

**CHRONOLOGICAL EVENTS
OF CHLORINATED BIPHENYLS (PCBs)**

Monsanto, Anniston, Alabama

Submitted To:

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1.
1881

PCBs were reportedly first synthesized by Schmidt and Schultz.

[Hubbard, H. L. (1964), "Chlorinated Biphenyl and Related Compounds," in "Encyclopedia of Chemical Technology," 2nd Ed. Vol. 5, PP. 289-298; also see M07597, July 1976.]

Doc ID # 1322 Exhibit # P-0789

In 1899 Herxheimer described a condition that he called chloracne, which was caused by chlorinated biphenyls or chlorinated naphthalenes.

[MONS 034661, "PCB Conference, Stockholm, PCB – effects on mammals by Matha Berlin," September 29, 1970.]

Doc ID # 839 Exhibit # P-0422

2.
1927-28

Swann Chemicals Company developed a process for making diphenyl.

[M 40181, Standard Manufacturing Process for Aroclors: Appendix K - Background Information.]

Doc ID # 3431 Exhibit # P-0002

Also See: DSW 002603.

Doc ID # 26171 Exhibit #

3.
12/16/28

Aroclors were produced in the laboratory in 1928.

Biphenyl production began on February 28, 1928;

*Aroclor production (3,000 lbs/day) started on December 16, 1928.

[M 40181, Standard Manufacturing Process for Aroclors: Appendix K - Background Information.]

Doc ID # 3431 Exhibit # P-0002

Also See: DSW 002603.

Doc ID # 26171 Exhibit #

4.
1929 Commercial production of PCB's was initiated by the Swann Chemical Company.

[M07538, Monsanto Company, "Submission to the Subcommittee on Oversight and Investigations of the Committee on Interstate and Foreign Commerce, U. S. House of Representatives," November 16, 1979.]

Doc ID # 1184 Exhibit #

5.
1930 The potential industrial applications of PCBs were fully realized in about 1930.

"Although the synthesis of polychlorinated biphenyls (PCBs) was first described in 1881 by Schmidt and Schultz. The potential industrial applications were not fully realized until about 1930."

[John S. Waid, "PCBs and the Environment," Volume I, CRC Press, Inc. 1986. Also see MONS 223960.]

Doc ID # 10871 Exhibit #

6.
05/25/34 Report of Dr. Frederick B. Elinn of Patch Tests Made on Material Received from Swann Research, Inc.: "One is impressed with the fact that each of the Aroclors giving a positive reaction were of a fluid nature."

"The object of this investigation was to determine whether or not the various chlorinated diphenyl compounds submitted or some impurities contained therein might be the causative agent producing the dermatitis which had developed among some of the workmen in the plant."
[DSW 002969.]

Doc ID # 11405 Exhibit # P-0011

"Dr. Flinn's comments are copied verbatim, as follows:

Comments:

One is impressed with the fact that each of the Aroclors giving a positive reaction were of a fluid nature. Attempts were made to expose the animals to vapors but observations made us conclude that the only difference was that the animal would be exposed to the hot material and it was well known that the reaction where such an exposure is given is more severe."

"It has been shown in some investigations that chlorine did not produce a dermatitis when metallic electrodes were used but did if the metallic electrodes were replaced by carbon electrodes. The theory was advanced that some organic chlorine were produced in the latter case."

[DSW 002972, "Report of Dr. Frederick B. Elinn of Patch Tests Made on Material Received from Swann Research, Inc.", May 25, 1934.]

Doc ID # 11405**Exhibit # P-0011**

7.
1935

Monsanto bought Swann Chemical Company in Anniston and started to produce PCB's.

[p.36, "Deposition of Robert L. Cheever, Taken on Behalf of the Plaintiff," In the 30th Judicial Circuit Court for St. Clair County, Alabama, Pell City Division, September 3, 1998.]

Also See: MONS 002321, "Monsanto's PCB Production History Fact Sheet," May 1982.

Doc ID # 4318**Exhibit # P-0811**

8.
*1935

The occurrence of skin and systemic effects caused from chloronaphthalenes and chlorodiphenyls were first reported.

[M07570, Monsanto Company, "Submission to the Subcommittee on Oversight and Investigations of the Committee on Interstate and Foreign Commerce, U. S. House of Representatives," November 16, 1979.]

Doc ID # 1184**Exhibit #**

9.
* 1936 Halowax Corporation called attention of use of chlorinated naphthalenes and chlorinated diphenyl.

"In the spring of 1936, the Halowax Corporation, a division of the Baskelite Corporation, called our attention to three fatal cases of jaundice in workmen using chlorinated naphthalenes and chlorinated diphenyl, and requested that the subject be investigated as rapidly and thoroughly as possible."

[MONS 096643, "The Problem of Possible Systemic Effect from Certain Chlorinated Hydrocarbons," The Journal of Industrial Hygiene and Toxicity, Vol. 19, No. 7, September 1937.]

Doc ID # 799

Exhibit # P-0013

10.
1936 ♣ In 1936, occupational exposure was reported to cause toxic effects, and workplace threshold limit values were subsequently set.

"As early as 1936, occupational exposure was reported to cause toxic effects and workplace threshold limit values were subsequently set."

[Mitchell D. Erickson, "Analytical Chemistry of PCBs," Butterworth Publishers, Boston, An Ann Arbor Science Book, 1986.]

Also See: MONS 223453.

Doc ID # 10868

Exhibit # P-0005

11.
September
1936

Aroclor production equipment was installed in Krummrich Plant.

"As the demand for Aroclors increased, additional production equipment was installed, located at the Monsanto Illinois factory (then Plant "B" and now called the Krummrich Plant). This equipment came on stream in September 1936."

[M 40181, Standard Manufacturing Process for Aroclors: Appendix K - Background Information.]

Doc ID # 3431

Exhibit # P-0002

Also See: DSW 002603.

Doc ID # 26171 Exhibit #

12.
After 1936 After 1936, animal studies with both commercial mixtures and individual congeners have shown a variety of chronic toxic effects. PCB-contaminated cooking oil eventually caused a total of 1,291 'Yusho' patients in 1968 in western Japan.

"As early as 1936, occupational exposure was reported to cause toxic effects and workplace threshold limit values were subsequently set. Animal studies with both commercial mixtures and individual congeners have shown a variety of chronic toxic effects (National Research Council, 1979). PCB-contaminated cooking oil caused a total of 1,291 'Yusho' patients in 1968 in western Japan."

[Mitchell D. Erickson, "Analytical Chemistry of PCBs," Butterworth Publishers, Boston, An Ann Arbor Science Book.]

Also See: MONS 223453.

Doc ID # 10868 Exhibit # P-0005

13.
10/11/37 Systemic toxic effects due to prolonged exposure to Aroclor vapor at high temperature was shown from experiments.

"Experimental work in animals shows that prolonged exposure to Aroclor vapors evolved at high temperatures or by repeated oral ingestion will lead to systemic toxic effects." [MONS 219708 (or MONS 061332), October 11, 1937]

Doc ID # 233 Exhibit # P-0015

"Repeated bodily contact with the liquid Aroclors may lead to an acne-form skin eruption."

[MONS 219708 (or MONS 061332), L. A. Watt, "Attachment 3-2," October 11, 1937.]

Doc ID # 233 Exhibit # P-0015

14.

09/15/38 ✱ Monsanto knew that PCBs could cause liver problem as early as in 1938. In "Report To The Monsanto Chemical Company" by Cecil K. Drinker, M. D. (September 15, 1938)", it said that:

"Exposure to chlorinated diphenyl was begun on July 1, 1936 and ceased on November 18 of the same year. The average length of exposure was 16 hours daily for 6 days a week." [MONS 060026, September 15, 1938]

Doc ID # 235**Exhibit # P-0017**

"No abnormalities were seen at any time in the living rats. Blood and urine examinations were made; there were no losses in weight, and one would have considered that the animals were perfectly sound. However, rats sacrificed after 6 weeks exposure showed slight liver damage, which advanced during the next two months. The changes consisted in slight to moderate swelling of the liver cells, increased granularity, and many other mitotic figures. Hyaline inclusions were present and were invariably plentiful in animals receiving chlorinated diphenyl by inhalation or by mouth." [MONS 060027, September 15, 1938]

Doc ID # 235**Exhibit # P-0017**

"One is forced to conclude from the experiments that an average concentration of 0.57 mg. per cubic meter inhaled 16 hours daily produces definite slight changes in the liver and in this organ alone." [MONS 060027, September 15, 1938]

Doc ID # 235**Exhibit # P-0017**

"In considering the entire matter it seemed to us that the chlorinated hydro-carbons, if inhaled in sufficient concentration, might cause a slight degree of damage to the liver. This damage is resisted efficiently and causes no depreciation of health, but if the individual in question happens to suffer some ordinary disease of the liver the condition is superimposed upon a substratum of injury." [MONS 060027, September 15, 1938]

Doc ID # 235**Exhibit # P-0017**

"It would seem therefore that inhalation of a concentration of chlorinated diphenyl in the manner I have described is capable of producing a condition which may be dangerous to the individual

inhaling it, though of itself no visible harm will be done." [MONS 060028, September 15, 1938]

Doc ID # 235

Exhibit # P-0017

"It is evident the alterations produced by this hydro-carbon are persistent and individuals who have been caused trouble by it should be removed completely and for a long time." [MONS 060028, September 15, 1938]

Doc ID # 235

Exhibit # P-0017

"From these experiments we are forced to conclude that concentrations of chlorinated diphenyl in workrooms should not be allowed to rise above 0.5 mg. per cubic meter of air." [MONS 060028, September 15, 1938]

Doc ID # 235

Exhibit # P-0017

"Many feeding experiments were done with this chlorinated diphenyl. The general changes in the liver were the same as those already described. No diarrhea or gastro-intestinal aspects seemed to be present."

[MONS 060026-29, Cecil K. Drinker, "Report To the Monsanto Chemical Company," September 15, 1938.]

Doc ID # 235

Exhibit # P-0017

15.
1941

Additional capacity for Aroclor production, largely designed on the plant "B" model, was installed at Anniston in 1941.

[M 40181, Standard Manufacturing Process for Aroclors: Appendix K - Background Information.]

Doc ID # 3431

Exhibit # P-0002

Also See: DSW 002603.

Doc ID # 26171

Exhibit #

16.
1946

By 1946, the Aroclor production capacities in both the Anniston and Krummrich Plants were doubled, and approaching 2 million pounds a month.

"By 1946 both plants had doubled their capacity, to give a total production capacity approaching 2 million pounds a month."

[M 40181, Standard Manufacturing Process for Aroclors: Appendix K - Background Information.]

Doc ID # 3431 Exhibit # P-0002

Also See: DSW 002603.

Doc ID # 26171 Exhibit #

17.

09/1947

In 1947, recommendation was made to substitute Aroclors' use in the laboratory melting point bath because of the repeatedly demonstrated toxicity.

"A recently published article (Maglio, M. Martin, Chemist Analyst, 35 94 (1946)), has recommended the substitution of one of the "Aroclors" as the melting-point bath liquid in preference to the customary sulphuric acid. As stated in that article "Aroclors" are a group of chlorinated diphenyls produced by the Monsanto Chemical Company.

There is need therefore to give warning. For the toxicity of these compounds has been repeatedly demonstrated, both from the standpoint of their absorption from the inspired air as well as from their effects in producing a serious and disfiguring dermatitis when allowed to remain in contact with the skin. Since these effects have been repeatedly, observed, industrial hygienists have taken care to see that the proper controls have been established wherever these products are used. For example, the maximum allowable concentration of chlorinated diphenyl for an 8-hour working day is 1 milligram per cubic meter of air."

{ "It is probable that nothing like an uncontrolled industrial exposure will occur in the laboratory."

"The foregoing remarks have been prompted by the belief that in recommending the use of a material with which is associated a potential hazard from the health standpoint, it is very important that the possible consequences be presented together with recommendations for correct handling."

[MONS 095206, Robert M. Brown (Chief, Industrial Hygiene Section, Division of Health, Dept. of Public Welfare, City of St. Louis, MO), "On the Toxicity of the 'Arochlors' (sic)," The Chemist Analyst, Vol. 36, No.2, page 33, September 1947.]

Doc ID # 307

Exhibit # P-0033

18.

Sept. 1947 Toxicity of Arochlors was reported in The Chemist Analyst.

"A recently published article (1) has recommended the substitution of one of the "Arochlors" as the melting-point bath liquid in preference to the customary sulfuric acid. As stated in that article, the "Arochlors" are a group of chlorinated diphenyls produced by the Monsanto Chemical Company."

"There is need, therefore, to give a warning. For the toxicity of these compounds has been repeatedly demonstrated, both from the standpoint of their absorption from the inspired air as well as from their effect in producing a serious and disfiguring dermatitis when allowed to remain in contact with the skin. Since these effects have been repeatedly observed, industrial hygienists have taken great pains to see that proper controls have been established wherever these products are used. For example, the maximum allowable concentration of chlorinated diphenyl for an 8-hour working day is 1 milligram per cubic meter of air."

{ [MONS 031540, "On the Toxicity of 'Arochlors'," The Chemist Analyst, September 1947.]

Doc ID # 237

Exhibit # P-0841

19.

12/30/47

The toxicity of Aroclor vapors were discussed in the articles published as early as in 1937 to 1938, which discussed the possible damage to the liver.

"The best published information about the toxicity of Aroclor vapors with reference to possible damage to the liver is in a series of three articles written for the Journal of Industrial Hygiene and Toxicology." "The first article appearing in the September 1937 issue, Vol. 19, No. 7 and the second article published in the February 1938 issue, Vol. 20, No. 2 were written by C. K. Drinker, M. F. Jarron, and G. A. Bennet and cover only Aroclor 4465. The third article written by Dr. Drinker alone is more complete as it gives

information about Aroclors 4465, 1254, 1268 and 5460. (Vol. 21, No. 5, May 1939.)" [M33081, December 30, 1947.]

Doc ID # 2836

Exhibit # P-0024

"Based on our practical experience in the manufacture and sale of millions of pounds of Aroclors annually, the point that we would emphasize is that workers should not be exposed to Aroclor vapors and that the men working with Aroclors should observe "good house-keeping" rules about keeping their clothing and skins free of the material and avoid ingestion of it."

[M33083, "Letter from P. G. Ponieous (Development Department of Monsanto) to Central Research Laboratory, Celanese Corporation of America (NJ)," December 30, 1947.]

Doc ID # 2836

Exhibit # P-0024

20.
1949

Three fatalities caused by chlorinated diphenyl and naphthalene were reported in 1936-1937. In 1939, three additional cases were reported and a further case in 1943.

"Systemic poisoning from these chlorinated substances usually follows the inhalation of fume rather than from the handling of the dry hydrocarbon waxes. Damage is severe and occasionally fatal. Acute yellow atrophy of the liver is generally associated with serious exposure to the chlorinated naphthalenes and diphenyl fumes. Three fatalities were reported in 1936-1937 (4, 5). In 1939, three additional cases were reported by Greenburg, Mayers, and Smith (6) and a further case by Collier in 1943 (7). While acne may be taken as a warning sign in workers handling this material it is not invariably present and systemic poisoning may occur in the absence of this sign."

[MONS 046928-29, "Chlorinated Diphenyl and the Chloro-naphthalenes, Toxicity" in "Industrial Toxicology by L. T. Fairhall, 1949 ed. (Public Health, Inc.)," 1949.]

Doc ID # 239

Exhibit # P-0027

21.
08/30/49

Prolonged exposure to AROCHLOR vapours will lead to systemic toxic effects.

"As far as I know, we only publish one technical service bulletin on Aroclors (G2) and this states:

Toxicity – Prolonged exposure to AROCHLOR vapours will lead to systemic toxic effects. However, this is not significant except at high temperatures and then normal draught ventilation will remove any risk. Acne-form skin eruptions may arise from continued bodily contact with liquid AROCLORS, but normal precautions and, if necessary, suitable garments provide adequate protection. Toxic effects will follow considerable oral ingestion, but this hazard is unlikely to be encountered".

[MONS 095208, "Letter from M. N. Strachan to Dr. J. W. Barrett: Aroclor Toxicity -- Summary of References," August 30, 1949.]

Doc ID # 307

Exhibit # P-0033

22.
08/30/49

Monsanto knew in 1949 that the vapours of Aroclor 1248 emitted at elevated temperatures are injurious to the liver on prolonged exposure and should not be breathed.

"Aroclor 1248

The vapours emitted at elevated temperatures are injurious to the liver on prolonged exposure and should not be breathed. Maximum safe amount permissible – 0.5 mg./cu. m. air."

[MONS 095213, "Letter from M. N. Strachan to J. W. Barrett: Aroclor Toxicity -- Summary of Data," August 30, 1949.]

Doc ID # 8702

Exhibit # P-0029

23.
01/01/50

Test results demonstrated that in Anniston Plant, "The Aroclor vapor concentration in the plant is almost never below the 0.5 to 1 mg. per cu. meter level, and often reaches about 5 mg. per cu. meter in some locations".

"At the request of Dow Chemical Company who is interested in using our Aroclor 1254, the concentration of Aroclor vapors in the atmosphere of our plant at Anniston, Alabama where the Aroclors are made was determined."

"The actual Aroclor vapor concentrations varied from about 0.35 mg. per cu. meter to about 5.0 mg. per cu. meter under the most

severe conditions. No definite average concentration has been established."

"It was found, however, that the Aroclor vapor concentration in the air at the sample points is seldom below the 0.5 to 1.0 mg. per cu. meter level, which is the maximum tolerable concentrations (according to Elkins, see References), and often is as high as 3 to 5 mg. per cu. meter. These higher concentrations are extremely irritating to the eyes, nose, and throat." [MONS 058074]

Doc ID # 6792

Exhibit # P-0030

"VI. Conclusion:

The Aroclor vapor concentration in the plant is almost never below the 0.5 to 1 mg. per cu. meter level, and often reaches about 5 mg. per cu. meter in some locations." [MONS 058078]

Doc ID # 6792

Exhibit # P-0030

[MONS 058074-78, Report entitled: "The Determination of Aroclor Concentrations In The Atmosphere At Monsanto Chemical Company's Anniston, Alabama Plant," CONFIDENTIAL, January 1, 1950 (?)]

Note: There is no date on the Report. According to the "Data Base", it is listed as January 1, 1950.

Doc ID # 6792

Exhibit # P-0030

24.
02/14/50

Liver damage from Aroclor fumes was mentioned by Dr. R. F. Kelly (Monsanto Medical Director).

"As far as I could determine, two men suffered from gastrointestinal upset. I suspected the possibility that the Aroclor fumes might have caused liver damage, but was unable to obtain this information over the phone." "In the particular work at Harvard, Dr. Drinker found that Aroclor 1268, which means diphenyl chlorinated to 68%, was of low toxicity. The confusion existed in his findings that Aroclor 1254, which is the diphenyl chlorinated to only 54%, was considerably more toxic on inhalation."

[M11678, "Letter from R. F. Kelly (Medical Director, Monsanto) to Dr. L. W. Spolyar, Indiana State Board of Health," February 14, 1950.]

Doc ID # 1555**Exhibit #**

25.

02/28/50

Spolyar (Indiana State Board of Health) to Kelly: The chief complaints due to the PCBs pollution were irritation of the upper respiratory tract plus possible liver damage in a plant located in Indiana.

"Thank you very much for your very informative letter of February 14, relative to the use of Aroclors in industry. The plant under question is the Brazil plant mentioned in your letter.

The chief complaints were irritation of the upper respiratory tract plus possible liver damage. At the time of our study Aroclor was circulated in galvanized pipes and most pipes were leaking. It was suggested that new pipes be installed and local exhaust employed."

[M11677, "Letter from L. W. Spolyar, M. D., Director, Division of Industrial Hygiene, Indiana State Board of Health, Dr. R. Emmet Kelly, Medical Director, Monsanto Chemical Company", February 28, 1950.]

Doc ID # 1555**Exhibit #**

26.

12/11/51

Monsanto was aware of the article regarding the toxicity of Aroclors published in "The Chemist Analyst" in September 1947.

"Since writing to you on December 3rd I have come across a letter of mine to Mr. W. M. Cooper, London, June 24/48, (copies to W.D.S, W.H.G., and others), calling attention to an article in the J. T. Baker Company's "Chemist Analyst", Vol. 26, No. 2, page 33, September 1947.

I attach a copy of this article, and I think you will agree that the warning relates only to really bad exposure, not such as should occur in ordinary analytical work."

"On Oct.27/47 Mr. Barbre of the Krummrich plant sent a copy of this Journal to Dr. Jenkins at Anniston from comment. Dr. Jenkins did not make any comments at the time, but the following extract from Mr. Barbre's letter is interesting..."

[MONS 095205, "Letter from E. Mather (St. Louis) to Mr. P. J. C. Haywood (Newport)," December 11, 1951.]

Doc ID # 307**Exhibit # P-0033**

27.

02/29/52

Monsanto realized that the toxicity of PCBs was well established, in particular, its mixture with other chlorinated compounds was more toxic. Deaths were caused by such kind of PCBs mixtures during the war in the cable applications by the Navy. It also knew that high temperature conditions, violations and over-look handling of PCBs occurred from time to time.

"Since so many of the new Aroclor applications involve their use at elevated temperatures, the wording of the warning label to avoid inhalation of fumes is especially significant. We constantly keep this factor in mind in our development work, and emphasize it in direct contacts as well as indirect contacts such as our literature. While the toxicity hazard of Aroclor's fumes is well established and should be thoroughly understood by all, yet, as we go along we find that we are always confronted with violations in one degree or another, and indeed, regard keeping in touch with these things to be a major responsibility in the promotion of Aroclors.

Referring to the few deaths, and the relatively large number of acne or dermatitis cases arising during the war, in connection with fabricators of Navy cable coating materials using a mixture of Aroclor 4465 and Halowax, there are two things to keep in mind. One is that this combination of chlorinated hydrocarbons is more toxic than the chlorinated biphenyl or terphenyls alone; and secondly, in this program of operations, proper working facilities and cleanliness were overlooked. In fact, the workers' wives at home even acquired acne and dermatitis which was traced back to the halogenated hydrocarbon compounds." [MONS 094552, February 29, 1952]

Doc ID # 242**Exhibit # P-0034**

The subject xxx not the easiest one in the world to understand, but in view of the large stake that we now have in the rather widespread commercial use of Aroclors, we constantly strive to learn more about his subject of Aroclor toxicology and to safeguard against any possible hazards." [MONS 094553, February 29, 1952]

[MONS 094551-53, "Letter from P. G. Benignus to Mr. T. K. Smith, Jr. (St. Louis)," February 29, 1952.]

Note: "xxx" = The copy was too blurring to read in some places.

Doc ID # 242 Exhibit # P-0034

28.
12/31/52

Concentrations of Arochlor 1248 were found to be in a range from 9.2 to 49.9 milligrams per 10 cubic meters of air.

"This report will serve as a summary of a survey made on December 9 and 10, 1952, to collect air samples for Arochlor 1248, and to determine concentrations by laboratory analysis."

"Summary

Concentrations found by laboratory analysis show a range from 9.2 to 49.9 milligrams of Arochlor per 10 cubic meters of air." [MONS 061754]

Doc ID # 7737 Exhibit #

[MONS 061753-54, Monsanto Chemical Company, Plastic Division, Springfield, Massachusetts: 'Aroclor in Air', by Stanley C. Ballard (Industrial Hygienist)," December 31, 1952.]

Doc ID # 7737 Exhibit #

29.
06/17/53

High Aroclor vapor concentrations in the air were determined. The Aroclor vapor concentration in the plant was almost never below the 0.5 to 1 mg. per cu. meter level, and often reaches about 5 mg. per cu. meter in some locations.

"The chlorine content of the air in the Aroclor plant has been determined at several positions and under various conditions. Willson Product's, Incorporated, apparatus for determination of chlorinated hydrocarbons was employed for these tests. (See Appendix). The Aroclor vapor concentration was found to vary widely depending upon several factors including location of sampling apparatus, operations being carried out, directions of drafts through the still room, and temperature and boiling point of the Aroclor under question. The actual Aroclor vapor concentrations varied from about 0.35 mg. per cu. meter to about 5.0 mg. per cu. meter under the most severe conditions. No definite average concentration has been established."

"It was found, however, that the Aroclor vapor concentration in the air at the sample points is seldom below the 0.5 to 1.0 mg. per cu. meter level, which is the maximum tolerable concentrations

(according to Elkins, see References), and often is as high as 3 to 5 mg. per cu. meter. These higher concentrations are extremely irritating to the eyes, nose, and throat."

"On the basis of these facts it is difficult to conceive that concentrations in the range of 1 to 5 mg. per cu. meter reported by the Plastics Division as a result of painting with an Aroclor-containing paint could be attained under normal conditions with this type paint. It should be further noted that nearly half the tests in the plant showed less than 1.0 mg. Aroclor per cu. meter, and about two thirds of the tests showed less than 2.0 mg. Aroclor per cu. meter, and only about 5.0 mg. per cu. meter under the most severe conditions. It is recommended that this laboratory secure a sample of the paint under question and make tests with it to determine the resulting Aroclor vapor concentration in the air." [MONS 058949, June 17, 1953]

Doc ID # 243 Exhibit #

"Exposure at the desk where the concentration was fairly high as seen in Table III. The drumming operation is the most severe of these since the concentration is highest and the time to which the operator is exposed to this concentration is usually in the order of 3 to 6 hours as compared to about 30 minutes for any of the other operations. The Aroclor vapor concentrations during the distillation operation varies from about 0.5 to 1 mg. per cu. m." [MONS 058952, June 17, 1953]

Doc ID # 243 Exhibit #

"It is noteworthy that the high concentration found in test No. 31 was during the earth treatment of a batch of Aroclor 1242, but not during a filtration. The intake to the sampling apparatus was about 8 ft. from the closed hatch of the tank in which the Aroclor was being treated at 110 °C. There was a gentle draft through the room in the direction from the operating equipment toward the sampling apparatus. The Aroclor vapor concentration under these conditions was extremely high. Also, the concentrations in tests 29 and 30 were quite high in comparison to that found under the same conditions for 1260. These tests were made on the upwind side of the Aroclor treating tank." [MONS 058952, 1953]

Doc ID # 243 Exhibit #

"From these data it may be seen that the Aroclor vapor concentration in the plant varies from about 0.5 to 1 mg. per cu.

meter at the minimum up to about 5 mg. per cu. meter under the most severe conditions. No average concentration or average daily exposure of the operator have been developed from the data so far." [MONS 058953, 1953]

Doc ID # 243 Exhibit #

"VI. CONCLUSIONS:

1. The Aroclor vapor concentration in the plant is almost never below the 0.5 to 1 mg. per cu. meter level, and often reaches about 5 mg. per cu. meter in some locations.
2. The concentrations reported by Springfield of 1 to 5 mg. per cu. meter from paint containing Aroclor hardly seem reasonable considering the concentrations found in the plant.
3. No average daily exposure may be developed from these data."

[MONS 058949-953, "Report No. 2892, Interim Report on Aroclor in Gases," June 17, 1953.]

Doc ID # 243 Exhibit #

30.
09/01/53

Wheeler said "As I am sure you know, Aroclors cannot be considered nontoxic."

[MONS 095187, Monsanto, "Letter from E. P. Wheeler (Monsanto at St. Louis) to E. Mather, Aroclors: Toxicity," September 1, 1953.]

Doc ID # 4995 Exhibit #

31.
11/10/53

"The LD₅₀ of Aroclor 1254 from rats was found to be 3.10 milliliters per kilogram."

[MONS 060049, "Certificate of Analysis" by Fred B. Younger, November 10, 1953.]

Doc ID # 245 Exhibit #

32.
1954

Meigs, J. W., et al., published a paper in JAMA entitled "Chloracne from an unusual exposure to Arachlor".

([Meigs, J. W., J. J. Albon, B. L. Kartin, "Chloracne from an unusual exposure to Arachlor," JAMA, Volume 154, p.1417, 1954.]

Also See: MONS 210806.

Doc ID # 9701 Exhibit # P-0840

33.
1954

About 1954, chlorine cells used in the Aroclor production were installed at Anniston.

[M 40181, Standard Manufacturing Process for Aroclors: Appendix K - Background Information.]

Doc ID # 3431 Exhibit # P-0002

Also See: DSW 002603.

Doc ID # 26171 Exhibit #

34.
03/15/54

Aroclors in paint caused the PCB vapor concentrations being higher than the limit level in the room. In the manufacturing area, the PCB vapor concentrations varied with conditions.

"In connection with the room painted with Lustrex Latex Paint containing Aroclor 1248, the sampling operation shows that the concentration falls off in a few days to the limit of less than 1 mg./cu. meter. There is definitely an Aroclor odor in the room after being freshly painted and the odor persisted for several days before it disappears with natural air movements. In forced ventilation the story might be different.

Our work is merely an indication of the levels of Aroclor vapor found in the area under test. In our manufacturing areas, the level varies according to the type Aroclor being handled and the temperature of the Aroclor. The Aroclor vapors are usually strong enough to be quite irritating when they reach the level of 1 mg./cu. meter."

"My opinion on the use of Aroclor in paint is that each paint would have to be tested in a room. If the odor of Aroclor is present, then caution will have to be exercised before the paint is distributed freely for household use."

[MONS 095186, "Letter from A. K. Ellenburg to Mr. E. Hather (St. Louis)," March 15, 1954.]

Doc ID # 303 Exhibit #

35.
✱ 03/18/54 Letter from Mathor to Dr. Barrett (London): Discussed the toxicity of Aroclor vapor, and the use of Aroclor containing paint.

"In receipt of your letter of March 4, 1954, I asked Anniston for their last minute information on the toxicity of Aroclors with special reference to the use of Aroclors in paints etc., and Mr. Ellonburg has replied as follows:

'The final report on the problem of checking the concentration of Aroclor vapor in the air has been written and is now in process of being typed.

In the report the method of determining the Aroclor concentration in the air is given in detail. You will also find those methods in the interim report by H. B. Richards, Jr. dated June 17, 1953'." [MONS 095184, March 18, 1954]

Doc ID # 248 Exhibit #

"My opinion on the use of Aroclor in paint is that such paint would have to be tested in a room. If the odor of Aroclor is present, then caution will have to be exercised (?) before the paint is distributed freely for household use."

[MONS 095184-85, "Letter from Mathor to Dr. J. W. Barrett (London): Aroclor Toxicity," March 18, 1954.]

Note: (?) = the word is too blurring to read.

Doc ID # 248 Exhibit #

36.
✱ 06/17/54 Serious outbreak of chloracne happened among workers using Aroclors as the heat-transfer media in a plant. Monsanto worried that its Aroclor business might be hurt.

"I have carefully studied the extract from the paper by J. M. Hage, J. J. Albome and B. L. Karton (J. Amer. Med. Assoc., April 24, 1954) concerning the outbreak of chloracne among workers on a plant using Aroclor as heat-transfer media, particularly in view of its severe impact on our Aroclor business."

"We are told that after 19 months' exposure one of the workers developed acute contact dermatitis. What is the significance of the word contact in this context? To me it suggest the possibility of

liquid contact. On examining the details, I find that there was "a slight leakage of vapour, particularly around the cover of a sump pump, and from all gasketed connections in the system."

[MONS 095182, "Letter from L. V. H. xxx to Dr. H. K. Newvan," CONFIDENTIAL, June 17, 1954.]

Note: *the letter is too blurring to read, in particular, the names of authors of the paper, which might be spelled wrong here.*

Doc ID # 249 Exhibit #

37.
07/05/55

The Toxicity of a Mist Generated by the Aspiration of Pydraul: Research found that exposure to Pydraul at 0.45 mg/L for 2 to 4 hours resulted in serious toxicity. "The guinea pigs that died had diffuse toxic lesions in their brain, liver and kidneys, but no alternations of the lungs."

uses
of
Pydraul?

"2. Fatalities, preceded by evidences of labored breathing, occurred among guinea pigs, following 2.0 or 4.0 hours of exposure to air bearing the mist of Pydraul in the concentration of 0.45 mg per liter. The guinea pigs that died had diffuse toxic lesions in their brain, liver and kidneys, but no alternations of the lungs.

Cats, rabbits and rats survived under the severe conditions which induced some fatalities among guinea pigs, and developed no signs of intoxication (there was an excess of salivation on the part of the cats). When these animals were killed for examination, the livers and kidneys of the cats and rabbits exhibited degenerative changes, but no visceral abnormalities were found in the rats."

[DSW 005349-50, "The Toxicity of a Mist Generated by the Aspiration of Pydraul", CONFIDENTIAL, July 5, 1955.]

Doc ID # 11420 Exhibit # P-0040

38.
08/19/55

Prolonged exposure to Aroclor vapour at 1.5 mg/m³ can produce damage to the liver and kidneys of test animals. As the Monsanto document indicates that "In translating this finding to the human being it is the recognised practice to employ a safety factor of 10." "With 1254 we now know that 1.5 mgrm./m³ is above the maximum permissible concentrations for test animals so that the maximum for human must be placed below 0.15 mgrm./m³, and must be regarded as applying to all Aroclors, on account of their similar chemical constitution." And "Our own analytical work with a room

✶ painted with Aroclor 1248 plasticised Lustrex paint affords evidence that Aroclor concentrations of the order of 0.5 mgrm./m^3 can prevail for a month."

"During the near future, at any rate, our consideration of the suitability of Aroclors of specific applications must be governed by this finding that prolonged exposure to Aroclor vapour at 1.5 mgrm./m^3 can produce damage to the liver and kidneys of test animals. In translating this finding to the human being it is the recognised practice to employ a safety factor of 10; in other words, when the maximum, safe concentrations for test animals has been located, the corresponding value for the human being is taken as one tenth of it. With 1254 we now know that 1.5 mgrm./m^3 is above the maximum permissible concentrations for test animals so that the maximum for human must be placed below 0.15 mgrm./m^3 , and must be regarded as applying to all Aroclors, on account of their similar chemical constitution." [MONS 095215-16, August 19, 1955]

Doc ID # 8703 Exhibit # P-0041

✶ "Our own analytical work with a room painted with Aroclor 1248 plasticised Lustrex paint affords evidence that Aroclor concentrations of the order of 0.5 mgrm./m^3 can prevail for a month; we have not so far attempted to develop the more refined analytical technique necessary to determine with reasonable precision concentrations in the range of $0.1-0.5 \text{ mgrm./m}^3$. This development would be a difficult assignment and when available it would only permit as to determine the time to reach 0.15 mgrm./m^3 and hence the time during which a person could be exposed to concentrations greater than what must now be regarded as the maximum permissible.

Previously on the basis of published work the value has been taken variously at 0.5 or 1 mgrm./m^3 and Monsanto has normally used the higher figure. On that basis it could be argued that exposure to a concentration at or above the maximum permissible would be of short duration and that any hazard was of marginal significance."

"However, we now have to reckon with a fairly long exposure to concentrations above the new maximum, and hence the hazard must be rated greater. There is yet a further consideration that is always taken into account by Health Authorities, and this relates to the idiosyncrasy (?) factor. So far we have considered the average human being, but there will always be a minor proportion more susceptible than the rest. This may be due to the natural variability

of resistance or predisposition existing among healthy individuals, or to functional disability, and in assessing a human hazard consideration is always given to those individuals who are more likely to suffer injury; in this case presumably those possessing impaired livers and kidneys would be most likely to suffer first.

If the argument I have presented above is accepted then we must now line up with M.C.C. in withdrawing our recommendation that Aroclors be used as plasticizers in Lustrex Latex paints. As regards the use of Aroclors in P.V.A. paints, we have so far made no measurements of Aroclor concentrations in painted rooms, but I see no reason for believing that materially reduced concentrations would be found." [MONS 095216, August 19, 1955]

★

Doc ID # 8703 Exhibit # P-0041

[MONS 095215-16, "Letter from D. V. N. Hardy to Dr. J. W. Barrett: Aroclors -- Toxicological Examination," CONFIDENTIAL, August 19, 1955.]

Note: (?) = word can't be read for sure.

Doc ID # 8703 Exhibit # P-0041

39.
09/08/55

Letter from Barrett to Mason: "Here there is a convention that a factor of 10 is used in translating animal toxicities to human toxicities." Thus, much lower PCB vapor concentration, i.e., 0.15 mg/cubic meter, should be used when human health is considered, which made the PCB containing paints to face more inappropriate status based on the data available.

"Recently we received through Dr. Kelly the findings of the Kettering Laboratory which as far as we were concerned included entirely new data. In particular, the toxicity of Aroclor 1254 was demonstrated with a range of animals at a level of 1.5 mgm./cu.m."

"Here there is a convention that a factor of 10 is used in translating animal toxicities to human toxicities. In other words there would be an interpretation that Aroclor 1254 should not be used where atmospheres containing a quantity something less than 0.15 mg./cu.m. results.

Both Sales and Development here are very anxious to handle this awkward problem in the right way and to remain in complete liaison with you on actions which might be necessary. Perhaps it is particularly important to us as a very large proportion of our present

sales do go to surface coating uses." [MONS 095194, September 8, 1955]

Doc ID # 11883 Exhibit # P-0044

"To us there seems the necessity of establishing quite a lot more data and we would be willing to arrange for some of this to be obtained if you think that this is a reasonable suggestion. Dr. Newman's visit is particularly appropriate at this stage and of course it would be possible for me to discuss the matter broadly during my visit in late October. However, meanwhile we would be most grateful to gain as much of the M. C. C. point of view as possible." [MONS 095195, September 8, 1955]

Doc ID # 11883 Exhibit # P-0044

MONS 095194-95, "Letter from J. W. Barrett to H. K. Mason (St. Louis): Aroclor Toxicology," September 8, 1955.]

Doc ID # 11883 Exhibit # P-0044

40.
09/20/55

Kelly (Monsanto) discouraged Barrett (London) to conduct further research on the toxicity of Aroclor.

"I don't know how you would get any particular advantage in doing more work. What is it that you want to prove? I believe your work should be directed towards finding out what the concentrations are of Aroclor during different operations whether it is industrial or painting. The reports you have seen from Kettering Laboratory are the result of approximately \$15,000 to \$20,000 expenditure by MCC."

"MCC's position can be summarized in this fashion. We know Aroclors are toxic but the actual limit has not been precisely defined. It does not make too much difference, it seems to me, because our main worry is what will happen if an individual develops any type of liver disease and gives a history of Aroclor exposure. I am sure the juries would not pay a great deal of attention to MACs." [MONS 095196, 09/20/1955]

Doc ID # 305 Exhibit # P-0045

"If, however, it is distributed to householders where it can be used in almost any shape and form and we are never able to know how much of the concentration they are exposed to, we are much more

strict. No amount of toxicity testing will obviate this last dilemma and therefore I do not believe any more testing would be justified."

[MONS 095197, "Letter from Dr. R. E. Kelly (Monsanto) to Dr. J. W. Barrett (London)," Aroclor Toxicity, September 20, 1955.]

Doc ID # 305 Exhibit # P-0045

Also See: M 39180-81.

Doc ID # 3657 Exhibit #

41.

09/22/55

Letter from Dr. Kelly (Monsanto) to Dr. Barrett (London): Aroclor Toxicity.

"You commented in your letter about the difference in toxicity between Aroclor 1254 and 1242. These differences are not surprising because in the earlier work it was found that toxicity increased with degree of chlorination. Of course, the volatility is important in the case of inhalation toxicity, and absorption into the intestinal tract is important from the point of oral toxicity. Frankly, there was not a great deal of difference between the two subject compounds. As you know, the maximum allowable concentration is 0.1 mg/cubic meter in the case 1254 and is as high as 10.0 mg/cubic meter in the case of 1268. I think the former is too low and the latter is too high. In the United States they don't use maximum allowable concentrations (MAC) very routinely but in England I think it would be alright to consider 0.2 mg/cubic meter as perfectly safe."

[MONS 095198, "Letter from Dr. R. E. Kelly (Monsanto) to Dr. J. W. Barrett (London)," Aroclor Toxicity, September 22, 1955.]

Doc ID # 8698 Exhibit # P-0046

42.

11/14/55

Garrett worried about the early literature reports on the toxicity of Aroclors.

"While the Aroclors are not particularly hazardous from our own experience, this is a difficult problem to define because early literature work claimed that chlorinated biphenyls were quite toxic materials by ingestion or inhalation. In any case where a workman claimed physical harm from any contaminated food, it would be

extremely difficult on the basis of past literature reports to counter such claims."

[MONS 093616, "Letter from Jack T. Garrett (St. Louis, Monsanto) to Mr. H. B. Patrick," CONFIDENTIAL, November 14, 1955.]

Doc ID # 253 Exhibit # P-0048

43.
03/23/56

It was reported that liver was affected by serious exposure to vapors of Aroclors.

"Chlorinated Biphenyl (Aroclors) - Aroclors can give rise dermatitis when contacted with the skin. Inhalation of vapors is usually followed by systemic poisoning. The liver is affected by serious exposure to vapors. Toxicity increases with increasing degree of chlorination. The proper protective clothing should be worn when handling Aroclors. Respiratory equipment should be used when vapor contact is anticipated."

[M31571, "St. Louis Research Report No. P-688: Tentative Process for Continuous Chlorination of Biphenyl," Monsanto, March 23, 1956.]

Doc ID # 7724 Exhibit # P-0049

44.
04/10/56

The Navy decided to test use of Pydraul 150 fluid in the submarine in spite of lack of approval by the Bureau of Medicine. However, Navy and their consultants had not been told the detailed composition.

"Pydraul 150

In November of last year we were informed that a sample of this fluid had been sent to Dr. Lehman for investigation, allegedly clinical. We have been unable to learn what work Lehman did and what results he obtained. Presumably the Navy decided to test use this fluid in spite of lack of approval by the Bureau of Medicine. To date we have not heard of any difficulties encountered in submarine use."

"I plan to discuss more fully (yet within the limits of the confidential nature of the subject) the composition of 150 with Harold Hodge and Norton Nelson at the time of the Philadelphia meeting. I do not believe that any of Navy people nor their consultants have been

told that 150 contains no TCP. Litzsinger has told me that we certainly can emphasize this point."

[MONS 095628, "Letter from E. P. Wheeler to Dr. R. E. Kelly (Main Office): Hydraulic Fluid Discussion with Captain Stone – U. S. Navy," April 10, 1956.]

Doc ID # 254 Exhibit # P-0050

45.
✱ 05/29/56

Navy was not satisfied with the toxicity of Pydraul 150 for use in submarines, however, Monsanto would prefer the game to have the Navy to use it.

"This afternoon Bob Sido called and stated that the Navy is not satisfied with the toxicity of Pydraul 150 for use in submarines. It is particularly concerned since as in the case of the atomic powered submarines, these vessels will remain submerged for periods up to six weeks. Therefore, any possible toxicological effects cannot be tolerated."

"There will be a meeting on June 6 in Washington to discuss this matter and Sido would like very much to have you or someone else in the Medical Department, sit in to discuss our fluids." "The subject of the meeting will be the demise of Pydraul 150 in the antenna retracting mechanisms of submarines unless we can present a convincing story as to its safety of use. If Pydraul 150 is ruled unsatisfactory, we would then suggest that the Navy consider the use of OS-16." "We would prefer at this stage of the game to have the Navy continue to use Pydraul 150; however, we have OS-16 as an ace in the hole"

[MONS 095631, "Letter from H. S. Litzsinger to J. T. Garrett (Main Office, St. Louis, Monsanto): Pydraul 150," May 29, 1956.]

Doc ID # 256 Exhibit # P-0051

46.
10/12/56

Things were arranged for NAMRI to cooperate in the testing program associated with trial use of Pydraul 150 aboard submarines.

"According to Jack Siegel, they have things arranged for NAMRI to cooperate in the testing program associated with trial use of Pydraul 150 aboard submarines. Samples recently required for Dr. Sendroy at NAMRI are to be used in some continuous exposure

work they are undertaking. They plan some nine and 30-day continuous exposures to air saturated with Pydraul 150. They are undertaking this work at their expense because they feel it is of vital importance to the Navy. NAMRI has promised to have the results within two months. Will keep you posted on further developments."

[MONS 095635, "Letter from G. Robert Sido to Dr. E. P. Wheeler (Main Office, Monsanto): Pydraul 150," October 12, 1956.]

Doc ID # 260

Exhibit # P-0054

47.

12/19/56

Navy conducted their own tests and found high toxicity of Pydraul 150.

"According to Commander Siegel, the test results at the Naval Medical Research Institute on Pydraul 150 toxicity are rather discouraging. All of their work has been with saturated atmospheres. They have gotten high toxicity through skin absorption of animals. They are most concerned about liver damage which resulted through skin absorption." "If you would like to discuss this toxicity work with Siegel or people at NAMRI, it could be arranged early in January. If not, we should hear from the Bureau of Ships after January fifteenth. Would appreciate any comments you might have."

[MONS 095639, "Letter from G. Robert Sido (Monsanto at Washington, D. C. to Elmer Wheeler (Main Office, St. Louis, Monsanto)," Subject: Pydraul 150; December 19, 1956.]

Doc ID # 263

Exhibit # P-0055

48.

01/21/57

Navy thought that Pydraul was too toxic to be used.

"Dr. Treon and I spent an afternoon with the Navy people to discuss Pydraul 150. Those present were Captain Shone, Captain Alvis, Captain Segoions, Commander Siegel and Mr. Mickey Albert. They discussed their information concerning Pydraul 150 which was obtained at the Naval Institute of Medical Research. While reports were not available, they had the following general data:

(Skin applications of Pydraul 150 caused death in all of the rabbits tested. (The amount administered was not given.) A like amount of Collulubo 220 did not cause any deaths.

The inhalation of 10 milligrams of Pydraul 150 per cubic meter or approximately 2 tenths of a part of the Aroclor component per million for 24 hours a day for 50 days caused, statistically, definite liver damage. No matter how we discussed the situation, it was impossible to change their thinking that Pydraul 150 is just too toxic for use in a submarine. It may be that such concentrations would never be reached in the submarine but the Navy does not appear willing to even put the material in a trial run to see if it will work.

[MONS 095640, "Letter from Dr. R. E. Kelly to Mr. H. I. Armstrong (St. Louis, Monsanto)," Subject: Pydraul; January 21, 1957.]

Doc ID # 265

Exhibit # P-0057

49.
02/25/57

Dr. Kelly believed that the toxicity of Montars can be interpreted by that of Aroclors which included causing liver troubles, but was not willing to spend money on further tests on toxicity.

"We have no laboratory toxicological data on the Montars."

"I believe, however, we can interpret our Aroclor data in advising about the toxicological hazard that might be expected from contact with these compounds. There are two hazards."

"One, I feel quite certain that they could cause chloracne similar to the chlorinated naphthalenes and diphenyls. Secondly, I am sure they can cause liver trouble by inhalation of the fumes liberated at elevated temperatures. As you know, the old chlorinated "high boilers" were more toxic than the plain chlorinated Aroclors, and I feel sure that this mixture of polyphenyls is more toxic than chlorinated diphenyl."

"Any experimentation that would give us a definitive answer would require repeated inhalation studies at various levels and would be quite expensive (\$10,000 to \$20,000) and, I repeat, probably would not give us any different information."

"The Medical Department was remiss in allowing a toxicity statement in Bulletin 0-139 to appear without any mention of an inhalation hazard."

[MONS 094942, "Letter from R. E. Kelly (St. Louis, Monsanto) to Mr. J. E. Crouch (Anniston, Alabama)," Subject: Toxicity of Montars; February 25, 1957.]

Doc ID # 268 Exhibit # P-0058

50.

09/11/57

Monsanto worried about the possible broader implications from publishing the toxicity test data from Navy.

"As requested, we stamped your letter of September fourth to Dr. Julius Sendroy, Jr. (NAMRI) "Commercially Discreet for Official Use Only" and delivered it personally."

"In their animal tests they also found that while rats seemed quite normal in growth and life span when exposed to Aroclor vapor or skin contact, on autopsy they observed damage to the liver and feel this should be made available in literature. Due to possible broader implications, it would be advisable for you to discuss this with them the next time you are in Washington." [MONS 095645, September 11, 1957]

Doc ID # 275 Exhibit # P-0059

"In publishing such data, they feel they would have to be rather specific chemically to be meaningful but could avoid all reference to trade names, hydraulic fluid, or Monsanto."

[MONS 095645, "Letter from G. Robert Sido (Monsanto at Washington, D. C.) to E. P. Wheeler (Main Office, Monsanto)," September 11, 1957.]

Doc ID # 275 Exhibit # P-0059

51.

09/25/57

Navy determined that Pydraul would not be suitable for use in submarines.

