NIOSH

Posthearing Comments to OSHA

POSTHEARING COMMENTS 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
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Abstract: The testimony presents specific responses of NIOSH to OSHA requests for additional information. Specific topics touched on in this testimony include the provision of additional information on the change out schedule for respirator cartridges/canisters, additional insight from a published article on the potential usefulness of biological monitoring to evaluate dermal exposures, engineering controls in the autobody repair industry, information on the types of engineering controls that would be appropriate for reducing airborne concentrations of glycol ethers during bulk transfer operations, engineering controls in a previous study in the semiconductor industry, a surveillance program for glycol ethers, and the position of NIOSH on future OSHA rulemaking for other glycol ethers.

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The following are posthearing comments of the National Institute for Occupational Safety and Health (NIOSH) in response to requests for additional information from the Occupational Safety and Health Administration (OSHA) at the glycol ethers (GEs) hearing on July 21, 1993.

1. **OSHA requested that NIOSH provide additional information on the change-out schedule respirator cartridges/canisters.**

   Because the available odor threshold data indicate that the GEs of concern to OSHA rulemaking have inadequate warning properties [NIOSH 1993a], NIOSH continues to recommend that air-supplied respirators be worn when respiratory protection is necessary.

   Currently, NIOSH does not have sufficient data upon which OSHA can reliably establish change-out schedules for respirator use against GE. Service lives of cartridges and canisters vary considerably with concentration and humidity in the workplace and with the brand of respirator. More importantly, other organic vapors in the atmosphere will significantly affect breakthrough times of cartridges and canisters. Thus, conditions in the workplace can change the service life of an air-purifying cartridge or canister. Therefore, until there are sufficient breakthrough data under "worst-case" conditions, it would not be safe to prescribe change-out schedules for GE respirators because of the inadequate warning properties for GEs [NIOSH 1993a].

   In the event that OSHA decides to allow air-purifying respirators for certain short-duration tasks where air-supplied respirators are not feasible, NIOSH has enclosed several documents that may be useful in helping to determine the service-life of respirator cartridges under normal use conditions [NIOSH 1991a; Wood and Ackley 1989; Moyer and Peterson 1993; Trout et al. 1986; Moyer et al. 1993]. Of particular interest are references by NIOSH [1991a] and Wood and Ackley [1989] that describe recommendations for the laboratory breakthrough testing of organic vapor respirator cartridges. The variability of breakthrough times as a function of humidity, flow rate, challenge concentration, cartridge packing density, carbon activation, and cartridge brand are described in Moyer and Peterson 1993 and Trout et al. [1986]. In a preliminary study, Moyer et al. [1993] evaluated organic vapor detectors that could be used in respirator cartridges as end-of-service life indicators (ESLI). However, this work is very preliminary and an ESLI is currently not recommended by NIOSH for use against GEs. If an ESLI is developed for GE, it would have to be tested under Subpart N of 30 CFR 11 and, if it meets the criteria, the respirator would be certified by NIOSH and the Mine Safety and Health Administration for use against GEs.

2. **OSHA requested that NIOSH provide additional insight from a published article by Piacitelli [1990] on the "potential usefulness of biological monitoring to evaluate dermal exposures."**

Survey observations during the NIOSH study by Piacitelli [1990] indicated a high potential for direct skin contact with liquid glycol ethers. In particular, skin contact was observed during many routine activities such as quality control sampling, mixing and filling tasks, and cleanup or maintenance. Worker interviews confirmed that dermal contact with glycol ethers was frequently a problem, even in facilities with low airborne concentrations. Because glycol ethers are not volatile and yet can easily penetrate the skin, this study showed that air sampling alone may provide an incomplete assessment of total exposure to glycol ethers. As described in our testimony [NIOSH 1993a], biomonitoring, in addition to air monitoring, would provide a more complete and accurate assessment of total exposure to glycol ethers.

3. **OSHA has requested that NIOSH provide the following information on engineering controls:**

   a) **Submit all NIOSH control technology studies on the autobody repair industry and summarize the engineering controls from these studies that would be appropriate for reducing exposures to glycol ethers.**

   NIOSH has completed a total of 6 control technology assessment studies of the autobody repair industry. NIOSH has previously submitted one [NIOSH 1993b] of these 6 studies which indicated that substitute chemicals for glycol ethers were currently being used in paints for spray painting operations. NIOSH is submitting the remaining 5 studies to the OSHA docket [NIOSH 1992a, 1992b, 1993c, 1993d, 1993e].

