TOXICITY OF MONSANTO'S THERMINOL FR-1 AND FR-2

1. Toxicity Data

The acute oral toxicity in rats for THERMINOL FR-1 and FR-2 is approximately 9 grams per kilogram and 12 grams per kilogram respectively. When applied to the skin of rabbits, the minimum lethal dose is approximately 1 gram per kilogram for either THERMINOL. It is not unusual to see greater sensitivity in the rabbit with this type of material.

2. Detrimental effects on personnel resulting from overexposure

No serious acute detrimental effects on personnel would be expected during the normal handling and use of this fluid. The vapor concentrations which might cause nausea, vertigo, and temporary liver damage are so irritating to the eyes, nose, and throat that workers would not be expected to voluntarily subject themselves to such an exposure. Equally important, however, is the possibility of systemic injury resulting from day-in and day-out chronic exposures - either by vapor inhalation or continuous skin exposure.

3. Symptoms of overexposure

In addition to the items mentioned in (2) above, prolonged and repeated skin exposure to the fluid may result in a solvent action on the skin followed by drying, chapping, and cracking. If the exposure is sufficiently great and prolonged sufficiently, chloracne may develop.

4. Maximum allowable concentration

The maximum allowable concentration for THERMINOL FR-1 is 1 milligram per cubic meter. As you undoubtedly know, this fluid is a specially refined grade of chlorinated biphenyl (chlorinated to 42% by weight). In the case of THERMINOL FR-2, this is a specially refined grade of chlorinated biphenyl (chlorinated to 48% by weight). No maximum allowable concentration has been established for this compound, however, we would suggest 0.5 milligram per cubic meter of air.

Summarizing all of the animal toxicity data and many years experience with this type of chemical, our evaluation is as follows:

1. The daily use of this product in this application presents no hazards when one follows the recommended precautions, such as the use of the medium in a completely sealed system where there will be no leakage of liquid or the vapors when the material is heated.

2. The loss of fluid at a high temperature or by being sprayed onto heated surfaces (as the result of a broken line) presents a hazard to humans no more critical than with other type fluids. In either event, the vapors or decomposed products would be so irritating that workmen would not remain in the contaminated atmosphere without respirators or gas masks. In those instances where breaks have occurred, exposure to the workers long enough to shut off the system and evacuate the premises has not resulted in any ill effects.

3. Skin contact with THERMINOL FR-2 at normal temperatures does not present a hazard in terms of immediate or subsequent systemic effects if normal personal hygiene practices are followed. In other words, if there is massive skin exposure, workmen should, within a reasonable time, remove contaminated clothing and bathe thoroughly.

4. Repeated or prolonged daily skin contact should be avoided in order to prevent possible irritation to the skin and possible systemic effects. Again, normal personal hygiene should suffice as long as it is understood that workmen must not smear the liquid on the skin and allow it to remain.

There have been no problems at our production facilities in Anniston where the fluid has been handled for many years.

There is no more hazard than that experienced in work with such commonly handled fluids as:

perchlor ethelene
trichlor ethelene
stoddard solvent
dry cleaning fluids in general.

The material in this report is to be used in development of the product and may be given to responsible sales contacts, but it is not to be used by them in advertising copy. The source of this material is not to be divulged until it appears in formal publications. No exceptions to the established rule may be made without the approval of the Medical Department in St. Louis. Customers' inquiries regarding matters of toxicity are to be referred as before to the Medical Department in St. Louis for reply.

---Monsanto Chemical Company