"Early this year (January) BuMed of the Navy informed us that they had animal toxicity data which indicated, in their opinion, that Pydraul 150 would not be suitable for use in submarines. The decision was based not on the possibility of forming phosgene upon decomposition but rather on the toxicity effects following repeated application of Pydraul 150 to the skin of animals or toxic effects following repeated inhalation of mists (or vapor). We have not as yet seen the data obtained in the Navy research program but hope to get more information concerning it next week."

"The Navy convinced us that they would not accept Pydraul 150 and probably no other fluid containing chlorine or chlorinated diphenyls."

[MONS 095646, "Letter from E. P. Wheeler (St. Louis, Monsanto) to Philip L. Slayton (Everett, MASS)," Toxicity of Pydraul 150, 09/25/1957.]

Doc ID # 276 Exhibit # P-0060

52.

09/30/57

In Anniston's operations, fumes may escape to the air. Inhalation of the fumes liberated at elevated temperatures could cause liver trouble.

"In the reference memo, Dr. Kelly advised that he had no laboratory toxicological data on the Montars but felt certain they could cause chloracne similar to the chlorinated naphthalenes and diphenyls, and, secondly, they could cause liver trouble by inhalation of the fumes liberated at elevated temperatures. He recommended that the maximum allowable fume concentration be set at 0.5 milligrams per cubic meter of air for exposure data information to our customers."

"At Anniston, we drain Montars at 380 °C, from our stills an average of once per day when operating at maximum rate. The operation is performed under large hoods which I believe are effective in protecting our personnel. However, it is possible that some fumes may escape into the operating area due to wind currents or inadequacies in our blower system."

*

[MONS 095660, "Letter from C. M. Edelblut (Anniston, Alabama) to Mr. R. S. Wobus (St. Louis, Monsanto)," September 30, 1957.]

Doc ID # 277 Exhibit # P-0061

53.

10/03/57

Anniston doubted that any large-scale investigation of the toxic problem of Montars could be given a high priority.

"In your memorandum you have requested information regarding toxicity of Montars and measurement of their concentration in air. I doubt that much, if any, work has been done regarding evaluation and measurement of the hazards involved. However, any information that the Research and/or Medical Departments can contribute on the subject will be appreciated. It is doubtful that any

large-scale investigation of the problem can be given a high priority at this time with the pressure of other work now on the research agenda."

[MONS 095662, "Letter from Mr. R. S. Wobus (St. Louis, Monsanto) to C. M. Edelblut (Anniston, Alabama)," October 3, 1957.]

Doc ID # 279 Exhibit # P-0062

54.
November
1957

In November 1957, continuous chlorinated Aroclors were first made in plant equipment. Before that time, Aroclors were made in batch operations.

"Batch chlorinated Aroclors were made until November 1957 when continuous chlorinated Aroclors were first made in plant equipment."

[M 40181, Standard Manufacturing Process for Aroclors: Appendix K - Background Information.]

Doc ID # 3431 Exhibit # P-0002

Also See: DSW 002603.

Doc ID # 26171 Exhibit #

55.
02/14/58

Anniston plant was found that employees did not have adequate knowledge on artificial respiration and other unsafe problems from Aroclors, etc.

"Plant knowledge of artificial respiration is very inadequate. The Committee found only 4 employees, out of 37 contacted, who appeared to have adequate knowledge of the latest artificial respiration techniques. Two employees have never received training. The remaining 31 employees felt that they needed refresher training. Sixty percent said that they were not familiar with the Neilson Lift Method." [MONS 035302, 2-14-58]

Doc ID # 281 Exhibit #

"The Committee recommends that supervision continue the review of Anniston accidents with their employees and pointed out that unless the trend is stopped, a lost-time accident is sure to follow."

"Many steam and water leaks were observed. These leaks not only represent a loss in money, but also may injure people through burns or creating slick surfaces by wetting or ice formation. Maintenance and Production supervision should be more diligent in their efforts to eliminate leaks."

"Most of the ice formation was caused by leaks or the purposeful bleeding of water and steam tracers to prevent freezing. Corrective action should be taken to stop the leaks and change the location of bleeders so that ice is not formed in critical areas." [MONS 035303, 02/14/1958]

Doc ID # 281 Exhibit #

"5. Unsafe Practices Observed or Related by Employees.

The following unsafe practices or hazards were observed by the Committee or related by the employees contacted during the inspection tour.

BIPHENYL

- a) Ground area on east side of Biphenyl Department in poor condition. Needs clean-up.
- b) Steam and water leaks should be repaired.
- c) Patch west wall of meter room to prevent water collecting in the room when it rains.
- d) The safety shower outside the hydrogen compressor room will not work.
- e) Biphenyl lunchroom needs some cleaning. Trash can should be provided in this room for lunch waste paper.
- f) Biphenyl lab bench area dirty. Needs general clean-up.
- g) The pipe rack area outside the Biphenyl pipe shop is cluttered. Items should be arranged more neatly.
- h) Remove fan and ceiling vent from their floor platform. Repeat item.
- i) Several small product spills were observed on the floors) throughout the Biphenyl Department. Leaks should be repaired and material cleaned up.

AROCLORS

- a) Floor is covered in places with tarry product. Should be sanded down.
- b) Clean off the tops of the hoods located in the ground floor area.

- c) Clean up jet platform. There are still parts of jets scattered around.
- (d) Consideration should be given to replacing the 55-gallon brick-filled stoves with standard gas heaters.
- e) Nose racks should be provided in strategic locations.
- f) There was a lever-pak lid wired to the forward flow sight glass on the #1 Aroclor still. This lid was used as a wind guard for a gas torch. This make-shift guard should be replaced by one fabricated in the shop."
- (g) Repair steam leaks.

[MONS 035302-307, Monsanto at Anniston Plant, "Safety and Housekeeping Inspection Committee Report," February 14, 1958.]

Doc ID # 281 Exhibit #

56.
07/08/58 Younger reported to Monsanto their findings on the toxicity of OS-95.

"Dr. Kelly and I have discussed the reference memo."

"In reviewing the Younger report on the toxicity screening, there are two aspects which we would like to check. One, we would not expect the lethal dose by skin absorption to be as low as indicated. Two, the degree of skin irritation is out of line with what we would expect from its components."

"We have asked Younger to repeat these two parts of the investigation and will notify you of the results."

[MONS 095674, "Letter from E. P. Wheeler (General Office, Monsanto) to Mr. H. S. Litzsinger (General Office)," Toxicity of OS-95; July 8, 1958.]

Doc ID # 284 Exhibit # P-0063

57.
06/23/59 Letter from Kelly to Hessel: Monsanto knew that the Pydraul "constituents are considerably more toxic than mineral oil", but they were still in an effort to promote "the sale of Pydraul AC in Germany".

"I wish I could be as optimistic as you are in stating that "any information you can give us from a medical standpoint will certainly be helpful in promoting the sale of Pydraul AC in Germany." If these Germans are afraid of mineral oil, I feel they will be rather

suspicious of Pydraul AC. After all, the constituents are considerably more toxic than mineral oil. The odor or taste would be considerably more marked than mineral oil, should any of the material get into the food."

"I think the Germans are being overcautious in this matter, but I certainly can't give Pydraul an absolutely clean bill of health, assuming some might get into the food. Pevely Dairy's experience is certainly good and it might be wiser just to mention this plus the LD₅₀'s of the Pydraul AC."

[MONS 098053, "Letter from R. Emmet Kelly, M. D. to Mr. O. F. Hessel: Pydraul AC," June 23, 1959.]

Doc ID # 8902 Exhibit # P-0065

58.
12/30/59

Letter from R. H. Munch to Elmer P. Wheeler: It was discussed to determine "whether toxicologically significant amounts of Pydraul AC components are entrained in compressed air".

"This will summarize the conclusions reached in our conversation regarding analytical work to determine whether toxicologically significant amounts of Pydraul AC components are entrained in compressed air from air compressors lubricated with that fluid."

[MONS 098055, "Letter from R. H. Munch to Elmer P. Wheeler: Pydraul AC Vapors In Compressor Air," December 20, 1959.]

Doc ID # 8904 Exhibit #

59.
1950s

The gaseous Aroclor went to air without control.

"Q: Okay. You mentioned that around these packed pumps, the gaseous Aroclor would come out. And was there any type of process or policy to collect the gas, or did it just dissipate?"

"A. There wasn't insofar as I recall -- At that particular time, you know, in the early '50s, that was not a problem that any body was aware of that -- You know, that just wasn't a problem." *

[pp. 32-33, "Deposition of Donald Curry, Chemical operator for Monsanto, taken in the Law Suit of Abernathy," January 20, 1999.]

60.

02/08/60

Monsanto knew the serious hazardous health effects of Aroclors. Kelly planned to tell Allied Chemical & Dye Corporation that "Aroclor 1254 is" "capable of causing systemic injury by the inhalation of fumes, especially at elevated temperatures or by absorption through the skin following repeated or continuous contact". He said that "The symptoms after exposure consist of headache, nausea and, after more severe exposure, signs of liver damage occur". He also mentioned that "While we have not encountered any fatalities, there is no question but this could occur should the exposure be massive or prolonged".

"I would tell Allied Chemical the following:

Aroclor 1254 is chlorinated diphenyl. It is capable of causing systemic injury by the inhalation of fumes, especially at elevated temperatures or by absorption through the skin following repeated or continuous contact. There is no question but that if the material is heated the vapors must be exhausted without allowing the employees to breathe them."

"The symptoms after exposure consist of headache, nausea and, after more severe exposure, signs of liver damage occur. This is evidenced by enlarged liver and jaundice. While we have not encountered any fatalities, there is no question but this could occur should the exposure be massive or prolonged. The method of detection is by breaking it down to the chlorine radical and analyzing for that. I presume reference is to detection in the air rather than detection in people. The concentration of Aroclor 1254 in the air should be kept below 0.5 milligrams per cubic meter."

[MONS 097894, "Letter from R. Emmet Kelly, M. D. to Mr. Jack Benaveglia (New York): Allied Chemical & Dye Corporation: AROCLOR 1254," February 8, 1960.]

Doc ID # 8297

Exhibit # P-0067

61.

1961

Anniston built a waste treatment plant, the first in Monsanto.

Capacity
Methods

[DSW 102005, "The Plant, its Products, its People", Anniston Booklet, 1968.]

Doc ID # 11071

Exhibit #

62.
1961

Anniston built a new Biphenyl-Tubular Reactor.

"Also, in 1961, we went on stream with a new Biphenyl-Tubular Reactor."

[DSW 102005, "The Plant, its Products, its People", Anniston Booklet, 1968.]

Doc ID # 11071 Exhibit #

63.
02/14/61

On February 14, 1961, continuous chlorinated Aroclor 1242 was made on a full time basis.

"Several test runs were made and sold to customers for evaluation. On February 14, 1961, continuous chlorinated Aroclor 1242 was made on a full time basis. Today Aroclor is made by both batch and continuous chlorination of Biphenyl and/or Santowax."

[M 40182, Standard Manufacturing Process for Aroclors: Appendix K - Background Information.]

Doc ID # 3431 Exhibit # P-0002

Also see: DSW 002604.

Doc ID # 26171 Exhibit #

64.
03/08/61

Letter from Garrett to Hinson: "Repeated contact on the unprotected skin in the form of dermatitis and from the inhalation of excessive quantities of vapors could cause liver and kidney difficulties."

"After reading Mr. Hanke's letter, it is our opinion that he has been handling Aroclors in a very incautious manner. Based on American industrial hygiene practices this might even be called a dangerous manner.

It is our recommendation that wherever Aroclor products are used at elevated temperatures, adequate ventilation must be provided to maintain the atmospheric concentrations of Aroclor below the Hygienic Standard or the Maximum Allowable Concentration (MAC) established by the American Conference of Governmental Industrial Hygienists. These MAC's for Aroclor products are: for

Aroclor 1242, 1.0 milligram per cubic meter, and for Aroclor 1254, 0.5 milligram per cubic meter."

"Under ordinary conditions the Aroclor products are not particularly toxic as indicated by the oral acute toxicity which for Aroclor 1242 is 4.15 ml/kg in rats and for Aroclor 1254 is 3.10 ml/kg in rats.

At the risk of being repetitious the problems with Aroclors come from repeated contact on the unprotected skin in the form of dermatitis and from the inhalation of excessive quantities of vapors could cause liver and kidney difficulties.

I would suggest that a copy of the attached publication on the vapor toxicity of Aroclor 1242 and Aroclor 1254 be sent to the subject company."

[MONS 097869, "Letter from Jack T. Garrett (General Offices) to A. T. Hinson (General Offices): Aroclor Toxicity," March 8, 1961.]

Doc ID # 8280 Exhibit # P-0070

65.
08/03/61

Letter from Wheeler to Dr. Maddy: "Odell will have his article relating to Aroclor 1242 and chick edema in the Journal of Poultry Science soon."

"We have heard recently from Chuck Eby that Odell will have his article relating to Aroclor 1242 and chick edema in the Journal of Poultry Science soon.

Sometime ago, there was some correspondence with Odell, then at the University of Missouri, indicating that you or Dr. Kelly might contact Odell about his studies. We in the Medical Department did not contact Odell, but wonder if you did or if you could bring us up to date on any further developments."

[MONS 097909, "Letter from Elmer P. Wheeler to Dr. Kenneth H. Maddy (General Offices): Aroclor 1242 -- Article by Professor B. J. Odell," August 3, 1961.]

Doc ID # 8807 Exhibit #

66.
09/01/61

Letter from Maddy to Wheeler: Studies had been conducting on Aroclor 1242 with regard to chick edema.

"You have asked for a status report on Aroclor 1242 with regard to chick edema. O'Dell is not planning to do any more work beyond that that he has already told us about. However, the word has gotten around in toxicology circles and more studies are under way.

Samples of Aroclor 1242 have been submitted to Proctor and Gamble, to MIT, and to the National Dairy Products Corporation, for evaluation in chick edema studies. The Proctor and Gamble people spent a day with us about six weeks ago and gave us a detailed report on their work with chick edema factor. It appears that Aroclor 1242 does indeed produce the same symptoms in chickens as does the chick edema factor that has occurred in commercial fats. However, the Proctor and Gamble people are convinced that the degree of toxicity is so much less for Aroclor 1242 than for the naturally occurring material, that the two are not identical. Furthermore, their physical-chemical data available on the chick edema factor indicates that it is structurally different from Aroclor 1242. I believe that we are pretty much out of the woods on this problem because of this marked difference in degree of toxicity."

[MONS 097441, "Letter from Kenneth H. Maddy to Elmer P. Wheeler: Aroclor 1242," September 1, 1961.]

Doc ID # 286 Exhibit #

67.
March 62 Missouri group published the paper, which revealed the toxic symptoms in the chick by Aroclor 1242.

[MONS 097442; or Missouri Group, "Poultry Science", Volume 41, page 296, 1962.]

Doc ID # 287 Exhibit #

68.
03/27/62 Moddy's letter to Bergen, Jr.: Discuss the paper published by the Missouri group, which revealed the toxic symptoms in the chick by Aroclor 1242, i.e., hydropericardium.

"The Missouri group has finally published their report on the ability of Aroclor 1242 to produce toxic symptoms in the chick. This paper appeared in Poultry Science, volume 41, page 296, 1962, and a copy of same is attached."

"A very complete report on hydropericardium was issued recently from the Food and Drug Administration and a copy of this report is also attached. You will note that her again reference is made to ability of Aroclor 1242 to produce hydropericardium." "I believe that it is the opinion of all who have done any work in this specific field that Arochlors are not the specific causative agents of hydropericardium. However, chlorinated hydrocarbons are suspect and I think that we should continue to watch this field to see if structures of the Aroclor type can serve as precursors to the toxic principle. I believe that this approach is now being evaluated at National Institute of Health."

[MONS 097442, "Letter from K. H. Moddy (General Office, Monsanto) to H. S. Bergen, Jr.," March 27, 1962.]

Doc ID # 287 Exhibit #

69.
08/03/62

As early as in May 1946, Monsanto already listed the reference to avoidance of exposure to Aroclor vapors and mention of the 'acne-form of skin eruption' in its Application Bulletin on 'The Aroclors'.

"I am forwarding also the copies of pertinent pages from the 1946 Application Bulletin on 'The Aroclors'; this was issued in May, 1946. You will note the reference to avoidance of exposure to Aroclor vapors and mention of the 'acne-form of skin eruption.'"

[MONS 097431, "Letter from J. R. Durlane to Mr. E. L. French," August 3, 1962.]

Note: The Original used the word: "erruption" instead of eruption.

Doc ID # 8143 Exhibit #

70.
08/27/62

Wheeler wrote to Lonsberg: Harmful concentrations of (Aroclor) vapors may be liberated in a workroom atmosphere.

"We cannot emphasize too strongly that the use of any of the Aroclors at elevated temperature must include provisions of exhaust ventilation. Although the hazard of vapor exposures may not be quite as great with the solid and resinous Aroclors, there is evidence that even with these, harmful concentrations of vapors may be liberated in a workroom atmosphere. For example, we are now faced with a suit alleging injury from Aroclor 4465 where the use of this material involved baking a particular formulation in an

oven. As we understand it, the oven was not vented to the outdoors."

[MONS 097445, "Letter from E. P. Wheeler (General Office, St. Louis, Monsanto) to Mr. J. P. Lonsberg (New York)," August 27, 1962.]

Doc ID # 291 Exhibit #

71.
11/27/62

Letter from R. Emmet Kelly to File: two cases of chloracne in people occurred in a die-casting foundry. Kelly told them to watch out "chloracne, as will as liver intoxication" under the described conditions in the foundry.

"I talked with Dr. Smith, at the G.M. plant in Massena, New York (RO. 4-0581, Area Code 315)."

"He was primarily interested in whether or not they would get acute exposures from molten aluminum dropping into puddles of Pydraul A-200. This is a die-casting foundry and they say they have lots of cloud smoke but no respiratory symptoms.

I told them they had no worry about phosgene, which was their particular concern but, if conditions were as sloppy as they declared, they would have worry about chloracne, as will as liver intoxication. He told me they did have two cases of chloracne in people who had the fronts of their trousers soiled from drainage. They also stated they would look out for jaundice."

[MONS 098084, "Letter from R. Emmet Kelly to File," November 27, 1962.]

Doc ID # 8924 Exhibit #

72.
06/19/63

For Aroclors labels, "There are three memos dated in May, 1947, which confirm the precautions regarding skin contact and inhalation of fumes and dust".

"Attached is a resume of the historical practice in labeling Aroclor products from prior to 1947 to date. There are three memos dated in May, 1947, which confirm the precautions regarding skin contact and inhalation of fumes and dust were agreeable to the Surgeon General and also conform to the California Hazardous Chemical Labeling Law passed at about that time."

[MONS 097583-86, "Letter from G. Robert Sido to Dr. EAL. Seppala: Aroclor precautionary labeling," and "the attached labels," June 19, 1963.]

Doc ID # 8194 Exhibit # P-0073

73.
09/30/63

Letter from Wheeler to M. T. Nemits: "Under the definitions of the Federal Hazardous Substances Labeling Act, Aroclor 1232 would be considered 'toxic'."

"We have been asked to forward the information requested in your subject memo.

The oral LD₅₀ in rats is 4470 mg/kg. Under the definitions of the Federal Hazardous Substances Labeling Act, Aroclor 1232 would be considered 'toxic' since this does falls within the range of 50 mg/kg to 5 gm/kg."

[MONS 097864, "Letter from Elmer P. Wheeler to M. T. Nemits (Los Angeles): Wynn Oil Company – Aroclor 1232," September 30, 1963.]

Doc ID # 8275 Exhibit #

74.
05/27/64

Letter from Wheeler to Nemits: "Aroclor 1232 would be classified as a 'toxic' substance".

"Under the provision of the subject act, Aroclor 1232 would be classified as a "toxic" substance since its oral LD₅₀ in rats is under 5 g/kg of body weight but more than 50 mg/kg. Similarly, the lethal dose when applied to the skin of rabbits is less than 2 g/kilo but more than 200 mg/kilo. The ranges indicated above apply to those products which reach the market place in such a fashion that they are included under the Federal act."

[MONS 097865, "Letter from Elmer P. Wheeler to Frank T. Nemits: "Aroclor 1232: Federal Hazardous Substances Labeling Act," May 27, 1964.]

Doc ID # 8276 Exhibit # P-0074

75.

08/04/64

Letter from Challen to Campbell: Cahllen wrote that regarding to the death, "trichlorethylene is much more likely to be the cause" than Aroclor. Challen suggested Campbell to clarify with Quinidroga immediately that "we have on file evidence that Condensadores de Trevoux were supplied with a copy of one of our Aroclor T.S.B.'s ..."

"In replying to Quimidroga we feel that it would be well worthwhile to particularly stress the comments made by Dr. Hardy in his third paragraph, i.e. that trichlorethylene is much more likely to be the cause (if, of course, it is proved that death was not due to a gastric ulcer in the first place) than Aroclor due to its comparatively much higher vapour pressure.

It is, as Dr. Hardy says in his fifth paragraph, extremely important that we have on file evidence that Condensadores de Trevoux were supplied with a copy of one of our Aroclor T.S.B.'s, and we suggest you clarify this point with Quinidroga immediately."

[MONS 097946, "Letter from J. H. Challen (London) to J. M. Campbell (London): Aroclor 1254 E," August 4, 1964.]

Doc ID # 8833 Exhibit #

76.

11/24/64

Letter from Kelly to File: Kelly explained to Dr. Wickham "that if sufficient concentrations of Therminol occurred from leaks, and the fluid at elevated temperatures came into the working environment, problems could result".

"I talked to Dr. W. G. Wickham, at the Griser, North Carolina Plant, of Celanese Plastics. This was referred to me by Mr. Stan Shaw, of Organic Sales.

I explained to Dr. Wickham that if sufficient concentrations of Therminol occurred from leaks, and the fluid at elevated temperatures came into the working environment, problems could result.

I told him, also, that in spite of the marked inhalation toxicity at elevated temperatures, we only had reports of three instances of problems that I could remember during the last five to ten years.

I impressed upon him the fact, however, that such leaks must be controlled or the fumes removed by exhaust ventilation."

[MONS 097854, "Letter from R. Emmet Kelly, M. D. to File: THERMINOL," November 24, 1964.]

Doc ID # 8270 Exhibit #

77.
12/03/64

Due to a proposed new application by British Railways Board, Denton-Roberts asked Hardy to give "a little more detail on what we consider to be 'prolonged contact'."

"The British Railways Board, Research Department, have in mind a particular application for Aroclor where it will be used in place of a mineral oil and it may, therefore, get on people's hands and be treated in a similar manner, i.e. only washed off at the end of the working day. The Aroclor will, of course, only be in the cold."

"I should be grateful if you would let me have your comments on this particular application and in particular a little more detail on what we consider to be 'prolonged contact'."

[MONS 097933, "Letter from T. Denton-Roberts to D. V. N. Hardy: Aroclor Toxicity," December 3, 1964.]

Doc ID # 8826 Exhibit #

78.
03/22/65

Letter from Kelly to Gedy: Monsanto realized that Aroclor was a hazard at elevated temperatures. "... if the fumes are as this employee describes, we have a hazard."

"As you know, this particular Inerteen PPO consists of 60% Aroclor 1260 and 40% trichlorobenzene.

When this material is subjected to temperatures of 250 °F. I think the trichlorobenzene would volatilize and that is probably what is giving this man the problem. The vapor pressure of Aroclor 1260 at 100 °C. for one hour should be extremely small but, of course, some fumes must come off. There is no question in my mind but that the stinging sensation this man complains of is due to the trichlorobenzene. Whether or not there is enough Aroclor being given off to create a health hazard is not clear at present but there could be a risk."

"I think one of our salesman should go out to this plant and check with their management rather than write this employee. How you

handle that is, I believe, a problem for the Toronto office. There is no question, however, that if the fumes are as this employee describes, we have a hazard. I don't know why, after all these years of use, a complaint like this arises but it may be some sort of special application."

[MONS 097882, "Letter from R. E. Kelly, M. D. to W. P. B. Gedye (Toronto)," March 22, 1965.]

Doc ID # 8287 Exhibit #

79.

May 1965

In May 1965 an Aroclor expansion was completed to bring the capacity to 58 M (million) pounds per year which includes 10 M pounds per year of Solid Aroclors.

[M40182, Standard Manufacturing Process for Aroclors: Appendix K - Background Information.]

Doc ID # 3431 Exhibit # P-0002

Also See: DSW 002604.

Doc ID # 26171 Exhibit #

80.

08/05/65

Hardy wrote to Dr. Kelly that "The man's doctor reports that he is suffering from some kind of mental deterioration which manifests itself as a general showing up of his faculties."

"We are advised that an employee of a customer of ours is claiming damages for injuries received due to breathing toxic vapours while welding a copper transformer which had previously been filled with Pyroclor. The man's doctor reports that he is suffering from some kind of mental deterioration which manifests itself as a general showing up of his faculties.

As far as my knowledge is concerned no such effect has previously been attributed to the breathing of chlorinated hydrocarbons such as these present in Pyroclor, or in their thermal decomposition products. I would be glad to know whether any such case has been brought to your notices, or alternatively whether in your opinion such mental deterioration could have been initiated by the incident which occurred in May 1963."

[MONS 097938, "Letter from D.V.N. Hardy to R. E. Kelly (St. Louis): Toxicology-Pyroclor," August 5, 1965.]

Doc ID # 8831 Exhibit #

81.
08/11/65 Letter from Johnson to Hardy: It was mentioned in this letter that a patient "alleges progressive mental deterioration from a single exposure to chlorinated hydrocarbons products."

"I have certainly never heard of any effect such as you describe in the patient who alleges progressive mental deterioration from a single exposure to chlorinated hydrocarbons products. I would certainly think that this incident has nothing to do with the man's illness.

I will call this to Dr. Kelly's attention and if he has any information to the contrary, I am sure you will hear from him."

[MONS 097937, "Letter from M. N. Johnson, M. D. to D. V. N. Hardy (Monsanto, London): Pyroclor -- Your letter to Dr. Kelly August 5, 1965," August 11, 1965.]

Doc ID # 8830 Exhibit #

82.
09/03/65 Letter from Wheeler to Davis: "the potential toxic hazards of the use of Aroclor 1242 at elevated temperatures".

"As I told you on the telephone Mr. Haredos called me earlier this week quite disturbed as a result of my letter of August 27. This letter apparently alerted him somewhat to the potential toxic hazards of the use of Aroclor 1242 at elevated temperatures. He told me that the Monsanto literature furnished him had been more reassuring in terms of what problems might arise in their application. I guess what really shook him was when I mentioned that with temperatures greater than 150° mechanical exhaust ventilation should be provided to remove vapors."

"I told Mr. Haredos further that the Medical Department was skeptical about the use of Aroclors in mining operations because we had not seen data to show absence of toxic levels."

"I emphasized and re-emphasized that the Aroclors are excellent products but must be used in closed systems if they are to be heated."

[MONS 097873-74, "Letter from Elmer P. Wheeler to Richard Davis: Aroclor 1242," September 3, 1965.]

Doc ID # 8283 Exhibit #

83.

09/10/65

Letter from C. L. Early to R. Davis: PCB's containing Pydraul fluid was considered to be used in the coal mines.

"As I indicated the last time we discussed the subject of odor and toxicity of chlorinated hydrocarbons for coal mine applications, these characteristics have been considered and will be resolved in due time. The problems of getting a candidate fluid in a mine for a meaningful field test are many-fold, but we are making progress. There has to date been no serious alarm shown regarding toxicity of Pydraul 312 (first candidate) by anyone in the industry. Please, let's not jeopardize our chances of getting a field test underway by prematurely raising the question of toxicity to the industry. They can think of enough reasons on their own for not using fire-resistant fluids without any assist from Monsanto. As soon as field tests are underway, the Monsanto and 'customer' medical departments will be asked to assist in evaluating toxicity in an actual mine situation. Such evaluations will be far more meaningful than simulative tests which could be conducted prior to field tests."

[MONS 098030, "Letter from C. L. Early to R. Davis: Fire Resistant Hydraulic Fluids for Coal Mines," September 10, 1965.]

Doc ID # 8884 Exhibit #

84.

12/29/65

Birrell wrote to Hardy regarding the toxicity of Aroclors raised in the letter by Coventry Corporation Water Undertaking.

"I attach a photostat of a letter from the Coventry Corporation Water Undertaking, and also a photostat of the information given in the chemical handbook which they mention.

I would appreciate your comments and advice with regard to the question of recommendations to the Coventry Corporation Water Undertaking.

The copy of the chemical handbook article appears to be fairly damning at first sight. Are you able to recognize where it comes from?"

[MONS 097930, "Letter from R. G. Birrell to D. V. N. Hardy: Aroclor Toxicity," December 29, 1965.]

Doc ID # 8823 Exhibit #

85.

12/30/65

"Aroclor 1242 - Acute Toxicity Screening Data:

Oral Toxicity - Rats - Mixed Sex - Administrated Undiluted. The LD50 was 8650 (7610 - 9975) mg/kg. The survival time was from about 24 hours to 3 days with most of the deaths occurring in 2 days. The toxic signs were diarrhea, loss of appetite, increasing weakness, dyspnea and collapse. At autopsy, macroscopic examination revealed liver and renal hyperemia."

[M11667, "Letter from Dr. William H. Hunt (Toxicologist, Medical Department) to Dr. M. J. Thomas (Dayton, Ohio)," 12/30/1965.]

Doc ID # 1497 Exhibit #

86.

1966

The presence of PCBs in the environment was first discovered in 1966 by Jensen. Then, it was confirmed by Jensen and others in the following years.

"In 1966, Jensen (Anon., 1966); Jensen et al., 1969; Jensen, 1972; Hutzinger et al., (1974a) reported PCBs in eagles, herring, and other Swedish environmental samples. Since then, PCBs have been shown to be nearly ubiquitous environmental pollutants, occurring in most human and animal adipose samples, milk, sediment, and numerous other matrices."

[Mitchell D. Erickson, "Analytical Chemistry of PCBs," Butterworth Publishers, Boston, An Ann Arbor Science Book, 1992.]

Also See: MONS 223452.

Doc ID # 10868 Exhibit # P-0005

87.

01/14/66

Letter from Hardy to Birrell: Hardy said that after long-exposure to Aroclors, "some of the more serious effects would develop".

"I suggest that you summarize (1) the number of Aroclor-insulated transformers and capacitors that have been supplied (2) the kinds

of organization and of industry that have taken them (3) the safety and other performance record.

The chemical handbook citation comes from "Dangerous Properties of Industrial Materials" by N. Irving Sax and necessarily gives overall guiding information for all conditions of usage. Some of the more serious effects would develop only after long-exposure and are common to chlorinated hydrocarbons which the dry-cleaning and degreasing liquids such as carbon tetrachloride and trichloroethylene are typical."

[MONS 097929, "Letter from D.V.N. Hardy to R. G. Birrell: Aroclor Toxicity – Coventry Corporation Water Industry," January 14, 1966.]

Doc ID # 8822 Exhibit #

88.
02/03/66

Letter from Wheeler to Kelly: "a tank car equipped with Therminol FR-O had caused "illness" in some repair or maintenance men".

"Stan Shaw of the industrial fluids sales group in the Organic Division informed me that a tank car equipped with Therminol FR-O had caused "illness" in some repair or maintenance men (I believe) in the New Orleans area. The car is one of 56 which U. S. Steel converted to FR-O usage. It had originated at the U. S. Steel plant in Birmingham and was going to or had been delivered to Kaiser Aluminum near New Orleans.

A Dr. W. C. Quinn in New Orleans wants information about the fluid. Dr. Quinn can be reached at Area Code 504, 891-8313. He reportedly is the 'company surgeon' for the W. Surgi Equipment Company in New Orleans. I guess this is the company that provides the heat transfer equipment for the tank cars and presumably it was men from this company that had been made ill."

[MONS 097883, "Letter from Elmer P. Wheeler to R. Emmet Kelly, M.D.: Therminol FR-O (Our new heat transfer medium for tank cars)," February 3, 1966.]

Doc ID # 8288 Exhibit #

89.
03/07/66

Letter from Wheeler to Randall Craham: Mr. Breck raised inquiry to Monsanto. But Monsanto didn't want "to get involved in any extensive studies in connection with Mr. Breck's problem." Monsanto knew that "On the other hand, there have been

numerous cases of poisoning and deaths from compressed air in plants where the air entering the compressor has been a source of CO or other toxic material."

"Dale Smith asked for our comments relative to Mr. Breck's inquiry. I believe there are two pertinent points in your memo. One is that the volume of Pydraul in such applications would be pretty limited. Secondly, I doubt that Monsanto wants to get involved in any extensive studies in connection with Mr. Breck's problem.

In the last 2 – 3 years we have looked at standards for compressed air more from the standpoint of that used in a number of our plants rather than the problem of scuba divers. It is interesting to note that only recently has much attention been given to establishing standards for compressed air for either use. In industry more problems have arisen from connecting a cylinder of some other gas to the compressed air line rather than from contaminants in the compressed air. On the other hand, there have been numerous cases of poisoning and deaths from compressed air in plants where the air entering the compressor has been a source of CO or other toxic material and then distributed around the plant through pressure lines rather than in cylinders."

"In January 1964 the Department of Public Health of California issued a publication under the title 'Skin and Scuba Diving as a Health Problem.' This is made up of about 30 pages. A xerox copy of page 9 which indicates standards for the air is attached. (If Mr. Breck writes to California for a copy of this Publication, he will find that the report recommends a water lubricated compressor.)

In February, 1964 the State of New Jersey published regulations governing compressed air used in scuba activities. A xerox copy of their regulations is also attached."

[MONS 098001, "Letter from Elmer P. Wheeler to Randall Craham (New York)," March 7, 1966.]

Note: The name is too blurring to read.

Doc ID # 8865 Exhibit #

99.

03/29/66

Letter from Denton-Roberts to Hardy: Two women suffered skin irritation due to Aroclor vapor in the workroom.

"Prior to your memo of December 7th concerning the above matter, I had informed Turnigh Controls of the measures necessary to

prevent any occurrence of skin irritation on the two women concerned. The only safe way is to vent the Aroclor vapours to atmosphere. However, Turnright Controls spent £10,000 installing an air conditioning system which unfortunately did not take into account that Aroclor vapour was being evolved. They found my suggestions financially unacceptable and wished to have modifications made to the air conditioning system to keep the concentration of Aroclor vapour below our maximum recommended figure. The Aroclor being handled is not hot enough to cause a large concentration of vapour in the workroom and that is why the women have only suffered at times when very little fresh air has been blown into the air conditioning system but at the time of my discussion with Turnright Controls and Fuel Efficiency Company Limited who design the equipment, it appeared that the level of Aroclor might be kept to a very low figure by operating the cooler all the time."

[MONS 097926, "Letter from T. Denton-Roberts to D. V. N. Hardy (London): Turnright Controls – Aroclor 1248 - Handling," March 29, 1966.]

Doc ID # 8820 Exhibit #

100.
07/19/66

In response to the problem of Toxicity of Pydraul 135, Steel Company of Wales, Wheeler said that "I have purposely not made a direct comparison with Pydraul 150 because the animal toxicity data for Pydraul 135 shows that this fluid is 'more toxic' than Pydraul 150."

"Attached are two xerox copies of information entitled 'Pydraul 135 – Toxicity and Safe Handling Information.' These can be given to the appropriate individuals at the Steel Company of Wales.

I have purposely not made a direct comparison with Pydraul 150 because the animal toxicity data for Pydraul 135 shows that this fluid is 'more toxic' than Pydraul 150. Insofar as the toxicity of these fluids is concerned, however, the interpretation of the animal data is a matter of relativity. It becomes almost a question of whether one can say, "Bananas are more nutritious than oranges."

I believe you can point out that Pydraul 135 is no more hazardous to use than other numbers of the Pydraul series. The precautions to be observed are similar and if the recommended procedures are followed, there should be no more difficulty with one fluid than the other."

[MONS 098009, "Letter from Elmer P. Wheeler to T. Denton – Roberts (London): Toxicity of Pydraul 135, Steel Company of Wales, Your memo to R. Davis," July 19, 1966.]

Doc ID # 8869 Exhibit #

101.

08/19/66

Letter from Kelly to Waychoff: People working with Aroclor "were getting dermatitis from Aroclor".

"I talked to your customer, Bill Boyer, at Fiberfill in Evansville. He stated he had two people with dermatitis which was occurring during dry blending fiberglass, SAN resin, Aroclor, and antimony oxide.

I could not help him much and I told him that if they were getting dermatitis from Aroclor there was not anything we could do except use a barrier lotion and better housekeeping. From what he told me, however, their operation was quite clean."

"I told him the other alternative was just to remove the employees. This does not seem like a chloracne or sensitization as it gets better when the men are removed."

"He seemed to act like he would appreciate it if one of our doctors would go to Evansville but, frankly, I don't know what good this would do."

[MONS 097884, "Letter from R. Emmet Kelly, M. D. to Mr. Walter Waychoff," August 19, 1966.]

Doc ID # 8289 Exhibit #

102.

08/25/66

Letter from Press to Kelly: "The dermatitis problem" "could be a threat to the Aroclor business at this account."

"The dermatitis problem Bill Boyer at Fiberfill has discussed with you could be a threat to the Aroclor business at this account.

In your discussions with Mr. Boyer you may have already covered this point, but is it possible that the fiberglass used in the dry blending operation could be the source of the dermatitis problem? Is this the type of dermatitis that might be caused from an irritant such as fiberglass?"

[MONS 097885, "Letter from L. D. Press to R. E. Kelly: Your memo 8/19/66 to W. F. Waychoff," August 25, 1966.]

Doc ID # 8290 Exhibit #

103.

Nov. 1966 Professor Widmark and Jensen of the Institute of Analytical Chemistry at Stockholm, Sweden, announced and confirmed findings of PCB in fish, birds, and eggs.

[M07175, Monsanto: "Outline: PCB Environmental Pollution Abatement Plan," November 10, 1969.]

Doc ID # 406 Exhibit # P-0245

104.

11/02/66

Letter from Ferguson to Fuhrmeister: Based on the test results, Ferguson believed that Snow Creek contained some extremely toxic materials, and could "represent a potential source of danger to children" in that area.

Ferguson wrote in his letter that "The outflow to Snow Creek from the east side of the Monsanto Plant (at Highway 202) contains some extremely toxic materials and kills fish in less than 24 hours when diluted 300 times. In a flowing system (as opposed to our static tests) and under conditions of constant exposure, this effluent would probably kill fish when diluted 1000 times or so. Since this is a surface stream that passes through residential areas, it may represent a potential source of danger to children, domestic animals, etc." Ferguson concluded "In fact, I suspect that the constant fish die-off in Choccolocco Creek observed on our several visits could be traced to materials entering the stream via Snow Creek." Ferguson also asked Fuhrmeister to provide more information regarding "what is going into Snow Creek". He further wrote "Mr. Fuhrmeister, can your people tell us what is going into Snow Creek? Our experience in Chromatography has been limited to pesticide identification and we have no way of identifying the large numbers of compounds involved here. Judging by the samples taken by us, I assume the contents change from time to time."

"The following is a partial report of our findings during October. We have a number of water and fish samples being processed and I will forward a separate report should they merit comment."

"CAGING EXPERIMENTS"

- "3. A branch of Snow Creek originating in the Monsanto Plant and flowing east under Highway 202 and thence north. Water Temp. 32.1 C. Results: All 25 fish lost equilibrium and turned on their sides in 10 seconds and all were dead in 3 1/2 minutes. The gill covers (opercles) immediately assumed a flared position, and blood issued from the gills after 3-minutes exposure.
4. Snow Creek at a point where it is crossed by the Highway 21-Highway 78 cut-off (about 0.5 mile N. of Highway 78 bridge). Water Temp. = 16.2 C. Result: 10 fish were down after 1 hour and 40 minutes; all were down in 2 hours and 25 minutes. All were dead in 2 hours and 35 minutes."

[DSW 162358, November 2, 1966]

Doc ID # 52175 Exhibit # P-0080

- "12. Monsanto Treatment Plant - in the settling tank from which effluent flows to the Anniston Treatment Plant. Water Temp. = 25.5 C. Result: 23 dead, 1 very sick, 1 distressed after 5 hours. Note: The Niran plant was not operating at the time.
13. Anniston Sewage Treatment Plant - near the out-flow to Choccolocco Creek. Water Temp. = 23.0 C. Result: All 25 fish were dead when the first check was made after 23.5 hours. Their condition suggested that they had died several hours earlier. D. O. = 2-6 ppm. The detergent level was very high judging by the large amount of foam."

[DSW 162359, November 2, 1966]

Doc ID # 52175 Exhibit # P-0080

"CONCLUSION"

1. "The outflow to Snow Creek from the east side of the Monsanto Plant (at Highway 202) contains some extremely toxic materials and kills fish in less than 24 hours when diluted 300 times. In a flowing system (as opposed to our static tests) and under conditions of constant exposure, this effluent would probably kill fish when diluted 1000 times or so. Since this is a surface stream that passes through residential areas, it may represent a potential source of danger to children, domestic animals, etc."

"Although our caging experiments lasted only 48-hours, they revealed toxic conditions extending from the Monsanto Plant to Choccolocco Creek and downstream. Prolonged exposures of weeks and months to these substances could very likely kill fish at all points in Choccolocco Creek below the mouth of Snow Creek. (We have some long-term caging tests in progress.)"
[DSW 162361, November 2, 1966]

Doc ID # 52175 Exhibit # P-0080

"In fact, I suspect that the constant fish die-off in Choccolocco Creek observed on our several visits could be traced to materials entering the stream via Snow Creek. It seems very probable that fish not killed out-right are in such a stressed condition that any unusual event, such as a by-pass of even small amounts of phosphate insecticide, could result in xxx kill."

"Mr. Fuhrmeister, can your people tell us what is going into Snow Creek? Our experience in Chromatography has been limited to pesticide identification and we have no way of identifying the large numbers of compounds involved here. Judging by the samples taken by us, I assume the contents change from time to time. Our samples have been crystal clear, with white flocculations, brownish, etc. Also, do you have date or flowrate? We have not yet determined whether or not Snow Creek contains cholinesterase inhibitors, but hope to do so very soon."

[DSW 162358-362, "Letter from Denzel D. Ferguson to Mr. L. C. Fuhrmeister, Technical Services Superintendent, Monsanto Chemical Company, Anniston, Alabama," November 2, 1966.]
Note: *the document is too blurring to read in some places.*

Doc ID # 52175 Exhibit # P-0080

105.

11/20/66

Hirshberg Brothers & Co. Chemicals to Monsanto Europe: Chlorinated Diphenyls have chronic toxic properties.

"Re: Aroclor 1254

It has recently come to our attention that Chlorinated Diphenyls have chronic toxic properties."

[MONS 090071, "Letter from Hirshberg Brothers & Co. Chemicals Ltd. to Monsanto Europe (Brussels)," November 20, 1966.]

Note: *The document is too blurring to read, in particular, the date.*

Doc ID # 4867 Exhibit # P-0084

106.
11/28/66

"As mentioned, there has been some publicity in Sweden concerning investigations made at the Institution of Analytical Chemistry at the Stockholm University. These have revealed that a group of products called Polychlorinated Bi-Phenols - PCB for short - accumulated in certain organs of animals. They are said to be related to DDT and equally poisonous." "PCB is broken down considerably slower than DDT and gives rise to damage of liver and skin." "It is, however, obvious already now that PCB is most frequently found in organisms living in water or feeding from water animals." "PCB is found in water and in air, and not only in the Swedish air, but also in e.g. London air." [M11601-602, November 28, 1966]

Doc ID # 1461 Exhibit # P-0085

"Mr. Jensen har [has] also examined the hair of his family and himself and has found PCB on all samples. Most PCB was found in the hair of his wife but most sensational was that the girl aged 5 months had more PCB in her hair than her brothers and sisters of 3 and 6 years. Probably the girl had got the poison via the mother's milk."

[M11601-02, "Letter from Henry Strand (Rising & Strand) to Mr. David Wood, Monsanto Europe, (Brussels 3, Belgium)," November 28, 1966.]

Doc ID # 1461 Exhibit # P-0085

107.
12/12/66

Letter from Kelly to Wood: Kelly said that "I do not believe that we can glibly accept Aroclors as a synonym for polychlorinated phenols that were discussed at the meeting of scientists..."

"I do not believe that we can glibly accept Aroclors as a synonym for polychlorinated phenols that were discussed at the meeting of scientists at the Wenner-Gren Centre in Stockholm on November 27.

There are polychlorinated phenols which presumably could include derivatives from, or impurities in pentachlorophenol and, especially,

2,4-D and 2,4,5-T. These compounds would be such more liable to appear in salmon, pike, and sea eagles than any derived from Aroclors.

There are many chlorinated polyphenyls that can be formed during the manufacture of 2,4,5-T and probably pentachlorophenol, as well. Our only problem is whether or not we want to bring these facts up and have our herbicide program receive another black eye. This, I will have to leave to your judgment.

I think the question here is primarily an analytical problem. How can we find out what product Mr. Jensen is talking about? Can we compare these chromatographic peaks that Mr. Jensen is describing with anything found in Aroclors, pentachlorophenol, 2,4,5-T, etc? I admit I am out of my depth here but I think another compound is indicted rather than Aroclor."

[MONS 097924, "Letter from R. Emmet Kelly, M. D. to Mr. D. Wood (Brussels): Aroclor -- Sweden," December 12, 1966.]

Doc ID # 8818 Exhibit #

108.

12-15-66

S. Jessen and Professor Widmark reported New Chemical Hazard – "New Scientist," December 1966
Jensen's work on PCB's was published which was the first published report about PCB.

109.

12/16/66

Sugar was contaminated by PCB's.

"Dick Davis has asked me to comment on the subject question raised in your Call Report dated November 21, 1966.

I believe that all we can tell Mr. Colmont is that a few drops of Pydraul contaminating a few lumps of sugar would not create any toxicity problem. It is probable, however, that an undesirable taste would result which would classify the sugar as adulterated. I don't know whether anyone has tried any Pydraul in their coffee or iced tea but there might be an off-flavor which would not have a particularly desirable effect on customer or consumer relations."

[MONS 098003, "Letter from Elmer P. Wheeler to V. J. Heroufosee (Brussels): Pydraul Fluids Contamination of Sugar," December 16, 1966.]

Doc ID # 8866 Exhibit #

110.

12/17/66

Letter from Denzel D. Ferguson to Mr. L. C. Fuhrmeister: when analyzing water samples, Ferguson noticed that "A peak having the same retention time as parathion appeared in these samples." He also found from the samples of Snow Creek that "Many peaks - as in previous samples from this site - no identifications could be made."

"This will be a brief report of certain information requested by your people."

"V. Analyses of water samples collected October 10, 1966 produced the following findings (expressed as parts per billion):

Collection site	Pesticides
Choccolocco Creak - 4 miles E. Boiling Spring	DDT: 0.40 DDE: 0.40 DDD: 0.10 Parathion* 4 unidentified peaks
Anniston Sewage Treatment Plant	DDT: 0.20 DDE: 0.33 DDD: 0.21 Methyl Parathion: 0.70 Parathion* 6 unidentified peaks
Snow Creek (near Oxford at Highway 21 - Highway 78 cut-off	Many peaks - as in previous samples from this site - no identifications could be made.

** A peak having the same retention time as parathion appeared in these samples. When the sample from the Monsanto Treatment Plant was chromatographed by thin-layer, a dark spot (R_f value = 0.50) and a light spot (R_f = 0.12) appeared. A parathion also had an R_f of .12. Materials from the unidentified spots were collected, dissolved in hexane, and each was chromatographed (GLC) using a D C - 200 column. Retention times were identical for the two substances. Although one of the materials is almost certainly parathion, no quantitations could be done on samples collected

from thin-layer plates. We are conditioning a new polar column which should separate these two peaks."

"Other water and fish samples are being processed."

[DSW 162363-65, "Letter from Denzel D. Ferguson to Mr. L. C. Fuhrmeister, Technical Services Superintendent, Monsanto Chemical Company, Anniston, Alabama," December 17, 1966.]

Doc ID # 52176 Exhibit #

111.

12/19/66

Letter from Early to W. H. Hunt: A paper published on Poultry Science discussed the "subject of chick Edema" caused by PCBs.

"As per our discussion of last week, please find enclosed a reprint from Poultry Science dealing with the subject of chick Edema. Dr. Joe McLaughlin informed me that additional data on this subject should be available from the nutrition people in the Food and Drug Administration. However, since these are not his data he was not at liberty to send them along to you. He suggested that you write to Bill Ramdolph and request a copy of these data. You should probably receive the same without any difficulty."

