



Request for Assistance in...

## Controlling Exposures to Nitrous Oxide During Anesthetic Administration

NIOSH ALERT: 1994

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 [94-100sum.pdf \(Worker/Employer Summary Sheet Only\)](#) (268 kb) 1 page  
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### WARNING!

**Workers exposed to nitrous oxide (N<sub>2</sub>O) may suffer harmful effects.**

The National Institute for Occupational Safety and Health (NIOSH) requests assistance in controlling exposures of workers to nitrous oxide (N<sub>2</sub>O) during the administration of anesthetic gas in medical, dental, and veterinary operatories. NIOSH concluded in 1977 that exposure to N<sub>2</sub>O causes decreases in mental performance, audiovisual ability, and manual dexterity [NIOSH 1977b]. A recent study of workers [Rowland et al. 1992] and several experimental animal studies [Corbett et al. 1973; Vieira 1979; Vieira et al. 1980, 1983] indicate that adverse reproductive effects may also result from chronic exposure to N<sub>2</sub>O.

This Alert presents control measures for preventing or greatly reducing exposure to N<sub>2</sub>O during the administration of anesthetic gas. These control measures should be part of a comprehensive written safety and health plan for workers. NIOSH requests that safety and health officials, editors of appropriate journals, manufacturers of anesthetic equipment, union representatives, employers, and managers bring the recommendations in this Alert to the attention of all workers who are at risk.

## BACKGROUND

N<sub>2</sub>O is used as an anesthetic agent\* in medical, dental, and veterinary operatories. This gas is also used as a foaming agent for whipped cream, an oxidant for organic compounds, a nitrating agent for alkali metals, and a component of certain rocket fuels [Beard 1982; Suruda and McGlothlin 1990].

In 1977, NIOSH published a technical report entitled *Control of Occupational Exposure to N<sub>2</sub>O in the Dental Operatory*. This report presented methods for limiting the concentration of waste N<sub>2</sub>O to 50 parts per million (ppm) during administrationCa limit based on the technical feasibility of existing

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Use the guidelines in the following section to minimize worker exposures to N<sub>2</sub>O.

## **GUIDELINES FOR MINIMIZING WORKER EXPOSURES**

### **Exposure Monitoring**

Exposure monitoring should be the first step in developing work practices and worker education programs, since measurements of N<sub>2</sub>O are needed to determine the type and extent of controls that are necessary. Follow the guidelines below to minimize worker exposures:

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Monitor for N<sub>2</sub>O when the anesthetic equipment is installed and every 3 months thereafter.

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Include the following types of monitoring:

- Leak testing of equipment

- Monitoring of air in the worker's personal breathing zone

- Environmental (room air) monitoring

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Prepare a written monitoring and maintenance plan for each facility that uses N<sub>2</sub>O. This plan should be developed by knowledgeable persons who consider the equipment manufacturers' recommendations, frequency of use, and other circumstances that might affect the equipment.

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Perform air monitoring by gas-bag sampling [NIOSH 1984] or real-time sampling [McGlothlin et al. 1989].

When real-time sampling is conducted to obtain personal exposure data, attach the sampling train to the lapel of the worker on the side closest to the patient; N<sub>2</sub>O concentrations in this location are most representative of those in the worker's breathing zone. Diffusive samplers (referred to as passive dosimeters) are commercially available and may be useful as initial indicators of exposure [Bishop and Hossain 1984].

### **Engineering Controls and Maintenance Procedures**

The following engineering controls and maintenance procedures have been shown to be feasible and effective in reducing exposure to N<sub>2</sub>O during anesthetic administration.

**Anesthetic delivery.** Excessive exposure to N<sub>2</sub>O may occur as a result of leaks from the anesthetic