Monsanto

FROM (NAME & LOCATION): W. B. Papageorge - St. Louis

March 9, 1971

cc H. S. Bergen
J. Mason
C. J. Smith

SUBJECT: PCB ENVIRONMENTAL PROBLEM
FEBRUARY STATUS REPORT

REFERENCE:

TO:
P.J.A. Marsh - Brussels
W. S. Clark
J. R. Durland - Tokyo
E. V. John
R. E. Keller - 2nd Street
R. M. Kountz
T. L. Gossage
P. S. Park
W. R. Richard
J. R. Savage
E. P. Wheeler

GENERAL:

Studies to determine source of PCB's in chickens in New York State continue. Preliminary data indicates source is bakery products which are crushed to form a meal which is blended with other ingredients to form chicken feed.

A public hearing to discuss legislation banning the discharge of PCB's to the environment was held in Massachusetts. Interest in this legislation appears to be very limited at this time.

A group consisting of representatives of the electrical industry and Monsanto under the auspices of the National Electrical Manufacturers Association (NEMA) is preparing a formal proposal to the American National Standards Institute (ANSI) to sponsor a committee composed of representatives of the transformer and capacitor manufacturers, utilities, major industry, Monsanto, and governmental regulatory agencies. The committee would develop policy, standards and guidelines for the proper use, disposal and control of polychlorinated biphenyls in transformers and capacitors.

MARKETING:

The sale of 6000 series Aroclors as replacements for the Aroclor plasticizers which were withdrawn from the market have been well below budget for January and February. Feedback from the field sales force indicates that this is still the result of the heavy inventory buying that was done last August and that sales should pick up in the second quarter.

A visit was made to the Ameripol Division of B. F. Goodrich to review the ecological/toxicological aspects of Aroclor 6050. Some additional analytical work will be done for Ameripol in support of plant trials to be held this month at Port Natchez, Texas. Further, we will be providing whatever inhalation data we have on the components of Aroclor 6050.

ENGINEERING:

CEA 2415 - Incineration - WGK

Field work is progressing rapidly. Foundations are virtually complete. Process piping around the existing storage tanks and pumps is installed and steam traced where applicable.

As of this writing, virtually all of the incinerator equipment, including the oxidizer, quench pot, combustion air blower and the scrubber are being trucked to the W. G. Krummrich plant. The trucks are within 70 miles of the plant.

The project is on schedule for an early May completion.

CEA 2417 - MCS-1016 - WGK

A reduction and reassignment of personnel temporarily delayed piping design and put the project behind schedule; however, it is believed that most of the lost time can be made up without affecting overall completion.

In the field, foundation work is progressing well. The column foundation has been poured. The column has been delivered to the plant and it is scheduled for installation March 10. Piping designs are being delivered to the field and some fabrication work is being done. Other elements of work are compatible with much of the equipment scheduled to be delivered March 10-15.

CEA 2451 - N-C Phosphate - JFQ

The project scope is now approved and the preliminary capital estimate is now complete. Following an internal project review scheduled for March 5, the appropriation request data transmittal will be issued.

Pre-approval funds were authorized by the General Manager, therefore, definitive design is in progress. The Step I condensers needed for the next plant run are on order and piping design for these condensers is underway. Other elements of the project will be installed after the plant run this spring.

JAPAN:

Following the Japan Broadcasting Corporation report on the conference held in Rome, Italy in December by the United Nations Food and Agriculture Organization, the PCB pollution problem is receiving considerable attention. The Welfare Ministry and National Hygienic Laboratory have initiated investigations.

The "Asahi", one of the largest newspapers in Japan, carried a sensational article dealing with a laboratory report issued by Ehme University on alleged PCB pollution. The industrial uses and Japanese manufacturers of PCB are mentioned.

EUROPE:

1. A "popular" article in the December issue of the "Ecologist" reviewed, somewhat inaccurately, the PCB situation.

2. Numerous press inquiries have resulted from the "Ecologist" article. In all cases reviewed to date we have received favorable press comment in the U.K. and in many cases have been praised for our voluntary withdrawal program.

3. Incineration alternatives have been reviewed. Purle Brothers can now offer a service for liquid and filter earth wastes at approximately one cent per pound plus freight. They are also prepared to put in equipment to handle solids, such as capacitor windings and cans.

