Monsanto

FROM (NAME & LOCATION) E. S. Tucker/E. M. Emery - Technology Department - S. Second St.

DATE : November 20, 1970

SUBJECT : BIODEGRADATION TESTING PROGRAM

REFERENCE : REK 11-10-70 Memo to WRR

TO : R. E. Keller
Research 1

cc: H. S. Bergen - GO
M. W. Farrar - Res. 1
J. D. Hinchen - Res. 4
W. K. Johnson - GO
W. B. Papageorge - GO
W. R. Richard - GO
C. W. Roos/T. M. Patrick - Res
V. W. Saeger - Res. 2
→ N. T. Johnson/D. R. Pogue - GO

As requested (action #2), the table issued 10-13-70 summarizing our biodegradation program has been updated and a copy is included with this memo. For the most part, the changes made to the original table are self-explanatory with perhaps the exception of the estimated completion dates. These have all been extended from the original maximum estimate of 3-4 months duration to a more realistic maximum time period of 6-8 months. This time period is presently more consistent with what appears to be the maximum period that should be allowed for an activated sludge unit to reach what is termed a steady state (consistent degradation rates).

Additionally (action #3), based on our experience to date, we have drawn up a schematic outline (Figure I) of the time periods required to complete the various phases of our proposed biodegradation program as well as a cost estimate. It appears that if the material submitted is readily degradable, the total average cost of generating this data will be on the order of $5M. On the other hand, if the material is difficult or impossible to degrade via these techniques the average total cost would be more like $7.5M.

With regard to action #4, Jack Hinchen has been contacted and is currently in the process of helping with the design of the testing program as well as statistically evaluating the data so far accumulated.

Action #5 will be implemented as soon as Jack has completed his evaluation.

Progress reports (action #6) will be issued at the end of each month beginning in December of this year.

E. S. Tucker

db
Attach.

PLAINTIFF'S EXHIBIT
O for DD
MRR 4/15/82

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SN-10 REV. 11-65

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Elasped Time Required for Biodegradation Testing

