MEMORANDUM

SUBJECT: Sulfotepp Contamination of Diazinon

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The sulfotepp contamination of diazinon at the levels
 cited in the memo from Dean Hill (Dec 7, 1984) are of no
 known toxicological significance.

Discussion

Sulfotepp is a common contaminate of the pesticide
diazinon particularly in technical material manufactured
outside the United States. That technical material manufactured
by Ciba-Geigy is stabilized to prevent further conversion of
diazinon to sulfotepp.

The Hill memo gives the following concentrations of
sulfotepp in various commercial technical material.

<table>
<thead>
<tr>
<th>Source</th>
<th>Concentration of Sulfotepp</th>
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</thead>
<tbody>
<tr>
<td>Ciba-Geigy (U.S.)</td>
<td>250 ppm 0.026</td>
</tr>
<tr>
<td>Ciba-Geigy (France)</td>
<td>200-300 ppm 0.020 - 0.030</td>
</tr>
<tr>
<td>Nippon-Kayaku (Japan)</td>
<td>3500-5500 ppm 0.35 - 0.55</td>
</tr>
<tr>
<td>Makhteshim (Israel)</td>
<td>1900-2300 ppm 0.19 - 0.23</td>
</tr>
</tbody>
</table>

The maximum residue is in the product from Japan and
this memo will address its toxicity.

Both sulfotepp and diazinon must be oxidized to the
oxygen analogue which is the biologically active compound.
These compounds are toxic by virtue of their ability to
inhibit cholinesterases. The structures of the critical
compounds are shown below.

\[\begin{align*}
\text{Diazinon} & : C_2H_5O - \text{S} - O - C - \text{N} - \text{CH}_3 \\
\text{Sulfotepp} & : C_2H_5O - \text{S} - O - C_2H_5
\end{align*}\]

Tepp

Diazinon has published tolerances in a wide variety of crops (40 CFR 180.153). There are no published tolerances for sulfotepp which is commercially known as Bladafum. Tepp has negligible residue tolerances of 0.01ppm (40 CFR 180.347).

The known toxicity data base for the three compounds is as follows.

<table>
<thead>
<tr>
<th></th>
<th>Diazinon</th>
<th>Sulfotepp</th>
<th>Tepp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral LD(_{50})</td>
<td>400mg/kg</td>
<td>10mg/kg</td>
<td>1mg/kg</td>
</tr>
<tr>
<td>Subchronic</td>
<td>NOEL = 0.02mg/kg/day dog</td>
<td>no data</td>
<td>NOEL = 0.1mg/kg/day rat and dog</td>
</tr>
<tr>
<td>Teratology</td>
<td>Negative at 100mg/kg-rabbit</td>
<td>no data</td>
<td>no data</td>
</tr>
<tr>
<td>Neurotoxicity</td>
<td>Negative</td>
<td>no data</td>
<td>negative</td>
</tr>
<tr>
<td>Reproduction</td>
<td>NOEL = 0.4mg/kg/day rat</td>
<td>no data</td>
<td>no data</td>
</tr>
<tr>
<td>Chronic</td>
<td>No systemic effects in dog and rat</td>
<td>no data</td>
<td>no data</td>
</tr>
<tr>
<td>Oncogeneic</td>
<td>Negative in rat and mouse</td>
<td>no data</td>
<td>no data</td>
</tr>
</tbody>
</table>

Based on their structural relation one may reasonably expect no qualitative differences in the toxicity of the three compounds. However, a thorough comparison of the toxicity of
these compounds, other than acute lethality, would require additional studies.

The toxic effect of concern in the contamination of diazinon with sulfotepp is acute lethality. When two compounds have the same mechanism of lethality, as diazinon and sulfotepp do, it is possible to make some predictions about their combined lethality. Three approaches will be used.

1. Figure 1 is a plot, on semilog paper, of the respective LD50 values versus their concentration. Thus at 100% sulfotepp the LD50 is 10mg/kg and at 100% diazinon the LD50 is 400mg/kg. For a mixture containing 0.55% sulfotepp, it would not be possible to detect a decrease in LD50 (increase in toxicity) on this plot. To double the toxicity of the mixture (half the LD50) it would be necessary to have in the order of 20% sulfotepp in the mixture.

2. Based on kinetic considerations, contamination of a pesticide with a more lethal compound having the same mechanism of lethality will not cause a toxicologically significant increase in lethality of the mixture until the ratio of the quantity of the more lethal to the less lethal exceeds the ratio of their respective LD50's. For the subject compounds contamination sufficient to cause an increase in lethality would require more than 2.5% sulfotepp in diazinon. The maximum sulfotepp contamination reported is 0.55%.

3. Consideration of the total quantity of the mixture necessary to produce an LD50 of each component.

   a. The most contaminated diazinon contains 0.55% sulfotepp.

   b. One LD50 of diazinon (400mg) contains 2.2mg of sulfotepp (22% of an LD50 of sulfotepp).

   c. One LD50 of sulfotepp (10mg) is contained in 1818mg of diazinon (4.5 times the LD50 of diazinon).

Conclusion

From these considerations one may conclude that the quantities of sulfotepp reported as contaminating diazinon will not significantly increase the toxicity of the mixture.