[MONS 097440, "Letter from Jack D. Early to W. H. Hunt (St. Louis, Medial Dept.)," December 19, 1966.]

Doc ID # 8144 Exhibit #

112.

12/29/66

Widmark to Ford: Widmark informed Ford that Jensen found the unknown GC-peaks in their analysis to be polychlorinated biphenyls which among other companies were manufactured by Monsanto, trade name Aroclor. The results would be published in Acta Chem. Scand. (Summer 1967). In the sample of the sea eagle, polychlorinated biphenyls concentration was as high as 80 ppm.

"This letter is to inform you that we recently have identified most of the unknown GC-peaks at residue analysis of pesticides in biological samples. By the aid of combined GC and mass spectrometry Mr. Jensen of this institute has found the unknowns to be polychlorinated biphenyls which among other companies are manufactured by Monsanto, trade name Aroclor.

Added to this letter you will find a preprint of the synopsis of our publication which will appear in Acta Chem. Scand. (Summer

1967). Two gas chromatograms are also added to show that the chlorinated biphenyls are enriched in ecological series. – In the sample of the sea eagle were found: Polychlorinated biphenyls 80 ppm; ordinary chlorinated pesticides 80 ppm and mercury (1) 40 ppm."

[MONS 088150, "Letter from Dr. Gunnar Widmark (Institute of Analytical Chemistry, University of Stockholm) to Mr. Ford (Monsanto)," December 29, 1966.]

Doc ID # 11931 Exhibit #

113.
1967

PCBs were found in the environment of Great Britain.

[M07175, Monsanto: "Outline: PCB Environmental Pollution Abatement Plan," November 10, 1969.]

Doc ID # 406 Exhibit # P-0245

114.
01/09/67

Letter from Randolph to Dr. Hunt: On December 28, 1966, Dr. Hunt of Monsanto Company requested a copy of any data available regarding past toxicity studies conducted by DHEW concerning 60 percent chlorinated terphenyl (Arochlor 5460). DHEW sent him some data.

"This replies to your letter of December 28, 1966, requesting a copy of any data we may have available regarding past toxicity studies conducted by this Administration concerning 60 percent chlorinated terphenyl (Arochlor 5460) which is the subject of the above referenced petition.

In response to your request we have prepared the following summary of some results obtained in our testing of various Arochlors using the AOAC bioassay method for chick edema factor (Official Methods of Analysis, 10th Ed., Association of Official Agricultural Chemists, 26.087-26.091)."

[MONS 099177, "Letter from William F. Randolph (Department of Health Education and Welfare Food and Drug Administration) to Dr. William H. Hunt (Monsanto Company): Food Additive Petition No. 7B2117," January 9, 1967.]

Doc ID # 295 Exhibit #

115.

01/10/67

LKB Press Release: GC/MS instrument helped to detected a previously unobserved poison (PCBs) in fish, fowl and mammal. PCBs can have a steady build-up in the human body and traces have been found in both adults and children. The Press Release said that "the effect of the poison on man is not yet known. In 1936 tests showed that 23 out of 24 men employed in manufacturing PCB suffered from an acne, which appeared 6 to 8 months after handling the substance..." However, no references were given for these statements.

"Swedish firm produces instrument that detects a previously unobserved poison in fish, fowl and mammal.

The Nature of the Poison

The poison that has been isolated is a hitherto unobserved chlorinated hydrocarbons having eight chlorines in the molecule. This polychlorinated biphenyl (PCB) was isolated in residue analysis carried out with the LKB Combined Gas Chromatograph-Mass Spectrometer, LKB 9000.

100 ng of residue from 20 mg of fat, taken from a Sea Eagle found dead in the Stockholm archipelago, was used in the analysis which was made by Soren Jensen, of the Institute of Analytical Chemistry of the University of Stockholm, who has been engaged on this type of research for some considerable time. The dramatic importance of this discovery can best be understood by studying the main characteristics of PCB:

1. Very high stability. Capable of being boiled with nitric acid without destruction.
2. Has hardly any metabolism in living organisms. Can have a steady build-up in the human body and traces have been found in both adults and children.
3. If more than four chlorines are present PCB is non-inflammable.

As well as isolating a poison this research has drawn attention to the need for close co-operation in two parallel lines of investigation. The study of the persistency and toxic effects of herbicides, pesticides and related chemicals, which for some time now has caused general concern throughout the world, and the quest for improved methods of assessing the pollution of industrial wastes."

[MONS 062162, January 10, 1967]

Doc ID # 7755

Exhibit #

"The effect of the poison on man is not yet known. In 1936 tests showed that 23 out of 24 men employed in manufacturing PCB suffered from an acne, which appeared 6 to 8 months after handling the substance, and in 1937 it was(?) possibly(?) responsible for the death of three young workers. Tests so far carried out on animals indicate that in all cases the liver degenerates(?) and that generally the skin and the liver are the parts of the body susceptible to the poison." [MONS 062164]

[MONS 062162-64, "LKB Press Release," January 10, 1967.]

Note: (?) following the words = words are too blurring to read.

Doc ID # 7755 Exhibit #

116.
01/12/67

Letter from Hardy: Hardy and Richardson discussed "the Swedish Press report relating to the identification of 'Polychlorinated Biphenols' as trace contaminant in sea birds, fish etc." by Jensen.

"On 2nd January 1967 Mr. A. Richardson of Shell Chemicals' Tunstall Laboratory, Sittingbourne, Kent talked with me over the telephone concerning the Swedish Press report relating to the identification of 'Polychlorinated Biphenols' as trace contaminant in sea birds, fish etc. Richardson has been working for some years on the similar problem with insecticides such as DDT, which are known to have wide distribution in trace quantities. He had already found that the chlorine-containing residue contained substances more stable than DDT. and just as Sören Jensen reports he has obtained spectrographic evidence that these are very similar if not identical with Aroclors. He has obtained samples of Aroclors 1242, 1254, 1262 and 5460 from us, and would now like to have small samples of any chemically pure Aroclor constituents which we may be able to supply. Milligram quantities would suffice for his purpose."

"Mr. Richardson was quite sure that the compounds reported to be 'polychlorinated biphenols' are really meant to be polychlorinated biphenyls and as support he has sent me a copy of the synopsis of a paper entitled 'Pesticide Analysis: Presence of Polychlorinated Biphenyls at Residue Analysis of Biological Samples' by Sören Jensen and Gunner Widmark (photocopy attached)."

"I discussed with Richardson the soundness of Jensen's claims, and was assured that his work and findings are sound. Jensen is on the staff of the Institute of Analytical Chemistry, University of Stockholm. A note on the staff and work of the Institute is attached.

From this you will see that Jensen is wholly concerned with the analysis of chlorinated pesticides and with the work of stations for routine analysis."

"I would be glad if Dr. Baxtor and Dr. Buchanan would arrange to send me milligram samples of any pure Aroclor constituents that may be available at Rusbon and St. Louis respectively."

[MONS 097923, "Letter from D. V. N. Hardy (London) to P. G. Benignus, et al.: Aroclor - Sweden," January 12, 1967.]

Doc ID # 8817 Exhibit #

117.

01/19/67

Letter from Ferguson to Mr. Fuhrmeister: " a large peak on gas chromatograms that coincides with parathion--this peak was found in samples from all of our stations." The identification of this large peak was actually unsolved by Ferguson. Similarly, in the samples from Bluegill had "About 15 tall peaks, many of which interfere with pesticides." "Many of these large peaks correspond exactly with peaks noted in mud samples collected downstream from Anniston and with those in water samples from Snow Creek at the Monsanto Plant." Ferguson concluded that "A number of materials originating at the Monsanto Plant (via Snow Creek) are showing up in fish and mud samples taken downstream from Anniston."

"The most vexing problem has been the appearance of a large peak on gas chromatograms that coincides with parathion--this peak was found in samples from all of our stations. Initially, we thought it to be parathion. However, when we found it upstream from Anniston and because of its peculiar behavior on thin-layer plates, we decided that it was not parathion. Yet, the peak masked the actual parathion peak (if any) and prevented quantitation of parathion in samples. After rechecking all equipment, reagents, and other materials used to process samples, we finally discovered the source of the mysterious peak. It seems that the hexane stored in polyethylene squeeze bottles picks up at least three contaminants, one of which has the exact same retention time as parathion. This has been a most exasperating experience."
[DSW 162366, January 19, 1967]

[**Doc ID # 52177 Exhibit #**

"10/10/66 Bridge on Hiway 109 Bluegill (1.01 g)

About 15 tall peaks, many of which interfere with pesticides. One peak corresponds with methyl parathion (13.550 ppm) and another with malathion (10.560 ppm). Many of these large peaks correspond exactly with peaks noted in mud samples collected downstream from Anniston and with those in water samples from Snow Creek at the Monsanto Plant."

"We believe that a number of materials that enter Snow Creek from the Monsanto Plant are being accumulated by fish in Choccolocco Creek. Presumably these substances are non-toxic."

[DSW 162367, January 19, 1967]

Doc ID # 52177 Exhibit #

"In conclusion, it is obvious that all our data are incomplete. A number of materials originating at the Monsanto Plant (via Snow Creek) are showing up in fish and mud samples taken downstream from Anniston. We hope to make a trip to Anniston soon and bring chromatograms to illustrate this phenomenon."

[DSW 162366-69, "Letter from Denzel D. Ferguson to Mr. L. C. Fuhrmeister, Technical Services Superintendent, Monsanto Chemical Company, Anniston, Alabama," January 19, 1967.]

Doc ID # 52177 Exhibit #

118.
01/26/67

D. Wood's letter to Buchanan: Wood confirmed chlorinated biphenyl report of Jensen. He visited Jensen in Sweden. Wood told Jensen the need for care in any further publication. He said "The point that I have made to Jensen is the need for care in any further publication of his work which is made." He realized that "if any technical journal takes up the press release from the LKB Productor Company, there is little that Monsanto could, or should do in the way of publishing rebuttals." However, he was trying to get help from Jensen. He said "I am hopeful that we might persuade Jensen himself to write a letter defining the true extent of his own research work and placing his results in their proper perspective."

"We recently sent you a translation of a Swedish newspaper article referring to the identification in nature of polychlorinated biphenols."

"To eliminate any earlier confusion that there may have been, I should like to emphasise that there is no doubt that the chemical which is the subject of the investigation and the news release, is chlorinated diphenyl i.e. Aroclor." [M33269, 01/26/67]

Doc ID # 2841 Exhibit #

"The company that supplied the mass spectrometer which was used in the research programme, in fact have recently put out a press release on this work. Although I am horrified by some of the headlines in this press release, it does basically describe the research programme carried out in Sweden, and described in clear terms how chlorinated diphenyls were identified. I therefore, enclose a copy for your files." [M33269, 01/26/67]

Doc ID # 2841 Exhibit #

"Jensen, however, stated that he had been approached personally by several workers associated with chlorinated diphenyls for non-electrical uses and these workers were quite worried as to the possible affect on their health." [M33270, 01/26/67]

Doc ID # 2841 Exhibit #

"Jensen is forwarding me copies of his mass spectrographs and details of sample preparation so that we have all the details of his research work." [M33270, 01/26/67]

Doc ID # 2841 Exhibit #

"The point that I have made to Jensen is the need for care in any further publication of his work which is made. He accepts that the toxicology of chlorinated diphenyls should only be discussed with detailed information about exposure concentrations and exposure times and that generalized statements out of context can only arouse undue public concern. If any technical journal takes up the press release from the LKB Productor Company, there is little that Monsanto could, or should do in the way of publishing rebuttals. We do not want, personally as Monsanto to get too involved in this question. I am hopeful that we might persuade Jensen himself to write a letter defining the true extent of his own research work and placing his results in their proper perspective. It would certainly be helpful in gaining his further support if we were able to make available to him any small quantities of pure isomers."

[M33269-M33271, "Letter from D. Wood (Monsanto, Brussels, Belgium) to G. R. Buchanan (Monsanto, St. Louis)," Subject: Sweden, Aroclor; 01/26/67.]

Doc ID # 2841 Exhibit #

119.

02/02/67

Hardy wrote to Border Chemicals Ltd.: Aroclors can cause damage to the liver as a result of prolonged exposure to the vapour and to the liquid.

"You will note that like so many other chlorinated hydrocarbons the Aroclors can cause damage to the liver as a result of prolonged exposure to the vapour and to the liquid. To the best of our knowledge no fatality has ever been attributed to a chlorinated diphenyl, but in view of the chronic action on the liver we advise that contact with the vapor and liquid must be kept to a minimum."

([M11730, "Letter from D. V. N. Hardy, Monsanto Research Service Manager to Mr. Fuller, Border Chemicals Ltd.," February 2, 1967.]

Doc ID # 1588**Exhibit # P-0090**

120.

02/08/67

Letter from Ferguson to Mr. Fuhrmeister: Unidentified peaks continued to be found in the water and fish samples, and in Snow Creek. Ferguson wrote, "Several peaks extracted from Snow Creek have similar retention times as pesticide standards. Certain peaks in Snow Creek appear in bluegills caged downstream. Identification of these peaks is beyond our present capabilities." Ferguson also concluded from his tests that "Snow Creek continues to be the only environment unfit for aquatic life". "Several materials in Snow Creek appear to accumulate in fishes caged downstream, but the biological properties of these compounds are unknown."

"Enclosed is a description of our findings since the last progress report."

"We have been unable to demonstrate any reason why large fish kills should occur in Choccolocco Creek."

([DSW 162370, February 8, 1967]

Doc ID # 52178**Exhibit # P-0091**

"Progress Report -- January"

"On January 25, 1967 water samples were collected for gas chromatographic analyses. At the same time, bluegills that had been caged 2 weeks in Choccolocco Creek upstream and downstream from Anniston were collected for analyses. The

findings are shown in the following tables (water samples are given in ppb; fish in ppm):"

Among the seven samples one had high background, and the other six samples had 3 to 11 unidentified peaks.

[DSW 162375, February 8, 1967]

Doc ID # 52178 Exhibit # P-0091

"Chromatographic analyses were done on a 10% Dow-200 column with a 5% QF-1 polar column used as a back-up. In certain cases (Malathion and Heptachlor Epoxide) interference was encountered and the identifications are tentative. The parathion reported in the bluegill tissues (hiway 93 Bridge) did not exactly match the standard and eluted from the clean-up column early. However, clear separation was made with the parathion peak in the two water samples reported. Several peaks extracted from Snow Creek have similar retention times as pesticide standards. Certain peaks in Snow Creek appear in bluegills caged downstream. Identification of these peaks is beyond our present capabilities."

"Conclusions

Snow Creek continues to be the only environment unfit for aquatic life, however, there is no evidence that these undesirable effects alter Choccolocco Creek at downstream sites. Several materials in Snow Creek appear to accumulate in fishes caged downstream, but the biological properties of these compounds are unknown.

We are accumulating background data for assessing possible cholinesterase inhibition in caged fish. Survival of caged fish for relatively long periods of time suggests that the factor or factors causing fish kills in Choccolocco Creek may not be operative at all times, at least on a lethal level."

([DSW 162370-6976, "Letter from Denzel D. Ferguson to Mr. L. C. Fuhrmeister, Technical Services Superintendent, Monsanto Chemical Company, Anniston, Alabama," February 8, 1967.]

Doc ID # 52178 Exhibit # P-0091

121.
02/10/67

Letter from R. Emmet Kelly, M. D. to Mr. D. Wood: Referring to the findings of Aroclor in the air and in various fish and other living reservoirs, Kelly told Wood that "We are very worried about what is

liable to happen in the states when the various technical and lay news media pick up the subject."

"We have had a rather extensive meeting, which included the St. Louis individuals receiving copies of this memorandum, on Aroclor in the air and in various fish and other living reservoirs.

The decision was that more information had to be gained, and whether this would necessitate a trip from someone in the Medical Department to the various agencies working on this problem in Europe would depend upon how easily obtainable these gaps in our knowledge are by other means than personal communication.

We are very worried about what is liable to happen in the states when the various technical and lay news media pick up the subject. This is especially critical at this time because air pollution is getting a tremendous amount of publicity in the United States.

We have been receiving quite a few communications from our customers, but the most critical one is NCR, Who are very much involved with their carbonless carbon paper."

([MONS 097918, "Letter from R. Emmet Kelly, M. D. to Mr. D. Wood (London)," February 10, 1967.]

Doc ID # 8815 Exhibit # P-0093

122.

02/13/67

Letter from Wilde to R. Kelly: Due to the importance of the Aroclor products to the Organic Division, Monsanto decided a series of actions. Wilde wanted Kelly to follow through these actions. He also asked Kelly to prepare a press release and hold it until such a time that we feel as though it should be released.

"We reviewed the information we have received so far on the adverse publicity in Europe on polychlorinated biphenyls."

"Due to the importance of the Aroclor products to the Organic Division, we decided on the following plan of action. Since all of the action required falls within the realm of your authority, you accepted the responsibility to follow through on the followings:

1. Prepare a statement or letter for me by Marketing with customers who inquire about this publicity.

2. You will talk to Den Forrestal on preparing a press release and hold it until such a time that we feel as though it should be released.
3. Give some thought to how we would approach this problem on a toxicological and pharmacological basis.
4. Talk to the LKB people after we define the person to contact.
5. Arrange for contact with Bayer and Prodalac.

Two questions that kept coming back to our minds during the meeting were that in all of the propaganda published, there has been nothing about the levels that have been found particularly in the air and no one has defined anything about what level would be considered harmful. Bob Faller brought out the fact that there must have been other products found in this complete analysis and he would be interested in knowing what other things were found.

All of these actions need immediate attention with the exception, of course, of the gathering of the toxicological and pharmacological information."

[MONS 097089-90, "Letter from Gene Wilde (General Offices, Monsanto) to R. Kelly, M. D.," February 13, 1967.]

Note: *The document is too blurring to read.*

Doc ID # 7677 Exhibit #

123.
02/21/67

Kelly to Wilde: "There is no necessity at present for anyone from St. Louis to contact the Swedish people. In fact, it would be unwise at present." Kelly also wrote that "Unless something unusual happens in the United States, I would be of the opinion that we should do no further action until we have time to evaluate this information."

"I talked to Dave Wood in Brussels this morning and I list below the salient features of our conversations:

1. He has 90% of the information asked for in my letter of February 10 and will have the rest obtained in the next day or so and will forward the bundle to me.
2. His customers in Europe are seemingly less concerned than they were, especially since there has been no particular

government activity and no increase in the newspaper articles. The customers would like to have some reassurance on the toxicity of Aroclor (I complained to Dave that there just was no information available on the action of nanograms of Aroclor in the human body over a lifetime).

3. There is no necessity at present for anyone from St. Louis to contact the Swedish people. In fact, it would be unwise at present.

I am to get in touch with Mr. Wood after I receive the bundle of information he is sending me. Unless something unusual happens in the United States, I would be of the opinion that we should do no further action until we have time to evaluate this information."

[M43884, "Letter from R. Kelly to Mr. Gene Wilde," February 21, 1967.]

Note: *The document is too blurring to read in some places.*

Doc ID # 323 Exhibit #

124.
02/21/67

Hardy to Dr. R. Kelly -- Sweden, Aroclor: Richardson from Shell reported to Hardy that "the chlorinated biphenyls appear substantially unchanged in the egg" during his metabolic experiments on fowls. Richardson was going to meet Jensen around March 2nd, and discussed his latest results. They concluded that "Jensen must therefore have jumped the gun in blaming chlorinated biphenyls."

"I have also been in touch with Mr. Richardson of Shell, to whom I supplied the samples of pure Aroclor components, and he reports that the characteristics of the unknown material in the organochlorine residues are quite different from those of any of the chlorinated biphenyls I submitted to him. He also said that he is carrying out metabolic experiments on fowls and that the chlorinated biphenyls appear substantially unchanged in the egg. I told him that Jensen has been asking for pure samples of Aroclor constituents, and we came to the conclusion that Jensen must therefore have jumped the gun in blaming chlorinated biphenyls. Richardson is going to see Jensen around March 2nd and they will discuss the position and Richardson's latest results. The situation will be reported to me on Richardson's return and I will pass it on directly to you."

[MONS 096494, "Letter from D. V. N. Hardy to Dr. R. Kelly (St. Louis): Sweden, Aroclor," February 21, 1967.]

Doc ID # 324 Exhibit #

125.
02/27/67

Widmark to Wilde: Professor Widmark reviewed his lecture given in Bayer, Germany on the PCB issue. He told Wilde that "The chromatogram added to this letter demonstrates the increase of the higher chlorinated PCB's through a food chain and the decrease of the lower ones." Monsanto representative in Europe met with Jensen in Sweden. He also received a copy of the lecture, which Jensen recently gave to the board of the Swedish Committee of Natural Resources.

"Thank you for your letter of January 24, which was on my desk when I returned from a lecture trip to Germany. During this trip I gave a lecture at Bayer AG, Leverkusen, a company manufacturing polychlorinated biphenyls under the trade name of Clophen A 50 and A 30. During the intense discussion which followed my lecture there were no objections to our analytical findings except for the possibility of one of the PCB isomers to be formed at the decomposition of Lindane; over three chlorobenzene. Although we do not have a scientific proof against this assumption made by an application chemist of Bayer – I think the reaction is very unlikely and only responsible for one of the PCB isomers. – The chromatogram added to this letter demonstrates the increase of the higher chlorinated PCB's through a food chain and the decrease of the lower ones; this is against the "lindane-theory". Remark also the non-presence of PCB in a non-aquatic animal.

During my visit to Germany your Swedish representant, Rising and Strand Co (Mr. O. Palm) has been in contact with Mr. Soren Jensen of this institute. At their discussion Mr. Palm was given a manuscript of a lecture which Mr. Jensen recently gave for the board of the Swedish Committee of Natural Resources. A copy of this lecture has been sent to Monsanto. It has to be underlined that, according to the agreement between these two gentlemen, this manuscript must only be in use inside Monsanto. Please inform your colleagues of Monsanto of this limitation."

[MONS 091208-09, "Letter from Gunnar Widmark to Gene C. Wilde (Plasticizer Sales Dept., Monsanto)," February 27, 1967.]

Note: there are spelling mistakes in the Original. No changes have been made to them.

Doc ID # 6963 Exhibit #

126.

02/27/67

Kelly to Thomas: Kelly sent Dr. Thomas a copy of Jensen's paper on polychlorinated biphenyls. Kelly said that "it is true that chloracne and liver trouble can result from large doses" of PCBs.

"Attached is a photostat of the original paper of Dr. Jensen in Sweden, relating to polychlorinated biphenyls. I will be happy to have your ideas after you read it.

As far as the section on toxicology is concerned, it is true that chloracne and liver trouble can result from large doses. Whether or not this is at all relevant to small quantities existing in human fat is, of course, an entirely different question.

At any rate, I believe before we worry about the toxicological part of the problem, we should settle the analytical part."

[MONS 088146, "Letter from R. E. Kelly, M.D. to Dr. M. J. Thomas," February 27, 1967.]

Doc ID # 11930 Exhibit # P-0095

127.

02/27/67

Letter from Kelly to Mr. Wood: Wood sent Kelly some information, and Kelly was "having our analytical people, as well as NCR here in the states, evaluate it". Kelly admitted, "there is no question but that Aroclor does possess a certain amount of toxicity". "All our literature says this".

"Thank you for the information you sent me. I am having our analytical people, as well as NCR here in the states, evaluate it.

As far as the toxicological part of his report is concerned, he has confused and interchanged the experience on chlorinated biphenyl, chlorinated naphthalene, and a combination of both. This really is not too important, however, as there is no question but that Aroclor does possess a certain amount of toxicity. All our literature says this, but whether nanogram quantities mean anything is an entirely different matter.

I think we should fight the battle of the analytical method first before we get too involved with toxicology."

[MONS 097694, "Letter from R. Emmet Kelly, M. D. to Mr. Dave Wood (Brussels)," February 27, 1967.]

Doc ID # 8217 Exhibit # P-0094

128.

03/02/67

Letter from Ferguson to Mr. Fuhrmeister: Ferguson stated that "It is clear that very low concentrations and long exposures can be quite harmful." "We are certain that several of the peaks noted in the caged fish originate in Snow Creek. In addition to similar retention times, peak width, shoulders, and other characteristics are often similar."

"The combination of a plant shut-down and the loss of our caged fishes necessitates that we obtain native fish immediately if we are to learn anything about acety-cholinesterase levels. We hope to collect some dead fish for mercury analyses at the same time."

[DSW 162377, March 2, 1967]

(Doc ID # 52179 Exhibit # P-0096

"Progress Report (February 8 - March 1)"

"Between February 18 and 24, 14 bluegills from our State College population were kept in 4 ppb parathion in an aquarium. The insecticide solution was changed daily. Fourteen bluegills were kept in tap water and served as controls. By February 25, 6 of the treated fish were dead and all controls were alive."

[DSW 162378, March 2, 1967]

Doc ID # 52179 Exhibit # P-0096

"In general, the AChE levels in the controls conform to those we have reported previously. Probably, the lower values for the caged controls are not significantly different from the tapwater controls."

"Weiss (1964) exposed bluegills to 1 ppb parathion and obtained as much as 77% inhibition in 14 days. Also, he noted up to 90% inhibition in 10 ppb parathion after 6 days."

"It is clear that very low concentrations and long exposures can be quite harmful. In the next few weeks, we intend to concentrate much of our efforts on this aspect of the problem, especially as it pertains to fishes in the lower portions of Choccolocco Creek."

([DSW 162379, March 2, 1967]

Doc ID # 52179 Exhibit # P-0096

"A bluegill caged at the flat bridge location and water from the front ditch were collected on February 11. At least 14 major peaks appear in the front ditch water sample and ten peaks having similar retention times appear in the caged bluegills. Several of the peaks have retention times very similar to pesticides."

"* Elution A contain most chlorinated hydrocarbons; phosphates generally come out in Elution B."
[DSW 162381, March 2, 1967]

Doc ID # 52179 Exhibit # P-0096

"All retention times are based on the zenith of peak height and estimates of time are subject to an error of about ± 5 seconds. It is apparent that these unknown peaks will mask or interfere with peaks of pesticides having similar retention times. In many cases, fortification of the sample with pesticide standards and decreasing the rate of carrier gas flow failed to separate pesticide peaks from these unknowns."

"We are certain that several of the peaks noted in the caged fish originate in Snow Creek. In addition to similar retention times, peak width, shoulders, and other characteristics are often similar."

"Peak #3 in the bluegill resembles parathion but appears in the first clean-up elution from the column. Parathion should be in the "3" wash."

"We include the above information to indicate the difficulty that is encountered in attempting to identify pesticides in samples with GLC."

[DSW 162377-162382, "Letter from Denzel D. Ferguson to Mr. L. C. Fuhrmeister, Technical Services Superintendent, Monsanto Chemical Company, Anniston, Alabama," March 2, 1967.]

Doc ID # 52179 Exhibit # P-0096

129.

03/10/67

Letter from Ferguson to Mr. Fuhrmeister: "If fish continue to die in Choccolocco Creek and if AChE levels continue to show no inhibition, it will be obvious that some other lethal factor is operating. Such findings should aid the lawyers in building their case."

"On March 5, we collected a water sample from Dry Creek (at the Highway 202 bridge). The attendant at the service station said that fish had been killed in the creek. This man claims that several cattle died as a result of drinking from Dry Creek. He said that on Friday afternoons the creek is a real mess. However, when we collected the water samples, I observed live mosquitofish in the creek, thus, I am not convinced that the stream is as bad as he thinks."

[DSW 162383, March 10, 1967]

Doc ID # 52180 Exhibit # P-0097

"We hope to get more AChE data soon. If fish continue to die in Choccolocco Creek and if AChE levels continue to show no inhibition, it will be obvious that some other lethal factor is operating. Such findings should aid the lawyers in building their case."

[DSW 162383-85, "Letter from Denzel D. Ferguson to Mr. L. C. Fuhrmeister, Technical Services Superintendent, Monsanto Chemical Company, Anniston, Alabama," March 10, 1967.]

Doc ID # 52180 Exhibit # P-0097

130.

04/06/67

Letter from Ferguson to Mr. Fuhrmeister: The GC chromatography demonstrated that "The peaks do not match these times perfectly, indicating that they are not pesticides."

"The GLC tracing for these 3 fish are included as a part of this report. Note the clean sample from the fish taken upstream. Many of the peaks in the downstream fish are those we have found in Snow Creek. Could this be the reason that the SE Lab did not do GLC analyses of fish tissues as a part of their report? Note that we indicate retention times for several pesticides on one tracing. The peaks do not match these times perfectly, indicating that they are not pesticides."

[DSW 162389, April 6, 1967]

Doc ID # 52181 Exhibit # P-0098

[DSW 162386-404, "Letter from Denzel D. Ferguson to Mr. L. C. Fuhrmeister, Technical Services Superintendent, Monsanto Chemical Company, Anniston, Alabama," April 6, 1967.]

Doc ID # 52181 Exhibit # P-0098

131.

05/03/67

Letter from Ferguson to Mr. Fuhrmeister: Ferguson tried to see whether freezing had some adverse effects on ACh levels. He said, "If the foregoing test is valid, freezing whole fish has some adverse effect on ACh levels. Also, if this proves to be the case, the State of Alabama has no case."

"In my report of April 6, 1967 I presented ACh data for distressed fish collected at Eureka Bridge on March 26. You will recall that the specimens were quick-frozen on dry ice. The results were erratic and showed marked reductions in specific activity."

[DSW 162405, May 3, 1967]

Doc ID # 52182 Exhibit # P-0099

"Note that ACh levels for both groups of fish are low but comparable with those for frozen fish reported on April 6. Also, the results are erratic and contain some very low values for control fish. The most striking thing is that the average value for controls is much lower than those we have found previously using unfrozen fish."

"If the foregoing test is valid, freezing whole fish has some adverse effect on ACh levels. Also, if this proves to be the case, the State of Alabama has no case. We are now planning an experiment in which the brains will be removed and frozen. It may be that freezing the entire fish is the source of the problem."

[DSW 162405-162407, "Letter from Denzel D. Ferguson to Mr. L. C. Fuhrmeister, Technical Services Superintendent, Monsanto Chemical Company, Anniston, Alabama," May 3, 1967.]

Doc ID # 52182 Exhibit # P-0099

132.

05/24/67

Letter from Moore to Dr. Hardy: Aroclor was proposed to be used in spray coating for the outside of aircraft. Moore told Hardy that "Mr. Gillison would like some assurance from us that no health hazard would arise from this proposed application of Aroclor 1242".

"To confirm telephone conversation in which you were advised that we had recently supplied the above with a sample of Aroclor 1242 together with our bulletins covering the physical and chemicals properties also the toxicology and safe handling of Aroclor.

Subsequently a telephone call was received from a Mr. Gillison who stated that it was proposed to use Aroclor 1242 in conjunction with a spray coating for the outside of aircraft. Basically they would be using a 2% solution of Aroclor in their lacquer. It was intended that spraying would be carried out in an open hangar and that the operatives would wear filter masks."

"Mr. Gillison would like some assurance from us that no health hazard would arise from this proposed application of Aroclor 1242.

It is understood that you will write to Mr. Gillison pointing out that a filter mask would in fact offer no protection, and giving your comments on the proposed use of our material."

[MONS 097925, "Letter from G. E. Moore to Dr. D. V. N. Hardy: Titanine Ltd., Colindale, London, N.W.9. -- Aroclor 1242," May 24, 1967.]

Doc ID # 8819 Exhibit #

133.

06/02/67

Letter from Ferguson to Mr. Fuhrmeister: Ferguson prepared "a bibliography of scientific literature related to parathion-fish relationships." He said that "If the enzyme deteriorates with time, the State's case will be damaged, since they collected "sick fish" several weeks prior to collecting controls."

"In response to your request, I have prepared a bibliography of scientific literature related to parathion-fish relationships. I have included only the major references used in our work plus a few others what seem most pertinent. If this list is not satisfactory, please advise me."

"We have completed an experiment designed to show the effects of freezing upon the results of acetylcholinesterase tests. Briefly, we compared cholinesterase levels in fresh fish, brains frozen in buffer (as recommended by Weiss), and brains of frozen whole fish (as used by the SE lab)."

[DSW 162411, June 2, 1967]

Doc ID # 52183 Exhibit # P-0101

"An inspection of the Table 1 shows that freezing has had an effect upon the data, as we had reported previously. These findings are contrary to all reports in the literature. We plan to repeat this test

and freeze the samples for various periods of time. If the enzyme deteriorates with time, the State's case will be damaged, since they collected "sick fish" several weeks prior to collecting controls."

[DSW 162411-12, "Letter from Denzel D. Ferguson to Mr. L. C. Fuhrmeister, Technical Services Superintendent, Monsanto Chemical Company, Anniston, Alabama," June 2, 1967.]

Doc ID # 52183 Exhibit # P-0101

134.

06/05/67

Letter from Ferguson to Mr. Fuhrmeister: Ferguson said that "a very large number of toxic materials caused reversed pectorals in fishes."

"We have under way some preliminary investigations concerning types of compounds which cause "reversed" pectoral fins in fishes. When I come over June 13th, I will give a report on the complete study but for the time being I simply want to alleviate your anxiety by pointing out that a very large number of toxic materials caused reversed pectorals in fishes. In fact our tests suggest that this symptom occurs almost any time a fish dies as a result of exposure to stringent external agents, and in no way can reversed pectorals be construed as a specific symptom of phosphate poisoning."

[DSW 162417, "Letter from Denzel D. Ferguson to Mr. L. C. Fuhrmeister, Technical Services Superintendent, Monsanto Chemical Company, Anniston, Alabama," June 5, 1967.]

Doc ID # 52184 Exhibit #

135.

06/10/67

Letter from Ferguson to Mr. Fuhrmeister: AWIC stated that "Loss of equilibrium and reversed pectoral fins displayed by distressed fish observed by the investigators are typical reactions from poisoning by organic phosphorus insecticides".

"The 'Discussion' section of the report prepared by the Water Improvement Commission includes the following statement: "Loss of equilibrium and reversed pectoral fins displayed by distressed fish observed by the investigators are typical reactions from poisoning by organic phosphorus insecticides".

"Parker's report mentions "reversed pectorals" several times, e.g., 'In particular, reversed pectoral fins are characteristic of poisoning by organic phosphorus compounds and not of other insecticides'.

In another place he states that 'At this time, practically all the distressed fish observed displayed reversed pectorals, loss of equilibrium, and were in a tetanic state'.

In our own lab, we have tested fish on more than 25 insecticides and have not noted a greater tendency for reversed pectorals in phosphates than in other compounds such as Toxaphene. Also, I noted that a large number of the dead and dying fish observed at the Eureka Bridge on May 25 had reversed pectorals."

"We have recently completed a series of tests in which fish were killed by many different methods. These tests show that loss of equilibrium, a tetanic state, and reversed pectorals are in no way specific symptoms of phosphate poisoning. In fact these symptoms occur almost any time a fish dies as a result of stringent external agents or stimuli."

[DSW 162418-20, "Letter from Denzel D. Ferguson to Mr. L. C. Fuhrmeister, Technical Services Superintendent, Monsanto Chemical Company, Anniston, Alabama," June 10, 1967.]

Doc ID # 52185 Exhibit # P-0102

136.
07/17/67

Letter from Ferguson to Mr. Fuhrmeister: Ferguson concluded that "If the fish samples collected at the time of the kill were handled correctly, as implied in Miller's report after his trip to Athens, then the entire matter of effects of freezing may become purely academic."

"In view of continued evidence that freezing results in reduced cholinesterase activity, we decided to recheck the possibility that we were doing something wrong. This month Mr. Ludke and Mr. Gibson visited the U.S.D.I. Commercial Fisheries Laboratory at Gulf Breeze, Florida."

"As a result of these visits, we have modified our procedures slightly but the modifications are of a nature that will reduce variability but presumably make little difference insofar as detecting inhibition is concerned."

"Armed with all this newly acquired knowledge, we have repeated a test concerning the effects of freezing."
[DSW 162421, July 17, 1967]

Doc ID # 52186 Exhibit # P-0103

"In view of this test and all of the others that we have performed, it must be concluded that freezing does indeed reduce the level of cholinesterase activity in samples. If the fish samples collected at the time of the kill were handled correctly, as implied in Miller's report after his trip to Athens, then the entire matter of effects of freezing may become purely academic."
[DSW 162422, July 17, 1967.]

Doc ID # 52186 Exhibit # P-0103

[DSW 162421-424, "Letter from Denzel D. Ferguson to Mr. L. C. Fuhrmeister, Technical Services Superintendent, Monsanto Chemical Company, Anniston, Alabama," July 17, 1967.]

Doc ID # 52186 Exhibit # P-0103

137.
08/15/67

Letter from Ferguson to Mr. Fuhrmeister: Ferguson wrote that "On August 9, we noted that Choccolocco Creek was crystal clear at the Hiway 93 bridge but murky and turbid at Jackson Shoals, only 3 or 4 miles downstream."

"On August 9, we noted that Choccolocco Creek was crystal clear at the Hiway 93 bridge but murky and turbid at Jackson Shoals, only 3 or 4 miles downstream. Do you people know of any source of contamination between these two sites? We observed 2 or 3 dead or dying fish at Jackson Shoals but there were plenty of live ones too."

[DSW 162427, August 15, 1967]

Doc ID # 52187 Exhibit # P-0100

"We have a survey of invertebrates in Choccolocco Creek underway at the present time and the results will be included in the final report in early September."

[DSW 162425-28, "Letter from Denzel D. Ferguson to Mr. L. C. Fuhrmeister, Technical Services Superintendent, Monsanto Chemical Company, Anniston, Alabama," August 15, 1967.]

Doc ID # 52187 Exhibit # P-0100

138.
08/29/67

Central Engineering Department, Project Scope Report: Aroclors Expansion: Expansion plan was made to expand production of

Aroclors in Anniston Plant of Monsanto, Alabama. Various tanks, pipes and other equipment were added to the Anniston Plant.

"Add Storage Tanks, Drumming Facilities, Flakers, Packaging Equipment and New Manufacturing Building, Anniston, Alabama, Plant"

[MONS 061972]

Doc ID # 7749 Exhibit #

"1. 412 For Anniston

New storage and blending tanks to be added:

Aroclor	1242	54,000	gallon	(2 – 27,000 gallon)
"	1248	18,000	"	
"	1254	54,000	"	(2 – 27,000 gallon)
"	1260	18,000	"	
"	1262	18,000	"	
"	1221/1232	18,000	"	

"An existing 2,000 gallon mixing tank will be relocated.

One covered loading dock for tank cars.

One covered loading dock for tank cars and trailers.

A new railroad spur."

"New drumming facilities to be added include a high speed drumming scale and a conveyor system to bring empty drums to the scale and take filled drums away from the scale.

New flaking and bagging facilities to be added:

Storage for Aroclor 5460, 1268 and biphenyl

Flaker for solid Aroclors"

[MONS 061983, August 29, 1967]

Doc ID # 7749 Exhibit #

"Flaker for biphenyl

Mill for Aroclor 1268

High speed bagging machines for Aroclor 5460 flakes and biphenyl flakes

Conveyor system to take filled bags away from bagging machines

Fume control system for Aroclor 1268

The existing Aroclor and biphenyl flakers will be dismantled together with the present Aroclor feed tank."

"A suitable building (120' X 60') to house the drumming and flaking operations.

Pipelines from Department 27 to tank farm as follows..."

"Pipelines from tank farm to mix tanks..."

"Pipelines from tank farm to loading spots and drum filling..."

[MONS 061984]

Doc ID # 7749 Exhibit #

"Pumps will be provided as follows..."

[MONS 061983-85, Central Engineering Department, "Project Scope Report: Aroclors Expansion, CEA 1430, Anniston, Alabama Plant," August 29, 1967.]

Doc ID # 7749 Exhibit #

139.

08/31/67

Mr. Ferguson submitted his "Final Report" to Monsanto. A specific goal of the investigation "was to examine evidence and information related to the fish kill that occurred in Choccolocco Creek in March 1966." This report investigated the relationships between pesticide and wildlife in the Choccolocco Creek Drainage." The author reported that "Water samples from Snow Creek produced 12-20 major peaks on a gas chromatogram during a 30-minute elution time." But some of them were un-identified. He also indicated that "When a tributary of Snow Creek originating within the Monsanto Plant was found to be devoid of life, samples of water from the stream were used to bioassay bluegills. The fish lost equilibrium in

the full strength water in 10 seconds and all died in less than 5 minutes. Bluegills survived less than 16 hours when bioassayed in 1 part Snow Creek water diluted with 300 parts tap water." The report warned, "Snow Creek is a potential of future legal problems. The stream does not support life and contains many materials that accumulate in water, fish, and muds downstream. Although there is no evidence that these materials are harmful to fish, their presence constitutes damaging evidence of pollution. The argument that these compounds impart undesirable palatability qualities to Choccolocco Creek fish would be very convincing and probably easy to prove." Finally, the report recommended that "1. Do not release untreated waste in the future! 2. Clean-up Snow Creek."

"In the late summer of 1966, the Zoology Department of Mississippi State University entered into a contract with the Monsanto Chemical Company to investigate certain physical, chemical, and biological properties of the Choccolocco Creek Drainage in Alabama. The prime objective of the study was to assess the actual and potential impact of the Anniston Monsanto plant, which produces organophosphate insecticides, upon the ecology and welfare of the aquatic life inhabiting the stream system. A specific goal was to examine evidence and information related to the fish kill that occurred in Choccolocco Creek in March 1966."

[DSW 162433, August 31, 1967]

Doc ID # 216 Exhibit # P-0104

"Known sources of pollution in Choccolocco Creek include industrial wastes in Snow Creek and Coldwater Creek, effluent from the Anniston Sewage Treatment Plant, and suspended sediments from agricultural lands."

"Below the mouth of Snow Creek, Choccolocco Creek and especially its mud deposits have a distinctive odor traceable to Snow Creek."

[DSW 162434, August 31, 1967]

Doc ID # 216 Exhibit # P-0104

"When a tributary of Snow Creek originating within the Monsanto Plant was found to be devoid of life, samples of water from the stream were used to bioassay bluegills. The fish lost equilibrium in the full strength water in 10 seconds and all died in less than 5 minutes. Bluegills survived less than 16 hours when bioassayed in 1 part Snow Creek water diluted with 300 parts tap water."

"Further investigations showed unfavorable pH (HCl , H_3PO_4) and mercury to be the lethal agents."
[DSW 162438, August 31, 1967]

Doc ID # 216 Exhibit # P-0104

"DDT, DDE, DDD and occasionally other chlorinated hydrocarbon insecticides were found in the low parts per billion range in nearly every water sample from Choccolocco Creek (both upstream and downstream from Anniston), the Anniston Sewage Treatment Plant, and from Logan-Martin Reservoir. Parathion occurred in trace quantities (less than 1 ppb) in some water samples. A maximum of 3 ppb parathion was found in a water sample for the Anniston Sewage Treatment Plant and 1.5 ppb parathion was the maximum found in a Choccolocco Creek sample."
[DSW 162439, August 31, 1967]

Doc ID # 216 Exhibit # P-0104

"Water samples from Snow Creek produced 12-20 major peaks on a gas chromatogram during a 30-minute elution time. Gas chromatographic analyses of fish, mud, and some water samples collected in Choccolocco Creek below the mouth of Snow Creek almost always showed over a dozen of these same peaks. Attempts to chromatograph mud samples were hopeless. These interfering compounds frustrated attempts to clean-up samples and often would have masked pesticides were retention times were similar."
[DSW 162440, August 31, 1967]

Doc ID # 216 Exhibit # P-0104

"A downstream site yield about 5 times as many snails as did a site upstream from Anniston, presumably a reflection of the additional fertility derived from the Anniston Sewage Treatment Plant and possibly the minerals for shell formation derived from the Gypsum Plant effluent."

"A further indication that some sublethal factor may be present is the apparently high incidence of diseased fish."
[DSW 162444, August 31, 1967]

Doc ID # 216 Exhibit # P-0104

"A major fish kill started several days prior to March 23 in Choccolocco Creek below Jackson Shoals and in Logan-Martin Reservoir, including areas upstream from the mouth of Choccolocco Creek. When the area was visited on March 25, vast numbers of fish were dying and wind-rows of them were washed up along the shores."

"The number of fish observed dying, those recently killed, and the large number that had been dead for several days would be exceeded the 56,200 counted in the 1966 kill. We estimated that a 75-ft segment of beach contained 1,000 dead fish."

[DSW 162445, August 31, 1967]

Doc ID # 216 Exhibit # P-0104

"CONCLUSIONS"

"3. Snow Creek is a potential of future legal problems. The stream does not support life and contains many materials that accumulate in water, fish, and muds downstream. Although there is no evidence that these materials are harmful to fish, their presence constitutes damaging evidence of pollution. The argument that these compounds impart undesirable palatability qualities to Choccolocco Creek fish would be very convincing and probably easy to prove."

"4. Choccolocco Creek fish populations are subject to continued low-level mortality and periodic massive die-offs. There are reports of fish kills in Dry Creek; Coldwater Creek is highly polluted. Monsanto needs to monitor the biological effects of its effluents as a protection against future accusations. (See Recommendations)."

"5. An attempt to investigate a fish kill after it has happened is futile, however some pertinent information has emerged from the studies."

[DSW 162446, August 31, 1967]

/ Doc ID # 216 Exhibit # P-0104

"RECOMMENDATIONS

2. Do not release untreated waste in the future!

3. Clean-up Snow Creek."

[DSW 162447, August 31, 1967]

/ Doc ID # 216 Exhibit # P-0104

"APPENDIX"

"The following are some criticisms of the evidence presented by the State in its case against the Monsanto Company:"

- "6. Fish kills are reported in Dry Creek.
7. There are many cholinesterase inhibitors.
8. The SWL reported no other insecticides in the water samples, but reported parathion in the 2 ppb range. Our analyses and those of the Southern Testing and Research Lab. show other insecticides to be present, although in small amounts. The point is that the SWL may not have really looked for other possible causes for the fish kill."

[DSW 162429-454, Denzel E. Ferguson, Principal Investigator, "A FINAL REPORT: Investigations of Certain Pesticide-Wildlife Relationships in the Choccolocco Creek Drainage," A Contract Between the Monsanto Chemical Company and Mississippi State University (September 1, 1966 through August 31, 1967), COMPANY CONFIDENTIAL, August 31, 1967.]

Doc ID # 216 Exhibit # P-0104

140.
09/01/67

Letter from Schuitema to Heroefosse: Some workers working in the ship industry got skin irritations from Aroclors.

"I got some complaints from Piet Smit, one of the wharfs where the W-kerk ships are being built, that some of their workers got skin irritations when handling Santotherm. I did send the Aroclor toxicology and safehandling booklet, but this is insufficient, as it does not tell the doctor what to use or to do to stop and heal the irritation.

I presume that such irritations did occur before, please let me know what medicines has been given to the people involved."

[MONS 097949, "Letter from M. Schuitema to Mr. V.J. Heroefosse," September 1, 1967.]

Doc ID # 8836 Exhibit #

141.
11/02/67

Richardson to Dr. Hardy: Chicken feeding tests on PCBs conducted by Richardson indicated that high concentrations of PCBs were present in the eggs, up to 89 ppm; and they are persistent.

Richardson told Hardy that "our results are in broad agreement with that of the Government Laboratory and that we have no disagreement with them."

"As you know, we have been for some time examining extracts of marine birds and their eggs in connection with the possible occurrence of Polychlorinated Biphenyls.

In one particular experiment we have extracted approximately 100 eggs of the Shag (*Phalacrocorax aristotells*) and examined the resulting extract following liquid-solid chromatography on Silica Gel, by gas-liquid chromatography-mass analysis and by mass spectroscopy. Mass spectroscopy of a fraction from the Silica Gel column showed the presence of a compound of molecular weight 426 which contained 8 chlorine atoms, this is consistent with an octachloro biphenyl; gas-liquid chromatography-mass analysis indicated the presence of compounds of mass 324, 358, 392 and 426 respectively. Those masses are consistent with pentachloro, hexachloro, heptachloro and octachloro biphenyls by being present.

In addition we have fed chickens for two months on a diet containing 100 ppm Arochlor 1254 after which we placed them on normal diet and collected the eggs for a further three months. Extracts of these eggs have been examined by gas-liquid chromatography and indicate that a substantial amount of Arochlor 1254 is excreted into the egg, the maximum concentration being 89 ppm. Examination of an egg taken three months after feeding was discontinued shows that these materials are very persistent and that the less chlorinated constituents are more readily metabolised.

I would say that our results are in broad agreement with that of the Government Laboratory and that we have no disagreement with them; however, I believe that they may have over-stressed the likely toxic effects of these materials but as you know there is only very limited evidence for us to go on."