4. We aim to establish a service for incineration in the U.K. by March.

5. Our reclamation program has been reviewed with Daltons to establish the reclamation of Pydraul ex-continent and Pyroclor/Aroclor ex-U.K.

6. The Norwegian government is attempting to establish a plan whereby the five Nordic countries (Norway, Sweden, Finland, Denmark and Iceland) would ban the dumping of certain toxic wastes, including chlorinated hydrocarbons, in the North Sea.

MONS 099568

MEDICAL:

A paper authored by Drs. Keplinger, Fancher and Calandra, Industrial Bio-Test Laboratories, has been prepared and will be presented on March 10 at the annual meeting of the Society of Toxicology in Washington, D. C. A 15 minute presentation will essentially cover only the highlights of the reports which have been submitted to us on the progress of the chicken toxicity studies and the reproduction studies. In other words, there will be nothing presented that has not already been given in greater detail to government agencies here and abroad.

The 90-day feeding studies on Aroclors 1221, 5432 and 5442 are scheduled to begin March 17 in rats and dogs with final results due September 1 at the latest.

Fish toxicity studies on these materials are pending the availability of catfish (bottom feeders). These seasonal test specimens should be available between April 1 and 15.

The rats and dogs on the 90-day studies of HB40 and MIPB were sacrificed on February 25. In general terms HB40 came out clean. The animals on MIPB showed a decreased increase in weight in male and female animals on 100 ppm diet.

PUBLIC RELATIONS:

PCB background material was prepared for the Pensacola plant prior to the appearance of Jim Lipe before the Florida pollution control board. Press queries came from Electrical World on the use of the PCB incinerator; Chemical Week asked what we would do differently if PCB were introduced as a new product today, and Feedstuffs magazine inquired about PCB found in chickens in New York State.

RESEARCH:

Aroclor Environment Program

EC/GC analyses of the January composite sample of the JFQ sewer effluent for PCB's verified that amount being discharged is remaining low. The January composite contained an estimated level of 13.9 ppb, which is in close agreement with last month's level of 12.1 ppb. The internal specification for plant discharges is ~ 10 ppb total PCB's.

Analysis of a second composite egg sample submitted by the Agway Company again verified the presence of PCB's. The level found was 190 ppb calculated as Aroclor 1248 on a wet weight basis. "Bakery meal" a component of their chicken feed appears to be the most logical source of the PCB's found in the feed and in chickens that consume it. EC/GC analysis of a bakery meal sample, requested from Agway, confirmed this suspicion. A level of 480 ppb PCB was found in the sample and the E.C. chromatogram of the meal extract was almost identical to the earlier E.C. chromatograms of the feed extracts. Since "bakery meal" is prepared by pulverizing stale bakery goods, containers and all, it is possible that recycled coated paper may be the ultimate PCB source. Alternately, the PCB's could be introduced into the meal during processing.

Several effluent samples, submitted for analysis by the Mead Company, were found to contain low levels of Aroclor 1242. The levels found ranged from < 1.5 ppb to 2.2 ppb; an exception was a 24 hour composite secondary effluent sample which contained 24 ppb.

Comparative EC/GC analysis of duplicate Anniston plant effluent samples for PCB's were carried out at Anniston and St. Louis. The levels of PCB's found, calculated as Aroclor 1242, were 2 to 4 times greater than those reported by Anniston. The reason for the disagreement lies in the methods used to estimate the PCB level. Anniston uses the peak height technique, while we employ the total area of the envelope. The two techniques produce equivalent results when the isomer distribution of the Aroclor in

question is unaltered. The search for a more absolute quantification should be continued as its priority increases and research time becomes available. Additional exchange samples will be analyzed using the total area calibration procedure.

Analysis of the tissues from the Bio-Test toxicity studies has not been initiated, although rat tissues from the first 12 months of the two year chronic oral study of Aroclor 1242, Aroclor 1254 and Aroclor 1260 in albino rats are in hand. Their analysis is scheduled to begin when the manpower becomes available.

The status of the fish samples from the last survey of the water shed associated with the Anniston plant is unchanged, about 50% of the samples have been analyzed to date.

