system (if applicable) to flush for 5-10 seconds, or the time period noted by the manufacturer.
- Use a certified local exhaust ventilation system (chemical fumehood, downdraft table/sink, etc.) as the preferred means to remove WAG. Note that a biosafety cabinet that is NOT ducted to the exhaust system will only recirculate WAG and may not effectively remove it from the room.
- Maintain downdraft tables free of obstructions.
- Avoid excessive flow rates.
- Ensure the ports are sealed/plugged if animals are not in place (when using manifold or multi-port systems, including some imaging units).
- Use a certified local exhaust ventilation system (chemical fume hood, downdraft table/sink, etc.) when filling the vaporizer.
- Keep laboratory doors closed when anesthetic gas is in use.
- Ensure preventative maintenance has been performed on the system annually, or more frequent if recommended by the manufacturer.
- Create a nose cone for small animals (if applicable) comprised of a sheath and gasket to minimize WAG from escaping around an animal's face (see photo).

Small charcoal canisters:

- Adhere to the weighing and change-out schedules, as recommended by the manufacturer for the commonly used small charcoal canisters (e.g. F/AIR canisters).
- Weigh the canisters **before** every use.
- Avoid the use of any other large charcoal based scavenging systems, as per guidance from the NIH "Ductless Fume Hood Review" document.

