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MONSANTO CHEMICALS LIMITED
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RUABON

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AROCLOR - ENVIRONMENTAL CONTAMINATION
STATUS REPORT OF EUROPEAN STUDIES - 2nd MARCH 1970

1. Biodegradation

Biphenyl-adapted micro-organisms appear to degrade the following P.C.B. isomers in the presence of biphenyl: 2:3 dichlorobiphenyl, 3:4 dichlorobiphenyl, 4:4' dichlorobiphenyl, 2:3':4' trichlorobiphenyl and, possibly, 2:3:2' trichlorobiphenyl. Isomers which appear to resist degradation include the following: 4:4' dichlorobiphenyl, 2:4:6 trichlorobiphenyl and 2:4:2':4' tetrachlorobiphenyl.

Work is in progress to study the effects of a pure culture of an organism found by workers at Bangor University to metabolize biphenyl and early results suggest that this may be more active in degrading some of the chlorinated biphenyls than the broad spectrum cultures used previously.

Work has also started to study degradation of some bromo~~chlorobiphenyls~~, from SHL Research

2. Newport Plant

The re-routing of some of the surface drains at the Newport works to the main effluent discharge line resulted in an increased level of P.C.B.'s detected. Although wide fluctuations in levels were observed, the average concentration of P.C.B. in the effluent increased to around 3,000 p.p.b., thus highlighting the need for more and improved interception points. A work programme has been put in hand and substantial progress has been made towards establishing the back-up facilities necessary for good control of the effluent situation. Facilities for monitoring the P.C.B. concentration are being established in Newport Analytical, but Ruabon R & D are still heavily involved in this work.

Until alternative arrangements can be made, the Aroclor trapped in the interceptor pits will be removed and disposed of under contract to the 'toxic land-fill' dump near Pontypridd.

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3. Technical Visits and Discussions

At a meeting with representatives of the Ministry of Agriculture, Fisheries and Food (Fisheries Laboratory) the main uses of Aroclors were discussed, but names of companies were not divulged, nor was the N.C.R. paper application. The Ministry officials aim to establish a use and distribution pattern to assist them in sampling coastal waters around the U.K., specifically to relate this to P.C.B. levels in fish. They reported that North Sea herring contain up to 1 p.p.m. P.C.B. (measured as penta- and hexa-chlorinated biphenyls) in muscle tissue. They have also established that the brown shrimp is sensitive to P.C.B. and have deduced an LC50 concentration at 0.3 ppm, which compares with a level of 0.005 ppm for D.D.T. A further meeting has been arranged for 10 March at which more information will be exchanged on analytical and toxicological studies and on the pattern of pollution in U.K. coastal waters.

Correspondence with the Natural Environment Research Council has revealed that the report on the 'Irish Sea Incident', involving the deaths of thousands of sea birds, is likely to be published early in April. This is expected to draw attention to the fact that many of the dead birds contained high concentrations of P.C.B.'s., but it is unlikely to draw the conclusion that the deaths were caused by P.C.B.'s.

A visit to the Central Institute for Nutrition and Food Research at Zeist, Holland, (reported by RAL and HAV on 23/2/70) confirmed that their analytical techniques for P.C.B.'s are very good. They also have good facilities for toxicological studies and work closely with the Institute of Veterinary Pharmacology and Toxicology at Utrecht. An item of interest arising from the discussions was that samples of Phenoclor and Clophen examined at Zeist contained measurable amounts (20-30 ppm) of chlorinated dibenzofuran, whereas samples of Aroclor did not. Since chlorinated dibenzo furans are highly toxic, this was claimed to explain why toxicity tests showed that Clophen and Phenoclor were about 10 times more toxic than Aroclor. This work is being published shortly and we hope to see the manuscript prior to publication.

Caution: Do not discuss this outside at this time.

We are alerting Bayer & Prodelec & Caffaro

4. Liaison with Bayer, Prodelec and Caffaro

A special meeting of BITA was held at Frankfurt on 9/10 February to discuss the problem of P.C.B.'s in the environment. Monsanto summarized the commercial and technical developments arising from this problem. Detailed discussions followed under the headings of analytical, toxicological, degradation and disposal, and a number of actions were agreed to gather and exchange information. There appears to be no public concern yet in Germany, France or Italy, but Bayer recognize the international implications and have initiated a programme of work to study analytical and toxicological aspects. They are starting to check on their own and customers' plants. Prodelec and Caffaro have not yet initiated any work on this subject and their main contribution appears to have been in stimulating reclamation, particularly of transformer askarels.

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5. P.C.B. Disposal at Customer Plants

Technical discussions with N.C.R. and Wiggins Teape have resulted in some agreed actions for exchange of information and the provision by Monsanto of analytical data on effluent samples from N.C.R. and Wiggins Teape. N.C.R. effluent has already been shown to be contaminated and suggestions have been made to improve the situation.

An analysis has been made by Wiggins Teape to estimate the quantity of Aroclor (1242) which could, at present, be discharged into effluent drains in the U.K. It is estimated that the 1969 amount was about 250 tons. Of this total about 50% could be controlled by Wiggins Teape and perhaps cut down to a low level, but the other 50% is outside their control.

Work is currently in progress to analyse effluent from the Wiggins Teape plants at Treforest and Nivelle.

6. Incineration

Arrangements have been made for incineration trials to be carried out on Newport waste samples at a contract waste disposal unit at Rainham, Essex. This unit operates at around 1200°C with a 3 second residence time. Gas scrubbing facilities are provided so that analysis of volatile residues can be made.

ACTION PLAN

(1) Continue bio-degradation studies and attempt to establish structural/degradation pattern for P.C.B.'s.

(2) Continue to monitor Newport Plant effluent and urge Newport Analytical to complete the establishment of their analytical facilities.

(3) Exchange information with Bayer, Prodelec and Caffaro as agreed.

(4) Continue to advise customers on disposal procedures and support them where necessary with analytical data and information on techniques.

(5) Co-operate with Ministry of Agriculture, Fisheries and Food and with the Natural Environment Research Council.
Seek discussion with interested organisations who can contribute effectively to a better understanding of the problem.

(6) Follow up incinerator trials.

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9th March, 1970

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