[MONS 091211, "Letter from A. Richardson (Shell Chemicals) to Dr. V. N. Hardy (Monsanto)," November 2, 1967.]

Doc ID # 6964 Exhibit #

142.
11/03/67

Hardy to Richardson: Hardy told Richardson that "now that it seems certain that contamination by chlorinated biphenyls is taking place we are keen to follow up and determine just how and where the contamination is taking place." Hardy was very curious at

Richardson's statement that he had evidence to suggest that the leakage occurred in the valley of the River Witham.

"I am glad to acknowledge receipt of your helpful letter of 2nd November concerning your experiments on the possible occurrence of polychlorinated biphenyls in marine birds and their eggs.

Now that it seems certain that contamination by chlorinated biphenyls is taking place we are keen to follow up and determine just how and where the contamination is taking place. You said over the telephone that you had evidence to suggest that the leakage occurs in the valley of the River Witham, and I am discretely following up this lead. However, before getting too deeply involved I feel I should enquire as to the nature of the evidence. Is it such as to constitute a very positive indictment, or does it suggest that the content is marginally greater in that area than elsewhere? This would clearly have an important bearing on the area of search. There is also the question of whether the material detected by Jensen has its origin in Scandinavia i.e., are there several sources of contamination to be located?"

[M11613, "Letter from D. Hardy to Mr. A. Richardson (Shell Chemicals)," November 3, 1967.]

Also See: M11621 and MONS 089194.

Doc ID # 1467 Exhibit #

143.
11/06/67

Richardson to Dr. Hardy: Richardson admitted that there was possible contamination of the river Whitham, and in the area about 10 miles from Boston. The occurrence of the PCBs in the eggs of herons was found.

"I thank you for your letter of 3rd November, 1967, which indicates that we are both concerned with the very similar problems.

I suggested that there was possible contamination of the river Witham because of the occurrence of the P.C.B.'s in the eggs of herons feeding on fish which come from the Witham Catchment area. More specifically the heronry is at Tumby Woodside, Lincs., some 10 miles from Boston. I suggest that water pollution may be responsible because the P.C.B.'s appear to occur to their largest extent in birds from an aquatic environment. We have no evidence of P.C. B. content in herons from elsewhere but we do find that some sea birds from the N.E. Coast also contain P.C.B.'s whilst on the N.W. and West Coast of Scotland they are absent."

[M13678, "Letter from Richardson to Dr. D. V. N. Hardy (Monsanto)," November 6, 1967.]

Doc ID # 2152 Exhibit #

144.

11/06/67

Letter from Kelly to Dr. Hardy (London): Kelly was interested to hear what "the reaction of the scientific community, as well as the regulatory bodies, is" to "Aroclors in wildlife".

"Thank you for the reprint concerning the Aroclors in wildlife.

I will be interested to hear what the reaction of the scientific community, as well as the regulatory bodies, is."

[MONS 097695, "Letter from R. Emmet Kelly, M. D. to Dr. D. V. N. Hardy (London): Aroclor/Sweden," November 6, 1967.]

Doc ID # 8218 Exhibit #

145.

11/06/67

Letter from Hamil to Shaw: An individual called Monsanto and asked about "the medical aspects of Aroclor-1248 vapors which had been emitted from their heater and saturated the plant area at this location".

"On Monday, October 30, I received a call from an individual at Frito Lay in Jacksonville, who was inquiring about the medical aspects of Aroclor-1248 vapors which had been emitted from their heater and saturated the plant area at this location. This call was referred to you, and in turn was handled by Dr. Kelley of our Medical Department." [MONS 097765, November 6, 1967]

Doc ID # 8244 Exhibit #

"It seems to me in retrospect that the key to this entire problem is the fact that the exhaust fan was cut off, thus making the heater almost airtight, and when these gaseous decomposition materials were formed they had absolutely no place to go, and therefore caused perhaps this 'muffled' explosion as experienced and reported by the Jacksonville fire department." [MONS 097767, November 6, 1967]

[MONS 097765-67, "Letter from Dick Hamil (Atlanta) to Stan Shaw (St. Louis): Frito Lay Boiler Accident, Monday, October 30, 1967," November 6, 1967.]

Doc ID # 8244 Exhibit #

146.

11/09/67

Letter from D.V.N. Hardy to C. E. Coleman: Hardy said that "I am naturally anxious to determine the extent to which our materials might be responsible and so I am looking for leads as to likely ways in which Aroclors might be thrown away..."

"You are probably aware that in the investigation of insecticide residues in marine life (fish, birds, birds eggs) chlorinated materials other than well-known insecticides have been found, and that there is now convincing evidence that these are chlorinated biphenyls. I am naturally anxious to determine the extent to which our materials might be responsible and so I am looking for leads as to likely ways in which Aroclors might be thrown away e.g. down the drains, or on to the land so that they would come down the rivers to the coast.

There is evidence to suggest that the valley of the River Witham (which flows southwards from Boston into the Wash) needs close scrutiny."

[MONS 097915, "Letter from D.V.N. Hardy to C. E. Coleman," CONFIDENTIAL, November 9, 1967.]

Doc ID # 8812 Exhibit #

147.

11/16/67

Letter from Dr. R. E. Kelly to Gene Wilde:

Dr. Kelly, Medical Director of Monsanto, said that "Frankly, if I know what to do or where to attack the problem of polychlorobiphenyl compounds in British wildlife, I would do it. As it is, however, I think the initiative is out of our hands. We have to wait to see how big a problem will be created for us by the conservationists in England."

[MONS 096492, "Letter from Dr. R. E. Kelly to Gene Wilde," November 16, 1967.]

Doc ID # 326 Exhibit #

148.

11/22/67

Meeting of the Board of Directors of Monsanto: The Board of Directors of Monsanto decided "that the expenditure of \$2,900,000 for expansion of Aroclor[®] facilities at the Anniston, Alabama and W. G. Krummrich plants, is hereby approved."

"The regular monthly meeting of the Board of Directors of Monsanto Company was held on November 22, 1967, at 1:30 p.m. at the St. Louis County, Missouri, office of the Company."

"Memorandum of Mr. T. K. Smith, Jr., dated October 27, 1967 requesting the appropriation of \$2,900,000 for expanding Aroclor[®] facilities at the Anniston, Alabama and W. G. Krummrich plants, was submitted to the members in advance of the meeting. This project will improve quality and will increase manufacturing flexibility, manufacturing and blending capacity, and raw materials and finished goods storage capacity. Upon motion made and seconded, the following resolution was unanimously adopted:

RESOLVED, that the expenditure of \$2,900,000 for expansion of Aroclor[®] facilities at the Anniston, Alabama and W. G. Krummrich plants, is hereby approved."

[DSW 013007, "Meeting of the Board of Directors," November 22, 1967.]

Doc ID # 11425 Exhibit #

149.

1968

Yusho Incident in Japan: About 1,000 people became ill from eating PCBs contaminated rice oil.

"In 1968, about 1,000 people in Japan became ill from eating rice oil heavily contaminated with Japanese-produced PCBs as a result of an industrial accident which has come to be known as Yusho incident."

[M07547, Monsanto Company, "Submission to the Subcommittee on Oversight and Investigations of the Committee on Interstate and Foreign Commerce, U. S. House of Representatives," November 16, 1979.]

Doc ID # 1184 Exhibit #

150.

1968

The History of the Anniston Plant: "In May 1935, Swann Chemical was purchased by Monsanto and became the new Phosphate Division." The liquid Aroclors produced in Anniston included "1221, 1242, 1248, 1254, 1260, 1262, 1268".

"The History of the Anniston Plant

The story of Monsanto's Anniston Plant actually began in 1915, at a time when Anniston was a quiet little community of less than 18,000 people. It was then that Mr. Theodore Swann became interested in the manufacture of six-inch explosive shell cases for the Army. He began the Anniston Ordnance Company for that purpose. In 1917, he formed the Southern Manganese Corporation and began operations at our present plant site that fall."

"In 1927, the corporation entered the field of Organic Chemicals when they first began producing biphenyl, today one of our three major product families. By 1930, Southern Manganese became Swann Chemical Company, with plants in Anniston, Carondelet, Missouri, and Camden, New Jersey. In May 1935, Swann Chemical was purchased by Monsanto and became the new Phosphate Division."

"The manufacturing position in basic products was strengthened in 1952 with construction of a 26-cell DeNora Chlorine Plant. Still later, in 1957, the decision was made to establish the Niran Production facilities at this plant followed by two chlorine plant expansions to 36-cells in 1961. In 1961, we received a 50% expansion of our Niran facilities, a waste treatment plant, the first in Monsanto and increased steam capacity in the form of a new boiler operation. Also, in 1961, we went on stream with a new Biphenyl-Tubular Reactor. The new PNP department in 1965 and the new P₂S₅ department in 1966 give Parathions a strong position in raw materials."

[DSW 102005]

Doc ID # 11071 Exhibit #

"The Liquid Aroclors (1221, 1242, 1248, 1254, 1260, 1262, 1268)

Raw Materials: Biphenyl, Chlorine

Uses: Capacitor dielectric fluids

Fire resistant plasticizers and extenders

Heat transfer fluids

Special service fire resistant dielectrics
Self-printing paper
Varnish, lacquer, adhesive components

The Solid Aroclors (4465, 5460, 5060)

Raw Materials: Biphenyl, Santowax R, Chlorine

Uses: Plasticizers in wire coatings and insulation
Dielectric sealants
Plasticizers, extenders
Varnish, lacquer, adhesive components"
[DSW 102006]

[DSW 102005-06, "The Plant, its Products, its People," Anniston Booklet, 1968.]

Doc ID # 11071 Exhibit #

151.
01/16/68

Wilson (Department of the Interior) to Gentlemen (Monsanto): Department of Interior noticed that "presumptive evidence of chlorinated biphenyl and chlorinated polyphenyl compounds have been found in avian and animal tissues." They asked Monsanto to provide Aroclor samples for further investigation.

"It has been brought to our attention that presumptive evidence of chlorinated biphenyl and chlorinated polyphenyl compounds have been found in avian and animal tissues.

We are in the process of further investigation of compounds of this series and would appreciate your sending us samples of your Aroclor compounds numbers 1242, 1254, 1268 and any others which might be extensively used."

[M 32942, "Letter from Richard A. Wilson, Sr. (Department of the Interior, Fish and Wildlife Service Bureau of Sport Fisheries and Wildlife) to Gentlemen (Monsanto)," January 16, 1968.]

Doc ID # 2831 Exhibit # P-0108

152.
01/18/68

Letter from Richard to Anagnostopoulos: Mr. Coon "is reexamining tissues up to 4 years old to see if the unknown peaks are chlorinated biphenyls or chlorinated terphenyls". His client was the Department of Interior.

"I called Mr. Francis Coon at the Wisconsin Alumni Research Foundation. Mr. Coon is examining tissues from shore birds for trace quantities of pesticide residues. Previous results had given unidentified peaks in gas chromatographic analysis. Following the work reported by Jensen and Widmark at U. of Stockholm and by Holmes, Simmons, Tatton (Nature 216 Pg. 227, 1967) he is reexamining tissues up to 4 years old to see if the unknown peaks are chlorinated biphenyls or chlorinated terphenyls. The customer in this case is Director of Wildlife Research, Dept. of Interior. Walter W. Dykstra is one of the top men.

Mr. Coon indicated that the Division of Wildlife Laboratories, Dept. of Interior, had been working with Aroclor 1242, 1248, 1254 and 5442."

"Mr. Coon said he was also working for other customers on this same subject but he declined to name who they were. He also said we should expect a publication on this same subject emanating from California. He had read this unpublished report."

"Mr. Coon will discuss results with us from time to time provided they do not conflict with the interest of his clients."

[MONS 097994, "Letter from W. R. Richard to C. E. Anagnostopoulos: Chlorinated Hydrocarbons Residue in Gulls and Various Shore Bird Species," January 18, 1968.]

Doc ID # 8861 Exhibit # P-0109

153.
02/05/68

Letter from Kelly to Pogue: FR-3 was proposed to be used in an open bath. Kelly said that if "FR-3 is going to be heated in this bath up to 500 °F., a most critical health hazard will result".

"This is in reference to your call report of January 28, 1968 on the subject customer.

If an open bath means what I think it does and FR-3 is going to be heated in this bath up to 500 °F., a most critical health hazard will result.

All the fumes will have to be evacuated from the room. In addition, a system must be constructed so that materials after they have been removed from the bath does not drip the FR-3 anywhere outside this confined bath. In short, I do not believe such a system

can be designed and I would think FR-3 has no place in such a bath.

If I have misinterpreted the possible use of this compound, please let me know but, certainly, the vapors of FR-3 at 500 °F. constitute, as I said, a serious health hazard."

[MONS 097768, "Letter from R. Emmet Kelly, M. D. to Donald R. Pogue (Santa Clara)," February 5, 1968.]

Doc ID # 8245 Exhibit # P-0110

154.

02/08/68

Spencer to W. R. Richard: Interference was discussed during the GC analysis of chlorinated hydrocarbons during the NACA meeting. Spencer felt "to being perplexed on how it is possible for PCB residues to be present as frequently as the European data suggests."

"Our interest in the matter here at NACA is solely as an interfering factor in the gas chromatograph analysis of chlorinated hydrocarbons. We are aware of the publications on this subject by Jensen and Widmark of the Institute of Analytical Chemistry in Stockholm, and of Holmes, Simmons, and Tatton in London. "

"I admit to being perplexed on how it is possible for PCB residues to be present as frequently as the European data suggests."

[MONS 091212, "Letter from Donald A. Spencer, Consultant, (National Agricultural Chemicals Association) to W. R. Richard (Monsanto)," February 8, 1968.]

Doc ID # Exhibit #

155.

02/15/68

Letter from Roush to Keller: Roush sent Dr. Keller a cooking oil sample which was contaminated with about 100 ppm Aroclor products.

"Bob, I am sending to your attention under separate cover a sample of peanut oil used for cooking potato crisps at subject company in Holland. This particular sample is from a quantity of fluid that had been contaminated with SANTOTHERM FR-1 (Aroclor 1242). It is reported from our Brussels office that the contamination is approximately 100 parts per million."

[MONS 097449, "Letter from Donald E. Roush to R. E. Keller (Queeny)," February 15, 1968.]

Doc ID # 8152 Exhibit #

156.
02/23/68

Hardy to Richard: Monsanto had provided Aroclor samples to Jensen, Widmark, Richardson and Tatton. Hardy also briefly summarized the information he received from Jensen, Tatton and Richardson.

"As you know we have already provided samples for Jensen and Widmark (Stockholm), Richardson (Shell, England) and Tatton (Government Laboratory, England), and the residual quantities are now to be reckoned in terms of milligrams. We assume you will be writing appropriately to the Syracuse University Research Corporation."

[MONS 097073, "Letter from Hardy (London) to W. R. Richard (St. Louis)," February 23, 1968.]

Note: *The letter is too blurring to read.*

Doc ID # 7668 Exhibit #

157.
03/07/68

Letter from Keller to Roush: Cooking oil was contaminated with Aroclor products. Less than 20 parts per million Therminol FR-1 (Aroclor 1242) was found in the used peanut oil sample from Holland.

"We have made an attempt to measure SANTOTHERM FR-1 at the 100 parts per million level in peanut oil used for cooking potato crisps at subject company in Holland. Total chlorine analysis by sodium biphenyl reduction shows 180 parts per million chlorine in both new and used peanut oil."

"Preliminary oscillographic polarograph measurements indicate that there is less than 20 parts per million Therminol FR-1 (Aroclor 1242) in the used peanut oil sample from Holland. Currently, the polarograph is in need of repair. More sensitive measurements will be attempted when our instrument is back in service. It is expected that this should be within several weeks."

[MONS 097448, "Letter from R. E. Keller to Donald E. Roush: Therminol/Santotherm Contamination of Cooking Oil – Smith Potato Crisps, Holland," March 7, 1968.]

Doc ID # 8151 Exhibit #

158.

03/20/68

Letter from Wood to Roush: Wood was eager to know the analysis results of the contaminated cooking oil. He said that the contamination "is still tending to hold back sales in the food process industry in Europe". This indicated that after the incident, Monsanto was still trying to sell Aroclor products to food processing industry.

"We should like to refer to your memo to Bob Keller dated February 15th concerning the Therminol/Santotherm contamination of cooking oil at the Smiths Potato Crisps factory in Holland. Have you had any reports from the laboratory yet as to whether this contamination can be detected?

This question of Santotherm detection in cooking oil is still tending to hold back sales in the food process industry in Europe, and we look forward to receiving some early news from you."

[MONS 097450, "Letter from D. Wood (Brussels) to D. E. Roush (St. Louis)," March 20, 1968.]

Doc ID # 8153 Exhibit #

159.

03/26/68

Letter from Roush to D. Wood (Brussels): Cooking oil was contaminated with Aroclor containing products.

"Dave, I have affixed copies of two reports from Dr. Keller's group on subject cooking oil contamination. The latest memo dated March 7, 1968, indicates that there is less than 20 parts per million Therminol/Santotherm FR-1 in the used peanut oil. Also indicated is the need for more sensitive measurements, which will be made when the analytical equipment has been repaired.

Dr. Keller's group is cognizant of the problem we have with chlorinated biphenyl contamination in the food processing industry and have been doing a fine job with this very difficult analytical problem. I shall notify you of further developments in this area when the information is available."

[MONS 097447, "Letter from Don Roush (St. Louis, General Offices) to D. Wood (Brussels): Therminol/Santotherm Contamination of Cooking Oil - Smith Potato Crisps, Holland," March 26, 1968.]

Doc ID # 8150 Exhibit #

160.
05/03/68

Letter from Newell to Hunt: Newell made suggestions on the research direction for Aroclor toxicity study. He offered to cooperate with Monsanto instead of getting fund from the government.

"We are suggesting for your consideration, that this work be expanded along the following lines:

1. Determine the LD₅₀ of Aroclor 1242 to fish at several temperatures to find the extent of its actual toxicity variability.
2. Obtain LD₅₀'s (96-hour exposure) with goldfish at 15 °C for other Aroclors, namely 1248, 1254, and 5460.
3. Obtain dietary L D₅₀ values (7-day exposure) on Japanese quail for these four compounds. Investigate the enzyme induction activity of Aroclors 1248, 1254, and 5460 by the barbituate sleeptime technique and compare their relative effect with that of 1242.

We would prefer to undertake the type of work suggested here in cooperation with Monsanto rather than seek government support. Since government agencies are already concerned with Aroclors and investigating them with regard to fish and wildlife hazards, we could offer your comparative data."

[MONS 088152, "Letter from Gordon W. Newell (Chairman, Department of Agricultural and Environmental Toxicology, Stanford Research Institute) to Dr. William H. Hunt (Medical Department, Monsanto)," May 3, 1968.]

Doc ID # 6571 Exhibit # P-0112

161.
05/06/68

Kelly to Anagnostopoulos and Robson: Kelly was against doing anything at that time regarding the Aroclor research proposed by Stanford Research Institute. Kelly thought "the persistence of polychlorinated biphenyl in some species" "appears to be a rather insignificant phenomenon." Thus, he wrote that "I think it would be wiser for us to find out what the Government is doing and see where we go from there."

"The attached letter should be of interest to both of you, inasmuch as I believe Aroclors are split between your two groups.

It is another example of widespread interest in what appears to be a rather insignificant phenomenon; namely, the persistence of polychlorinated biphenyl in some species. As far as the Stanford Research Institute's proposition is concerned, I would be against our doing anything at this time. I think it would be wiser for us to find out what the Government is doing and see where we go from there.

We will continue to follow this matter with any contacts we can establish."

[MONS 097092, "Letter from R. E. Kelly (M. D.) to C. E. Anagnostopoulos and E. S. Robson: Aroclor residues in Fish and Fowl," May 6, 1968.]

Doc ID # 7667 Exhibit #

162.
05/20/68

Richard to Davis: FDA asked for samples of Aroclor, presumably to look for ppm toxicity, and on residues in wildlife. Richard asked in the letter were Monsanto itself and its customers "preparing to minimize or prevent process, stream and air pollution" of PCBs?

"We now have FDA inquiry for samples of Aroclor, presumably to look for ppm toxicity, and on residues in wildlife.

Are we preparing ourselves and customers to minimize or prevent process, stream and air pollution?"

[MONS 097071, "Letter from W. R. Richard (Research Center) to R. Davis," May 20, 1968.]

Doc ID # 7666 Exhibit # P-0113

163.
07/31/68

Cumming Paton wrote to Richard, et al and felt so mad at the article published on December 15, 1966 in New Scientist.

"I attach an article from the "New Scientist" of 15 December, 1966. The New Scientist is an English periodical given over to "Popular" Science. On its inception about sixteen years ago, I thought it was given over more to sensation than to a strict regard for scientific accuracy. I am sorry to say that it has not changed over the years.

Their article on "PCB" is the most opinionated we have seen so far on Aroclor Toxicity, and I am sure their omission of the word Aroclor has prevented even greater repercussions. Their theory on how PCB finds its way into fish "and later humans" is an all-embracing one. I only hope Rachel Carson never subscribed to the New Scientist and that Ralph Wader doesn't decide to!"

[MONS 096501, "Letter from Cumming Paton (General Office) to Dr. W. Richard, Dr. R. E. Keller/E. Wheeler: A 'New Chemical Hazard'," July 31, 1968.]

Doc ID # 331 Exhibit # P-0114

164.
08/23/68

Wheeler to Mr. J. D. Early: Tried to set appointments with Dr. Glasgoe, Jr. and W. N. Blickenstaff on their research progress regarding Aroclors in fish and wildlife.

"Confirming the message I left with Matt McCauley this morning, we would appreciate it if you would try to set up appointments on Wednesday, September 4 for the following:

Dr. A. R. Glasgow, Jr.
Chief, Pesticides Reference Standards Section
Pesticide Branch
Division of Food chemistry & Technology
Food and Drug Administration"

"W. N. Blickenstaff
Chemist in Charge
Pesticides Regulation Division
U. S. Department of Agriculture"

"You will recall that these two gentlemen requested and have been provided samples of various Aroclors we believe they wanted in connection with Swedish and British reports of finding Aroclors in trace quantities in fish and wildlife. Scott Tucker and I would like to visit these gentlemen with you to determine what they are doing and what they are finding.

Our files do not indicate that other federal agencies in Washington have requested samples although we do know that some of the regional laboratories of the water pollution control agencies are making investigations. I will check with you and Bill Richards by

phone Monday to see if there are others in Washington that we ought to visit.

Alternate dates include Thursday, September 5 and September 10 through September 13."

[MONS 097070, "Letter from Elmer P. Wheeler (St. Louis) to Mr. J. D. Early (Washington): Aroclor/Ecology," August 23, 1968.]

Doc ID # 7665 Exhibit # P-0115

165.

09/05/68

Wheeler to Richard: Jack Early made a lot of contacts to arrange visits for Tucker and Wheeler.

"In response to my memo to Jack Early, a number of individuals were contacted by Jack to arrange visits for Scott Tucker and me."

[MONS 098141, "Letter from Elmer P. Wheeler (St. Louis) to W. R. Richard," September 5, 1968.]

Doc ID # 8943 Exhibit #

166.

09/11/68

Wheeler to Richard: Proposed Protocols for Aroclor Toxicity Studies at Industrial Bio-Test Lab.

"Attached is a copy of a letter from Industrial Bio-Test and proposed protocols for Aroclor toxicity studies. This arrives just as I am leaving for two weeks.

I will take this material with me and if possible send you my comments before the end of next week. If it appears desirable to have a session with Dr. Kelly and Bill Hunt to discuss this matter before I return, I am sure Dr. Kelly will be happy to see you."

[MONS 096502, "Letter from Elmer P. Wheeler (St. Louis) to Dr. W. R. Richard: Proposed Protocols for Aroclor Toxicity Studies at Industrial Bio-Test Lab," September 11, 1968.]

Doc ID # 333 Exhibit #

167.

09/11/68

Letter from Wheeler to Judy: "It is difficult to give specific numbers in answer to" "questions about elevated temperatures and sufficient ventilation."

"It is difficult to give specific numbers in answer to Kimberly Clark's questions about elevated temperatures and sufficient ventilation.

Somewhat arbitrarily we have said in the past that if Aroclor 1254 is heated above 150 °F then mechanical exhaust ventilation should be provided to remove vapors. This may or may not be conservative depending on the concentration of Aroclor in a formulation, the surface area exposed, the duration of the elevated temperature and the amount of general room ventilation provided.

'Sufficient ventilation' is that amount needed to reduce vapor concentrations of Aroclor 1254 to the Threshold Limit value (TLV) of 0.5 milligrams per cubic meter of air. The TLV is that amount which workers can inhale 8 hours a day, 5 days a week for a working lifetime without danger of injury.

This obviously will lead to the question of Kimberly Clark of how the concentration in a workman is determined. Aroclor vapors cannot be measured with simple instruments that can be used for such common work place contaminants such as carbon monoxide, hydrogen sulfate, many chlorinated hydrocarbon solvents, etc. The measurement of Aroclor vapors requires sampling equipment and techniques that involve wet chemistry analysis in a suitable laboratory.

'Sufficient ventilation' can also be defined as the amount of air moving over the source of a contaminant (in this case Aroclor) and into appropriately defined ventilating systems to carry the vapors outside the working area. Depending on the type and nature of the source the design of the ventilating system can be simple or complex."

[MONS 097900, "Letter from Elmer P. Wheeler to Mr. Lee Judy (Chicago): Aroclor 1254," September 11, 1968.]

Doc ID # 8802 Exhibit # P-0116

168.
Oct. 68

Yusho Incident happened in Japan, and spread to over 20 prefectures in the western part of Japan due to ingestion of rice oil contaminated with PCBs.

"In October, 1968, an epidemic of a peculiar skin disease similar to chloracne was reported in Fukuoka-Ken (Fukuoka prefecture), Japan. The epidemic was later proved to have spread not only

over Fukuoka-Ken but also over 20 other prefectures in the western part of Japan (Fig. 1). It produced 1,057 patient according to the latest tabulation (August, 1971) by the Ministry of Welfare."

"Fortunately, the cause of the epidemic was soon demonstrated to be the ingestion of a brand of rice oil contaminated with a commercial brand of polychlorinated biphenyls, and the disease was called 'Yusho', namely oil disease."

[MONS 210517, Masanori Kuratsune, et al., "Epidemiologic Study on Yusho, a Poisoning Caused by Ingestion of Rice Oil Contaminated with a Commercial Brand of Polychlorinated Biphenyls," Environmental Health Protection, April 1972.]

Doc ID # 19230 Exhibit # P-0620

169.
10/09/68

Risebrough's Confidential Pre-publication: Research results on PCBs contamination to the marine ecosystems of the Pacific Ocean. "Marine birds contain higher concentrations than fish; tissues of the Peregrine Falcon have contained the highest concentrations which have been so far recorded." He suggested that the possible passway for the marine contamination of PCBs could be attributed to the air movement of vapors coming from manufacturing process, etc.

"Polychlorinated biphenyls, which are widely used as plasticizers and in the manufacture of many industrial products, and the DDT compounds have been found to be widely distributed in marine ecosystems of the Pacific Ocean. Marine birds contain higher concentrations than fish; tissues of the Peregrine Falcon have contained the highest concentrations which have been so far recorded. The polychlorinated biphenyls have not yet been detected in samples of airborne particulates but their observed distribution in the sea indicates that they are dispersed by wind currents. Their effects upon natural populations, including man, are as yet unknown." [MONS 083014, October 9, 1968]

Doc ID # 5212 Exhibit # P-0117

"The polychlorinated biphenyls (PCB) occurring in fish and other marine organisms are assumed to be industrial pollutants. They are used extensively in industry as plasticizers and in the manufacture of paints, resins, electrical insulators and other products, and are available in railway car amounts. Since they are very stable, resist degradation, have significant vapour pressures,

are poorly soluble in water and highly soluble in lipid, it is inevitable that they should be concentrated in biological systems. Their chemical structure is in some respects similar to that of several chlorinated hydrocarbon pesticides, including DDT and the benzene hexachlorides, so that it is to be expected that they would behave similarly in their movements through ecosystems. They are highly toxic to man when inhaled as vapours [9, 25] and the more heavily chlorinated components have greater toxicity. Their presence in concentrations as high as one part per million on a wet weight basis, and several times higher on a lipid weight basis, in species which are used as human food, should be a matter of considerable concern. At the present time it is not entirely clear how the PCB enter marine food chains, but they could easily be introduced into the atmosphere as vapours during manufacturing processes, when high temperatures increase vapour pressure, or by gradual volatilization over a period of time or even when materials containing them are incinerated." [MONS 083015-16, October 9, 1968]

Doc ID # 5212 Exhibit # P-0117

[MONS 083014-16, "Professor R. W. Risebrough's Pre-publication: Chlorinated Hydrocarbons In Marine Ecosystems," Confidential, October 9, 1968.]

Doc ID # 5212 Exhibit # P-0117

170.

10/15/68

Letter from Wheeler to Walker: Wheeler told Walker that "there is data that indicate the handling of Aroclors in oil may present more hazards than handling the Aroclors per se."

"Enclosed is a summary of the toxicity data on Aroclors 1248 and 1254 but referred to as Santolubes 55 and 66. This is in response to your request for information to Cities Service.

Our interpretation of the animal toxicity data and potential hazards to humans is a little more conservative in this summary than would be the case if we were talking about using the Aroclors in heat transfer systems or hydraulic fluids. I believe this is necessary because there is data that indicate the handling of Aroclors in oil may present more hazards than handling the Aroclors per se.

I hope you will be able to determine how Cities Service intends to use the Aroclors. It is quite likely that Monsanto would have to discourage the use of Aroclors in formulations of automotive

lubricating oils while the use of these chlorinated hydrocarbons in industrial applications might not present too much risk."

[MONS 097892, "Letter from Elmer P. Wheeler to D. K. Walker (New York): Aroclors 1248 and 1254 (Santolubes 55 and 66)," October 15, 1968.]

Doc ID # 18486 Exhibit # P-0118

171.

10/21/68

Wheeler to Richard – Risebrough's paper: Monsanto received a pre-published paper. In this paper, Dr. Risebrough reported that he had found PCBs along with chlorinated pesticides in a number of species of fish and birds along the California coast as well as in waters off Baja California and Central America.

"In a few words, Risebrough has found PCBs along with chlorinated pesticides in a number of species of fish and birds along the California coast as well as in waters off Baja California and Central America. He further reports PCB in fish from the Channel Islands and Puget Sound. No PCB was detected in the liver of tuna taken in the Oslapagos Archipelago. Scott Tucker is going to scrutinize the analytical aspects and particularly the validity of some of the assumptions made by the author."

[MONS 096342, "Letter from Elmer P. Wheeler to W. R. Richard: Polychlorinated Biphenyls in the Environment," October 21, 1968.]

Doc ID # 417 Exhibit #

172.

11/01/68

Letter from Dr. Risebrough to Dr. Conkin – Publication Review: Professor Risebrough sent Dr. Conkin his two manuscripts on PCBs for comments. Dr. Risebrough believed that "the marine environment is now almost universally contaminated", and PCB "compounds are powerful inducers of live enzymes which break down steroids will ultimately lead to the setting of tolerance limits in fish consumed for food."

"Mr. Wayne Thornburg has mentioned your interest in the work of our laboratory with polychlorinated biphenyls in the global environment. Enclosed for your information are two manuscripts. The paper entitled 'Chlorinated Hydrocarbons in Marine Ecosystems' was presented at the Rochester Conference on Chemical Fallout in June and is now in press as a chapter in the Proceedings of that conference. The manuscript entitled

'Polychlorinated Biphenyls in the Global Ecosystem' is a draft of a paper now in press in NATURE.

I would greatly appreciate any critical comments you might have on these papers. Do you believe, for example, that there might be another source of these compounds other than your Aroclor products? We find that the concentrations of PCB in fish and birds are highest in industrial areas, but that the marine environment is now almost universally contaminated. The discovery that these compounds are powerful inducers of live enzymes which break down steroids will ultimately lead to the setting of tolerance limits in fish consumed for food.

I would especially appreciate any suggestions you might have in assisting us in looking for and identifying other industrial products which, because of their chemical stability and non-polar character, may also be accumulated by fish and wildlife."

[MONS 090709, "Letter from Dr. Robert W. Risebrough (Professor, University of California, Berkeley) to Dr. Robert A. Conkin (Group Leader Research, Monsanto)," November 1, 1968.]

Doc ID # 6691 Exhibit # P-0119

173.

11/06/68

Wheeler to Richard: To up date any recent developments concerning the Aroclors in the environment and to firm up the protocol for work by Dr. Calandra.

"Confirming my telephone conversation with several of you, we have scheduled a meeting in Dr. Kelly's office at 1:30 p.m. Tuesday, November 12 to bring everyone up to date on any recent developments concerning the Aroclors in the environment and secondly to firm up the protocol for work by Dr. Calandra."

[MONS 097455, "Letter from Elmer P. Wheeler to W. R. Richard: Meeting for PCB Discussion," November 6, 1968.]

Note: The document is too blurring to read.

Doc ID # 8157 Exhibit #

174.

11/27/68

Paton to Richard: Paton requested that any Aroclors that were tested either within Monsanto or elsewhere to be completely characterized with regard to physical properties and production records.

"Re our proposed program on metabolic studies with various Aroclors, can we make sure that any Aroclors that are tested either within Monsanto or elsewhere are completely characterized with regard to physical properties and production records? We also should make sure that all parties testing these materials retain samples and that Anniston also retains samples even though this may mean keeping samples longer than normal.

I also believe Aroclor 5460 should be included in these studies.

I make these requests because of the 'local' difficulties we are having with our petition to F.D.A. on A-5460 approval."

[MONS 097704, "Letter from C. Paton to Dr. W. Richard: Aroclor -- Metabolism Studies," November 27, 1968.]

Doc ID # 8225 Exhibit # P-0120

175.

12/04/68

Olson to Richard -- Aroclor Toxicity: The Yusho Incident led the Japanese government shut down the rice-brand oil manufacturing plant, and forced Monsanto to evaluate whether there was a significant risk in selling Therminol in food applications.

"MMK has just issued a market plan for Santotherm in Japan. In a discussion of the competitive chlorinated biphenyl manufactured by Kaneka (Kaneclor), the following is stated:

"It was only last month that a serious accident happened at an edible rice-brand oil manufacturing plant in Kitakyushu, where Kaneclor in use leaked out into edible oil through stainless steel piping. The authorities investigated the whole plant and found out cracks of the Kaneclor circulating stainless steel pipe. As many as 12,000 people suffered from toxication in addition to a great number of chickens fed with the oil died. The Ministry of Welfare shut down the plant. The sensation was caused. The investigation is still going on but it is certain that 5,000 to 7,000 PPM of Kaneclor contained in the food oil caused toxication. It is very unfortunate that MMK just started market campaign when Kaneclor is giving the same market notorious influence."

This is most distressing, and I thought you may want it for your meeting with Calandra.

We should carefully evaluate whether there is a significant risk in selling Therminol in food applications, and what guidelines should be used."

[MONS 096341, "Letter from D. A. Olson to W. R. Richard: Aroclor Toxicity," December 4, 1968.]

Doc ID # 334 Exhibit # P-0121

176.
12/09/68

Letter from Wheeler to Richard: "Aroclors - Minutes of Our Discussion with Dr. Calandra": Monsanto was planning to start its own toxicity study on Aroclors, and "the actual preparation of "hot" material is to be held in abeyance." It also tried to initiate discussions with Risebrough and others around the country whom Monsanto had not yet contacted but believed to be actively engaged in research projects looking for the PCBs.

"I believe the following summarizes briefly our discussions Friday:

- 1) Dr. Calandra is to dose several chickens with the Aroclors to make available sample tissues for analysis by Scott Tucker...
- 2) Dr. Calandra is to begin 30-day 'range finding' toxicity studies with rats on each of the four Aroclors which have been sent to him...
- 4) The actual preparation of "hot" material is to be held in abeyance but exploration as to the availability and cost of tagged material is to be continued and firmed up. [MONS 096394, December 9, 1968]

Doc ID # 337 Exhibit # P-0123

- 8) There should be follow-up with the fish and wildlife people at Patuxent with a request for duplicate samples of some of the tissues in which they have identified PCBs so that Scott can attempt to confirm their results.
- 9) There should be further discussions initiated with Risebrough and others around the country whom we have not yet contacted but who we believe to be actively engaged in research projects looking for the PCBs.
- 10) It was deemed advisable to arrange more formally for the correlation and analysis of all of the publications and bits of

information which are available. This would include possibly statistical analysis by someone with appropriate biological and biochemical background as well as statistical analysis capability.

- 11) It was the consensus that the group should schedule monthly meetings to review progress. The first such meeting was tentatively scheduled for January 15 at Dr. Calandra's Laboratories in Chicago." [MONS 096395, December 9, 1968]

Doc ID # 337 Exhibit # P-0123

[MONS 096394-95, "Letter from E. P. Wheeler to W. R. Richard: Aroclors - Minutes of Our Discussion with Dr. Calandra," December 9, 1968.]

Doc ID # 337 Exhibit # P-0123

177.
12/09/68

Richard to Wheeler: Richard wanted to determine whether Jensen and Co. really had Aroclor or not in tissue of birds. He also wanted to keep track of what government research laboratories were doing and finding regarding PCBs.

"The issues on Aroclor toxicity testing are complicated. I know you plan to issue written program objectives. My understanding after last meeting 12/6/68 is as follows:

1. Determine whether Jensen and Co. really have Aroclor or not in tissue of birds:
 - (a) by putting Aroclor through rats and chickens and seeing if we get the same or different peaks than found in Jensen paper. (Use mass spectrograph for check.)
 - (b) by getting hold of tissues from nature which others say is Aroclor but which could be many other compounds. Use mass spectrograph to check vs. known Aroclor results.
4. Keep track of what Govt. research labs are doing in the way of testing, plus interpret their results for Monsanto.
5. Keep track of what Govt. research labs are finding in the way of geographical location of so-called PCB peaks, and in what species of animals. What does this mean in the way of product control by Monsanto. Check with Johnson of Callandras Laboratories."

[MONS 096503, "Letter from W. R. Richard (Research Center, Monsanto) to E. Wheeler: Aroclor Testing," December 9, 1968.]

Doc ID # 336**Exhibit # P-0122**

178.

12/14/68

Risebrough published a paper entitled "Chlorinated Hydrocarbons in Marine Ecosystems," on "Nature" (Vol. 220, p.1098) regarding the problems caused by PCBs.

"Risebrough in a recent paper "Nature", Vol. 220, Dec. 14, 1968, has attacked chlorinated biphenyls in three ways:

- (1) a pollutant - widely spread by air-water; therefore an uncontrollable pollutant.
- (2) a toxic substance - with no permissible allowable levels causing extinction of peregrine falcon by induced hepatic enzymes which degrade steroids upsetting Ca metabolism leading to reproductive weakness, presumably through thinner egg shells.
- (3) a toxic substance endangering man himself; implying that the peregrine falcon is a leading indicator of things to come."

[M07155, "Letter from W. R. Richard (Research Center of Monsanto) to E. Wheeler," March 6, 1969; and MONS 010847, "Proposal for a Historical Prospective Mortality Study of Polychlorinated Biphenyl Exposed Workers".]

Doc ID # 33642**Exhibit # P-0800**

Also See: MONS 096509.

Doc ID # 359**Exhibit # P-0126**

179.

12/19/68

Richard to Tucker: Monsanto planned to run tests with chlorinated naphthalene, DDT, Aroclor and Toxaphene to check whether they elute in the GLC at the same positions as Aroclor.

"I have asked Jim Sullivan to order 5 gal. each of the chlorinated naphthalene series containing from 1 to 8 chlorine atoms. Some of the chlorinated naphthalenes could be fed to chickens and the tissue extracted to see if these compounds elute in the GLC at the same positions as Aroclor.

I understand you plan to run DDT, Aroclor, Toxaphene and Cl naphthalene. Are there any other likely candidates of a similar chemical nature?"

[MONS 096498, "Letter from W.R. Richard E. Scott Tucker– Res.2: Wildlife - Aroclor," December 19, 1968.]

Doc ID # 338 Exhibit #

180.
12/20/68

Wheeler to Calandra: Monsanto authorized Calandra the initiation of two of the proposed Aroclor studies.

"This letter authorizes the initiation of two of the proposed Aroclor studies as follows:

Project No. BTL – Aroclor I-Fowl – Gross Toxicity".

"The protocol for these studies is to be consistent with our discussions when you were in St. Louis and I would appreciate receiving a note from you outlining what you plan to do with an approximate cost."

Project No. BTL – Aroclor II – 30 Day Rat Tissue Study..."

[M 42519, "Letter from E. P. Wheeler to Dr. Joseph C. Calandra (Industrial Bio-Test Laboratories, Inc.," December 20, 1968.)

Doc ID # 3523 Exhibit #

181.
12/30/68

Letter from Tucker to W. R. Richard: Tucker needed to have the chlorinated naphthalene sample, and ruled out DDT as a candidate for Aroclor Toxicity test because its metabolic products are well known.

"When the chlorinated naphthalenes are in hand please have Jim send me samples of each. I will check these, as is, versus the Aroclors on the GC equipment.

I am sure that we are not planning to run DDT. Its metabolic products are well known and I think it can be ruled out as a candidate on this basis.

In rereading the early correspondence on PCB I noted there was a statement made by an application chemist at Bayer about the possibility of one of the PCB isomers being formed by decomposition of Lindane. I think this is a much more likely candidate than DDT and should be substituted for it unless someone has any objections."

[MONS 097069, "Letter from E. S. Tucker to W. R. Richard: Wildlife - Aroclor," December 30, 1968.]

Doc ID # 7664 Exhibit #

182.
12/30/68

Richard to Kuhn, Aroclor - Wildlife (Legal Problem): Richard worried that Aroclor may have the same fate as DDT due to the DDT trial. He said that "These wildlife people have to be taken seriously. They have taken the DDT industry to court in Wisconsin to prevent the use and sale of DDT in Wisconsin." He also concerned that "our problem is that Aroclor has been 'identified' along with DDT residue and hence we are almost certain of being drawn into the court records and may also be one of the scapegoats of the DDT defense."

"Bill, you wanted to become more familiar with the legal-political problems facing Aroclor with regard to pollution and the accusations in the literature that chlorinated biphenyls are poisoning and killing wildlife.

These wildlife people have to be taken seriously. They have taken the DDT industry to court in Wisconsin to prevent the use and sale of DDT in Wisconsin and if they win in that state, DDT will be banned in many others. This case was on National Television last week. The wildlife people are dedicated to the demise of DDT.

Our problem is that Aroclor has been 'identified' along with DDT residues and hence we are almost certain of being drawn into the court records and may also be one of the scapegoats of the DDT defense. The wildlife people have accused Aroclor of doing all the bad things of DDT."

[MONS 097307, "Letter from W. R. Richard to W. A. Kuhn: Aroclor - Wildlife," December 30, 1968.]

Doc ID # 8113 Exhibit # P-0125

183.
12/30/68

Letter from Johnson to Richards: Johnson said that "we should solicit support from other Aroclor manufacturers and approach this as an industry program".

"What progress has been made toward determining what information ex-U.S. manufacturers of Aroclors have on their toxicity.

If I am not mistaken, our Medical Department was to contact Bayer and other ex-U.S. manufacturers to determine their knowledge of Aroclor toxicity before extensive Monsanto feeding tests were undertaken.

I feel strongly that if a major feeding test is supported, we should solicit support from other Aroclor manufacturers and approach this as an industry program."

[MONS 097456, "Letter from W. K. Johnson (St. Louis, General Offices) to W. R. Richards," December 30, 1968.]

Doc ID # 8158 Exhibit #

184.
12/31/68

Letter from Richard to Tucker – Aroclor at Anniston: "Gerry Miller at Anniston says that he has GLC curves for Aroclor in fish tissue." Fishes were killed in streams below the Anniston Plant due to contamination.

"Gerry Miller at Anniston says that he has GLC curves for Aroclor in fish tissue. This work was done in connection with parathion studies and fish killed in streams below the Anniston Plant.

Aroclor being "lost" at Anniston is coming partly from unpurified HCl/Aroclor off gas vapor stream from chlorination reactors."

[MONS 096506, "Letter from W. R. Richard to E. Scott Tucker - Res. 2: Aroclor in Fish Tissue," December 31, 1968.]

Doc ID # 339 Exhibit # P-0126

185.
1969

The U.S. Food and Drug Administration (FDA) started sampling foods for possible contamination by PCBs in 1969.

[MONS 027017, EPA/600/6-86/002, "Development of Advisory Levels For Polychlorinated Biphenyls (PCBs) Cleanup," May 1986.]

Doc ID # 1223 Exhibit # P-0821

186.
Jan. 69

An article appeared in a Danish newspaper discussing Jensen's work.

[MONS 096517, "Letter from D. Wood (Monsanto, Brussels) to E. Scott Tucker (R & D Laboratories, St. Louis): Chlorinated Biphenyl in Wildlife," February 4, 1969.]

Doc ID # 353

Exhibit # P-0143

187.

01/03/69

In response to recent correspondence concerning contamination of a food product by PCBs, Monsanto planned to review applications on Therminol FR and list important design considerations.

"In response to recent correspondence concerning contamination of a food product by chlorinated biphenyl, I would like to review applications on Therminol FR and list important design considerations.

We presently can account for 70 large food processing systems using Aroclor/Therminol FR as a heat transfer fluid. The earliest food processing system we can recall is now in the 15th year of operation. Five systems have been in operation over 13 years and ~30 systems have been in operation over 5 years. In addition, approximately 192,000 electric fry pans are in use in U.S., Canada, and Australia incorporating Therminol FR-3 as a heating medium."

[MONS 096397, "Letter from D. E. Roush: Therminol FR System Experience and Design Considerations for Food Applications," January 3, 1969.]

Doc ID # 348

Exhibit # P-0132

188.

01/07/69

Letter from G. W. Miller to E. Scott Tucker: "The Anniston plant needs to be on stream with trace Aroclor analyses by February 15, if at all possible."

"The Anniston plant needs to be on stream with trace Aroclor analyses by February 15, if at all possible. To meet this target date, there are several actions which must be completed at time intervals one to three weeks in advance."

[DSW 013946, "Letter from G. W. Miller to E. Scott Tucker: Aroclor Trace Analysis," January 7, 1969.]

Doc ID # 3

Exhibit # P-0133

189.

01/09/69

Wheeler to Richard, Aroclor - Wildlife: Wheeler wrote to Richard to confirm his meeting with Richard on Aroclor (Wildlife) issue.

"Telephone follow-up of my reference memo indicates agreement to meet next week."

"I have asked to Paul Hodges to join us in our earlier session in the same conference room at 2:00 p.m."

[MONS 097458, "Letter from E. P. Wheeler to W. R. Richard: Aroclor - Wildlife," January 9, 1969.]

Doc ID # 8160 Exhibit #

190.

01/16/69

Wheeler to Tucker: Wheeler discussed Widmark's Paper and the related comment.

"Yesterday we mentioned again that the Swedish work by Widmark had not been published. I find that in the bibliography for the paper which Risebrough is to publish shortly this comment – 'Considerable effort was made to identify the unknown peaks present in the chromatograms but these attempts were unsuccessful until the reports appeared from Sweden (22, 23) and Great Britain (24) identifying polychlorinated biphenyls in European wildlife'."

"The bibliography shows the references to be:

22. Jensen, S., New Scientist 32, 612 (1966).

23. Widmark, G., J. Ass. Orr. Anal. Chem. 50, 1063 (1967).

24. Holmes, D. C., and Simmons, J. H., and Tatton, J. Nature 216, 227 (1967)."

[MONS 097836, "Letter from E. P. Wheeler to Scott Tucker: AROCLOR – WILDLIFE," January 16, 1969.]

Doc ID # 8260 Exhibit # P-0135

191.

01/21/69

Letter from Wheeler to Richard: Richardson's GC-MS work of detecting PCB's from marine bird eggs confirmed the findings of

Swedish scientists. However, Wheeler was still trying to deny these findings.

"As you know, Mr. A. Richardson of Shell in Great Britain did some work on the extracts of marine bird eggs (using the specimen shag or phalacrocorax aristotelis). Mass spectroscopy of a fraction from a silica gel column showed the presence of a compound of molecular weight 426. Gas-liquid chromatography-mass analysis indicated compounds of mass 324, 358, 392 and 426. These molecular weights correspond to 5, 6, 7 and 8 chlorinated biphenyl. The Swedish work indicated the same results, however all workers suggested that the material found in non-pretreated specimens was the higher chlorinated biphenyl.