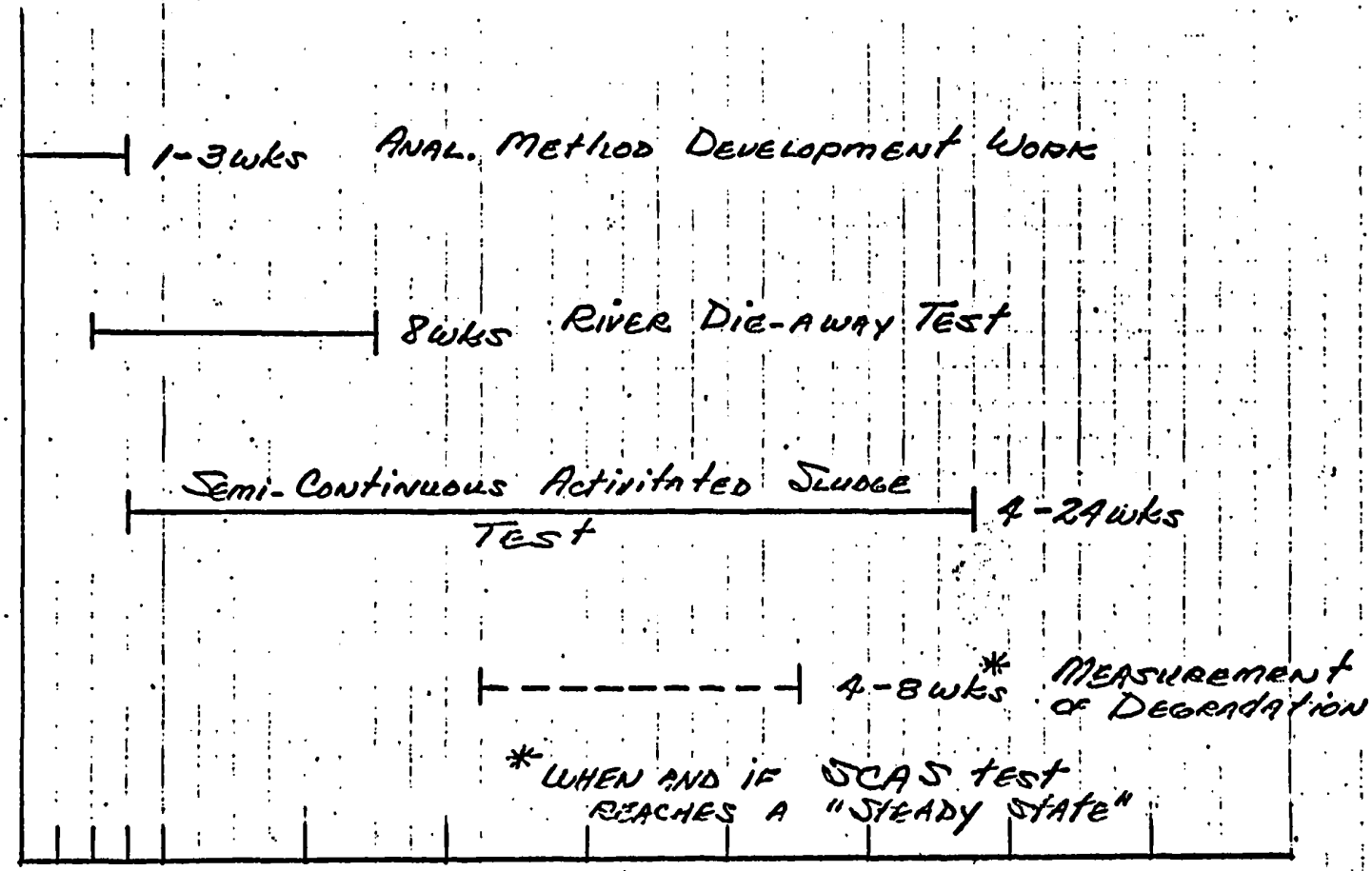


Figure I

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BIODEGRADATION TEST PROGRAM

Provide Degradation Rates of M erial Submitted for Testing

Business Group	Product (In order of Priority)	Testing Procedure	Location	Method of Analysis	Start Up Date	Estimated Completion Date
Functional Fluids	MCS 1043 MCS 1016 Aroclor 1242 Aroclor 1254	1. Activated Sludge 2. River Die-Away 3. Shake Flask	St. Louis St. Louis Ruabon	EC/GC EC/GC EC/GC	8-10-70 11-3-70 Underway	2-71 1-4-71 ?
	Aroclor 5432 Aroclor 5442 Arobrom 5465	1. Activated Sludge 2. River Die-Away	St. Louis St. Louis St. Louis	? ? ?	Holding until further analytical method development work is completed	
	Trichloro-benzene	1. Activated Sludge 2. River Die-Away	St. Louis St. Louis	EC/GC EC/GC	10-27-70 11-3-70	4-71 1-4-71
	Gulf 200 Bright Stock Neville Uniclor 40	1. Activated Sludge 2. River Die-Away	St. Louis St. Louis	FID/GC FID/GC	12-1-70 12-1-70	6-71 2-2-71
	MCS 717 MCS 762 penta-Biphenyl Isomers hexa Biphenyl Isomers	Shake Flask	Ruabon	EC/GC	Underway	?
	NC Phosphate Cresyl Diphenyl Phosphate Tributyl Phosphate Tricresyl Phosphate Diphenyl Sulfone Tolyl Xylyl Sulfone Trichloro Diphenyl Ether Monobromodichlorobenzene (Cont'd)	Materials to be incorporated into program as equipment and manpower become available.				

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Provide Degradation Rates of Material Submitted for Testing

Business Group	Product (In order of Priority)	Testing Procedure	Location	Method of Analysis	Start Up Date	Estimated Completion Date
Functional Fluids (Cont'd)	2,2'-dichlorodiphenyl ether Cumylphenol Isopropylphenyl Phosphate Orthoxenyldiphenyl Phosphate Xylyl Phosphate Ester (Fyrquel 220)					
Plasticizers	MIPB HB-40	1. Activated Sludge 2. River Die-Away	St. Louis St. Louis	UV and FID/GC	5-27-70 8-31-70	Initial work completed; report to be issued
	Aroclor 5460	1. Activated Sludge 2. River Die-Away	St. Louis St. Louis	?	Holding until further analytical method development work is completed	
	Aroclor 1221	1. Activated Sludge 2. River Die-Away	St. Louis St. Louis	EC/GC EC/GC	10-27-70 11-18-70	4-71 1-19-71
	Santicizer 711M	1. Activated Sludge 2. River Die-Away	St. Louis St. Louis	?	Holding until analytical method development complete	
	IN-425 IN-420	1. Activated Sludge 2. River Die-Away	St. Louis St. Louis	Hold -	Potential economic and acute toxicity problems	

(Cont'd)

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Provide Degradation Rates of M rial Submitted for Testing

Business Group	Product (In order of Priority)	Testing Procedure	Location	Method of Analysis	Start Up Date	Estimated Completion Date
Food and Fine Chemicals	3,4,4'-Trichloro-carbanilide	1. Activated Sludge 2. River Die-Away	St. Louis St. Louis	UV UV	7-27-70 8-28-70	Initial work completed; report to be issued
	3,3',4-Trichlorocarbanilide 3,3',4,4'-Tetrachlorocarbanilide Santophen I	River Die-Away	St. Louis	UV	8-28-70	Initial work completed; report to be issued
General Chemicals	p-Nitrochlorobenzene o-Nitrochlorobenzene p-Chloroaniline nitrated orthene	1. Activated Sludge 2. River Die-Away	St. Louis St. Louis	?	Analytical method development work to be initiated 11-23-70.	

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