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Industrial Hygiene
Occupational Health and Safety
Employee Relations Staff

Ford Motor Company
104 Central Laboratory
15000 Century Drive
Dearborn, Michigan 48120

August 28, 1990

Mr. Richard Niemeier, Director
Division of Standards Development and Technology Transfer
NIOSH
4676 Columbia Parkway, C-14
Cincinnati, Ohio 45226

Dear Mr. Niemeier:

In response to your request in the Federal Register of May 18, 1990, the Ford Motor Company Industrial Hygiene Department would like to submit the following information regarding metalworking fluids.

Our Department does not have complete information regarding many of the topics about which you requested comment. Our role is that of a corporate function to serve our manufacturing plants, generally upon request from these facilities. We have little direct control over the formulation of coolants, choice of coolant type, monitoring of coolant quality, or addition of biocides and other additives. We can influence coolant decisions by various informational means. Our comments will be organized consistent with the ten topics you listed on page 20637.

Items 1 through 6: The coolant selection, use, and maintenance issues are not under Industrial Hygiene direction. However, many of our plants have records pertaining to coolant system checks and additions and replacement of coolants. We may be able to help you obtain information from representative plants through our contacts at the manufacturing facilities.

Item 7: In one facility, it was determined that a re-refined petroleum base material was contaminated with polychlorinated biphenyls (PCBs). Personal air sampling in the plant at systems where the coolant, a water-soluble oil, was in use indicated no detectable exposure to PCBs. This is the only incident of this type of which we are aware.

Item 8: Because it is difficult to determine whether a health effect results from exposure to the coolant, an additive, or a contaminant, we will relate general experiences regarding health effects. Many complaints from employees are directed at plant safety engineers and describe respiratory or skin irritation that is relatively minor. Many of these complaints are not logged in the plant medical records because employees do not report them to plant medical staff. Our experience has been that exposure to mists of true oils and soluble oils are unlikely to generate complaints. Semi-synthetic and synthetic coolants generate far more complaints of slight but noticeable upper respiratory tract irritation and dermatitis. Industrial hygienists from other automotive companies report very similar experiences. Based on conversations with colleagues from these companies, Ford apparently uses fewer synthetic and semi-synthetic coolants than General Motors or Chrysler.

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We have little information on systemic effects from exposure to coolants.

Item 9: We do not have a database from which to extract detailed exposure records. However, we can state with confidence that virtually all exposures measured are below the existing PEL of $5\text{mg}/\text{M}^3$. In fact, Ford has an internal standard of $2.5\text{mg}/\text{M}^3$, and this standard is very rarely exceeded, even though our sampling is generally skewed toward higher exposures in response to complaints from employees. We have performed three plant-wide mist surveys, and results are consistent with our "complaint" results.

Our sampling and analytical technique is unique. We collect contaminants using a tared 37mm glass fiber filter followed by a 600mg charcoal tube. The filter is weighed on return to the laboratory, extracted with methyl chloroform, and weighed again. By difference, we determine total particulate and oil mist. All material extracted by the solvent is assumed to be oil mist. This method is used for all coolants, even though the semi-synthetic and synthetic coolants have little or no petroleum products in them. Our attempts to collect and analyze for the amines found in many of these coolants, which we suspect to be the cause of skin and respiratory irritation, have been unsuccessful. Again, our conversations with colleagues in other machining operations reveal that they have had little success in such efforts.

Our experience with the NIOSH ultraviolet fluorescence method for petroleum oils has been poor. A large consulting firm which formerly employed two of our hygienists has had similar experience. Total weights (mist and dust) often are reported which are substantially less than the mist weight alone, and collecting an appropriate standard to use in the analysis is nearly impossible in many situations.

Item 10: Engineering controls, when they are applied, typically consist of local exhaust ventilation added to the machining lines after the machines are installed. This method is generally very unsatisfactory; large volumes of air are exhausted but much mist escapes capture because hoods cannot be placed close enough to generation points to be effective. Splash shielding is also ineffective in most cases because it is not integral with the machine and therefore cannot be added without constantly interfering with maintenance and tool changes which occur regularly.

We have found that coolant mist generation is dependent on at least 14 factors that include, but are not limited to:

- Coolant type
- Coolant care and maintenance
- Purpose for which metalworking fluid is used -- as a coolant, to remove chips, etc.
- Coolant pressure and volume
- Coolant application method and nozzle configuration
- Type of material being machined (aluminum is most problematic)
- Type of chip removal -- chip drag or velocity trench
- Local exhaust ventilation design and application
- Type of enclosure
- Make up air and percentage of fresh air
- Types of air cleaners used and amount of recirculation
- Maintenance of air cleaners and overall maintenance of the entire machining system
- Local exhaust ventilation and enclosure of velocity trenches
- Filtration equipment used

We have found some variant of the above issues as the cause of complaints in all our facilities worldwide. What our experience tells us, is that coolant mist control must be an ongoing systematic process. Exposure limits and air sampling is of limited value to the long term control of metalworking fluid mist, the total system must be in control and that requires discipline, training, education, and maintenance.

The major machining Divisions at Ford have active air quality control committees that periodically meet to share their experiences and continue to determine root causes of misting problems. Dennis O'Brian from NIOSH has attended one of these meetings and can share his impressions with you. We can put you in contact with the leaders of these committees so that you can obtain additional information.

If we can be of further assistance or if you have any questions, please contact me, on 313/594-6961 or Dave Hands on 313/594-1611.

Sincerely,

A handwritten signature in black ink that reads "H. B. Lick". The signature is written in a cursive, slightly slanted style.

H. B. Lick, Manager
Industrial Hygiene

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