There are a great many peaks that fall close to the so-called PCB peaks in the GLC-EC readouts that are identified as chlorinated pesticides and/or their identified metabolites. I have listed below several pesticides and pesticide metabolites along with their structure and molecular weight..."

[MONS 098144, "Letter from Elmer P. Wheeler to W. R. Richard: Aroclor (Wildlife) vs. Pesticides," January 21, 1969.]

Doc ID # 8945 Exhibit #

192.
01/23/69

Hodges to Wright (Anniston) and Buckley (Krummrich) – Aroclors in Plant Effluents: Monsanto knew that Aroclors were sewerage through the plant outfalls. However, it did not want to take actual clean-up action right away, it needed only action preparatory to actual clean-up in case that a crisis developed. "Do not proceed with abatement projects at this time except as in (3) below."

"With the likelihood that the attention now being focused on presence of aroclors in natural waters will draw attention to any aroclor being sewerage in our production plant outfalls, we should begin to protect ourselves. Since the problem, if any, has not yet been defined, I'm recommending at this time only action preparatory to actual clean up. Please arrange for the following:

1. Waste samples -- Before any clean up action of any kind is taken, we need to know, at least approximately, how much aroclor we are discharging into natural waters via our waste outfalls." [DSW 014282, January 23, 1969]

Doc ID # 5 Exhibit # P-0138

"2 In addition to collecting the samples, commence collecting data on points and amounts of aroclor discharges to sewers and means of disposal alternate to sewerage. This information will help permit us to move rapidly in case a crisis develops. Do not proceed with abatement projects at this time except as in (3) below. Publish report on information developed along with roughly estimated costs. June 1, 1969, appears to be a reasonable deadline at this time for the report, but this could change drastically." [DSW 014282, January 23, 1969]

Doc ID # 5 Exhibit # P-0138

"3. In case you discover sewerage of large amounts with a low cost alternate disposal method, proceed with clean up. One example is the sewerage of spent aroclor from P₂S₅ operations at W. G. Krummrich. From standpoints of possible sewer pluggage plus gummy hard-to-handle solids collected at the waste treatment plant, present practice is poor. Anniston is drumming and hauling their similar spent aroclor to a dump. We suggest that W. G. Krummrich find out how Anniston is handling this and proceed with a similar set-up if it appears practicable and reasonably economical." [DSW 014283, January 23, 1969]

[DSW 014282-83, "Letter from Paul B. Hodges to E. G. Wright (Anniston) and C. F. Buckley (Krummrich): Aroclors in Plant Effluent," CONFIDENTIAL, January 23, 1969.]

Doc ID # 5 Exhibit # P-0138

193.

01/23/69

Kelly to Durland (Tokyo - Japan): Kelly tried to find the details of symptoms the people had and the causes of deaths after the Yusho Incident in Japan, and wanted to know where Monsanto could go after that incident if the Japanese government ruled out Aroclors from use.

"We have received copies of extracts from the Japanese Times, November 3, November 7, and November 17, 1968, concerning 'an outbreak of mass poisoning' (10,000 or more), which were supposed to have resulted from contamination of rice bran oil with chlorinated biphenyl. This was not our Aroclors but was that of a competitor, Kaneclor, manufactured by Kaneka."

"What I would like to find out is, first, what symptoms the people had. We were told there were 10,000 affected and 70 deaths. I

wonder if there has been any data as to the type of death, such as jaundice, liver failure, etc. Second, what is the present posture as far as the use of chlorinated biphenyl in heat transfer agents in Japan. Has it been ruled out by the government and, if so, where do we go from here?"

[MONS 090070, "Letter from R. E. Kelly, M. D. to Mr. J. R. Durland (Tokyo - Japan)," January 23, 1969.]

Doc ID # 6666 Exhibit # P-0140

194.
01/23/69

Wheeler to Silverstein: After the massive poisoning incident in Japan, Monsanto was attempting to determine the status of chlorinated biphenyl usage or prohibition in Japan.

"We have the following information concerning the alleged difficulties in Japan with chlorinated biphenyls:

'December 4, 1968 -- It was only last month that a serious accident happened at the edible rice-bran oil manufacturing plant in Kitskyushu, where Kaneclor in use leaked out into edible oil through stainless steel piping. The authorities investigated the whole plant and found out cracks of the Kaneclor circulating stainless steel pipe. As many as 12,000 people suffered from toxication in addition to a great number of chickens fed with the oil died. The Ministry of Welfare shut down the plant. The sensation was caused. The investigation is still going on but it is certain that 5,000 to 7,000 ppm of Kaneclors contained in the food oil caused toxication.'

Further, we have received copies of newspaper accounts of the incidents in the Japan Times of Nov. 3, 7, and 17. Copies of these items are enclosed.

We are currently attempting to determine the facts in this incident as well as the current status of chlorinated biphenyl usage or prohibition in Japan."

[M11920, "Letter from Elmer P. Wheeler to Mr. Silverstein (Vice President, The Ore-Lube Corporation)," January 23, 1969.]

Doc ID # 1774 Exhibit # P-0139

195.

01/30/69

Letter from Tucker to Dave Wood, Chlorinated Biphenyl in Wildlife: Tucker wanted to have up-dated information on chlorinated biphenyl in wildlife. He also wanted to know whether Jensen ever forwarded any more analytical data or details to Wood.

"Would you please bring us up to date on chlorinated biphenyl in wildlife. More activity is going on in the States. We have some analytical work and some biological work underway to see if Aroclor is really present.

Has Baeyer, Progil and Kuhlman done any identification work? Has Jensen confirmed his initial publication? What chlorinated biphenyl isomers did we actually supply Jensen? Did Jensen ever forward any more analytical data or details to you?"

[MONS 097058, "Letter from E. Scott Tucker to Dave Wood (Brussels, Belgium): Chlorinated Biphenyl in Wildlife," January 30, 1969.]

Doc ID # 7655**Exhibit #**

196.

Feb. 69

Professor Risebrough of the University of California published an article in the San Francisco Chronicle revealed his findings of PCB contamination in the environment of the United States.

[M07175, Monsanto, "Outline: PCB Environmental Pollution Abatement Plan," November 10, 1969.]

Doc ID # 406**Exhibit # P-0245**

197.

02/04/69

Letter from Wood to Tucker – Reply: Wood met Jensen after his publication on PCBs.

"Thank you for your memo dated January 30th. At the time that Jensen in Sweden first published his assertions about the presence of Aroclor in wild life we met with him and discussed his work. As a result of these discussion he admitted that possibly some of his conclusions regarding the hazards associated with the chlorinated biphenyl that he had found were publicized out of proportion. I don't think at that time we questioned that he had in actual fact found chlorinated biphenyl in the sea eagles' livers but questioned his incorrect quotation of certain medical information. Since he had appreciated this point we then let the matter rest, not wanting to stir

up further agitation in other countries. There has been little more happening in Europe until about a month ago, when an article appeared in a Danish newspaper discussing Jensen's work. We are trying to find out at the present time whether this covers new work or whether it is merely a re-hash of his original paper. At such time as we get any further data we shall certainly let you have this."

[MONS 096517, "Letter from D. Wood (Monsanto, Brussels) to E. Scott Tucker (R & D Laboratories, St. Louis)," Subject: Chlorinated Biphenyl in Wildlife; February 4, 1969.]

Doc ID # 353 Exhibit # P-0143

198.
02/06/69

Letter from Wheeler to Weiss: "the fluorination of the Aroclor 1254 increases the toxicity of the Aroclor", and the compound "has to be classified as 'Class B Poison'..."

"The data in the attached report from Younger Laboratories indicates that the fluorination of the Aroclor 1254 increases the toxicity of the Aroclor particularly as regards the skin absorption lethal does in rabbits. A lethal does between 158 and 251 mg/kg brackets the 200 mg. figure. Compounds with a skin LD₅₀ of 200 or less mg. has to be classified as a 'Class B Poison' and a label has to carry the word 'POISON' in large letters and a skull and cross bones."

[MONS 097888, "Letter from Elmer P. Wheeler to Richard W. Weiss: Toxicity of Fluorinated Aroclor 1254," February 6, 1969.]

Doc ID # 8293 Exhibit # P-0144

199.
02/06/69

Letter from Durland to Dr. Kelly: Kelly sent a letter to Durland "inquiring about the medical aspects of the chlorinated biphenyl exposure" in Japan.

"I have your letter inquiring about the medical aspects of the chlorinated biphenyl exposure here in Japan. The only publications of consequence to date have been in the newspapers, and I believe you have copies of what has been printed. This has not been too factual from a medical point of view.

We are now working at trying to find medical authorities who are willing to release information to you directly or to the medical staff of the Mitsubishi group.

We are trying to expedite this, but there is some delay because of prefectural and governmental investigations that are underway."

[MONS 097692, "Letter from J. R. Durland (Tokyo, Mitsubishi Monsanto) to Dr. R. E. Kelly (St. Louis)," February 6, 1969.]

Doc ID # 8215 Exhibit #

200.

02/18/69

Letter from Kelly to Durland: Kelly told Durland that in order to protect their PCB's market, "the Organic Division has pointed up a program under Bill Richard from their division and Elmer Wheeler from our department, to get some factual data".

"Thank you very much for the information you are giving me about chlorinated biphenyl."

"I do not know how extensively you have been clued in on the worldwide biphenyl problem."

"In order to protect their market, the Organic Division has pointed up a program under Bill Richard from their division and Elmer Wheeler from our department, to get some factual data. This data would be in toxicological, ecological, and biological areas. It will encompass some \$200,000 worth of toxicological and analytical work on the part of Monsanto, cooperation with government biologists in the United States and probably in Europe, and, most especially, an overview of the entire problem of the distribution and reclamation of Aroclors."

[MONS 097691, "Letter from R. E. Kelly, M.D. to J. R. Durland (Tokyo)," February 18, 1969.]

Doc ID # 8214 Exhibit # P-0146

201.

02/24/69

San Francisco Chronicle published an article (by Perlman) about "A Menacing New Pollutant" found in the San Francisco Bay area.

"The article was based on marine life research carried out by Dr. Robert Risebrough of the University of California. It stated that residues of polychlorinated biphenyl (PCB) were killing birds and implied a long-term threat to humans."

[M13503, "Statement from Monsanto Company, St Louis, MO.,"
March 3, 1969.]

Doc ID # 2105 Exhibit # P-0159

202.
02/24/69

Letter from Benignus and Johnson to Bradford (Los Angeles), et al., (Pollution Studies): San Francisco Chronicle reported that residues of polychlorinated biphenyls (PCB) were killing certain marine birds and posed a long-term threat to humans.

"On February 24, the San Francisco Chronicle carried a feature about "a menacing new pollutant" found in the San Francisco Bay area. The article was based on marine life research by a scientist at the University of California. It stated that residues of polychlorinated biphenyls (PCB) were killing certain marine birds and posed a long-term threat to humans.

This sensational story has caused considerable comment on the West Coast and its claims may be repeated elsewhere. Our Aroclor polychlorinated biphenyl was used by the scientist in his work and we were identified as a producer." [MONS 096364 March 3, 1969]

Doc ID # 356 Exhibit # P-0157

"If customers or pollution control authorities in your area contact you, please have their medical/pollution representative contact Elmer Wheeler in the Medical Department. If a member of the press contacts you, please immediately notify Tom Ford in Public Relations."

[MONS 096364-65, "Letter from P. G. Benignus and N. T. Johnson to C. L. Bradford (Los Angeles), et al.: Pollution Studies," March 3, 1969.]

Doc ID # 356 Exhibit # P-0157

203.
02/24/69

Progress Report: Audits of wastes were conducting. "The primary wastes from the Aroclor department" "originate from spills, pump leaks, or when the department is being cleaned up."

"At the present time both the waste treatment plant and the neutralization pits are operating at near capacity. During certain periods these systems are overloaded. These audits will provide

data to show where these losses actually are and provide some insight as to how these losses can be reduced. The reduction of some of these losses will provide for better operation of the waste treatment plant as well as the neutralization pits.

The test period will last for two weeks in each operating department. Flow measurement will be made a minimum of three times in each department so that a good average flow rate can be determined. The sampling will be done in the same manner in which it is now done. Accurate data will be collected on production rates so that the losses can be related to this. Sample data sheets and drawings showing sampling points are attached at the end of this report." [DSW 014277]

/ Doc ID # 6 Exhibit # P-0147

"Aroclor Department:

The primary wastes from the Aroclor department are organic materials and HCl. These wastes originate from spills, pump leaks, or when the department is being cleaned up. Due to the recent concern over chlorinated Biphenyl (Aroclor) compounds being found in the tissues of some animals and the effects of these compounds on the palatability of fishes, it is necessary that the quantities of this material being lost is determined."

[DSW 014277-279, "E. G. Wright, Technical Services Dept.: Progress Report," COMPANY CONFIDENTIAL, February 24, 1969.]

Doc ID # 6 Exhibit # P-0147

204.
02/25/69

Tucker to Richard and Wheeler, Anniston River Results: PCBs were found from water and sediment samples taken from Snow Creek. Tucker told Richard and Wheeler that "if the PCB accusation turns out to be true and the government people become more active, we should plan on an extensive evaluation of the extent of contamination in this area."

"On 9-6-68 four samples, two sediment and two water, from Snow Creek were received for Aroclor analysis. The water and sediment were sampled on 6-27-68 at the plant out fall and approximately one block below the plant out fall. The results of the analysis are as follows:

Amount Aroclor Found

<u>Sample Designation</u>	<u>Sediment</u>	<u>Water</u>
Plant Out fall	0.20 $\pm$ 0.02%	58 $\pm$ 2 ppb**
Plant Out fall (1 blk)	1.64 $\pm$ 0.04%	-- *

* Sample broken in transit.

** No less than this amount present.

The amount of Aroclor found was calculated as Aroclor 1242. The EC/GC traces of the sediment were unmistakably Aroclor 1242. The water extracts appeared to contain only the lighter chlorinated species along with a number of other electron capture active materials. For this reason a 'no less than' value is stated, more quantitative results will have to await the development of more specific separation techniques.

Bill, on the basis of this information, I think that if the PCB accusation turns out to be true and the government people become more active, we should plan on an extensive evaluation of the extent of contamination in this area. For example, samples should be taken further down Snow Creek, down Choccolocco Creek and even from the Coosa River if necessary."

[M43997, "Letter from E. Scott Tucker to W. R. Richard/E. P. Wheeler, AROCLOR - Wildlife," February 25, 1969.]

Doc ID # 354 Exhibit # P-0148

205.

02/25/69

Plank to Keplinger: Tissues from rats employed in toxic study "will be sent to Monsanto."

"Tissues from rats employed in the following groups will be sent to Monsanto during the week of March 10, 1969:

1. Control
2. Aroclor 1242 - 300 and 1000 ppm
3. Aroclor 1254 - 300 and 1000 ppm
4. Aroclor 1260 - 300 and 1000 ppm
5. Technical DDT - 50 and 300 ppm
6. Halowax 1014 - 300 ppm
7. Halowax 1099 - 300 and 1000 ppm

Tissues from Toxaphene (50 and 300 ppm) animals will be shipped during the week of March 17, 1969.

Tissues from Aroclor 5460 (300 and 1000 ppm) and Halowax 1014 (100 ppm) rats will be sent during the week of March 31, 1969. This 100 ppm level of Halowax 1014 replaced the 1000 ppm level originally scheduled."

[MONS 097708, "Letter from J. Plank to M. L. Keplinger," February 25, 1969.]

Doc ID # 8228 Exhibit #

206.
02/26/69

Tucker to Stark, Water Solubility of Aroclor: An analytical procedure for extracting, concentrating, and measuring Aroclor at the sub ppm level in water was developed and verified with Aroclor 'spiked' tap water samples. This procedure was employed to determine the tap water solubility of Aroclor 1242, 1248 and 1254.

"An analytical procedure for extracting, concentrating, and measuring Aroclor at the sub ppm level in water has been developed and verified with Aroclor 'spiked' tap water samples (Table I).

This procedure was employed to determine the tap water solubility of Aroclor 1242, 1248 and 1254 (Table II)."

"The data in Table II also seems to indicate that a stable Aroclor-water emulsion is formed at approximately twice their solubility levels."

[M14601, "Letter from E. Scott Tucker to L. R. Stark (General Offices): Aroclor Water Solubility," February 26, 1969.]

Doc ID # 2364 Exhibit # P-0151

207.
02/27/69

Monsanto told Mr. Knapp that "Aroclors are soluble in water only to the extent of 200 parts per billion (ppb) and that the levels found in water are not considered hazardous to humans or aquatic life."

"Mr. M. C. Knapp of the technical staff of the San Francisco Bay Regional Water Quality Board called our San Francisco sales office during the early part of the week, February 23-28, 1969, and asked for information about Aroclor use in the bay area. The sales office told Mr. Knapp that he would be contacted by the St. Louis office. They referred the call by phone to Mr. T. C. Ford of Public

Relations. Mr. Ford then asked the Medical Department to answer the call." [MONS 096366, February 27, 1969]

Doc ID # 355 Exhibit # P-0152

"Mr. Knapp was further told that Aroclors are soluble in water only to the extent of 200 parts per billion (ppb) and that the levels found in water are not considered hazardous to humans or aquatic life.

Mr. Knapp seemed satisfied with the information received." [MONS 096367, February 27, 1969]

Doc ID # 355 Exhibit # P-0152

[MONS 096366-67, "Letter from Jack T. Garrett: Aroclors -- San Francisco Bay Regional Water Quality Board," February 27, 1969.]

Doc ID # 355 Exhibit # P-0152

208.
02/27/69

Monsanto prepared its response to the article appeared on February 24 San Francisco Chronicle. It can be seen that Monsanto was unhappy about this and other reports on PCB's.

"In the last several years, several scientists around the world have been investigating the existence of an unidentified chemical in the tissues of marine life -- fish, birds, etc. This word sprang from earlier studies on DDT residues.

One unidentified element in chromatograph analysis was labeled by a Swedish scientist as polychlorinated biphenyls (PCB). Numerous other groups are now doing similar investigations and, in fact, are using samples of our Aroclors in their tests.

One such study is being carried out by a Dr. Risebrough at the University of California. His work has been published in Nature, a U.K. magazine, and Scientific American.

Last week a science writer of the San Francisco Chronicle interviewed Dr. Risebrough and prepared the attached article which appeared in the paper's February 24 issue. Timing, and other factors, did not permit us to present our side of the story in the article."

"As you can appreciate, our West Coast offices have received several inquiries and we have also been contacted by the San

Francisco Regional Water Quality Control Board." [MONS 097609, February 27, 1969.]

Doc ID # 8296 Exhibit #

"There will undoubtedly be other questions on this matter. Attached is a sheet which gives our answers to press inquiries, at this time. As we conduct further investigations, we will be in a better position for a more detailed reply."

[MONS 097609-11, "Memo (Draft)," and "Answers to Press Inquiries," February 27, 1969.]

Doc ID # 8296 Exhibit #

209.
02/28/69

Monsanto issued its Statement on the PCB's issue due to the publication of an article on "the San Francisco Chronicle carried a major feature about 'a menacing new pollutant' found in the San Francisco Bay area".

"On February 24, the San Francisco Chronicle carried a major feature about 'a menacing new pollutant' found in the San Francisco Bay area. The article was based on marine life research carried out by Dr. Robert Risebrough of the University of California. It stated that residues of polychlorinated biphenyl (PCB) were killing certain marine birds and posed a long-term threat to humans.

This sensational story has caused considerable comment on the West Coast and its claims may be repeated elsewhere. As you know, Monsanto manufactures polychlorinated biphenyl and markets it under our Aroclor trade name. We, therefore, would like to present some additional facts." [MONS 087893, February 28, 1969]

Doc ID # 6549 Exhibit # P-0154

"Monsanto has a research program to confirm the identity of the compounds reported to be PCB by the Swedish and California scientists. We also cooperate, on a regular basis, with federal, state and university laboratories in their analysis of chlorinated hydrocarbon residues.

The source of the marine life residue identified as PCB is not yet known. It will take extensive research, on a worldwide basis, to confirm or deny the initial scientific conclusions."

[MONS 087893-96, "Monsanto Statement," February 28, 1969.]

Doc ID # 6549 Exhibit # P-0154

210.

02/28/69

"Letter from Ford to Mr. Bergen: Wheeler and Richard drafted "some suggested correspondence about the supposed contamination of wildlife by polychlorinated biphenyls", which was in response to the article from San Francisco Chronicle on February 24, 1969.

"Enclosed are two copies each of some suggested correspondence about the supposed contamination of wildlife by polychlorinated biphenyls. This includes a brief memo for possible distribution to salesmen and a longer letter for mailing to customers.

The letter essentially contains comments drafted yesterday by Elmer Wheeler and Bill Richard. Neither man has had a chance to see these drafts and, by carbon, I am asking them to call you immediately if they see the need for any further revision."

[MONS 097599-605, "Letter from Tom C. Ford to Mr. Howard S. Bergen," and "two Drafts for salesmen and customers," February 28, 1969.]

Doc ID # 8196 Exhibit # P-0155

Also See: MONS 097594-98.

Doc ID # 8195 Exhibit #

211.

03/03/69

Statement from Monsanto Company: Tried to deny the occurrence of PCBs in the natural environment and wildlife.

"The work done by Dr. Risebrough dates back to earlier research by other scientists to analyze the amount of pesticides in wildlife, soil and water. The initial pesticide research was extremely difficult since any search to detect materials in the parts-per-billion range also brings out other "interfering" substances." [M13503, March 3, 1969]

Doc ID # 2105 Exhibit # P-0159

"Several years ago, two Swedish scientists at Stockholm University's Institution of Analytical Chemistry, Professor Gunnar Widmark and Soren Jensen, reported they had identified the other substances which were appearing during analysis of chlorinated pesticide residues. They said some of the materials were polychlorinated biphenyl or PCB. The amount reported was in the parts-per-billion range, or less. Since PCBs are not "broadcast" or spread around the land as are pesticides, the scientists theorized that the source must be the industrial wastes of PCB users." [M13504, March 3, 1969]

Doc ID # 2105 Exhibit # P-0159

"Dr. Risebrough's more recent work reports the identification of PCB, along with DDT and DDE pesticides, in the tissues of birds and fish on the West Coast." [M13504, March 3, 1969]

Doc ID # 2105 Exhibit # P-0159

"The conclusions of these scientists are puzzling from several aspects. Polychlorinated biphenyls are stable chemical compounds which are essentially insoluble in water. Their use does not make them easily released into the natural environment." [M13504, March 3, 1969]

Doc ID # 2105 Exhibit # P-0159

"To our knowledge, polychlorinated biphenyls are not sprayed or dusted on crops, woodlands or any other areas, as are pesticides. It is, therefore, not only puzzling, but extremely difficult to conceive how commercially produced PCB can show up in wildlife in the quantities reported. This raises the question whether the substances identified in the Swedish work, and now in California, are actually PCBs -- or whether they are compounds which, due to the metabolism of other materials in the marine environment, appear to be PCBs." [M13505, March 3, 1969]

Doc ID # 2105 Exhibit # P-0159

"The source of the marine life residue identified as PCB is not yet known. It will take extensive research, on a worldwide basis, to confirm or deny these initial scientific conclusion."

[M13503-06, "Statement from Monsanto Company, St Louis, MO.," March 3, 1969.]

Doc ID # 2105 Exhibit # P-0159

212.

03/03/69

Letter from Ford to Mr. Harry M. Bennett, et al.: An article was published on the San Francisco Chronicle on February 24 regarding the supposed pollution of wildlife by PCB.

"As you know, we didn't get a reply to David Perlman of the San Francisco Chronicle in time for his February 24 article on the supposed pollution of wildlife by polychlorinated biphenyls (PCB). I did get approved answers from our Organic Chemicals Division last Tuesday, February 25, and gave them to you, Linton, for transmission to Perlman.

Evidently the story has now spread further on the West Coast. Harry, I believe you said it was in a Los Angeles newspaper and on a local TV station.

Enclosed is a more detailed reply to these charges. This will probably be the full extent of our statements until we are able to make definite conclusions from our own research program. You are free to distribute this reply as you see fit."

[MONS 097499, "Letter from Tom C. Ford to Mr. Harry M. Bennett (Sherman Oaks) and Mr. Linton von Beroldingen (San Francisco)," March 3, 1969.]

Doc ID # 8180 Exhibit # P-0160

213.

03/04/69

Letter from Wheeler to Woods (Department of Fish and Game): Wheeler sent Woods some toxic and inhalation data of Aroclors. Wheeler told him that "the Aroclors are not seriously toxic from the standpoint of acute single exposures."

"In reply to your letter of February 27, I have enclosed a table showing the general physical properties of our Aroclors. At the bottom of this table I have added the results determined in oral toxicity studies with rats and the minimum lethal dose of the Aroclors when applied to the shaven skin of rabbits. You will notice that there is a difference in the manner in which the sample is administered due to the physical form of the sample, its viscosity, solubility, etc.

We believe that these data show that the Aroclors are not seriously toxic from the standpoint of acute single exposures.

A second enclosure is a reprint describing the results of chronic inhalation experiments on two of the Aroclors. This work has led to the establishment of a threshold limit value of 1.0 milligrams per cubic meter for Aroclor 1242 and 0.5 milligram per cubic meter for Aroclor 1254."

[MONS 089186, "Letter from E. P. Wheeler (Manager, Environmental Health) to Mr. Leon A. Woods (Department of Fish and Game, Pesticides Investigations)," March 4, 1969.]

Doc ID # 6609 Exhibit #

214.

03/04/69

Tucker to Richard, Incineration of NCR Paper (Aroclor - Wildlife): Aroclor undergoes little, if any, decomposition when burned. Tucker also told Richard that "Unfortunately, it appears that significant air pollution can occur via burning of N.C.R. paper of other Aroclor containing materials even under more strenuous conditions."

"It has been proposed from the observed distribution of polychlorinated biphenyls in tissue samples taken from marine organisms that global eco-distribution of these materials occurs via aerial transport (wind currents, airborne particulate matter, etc.)

A qualitative experiment has been performed with the objective of determining if Aroclor in N.C.R. paper is destroyed or volatilized when the paper is disposed of by burning." [MONS 097053, March 4, 1969]

Doc ID # 7654 Exhibit # P-0831

"Conclusions:

Under the conditions of this experiment:

1. Aroclor is easily volatilized when N.C.R. paper is burned.
2. Aroclor undergoes little, if any, decomposition when burned.
3. Unfortunately, it appears that significant air pollution can occur via burning of N.C.R. paper of other Aroclor containing materials even under more strenuous conditions."

[MONS 097053-54, "Letter from E. S. Tucker to W. R. Richard: Aroclor - Wildlife: Incineration of NCR Paper," March 4, 1969.]

Doc ID # 7654 Exhibit # P-0831

215.

03/05/69

Letter from Ford to Kohlberg and Thorne: A "major incident" regarding the supposed contamination of wildlife by polychlorinated biphenyls occurred due to the report from San Francisco Chronicle.

"Recently we have had a "major incident" regarding the supposed contamination of wildlife by polychlorinated biphenyls such as the Aroclors manufactured at your plant. This primarily resulted from a story in the San Francisco Chronicle.

A statement from Monsanto about this matter is attached. If you should be contacted by editors in your area, you are free to use this statement in its entirety. However, please do not go beyond this material and please let me know immediately when you have had such an inquiry."

[MONS 096363, "Letter from Tom C. Ford to Krummrich -- Mr. Joe Kohlberg, and Anniston -- Mr. Jim Thorne," March 5, 1969.]

Doc ID # 358 Exhibit # P-0158

216.

03/05/69

Letter from Bryant to Bergen, et al.: 1500 gallons of fluid consisting of 70% Aroclor 1254 emptied on the dirt after an eruption. "The fluid either splashed on the muffler or was picked up on the tires and thrown on the muffler" when a steel hauling truck drove through some of the puddles. "The driver claims he received considerable lung congestion from the exposure and in turn sued Westinghouse."

"To insure that everyone is not caught as cold as I was upon receiving this inquiry, I would like to pass on what background information I have obtained. Since the inquiry came from Phoenix, where Westinghouse has a large manufacturing facility and the subject was a Westinghouse mix of 70% Aroclor 1254 and 30% trichlorobenzene, I called John Fenwich at the Phoenix Plant to obtain any background information they may have." "The story goes as follows:

Westinghouse Phoenix has no railroad siding, so the fluid is taken from the tank car in a tank truck (capacity 1500 gallons per load) to the plant storage tank. It was in this transfer from the tank car to

the plant storage that the difficulty occurred. In April 1967, the tank truck ruptured in the alley behind the plant where the entire 1500 gallons emptied on the dirt. Most of the fluid soaked into the dirt but some of it puddled. The next day they hauled in dirt and dumped it on the puddles to absorb the remainder. However, in the meantime the driver of the steel hauling truck (type with half cab) drove through some of the puddles. The fluid either splashed on the muffler or was picked up on the tires and thrown on the muffler. In any case the fluid flashed off the hot muffler system. The driver claims he received considerable lung congestion from the exposure and in turn sued Westinghouse."

"McGowen was not sure which side these lawyers were on, so he referred me to Wilbur Spiker at Pittsburgh who had done all of the Westinghouse correspondence in the case."

[MONS 097443, "Letter from J. G. Bryant to H. S. Bergen, et al.: Inquiry from Langerman, Begam and Lewis (legal firm), Phoenix, Arizona, Concerning Inhalation of Chemical Vapors from 54201KA," March 5, 1969.]

Doc ID # 357

Exhibit # P-0161

217.
03/06/69

Richard to Wheeler: Richard talked about Risebrough's recent paper published on Nature about the PCB problem and EDF's efforts to write "new legal precedents in conservation law by hearing and court action." Richard said that "Monsanto is preparing to challenge certain aspects of this problem but we are not prepared to defend against all of the accusations."

"Risebrough in a recent paper "Nature", Vol. 220, Dec. 14, 1968, has attacked chlorinated biphenyls in three ways:

- (1) a pollutant – widely spread by air-water; therefore an uncontrollable pollutant.
- (2) a toxic substance – with no permissible allowable levels causing extinction of peregrine falcon by induced hepatic enzymes which degrade steroids upsetting Ca metabolism leading to reproductive weakness, presumably through thinner egg shells.
- (3) a toxic substance endangering man himself; implying that the peregrine falcon is a leading indicator of things to come.

As outlined in Science, Vol. 163, Pg. 548, Environmental Defense Fund (EDF) is attempting to write new legal precedents in conservation law by hearing and court action. In the Wisconsin case, water quality standards are at issue. "A substance shall be regarded as a pollutant if its use results in public health problems or in acute or chronic (injury) to animal, plant or aquatic life". Wisconsin is one of 7 states which now have federally approved water quality standards. According to Bern Wright, acting chief of the Federal Water Pollution Control Administration's Water Quality Standards Branch, DDT would fit the definition of a pollutant upon a showing that it is harmful to aquatic life.

These people in EDF are saying we must not put stress on any living thing through a change in air or water environment. Eagles, plant life, anything which lives or breathes. This group is pushing hard on the extension of the word harmful. They claim "enzyme inducer" activity is the real threat of DDT and PCB's and are using these arguments to prove that very small amounts of chlorinated hydrocarbons are "harmful".

Monsanto is preparing to challenge certain aspects of this problem but we are not prepared to defend against all of the accusations."

[MONS 096509, "Letter from W. R. Richard to E. Wheeler: Aroclor Wildlife Accusations," March 6, 1969.]

Doc ID # 359 Exhibit # P-0163

218.

03/06/69

Letter from Tom C. Ford to Mr. H. H. Bible, et al.: Ford realized that the Aroclor problem "will become national", and asked the company to get ready for that.

"I would like to inform you about current publicity on the alleged contamination of wildlife by polychlorinated biphenyls – the Aroclors marketed by the Organic division. Research of this type began several years ago in Sweden and has been continued by several other scientists, including a Dr. Risebrough from the University of California. His work has appeared in NATURE, an English magazine, and SCIENTIFIC AMERICAN.

Late in February, the SAN FRANCISCO CHRONICLE carried a front page story (copy enclosed). This resulted in several customer and governmental inquiries from the West Coast plus a few letters from citizens there.

It now appears this issue will become national. Today we were contacted by TIME which is working on an article for its science section. Since TIME's local correspondent is on the ST. LOUIS POST-DISPATCH, another story could appear locally.

Enclosed is a company statement prepared to answer inquiries. It is the product of a joint effort between Public Relations, Organic, Medical and Law. A "committee" has been established to handle this and future public inquiries. Howard Bergen is the Organic representative; Elmer Wheeler represents Medical."

[MONS 097978, "Letter from Tom C. Ford to Mr. H. H. Bible, Mr. E. J. Bock, Mr. J. L. Gillis, Mr. Finis Morgan, Mr. E. A. O'Neal, Mr. E. J. Putzell, Mr. T. K. Smith, Mr. C. H. Sommer and Mr. M. C. Throdahl," March 6, 1969.]

Doc ID # 8850 Exhibit # P-0164

219.
03/07/69

Letter from Wheeler to Dr. Kelly: "The Aroclor pot is really boiling." Throdahl told Wheeler to give a possible 15-minute presentation to the Corporate Development Committee regarding the PCB problem. Monsanto planned to keep some one from universities as consultants. Wheeler made it clear that "The intent is to select someone from the university who can serve as an objective spokesman on this whole problem and with contacts not intimately related to Monsanto or Industrial Bio-Test."

"The Aroclor pot is really boiling. Monte Throdahl asked me to have lunch with him today to give him the background as to what the whole problem is about. He said he might call me Monday morning to give a 15 minute presentation to the Corporate Development Committee. He thought that he could probably answer questions that might arise but told me to be prepared."

"Bill Richard and I were at Calandra's yesterday and the proposals from Joe on the various studies are to be undertaken posthaste, including the two-year chronics in rats and dogs. We are to have a meeting, possibly before you return, of those involved here in St. Louis, Joe Calandra, and one or two of his people, with perhaps as many as three consultants who are already retained by Monsanto for either Ag Division or NED projects. These include entomologists and enzyme specialists from the University of Illinois. Marquette, and possibly Harvard."

"The intent is to select someone from the university who can serve as an objective spokesman on this whole problem and with contacts not intimately related to Monsanto or Industrial Bio-Test."

[MONS 097459, "Letter from E. F. Wheeler to Dr. R. Emmet Kelly," March 7, 1969.]

Doc ID # 8161 Exhibit # P-0165

220.

03/13/69

Keller to Wheeler: Rock (Federal Water Pollution Control Administration, Alameda, California) raised a series of questions regarding PCBs to Monsanto.

"Per our agreement with reference to the above memo from C. Paton, I called Mr. Robert Rock of the Federal Water Pollution Control Administration, Alameda, California on March 12." [MONS 096358, March 13, 1969]

Doc ID # 365 Exhibit # P-0169

"He listed the following questions and I promised that an authority would reply shortly. Will you handle?

1. Would polychlorinated biphenyl type materials such as those in our Aroclors be expected to be found in domestic wastes (household)?
2. Same question as 1, but in industrial wastes?
3. If the answer to 2 is yes – would this be a result of a breakdown of a marketed product following use or as a waste from a manufacturing process in which polychlorinated biphenyls are used?
4. Would chlorinated biphenyls be found in oil/gasoline refinery effluents?
5. Do we have toxicity data – especially for fish?
6. Can we provide chemical/physical property data for our Aroclor products – especially solubility in water?

Rock impressed me as being quite knowledgeable about this whole subject. His approach and reasoning seemed very rational. We should keep him in mind as a future contact when we reach a

position where it is timely and beneficial to exchange information with certain other laboratories." [MONS 096359, March 13, 1969]

Doc ID # 365 Exhibit # P-0169

[MONS 096358-59, "Letter from R. E. Keller to E. Wheeler (General Offices)," March 13, 1969.]

Doc ID # 365 Exhibit # P-0169

221.

03/14/69

Letter from Tom C. Ford to Mrs. Robert A. Rivera (Oakland, California): Monsanto tried again to deny the discovery of PCBs presence in the natural environment.

"The earlier work done in Sweden reported traces of residue, identified as PCB, in quantities approaching that of DDT and DDE pesticides. Even though all these residues required precise measurement to find them in the parts-per-billion range, we are highly puzzled by one fact. How could that much commercially produced PCB appear in the natural environment? The chemical is a highly specialized product used in restricted ways." [M13684, March 14, 1969]

Doc ID # 2204 Exhibit # P-0170

"One possible answer is that the substance is not really PCB, but a materials which only appears so." [M13684, March 14, 1969]

Doc ID # 2204 Exhibit # P-0170

"The source of the residues identified as PCB is not yet known. It will take extensive research, on a worldwide basis, to confirm or deny these initial scientific reports."

[M13684-85, "Letter from Tom C. Ford, Manager of Divisional Public Relations of Monsanto to Mrs. Robert A. Rivera (Oakland, California)," March 14, 1969.]

Doc ID # 2204 Exhibit # P-0170

222.

03/18/69

Letter from Wheeler to Ford: Monsanto rewrote its previous Statement on PCB's in wildlife based on the suggestion of at Industrial Bio-Test Laboratories in an effort to make some improvements.

"Attached is a copy of a proposed rewrite of Monsanto's comments relating to the San Francisco Chronicle article.

You will note that there is not a lot of change from the statement you put together previously and dated March 3.

The attached is an attempt by our consultants at Industrial Bio-Test Laboratories to be a little more 'positive' in referring to Monsanto's efforts and interests. Drs. Calandra and Fancher from the consulting lab thought there could be some improvement in what they consider the 'defensive' aspect of our original release.

I don't know if there will be any great need for sending out additional copies of a statement but I would appreciate your comments as to whether the attached should replace the March 3 issue."

[MONS 097606, "Letter from Elmer P. Wheeler to Tom Ford: Monsanto's Statement on PCB's in Wildlife," March 18, 1969.]

Doc ID # 8197 Exhibit # P-0171

223.
03/25/69

Letter from Wright to Kuhn: Monsanto received three reports from contracted consultants on the study of Chocoolecco Creek.

"Jee Leadwehr has requested that I send you the last three reports from outside consultants with whom we have contracted to study Chocoolecco Creek."

[MONS 097308, "Letter from E. G. Wright to W. A. Kuhn (St. Louis): Biological Studies on Chocoolecco Creek," March 25, 1969.]

Note: *The copy is not clear at all, and is too difficult to read.*

Doc ID # 368 Exhibit # P-0173

224.
04/15/69

Monsanto authorized Industrial Bio-Test Laboratories to initiate as soon as possible the PCBs toxicity studies 5 through 9 on the attached.

"Concerning my recent telephone conversations with Otis and the exchanges of correspondence concerning the Aroclor studies at your laboratory, this letter is to authorize you to initiate as soon as possible studies 5 through 9 on the attached."

"I would appreciate it if Dr. Fancher or Mr. Berndt could let me know the date that these various studies are started, perhaps, using your usual forms such as you send Dr. Hunt.

Please note that we are deferring the subacute fish toxicity studies until we get a better idea of work which is underway in Europe or other laboratories in the U. S."

[M 42524, "Letter from E. P. Wheeler to Dr. Joseph Calandra, Industrial Bio-Test Laboratories, Inc.," April 15, 1969.]

Doc ID # 3527 Exhibit # P-0179

225.
04/24/69

Letter from Kelly to Richard: Monsanto had a plan "to add chlorinated naphthalenes" to its "Santosafe class of fire resistant hydraulic fluids". Kelly opposed the idea. The toxic effects of the mixtures of chlorinated naphthalenes, chlorinated diphenyls and chlorinated diphenyl oxides were discussed. It was reported in the mid-1930s that "workmen were being excessively exposed to vapors of the hot mixture and probable excessive skin contact indicates that there were several deaths due to acute atrophy of the liver and a number of non-fatal cases of liver disease".

"Mr. Wheeler has told me of your discussion with him concerning the possible addition of chlorinated naphthalenes to our Santosafe class of fire resistant hydraulic fluids. Based not only on the reports of toxicity studies of these compounds and the chlorinated biphenyls as shown in the enclosures but, further, based on the potential hazards which might develop from the use of the combination of these materials, I would never approve the addition of chlorinated naphthalenes to our formulations.

As Mr. Wheeler told you difficulties with mixtures of chlorinated naphthalenes, chlorinated diphenyls and chlorinated diphenyl oxides developed in the mid-1930s. The products involved were known as 'halowax' and were being used for impregnating electrical cable coatings. The summary of the number of investigations which followed the realization that workmen were being excessively exposed to vapors of the hot mixture and probable excessive skin contact indicates that there were several deaths due to acute atrophy of the liver and a number of non-fatal cases of liver disease. In addition serious acneform dermatitis developed in many workers with a lower degree of exposure.

Animal toxicity experiments originally implicated chlorinated biphenyls alone with the other materials. Subsequent experience, however, has indicated to our satisfaction that reasonable control of exposure to the chlorinated biphenyls will prevent any toxic effects. The control includes the avoidance of inhalation of vapors when the chlorinated biphenyls are heated in open containers or when there are leaks of the hot liquids. Secondly reasonable care to avoid prolonged and repeated skin contact is necessary. When these precautions are followed the industrial use experience with the chlorinated biphenyls has been singularly free of any difficulties."

"Again, in the early 1950's problems arose with certain uses of the chlorinated naphthalenes as indicated in the enclosed copies from Patty's 'Industrial Hygiene and Toxicology.' A number of herds of cattle around the country suffered fatalities and disabilities from a condition described as 'hyperkeratosis'. This apparently developed from cattle ingesting high pressure lubricating greases on farm machinery that contained chlorinated naphthalenes. As the time of the incident research sponsored by Monsanto and the U. S. Department of Agriculture led to a statement by the latter that the chlorinated diphenyls were not responsible for the cattle disease (even though some chlorinated diphenyls were being used in extreme pressure lubricants)."

[MONS 097461-62, "Letter from R. E. Kelly, M. D. to W. R. Richard: Chlorinated Naphthalenes In Fluids," April 24, 1969.]

Doc ID # 8162 Exhibit # P-0180

226.
04/28/69

Hodges wrote to Anniston and Krummrich plants regarding his present general ideas on how fast and how far they should go in the clean-up of their sewage streams.

"As follow-up on our telephone conversations regarding clean-up of aroclors from our sewage streams, I have written down some thoughts which you might find useful. These are my present general ideas on how fast and how far we should go in the clean-up. We must realize that when we receive your programs on May 9 (verbally or written) and transmit them to the Business Group for comments, we may be requested to alter the plans considerably. Also, subsequent events may necessitate changes.

1. Analyses of Wastes for Aroclors Content
2. Determination of Aroclor Levels in Receiving Streams
3. In-Plant Reduction of Aroclors

The general philosophy expressed in the memorandum of January 23, 1969, "Aroclors in Plant Effluent," by me still holds except that timing is now tightened following the San Francisco Chronicle blast and recommendations of R. L. Metcalf (our University of Illinois consultants)."

[MONS 096507-08, "Letter from P. B. Hodges (General Office) to W. F. Taffee (Anniston) and C. F. Buckley (Krummrich)," CONFIDENTIAL, April 28, 1969.]

Doc ID # 371 Exhibit # P-0181

227.
04/30/69

Letter from Mainprize to Baxter: Mainprize had searched "available literature (Water Poll. Abstracts etc.) for any references to work on the biodegradation of chlorinated bi-phenyls and have so far been unsuccessful". He emphasized the immediate need "to demonstrate that primary breakdown of Arcolors can occur in nature", however, did not want to have extensive study of the toxicity of any degradation products.

"I have searched available literature (Water Poll. Abstracts etc.) for any references to work on the biodegradation of chlorinated bi-phenyls and have so far been unsuccessful. There is however considerable published information on the techniques for studying the breakdown of other potentially toxic, water insoluble materials, and these I think could be adapted for work on Aroclors.

Unfortunately, little evidence exists of any standardization of technique amongst various workers, a fact which is commented on in the report of a U.S. committee published in 1967¹. (R.D. Swisher was a member)."

"I have assumed that the immediate need is to demonstrate that primary breakdown of Arcolors can occur in nature, and that extensive study of the toxicity of any degradation products should not be considered at this stage."

[MONS 097696-97, "Letter from J. H. Mainprize to R. A. Baxter (Ruabon): Biodegradation of Aroclors," April 30, 1969.]

Doc ID # 8219 Exhibit # P-0183

228.
05/05/69

Letter from Herman to Faulkner (Anniston): Due to the Near-Miss Accident in Anniston, Herman requested Anniston to "develop adequate background information to predict and control explosion-fire potential of the biphenyl packaging system".

"9. Provide adequate door design for both Biphenyl and Aroclor flakers which meet operational needs and curtail product and vapor loss from the flaker systems."

"A copy of the Near-Miss Accident Report has been forwarded to R. J. Green, CED Safety Manager for CEA 1430. Mr. Green should be contacted by Anniston T.S.D. as they discharge their responsibility under item No. 6 – develop adequate background information to predict and control explosion-fire potential of the biphenyl packaging system."

[MONS 097955, "Letter from R. C. Herman to L. L. Faulkner (Anniston): Near-Miss Accident Report No. 1-69," May 5, 1969.]

Doc ID # 8840

Exhibit # P-0185

229.
05/08/69

A person from the DDT Task Force testified that "a lot of the residue found in Coho salmon was really PCB – and it was made by Monsanto." Ford felt bad for that and said "what we didn't count on were our 'friends'."

"As you know, the State of Wisconsin is holding hearing on a proposal to outlaw DDT. We felt the chance of the 'opposition' bringing PCB into the picture was slim. What we didn't count on were our 'friends'.

Wednesday morning I began receiving calls from Madison advising me that a Mr. Francis Coon, from the Wisconsin Alumni Research Foundation Laboratory, was testifying that a lot of the residue found in Coho salmon was really PCB – and it was made by Monsanto. At first I assumed he was a witness for the opposition (the Environmental Defense Fund) or the state. It turned out he was testifying for the DDT Task Force which is being assisted by the National Agricultural Chemical Association.

Later calls indicated the DDT Task Force has three similar witnesses scheduled for this morning, including a man from Shell in the United Kingdom.

Although we had only partial information, this development was obviously disturbing." [MONS 096352, May 8, 1969]

Doc ID # 373 Exhibit # P-0187

"Garrett, Dr. Kelley and I discussed whether anyone should fly up to Madison from the rest of the testimony. Garrett advised against this since any Monsanto person would be recognized and perhaps even asked to testify. This possibility was confirmed by the NACA gal who said reporters were covering the airports to see who came into town for the hearings."

[MONS 096352-53, "Letter from Tom C. Ford to Mr. Howard S. Bergen, Dr. W. R. Richard and Mr. E. P. Wheeler," May 8, 1969.]

Doc ID # 373 Exhibit # P-0187

230.
05/08/69

Letter from Hunt to Sullivan: A toxic study with the sample (40% Aroclor 1242, 60% o-dichlorobenzene) in corn oil revealed that it caused liver, kidney problems, etc.

"The sample, as a 20% solution in corn oil, was classed as slightly toxic when administered orally to mixed sex rats. The acute oral LD₅₀ was 1600 mg/kg. Most deaths occurred in 2 to 3 days. Toxic signs were reduced appetite and activity, increasing weakness, collapse, and death. Gross pathologic examination of those that succumbed revealed a mottled and discolored liver, hemothagic lungs, gaseous and inflamed intestinal tract, and in some discoloration of the kidney. Those that were sacrificed revealed discoloration of the liver and kidneys and gastrointestinal inflammation."

[MONS 097851, "Letter from William H. Hunt, Ph.D. to James D. Sullivan: Functional Fluid Formulation (40% Aroclor 1242, 60% o-dichlorobenzene), Acute Toxicity Screen," May 8, 1969.]

Doc ID # 8268 Exhibit # P-0188

231.
05/12/69

Letter from F. E. Hodges to W. A. Kuhn (Confidential): "free" globules of Aroclors can be seen in Snow Creek, but Monsanto was reluctant to spend money to fix the problem.

"External to plant -- that a problem exists at Anniston is evident because 'free' globules of Aroclors can be seen in Snow Creek.

We do not know what problem exists in Choccolocco Creek and the Coosa River. By July 1, 1969, we will determine the limit of visual evidence of Aroclors downstream in Snow Creek." [DSW 013579-81, May 12, 1969]

Doc ID # 20169

Exhibit # P-0177

"We have generally taken the position that, before any expensive projects are undertaken to halt sewerage of aroclors, we should know what levels exist in the receiving waters. In other words, we need to define problems, if any, resulting from loss of aroclors in the plant effluents."

[DSW 013579-81, "Letter from F. E. Hodges to W. A. Kuhn: Aroclors Clean-up from Plant Effluent," Monsanto, C-O-N-F-I-D-E-N-T-I-A-L, May 12, 1969.]

