



NIOSH

Posthearing Brief to OSHA

**POSTHEARING BRIEF OF THE
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
ON THE
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
PROPOSED RULE ON
OCCUPATIONAL EXPOSURE TO 2-METHOXYETHANOL, 2-ETHOXYETHANOL
AND THEIR ACETATES (GLYCOL ETHERS)**

**29 CFR Part 1910
Docket No. H-044**

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health**

2/1/94

Staff of the National Institute for Occupational Safety and Health (NIOSH) have reviewed the report that was submitted to the Occupational Safety and Health Administration (OSHA) docket on glycol ethers (GEs) by Mr. Richard S. Holmes of Union Carbide Chemicals and Plastics Company, Inc. The report presents findings from a respirator cartridge study conducted by Miller-Nelson Research, Inc., with consultation from NIOSH (Enclosure 1).

The results of the study were used to predict that organic vapor chemical cartridges can adsorb GEs at the proposed maximum-use concentrations. In addition, the report recommends a cartridge change-out schedule of 1 week for full-face air-purifying respirators and 2 weeks for half-face air-purifying respirators. However, the report does not include an evaluation of the migration of GEs through the cartridge sorbent bed, either over a weekend or overnight. It may be possible for the GEs to migrate through the sorbent bed. This would result in the wearer being exposed to GEs when the respirator is used again. Therefore, until migration studies are completed, NIOSH recommends that if OSHA were to allow the use of air-purifying respirators with organic vapor chemical cartridges for protecting workers from exposure to GE, the cartridges be changed after each shift (up to 12 hours). This is consistent with previous NIOSH recommendations that chemical cartridges be changed at least daily [NIOSH 1987].

Air-purifying respirators with organic vapor cartridges should be used only for short duration tasks (e.g., maintenance tasks, installation of engineering controls) for which air-supplied respirators are not feasible. NIOSH continues to recommend the use of air-supplied respirators when respiratory protection is necessary [NIOSH 1993].

REFERENCES

NIOSH [1987]. NIOSH guide to industrial respiratory protection. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 87-116, pp. 52-53.

NIOSH [1993]. NIOSH testimony on the Occupational Safety and Health Administration's proposed rule on occupational exposure to 2-methoxyethanol, 2-ethoxyethanol and their acetates (glycol ethers), July 21, 1993, OSHA Docket No. H-044, NIOSH policy statements. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health.

10/29/93

Enclosure 1

CARTRIDGE BREAKTHROUGH
STUDY PARAMETERS FOR
GLYCOL ETHERS

The following "worst-case" testing will be conducted on the four glycol ethers (2-EE, 2-EEA, 2-ME, and 2-MEA) covered by OSHA proposed rulemaking [58 FR 15526].

- One brand of organic vapor cartridge with a low cartridge sorbent fill weight (e.g., North) will be tested. The between-brand variability in breakthrough times is due principally to the between-brand difference in the amount of charcoal sorbent in the cartridges. Therefore, the worst-case condition would be to choose the cartridge with the lowest cartridge brand fill weight of sorbent.
- Two replicates will be tested at each study condition. Scientific evidence indicates that there is only 5 to 10% within-lot variability for breakthrough times for organic vapor cartridges. Therefore, testing many replicates is not necessary.
- Testing will be conducted at 80% relative humidity and 25°C. These conditions were chosen to match previous worst-case study conditions. However, one or two cartridges will be tested at a low (e.g., 20%) humidity condition (and high challenge concentration--i.e., 500 ppm) to test the assumption that high humidity conditions will result in more rapid breakthrough of glycol ethers compared to low humidity conditions.
- Testing will be conducted at three concentrations (10 ppm, 100 ppm, and 500 ppm). These results should provide minimally sufficient information to determine a breakthrough curve for glycol ethers that could help determine breakthrough time as a function of challenge concentration. Such a curve could be used to extrapolate breakthrough times down to a challenge concentration of approximately 1 ppm.
- Testing will be conducted at 50 lpm. Scientific evidence indicates that this flowrate is equivalent to what workers might breathe working at medium to high intensity work conditions.
- Testing for each study condition will be continued until there is 10% breakthrough or until 18 hours has elapsed (whichever comes first).



PB94-175072

REPORT DOCUMENTATION PAGE		1. REPORT NO.	2.	3. Re
4. Title and Subtitle NIOSH Testimony on Occupational Exposure to 2-Methoxyethanol, 2-Ethoxyethanol and Their Acetates (Glycol Ethers) by R. W. Niemeier, February 1, 1994		5. Report Date 1994/02/01		
7. Author(s) NIOSH		8. Performing Organization Rept. No.		
9. Performing Organization Name and Address NIOSH		10. Project/Task/Work Unit No.		
		11. Contract (C) or Grant(G) No. (C) (G)		
12. Sponsoring Organization Name and Address		13. Type of Report & Period Covered		
		14.		
15. Supplementary Notes				
16. Abstract (Limit: 200 words): This testimony presents a review of the findings of a study which predicted that organic vapor chemical cartridges can adsorb glycol ethers at the proposed maximum use concentrations. The report recommended that a cartridge change out schedule of 1 week be adopted for full face air purifying respirators and 2 weeks for half face air purifying respirators. However, the migration of glycol ethers through the cartridge sorbent bed over a weekend or overnight was not evaluated. Such a migration would result in the wearer being exposed to glycol ethers when the respirator was used again. NIOSH recommends that if OSHA were to allow the use of air purifying respirators with organic vapor chemical cartridges to protect workers from glycol ether exposure, the cartridges should be changed after each shift, up to 12 hours. NIOSH recommends the use of air supplied respirators when respiratory protection is necessary.				
17. Document Analysis a. Descriptors				
b. Identifiers/Open-Ended Terms NIOSH-Publication, NIOSH-Author, NIOSH-Testimony, Niemeier-R-W, Respiratory-protective-equipment, Organic-solvents, Solvent-vapors, Air-purifying-respirators				
c. COSATI Field/Group				
18. Availability Statement		19. Security Class (This Report)		21. No. of Pages 4
		22. Security Class (This Page)		22. Price

