

→ GFF/RAJ

MINUTES OF MEETING
PHOSPHATE ESTERS - TOXICITY
HELD 4/27/72

Copies to:

Those Present:

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M. W. Farrar
P. R. Graham
R. E. Hatton
J. F. Herber
W. K. Johnson
G. J. Levinskas
J. S. Metcalf
W. R. Richard
C. W. Roos

And To:

H. S. Bergen
R. E. Bilger
W. H. Hunt
R. E. Keller
R. E. Kelly
G. Kosup
W. B. Papageorge
J. E. Springgate
E. S. Tucker
E. P. Wheeler
J. S. Williams

PURPOSE:

This meeting was held to discuss toxicity and environmental effects of phosphate esters and to decide upon a course of action to be taken in accordance with a request by G. J. Levinskas of the Medical Department (memo GJI/JFQ, 4/5/72).

SUMMARY:

1. Toxicity information is inadequate for the phosphate esters currently being manufactured and/or sold by Monsanto. Products include S-140 (cresyl diphenyl phosphate); S-141 (2-ethyl hexyl diphenyl phosphate); S-148 (isodecyl diphenyl phosphate); TCP (tricresyl phosphate); TPP (triphenyl phosphate); DBPP (dibutyl phenyl phosphate); TBP (tributyl phosphate); and TBEP (tributoxy ethyl phosphate). Certain basic tests will be carried out to fill this gap as per agreement of the business groups involved namely:

a. Acute Toxicity Screen

All products have been or are in the process of being tested for acute toxicity.

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b. Demyelination

Only S-140 and TCP are currently under test. Tests will be scheduled for S-141, S-148, DBPP, and TPP. FMC, our supplier of TBP and TBEP, has been contacted with the hope that they will support or run similar tests on their products.

c. Acute Fish Toxicity

None of the products have been tested to date. Tests will be scheduled for S-140, S-141, S-148, TCP, TPP, and DBPP. FMC has been asked to furnish this information on TBP and TBEP. If they will not, these products will be added to our list.

d. Biodegradability

All products with the exception of S-148, and DBEP have been or are in the process of being tested. S-148 will be added to our list.

2. CDP has not been included in the list for toxicity testing because it is assumed that the market for this product will disappear. We are using the same grade of cresylic acid, at the present time, for both CDP and S-140 - so toxicity should be fairly comparable. The only difference between CDP and S-140 is the ratio of cresol/phenol used and product quality specifications.
3. Kronitex 100 (isopropylphenol based phosphate ester) will be put through the full complement of tests stated in (1). This material is being considered as a substitute for cresylic acid based phosphate esters if toxicity and economics are favorable.
4. New Monsanto products such as N₂CP and NCP, as well as their blends with other materials, are not included in this program since they are already under test as per company directive (for new products).
5. Costs of the tests will be distributed on the basis of sales volume as follows:

Plasticizers Business Group	70%
Specialty Products Group	20%
Process Chemicals Group	10%

DETAILS:

Monsanto manufactures S-140, S-141, S-148, TCP, TPP, and DBPP. We market TBP and TBEP both of which we are currently purchasing from FMC for resale.

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Certain of these phosphate esters are known to be toxic depending upon raw materials used in their manufacture while others are considered to be nontoxic. Information as to toxicity and environmental behavior, however, is incomplete for all of the products. It was the purpose of this meeting to point out what is and what is not known about both the triaryl and the alkyl aryl phosphate esters and to agree upon a testing program to develop basic data covering toxicity and environmental impact.

The Medical Department (memo G. Levinskas/J. Quinn, 4/5/72) described what is known and what is desired. We added Kronitex 100 and TBEP and corrected the studies in progress as concerns biodegradability.