Doc ID # 20169

Exhibit # P-0177

Also See: MONS 036147-151

Doc ID # 4717

Exhibit #

232.
05/12/69

Letter from Taffee to Paul B. Hodges: "The Anniston Plant plans for poly-chlorinated biphenyl (PCB) determinations in liquid waste streams including sources, quantities and recommended actions are included."

"The following information is a summary of our telephone conversation of May 9, 1969, complying with your request in reference memo.

The Anniston Plant plans for poly-chlorinated biphenyl (PCB) determinations in liquid waste streams including sources, quantities and recommended actions are included. We do not plan to look for atmospheric losses based on our present mutual feeling that losses to the atmosphere are negligible."

[DSW 014265]

Doc ID # 9

Exhibit # P-0189

"That completes the proposed plan. There are a few other points I'd like to mention though.

1. The Anniston Plant is proceeding with projects to reduce the Aroclor in recovered HCl – some of which is sewerred.
 - a) The 'catch-tank' in the HCl off-gas line has been successfully started up and is collecting some material.
 - b) A membrane type coalescer is to be installed in May to remove organics from the absorbed HCl.

Aroclor from these two sources will be buried in the toxic dump.

2. Cross sampling of Snow Creek started the week of 4/28/69. Snow Creek outfall has been monitored for pH and % HCl for several years. (Potassium and mercury analyses are no longer run)
3. Preparations are well underway to start the Aroclor/HCl departmental audits. Actual sampling should start within a week, if the analyses can be run.
4. The only departments using or processing Aroclors at Anniston are:
 - a) P_2S_5 – a Therminol system. This is drained to drums when replacement of Therminol is required. This has been done in this manner since startup.
 - b) Aroclor

Processing
Two Therminol systems
Floor cleanings
Spills
HCl off-gas

No significant amount is lost from tank car cleaning since any material (including heels) is drained into drums, cleaning clothes are put in trash containers. Both drums of liquid and rags are sent to the dump."

[DSW 014267]

Doc ID # 9

Exhibit # P-0189

[DSW 014265-67, "Letter from W. F. Taffee to Paul B. Hodges, General Offices," May 12, 1969.]

Doc ID # 9**Exhibit # P-0189**

233.

05/13/69

Richard visited to Prof. G. Widmark (U. of Stockholm): Professor Widmark wanted Monsanto to restrict its sale of PCBs.

"Widmark has examined 2000 samples from the Baltic Sea. Another group of ecologists is examining the sea around Scotland. Their results are a bit different according to Widmark's knowledge." "Widmark had been contact with transformer manufactures in Sweden, They reported very low loss of chlorinated biphenyls, an occasional spill. Widmark kept hitting at marine paints as a source of the product." "He wanted Monsanto to restrict sale to those closed system applications. He asked if the economic value of PCP's was worth the bad publicity which would come to Monsanto." "We countered with a question. What products would he recommend as substitutes? What kind of synthetic compounds are biologically acceptable? Would he help establish a safe tolerance level of synthetic compounds in wild-life?"

[M32075, "Letter from W. R. Richard (Research Center, Monsanto) to File (Monsanto)," Subject: Visit to Prof. G. Widmark (U. of Stockholm); May 13, 1969.]

Doc ID # 2781**Exhibit # P-0190**

234.

05/23/69

Dr. Fancher from Bio-Test suggested the addition of 15/15 rats per group to the chronic Aroclor studies for Monsanto.

"It is our opinion that the addition of 15/15 rats per group to the chronic Aroclor studies in rats can be justified to provide some information prior to completion of the two-year study and to give some basis for possible changes in dose levels as the chronic study proceeds. The addition of this number of animals would permit sacrifice of 5/5 animals per group after 90 days, six months and one year."

"A similar increase in the dog study would be difficult to justify economically and no purpose would be served by increasing the number of animals in the chicken, duck and reproduction studies."

[M 42526, "Letter from Otis E. Fancher, Ph.D. (Director), to Mr. Elmer P. Wheeler (Monsanto)," May 23, 1969.]

Doc ID # 3673 Exhibit #

235.

05/26/69

Wheeler to Richard: The FWPCA concerned what Monsanto at Anniston, Alabama did to control the escape of polychlorinated biphenyls or waste products getting out of the plant.

"Dave Nelson of MRC called me today to relay the following information:

Dave says that in the course of the meeting some of the FWPCA boys raised the question as to what Monsanto at Anniston, Alabama does to control the escape of polychlorinated biphenyls or waste products getting out of the plant. Obviously Dave would not have any of the details of our programs at Anniston but passed this word on to me with the thought that we can anticipate that the Feds will be looking at creek, river or lake water and mud samples below Anniston for PCBs."

[MONS 096345, "Letter from Elmer P. Wheeler to W. R. Richard," May 26, 1969.]

Doc ID # 27341 Exhibit #

236.

06/10/69

Letter from Springgate to Schalk: PCB was used in paints. Several years prior to 1969, Monsanto did approve the use of such paints "for the interior of water towers, where the water is primarily for human consumption".

"As you know, there has been work by various scientists in regard to finding polychlorinated biphenyl in marine life. There will certainly be more work on this, both in the U.S. and in Europe.

One of the problems is that PCB can be detected in parts per billion. Although there are no known harmful effects at these low levels, there are probably some uses that could be questioned and would be hard to defend.

One such use would be in paints for the interior of water towers, where the water is primarily for human consumption. Howard Bergen was under the impression we were asked about this specific use several years ago and did approve it.

Do we know of any customers formulating paints specifically for water towers?"

"Martin:

Would you please have someone calculate the probably level of PCB in water from a water tower painted with Aroclor formulation?"

[MONS 097841, "Letter from J. E. Springgate to Mr. W. E. Schalk: Aroclors," June 10, 1969.]

Doc ID # 8262 Exhibit # P-0192

237.

06/10/69

Anniston collected its first full set of samples from the effluent to determine the losses of Aroclors in the Plant Effluent.

"A limited number of samples were collected recently during a several-day shut down of Aroclor production to establish losses without Aroclor production. Another full set of samples will be collected soon in order to resolve discrepancies with results from the first (June 10, 1969) samples. Following establishment of reasonably reliable facts on present receiving stream PCB levels, we will continue to sample at about six months intervals."

[DSW 014004-06, "Letter from Paul B. Hodges to Mr. W. A. Kuhn: Status Report – Aroclors Clean-up of Plant Effluents", October 9, 1969.]

Doc ID # 13 Exhibit # P-0229

238.

06/12/69

Letter from Wheeler to Dr. Keller: Summary Report on Human Poisoning caused by the rice bran oil in Japan.

"Attached is a summary of the Japanese interim report on the incident where humans were poisoned with the Japanese chlorinated biphenyl when it leaked into and contaminated rice bran oil.

Briefly, the original newspaper articles were vastly exaggerated since they indicated as many as 14,000 people may have suffered poisoning. This number was reduced to 600 and the enclosed report indicated that there are 178 diagnosed cases and 111 suspected cases.

The principal symptoms are related to the dermatological effects (chloracne, blackheads, rash, etc.). The clinical investigations report possible more serious effects including those on pregnant women and subsequent new births."

[MONS 096456, "Letter from Elmer P. Wheeler to Dr. Robert E. Keller: Report on 'Human Poisoning with Kane-Chlor'," June 12, 1969.]

Doc ID # 379 Exhibit # P-0193

239.

06/12/69

In response to Dr. Fancher's suggestion, Wheeler agreed to add another 300 animals to the two-year Aroclor chronic study.

"We have decided that it would be desirable to proceed with additional animals for interim sacrifice during the two year chronic studies with rats. This letter will authorize you to add the 300 animals at a cost of \$12,000 in accordance with your letter of May 23, 1969."

[M 42528, "Letter from Elmer P. Wheeler to Dr. Otis E. Fancher, Ph.D.," June 12, 1969.]

Doc ID # 3675 Exhibit #

240.

06/13/69

Ford wrote to Wall Street Journal: Dr. Risebrough indicated our sentence that PCB is essentially insoluble in water was misleading.

"Dr. Risebrough indicated our sentence that PCB is essentially insoluble in water was misleading. We did not intend such. We know PCB is fat soluble. We did want to point out that its insolubility in water meant it settles to the bottom and is not easily transported or dispersed."

[M13509, "Letter from Tom C. Ford Manager of Divisional Public Relations of Monsanto to Mr. Phillip Yaffee, Wall Street Journal," June 13, 1969.]

Doc ID # 2106 Exhibit # P-0194

241.

06/19/69

The calculated lethal concentration of 0.66 parts per million for the 1242 and 1254 samples when bluegills were exposed made Monsanto feel nervous.

"The fish toxicity studies raise a number of questions, some of which I hope can be answered when there has been an opportunity to analyze the water samples which the laboratory sent to Scott. The numbers reported as being the lethal doses are real encouraging, if we could ever determine that the concentration in the fish tanks were actually at the levels indicated. In other words, if the concentration was greater than 100 parts per million and the fish survived this would really be something. We find it hard to believe, however that such a concentration would exist in the water even though a sufficient Aroclor dissolved in acetone was added to the water to establish such a concentration.

The calculated lethal concentration of 0.66 parts per million for the 1242 and 1254 samples when bluegills were exposed adds only confusion if one considers the solubility limits of the Aroclors. Dr. Keplinger told me they repeated the experiment three times and got the same results in so far as the bluegill-Aroclor numbers are concerned."

[MONS 096491, "Letter from Elmer P. Wheeler to W. R. Richard and R. E. Keller/S. Tucker: Preliminary Reports from Industrial Bio-Test," June 19, 1969.]

Doc ID # 380 Exhibit # P-0196

242.

Mid-1969

Monsanto confirmed the presence of PCB's in the environment, and confirmed the adequacy of work by Widmark and Jensen and others.

"Monsanto confirmed the presence of PCB's in mid-1969 and confirmed the adequacy of work by Widmark and Jensen and others; truly, the PCB's are a worldwide ecological problem."

[M07175, Monsanto, "Outline: PCB Environmental Pollution Abatement Plan," November 10, 1969.]

Doc ID # 406 Exhibit # P-0245

243.

07/23/69

The Monthly Report indicated that the warehouse was one the major sources for Aroclor losses. It was caused by the followings: "It is drained by dropping the material into a drum and allowing the aqueous layer to overflow to the sewer. The other major sources

are leaks and spills which are washed directly to the sewer when the floor is steam cleaned in the warehouse."

"The major sources of organic (primarily Aroclors but with smaller amounts of Biphenyl, Santowax and HB-40) and acid waste in the Aroclor and HCl departments have been identified and quantified. The average total losses of organic material from these departments is approximately 27#/day. The new warehouse drumming and flaking area accounts for almost half of the organic losses with an average daily loss of 11#/day. The remainder of these organic losses comes from the Aroclor still room sewer (2#/day), the chlorinator sewer (8#/day) and the HCl department (6#/day). The acid losses from these departments came from two sources. The chlorinator sewer and the HCl department sewer. The chlorinator sewer showed an average loss of 1,100#HCl/day and the HCl department losses were an average of 15,500#/day.

To provide facts on the effects of P.C.B. in plant effluent water, Snow's Creek and Choccolocco Creek were investigated, Snow's Creek was checked visually for two phase systems (i.e. Aroclor and water). None was noted more than one block from the plant boundaries. Six samples of mud and water were collected downstream from the plant (see attached map for locations of sampling points)." [MONS 057607]

| **Doc ID # 382** **Exhibit # P-0198**

"FUTURE WORK

1. Continue to monitor organic losses periodically on the total plant outflow.
2. A decision will be made on continuing to sample on Choccolocco and Snow's creek as soon as the results from the first set of samples are received.
3. Collect one set of fish samples from Choccolocco Creek and have these analyzed for P.C.B. levels." [MONS 057608]

| **Doc ID # 382** **Exhibit # P-0198**

"Warehouse Audit

This sewer collects the wastes from the Aroclor drumming end flaking area in the new warehouse. It was found to be the largest singular contributor of organics to the sewer with an average daily loss of approximately 11.0#/day of dissolved organics. The 2nd (organic) phase of this sewer is presently being trapped in a sump

located at the north-east corner of the warehouse. During a one week period we collected approximately 2.5 gallons of organics or 27# for the 7 day period. This average 3.8 #/day plus the 11 #/day of dissolved material brings the total from this source to 14.8 #/day. We will continue to monitor this sump to gather long term data. These organics came from two major sources. These are the wet scrubber which was installed to scrub the vents from the Biphenyl and Aroclor flakers. The organic material and water is drained from the scrubber once per day. It is drained by dropping the material into a drum and allowing the aqueous layer to overflow to the sewer. The other major sources are leaks and spills which are washed directly to the sewer when the floor is steam cleaned in the warehouse." [MONS 057610]

Doc ID # 382 Exhibit # P-0198

[MONS 057607-10, "E. G. Wright, "Progress Report, Anniston Alabama Plant," COMPANY CONFIDENTIAL, July 23, 1969.]

Doc ID # 382 Exhibit # P-0198

244.
07/25/69

Wheeler and other Monsanto people planned to visit the Bio-test Laboratory to review its on-going Aroclor toxicity studies.

"A group of Monsanto people with Elmer Wheeler will visit the laboratory on Thursday, July 31, to review certain aspects of the Aroclor studies. He requested that we have brief status summaries of all the projects in progress. There are certain problems with the fish toxicity studies. The materials being found in water and fish from the fish toxicity studies do not correspond to the materials expected from our labeling."

[M 42531, "Otic E. Fancher: Inter-Office Correspondence," July 25, 1969.]

Doc ID # 3678 Exhibit # P-0199

245.
08/04/69

Letter from A. Lovat-Howitt to B. O. Fjeld: Birds died from poisoning in the Oxclönsund lake. Pydraul 135, which is a PCB containing product, was suspected to be responsible.

"I had a call from Mr. M. Page of Pyeunican. He said that they supplied equipment to Oxclönsund. The latter had asked them, as part of their service, to perform gas chromatographic analyses on

the local Oxclönsund lake water. The reason for this, was that some birds had died with some sort of poisoning. It was suspected that the lake had been contaminated with Pydraul 135.

[MONS 097699, "Letter from A. Lovat-Howitt to B. O. Fjeld (Stockholm): Oxclönsund Steel Works - Pydraul 135," August 4, 1969.]

Doc ID # 8221 Exhibit # P-0202

246.
08/05/69

Garrett told Wheeler that on the issue of Aroclor Mr. Teasley "could be a good friend to us in connection with this problem and I would recommend that he be treated accordingly."

"Mr. John I. Teasley of the National Water Quality Laboratory in Duluth is presently gearing up to do GLC-EC analysis for PCB and chlorinated pesticides. Dr. Mount, Mr. Teasley and Dr. Gary Glass all expressed the opinion that the PCB found in Lake Michigan and Lake Superior entered the lake as a contaminate of some other material rather than as a pollutant from PCB manufacture or use. In other words these gentlemen feel the same as we do about the origin of the PCB they are seeing in their analysis.

Mr. Teasley asked if he could have a copy of the Swedish work showing the mass spec data. He has not seen this paper but the Ann Arbor Laboratory people have told him about it. If there is no objection, I think a copy should be sent to Mr. Teasley. I invited him to come to St. Louis and discuss analytical systems with Dr. Tucker and Dr. Keller. I understand he has already contacted Dr. Tucker in this respect. He could be a good friend to us in connection with this problem and I would recommend that he be treated accordingly."

[MONS 097969, "Letter from Jack T. Garrett to E. P. Wheeler," August 5, 1969.]

Doc ID # 8843 Exhibit #

247.
08/05/69

Letter from Garrett to Dr. Tucker: A recent "contamination was traced to the dishwasher soap used in a washing machine". "Analysis showed that the dishwasher soap contained 5 ppm PCB."

"In the discussions they mentioned that the Fish and Wildlife Service Laboratory at Ann Arbor, Michigan had told them of a

recent contamination problem they had experienced. Apparently this contamination was traced to the dishwasher soap used in a washing machine for laboratory apparatus. Analysis showed that the dishwasher soap contained 5 ppm PCB. The dishwasher soap in question was 'Electro-Sol' which is manufactured by Economics Laboratory, Inc., St. Paul, Minnesota. Incidentally, this company also manufactures 'Finish' dishwasher soap."

"It is of interest to note that all current dishwasher soaps contain an available chlorine additive. Cascade, manufactured by Proctor and Gamble, and Dishwasher All, manufactured by Lever Brothers, contain chlorinated trisodium phosphate.

Dr. Mount and Mr. Teasley are convinced that PCB is entering the water environment as a contaminate and not necessarily from the manufacture or use of this product. One clue about the possibility of PCB in these products is its use as a de-dusting agent. According to the Inorganic Division, none of our phosphates use this material as a de-duster. It is, however, possible that the medicilicate and/or the carbonate salts were so treated."

[MONS 097464, "Letter from Jack T. Garrett (Medical Department) to Dr. E. S. Tucker," August 5, 1969.]

Doc ID # 8164 Exhibit #

248.

08/15/69

Letter from Wheeler to Fallon: PCB's containing Therminols were used for heat transfer in food processing equipment. Food contamination by PCB's was reported. Wheeler "heard (about five years ago) from a customer on the east coast that had run experiments where 25 ppm could not be detected in fried foods (I think it was donuts)".

"The question raised in your memo concerning the possible contamination of cooking oil in foods warrants, I believe, a full discussion. I propose that we set up a meeting for this purpose the week of August 25 or soon thereafter. Dr. Kelly is out of the office until the 25th.

When Therminols were introduced for heat transfer in food processing equipment, we believed that if any Thereminol contaminated the food, the taste of the Therminol would make the food unpalatable before a toxic concentration would be reached in the food. This conclusion was based on a simple test we

personally ran about 15 years ago. We could detect less than 1 ppm in water by taste and/or odor."

"We subsequently heard (about five years ago) from a customer on the east coast that had run experiments where 25 ppm could not be detected in fried foods (I think it was donuts)."

"We felt this was desirable because even though the concentration of Therminol in the food might be below any toxic level and might be below a level detectable by taste or odor, the food product would be subject to seizure and destruction because of 'adulteration'."

"A research effort was not successful in providing an analytical method or instrumentation which could be economically applied for use by the food processor."

[MONS 097763, "Letter from Elmer P. Wheeler to J. R. Fallon: Therminol FR Series -- Chlorinated Biphenyls Food Processing," August 15, 1969.]

Doc ID # 8243 Exhibit # P-0203

249.

08/18/69

Letter from Tucker to Wheeler: Dr. Gunther contacted Monsanto, and told Conkin that as many as 8-10 people were interested in meeting "with Monsanto people working on the PCB problem at a closed, off the record, evening dinner session on Friday, October 17th".

"Bob Conkin called me today; he had just been contacted by Dr. Francis Gunther (University of California, Riverside, Department of Entomology), head of the USDA Committee W-45 which is presently carrying out research in the western states on pesticides and PCBs. This committee is holding a meeting in St. Louis the week of October 15-17. Dr. Gunther expressed the wish to meet with Monsanto people working on the PCB problem at a closed, off the record, evening dinner session on Friday, October 17th. He indicated that as many as 8-10 people were interested, including a Dr. Don Crosby (Chairman A.C.S. Pesticide Division and Past Director, Toxicology Labs, University of California, Davis), and possibly even Reisbrough."

"Topics for discussion would probably include:

1. Technical methods.
2. Programs.

3. Sources of PCB contamination.
4. Their results.
5. Our results.
6. General ideas."

[MONS 097411, "Letter from E. Scott Tucker (R&D Laboratories) to E. P. Wheeler (General Offices): AROCLOR WILDLIFE," August 18, 1969.]

Doc ID # 8132 Exhibit #

250.

08/21/69

On August 21, 1969, in its sixth of regular quarterly reports summarizing pollution accomplishments and problems around the division, when talking about the water pollution, it says that "With Congress deeply involved in other problems, comparatively little attention was given to pollution. There was little evidence of real pressure from the Nixon administration to speed up pollution control or to increase federal financing of control projects. David Dominick (a young lawyer-politician with no background in pollution control) was appointed Commissioner of the Federal Water Pollution Control Administration (FWPCA). A proposed water Quality Improvement Act of 1969 is being kicked around but appears to be mostly concerned with oil spill clean up. The 7% Investment Tax Credit for control facilities will be out and may be replaced with a 3- or 5-year write-off provision." Only real activity affecting us is the FWPCA pressure on Iowa to set early dates for secondary treatment along the Mississippi and Missouri Rivers. The Illinois Air Pollution Control Board, in deep political trouble, was given a last-minute reprieve by the new Governor in the closing hours of the Illinois Legislature and is still in existence with reasonably adequate funds. The reprieve was coupled with a warning to "shape up" public relations-wise. Accordingly, the Board is in process of adopting extremely stringent air quality standards and unrealistically tight timetables for the Chicago and Saint Louis Regions. This will eventually cause high control costs at W. G. Krummrich, which is in an area of relatively high pollution."

[M28931-32, Monsanto, "Pollution Summary Report, C-O-N-F-I-D-E-N-T-I-A-L," August 21, 1969.]

Doc ID # 2621 Exhibit # P-0206

251.

08/22/69

Letter from Garrett to Wheeler: Monsanto was told that the dishwashing soap contained 5 ppm PCB.

"When I recently visited the Duluth laboratories of the FWPCA, John Teasley of that lab informed me that the Ann Arbor laboratory of the Bureau of Sport Fishing and Wild Life had informed him that 'Electro-Sol' dishwashing soap contained 5 ppm PCB and the use of this material on laboratory equipment would contaminate PCB analysis."

"Monday of this week Scott called me and told me that 'Electro-Sol' and 'Finish' manufactured by Economics Laboratories of St. Paul, Minnesota contained Aroclor 1254 in ppm levels."

[MONS 097466, "Letter from Jack T. Garrett to Elmer P. Wheeler: PCB's in Dishwashing Soaps," August 22, 1969.]

Doc ID # 8166 Exhibit # P-0207

252.
08/26/69

Letter from Garrett to Wheeler: In Florida, "Newspapers had noted that there was virtually no shrimp being caught and the largest catch caught to date was five pounds." "Dean wanted to know what to reveal to these two officials" of the two pollution control agencies of Florida.

"On Wednesday, August 20, B. T. Dean of Pensacola called and told me that the following morning at 9:00 a.m. Wayne Tisedale and Don Brown of the two pollution control agencies of Florida wanted to talk to him about the Aroclor 1254 problem with shrimp being investigated by Drs. Hopkins and Dukes. Dr. Hopkins is the head of the Biology Department of Western Florida University and Dr. Dukes is a Research Biologist with the U. S. Department of Interiors, Bureau of Commercial Fisheries."

"Dean wanted to know what to reveal to these two officials. At the same time Dean told me that the in-bay shrimp season had recently opened in the Escambia Bay. Newspapers had noted that there was virtually no shrimp being caught and the largest catch caught to date was five pounds. Dean had apparently talked to you briefly just before he talked to me." [MONS 097989, August 26, 1969]

Doc ID # 8859 Exhibit # P-0208

"We called Mr. Dean and Mr. O'Leary several times to settle on what general approach Dean and Turner should make to the state agencies and what answers they would give to specific questions. We composed the following questions and answers:

1. The general approach should be our continuous cooperation with these agencies and to answer their questions but not offer a great deal of information or comment."

"4. If they ask the question, 'do you use this material in your plant?' the answer should be 'yes, in very minor quantities as a lubricant'."

"8. If they ask the question, 'does this material biodegrade?' answer that 'we have studies underway to determine this'."
[MONS 097990, August 26, 1969]

Doc ID # 8859 Exhibit # P-0208

"On Thursday morning the 21st, Mr. Turner and Mr. Dean met with the two state authorities and answered their questions with no difficulty. The meeting was amiable and the state authorities thanked Monsanto for its cooperation. They, in fact, asked no particularly embarrassing questions. Mr. Brown did bring up an interesting point however. He stated that Dr. Duke told him that on August 16 he took a bottom mud sample one-fourth mile below our plant outfall and analyzed it for PCB. The analysis showed 436 ppm of Aroclor 1254." [MONS 097991, August 26, 1969]

Doc ID # 8859 Exhibit # P-0208

[MONS 097989-91, "Letter from Jack T. Garrett to Elmer P. Wheeler," August 26, 1969.]

Doc ID # 8859 Exhibit # P-0208

253.
09/05/69

Minutes of Aroclor 'AD HOC' Committee, First Meeting," (CONFIDENTIAL): PCB may be a global contaminant. Monsanto also realized that water contamination by PCBs would be a long term problem due to its high concentrations in the mud. However, Monsanto still set its objectives as: "Permit continued sales and profits of Aroclors and Terphenyls".

"Objectives: (Agreed to by the Committee)

Submit recommendations for action which will:

1. Permit continued sales and profits of Aroclors and Terphenyls.

2. Permit continued development of uses and sales.
3. Protect image of Organic Division and of the Corporation."

"PCB has been found in: a. Fish, oysters, shrimp, birds. B. Along coastlines of industrialized areas such as Great Britain, Sweden, Rhine River, low countries, Lake Michigan, Pensacola Bay, in Western wild life (eagles). It may be a global contaminant."
[M28926, September 5, 1969]

Doc ID # 2620 Exhibit # P-0211

" 'Allowable levels' are probably lower than DDT. The worst example to date is then test at Pensacola where 5 ppb was found to be toxic to shrimp in 18 days exposure." "One problem we are facing is to keep the 'safe level' (?) for shrimp from being applied to e.g. Lake Michigan where more tolerant fish species probably exist. We need to show the safe level in shrimp, clams, oysters and several species of fish." "For a clearer understanding of the general problem, the situation at Pensacola was reviewed. From a relatively negligible discharge of 1-3 gal/day into a large river, 1/4 mile downstream levels of 42 ppb in water and 476 ppm in mud were found. Although use of Aroclor was halted immediately, we can expect the water contamination to continue for a lengthy period by leaching from the contaminated mud."

[M28926-929, "Minutes of Aroclor 'AD HOC' Committee, First Meeting," CONFIDENTIAL, September 5, 1969.]

Doc ID # 2620 Exhibit # P-0211

Also See: DSW 014625-28.

Doc ID # Exhibit #

254.
09/09/69

Letter from Richard to Wheeler: Monsanto's "strategy" to PCB problem:

"General Policy

Make the Govt., States and Universities prove their case, but avoid as much confrontation as possible. Comply and work with public officials to meet or exceed requirements ahead of time. Adverse publicity and competition are the real weapons." [DSW 014257, 09/09/1969]

Doc ID # 389**Exhibit # P-0213**

"The Dept. of Interior and/or State authorities could monitor plant outfall and find ppm of chlorinated biphenyls at Krummrich or Anniston anytime they choose to do so. This would shut us down depending on what plants or animals they choose to find harmed."

"Action - Take steps to see that every precaution is taken to prevent Aroclor entering water streams. Try to reduce to ppb level."

[DSW 014261, "Letter from W. R. Richard (Research Center, Monsanto) to Mr. E. Wheeler: Defense of Aroclor," September 9, 1969.]

Doc ID # 389**Exhibit # P-0213**

255.

09/10/69

Trip Report to Great Lakes Steel: "Pydraul 312 having 100% kill on blue gills after four days at a level of 0.67 ppm".

"Report #698031B from above lab dated 4/69 shows Pydraul 312 having 100% kill on blue gills after four days at a level of 0.67 ppm. Arocolor 1248 also a 100% kill after four days at slightly higher limits, but lower kill after only two days. Houghtosafe 1120 had no kill up to 1000 ppm or 1%. Houghtosafe 520 and 620 showed slight toxicity at very high concentrations, but no where near Pydraul or Aroclor."

[MONS 070623, Monsanto, "Trip Report to Great Lakes Steel, Detroit, Michigan," September 10, 1969.]

Doc ID # 5166**Exhibit # P-0215**

256.

09/19/69

F. D. A. has definitely identified 5 ppm of PCB's in the milk from six dairy herds, all located within a six-mile diameter of Martinsburg, W. Virginia.

"Received a call from Jerry Miller, Chief Chemist at Anniston. He has received a call from Boyd Cook, Field Representative for the Maryland Milk Association. Cook says that the F. D. A. has analyzed the milk from six dairy herds, all located within a six-mile diameter of Martinsburg, W. Virginia, and has definitely identified 5 ppm of PCB's. They have tentatively identified the PCB as Aroclor 1254. Cook stated that he thought the F. D. A. was certain to require that the milk be dumped. Cook inquired about uses for Aroclor and Jerry told him only two -- capacitors and heat transfer.

Cook then asked if Aroclor was ever used in pasticizers and Jerry said he supposed it was possible. Cook stated that silos in the area were lined with plastic materials – there could be some connection here. Another conjecture – all six herds graze in the same limestone belt area – may have common water supply."

[MONS 096384, "Letter from W. A. Kuhn (St. Louis) to H. S. Bergen," September 19, 1969.]

Doc ID # 383

Exhibit # P-0834

257.

09/25/69

Tucker to Keller: Tucker (Monsanto) admitted that Aroclors 1254 and 1260 were present in Lake Michigan. They also suggested methods to protect Aroclor 1242's market.

"A review and comparison of the PCB analytical methodology developed here and independently in the WARF laboratories was held with F. Coon (director, chemical analysis section), J. Birdsall (project coordinator), and D. Hughes (analyst) in Madison, Wisconsin at their research laboratories."

"Additionally, I believe that we should consider using WARF facilities to eliminate some of our current manpower and routine sample backlog problems.

The chromatograms I saw of the Lake Michigan samples they had looked at corresponded to the higher chlorinated biphenyls 1254 and 1260. The samples taken in and around the industrial areas (southern one-third of lake) appeared to contain the higher levels." [MONS 071163, September 25, 1969]

Doc ID # 392

Exhibit # P-0217

"In view of this, our current Pensacola problem, and other published information, I would suggest that we step up our efforts at finding immediate replacement formulations for Pydraul AC and Pydraul 625. I also feel that Aroclor 1242 should not be used in replacement formulations. If this were done, I firmly believe that in a short period of time analysts would soon be reporting Aroclor 1242 as a significant water pollutant thus seriously endangering a market which so far has not been questioned."

[MONS 071163-64, "Letter from E. S. Tucker to R. E. Keller: Wisconsin Alumni Research Foundation Institute Trip Report," September 25, 1969.]

Doc ID # 392**Exhibit # P-0217**

258.

09/25/69

Birds died due to the contamination by Pydraul 135 in the water. Garrett said that "If the Pydraul is not removed or reduced, there will be additional deaths of this type".

"I have been asked by Mr. Elmer P. Wheeler to answer the call report dated September 2, 1969, that you sent to him. Pydraul 135, as you know, contains Aroclors. I have attached a summary of the animal toxicity data on the subject product.

It appears that Oxelosunds has a cooling system that is probably saturated with the Pydraul fluid components. At about 25 °C this means that their circulating cooling system can contain 200 ppb (parts per billion) of dissolved Aroclor 1242. This concentration is not acutely toxic to most adult fish. It is possible that this material is chronically toxic to fish and other aquatic species. The swan and duck mentioned in the call report probably consumed the Pydraul in full strength while foraging in the lake. Birds of this type forage by diving to the bottom of shallow bodies of water for food. If the Pydraul is not removed or reduced, there will be additional deaths of this type."

[MONS 098010, "Letter from Jack T. Garrett to J. Maggart (Brussels): Pydraul 135 at Oxelosunds Jarnverk," September 25, 1969.]

Doc ID # 8870**Exhibit # P-0218**

259.

09/29/69

Letter from Richard, Manager of Research and Development of Monsanto to Mr. David K. Goering: more highly chlorinated compounds (PCBs) are most persistent.

"Dr. Koeman reported results of polychlorinated biphenyls Phenoclor DP 6, Aroclor 1260 and Clophen A 60 on fish, mussels and birds. He indicated that the more highly chlorinated compounds are most persistent."

[MONS 089198, "Letter from W. R. Richard (Manager, Research & Development, Monsanto) to Mr. David K. Goering (University of Arkansas)," September 29, 1969.]

Doc ID # 394**Exhibit #**

260.

09/29/69

Letter from Richard to Tucker: Department of Interior started toxicological testing with Aroclors 1254 and 1260.

"Dr. Glasgow, Dept. of Interior, called requesting 1 pound samples of Aroclor 1254 and Aroclor 1260 for toxicological testing, presumably in mice and rats."

"Dr. Glasgow suggested that he would help in establishing contact between Mr. Jack Early of our Washington office and the principal investigators to give us first-hand information on the results."

[MONS 097973, "Letter from W. R. Richard to E. S. Tucker: Aroclor for Toxicological Studies," September 29, 1969.]

Doc ID # 8846 Exhibit #

261.

10/01/69

Letter from John and Hodges to Plant Communicators, et al.: John said that "for the past seven months there has been considerable interest in the possible environmental contamination by polychlorinated biphenyls (PCB)". John wanted all the inquiries to be directed to St. Louis, Monsanto.

"You are probably aware that for the past seven months there has been considerable interest in the possible environmental contamination by polychlorinated biphenyls (PCB). The subject first came up in the U. S. in connection with a research study done by a Dr. Robert Risebrough of the University of California. Dr. Risebrough was investigating the possibility of environmental contamination by DDT when he discovered an 'interfering substance' which later was identified as PCB.

The San Francisco Chronicle published a story based on these findings. Further DDT investigations by government, state and university laboratories have substantiated that PCB's are showing up in the environment, generally in the parts-per billion range, but occasionally in the parts-per-million range.

PCB's are manufactured by Monsanto and marketed under the trade name Aroclor. (There are other producers in Europe and Japan).

We have received numerous inquiries from the press and private, governmental and university laboratories for information about PCB."

"This memo is to alert you to the procedure for handling inquiries. Should you receive a request for information concerning PCB's from any source (press, government, university or private citizen) please direct the inquiry to St. Louis. If the request comes by telephone, take the name, address, return phone number and the nature of the inquiry. By providing information from one central source, we can project our corporate position of cooperation, and emphasize our efforts in research and study being directed to eliminating any possible contamination sources."

[MONS 097979, "Letter from E. V. John and Paul B. Hodges to Plant Communicators, Pollution Control Engineers, and Plant Managers," CONFIDENTIAL, October 1, 1969.]

Doc ID # 8851 Exhibit # P-0221

262.
10/01/69

The Food and Drug Administration representative in the Baltimore area called Anniston Plant that "PCB's had been detected in milk being processed by the Maryland Milk Producers Association in Baltimore".

"September 22 we received a call from Gerald Miller, Anniston, indicating that he had received an inquiry from the Food and Drug Administration representative in the Baltimore area. The man's name was Boyd Cook. His phone number is 301-944-6800. Mr. Cook indicated that PCB's had been detected in milk being processed by the Maryland Milk Producers Association in Baltimore. The PCB was believed to be our Aroclor 1254 and had appeared in the 5-parts-per-million range. Mr. Cook had traced the source of the milk to six dairy herds in the Martinsburg, W. Virginia area, 150 miles west of Baltimore. Mr. Cook was calling for information and assistance. He had heard of a case in Georgia where a plastic liner had been used in silos and allegedly some of the Aroclor had leached out of the plastic into the cow's feed. He also discovered that where the dairy herds were located the water source came from the same limestone belt."

[MONS 097410, "Memo from E. V. John to the file: PCB Committee," October 1, 1969.]

Doc ID # 8131 Exhibit # P-0220

263.

10/02/69

Report of Aroclor 'AD HOC' Committee: Protect continued sales and profits of Aroclors. The Report also said that "In view of legal and moral considerations, notify all Aroclor 1254 and 1260 customers of environmental contamination problems."

"The objective of the committee was to recommend action that will:

1. Protect continued sales and profits of Aroclors;
2. Permit continued development of new uses and sales, and
3. Protect the image of the Organic Division and the Corporation as members of the business community recognizing their responsibilities to prevent and/or control contamination of the global ecosystem." [M28915, 10/02/69]

Doc ID # 2619 Exhibit #

"Secondly, the committee believes there is no practical course of action that can so effectively police the uses of these products as to prevent completely some environmental contamination."

"There are, however, a number of actions which must be undertaken in order to prolong the manufacture, sale and use of these particular Aroclors as well as to protect the continued use of other members of the Aroclor series."

"RECOMMENDATIONS"

1. In view of legal and moral considerations, notify all Aroclor 1254 and 1260 customers of environmental contamination problems."
2. Reduce losses of Aroclors in liquid wastes from Monsanto plants to minimum.
3. Consult with appropriate federal agencies' head-quarters in Washington to determine current status of concern and to inform appropriate individuals therein of Monsanto's research and control efforts."

[M28916-18, Monsanto, "Report of Aroclor 'AD HOC' Committee," CONFIDENTIAL, October 2, 1969.]

Doc ID # 2619 Exhibit #

Also See: M39184-86.

Doc ID # 5393 Exhibit # P-0224

264.

10/02/69

Some obvious effects from treatment by Aroclors were observed during the toxicity study at the Bio-Test Laboratory.

"At the time of my recent visit, the following points were agreed upon:

1. There will be no second hatch.
2. For those groups showing obvious effects from treatment, it is not necessary to prolong the study until 100 eggs have been collected for incubation."

[M 42535, "Otis E. Fancher: Inter-Office Correspondence," October 2, 1969.]

Doc ID # 3682 Exhibit # P-0223

265.

10/08/69

Considerable interest was directed to the PCB contamination in the United States due to the publication of Dr. Risebrough. Monsanto alerted its field sales offices, etc. to direct all inquiries on PCBs to St. Louis.

"You are probably aware that for the past seven months there has been considerable interest in the possible environmental contamination by polychlorinated biphenyls (PCB). The subject first came up in the U.S. in connection with a research study done by a Dr. Robert Risebrough of the University of California. Dr. Risebrough was investigating the possibility of environmental contamination by DDT when he discovered an "interfering substance" which later was identified as PCB.

The San Francisco Chronicle published a story based on these findings. Further DDT investigations by government, state and university laboratories have substantiated that PCB's are showing up in the environment, generally in the parts-per-billion range, but occasionally in the part-per-million range.

PCB's are manufactured by Monsanto and marketed under the trade name Aroclor. (There are other producers in Europe and Japan).

We have received numerous inquiries from the press and private, governmental and university laboratories for information about PCB. In some cases, requests have been made for samples of our Aroclor products.

This memo is to alert you to the procedure for handling inquiries. Should you receive a request for information concerning PCB's from any source (press, government, university or private citizen) please direct the inquiry to St. Louis."

[MONS 096391, "Letter from E. V. John and Paul B. Hodges to Field Sales Offices, Plant Communicators, Pollution Control Engineers, and Plant Mangers," CONFIDENTIAL, October 8, 1969.]

Doc ID # 395 Exhibit # P-0226

266.

10/08/69

Letter from E. S. Tucker to E. G. Wright (Anniston Plant): Gas Chromatographic Analysis of Anniston Water and Sediment Samples showed the presence of PCBs.

RESULTS

<u>Sample Description</u>	<u>Aroclor and Amount Found</u>		
	<u>1242</u>	<u>1248</u>	<u>1260</u>
Snow Creek, Water	23.3 ppb	----	----
Snow Creek, Sediment (Glen Eddie)	2.36%	----	----
Choccolosso Creek, Water	8.1 ppb	----	----
(Above Confluence with Snow Creek) Sediment	78.0 ppb	----	----
Choccolosso Creek, Water	5.8 ppb	----	----
(Jackson Shoals) Sediment	----	3.62 ppm	3.68 ppm
City Treatment Plant, Water	<2.0 ppb	----	----
Sediment	----	527 ppm	211 ppm

[MONS 096452, "Letter from E. S. Tucker to E. G. Wright (Anniston Plant): Electron Capture Gas Chromatographic Analysis of Anniston Water and Sediment Samples for Polychlorinated Biphenyls," October 8, 1969.]

Doc ID # 396**Exhibit # P-0227**

267.

10/08/69

Letter from Richard to Miller: Monsanto was trying to keep its Aroclor business alive, and was eager to know "what steps should be taken to minimize adverse effects on our business".

"Attached are the first of several internal papers dealing with various aspects of the 'Aroclor pollution' problem. The purpose is to stimulate thinking and encourage an input of ideas as to what steps should be taken to minimize adverse effects on our business.

Anyone wishing to put his oar in is invited to do so, either by writing his own white paper or by commenting on subject matter which has already appeared. Papers may or may not be 'in depth' reviews of a specific topic. We anticipate that short concise reports will be of most value, but anything contributing to the stated objective will be satisfactory."

[MONS 098166, "Letter from W. R. Richard to D. R. Miller," October 8, 1969.]

Doc ID # 8956**Exhibit # P-0228**

268.

10/09/69

Status Report – Aroclors Clean-up of Plant Effluents: The Report planned to collect another set of samples soon "in order to resolve discrepancies with results from the first (June 10, 1969) samples." The Anniston was also planning to determine the Aroclor losses when there was no operation. "The next logical step in waste reduction is to provide sumps in the operating department to collect spillage from pipe leaks, pump packing, etc."

"Anniston Plant

A. Status

1. Waste Reduction

Numerous small changes have been made to eliminate any possibility of free Aroclor leaving the plant and depositing in Snow Creek (as previously experienced). These changes include:

- a. Rehabilitation of the neutralization pit in the total (less Niran)

effluent flow leaving the plant. This will effectively prevent Aroclor losses above saturation and will stop future deposition in Snow Creek.

- 1) To reduce losses to well below saturation, changes have been made to collect free Aroclors at points prior to dilution of the wastes. Included are:

- a) An existing sump at the end of the warehouse is being utilized to trap Aroclors spilled from drumming and flaking operations.

[DSW 014004, October 9, 1969]

Doc ID # 13 Exhibit # P-0229

- b) A coalescer was installed in the muriatic acid flow from the HCl absorbers. Primary purpose was to improve quality and ease of treatment of the muriatic acid, but a considerable amount of free Aroclor is being trapped following the coalescence.

2. Waste Sampling

A set of samples taken June 10 were analyzed recently. A full report will be issued soon. The most interesting data are:

- a. Snow Creek, about 1 mile below our plant –

Mud – 2.36% PCB

Water – 8.3 ppb PCB

With this concentration of Aroclor in the mud of Snow Creek, we can expect leaching to continue for a long time, regardless of how well we clean up in the plant.

- b. Choccolocco Creek, about 10 miles below confluence with Snow Creek –

Water – 5.8 ppb PCB

B. Future Work

1. Waste Sampling

Drs. Gunning and Suttikus, biological consultants from Tulane University, who have been making fish studies for the plant, will be conducting a phase of their continuing study during late October. They will be requested to collect a variety of fish species above and below our outfall for PCB analysis by Dr. Scott Tucker's laboratory.

Collection of water and mud samples from Snow Creek, Choccolocco Creek and the Coosa River will be continued on an as-justified basis. A limited number of samples were collected recently during a several-day shut down of Aroclor production to establish losses without Aroclor production. Another full set of samples will be collected soon in order to resolve discrepancies with results from the first (June 10, 1969) samples. Following establishment of reasonably reliable facts on present receiving stream PCB levels, we will continue to sample at about six months intervals. As in the case at W. G. Krummrich, we need the laboratory results fairly promptly in order to guide future sampling work.

2. Waste Reduction

The next logical step in waste reduction is to provide sumps in the operating department to collect spillage from pipe leaks, pump packing, etc. Firm plans will be developed after we gain quantitative information on losses (about January 1, 1970). Meanwhile, efforts will be directed toward making maximum use of the collection equipment already provided (the warehouse sump and the coalescers)."

[DSW 014005-06, October 9, 1969]

Doc ID # 13 Exhibit # P-0229

[DSW 014004-06, "Letter from Paul B. Hodges to Mr. W. A. Kuhn: Status Report – Aroclors Clean-up of Plant Effluents", October 9, 1969.]

Doc ID # 13 Exhibit # P-0229

269.
10/14/69

Letter from Panue to Johnson: After Chrysler stopped using PCB's containing Pydraul liquid, Monsanto planned to visit Michigan Natural Resources Department immediately and Chrysler in an effort to persuade them to use PCB's products.

"Nick Oraham at Chrysler, however, called and reported that he has been forced to deny all shop trials of any Pydraul fluids until they are reformulated to contain no PCB's. This order was handed down from Al Baulden, Chrysler Department of Environmental Control.

Thus, at this moment, we are completely out at Chrysler, affecting Kokomo, Huber Avenue Foundry and Indianapolis. With time, things could get worse at Ford, too. My recommendation is that we visit the Michigan Natural Resources Department immediately to inform them of the impact their letter made on Chrysler and to make them aware of some of our toxicological studies in this area. A visit to Chrysler's Mr. Baulden should follow. In fact, a meeting with Baulden, Elmer Wheeler and Don Ksehelbash of Chrysler's Industrial Hygiene Department should be arranged."

[MONS 097999, "Letter from G. P. Panue to N. T. Johnson: Water Pollution," October 14, 1969.]

Doc ID # 8864 Exhibit # P-0230

270.

10/15/69

Monsanto "AD HOC" Committee issued a report summarizing the polychlorinated biphenyl (PCB) pollution problem from the known available information.

"On 15 October the "AD HOC" Committee consisting of Messrs. M. Parrar, P. Hodges, E. John, W. Richard, and E. Wheeler issued a report summarizing the polychlorinated biphenyl (PCB) pollution problem from the known available information to date. Out of this report came considerable information, conclusions, and recommendations which we have attempted to tie together into a plan of action in this document."

[M07173, Monsanto, "Outline: PCB Environmental Pollution Abatement Plan," November 10, 1969.]

Doc ID # 406 Exhibit # P-0245

271.

10/22/69

Professor G. F. Lee of the University of Wisconsin wrote to Dr. E. P. Wheeler of Monsanto: He disagreed Wheeler's interpretation for the results of the chronic feeding studies.

"I appreciated your enclosure of the results of the chronic feeding studies from your toxicology consulting laboratory. However, the results are not meaningful as you described them because 1) diet

levels say nothing concerning levels in various body tissues, 2) uptake effects of laboratory feeding cannot be extrapolated to effects in the environment due to varying uptake rates, metabolic rates, and environmental stresses, and 3) the mammalian liver is generally more active in detoxifying chlorinated hydrocarbons than are the systems of biological communities associated with natural waters."

[M11626, "Letter of Professor G. F. Lee (the University of Wisconsin) to Dr. Elmer P. Wheeler, Manager of Environmental Health (St. Louis, Monsanto)," October 22, 1969.]

Doc ID # 1474 Exhibit # P-0231

272.
10/22/69

Letter from H. S. Bergen (St. Louis) to Dr. R. S. Gordon. Monsanto was worrying that PCB's problem would be brought up by the Panel on Food Safety. Bergen said, "We would like to exert all possible influence to bring our knowledge and information to bear on this subject and to be certain that we receive fair consideration." They were also trying to get Dr. Gordon and others to contact Dr. Gene Mayer and Donald Kendall.

"You have received a copy of Elmer Wheeler's memo of October 15, subject PCB Crisis of the week, and our concern that PCB's (Aroclors) will be brought up by the Panel on Food Safety: Food Additives. Administrative Structure to Assure Safety, which is under the Chairmanship of Pepsico's Donald M. Kendall (we understand that you are chairman of the panel on New Foods: Standards of Food Identities that Simulate Traditional Foods).

We also understand that you are a friend of Dr. Gene Mayer, who is the overall Conference Chairman.

We would like to exert all possible influences to bring our knowledge and information to bear on this subject and to be certain that we receive fair consideration. We would greatly appreciate it if in some manner you could talk to Dr. Gene Mayer and perhaps Donald Kendall to see if we can get our inputs heard and considered.

I talked to Don Marriner to see if our Food & Fine Group had any close relationships with Donald Kendall and they do not, so that avenue does not appear attractive.

We would appreciate your thoughts and any help that you can give us."

[MONS 096389, "Letter from H. S. Bergen (St. Louis) to Dr. R. S. Gordon: Aroclors - PCB - Washington Conference on Food Nutrition and Health," October 22, 1969.]

Doc ID # 405 Exhibit # P-0239

273.

10/27/69

Letter from Baxter to Budd, et al.: Baxter wrote that "polychlorinated biphenyls are connected with the recent widespread deaths of seabirds".

"Herewith copy of a cutting from the Times of Saturday, October 25th, reporting that a high level of polychlorinated biphenyls has been found in dead sea birds. Reports of the meeting at which the announcement was made were also given on British Television programmes on Friday, October 24th.

Ruabon R. & D. are in touch with the Monks Wood experimental station where the analytical work was carried out and will be reporting further on this and any other data which we can assemble that polychlorinated biphenyls are connected with the recent widespread deaths of seabirds."

