UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

FEB 24 1984

MEMORANDUM

SUBJECT: Response to Issue 3 of Memo of 2/13/84 from Jeff Kempter to Amy Rispin on Pentachlorophenol

FROM: Nancy Dodd, Chemist
Residue Chemistry Branch
Hazard Evaluation Division (TS-769)

THRU: Charles L. Trichilo, Chief
Residue Chemistry Branch
Hazard Evaluation Division (TS-769)

TO: Jeff Kempter, Section Head
Risk Benefit Section
Registration Division (TS-767C)

Issue 3 - How would reducing HxCDD in pentachlorophenol affect the concentrations of other contaminants such as HCB, dibenzofurans, etc? Is it possible to reduce HxCDD without increasing these other contaminants?

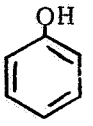
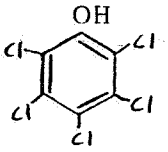
Residue Chemistry Branch should examine the product chemistry/ manufacturing process of pentachlorophenol and develop an answer based on available information. RCB should let us know if they need anything from us.

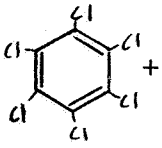
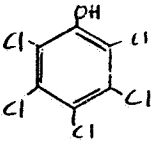
RCB Response

We have no product chemistry/manufacturing process data on pentachlorophenol technical in our files. Registration Division is currently researching the data but has not found anything so far.

We have information from reference books and journials as follows:

Manufacturing Process - There are two methods of making pentachlorophenol. They are (1) chlorination of phenol and (2) hydrolysis of hexachlorobenzene. (Pesticides Process Encyclopedia, Marshall Sitting, Chemical Technology Review No. 81, 1977, published by Noyes Data Corp.)

(1)  + 5 Cl_2 —Catalyst, Elevated Temperature→  + 5 HCl

(2)  + NaOH ——→  + NaCl

Composition

The composition of technical pentachlorphenol is listed below as published in Journal of Dairy Science, Vol. 64, No. 1, p. 43, 1981. A supplier, Monsanto Industrial Chemical Co., supplied the information on chlorophenol content in 1978. The dioxin content was determined by chemical analysis.

Chlorophenols

Pentachlorophenol	85 - 90%
Tetrachlorophenols	4 - 8 %
Trichlorophenols	0.1%
Other	2 - 6 %

Chlorodibenzo-p-dioxins (CDD)

Octa - CDD	1000 ppm
Hepta - CDD	378 ppm
Hexa - CDD	173 ppm
Tetra - CDD (excluding 2,3,7,8-tetra CDD)	0.035 ppm

The Journal of Agricultural Food Chemistry, Vol. 27, No. 6, p. 1171, 1979, contains the following information as quoted from Firestone, D. J. Assoc. of Official Anal. Chem. 55, 85 (1972):

"Commercial technical grade pentachlorophenol is a mixture of about 85-90% PCP and several percent each of tetrachlorophenol and chlorinated phenoxyphenols; it also contains a number of impurities including chlorinated dibenzofurans (furans), and chlorinated diphenyl ethers."

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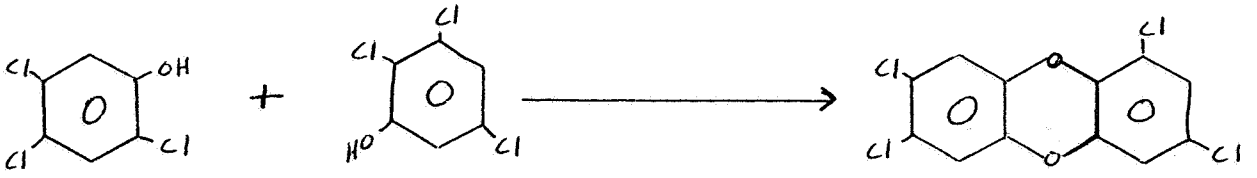
We note that the dioxin and furan impurities are caused by reaction of chlorinated phenols, salts of chlorinated phenols, or chlorinated diphenyl ethers.

Example



2,3,5-

2,4,5-trichlorophenol trichlorophenol 1,3,7,8-tetra-CDD

Trade names listed in Pesticides Process Encyclopedia are Dowicide 7 (Dow Chemical Co.) Santophen 20 (Monsanto), Santobrite (Monsanto), Chlorophen (Reichhold Chemicals), Glazed Penta, and Sinitucho.

Based on theoretical considerations, we would expect an extraction of an alkaline aqueous solution of pentachlorophenól with a non-polar aromatic solvent to reduce the levels of HCB, dioxins and dibenzofurans at the same time. We have no means to judge the practicality of such a purification process on the industrial scale. Consequently, Residue Chemistry Branch concludes that we do not have the necessary information to answer the question. We recommend that the manufacturers (ex. Monsanto, Dow, Reichhold, etc.) be asked whether HxCDD and the other contaminants can be reduced by use of additional purification steps, and to provide the process information, impurity analysis and certification of limits.

TS-769:RCB:N.Dodd:vrg:CM#2:RM810:X77377:2/22/84
cc: RF., Circu, Reviewer, A. Rispin, Pentachlorophenol SF
RDI: E. Zager, 2/22/84; R. Schmitt, 2/22/84