Summary of Status of Toxicity Testing

<u>PRIORITY</u>	<u>Product</u>								Kronite: 100
	<u>Type of Test</u>	<u>S-140</u>	<u>S-141</u>	<u>S-148</u>	<u>TCP</u>	<u>TBP</u>	<u>DBPP</u>	<u>TPP</u>	<u>TBEP</u>
<u>SHOULD HAVE</u>									
	Acute toxicity screen	+	+	+	+	+	+	+	X
	Demyelination	+	0	0	+	X	0	0	X
	Acute fish toxicity	0	0	0	0	X	0	0	X
	Biodegradability	+	+	0	+	+	+	+	X
<u>DESIRABLE</u>									
	Repeated feeding studies	?	+	?	?	?	?	?	?
	Cholinesterase inhibition	0	?	?	?	?	?	0	?
	Tissue residues	?	?	?	?	?	?	?	?
<u>SPECIAL CASES</u>									
	Sensitization	?	+	?	?	?	+	?	?
	Vapor inhalation	?	?	?	?	?	+	+	?
	Metabolism	?	+	?	?	?	?	?	?
	Other tests - related to end use of product	?	?	?	?	?	?	?	?

+ - Have data, or tests in progress

0 - Should develop data

? - Need uncertain at this time

X - Purchased from FMC. Do not have data but will be requested from FMC.

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It was decided that the "Should Have" category will be completed on all compounds with possible exceptions of TEP and TBEP. George Levinskis is in contact with FMC and, hopefully, can convince them to obtain the desired information on their products. It would be preferred to include these products in our testing program (for uniformity) but at FMC's expense.

S-140 and TCP cover types prepared using 28000 (ortho 4.5% max.) and 28002 (ortho <1%) grades cresylic acid. Acute toxicity and demyelination tests are being run on both types, the same will be done for acute fish toxicity.

Kronitex 100 has been included in the test program because it may prove to be of lower toxicity than cresylic based products and may offer economic advantages. Application tests need to be run to confirm the suitability of this product as a plasticizer and as a component in functional fluids.

Tests included under the categories "Desirable" and "Special Cases" are to be deferred until the primary tests have been completed and/or need dictates.

Costs for running the demyelination, acute fish toxicity and biodegradation studies are to be distributed as follows:

Plasticizer Group	70%
Specialty Products Group	20%
Process Chemicals Group	10%

Tests will be in the range of \$6000-\$7000 total for the demyelination and acute fish toxicity tests. Biodegradation studies will be conducted "in house" and will approximate \$5000.

MISCELLANEOUS:

Pydraul 30E has been found to have some neurotoxic properties as noted by recent demyelination tests run at Bio Test Laboratories. It's felt that this is due to the S-140 present in the formulation which undoubtedly was prepared using Merichem (4.5% ortho) cresylic acid. Source will be checked.

Statement was made that Pydraul 50E will be tested by the Navy for neurotoxicity (wing drop test). Results of demyelination tests on this product which are favorable have been transmitted to them.

It was mentioned that the Fish and Pesticide Laboratory of the Bureau of Sports Wildlife and Fisheries at Columbia, Missouri is testing Pydraul 50E for fish toxicity. The request came from an agency in the State of Michigan which also sent a sample of a competitive material from Houghton.

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Of the isopropylphenol based phosphate esters available, both the Specialty Products and Plasticizer Groups stated that Kronitex 100 was the product of choice. This product will be put through the testing program and will be analyzed for phenolic (isomer) composition. It was stated that Rheofus (similar to Kronitex) compounds are not devoid of neurotoxic properties. Geigy has mentioned that their product passes the 2 gms./kg dosage. They said that of the cresylic based esters only those made from meta-para cresol completely free of ortho will pass the 5 gms./kg dosage tests.

Acute fish toxicity tests will be the 4 day TL₅₀ (static) type as run at Bio Test. It's known that the dynamic and chronic tests may give different findings but the static test is considered to be a satisfactory screen.

The new phosphate esters, N₂CP and NCP, have not been included in the present test program because they are new compounds subject to a company directive which requires such pertinent information. Tests run to date show them to be relatively non-toxic.

J. F. Quinn

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