[MONS 097981, "Letter from R. A. Baxter to W. J. S. Budd, et al.: Aroclors In Wild Life," October 27, 1969.]

Doc ID # 8852 Exhibit # P-0232

274.

10/27/69

Letter from Marsh to Vodden: It was reported that " polychlorinated biphenyl was found in very high concentrations constituting toxic and possibly lethal levels". Marsh instructed that "as previously instructed no comments or statements should be made without first checking back through Research".

"Further to my note of 22nd October, the attached articles have since appeared in various newspapers.

Both articles, The Times 25/10/69 and The Sunday Times 26/10/69, have reported that polychlorinated biphenyl was found in very high concentrations constituting toxic and possibly lethal levels.

No definite conclusions were reported but if you have any more detailed reports which you feel Field Sales should be aware of, please let me know.

I would also ask all U.K. Fluids Field Salesmen to report any comments on this topic from outside contacts.

Of course, on no account should we bring the subject up and as previously instructed no comments or statements should be made without first checking back through Research."

[MONS 097982, "Letter from P. J. A. Marsh to H. A. Vodden: Toxicology," October 27, 1969.]

Doc ID # 8853 Exhibit # P-0233

275.
10/27/69

Letter from Cameron to Richard: It was reported in the U.K press "the detection of relatively high concentrations of PCB in some of the birds".

"Attached are further cuttings from last weekend's U. K. press. The detection of relatively high concentrations of PCB in some of the birds also made the radio news bulletins on Saturday morning."

[MONS 097983, "Letter from D. S. Cameron to W. R. Richard (St. Louis): Aroclor," October 27, 1969.]

Doc ID # 8854 Exhibit # P-0234

276.
10/28/69

Letter from Macdonald (Newport) to W.J.S. Budd, et al.: "Aroclors in Wild Life," (HIGHLY CONFIDENTIAL). The author admitted that PCBs were causing discharge problems, marine growth in particular being affected and no doubt this could have a secondary effect on wild life birds. Much more strict regulations applied. "Also at the Conference, the Fisons Representative stated that in Pesticides manufacture, even rain water from the site must be collected for treatment and discharge. All sumps had to be collected for dump other than discharge in to the river."

"We have recently collected samples of mud from the Estuary in the Uakmouth area. Analysis of these samples and the method of analysis used were carried out by E. S. Tucker at the R & D Laboratories, South Second Street. The results of these

analyses are given but there is no indication as to the toxicity of these levels of concentration."

"Some interesting comments were made at the Water Pollution Conference 16th/19th. September 1969 at Douglas Isle-of-Man. The effect of toxic wastes on treatment processes and water courses highlighted that cleaning fluids based on chlorinated hydrocarbons were causing discharge problems, marine growth in particular being affected and no doubt this could have a secondary effect on wild life birds.

The I.C.I. representative from Birmingham pointed out that there was not much hope of developing alternative methods compared with chemicals for degreasing. Also at the Conference, the Fisons Representative stated that in Pesticides manufacture, even rain water from the site must be collected for treatment and discharge. All sumps had to be collected for dump other than discharge in to the river. The total cost of this was around £400,000 per annum from the Cambridgeshire site alone. Dump at sea was also involved by this Company." (Note: £ = British pound)

"In discussions with Dr. Newman and Robin Bell, mention was made of the extensive use of non soluble cutting oils in the engineering industry. These are normally based on chlorinated waxes or parafin. These should not be overlooked."

[MONS 096448, "Letter from Macdonald (Newport) to W.J.S. Budd, et al.: Aroclors in Wild Life," HIGHLY CONFIDENTIAL, October 28, 1969.]

Doc ID # 402

Exhibit # P-0235

277.

10/28/69

E. V. John to Wheeler, et al: Nature Magazine had contacted Brian (London, Monsanto) on the PCB issue. One of the ministries in England discovered a large bird kill in the Irish Sea. There were extremely high levels of PCBs in the dead birds. Monsanto also instructed its London Office to emphasize that there were several PCBs producers in Europe and Eastern block countries when responding to the inquiry.

"Yesterday, October 27, I received a call from Brian Garland in our London public relations office. Brian was alerting me to the fact that Nature Magazine had contacted him on the PCB issue."

"One of the ministries in England has discovered a large bird kill in the Irish Sea. Their investigation shows extremely high levels of PCBs present in the dead birds. We have no way of knowing at this point who conducted the research nor the methods used. However, Brian is investigating this for me."

"In the meantime, Brian is replying to the inquiry from Nature Magazine. Their specific questions included who manufactures PCBs, how are they used and what means are being taken for their disposal. I have sent by telex our latest preparedness statement dated October 17. I also asked Brian to emphasize the fact that there are several producers in Europe and the Eastern block countries. He will also alert the Newport plant to this latest inquiry and advise them of our initial clean-up plans aimed at 10 parts per billion. The manufacturing Department will be in touch with Newport today."

[MONS 096388, "Letter from E. V. John to E. P. Wheeler, et al.," October 28, 1969.]

Doc ID # 7598 Exhibit #

278.
10/28/69

Letter from E. V. John to Mr. P. B. Hodges, et al.: "extremely high levels of PCBs present in the dead birds" found in England by one of the ministries. Nature Magazine raised a series of questions to Monsanto's office in England.

"Yesterday, October 27, I received a call from Brian Garland in our London public relations office. Brian was alerting me to the fact that Nature Magazine had contacted him on the PCB issue.

One of the ministries in England has discovered a large bird kill in the Irish Sea. Their investigation shows extremely high levels of PCBs present in the dead birds. We have no way of knowing at this point who conducted the research nor the methods used. However, Brian is investigating this for me.

In the meantime, Brian is replying to the inquiry from Nature Magazine. Their specific questions included who manufactures PCBs, how are they used and what means are being taken for their disposal. I have sent by telex our latest preparedness statement dated October 17. I also asked Brian to emphasize the fact that there are several producers in Europe and the Eastern block countries. He will also alert the Newport plant to this latest inquiry and advise them of our initial clean-up plans aimed at 10 parts per

billion. The Manufacturing Department will be in touch with Newport today."

[MONS 097972, "Letter from E. V. John to Mr. P. B. Hodges, Dr. W. R. Richard and Dr. M. W. Farrar," October 28, 1969.]

Doc ID # 8845 Exhibit # P-0236

279.

10/29/69

Statement from Monsanto Company: Monsanto continued its effort to deny its responsibility for PCBs contamination in the natural environment.

"The common use of commercial PCB would not normally lead to its release into the natural environment." "The source of the marine life residue identified as PCB is not yet known. It will take extensive research on a worldwide basis, to confirm or deny these initial scientific conclusions." [M13517, Oct. 29, 1969]

Doc ID # 2107 Exhibit # P-0238

"Therefore, conclusions as to the source of PCB found in the environment are difficult to make. Some qualified scientists, using the latest laboratory equipment, have correctly identified the substances as being PCB. However, most scientists are not yet willing to indict commercially produced PCB as a pollutant."

[M13518, "Statement from Monsanto Company, St. Louis, MO.," October 29, 1969.]

Doc ID # 2107 Exhibit # P-0238

280.

10/30/69

Letter from HN Dahlstrom (Brussels): The UK press reported the death of thousands of seabirds on the West Coast and the claims that chlorinated diphenyls had been identified in ten birds analyzed at the Monks Wood Research Station. Monsanto UK realized it was a subject of major concern to the Organic Division and corporate Monsanto on a world-wide basis. However, it did not want to reveal the fact that Monsanto UK was actually the only manufacturer of PCBs in the UK.

"Most of you will have seen the articles in the UK press this past weekend reporting on the death of thousands of seabirds on the West Coast and the claims that chlorinated diphenyls have been

identified in ten birds analyzed at the Monks Wood Research Station."

"For those of you who have not been close to this subject it is neither new nor unique to the UK. There have been rumblings in other European countries for a considerable period of time, and there was a major crisis in the US earlier this year, when a lot of unfavorable press comment was leveled at these materials. Monsanto, as sole US producer, had to put out a number of press statements."

"The purpose of this memo is not to discuss the justification of these claims. I merely wish to point out to all who may become involved that this is a subject of major concern to the Organic Division and corporate Monsanto on a world-wide basis. Much has already been said and written in defence of our position. It is only a matter of time until someone discovers that we are the only manufacturers of chlorinated diphenyls in the UK. At this time many searching questions will be asked and our Public Relations department will have to answer these."

[MONS 096387, "Letter from HN Dahlstrom (Brussels): Toxicity of Chlorinated Diphenyls," October 30, 1969.]

Doc ID # 405 Exhibit # P-0239

281.

Nov. 1969

Monsanto made the decision to develop a plan to phase out the manufacture of Aroclor 1254 and 1260.

[MONS 035424-26, "Presentation of the PCB Management Plan," November 1969.]

Doc ID # 407 Exhibit # P-0461

282.

Nov. 1969

H. A. Vodden, Aroclor – Environmental Contamination: PCBs could be concentrated substantially through the food chain, and resulted in hazard to human health even at very low concentration levels.

"Recent publicity in the U.K. press regarding the finding of P.C.Bs in dead sea-birds has highlighted once again the fact that the chemicals are being found in wild-life, particularly in those species associated with a marine environment. The deaths of these particular sea-birds may, or may not, be connected with the presence of polychlorinated biphenyl and, on present evidence,

responsible opinion is non-committal. The fact is that evidence has been built up pointing to significant levels of P.C.Bs. in sea birds, particularly predators, and other species of wild life in many areas of the world. A substantial and growing number of scientific papers and reports provides a fairly detailed account of this evidence, much of it dependent on relatively new, highly sophisticated analytical techniques (1 – 6)."

"The occurrence of the highest concentrations of P.C.Bs in wildlife associated with a marine environment suggests that the origin of these substances is the sea. It has been established in tests on fish, that persistent organochlorine compounds, such as DDT, in water at a level of 1 part in 10^9 can concentrate up to 1 part in 10^6 in the fish muscle. It seems probable that similar concentration could occur with P.C.Bs. This level could be increased by a further factor of 10^2 when passing through a food chain to a predatory sea-bird. Considerations of this type suggest that it is plausible for P.C.Bs to be found in sea-birds at the 100 ppm level, originating from levels in the sea below 1 part in 10^9 . Similar arguments could apply to insecticides and thus explain why relatively high levels of both P.C.Bs and insecticide residues are often found simultaneously. Another way of expressing this is that P.C.Bs and other persistent chemicals when present in the sea at levels around 1 part in 10^9 or less may present an environmental hazard."

"To minimize this hazard it will be necessary, in future, to prevent the pollution of the atmosphere and the sea by the more persistent P.C.Bs and, where possible, to develop and use biodegradable products. It may be that the lower chlorinated biphenyls, or at least some of their isomers, are bio-degradable; work is in progress at Ruabon to determine this. If this can be demonstrated, the development of acceptable products of the Aroclor type may be possible and will be exploited. For persistent chlorinated biphenyls, efforts must be made to contain any waste product, not only at the manufacturing plant, but at customer plants and through to the end-product."

[MONS 061914-15, H. A. Vodden, "Aroclor – Environmental Contamination," November 1969.]

Doc ID # 412 Exhibit # P-0243

283.
11/10/69

Monsanto's Outline: PCB Environmental Pollution Abatement Plan.

"Professors Widmark and Jensen of the Institute of Analytical Chemistry at Stockholm, Sweden, in November 1966, announced and confirmed findings PCB in fish, birds, and eggs. Subsequent findings were made in 1967 in Great Britain. In February 1969, Professor Risebrough of the University of California published an article in the San Francisco Chronicle relaying his findings of PCB in the environment of the United States. Monsanto confirmed the presence of PCB's in mid-1969 and confirmed the adequacy of work by Widmark and Jensen and others; truly, the PCB's are a worldwide ecological problem."

"Analysis indicates the environmental presence of the 5 and higher chlorinated biphenyls which take the appearance of Aroclor 1254 and Aroclor 1260." [M07175-M07176, 11/10/69]

Doc ID # 406 Exhibit # P-0245

"A. Legal Liability Direct lawsuits are possible. The materials are already present in nature having done their "alleged damage". All customers using these products have not been officially notified about known effects nor do our labels carry this information. These are only a few of the possible legal implications which would best be covered by the legal department."

"B. Public Image: The corporate image of Monsanto as a responsible member of the business world genuinely concerned with the welfare of our environment will be adversely affected with increased publicity." "The evidence proving the persistence of these compounds and their universal presence as residues in the environment is beyond questioning. This combined with certain scare publications is certain to give an adverse image. Guilty by association (with DDT) will prevail as the background while actual facts may be sparse."

[M07179, Monsanto, "Outline: PCB Environmental Pollution Abatement Plan," November 10, 1969.]

Doc ID # 406 Exhibit # P-0245

284.

11/14/69

Letter from Wright to Papageorge: Aroclor Spill in Anniston plant.

"On Thursday (November 6, 1969) the line on the bottom of the #3 Aroclor still receiver failed which resulted in the loss of approximately 1,500 gallons of Aroclor 1242 to the acid sewer. To date, we have only been able to recover approximately 350 gallons

of this material. The remainder of the material is probably lying in the sewer and has been mixed with the dirt and sand at the head of the acid neutralization pit. Small quantities of this material can be seen leaking through the limestone at the effluent end of the limestone pit. It appears highly unlikely that we will be able to recover any more of this material. However, we will attempt to pump some more of this material to drums." "I would recommend that the plant begin to look into installing a catch basin or some other devices (located between the Aroclor department and the acid neutralization pit) which would prevent a recurrence of this type incident."

[DSW 013749, Monsanto, "Letter from E. G. Wright (Anniston, Alabama) to W. B. Papageorge: Aroclor Spill on March 6, 1969," November 14, 1969.]

Doc ID # 7620 Exhibit # P-0250

285.

11/17/69

Minutes of Meeting of the Corporate Development Committee (Monsanto).

"The 5 and 6 chlorinated biphenyls (Aroclor 1254 and 1260) have been found at limited locations in water, in birds and some forms of aquatic life. Recent indications are that such biphenyls may affect reproduction of fowl life and may be toxic to shrimp. These products are not toxic from the acute standpoint to man or fish but there is some evidence of ecological buildup in certain water deposits, in fish and ultimately in bird life." [M07195, November 17, 1969]

Doc ID # 409 Exhibit # P-0248

"Legal Aspects - D. W. Miller

The law in the field of manufacturer's liability is changing rapidly. Although the law is unsettled, the present general rule is that if a manufacturer knows or should know that a product of its manufacture may cause damage if not properly used, he has a duty to give adequate warning to customers and users." [M07195, November 17, 1969]

Doc ID # 409 Exhibit # P-0248

"Recommendations from the legal standpoint consist of - 1. Take steps to insure that PCB's are contained and not discharged in plant effluent."

[M07195-96, "Minutes of Meeting of the Corporate Development Committee," Monsanto, November 17, 1969.]

Doc ID # 409

Exhibit # P-0248

286.

11/17/69

Letter from Jack T. Garrett (St. Louis) to R. E. Keller: Professor Lee printed a brief report covering PCB's in the Milwaukee River.

"Since Lee's letter he has printed a brief report covering PCB's in the Milwaukee River and has given us a data summary that he and his co-workers intend to publish later on. The Milwaukee River report and the data summary were given to Mr. Joe Metoalf of the Inorganic Division Staff by Prof. Lee directly."

[MONS 096447, "Letter from Jack T. Garrett (St. Louis) to R. E. Keller," November 17, 1969.]

Doc ID # 414

Exhibit # P-0249

287.

12/03/69

All of the Monsanto test samples did not show any indication of biodegradation of PCBs (Aroclor 1242) after the biological test.

"The electron capture fingerprints of the extracts from each sample do not show any indication of biodegradation."

"The decrease in concentration observed is probably the result of dilution and adsorption of the Aroclor in the original waste water as it moves from the NCR plant to the treatment facilities."

"However, it is possible that high level of 'fresh' Aroclor present has completely masked any degradation that might have occurred to Aroclor previously discharged."

[MONS 096522, "Letter from E. S. Tucker to C. Paton and J. T. Garrett: Aroclor-Wildlife, NCR Water Samples," CONFIDENTIAL, December 3, 1969.]

Doc ID # 416

Exhibit #

288.

12/04/69 Reproduction studies were conducted by Bio-Test. Wheeler was concerned about the results. Dr. Fancher realized that "there is great anxiety at Monsanto about the whole Aroclor situation".

"Mr. Wheeler called on 12/3/69 to inquire as to whether or not there was to be a six-month sacrifice in connection with the rat study and to ask about the histological work done in connection with the three-month sacrifice.

Please provide me with short status summaries for the rat, dog and reproduction studies.

Since there is great anxiety at Monsanto about the whole Aroclor situation, I feel that we should send brief status brief status summaries at three-month intervals whether or not a sacrifice or a more formal report is scheduled."

[M 42540, "Letter from Otis E. Fancher to MLK, JP, DA, JFV, DL: Inter-Office Correspondence," December 4, 1969.]

Doc ID # 3686 Exhibit #

289.

12/09/69 Letter from Landwehr to Kuhn: Plant Effluent To Snow's Creek -- total normal discharge to Snow Creek was as high as 1,000 gpm.

"Plant Effluent To Snow's Creek: Total normal discharge to Snow's Creek is approximately 1000 GPM, made up of the above 500 GPM, 200 GPM of neutralized phosphoric acid from the Parathion plant, which passes through a limestone pit of its own and then joins Aroclor sewers in passing through the HCl limestone pit, and 300 GPM miscellaneous drainage most of which bypasses the limestone pit. Major storm drainage has been separated from the HCl limestone pit influent and bypasses around it. Weirs are provided and have recently been repaired for measuring bypass flow and total discharge to Snow's Creek." "Water Conservation: The volume of Aroclor-HCl sewer flow can probably be reduced by 100 - 200 GPM through reuse of water in 5 still jets, 3 blow tank jets, and 1 HCl drowning jet. This and any other conservation techniques will be included in the Aroclor-HCl waste reduction study."

[DSW 014075-6, Monsanto, "Letter from J. C. Landwehr to W. A. Kuhn (General Office, Monsanto in St. Louis)," December 9, 1969.]

Doc ID # 16 Exhibit # P-0262

290.
12/15/69

Letter from Ford Kevin P. Shea (Environment Magazine): Monsanto did not tell the truth about its PCBs losses and discharges to the natural environment.

"In the United States, Monsanto presently manufactures its Aroclor products at plants located in Sauget, Ill., and Anniston, Ala. Extensive efforts are in practice at these plants to prevent PCB losses to the environment. These practices have been in use for many years and controls are continually being improved. Controlling practices are also in effect to prevent loss in those manufacturing operations where Aroclor is incorporated into other Monsanto products." [M13522, December 15, 1969]

Doc ID # 2108 Exhibit # P-0265

"In the more than 40 years of manufacturing Aroclor products by Monsanto, we have had no instances of injury or adverse effects which could be associated with either the manufacturing or handling of these products."

[M13522, "Letter from Tom C. Ford, Manager of Divisional Public Relations of Monsanto to Mr. Kevin P. Shea, Environment Magazine," December 15, 1969.]

Doc ID # 2108 Exhibit # P-0265

291.
12/15/69

Garrett to Whitman: PCBs have been confirmed as long term contaminants in many countries. Monsanto also realized that "any hydraulic fluid component can be in sufficient concentration if discharged to a receiving water course be a threat to the biological stability of that water course."

"A full and detailed answer to your telephone inquiry about Monsanto hydraulic fluids would require a great deal of time and a great deal of data. Briefly, however, the situation is this: in recent years European scientists have found that certain unidentified interferences in the chromatographic analysis of DDT were polychlorinated biphenyls. Swedish scientists working with mass spectrometry attachments to the gas chromatographic equipment specifically identified polychlorinated biphenyls of five chlorine atoms and above in certain specific samples. Since the Swedish work, work in England, the Netherlands, and the United States has indicated that the higher chlorinated biphenyls are probably in fact

long term contaminants in certain ecological systems. None of the European data nor United States data nor any of the thousands of samples that we have analyzed show any residues of chlorinated biphenyl compounds in this series of less than five chlorine atoms per biphenyl molecule. These data indicate that the tetrachlorobiphenyl and the lower chlorinated homologs in this series degrade in the natural environment. Actually, some work done at the University of Utrecht shows that certain bird species metabolize the trichlorobiphenyl completely.

It is our contention that our Aroclor compounds of 48% chlorination and less are not long term environmental contaminants. We are studying in a limited way the degradation of these compounds in the laboratory." [M13670-71, December 15, 1969]

Doc ID # 2149 Exhibit # P-0266

"This discussion points out the fact that any hydraulic fluid component can in sufficient concentration if discharged to a receiving water course be a threat to the biological stability of that water course." [M13671, December 15, 1969]

Doc ID # 2149 Exhibit # P-0266

[M13670-72, "Letter from Jack T. Garrett (Manager, Industrial Hygiene) to Mr. Newton E. Whitman, Homer Research Laboratories," December 15, 1969.]

Doc ID # 2149 Exhibit # P-0266

292.
12/16/69

Monsanto tried to continue to manufacture the Aroclor-PCB products for its ex-USA business of PCB while there were mounting problems against PCB pollution in the USA.

"I believe that I briefly discussed with you the last time we talked about the Aroclor-PCB pollution problem. I think it is time now that we up-dated you a little more on this problem so that you can assess the implications that it has for MMK operations as well as coordinating our action plans harmoniously." [MONS 096385, December 16, 1969]

Doc ID # 419 Exhibit # P-0268

"It is quite possible that if we find that European Nations and Japan are not concerned with this pollution problem and that it is one that

exists primarily in the USA, we might continue to manufacture these products for our ex-USA business. At this time, we do know that the U.K. is quite upset and doing a lot of investigation on their own and we hear that this is spreading to Germany and France. John Mason and Norbert Dahlstrom will be following up further in the next several weeks with Bayer and Prodelec to get their attitude. We would appreciate it if you could determine Kanegafuchi's attitude and give us the Japanese viewpoint."

[MONS 096385-86, "Letter from H. S. Bergen to J. R. Durland (Tokyo)," PERSONAL & CONFIDENTIAL, December 16, 1969.]

Doc ID # 419

Exhibit # P-0268

293.

12/16/69

Letter from Garrett to Bergen: Garrett summarized the meeting between Monsanto and Michigan Water Resources Commissions (MWRC) on the PCBs contamination from hydraulic fluids used in Michigan. Monsanto told MWRC that "the principal PCB components in hydraulic fluids used in Michigan were the lower chlorinated type," which "are not general environmental contaminants". However, at the same time, Garrett worried that "if 1242 is ever proven to be a persistent environmental contaminant we could be out of business with Aroclor containing fluids in the State of Michigan."

"We discussed the PCB problem in general and specifically pointed out to these gentlemen that all the data we have been able to assemble indicates that the lower chlorinated biphenyls are not general environmental contaminants. We further assured them that the principal PCB components in hydraulic fluids used in Michigan were the lower chlorinated type. They generally accepted this summation of the data available and will probably accept this until they see data to the contrary. We then discussed the letter that Mr. Frost wrote to the automobile manufacturers in Michigan concerning the type of hydraulic fluids use and warning that Monsanto's Pydrauls are specifically hazardous. The WRC people said this was largely due to information they had received from our competitors in Michigan. After considerable discussion, Mr. Frost volunteered to write a letter to the same address as the original letter explaining that the Michigan Water Resources Commission was interested in the potential problems that arise from the discharge of any type of hydraulic fluid and that control of these fluids must be improved to avoid a potential threat to the immediate water environment."

"This meeting can be classified as successful in taking the immediate pressure off of Pydraul 312 sales. Copies of the WRC letter will be distributed to our customers by our salesmen as soon as we receive a copy with an explanation, if necessary, of what the letter means. It must be realized, however, that if 1242 is ever proven to be a persistent environmental contaminant we could be out of business with Aroclor containing fluids in the State of Michigan."

[MONS 096520-21, "Letter from Jack T. Garrett to Howard S. Bergen," December 16, 1969.]

Doc ID # 420 Exhibit # P-0269

294.
12/17/69

Letter from Miller (Anniston, Alabama) to Tucker: Air samples were collected on December 17, 1969 at Anniston Plant to determine Aroclor concentration levels in the plant air.

"I have forwarded three samples collected on Wednesday, December 17, which I hope will give us some idea as to the levels of Aroclor present in the plant air. Depending on the results you obtain, we can ascertain the optimum laboratory location and define requirements for air purification equipment. In each case 200 liters of air were scrubbed through 2-Butanol and the entire sample forwarded to you. These three samples were collected as follows:

Sample No. 1 - Building 28 immediately west of analytical laboratories

Sample No. 2 - Central plant east of the service building

Sample No. 3 - Plant property north of railroad."

[MONS 099455, "Letter from G. W. Miller (Anniston, Alabama) to Dr. Scott Tucker: Aroclor Atmospheric Pollution," December 17, 1969.]

Doc ID # 8308 Exhibit # P-0615

295.
12/17/69

Letter from Garland to Dahlstrom: During the last few weeks, almost every national newspaper in the U. K. fired questions about Monsanto's involvement in PCBs. Garland suggested Monsanto to be well prepared for the next batch of questions in order to get a good public image.

"During the past few weeks practically every national newspaper here in the U. K. has fired questions at us about Monsanto's involvement in PCBs. In addition we in P. R. have had television enquiries and enquiries from the trade/technical journals.

Due largely to the fact that we had a well-prepared company statement (from the U. S.) covering all kinds of likely questions, we seem to have succeeded in "taking the heat" out of the situation. However, we now have to keep one step ahead and prepare for the next batch of questions – which are likely to be centred on "what is Monsanto doing now to ensure that its PCB customers (- and their customers) realize that PCB waste products should be disposed of in a special way and that precautions should be taken during manufacturing process, to guard against leakage into drainage systems, etc." There is also the question of developing techniques to destroy PCBs."

"I understand we may have some new information on these subjects very soon. If so, I would like to have the details as soon as they are available."

"If we can show that Monsanto is concerned, and doing something really positive about this problem, then our public image should not suffer. If we appear to be leaving it to our customers and the government then we could take a hammering in the Press."

[MONS 099505, "Letter from Brion T. Garland (London) to H. N. Dahlstrom (Brussels): Toxicity of PCBs," CONFIDENTIAL, December 17, 1969.]

Doc ID # 8327 Exhibit # P-0272

296.

12/18/69

Letter from Dr. Peakall (Cornell University) to Dr. Bromley: Peakall suggested Monsanto to conduct some research on PCBs and warned the possible liability due to their contamination. He said "It seems to me that facts about the effects of PCB's on biological systems are of interest not only to the ecologist but also to the manufacturer since, with the wide-spread concern over environmental changes, he is liable to be held responsible."

"Our group at Cornell has been working for some time on the biological effects of sub-lethal doses of DDT and dieldrin. We have also carried out some preliminary work on the polychlorinated biphenyls. It seems to me that facts about the effects of PCB's on biological systems are of interest not only to the ecologist but also

to the manufacturer since, with the wide-spread concern over environmental changes, he is liable to be held responsible. I wondered if you would consider it worthwhile to sponsor some research along these lines."

"We are interested in looking at some or all of the following systems which have shown to be affected by DDT at environmental levels:

(1) Hepatic enzyme induction. We have already demonstrated that PCB's induce hydroxylating enzymes in the pigeon and kestrel. However we are interested in studying the results of these effects in the intact animal as we have for DDT."

[MONS 100015-16, "Letter from David B. Peakall, Ph. D. (Senior Research Associate, Cornell University) to Dr. William H. Bromley (Vice-President, Plastic Products, Monsanto)," December 18, 1969.]

Doc ID # 8466 Exhibit # P-0270

297.
12/29/69

Monsanto said "the hysteria vs. chlorinated aromatics is world-wide." PCB pollution caused increasing concern in Japan due to the Yusho Incident, and the Monsanto representative in Japan predicted that imports of PCB could not continue indefinitely.

"I think you must recognize that the hysteria vs. chlorinated aromatics is world-wide. Japan has recently followed the U.S. lead and has banned DDT and HCB. The chlorinated biphenyl aspect has not developed similar action, but should follow whatever happens to regulations in the U.S.

Kanegafuchi is concerned in the human exposure which occurred in the 'rice bran oil' incident – Kaneclor accidentally was included in rice bran oil which was used by several hundred people.

I have requested Yokkaichi plant to review the handling of wastes from the Aroclor unit to be sure that contamination to Ise Bay is essentially zero.

So, since imports cannot be continued indefinitely, we will be hoping for significantly improved formulations or there's no business ahead."

[MONS 098483-098484, "Letter from J. R. Durland (Tokyo) to H. S. Bergen (St. Louis)," December 29, 1969.]

Doc ID # 422**Exhibit # P-0271**

298.

12/29/69

Letter from John to Wheeler, et al.: John told Wheeler that "The Irish Sea bird kill and the seal deaths on the Cornish coast have precipitated an unusual number of news media reports."

"The attached clippings and television interviews come from our PR office in London. The Irish Sea bird kill and the seal deaths on the Cornish coast have precipitated an unusual number of news media reports. Many of these reports are inaccurate and inflammatory. Fortunately, our U. S. position statement has taken some of the heat out of the situation, for the moment.

Environment magazine, St. Louis, is planning their article for January, 1970, which could generate other PCB stories in this country."

[MONS 099504, "Letter from E. V. John to Mr. E. P. Wheeler, Mr. H. S. Bergen, Mr. J. E. Springgate, Mr. P. B. Hodges, Mr. W. R. Richard, and Mr. P. S. Park," December 29, 1969.]

Doc ID # 8327**Exhibit # P-0272**

299.

1950s-
1960s

Wash-down from the PCBs working area went into the storm sewer on the daily basis in Anniston Plant.

"Q: All right. Did -- And we may have touched on this. I'm sorry if we have, Mr. Curry. Were you involved or did you witness any release of PCBs from the Monsanto plant into any streams or creeks?"

"A: Other than just washing up our work area, which was a daily, normal part of our job, washing down our work areas with a hose with either hot or cold water or whatever, that ran into the storm sewer. Other than that, that was the extent of my knowledge."

"Q: Okay. And just to make sure, are you saying there was a small amount of PCBs on a daily basis, you think?"

"A: Yeah. Just, you know, drippings here and there from pump piping and from maybe breaking into a line, whatever residue was left there after the line had been blown out for maintenance work or

whatever. There may be a few drops there. But, you know, we didn't just break into lines and them still full of product and let it run out of the ground. That wasn't the way you did it."

[pp. 43-44, "Deposition of Donald Curry, Chemical operator for Monsanto, taken in the Law Suit of Abernathy," January 20, 1999.])

300.
1970

"The domestic sale of Aroclor products peaked to 33,000 metric tons in 1970."

[MONS 026995, EPA/600/6-86/002, "Development of Advisory Levels For Polychlorinated Biphenyls (PCBs) Cleanup," May 1986.]

Doc ID # 1223 Exhibit # P-0821

301.
1970

The presence of PCBs in the U.S. environment was confirmed.

[MONS 002321-22, "PCB Production History Fact Sheet," May 1982.]

Doc ID # 4318 Exhibit # P-0811

302.
1970

In the "Performance Review and 1970 Objectives", it was reported that "At year end Sauget reports 177 ppb, Anniston reports 321 ppb and Newport reports 54 ppb." Anniston had the highest PCB level in the plant effluents. The Report admitted frankly, "Losses are still above the 50 ppb target primarily because of prior years contamination of soil, sewers and the like as well as improperly maintained Therminol heating systems."

1. OBJECTIVE: Reduce and effectively control the PCB content of all effluent from Monsanto plants. All plants to achieve 50 ppb in effluent by January, 1971. All plants to achieve target of 10 ppb by September, 1971.

STATUS: The Newport, Anniston and Sauget plants have reduced losses considerably. Losses are still above the 50 ppb target primarily because of prior years contamination of soil, sewers and the like as well as improperly maintained Therminol heating systems. At Sauget tank truck washing is a prime source of contamination. Measures have been taken to control disposal of the wash liquids. At year end Sauget reports 177 ppb,

Anniston reports 321 ppb and Newport reports 54 ppb. The 10 ppb target can be achieved in 1971 with continued tightening of control and probably with the installation of carbon absorption equipment."

[MONS 035463, "Performance Review, 1970 Objectives, Polychlorinated Biphenyl Environmental Problem," 1970 (?).]

Doc ID # 423 Exhibit # P-0256

Note: 1. No date is available for the document; 1970 is determined based on the information provided in the document.
2. "At year end" may refer to 1969 from the information provided.

303.
1970

Monsanto's worldwide sale of PCB reached peak, over 90 million pounds in 1970.

[MONS 051311, Monsanto, "Position Paper," November 20, 1975.]
[believe this Bates No. is incorrect]

Doc ID # 4809 Exhibit # P-0765

304.
1970

Monsanto complained that the pollution hysteria continued to grow and specifically in the area of PCB's the number of laboratories, both governmental and university, involved continues to increase.

"In November (1969), the decision was made to develop a plan to phase out the manufacture of Aroclor 1254 and 1260. Since then, as you well know, the pollution hysteria continued to grow and specifically in the area of PCB's the number of laboratories, both governmental and university, involved continues to increase as we predicted." [MONS 035424-25]

Doc ID # 407 Exhibit # P-0461

"Since November, the press has been relatively quiet except for the recent flurry following Congressman Ryan's Press Conference. Two publications have appeared which implicate PCB. The January - February, 1970 issue of Environment published in St. Louis carried an article by Dr. Robert Risebrough and Virginia Brodine. The Presence of PCB in samples of human milk is first publicly reported in this article. An article by Dr. David Peakall of Cornell University appeared in the April issue of Scientific

American. In this article, the effect of DDT and PCB on egg shell formation and reproduction is described, and emphasizes that the problem has been apparent since the introduction of DDT to the environment. Three newspaper articles were noted, one in the Miami Herald, another in the Tampa Tribune, and the third in the Ann Arbor News, again describing the effects of DDT and PCB on the environment. The Florida papers referred to the effect on shrimp of hydraulic fluid which was traced to our Pensacola plant." [MONS 035425-26]

Doc ID # 407 Exhibit # P-0461

"In March, we held discussions with Dr's. Risebrough and Olcutt at Berkeley, California. They are personally convinced PCB's are harmful and were pleased that Monsanto was concerned and cooperative.

Also in March, we participated with about 50 technical representative representing State, Federal and Canadian Water, Fish, Wildlife regulatory agencies in a very objective discussion in Duluth, Minnesota. Analytical techniques, monitoring of the environment and toxicity of PCB were discussed." [MONS 035426]

Doc ID # 407 Exhibit # P-0461

[MONS 035424-26, "Presentation of the PCB Management Plan," 1970.]

Doc ID # 407 Exhibit # P-0461

305.

01/13/70

Monsanto was pressed to submit the reports on the Aroclor study by Dr. Fitzbugh.

"Dr. Fitzbugh is pressing Monsanto for reports on the studies underway with the Aroclors. It is necessary for me to have status summaries of all projects with these materials by noon on Wednesday, January 14.

The chicken study has not yet been reported by the Farm, but RJP will obtain the essential information for compiling a brief status summary."

[M 42541, "Letter from Otis E. Fancher to MLK and RJT: Monsanto Aroclor Studies," January 13, 1970.]

Doc ID # 3687**Exhibit #**

306.

01/19/70

The total PCB concentrations in the Mud taken from Snow Creek 1 Blk below Treatment Plant was as high as 2,193 ppm.

"The PCB analysis results of the last (11-23-69) round of plant monitoring samples are reported in the following table."

O.R. Log No.	Location	Matrix	Aroclor(s) Found	Aroclor(s) Found	Aroclor(s) Found
			1242	1248	1254
128	Choccolasso Creek @ Hwy 9	Mud	456 ppb	-	1.08 ppm
129	Choccolasso Creek @ Boiling Springs	Mud	26 ppb	-	-
130	Choccolasso Creek @ Jackson Shoals	Mud	-	470 ppb	-
131	Snow Creek @ Glen Eddy	Mud	1430 ppm	-	411 ppm
132	Snow Creek 1 Blk Below Plant	Mud	1656 ppm	-	537 ppm
133	Choccolasso Creek Below Treatment Plant	Water	-	51 ppb	7 ppb
134	Snow Creek 1 Blk Below Plant	Water	16.5 ppm	-	3.84 ppm
135	Snow Creek @ Glen Eddy	Water	-	1.13 ppm	305 ppb
136	Choccolasso Creek @ Hwy 9	Water	11 ppb	-	Trace
137	Choccolasso Creek @ Jackson Shoals	Water	10 ppb	-	Trace
138	Choccolasso Creek @ Boiling Springs	Water	10 ppb	-	Trace

[MONS 099183, "Letter from E. S. Tucker to E. G. Wright (Anniston Plant)," January 19, 1970.]

Doc ID # 430**Exhibit # P-0289**

307.

01/29/70

PCBs were exhibiting a greater degree of toxicity in the chronic study than Monsanto had anticipated, and the interim data would perhaps be worse.

"Enclosed is a copy of the reports from our consulting laboratory indicating the status of the animal toxicity studies. I have summarized the pertinent findings separately and as indicated in the table.

We have given copies of these data to one U.S. customer, the U.S. FDA and one or two other state agencies. I don't see why this information cannot be released with discretion in Britain or Europe.

Our interpretation is that the PCB's are exhibiting a greater degree of toxicity in this chronic study than we had anticipated. Secondly, although there are variations depending on species or animals, the PCB's are about the same as DDT in mammals.

We have additional interim data which will perhaps be more discouraging. We are repeating some of the experiments to confirm or deny the earlier findings and are not distributing the early results at this time."

[MONS 098480, "Letter from E. P. Wheeler to D. S. Cameron (Brussels)," January 29, 1970.]

Doc ID # 432**Exhibit # P-0291**

308.

01/29/70

Letter from Tucker, Litschgi, and Westenberger to Keller: The biological study indicated that "Aroclors 1242, 1248, 1254 remained unaffected after an exposure period of five weeks."

"The initial biologically populated river water degradation study on Aroclors 1221, 1242, 1248, and 1254 has been completed. An analysis of the results indicates that under the conditions employed the major isomers in Aroclor 1221 are readily degraded (Figures I and II). Aroclors 1242, 1248, 1254 remained unaffected after an exposure period of five weeks. The samples from the last exposure period (8 weeks) are presently in the process of being analyzed. A report will be issued when the analysis of these samples has been completed.

The semi-continuous activated sludge degradation studies have so far confirmed the river water results in that the major isomers of

Aroclor 1221 are readily degraded. Additionally, there are indications that some of the lower chlorinated isomers in Aroclors 1242 and 1248 are beginning to be effected.

Analysis of the final round of Anniston and W. G. Krummrich plant monitoring samples has been completed and the results sent to the respective plants. A special study report will be issued covering this plant support work and arrangements currently are being made so that the analytical plants labs can assume this responsibility in the future."

[MONS 099856-57, "Letter from E. S. Tucker, J. Litschgi, and B. J. Westenberger to R. E. Keller (Research I): Aroclor - Wildlife Monthly Summary," January 29, 1970.]

Doc ID # 8416 Exhibit # P-0293

309.
02/70

Monthly Report of Anniston Plant: "routine sampling to trace PCB losses to point sources" would be started in mid-March in Anniston Plant. "Equipment has been purchased to give the plant capability to start mobile air sampling". So, where are the results?

"Study of the excessive free chlorine in Aroclor off-gas has indicated nine changes contributing to the problem, many relating to chlorine plant shutdown. Five of these have been corrected with two others being worked on. Free chlorine in Muriatic acid from the absorber is currently at a more reasonable 0-50 ppm level, reduced from January values of 3000 ppm; principle remedies have been correction of chlorine pressure and density controller errors, modifications of the tank car unloading instruments, and production on chlorinators 2, 4, 5, 9 being scheduled back on liquid Aroclor. Further improvement in control instrumentation is scheduled for week of March 23, to continue the action sequence planned to regain 5 ppm level." [M 29248, February 1970]

Doc ID # 2662 Exhibit # P-0294

"Pollution Control

A Work Plan was issued to start routine sampling to trace PCB losses to point sources. Sampling will start during mid-March.

Equipment has been purchased to give the plant capability to start mobile air sampling in anticipation of increased state activity in this area."

[M 29248-49, "J. C. Landwehr, Technical Service Department, Anniston Plant: Monthly Report," COMPANY CONFIDENTIAL, February 1970.]

Doc ID # 2662 Exhibit # P-0294

310.

02/02/70

High concentrations of PCBs were detected from the fifth settling pond.

"The effluent contained ~10 ppm of apparent PCBs which were not identical to either 1242 or 1248 but rather like a mixture of the two. The alteration of the electron capture fingerprint could be due to the use of 1248 as make up in reclaimed 312, some biological alteration of 1242, or the presence of other chlorinated hydrocarbons in the extracts. I would suggest that we analyze a few more samples from these settling ponds before Fague discusses these results with any G.M. people."

[MONS 098640, "Letter from Scott Tucker (R & D Laboratories) to N. T. Johnson (Central Foundry Division (GMC): Effluent Sample From Fifth Settling Pond," February 2, 1970.)]

Doc ID # 433 Exhibit # P-0295

311.

02/12/70

Monsanto was worrying about that its internal 10 ppb target would not be reached.

"With PCB levels as low as 5 ppb proving lethal to juvenile shrimp and the purists' position that any PCB's present no matter how low in concentration will eventually, by "biological magnification", adversely affect the environment, do you have any further thoughts regarding the re-evaluation of the 10 ppb target?"

[MONS 098245, "Letter from W. B. Papageorge to E. P. Wheeler: PCB Levels -- Plant Effluent," February 12, 1970.]

Doc ID # 436 Exhibit # P-0297

312.

02/16/70

A list of questions and answers regarding PCB's pollution was prepared by Monsanto headquarter for its salesmen and related employees: "We can't afford to lose one dollar of business."

"Attached is a list of questions and answers which may be asked of you by customers receiving our Aroclor - PCB letter. You can give verbal answers; no answers should be given in writing. If the customer asks a question you can't answer or if he wants an answer in writing, then send his questions to me and will answer from here." [M32905, 02/16/1970]

Doc ID # 437 Exhibit # P-0298

"We have no replacement products for Aroclor 1254 and Aroclor 1260. We will continue to make these products; however, customers will have to use their own judgement on continued use."

"We can't afford to lose one dollar of business. Our attitude in discussing this subject with our customer will be the deciding factor in our success or failure in retaining all our present business. Good luck."

[M32906, Monsanto (St. Louis), "Pollution Letter," February 16, 1970.]

Doc ID # 437 Exhibit # P-0298

313.
02/18/70

Letter from Tucker to Lidgett: The Aroclor Biodegradability studies conducted by Monsanto indicated that Aroclors 1242, 1248 and 1254 did not show any significant biodegradation.

"Our work seems to confirm your observed need for biphenyl-adapted micro-organisms. We have exposed Aroclors 1221, 1242, 1248 and 1254 to biologically populated river water (8 weeks) and to lab sludge in semi-continuous activated sludge units (~2 months). Only Aroclor 1221 has shown significant degradation and this is probably due to its high biphenyl content."

[MONS 099180, "Letter from E. S. Tucker to R. A. Lidgett (Ruabon): Aroclor-Biodegradability," February 18, 1970.]

Doc ID # 9406 Exhibit #

314.
02/19/70

Letter from Mount, Director of NWQL, to Garrett and others: Mount told Monsanto that "There is increasing concern among many individuals about the importance of PCB's in the environment".

Thus, he invited Monsanto to a meeting in Duluth to discuss the related issues."

"There is increasing concern among many individuals about the importance of PCB's in the environment, what the major sources might be, and what methods of control ought to be initiated, if any, in order to avoid the development of a major problem. The recognition of these materials in biological samples is occurring with increasing regularity and more and more questions are being raised as to the importance of these residues, both from the standpoint of human consumption as well as effect on the aquatic environment.

Because this laboratory is likely to be intimately involved in ecological evaluation work, I am taking the liberty of serving as a coordinator to arrange a meeting of interested persons to talk about several pertinent questions in regard to these materials. I would like to invite you to a meeting at the National Water Quality Laboratory, 6201 Congdon Boulevard, Duluth, Minnesota on Tuesday, March 17, 1970, beginning at 9:00 a.m. to discuss the following items.

1. The volume of PCB's produced in the United States.
2. The types of products in which these PCB's occur.
3. The persistence and longevity of various types of PCB's.
4. Existing levels of PCB's in water and biological material.
5. The types of PCB's that are most toxic.
6. Suggestions for research to evaluate the importance of PCB's in terms of damage to the aquatic environment."

[MONS 099987, February 19, 1970]

Doc ID # 8456 Exhibit # P-0301

"I would not expect more than a few decisions to be made at this meeting, but it can serve as a useful place to exchange information, assemble our current knowledge in regard to the PCB situation, and to offer suggestions as to needed research that should be completed in order to better understand the problem."

[MONS 099987-88, "Letter from Donald Mount, Director of NWQL to Jack Garrett (Monsanto) and others: Meeting Concerning PCB's," February 19, 1970.]

Doc ID # 8456 Exhibit # P-0301

02/19/70 PCBs were reported to be found in oysters in Doeboy Sound off Sapelo Island, Georgia. Durant was puzzled regarding the source of PCB's.

"Yesterday I talked with Mr. Charles Durant, Marine Institute, University of Georgia, regarding the reported presence of PCB's in oysters in Doeboy Sound off Sapelo Island, Georgia.

He claims he found 1-2 ppm wet weight basis of Aroclor 1254 in the oysters while looking for DDT and derivatives. He also admitted having some difficulty with his analytical procedures and planned to go to the Federal Water Laboratory in Athens, Georgia for some guidance.

He is puzzled regarding the source of PCB's and has noted that the amount in the oysters appears to vary with recent samples showing decreasing amounts. He suspects someone is dumping PCB's either in the Savannah River or in the ocean. He will send me copies of any information he has."

[MONS 098187, "Letter from W. B. Papageorge to E. F. Wheeler," February 19, 1970.]

Doc ID # 439 Exhibit # P-0299

316.

02/23/70 Letter from Wheeler to Papageorge: Wheeler discussed with Papageorge regarding the letter from Mount, Director of the National Water Quality Lab. In this letter, Mount was planning to discuss the issues related to PCBs such as the volumes of PCB's production in the USA, and the type of products produced by Monsanto, etc.

"Attached is a memo Jack received from the author, Donald Mount, inviting him to attend a meeting in Duluth on Tuesday, March 17 to discuss in detail the following items:

1. The volumes of PCB's produced in the United States.
2. The types of products in which these PCB's occur.
3. The persistence and longevity of various types of PCB's.
4. Existing levels of PCB's in water and biological material.
5. The types of PCB's that are most toxic.

6. Suggestions for research to evaluate the importance of PCB's in terms of damage to the aquatic environment."

"In the meantime I think we should decide who from Monsanto is going to attend the meeting in Duluth on March 17."

[MONS 099986, "Letter from Wheeler to Papageorge: Meeting Concerning PCB's -- National Water Quality Lab, FWPCA, Duluth, Minnesota," February 23, 1970.]

Doc ID # 8456 Exhibit # P-0301

317.
02/23/70

Letter from Wheeler to Papageorge: The lethal dose of PCB to shrimp was reported in a article from the Newspaper.

"The attached is of interest since it is the first reference that I know of that:

1. Relates to the lethal dose of PCB to shrimp but,
2. More importantly indicates that PCB is not as toxic as DDT; and
3. "Refuted inferences by state officials last week that PCB may be worse than hard pesticides".

[MONS 099537, "Letter from Elmer P. Wheeler (Medical Department) to W. B. Papageorge: Newspaper Report on PCB," February 23, 1970.]

Doc ID # 8332 Exhibit # P-0300

318.
02/25/70

Letter from Baxter to Richard: The letter wrote that "The higher chlorinated biphenyls are very resistant to biodegradation".

"It is difficult to draw any overall conclusions of our work at this stage, but it certainly looks as though the higher chlorinated biphenyls are very resistant to biodegradation, and even the lower ones seem to require the presence of biphenyl itself, at any rate under the conditions we have examined so far."

[MONS 099358, "Letter from R. A. Baxter to W. R. Richard (St. Louis): Aroclor Biodegradability," February 25, 1970.]

Doc ID # 9443 Exhibit # P-0302

319.

02/27/70

Mr. David Epel wrote to Mr. Papagerorge to persuade Monsanto to stop production of PCB's.

"If you are interested in my own personal analysis, I believe that the use of PCB's should be drastically cut back in any area where release into the environment could occur."

[M11624, "Letter from Mr. David Epel to Mr. W. B. Papagerorge, Manager of Environmental Control, Monsanto," February 27, 1970.]