   In these studies of the autobody repair industry, NIOSH found that, in addition to substitution, ventilated spray painting booths reduced airborne contaminant concentrations during spray painting operations. Also, NIOSH and others [Johnson 1990; Ken 1991; Dwyer J; PNPPRC 1992; Lingk 1991] have shown that airborne contaminant concentrations and solvent usage can be lowered by using spray painting equipment that more efficiently transfers the paint from the spray painting gun to the surface being painted. For example, high-volume, low-pressure (HVLP) spray painting guns may be more efficient than conventional spray painting guns. HVLP spray painting guns allow the paint to be atomized with air pressures at the orifice of less than 10 pounds per square inch (psi) of pressure. HVLP guns have a transfer efficiency of at least 65 percent and conventional spray painting guns are commonly reported to have a transfer efficiency of 25% to 35% [Johnson 1990; Ken 1991; Dwyer 1990]. However, NIOSH has been unable to find data to substantiate these claims for autobody painting. Furthermore, one experimental study conducted in the wood finishing industry indicates that HVLP spray painting guns are not more efficient than other types of spray painting guns [PNPPRC 1992]. In addition to these HVLP transfer efficiency data, a study by Lingk [1991] showed that HVLP spray painting gun use caused significantly lower exposure to airborne particulate overspray than conventional spray painting guns. NIOSH data collected in July 1993 indicates

that HVLP guns can be more efficient than conventional spray painting guns. This improvement in transfer efficiency was not large enough to cause a statistically significant decrease in airborne solvent concentrations. However, the NIOSH researchers did see a statistically significant decrease in particulate overspray concentrations. The NIOSH report on this research will not be available until after January 1994.

b) **Provide information on the types of engineering controls that would be appropriate for reducing airborne concentration of GEs during bulk transfer operations (principally liquid transfer during the loading and unloading of drums, rail cars, and trucks).**

NIOSH has enclosed three studies that describe a tank loading facility for ethylene oxide [NIOSH 1985], a tank truck loading facility for petroleum distillates [Radian 1983], and a drum loading facility for various chemicals [Enviro Control 1982]. Engineering control strategies from these systems are applicable to controlling exposures to glycol ethers. The drum filling system used local exhaust to remove vapors generated at the point of filling as well as used auxiliary local exhaust to reduce vapor concentrations in the vicinity of the operators. The tank truck and car loading systems both incorporated automatic metering and shut-off of the liquid being loaded, a closed system vapor recovery facility to collect and condense or incinerate vapors generated during the loading process, and dripless connections to attach the cars or truck to the system. The tank car system incorporated the use of a nitrogen blanket and purge system to control exposures, as well as a checklist to ensure that operators followed the proper loading procedure.

c) **Summarize the engineering controls used in the previously submitted NIOSH study by Jones [1988] of the semiconductor industry.**

Engineering photolithography was performed using predominantly automated systems. Aerosol and vapor generating operations, such as spin-on application of primers, photoresists, and developers, were partially enclosed. Local exhaust ventilation was applied to these enclosures and to the overall machine cabinet that includes reservoirs of process chemicals. General ventilation was also used, primarily to keep airborne particulates from contaminating the wafers. Consequently, airflow patterns were often not optimally designed for reducing worker exposure because air was sometimes exhausted through, rather than away from, the workers' breathing zone.

4. **OSHA asked NIOSH to describe what can be accomplished with a surveillance program for glycol ethers.**

As presented in our testimony [NIOSH 1993a] and criteria document [NIOSH 1991b], NIOSH would support the triggering of a medical surveillance program for all workers who are potentially exposed to glycol ethers,

including by dermal absorption. The medical surveillance program would help ensure that all potentially exposed workers are not suffering any adverse health effects as described in the criteria document. Generically, the purpose of medical surveillance is the following: (1) to determine whether current control measures are protecting workers' health, (2) to help target additional control measures as needed, and (3) to assure appropriate medical care and preventive measures for workers whose health has been affected by exposure.

5. **OSHA requested that NIOSH clarify its position on future OSHA rulemaking for other glycol ethers.**

As stated in our testimony, NIOSH suggested that OSHA consider future rulemaking on ethylene glycol monobutyl ether (EGBE or 2-BE) and its acetate (EGBEA or 2-BEA) [NIOSH 1990, 1993a]. NIOSH does not advise OSHA to delay the current rulemaking process [58 FR 15526] to accommodate this request, but we do request that OSHA consider future expeditious rulemaking for 2-BE and 2-BEA.

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