Biodegradation Testing

The eight week statistical study of the effect that seven different variables have on the SCAS disappearance rates of three model compounds is completed with the exception of a few sample extracts that remain to be analyzed by EC/GC. Variables being evaluated are:

	1 Level	2 Level
1) Sludge level	2500 mg/l.	1250 mg/l.
2) Air sparge	0.5 cu.ft./hr.	1.0 cu.ft./hr.
3) Feed level	5 mg/cycle	1.0 mg/cycle
4) Water miscible solvent	5 mg/250 micro-liter	5 mg/100 micro-liter
5) Sampling	top of unit	bottom of unit
6) Introduction of sample	sub-surface at top	vortex of stirrer at bottom
7) Time	24 hr. cycle	48 hr. cycle

It is hoped that this study will help provide a better understanding of what occurs when water insoluble materials are exposed to a mixed bacterial population in the presence of an alternate energy source.

MCS 1043, MCS 1016, Aroclor 1242, Aroclor 1254, and Arobromochlor 1232

Two weeks of the scheduled four week sampling period have been completed for these materials. The feeding cycle being employed allows the test materials to be exposed to the sludge for two 48-hour and one 72-hour period per week. MCS 1043, MCS 1016, Arobromochlor 1232 and Aroclor 1242 samples from the 48-hour cycles are being analyzed by UV spectroscopy. The remaining 72-hour samples and all Aroclor 1254 samples are being analyzed by EC/GC. The first week UV analyses (2 data points per material) tentatively indicated that the observed disappearance rate of MCS 1043 was greater than Arobromochlor 1232 which in turn disappeared more rapidly than MCS 1016 and Aroclor 1242. At this time there are not enough data points to differentiate MCS 1016 and Aroclor 1242. The EC/GC analysis of the Aroclor 1254 samples and the 72-hour samples of the other materials have not been completed yet.

TCB, Aroclor 1221 and 2,2'-Dichlorodiphenyl Ether

A four week sampling period for these units has now been completed as has all the EC/GC analyses of the 2,2'-dichlorodiphenyl ether samples. The disappearance rate for the chlorinated ether was slightly less than that of MCS 1043 but greater than that of either MCS 1016 or Aroclor 1242. EC/GC analysis of the TCB and Aroclor 1221 samples has not been completed yet.

HB-40 and MIPB

SCAS testing of HB-40 and MIPB has been concluded. Upon completion of the last 4-week sampling period the units were monitored for an additional week without feeding of the test material to determine how rapidly the less degradable components disappeared. The mean disappearance rates for the 24-hour cycles were 78% for MIPB and 49% for HB-40,

which are quite comparable to the rates observed in earlier studies. A final test in which the feed level was increased to 50 mg (5X) gave disappearance rates of 75% for MIPB and 30% for HB-40 in a 24-hour exposure period. A special study report will be issued.

Environmental Studies - Europe

MCS 1016 was introduced at Liljeholmens, Sweden and Nokia, Finland. Apparently, Liljeholmens were not very enthusiastic despite the fear of legislative action in Sweden. This may be due to their suspicion that legislation will be aimed against specific uses of PCB's rather than against particular products. We still have no definite news of the proposals for legislation, but it is believed that these await recommendations from the Swedish National Environment Protection Board. Nokia, however, were much more impressed with the significance of the product from the environmental aspect and will be interested in its development.

Biodegradation (Europe)

Some progress has been made towards quantifying the residues after biodegradation of commercial mixtures of PCB's. Relative response factors for a number of isomer peaks in the chromatograms have been determined. These show that simple "area under the curve" determination is not enough even for order-of-magnitude quantification.

The workers at University College, Bangor, have selected a number of cultures which appear to be growing on Aroclors 1242 and 1254 as sole carbon sources. Some of the more active of these are now being grown at Ruabon for further study. The biphenyl culture, C_3, isolated at Bangor has been used for degrading 1242 and some PCB isomers. Preliminary results suggest that some degradation of 4,4'-dichlorobiphenyl has occurred, but this needs confirmation. If this is true, it suggests that most low chlorine isomers may be degraded if suitable cultures are available.

Solids-Aroclor Removal by Flocculation-Anniston

The originally designed clarification system was installed on schedule (2/1/71). Some operational difficulties occurred during start-up which necessitated making some modification in the original unit. These modifications have been completed. Start-up is now scheduled for 2/15. The unit will be started up at a 5 gpm flow. Flocculants, Bentonite clay and Betz polyelectrolyte 1170 will be metered in continuously to maintain a 15 ppm solution concentration of clay and 1.5 ppm concentration of poly 1170.

