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LETTER TO THE EDITOR

Mutagenicity Assessment of Airborne Particles From Three Polyurethane Foam Manufacturing Facilities

This letter is in response to the paper "Mutagenicity Assessment of Airborne Particles From Three Polyurethane Foam Manufacturing Facilities," by Ong T.-M. et al. [Am J Ind Med 11:475–482, 1987]. I might preface these remarks by stating that Olin Corporation through the International Isoayanate Institute was allowed by NIOSH to comment on their work before their publication of these data in your journal and because of this, data presented below uses some of the raw data from the Ong et al. effort. The comments below are almost identical to our comments made to NIOSH in February, 1986, on this work.

In this research, NIOSH used an in-plant mutagenicity screen and concluded that air in polyurethane manufacturing plants was mutagenic and, therefore, a significant hazard to workers. It is important to recognize the following points in the context of use of this Ames test method and data derived therefrom for risk assessment.

1. This modification of the Ames assay was designed only as a screening test. It has not been validated by experts in mutagenicity as a method on which to base a risk assessment decision.

2. The results of this assay indicate a weak response, at best. The results of all three studies showed that the indoor factory air was mutagenic as compared to the outside air only with *Salmonella typhimurium* strain TA-98, only in the presence of S-9, and only when the Ames test system capacity was exceeded or nearly exceeded. For example, on this latter point, data from one of the plants only show mutagenicity when 5–10 mg per plate is applied, which is near and over the range of concentration typically used in the Ames test system.

3. We do not feel the appropriate comparisons were emphasized in the journal article. The mutagenicity samples as compared to outside air were never compared for all test samples collected and were compared only with the TA-98 strain in the presence of S-9 fraction. The ratio of induced versus spontaneous revertants was similar for *most* of the samples. Analysis of data of one of the plants shows that in the TA-100 strain the outside air was more mutagenic than inside in the pouring line (see Table I).

4. The sample volumes collected inside were 34–40% larger than those collected from the outside air. This automatically places bias against the results from inside air versus outside air because more mass of material is deposited on the collection device used for inside air.

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TABLE I. Analysis of Outside Versus Inside Air

	TA100 -S9		TA100 + S9	
Job	Revertants/mg dust	Revertants/m^3	Revertants/mg dust	Revertants/m^3
Oven	43.7	8.9	48.0	9.8
Pourer	23.0	7.0	13.0	4.0
Outside	92.1	9.1	98.3	9.7

5. Further comments needed to be made relative to the potency of the data when compared to the positive control. The results indicate the test sample is much less responsive than the positive control, i.e., at least 1,000-fold less potent. Consideration should also be given to include other studies where air samples have shown mutagenicity, e.g., New York City air, in *Tradescantia*, and many others, and the relative potency of these results to those observed in the polyurethane manufacturing study.

6. The issue of use of dichloromethane (DCM) as an extraction solvent in this system was not discussed. DCM is much more efficient than human mucosal cells in extracting organics, thereby, compromising the biological significance of the test results.

Our arguments would suggest that the conclusions drawn by Ong et al. are premature, at best.

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