Carbon Adsorption Study-Anniston

The Pittsburgh carbon representative is scheduled to complete his evaluation of scale-up parameters by 2/24.

Pydraul Reformulations

Pydraul 135A, 150A, 230A, 312A and 540B passed the Factory Mutual fire tests. Approval will be issued shortly.

MANUFACTURING:

W. G. Krummrich Plant

PCB Levels in Sewer

A. Aroclor losses from the Aroclor Department trench averaged 0.04 lbs./day ranging from 0.01 to 0.17 lbs./day. No samples were obtained from the blow tank drowning jet but this loss has previously been measured at 0.5 lbs./day average. Data covers the period from 1/17 to 2/4.

Losses from the treatment plant for the same period averaged 55 lbs./day. Range for 6 samples was 19 to 161 lbs./day.

Data from 2/4 to 2/16 is not available at this time due to column contamination of the laboratory GLC.

B. Data for the month of January from the main plant sewers give an average total loss of 47 lbs./day. Average loss measured at the waste treatment plant influent is 84 lbs./day.

One sample taken from the Village sewer (Rogers Terminal) analyzed 0.033% PCB's which is equivalent to about 500 lbs./day. Apparently Rogers had dumped a wash the day this sample was taken (1/26/71). This probably explains the difference between the plant loss and the treatment plant influent.

Sediment samples from 4 of the plant sewers were high in PCB's ranging from 0.05 to 0.31%.

Projects to Reduce Sewered PCB's From Aroclor Dept.

Two projects remain to be completed. Estimate 2422 to pave and trench loading and storage areas, and Estimate 2811 to pave and curb under the Therminol unit design packages are out. Projects are scheduled for completion by 6/1.

Program to Eliminate Sewered PCB's from Using Depts.

A. Design packages were completed for the change-out of Therminol units to Therminol 66 in Depts. 270, 275, 258, 273, 239, 248 (2 units).

B. Five Therminol units in Depts. 243 and 244 will be changed out to a mixture of Therminol 55 and TCB. No projects are necessary.

C. Project package and estimate to change out Dept. 222 (PNA) Therminol unit is on hold pending final decision on future of permanent PNA. This decision is expected by 3/8/71.

D. Dept. 245 Therminol unit change-out is still being evaluated. EDC for the evaluation is 4/1/71.

E. Pydraul A-200B has been placed in two of the three hydraulic systems in Dept. 251.

F. All Aroclor trailers, including Rogers trailers, are being washed at WGK's Rip Track.

PCB Levels in the Atmosphere

Design package for Estimate 2675 to replace the nitrogen purge with a nitrogen blanket at the mix tanks has been rescheduled for completion by 6/1/71. This will reduce air pollution about 5 lbs./day which is insignificant compared to losses from some Therminol units.

Major Project Status

A. MCS 1016 (CEA 2417)

The final draft of the Appropriation Request is being forwarded for approval. New fixed capital requested is $820,000. Foundations are essentially complete and column erection is scheduled for March 10. Start-up is still targeted for June.

B. Incinerator (CEA 2415)

Major items of the J. Zink Company incinerator package have been shipped. Foundations are complete and 75% of the piping fabricated. Start-up targeted for first week of May. Project was approved ($590,000 including in-department improvements) in November.

Anniston Plant

Aroclor Wastes

Current level of Aroclor losses during February averaged 1.95#/day (182 ppb).

Breakdown of the numbers are:

27 day average	105 ppb	1.13#/day
Increase due to adding limestone to #2 HCl pit	77 ppb	0.82#/day
	182 ppb	1.95#/day

Projects and Evaluations

1. Acid-proofing of #1 HCl pit was delayed due to inclement weather. Proofing completed as of 3/1/71. Pit is now ready for service pending addition of limestone.

2. Installation of the reactor-clarifier. Experimental facilities for evaluating PCB removal by powdered adsorbant addition followed by flocculation-clarification removal of solids is complete. Start-up has been delayed by various mechanical problems. Start-up is now targeted for week of 3/1/71.

Spills

There were no spills during February.

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mjs