Doc ID # 1473 Exhibit # P-0303

320.

02/29/70

Letter from Mount, Director of NWQL to Garrett (Monsanto) and others -- Meeting Concerning PCB's: "There is increasing concern among many individuals about the importance of PCB's in the environment..."

"There is increasing concern among many individuals about the importance of PCB's in the environment, what the major sources might be, and what methods of control ought to be initiated, if any, in order to avoid the development of a major problem. The recognition of these materials in biological samples is occurring with increasing regularity and more and more questions are being raised as to the importance of these residues, both from the standpoint of human consumption as well as effect on the aquatic environment.

Because this laboratory is likely to be intimately involved in ecological evaluation work, I am taking the liberty of serving as a coordinator to arrange a meeting of interested persons to talk about several pertinent questions in regard to these materials. I would like to invite you to a meeting at the National Quality Laboratory, 6201 Congdon Boulevard, Duluth, Minnesota on Tuesday, March 17, 1970..."

[MONS 099987, "Letter from Mount, Director of NWQL to Jack Garrett (Monsanto) and others: Meeting Concerning PCB's," February 29, 1970.]

Doc ID # 8456 Exhibit # P-0301

321.

03/04/70 Monsanto asked Industrial Bio-Test Laboratory to determine 96-hour $TL_m(s)$ for Aroclors 1242, 1254 and 1260. Also, it requested the Bio-Test to redo the fish toxicity work.

"I believe Scott Tucker talked to you on the phone about redoing the fish toxicity work. This letter requests 96-hour $TL_m(s)$ be determined using the "standard methods" regardless of how high the exposure levels have to be pushed to cause complete mortality. The exposure levels we are talking about are the amounts of the Aroclor added to the tank to reach the mortality levels.

I think it has been agreed that these studies should be carried out on Blue Gills and Bullheads at three Aroclor exposure levels:

Lower concentration - all fish survive
Median concentration - less than all fish survive
Upper concentration - none of the fish survive

With Aroclor 1242 (Lot No. AK-255), 1254 (Lot No. AK-38), and 1260 (Lot No. AK-3)."

[M 42543, "Letter from Elmer P. Wheeler to Dr. Otis Fancher, Industrial Bio-Test Laboratory, Inc.," March 4, 1970.]

Doc ID # 3689 Exhibit # P-0306

322.

03/06/70 Letter from Papageorge to Durland (Tokyo): No major capital expenditures are planned at this time (to reduce the amount of Aroclors in the plant effluents).

"Both the Anniston and W. G. Krummrich plants have become more aware of the need to reduce the amount of Aroclors in the plant effluents to essentially zero." [MONS 099591, 03/06/70]

Doc ID # 445 Exhibit # P-0307

"No major capital expenditures are planned at this time. The Anniston plant plans to install a sump in their sewer system to trap Aroclors. All waste containing PCB's is at present hauled to the dumps the plants have been using for other plant waste. We recognize this is not the ultimate, since PCB's could eventually enter the environment, but we will continue this practice until better methods of disposal are available." [MONS 099591, 03/06/1970]

/ **Doc ID # 445 Exhibit # P-0307**

"Your question as to why the toxicity of Aroclors has not turned up downstream of the Anniston Plant after 40 years of manufacture is difficult to answer. We just don't know. Aroclors have been found in Snow Creek near the plant. There is no record of any water life observed in this creek for many years. We've assumed other plant wastes were to blame; e.g. muriatic acid. Aroclors could be involved also." [MONS 099592, 03/06/1970]

Doc ID # 445 Exhibit # P-0307

"Incineration

Aroclors will decompose at temperatures exceeding 800 °F. Bayer and Prodelec in Europe claim they are incinerating PCB's. We have been promised data on the stack gases formed. The Rollins-Purle, Inc. people in New Jersey claim that they incinerated some Aroclor 1254."

[MONS 099593, "Letter from W. B. Papageorge (St. Louis) to J. R. Durland (Tokyo): Aroclor Environmental Program," March 6, 1970.]

Doc ID # 445 Exhibit # P-0307

323.
03/06/70

Letter from Wheeler to Papageorge: Back to 1967, FDA conducted studies to determine chick edema factor of several of the Aroclors.

"Attached is a copy of a letter sent to Bill Hunt from the FDA back in 1967. It relates to work done by the FDA to determine chick edema factor of several of the Aroclors.

The second page relates to fractions of Aroclor 1242 which may be of particular interest."

[MONS 098587, "Letter from Elmer P. Wheeler to W. B. Papageorge: PCB and Chick Edema Factor," March 6, 1970.]

Doc ID # 9404 Exhibit # P-0308

324.
03/18/70

Letter from Keller to Lidgett: Fifty representatives of government and university laboratories in the USA and Canada attended the Duluth meeting on PCBs. "These representatives have shifted their emphasis to PCB's from pesticides."

"Bill Papageorge, Jack Garrett and I attended a meeting on PCB's called by the Pollution Control Administration in the USA (Duluth, Minnesota) this week. This was originally set up as an office type meeting. It quickly got out-of-hand on the number of attendees. Fifty representatives of government and university laboratories in the USA and Canada attended to hear Monsanto's position on PCB's in the environment and especially in water. These representatives have shifted their emphasis to PCB's from pesticides. They have developed enough experimental evidence on their own to convince themselves that the PCB contamination is real.

In short, a massive nationwide PCB program is unfolding in public agencies in the USA. One possible future result of this effort will be the setting of limits for PCB's in the environment."

[MONS 099853, "Letter from R. E. Keller to R. A. Lidgett: PCB's," March 18, 1970.]

Doc ID # 18974 Exhibit # P-0312

325.
03/19/70

Letter from Fujii to Durland: Two of the most influential papers in Japan reported that "over a wide range of areas PCB (polychlorinated biphenyl) has been found to be contained in animals, wild birds, fish, etc., as well as human mother's milk."

"Two of the most influential papers in Japan introduced in their Feb. 24, 1970 issues an article entitled "New Toxic Substance in Air" which originally was reported in the Feb. 22 issue of the San Francisco Chronicle and the contents of which are summarized as follows:

- 1) Over a wide range of areas PCB (polychlorinated biphenyl) has been found to be contained in animals, wild birds, fish, etc., as well as human mother's milk.
- 2) Nature of the injury done by PCB is much like that done by DDT, and a dosage above a certain level causes skin irritations, liver troubles, lethargy and even death in some cases.
- 3) PCB has a wide variety of uses. (Uses as plasticizers, as we call it, excluding electrical and heat transfer uses, were listed in the papers.). There is a possibility that the chemical is diffused as a component of insecticides.

- 4) PCB is marketed in USA by Monsanto with the tradename of "Aroclor" and is also produced in Japan and Europe."
[MONS 099877, March 19, 1970]

Doc ID # 8427 Exhibit # P-0313

"In This connection, we would greatly appreciate it if you would provide us with more detailed data on the toxicity of PCB as compared with other organic solvents from the medical standpoint, precautions to be taken from the labor-hygenic aspect, examples of hazard in U. S. A., etc."

[MONS 099877-78, "Letter from S. Fujii (Director of Technical Liaison) to Dr. J. R. Durland (Tokyo): PCB TOXICITY," March 19, 1970.]

Doc ID # 8427 Exhibit # P-0313

326.
03/20/70

The production of PCB's in Japan was different from what in Anniston, Alabama, and the former had much lower PCB's concentrations in its effluent. In the letter from J. R. Durland to W. B. Papageorge, it says, "The Yokkaichi plant for Aroclor manufacture discharge its water waste through a sump and a pond before overflowing into Ise Bay. Hence, it seems probable that the affluent will be at low levels. However, this will be monitored by periodic checks for PCB by the analytical procedure which you have sent." [MONS 098459, 03/20/70]

Doc ID # 449 Exhibit # P-0314

"Necessary steps are being taken by MMK marketing department to advise our customers of the PCB problem and of the necessity of controlling any discharge to waste water."

[MONS 098459, "Letter form J. R. Durland (Tokyo) to W. B. Papageorge (St. Louis): Aroclor Environmental Program," March 20, 1970.]

Doc ID # 449 Exhibit # P-0314

327.
03/23/70

Letter from Garrett to Wheeler: Garrett wrote to Wheeler about the Duluth PCB Meeting, and his discussion with Mount, Director of NAQL. He summarized the major points, which Monsanto was interested in.

"In February Dr. Donald I. Mount, Director, National Water Quality Laboratory, Federal Water Pollution Control Administrator, Duluth, Minnesota, sent me a letter and asked if I would attend an informal meeting on the PCB question in Duluth in Dr. Mount's office on the 17th of March, 1970. After several telephone calls to Dr. Mount and discussions with those within Monsanto concerned with the PCB issue, it was decided that Dr. Keller, Mr. Papageorge and myself would attend the meeting." [MONS 099990, March 23, 1970]

Doc ID # 8458 Exhibit # P-0317

"There were many bits and pieces of information developed that Monsanto is interested in and since there is no natural sequence of this development, I will mention them as individual subjects:

1. R. C. Kroner of the FWPCA, Analytical Quality Control Laboratory, Cincinnati, Ohio, stated that the national water quality network sampling program had developed two sample locations where Aroclors were found. They insisted that in both cases this was 1248." [MONS 099991, March 23, 1970]

Doc ID # 8458 Exhibit # P-0317

- "9. Dr. John Sprague of the Fisheries Research Board of Canada, Marine Laboratories, St. Andrews, New Brunswick, Canada could not attend but sent some data in a letter to Dr. Mount."

"However, Dr. Sprague did make some comments about loss to the environment of lower chlorinated isomers. He felt that the loss was sufficiently severe to justify placing exhaust hoods over his research tanks. Dr. Mount asked me what I thought of this and I told him I thought it unnecessary. Dr. Sprague indicated in his letter, however, that loss of the lower chlorinated isomers was quite severe in his testing. This information brings up the fact that we should be determining, using fresh natural water, distilled water and fresh salt water, what does happen to different Aroclors on standing in water. It might be additionally wise to expose tanks containing these water blanks and Aroclors to various sources of light and determine the effect of light on the subsequent analysis." [MONS 099993, March 23, 1970]

Doc ID # 8458 Exhibit # P-0317

[MONS 099990-93, "Letter from Jack T. Garrett to Elmer P. Wheeler: Duluth PCB Meeting," March 23, 1970.]

Doc ID # 8458 Exhibit # P-0317

328.

03/24/70

Letter from Wheeler to Bergen, and Springgate: Wheeler summarized the principal points of discussion and conclusions from the PCB meeting in Duluth.

"Attached is a rather lengthy narrative report which Jack Garrett put together after the meeting in Duluth last week.

I am sure both Bill Papageorge and Bob Keller will want to add their comments.

From discussing the meeting with Jack, Bill and Bob, I believe the following are the principal points of discussion or conclusions from the meeting:

2. The greatest concern shown by the participants related to the establishment or setting of a tolerance level for PCB's in food--fish principally. Representatives of the various agencies anticipated having to do this in the next six to twelve months."

[MONS 099989, "Letter from Elmer P. Wheeler to H. S. Bergen, and J. K. Springgate: PCB Meeting in Duluth," March 24, 1970.]

Doc ID # 8457 Exhibit # P-0318

329.

03/27/70

Letter from Richard to Papageorge: the higher isomers in Aroclor 1242 were probably un-degraded.

"Aroclor 1242

Mainprize, with bugs from Evans of Bangor University, seems to be doing better on Aroclor 1242 than in previous experiments. Peaks 1 through 4 probably represent degradation of di- and tri-chlorobiphenyls. Previously we had only seen degradation of the 2, 4' dichlorobiphenyl. We probably still have the higher isomers in Aroclor 1242 undegraded but this is not reported one way or the other by Mainprize."

[MONS 098577, "Letter from W. R. Richard to W. B. Papageorge: Aroclor Biodegradation," March 27, 1970.]

Doc ID # 452 Exhibit #

330.

03/30/70

Letter from Kelly to Papageorge: Dr Hill "has found PCB, particularly Aroclor 1254, in samples of milk from at least three herds in Ohio." Kelly said "This brings us to a very serious point. When are we going to tell our customers not to use any Aroclor in any paint formulation that contacts food, feed, or water for animals or humans?" He warned "All in all, this could be quite a serious problem, having legal and publicity overtones."

"We have been in communication with a Dr. Hill of the Ohio State Board of Health. He has found PCB, particularly Aroclor 1254, in samples of milk from at least three herds in Ohio. He has traced this contamination back to silage from three different silos. Dr. Hill reported concentrations of 0.2 ppm in the silage in the center of the silo and up to 20 ppm in the material next to the walls. He also stated that concentrations in the milk were between 0.1 ppm and 0.6 ppm and that some of the milk had been destroyed."

"The silos are concrete silos whose interior surfaces were painted in 1967 using a formulation that contained 1254. I don't know if there was any other Aroclor in the formulation nor do we know the coating manufacturer, although, this could be found out if important. The presence of PCB in the silage came from flaking off of the material and possibly from leaching out during the silage storage. At present they will have to destroy about 150 tons of silage which is valued at about \$30 per ton. As a rough guess, they consider there may be 50 other silos involved in Ohio that were painted with the same formulation. They are also looking into the fat contamination of the cows themselves."

"All in all, this could be quite a serious problem, having legal and publicity overtones."

"This brings us to a very serious point. When are we going to tell our customers not to use any Aroclor in any paint formulation that contacts food, feed, or water for animals or humans? I think it is very important that this be done. It may be that some of the customers will assure themselves on the basis of non-extractability that a particular formulation might be safe but I think we should make a blanket recommendation against these uses."

[MONS 099541, "Letter from R. Emmet Kelly, M. D. to W. B. Papageorge," March 30, 1970.]

Doc ID # 8334**Exhibit # P-0320**

331.

03/31/70

Recommendation of Task Force on Plant Dump: water leakage from the P. C. B. dump was a concern, and "the Monsanto (P.C.B.) dump area could be classified as a serious water pollution source."

"A serious problem exists at the present time with the Monsanto dump. The two main areas of concern are: (1) water leakage from the P. C. B. dump, and (2) lack of security throughout the dump area. These two areas create hazards in the areas of water pollution and in liability problems." [DSW 013822, March 31, 1970]

Doc ID # 41**Exhibit #**

"September 12, 1971, all open dumps in the State of Alabama will be converted to land-fill operations. This law applies to municipalities, but it also applies to any private dump operation which might pose a water pollution problem or health hazard. In light of the attention of P.C. B. has received, it is highly probable that the Monsanto (P.C.B.) dump area could be classified as a serious water pollution source."

[DSW 013822, "Letter from Monsanto Anniston, Alabama to J. L. Corder (Monsanto): Recommendation of Task Force on Plant Dump," March 31, 1970.]

Doc ID # 41**Exhibit #**

332.

March 70

Monsanto representatives met with Dr's. Risebrough and Olcutt at Berkeley, California. They were personally convinced that PCB's are harmful.

[MONS 035425, "Presentation of the PCB Management Plan," March 1970.]

Doc ID # 407**Exhibit # P-0461**

March 70

About 50 technical representative representing State, Federal and Canadian Water, Fish, Wildlife regulatory held a meeting in Duluth, Minnesota. Analytical techniques, monitoring of the environment and toxicity of PCB were discussed.

[MONS 035425, "Presentation of the PCB Management Plan," March 1970.]

Doc ID # 407 Exhibit # P-0461

April 1970 Dr. D. Peakall of Cornell University reported the effect of DDT and PCB on egg shell formation and reproduction in the April Issue of Scientific American.

[MONS 035425, "Presentation of the PCB Management Plan," April 1970.]

Doc ID # 407 Exhibit # P-0461

333.
04/1970 Approximately 35-40 samples were analyzed for PCB's during April.

"Equipment for analyzing PCB losses is on stream. Approximately 35-40 samples were analyzed during April."

[DSW 014970, "J. C. Landwehr, Technical Service Department, Anniston Plant: Monthly Report," COMPANY CONFIDENTIAL, April 1970.]

Doc ID # 2661 Exhibit # P-0323

334.
04/1970 Summary--Interim Status: Chronic Toxicity with Aroclors demonstrated that "The above data indicate that these materials are about the same order of toxicity as DDT in rats and dogs."

"In May and June of 1969, two-year feeding studies were initiated with Aroclors 1242, 1254 and 1260. The materials are being fed to rats and dogs at levels of 1, 10 and 100 parts per million in the diet.

After 11 months there have been no clinical effects observed in the rats in the Aroclor 1242 study. Animals sacrificed at six months showed negative Micropathology. There have been no clinical effects in the dogs and blood and urine chemistry studies at the one, three and six month intervals were negative.

In the case of Aroclor 1254, rats have shown a slightly depressed weight gain at 100 ppm. In the animals sacrificed at six months, there was slight increased liver weights in males of the animals on the 100 ppm diet. Micropathology was negative at all levels. In the

dogs there have been depressed weight gains in the females at all levels fed and at the 100 ppm level in the males. Blood and urine chemistry has been negative."

"The above data indicate that these materials are about the same order of toxicity as DDT in rats and dogs."

"Environmental Aroclor Project

Pain scrapings from silos and raw milk extracts showed presence of PCB by GC/Mass and EC/GC analysis. The paint scrapings contained 2.87% Aroclor 1254. The raw milk contained an estimated 0.6-0.7 ppm PCB, probably originally Aroclor 1254 but with an altered isomer distribution."

[MONS 059564 and 059806, Monsanto, "Summary--Interim Status: Chronic Toxicity With Aroclors," April 1970.]

Doc ID # 5008 Exhibit # P-0003

335.
04/03/70

Letter from Keller to Paton: Air was sampled several times in the laboratories and measured for Aroclor 1242 by GC.

"Action 2 in the reference memo requests a method for air sampling Aroclor 1221 vapor and subsequent analysis by GC.

We have sampled air several times in our laboratories and measured Aroclor 1242 by GC. This procedure needs to be proved and written for Aroclor 1221. This is one of our actions scheduled for the environmental polychlorinated biphenyls program.

I estimate we will have this write-up by May 1. We will send you copies for issuance at that time."

[MONS 099858-60, "Letter from R. E. Keller to Cumming Paton: Geigy/Aroclor 1221," April 3, 1970.]

Doc ID # 8417 Exhibit # P-0315

336.
04/07/70

Letter from Kelly to Papageorge: Kelly tried to find out who in the FDA or the Department of Agriculture might be setting a tolerance on PCB's in milk. However, he was also worrying whether his digging would be good or not.

"I talked to Dr. David Bill at the Ohio Department of Public Health with an idea to find out who in the FDA or the Department of Agriculture might be setting a tolerance on PCB's in milk.

Two things happened. First, he says they are now talking about a tolerance of 0.5 ppm in whole milk and a possible 5 ppm in the fat of edible animals. He stated that it looked like another six weeks before such a regulation would be issued. This, of course, is an educated guess on his part. When I tried to find out who in the FDA or Department of Agriculture would be the man to contact to try to find out something more, Dr. Hill was somewhat evasive. He told me that his source was a district office and it was second hand. I did not press him any further, as it looked hopeless.

At present, I am at a dead end as far as finding out anything from the FDA or Department of Agriculture. I am not so sure whether it might not do more harm than good for us to start poking around to find out. Let me know if anyone has any firm convictions that I should start digging."

[MONS 099173, "Letter from R. E. Kelly, M. D., to W. B. Papageorge (St. Louis)," April 7, 1970.]

Doc ID # 9402 Exhibit # P-0326

337.
04/09/70

Letter from John Mason to W. B. Papageorge: Mason set PCB's Management Plan. He complained that "pollution hysteria continues to grow". He wanted to emphasize that "the Aroclors are only mildly toxic and that this is unlikely to be a significant factor in their usage being banned or restricted."

"As I will have little opportunity to see you before our review with T. K. Smith and Howard Minckler on Friday afternoon, I am setting below my ideas on how we should approach this matter.

1. Open the review by referring to the previous presentation to the CMC highlighting particularly their direction that we should prepare a plan to discontinue the manufacture of 1254 and 1260.
2. Confirm that pollution hysteria continues to grow and that we are probably moving into a stage where government agencies as well as independent workers will become involved.

3. Highlight that we want to bring them up to data on all the latest developments, the progress we have made to data and the need for a modification in our strategy.

4. List major developments:

- a. Continuing work and reports published by independent workers - - reference to Risebrough discussions.
- b. Identification of PCB's in cow's milk in Ohio (refer to the fact that so far our own analytical work has not confirmed these results).
- c. Refer to probable intervention of FDA to fix minimum levels of PCB's in foodstuffs.
- d. Briefly report on meeting with Federal Water Pollution authorities.
- e. Describe increasing concern in the U.K. and intervention of Ministry of Agriculture, Fisheries and Food.
- f. More awareness of the problem by German, French and Italian producers and their willingness to cooperate and carry out the necessary work.
- h. Summarize that all of this adds up to the fact that we are currently very much on the defensive and there is a need for more rapid, positive and aggressive action.

5. Report on the progress we have made to date. Wherever possible indicated factual achievement: ..."

"7. Report on toxicity work in hand, emphasizing that based on information available to date, the Aroclors are only mildly toxic and that this is unlikely to be a significant factor in their usage being banned or restricted."

[MONS 098456-57, "Letter from John Mason to W. B. Papageorge: PCB's Management Plan," April 9, 1970.]

Note: In Paragraph 4-C "FDA to fix minimum levels of PCB's in foodstuffs", the word "minimum" should be "maximum".

Doc ID # 457

Exhibit # P-0327

338.

04/10/70

Monsanto Replies To Charge That PCB Threatens Environment: Monsanto said "We have and will continue to cooperate fully with governmental agencies investigating this problem."

"ST. LOUIS, April 10 - Monsanto Company said today it was well aware of the concern over possible environmental

contamination by polychlorinated biphenyl (PCB), an industrial chemical made by the company. The company began a six-point program in 1968 to properly identify and measure PCB in the environment. Steps have been taken to strictly control use of the chemical and replace those grades of PCB which linger in nature.

Monsanto's statement came in response to charges by Congressman William F. Ryan (Dem.) of New York that the discovery of PCB in the ecology represented a major threat."

Howard L. Minckler, Monsanto vice president and general manager of its Organic Chemicals Division, said, "We have and will continue to cooperate fully with governmental agencies investigating this problem. We also have been in close contact with our customers. Monsanto has spent over \$1 million to verify or correct scientific reports, monitor the use of PCB and search for substitute products where needed. This program will be successfully concluded this year."

[MONS 061139, April 10, 1970]

Doc ID # 7186 Exhibit # P-0329

"Monsanto's PCB program was initially directed at proper identification of chlorinated hydrocarbons appearing in the environment."

[MONS 061139-140, Monsanto, "Replies To Charge That PCB Threatens Environment," For Release Immediately, April 10, 1970.]

Doc ID # 7186 Exhibit # P-0329

339.
04/15/70

Estimate No. 3427 from Anniston Plant: Anniston requested to add a sump to collect Aroclor solids from spills and process contamination. It said, "The majority of this PCB leaves the plant as a second phase lying on the bottom of the effluent stream."

"BACKGROUND INFORMATION:

Spills and process contamination permit PCB (polychlorinated biphenyl) to enter the process water sewer. The majority of this PCB leaves the plant as a second phase lying on the bottom of the effluent stream."

"PROJECT DESCRIPTION AND OBJECTIVE:

—This project provides for the installation of a sump in the process sewer as it leaves the north end of the Aroclor department."

"The objective is to collect undissolved PCB and prevent it from leaving the plant in the effluent stream."

"JUSTIFICATION:

This project is necessary to reduce PCB contamination of the Anniston plant effluent. It is the initial step towards attainment of the Division goal of 10 PPB PCB in the effluent."

"ALTERNATE COURSE:

Install a sump in the main effluent stream as it leaves the plant. This alternative is not recommended because of the additional cost due to size of the sump necessary to handle the additional water added to the stream between the Aroclor department and the plant outfall."

[DSW 014383-384, "Estimate No. 3427, To The Director of Business Group, Organic Chemicals Division, Monsanto Company, from Anniston Plant, Anniston, Alabama," April 15, 1970.]

Doc ID # 11583 Exhibit # P-0406

340.
04/16/70

Tucker to Papageorge: Monsanto confirmed the presence of Aroclor isomers contained in the raw milk extracts by use of the GC/Mass technology. WARF Institute also suspected the contamination of an extract of a human fat biopsy fat sample by PCBs.

"GC/Mass and EC/GC analysis of the raw milk petroleum ether extract and the silo scrapings confirmed that they contain significant levels of PCB's.

Unaltered Aroclor 1254 was found in the silo scrapings at a level of 2.87%, while the raw milk extracts contained an estimated PCB level of 0.6-0.7 ppm. Although the isomer distribution of the PCB's in the raw milk extract was altered with respect to the Aroclor 1254 standard, the isomers present were those that occur in Aroclor 1254. This observation was further confirmed by GC/Mass analysis which detected trace amounts of tetrachlorobiphenyl and large amounts of penta and hexachlorobiphenyl."

"Another interesting sidelight is that we have observed strikingly similar isomer alterations in the electron capture chromatograms of an extract of a human fat biopsy fat sample, supplied to us by WARF Institute (Sample #9120924) and in extracts of raw milk samples supplied to us by the Maryland Coop Milk Producers. Both organizations had suspicioned PCB contamination, unfortunately, in both cases GC/Mass confirmation could not be obtained because of the limited amount of sample available (WARF) or the low level of contamination (MCMP)."

[MONS 099542, "Letter from E. S. Tucker to W. B. Papageorge (General Offices), PCB Contaminated Milk, State of Ohio, Dept. of Agriculture, Foods, Dairies, and Drugs Laboratories," April 16, 1970.] [*believe Bates No. is incorrect*]

Doc ID # 42860

Exhibit # P-0335

341.

04/16/70

Letter from Richard to Papageorge: Richard told Papageorge that "Newsom is not exactly pro-Risebrough and wanted samples of Aroclor to check some of Risebrough's claims. This should be followed-up to see what samples are desired."

"Dave Gerwitz of Ag Div called to report a "teach in" in which he had to debate Kevin Shay of Washington University. He wanted information on PCB status. I referred him to you.

Dave Gerwitz also reported that Prof. Newsom of L.S.U. was on a committee with Barry Commoner, K. Shay, and Risebrough on environmental control. Newsom is not exactly pro-Risebrough and wanted samples of Aroclor to check some of Risebrough's claims. This should be followed-up to see what samples are desired."

[MONS 100009, "Letter from W. R. Richard to W. B. Papageorge: Environment-Aroclor," April 16, 1970.]

Doc ID # 8464

Exhibit # P-0334

342.

04/17/70

Letter from W. B. Papageorge to Regional Vice Presidents, Plant Managers, District Sales Managers, U.S. Subsidiaries, and U.S. Plant Communicators: Monsanto prepared PCB background information for Earth Day (April 22), and warned that "Please do not present any Teach-In "visitors" with prepared handouts on PCB."

"As a result of recent publicity about polychlorinated biphenyl (PCB) and the possible threat this chemical poses to the environment, we have prepared background information for your use on Earth Day, April 22. We have anticipated some questions you might be asked and provided some answers." "Please do not present any Teach-In 'visitors' with prepared handouts on PCB. You may use this information in verbal conversations should the occasion arise."

[MONS 098455, "Letter from W. B. Papageorge (General Offices, Monsanto, St. Louis) to Regional Vice Presidents, Plant Managers, District Sales Managers, U.S. Subsidiaries, and U.S. Plant Communicators," April 17, 1970.]

Doc ID # 463

Exhibit # P-0337

343.

04/17/70

Keller to Papageorge: According to Monsanto's own analysis, PCBs were not only found in water, air and sediments in the United States and the U.K., but also found in milk, human fat and fish samples.

"This note summarizes work we have done to date on the detection of PCB's in environmental materials. The attached table covers a total of 167 samples which have been analyzed.

PCB's typical of our Aroclor products have been found in –

- Water and sediment from nine US rivers, on UK river and Lake Michigan,
- Air (atmospheric, 0.05 mg PCB/cubic meter) at the Anniston plant,
- Fish from Lake Michigan and three midwest rivers,
- Human fat from a midwest biopsy specimen and
- Milk from Maryland and Ohio dairy farms.

The water, sediment and air samples contain PCB's typical of Aroclor 1242, 1248, 1254 and /or 1260. The milk, human fat and fish samples contain PCB's most typical of Aroclor 1254."

[MONS 099552, "Letter from R. E. Keller to W. B. Papageorge: Environmental Material Analyzed by Monsanto for PCB's," PERSONAL AND CONFIDENTIAL, April 17, 1970.]

Doc ID # 461

Exhibit # P-0336

344.

04/21/70

Wheeler and Papageorge planned to visit Industrial Bio-Test Laboratory, and discuss the status of the present Aroclor studies, particularly the re-run of the chicken study with Aroclor 1242.

"Elmer Wheeler and Mr. Papageorge will probably visit the laboratory on Thursday, April 23, to discuss the present status of the Aroclor studies, particularly the re-run of the chicken study with Aroclor 1242. We will want to establish dose levels for this study and to consider any biochemical or metabolic studies that might be included."

[M 42552, "Letter from Otis E. Fancher (Industrial Bio-Test) to MLK: Visit by E. Wheeler," April 21, 1970.]

Doc ID # 3695**Exhibit # P-0338**

345.

04/23/70

Letter from Paton to Bechtold, et al.: Monsanto announced to discontinue its sale of PCBs to any customer using or intending to use PCB as an insecticide/pesticide carrier. However, "this ban does not extend to chlorinated terphenyls, namely Aroclor 5060, 5442, and 5460."

"Effective immediately, Monsanto will discontinue the sale of PCBs to any customer using or intending to use PCB as an insecticide/pesticide carrier. By PCB we mean the members of the Aroclor 1200 series, namely 1221, 1232, 1242, 1248, 1254, 1260, 1262, 1268, 4465 and toluol/xylol solutions of 1254, 1260 and 1262. This action is taken in light of current publicity indicating that certain PCBs may be environmental contaminants. We have already written to Dr. Hayes, Director, Pesticide Regulations Division of the U.S.D.A. recommending that his department give critical attention to the registration of PCBs as an ingredient of pesticide formulations (copy attached).

Our records indicate only three possible customers in the U.S.A. for PCBs in this application, viz.:

Chapman Chemical	Aroclor 1262	~ 2,400 Pounds
Chemagro	Aroclor 1254	Discontinued?
John Rooney ⁽¹⁾	Aroclor 1254/1260	Unknown Amount

(1) Sold through American Mineral Spirits Company, Miami."
[MONS 099535, April 23, 1970]

Doc ID # 8331 Exhibit # P-0339

"This ban does not extend to chlorinated terphenyls, namely Aroclor 5060, 5442, and 5460. Nevertheless, we feel that their usage should not be recommended or encouraged further."

"We would emphasize that the original recommendations on Aroclor in insecticides came not from Monsanto but from the U.S.D.A (see CS-6 attached)."

[MONS 099535-36, "Letter from Cumming Paton (General Offices) to D. H. Bechtold, et al.: Aroclor/Insecticides," PERSONAL AND CONFIDENTIAL, April 23, 1970.]

Doc ID # 8331 Exhibit # P-0339

346.
04/28/70

Letter from Mr. John Mason, Assistant General Manager, Monsanto Company to Congressman William F. Ryan: What Monsanto executive told Congressman is not consistent with its practice records on PCBs production.

"I can assure you that our commitment to pollution abatement has not been generated by recent public interest in this subject. Our record shows we have always attempted to conduct our operations in a manner consistent with the best interest of the public. We implemented positive pollution control programs long before the word ecology became fashionable." [M13679, April 28, 1970]

Doc ID # 2153 Exhibit # P-0340

"In view of our activity in total pollution control programs and the special measures we have taken and are continuing to take to regulate PCB, we feel any accusation or implication of irresponsible action by Monsanto is unjustified." [M13679, April 28, 1970]

Doc ID # 2153 Exhibit # P-0340

"Monsanto Company fully recognizes its responsibility and will continue to develop and produce products which contribute to the public well being, but at the same time we will take every precaution to protect the environment in which we all live." [M13679-M13680, April 28, 1970]

Doc ID # 2153 Exhibit # P-0340

"When we first became aware of the possible threat to the environment by PCB, our immediate action was to cooperate fully with scientists and government agencies to properly identify and measure PCB in the environment. Since then, we have taken other major steps directed toward strictly monitoring the manufacture, use and disposal of PCB-containing products which could possibly build up in the ecological system." [M13680, April 28, 1970]

Doc ID # 2153 Exhibit # P-0340

"You will recall that during our meeting with you we discussed the very important distinction between various Aroclor products and the fact that not all Aroclors are PCB's." [M13680, April 28, 1970]

Doc ID # 2153 Exhibit # P-0340

"With regard to our manufacturing operations, we have stated clearly our total commitment to pollution abatement. Production of polychlorinated biphenyls came under even stricter scrutiny when it appeared as a possible environmental hazard."

[M13681, "Letter from Mr. John Mason, Assistant General Manager, Monsanto Company to Congressman William F. Ryan," April 28, 1970.]

Doc ID # 2153 Exhibit # P-0340

347.
04/28/70

The NCR paper exports, which contained PCBs, were facing to be banned by another country and caused the attention of the UK Ministry. Bailey was going to publish his findings on PCB pollution.

"Capps felt the meeting was reasonably successful and that Rampton will have to react since it was pointed out that NCR paper is the largest export earner of the entire UK paper industry. The objective was to inform the Ministry openly and frankly, and to appeal for a rational approach to a problem that should be kept in perspective."

"The only reference to Monsanto was as the PCB supplier. Wiggins-Teape voiced their concern about the likelihood of publication of Bailey's finding and this provoked sympathy but little positive response (Bailey's name was not mentioned but his laboratory was identified). However, when considering the hypothetical situation of a possible ban on NCR paper imports by

another country, the Ministry expressed a willingness to help."
[MONS 098440, April 28, 1970]

Doc ID # 5888 Exhibit # P-0341

"Finally, Dr. Lister (Author D. Little, Edinburgh) has visited the Tolworth laboratory and his information indicates Bailey intends publishing a note on his findings in 'Chemistry in Industry.'"

[MONS 098441, "Report on Telephone Conversation with C. Capes, Wiggins-Teape," CONFIDENTIAL, April 28, 1970.] [**believe Bates No. is incorrect**]

Doc ID # 5888 Exhibit # P-0341

348.
04/30/70

Letter from Papageorge to Savage: Monsanto changed Aroclor Labels.

"Bob Sido is arranging for the modification of Aroclor labels to include reference to PCB in the environment. When the new labels are available, will you see that the plants order their supply and immediately begin using them on new packaged Aroclors?"

Bob is also preparing a supplementary label for placing on packaged material now in inventory. When these labels are available, the plants should make sure they are added to the package before shipping."

[MONS 099556, "Letter from W. B. Papageorge to J. R. Savage: Aroclor Labels," April 30, 1970.]

Doc ID # Exhibit #

349.
05/70

Monthly Report: The construction of a waste Aroclor sump was waiting for approval.

"The waste Aroclor sump project AFE 3427 (\$22,500 NFC) is awaiting formal approval. The design Package is complete and has been transmitted to Maintenance, and is out for contractor bids."

[DSW 014958, "J. C. Landwehr, Technical Service Department, Anniston Plant: Monthly Report," COMPANY CONFIDENTIAL, May 1970.]

| Doc ID # 11677 Exhibit # P-0345

350.

05/04/70

Monsanto discussed the so-called "Quick Action Possibilities" on the Aroclor Pollution.

"1. Release to the "scientific community" an estimate of worldwide PCB production, along with % in contained (sealed) applications. Explain that we do this in spite of competitive hazard, because we recognize...etc."

"3. Announce that, in addition to replacing/eliminating the non-biodegradable PCB's from "consumable" products (plasticizers, coatings, etc.) we are setting out to "close the loop" worldwide on contained (sealed) applications by providing a reclamation and disposal service to the customer. An extension of previous Pydraul and Therminol reclamation programs which make it unnecessary to discard used or contaminated fluids."

[MONS 098482, "Letter from J. R. Savage to Mr. H. S. Bergen (General Office): Quick Action Possibilities on Aroclor Pollution," May 4, 1970.]

Doc ID # 466**Exhibit # P-0346**

351.

05/07/70

Anniston Plant contacted AWIC, and tried to reach its objective on a confidential basis.

"On May 6, Messers. J. C. Landwehr, E. G. Wright and I visited Mr. J. L. Crockett, Technical Director of the Alabama Water Improvement Commission, in Montgomery. The purpose of the contact was twofold; first, to familiarize Mr. Crockett with the situation regarding Aroclor wastes and their reported pollution potential and, secondly, to build confidence that Monsanto intends to cooperate with governmental agencies to define the effects of Aroclor on the environment.

Mr. Crockett and the AWIC staff were totally unaware of the published information concerning Aroclors. Copies of the most pertinent articles describing the situation along with Mr. Minckler's statements were provided for his use. Additional information supplied covered the following facts: 1) Monsanto is currently investigating independently and in cooperation with governmental agencies the potential ecological effects of Aroclors. 2) Investigation and research programs are underway at Anniston to

identify, quantify and develop techniques which would control product losses to the environment. 3) Any Aroclors reaching the watershed from the Anniston plant were entering Snow Creek. 4) The production process was described in general detail to point out that water was not essential to production of Aroclors, and waste water was produced only by auxiliary equipment such as steam jets, etc.

His recommendation were as follows:

3. Give no statements or publications which would bring the situation to the public's attention.
4. If approached by news media, either the AWIC or Monsanto is free to state that the situation is under study by the staff of AWIC at the direction of the Technical Director, Mr. Crockett.
5. If in the future, information is developed indicating that Arcolors are detrimental to watersheds, Monsanto will be required to secure a permit from AWIC to allow certain maximum quantities of chlorinated biphenyl to enter Snow Creek.

In summary, Mr. Crockett was noticeably unexcited at our disclosure and all his remarks were directed toward a careful evaluation followed by actions as required by data. The full cooperation of the AWIC to reach the above objective on a confidential basis can be anticipated.

It must be remembered, however, that all AWIC actions are subject to state political pressure and federal control."

[MONS 099533-34, "Letter from G. W. Miller (Anniston, Ala.) to G. L. Jessee: Aroclor Pollution, AWIC Contact," May 7, 1970.]

Doc ID # 468

Exhibit # P-0349

352.

05/11/70

It was reported that "MC plan to stop in U.S.A., not only sales of muriatic acid to food processing industries, but also to withdraw from the market in Aroclors in all areas where food contamination is remotely possible." "It was stated that all PCB containing waste from Newport is sent via Purple Waste Ltd., to a toxic dump at Pontypridd."

"A meeting was held at Newport on 4th May, 1970, to discuss environmental contamination by P.C.Bs."

"It was reported that MC plan to stop in U.S.A., not only sales of muriatic acid to food processing industries, but also to withdraw from the market in Aroclors in all areas where food contamination is remotely possible, for example, the use of Aroclor as a heat transfer fluid for cooking food.

It was stated that all PCB containing waste from Newport is sent via Purple Waste Ltd., to a toxic dump at Pontypridd. Samples from stream in this area, taken by Monsanto Newport personnel, indicate a P.C.B. content of less than 4 p.p.b. This site is an approved dump for industrial waste only and it has been agreed that Monsanto sample the area for P.C.B. analysis at 6 month intervals.

Next discussed was PCB contamination in the liquid effluent from Newport. The site programme for controlling this via construction of interceptor pits, bund walls and waste bays was outlined (see appendix)."

[MONS 059565-66, "Technical Services Department, Progress Report: Environmental Contamination by P.C.B.s," May 11, 1970.]

Doc ID # 5009 Exhibit # P-0351

353.
05/14/70

Letter from Clark to Bechtold, et al.: Monsanto made the decision on May 11, 1970 to remove "non-biodegradable PCB Aroclors and Montars from the market". However, at the same time, the Anniston Plant was still knowingly discharging these Aroclor products into the Snow Creek.

"As all of you are aware, Monsanto has been in the process of evaluating our polychlorinated biphenyl (Aroclor) products since late last year. I would like to bring you up to date on the present status of these evaluations and to present our plans for these products for the next several months.

On May 11, John Mason presented our proposed course of action for polychlorinated biphenyls (PCBs) to the Corporate Management Committee. In that presentation, he made two basic recommendations; first, that we market non-biodegradable PCBs only for closed system applications where control over disposal is possible (e.g. transformer fluids). And second, that we phase out of all non-biodegradable PCB products where control is not possible and replace these materials with biodegradable PCBs or other suitable products. The Corporate Management Committee approved these recommendations.

In the plasticizer area, none of our applications are considered to be of a controllable nature. This means that we will be starting immediately on the job of removing non-biodegradable PCB Aroclors and Montars from the market. We will not be able to ship any of these materials after 8/30/71. This will include Montar 1, Aroclor 4465, Aroclors 1232, 1242, 1248, 1254, 1260, 1262, 1268, and the 1100 series Aroclors. Aroclor 1221 will not be withdrawn. The 5000 series Aroclors will not be removed from the market; indeed, they will figure in our replacement plans." [MONS 098951, May 14, 1970]

Doc ID # 9312 Exhibit # P-0355

"On the other hand, we feel that in the interest of equal treatment to all accounts, it is important to stick to the time-table shown above. Therefore, please do not contact any customers on this subject prior to 5/25/70. Also, would each of you send me the list (as short as feasible) of key accounts which you would like to contact the week of 5/25/70. This will be used to check to see whether we are all interpreting "key account" basically the same way. I will need that list by 5/22/70." [MONS098953, May 14, 1970]

Doc ID # 9312 Exhibit # P-0355

[MONS 098951-53, "Letter from Willis S. Clark to D. H. Bechtold, et al.: 1200 Series Aroclors; Removal of Products from Market," CONFIDENTIAL, May 14, 1970.]

Doc ID # 9312 Exhibit # P-0355

354.

05/14/70

Letter from E. S. Tucker to W. B. Papageorge: PCBs were found in milk, and the source was silo paint.

"Redmond suspicions that apparent pesticide residues found in milk by a particular regulatory laboratory are really PCB's and that the source is silo paint. He did not want to discuss any details about what state agency was involved nor the actual location of the contaminated herd; however, he indicated that it was not in Pennsylvania.

At this point, in time he is quite unsure of his results and with what Aroclors really are. I explained to him that Aroclors were isomeric mixtures and that if the isomer distribution was changed to any extent he would be unable to make an absolute identification with

only EC/GC. Additionally, I asked him to contact me when he had a chance to compare the reference materials being sent with the EC chromatograms of the residues in the milk -- he agreed."

[MONS 099171, "Letter from E. S. Tucker to W. B. Papageorge (General Offices): W. S. Clark's Request to Follow up on G. W. Redmond's Request for PCB Samples," May 14, 1970.]

Doc ID # 9400 Exhibit # P-0356

355.

05/15/70

Letter from Ehlers to Mintkler, et al.: Report on PCB Status, and the minutes of the Corporate Management Committee meeting of May 11, 1970.

"Attached is an excerpt from the minutes of the Corporate Management Committee meeting of May 11, 1970." [MONS 099799, May 15, 1970]

Doc ID # 8397 Exhibit # P-0357

"The Division's actions and plans concerning PCBs were reviewed and the following approved.

- Discontinue sale of Aroclor 1242 to NCR and replace with HB – 40 in U.K., and MIBP in U.S.A. Complete: U.K. – July 1, 1970; U. S. – January 30, 1971.
- Close the loop on heat transfer applications where fire resistance is vital and replace with alternates in other cases. Complete: December 30, 1970." [MONS 099800, May 15, 1970]

Doc ID # 8397 Exhibit # P-0357

"The action to be taken will require considerable expense and investment on the part of the company in terms of developing new products and installing the necessary manufacturing facilities for the new products. Estimated new capital required is \$3,585,000 and is not included in the present Construction Program. The Division was requested to be certain the pricing policy set on these products in the future is sufficient to give Monsanto an acceptable return on its investment, taking into account the expenses which are necessary to accomplish the overall objectives." [MONS 099801, May 15, 1970]

Doc ID # 8397 Exhibit # P-0357

[MONS 099799-801, "Letter from J. N. Ehlers (General Office) to H. L. Mintkler, et al.: Organic Division -- Report on PCB Status," May 15, 1970.]

Doc ID # 8397 Exhibit # P-0357

356.
05/25/70

Monsanto authorized Bio-Test to proceed with another toxic study with the leghorn chickens with the Aroclor 1242.

"This letter will authorize you to proceed with a study with the leghorn chickens with the Aroclor 1242, lot number AL-55. This should duplicate the study you did previously with Aroclor 1242, lot number AK-255, except in this instance you have suggested using dietary levels of 2, 4, and 8 ppm. •

This sample of Aroclor represents our current regular production which involves some clean-up instituted since the previous sample was made available to you. We would hope that we might find a higher "no effect" level with this sample as compared to the previous work.

As soon as suitable reference standards are available, the research laboratory in St. Louis will more carefully characterize the two samples in terms of possible minute amounts of contaminants."

[M 42556, "Letter from Elmer P. Wheeler to Otis E. Fancher (Industrial Bio-Test Laboratories, Inc.)," May 25, 1970.]

Doc ID # 3699 Exhibit # P-0361

357.
05/28/70

Letter from Marsh to Olson: Don had been preparing a total European action plan/timetable dealing with the whole PCB problem. Monsanto was also actively looking for reformulation for PCBs in Europe.

"Thank you for your note of May 13th bringing us up to date on your plans dealing with the PCB situation.

As you know Don Cameron is handling the total European PCB programme and reporting direct to Norbert Dahlstrom; in turn we in Fluids have been working closely with Don and in particular, following receipt of John Mason's telex directive to

Soden/Dahlstrom dated may 11, Don has been preparing a total European action plan/timetable dealing with the whole PCB problem. We are including detailed actions necessary in the Fluids product areas involved - namely:

Pydraul
Santotherm
Pyroclor
Electrical Aroclor
Non Electrical Aroclor

It is my understanding that this plan will be presented by Don to Dahlstrom and Soden before submission to Bill Papageorge for final approval. You should therefore see copies of this document shortly and thus have full details of our approach.

Meantime it will be most helpful if you would keep us informed of progress in your various areas as you suggest." [MONS 098911, May 28, 1970]

Doc ID # 9291 Exhibit #

"Certainly I agree with your last comment, in the competitive environment here in Europe we have every possibility of exploiting any significant advances we can make in reformulation, biodegradation etc. to improve our position in the acceptable applications. Maybe this will more than compensate for loss of revenue in other areas where we may pull out."

[MONS 098911-12, "Letter from P. J. A. Marsh to D. A. Olson (St. Louis): PCB (Your Memo on May 13, 1970)," May 28, 1970.]

Doc ID # 9291 Exhibit #

358.
06/70

Monthly Report: "Analyses are 90% complete on second Aroclor department Waste Audit."

"The waste Aroclor sump project AFE 3427 (\$22,500 NFC) has been approved." [M 29229]

"A project premise is in review to provide a drying bed for the sludge which is collected in the HCl neutralization pit mixing basin."

"Analyses are 90% complete on second Aroclor department Waste Audit."

[M 29229-30, "J. C. Landwehr, Technical Service Department, Anniston Plant: Monthly Report," COMPANY CONFIDENTIAL, June 1970.] [*believe Bates No. is incorrect*]

Doc ID # 31548 Exhibit #

359.

06/01/70

Letter from Papageorge to Savage: Papageorge wanted the plants to determine the loss of PCBs to the atmosphere.

"In evaluating our performance in the control of PCB's to the environment from our manufacturing facilities, we should not neglect to consider losses to the atmosphere through jet exhausts, vents, stacks, etc.

Bob Keller's group has developed procedures for the sampling and subsequent analysis of gas (air, vapor) samples.

I recognize that accurate determination of the losses to the atmosphere is difficult, but I believe a critical study of each facility considering flow rates, frequencies and concentrations could result in a pounds per day loss figure which could serve as a useful guide.

Will you have each plant develop a program for auditing the present situation, monitoring on a planned basis and taking corrective action to achieve targeted losses to the atmosphere?"

[MONS 098936, "Letter from W. B. Papageorge to J. R. Savage: PCB Losses to Atmosphere," June 1, 1970.]

Doc ID # 9007 Exhibit # P-0368

Also See: MONS 098995.

Doc ID # 9326 Exhibit # P-0352

360.

06/03/70

Letter from Fallon to Clay, et al.: The letter talked about the factors needed in Therminol FR systems to minimize or eliminate leakage so that "operating personnel are not exposed to hot fluid or vapors."

"We have always emphasized certain factors in Therminol FR systems to minimize or eliminate leakage so that operating personnel are not exposed to hot fluid or vapors.

This emphasis must be reenforced with the user, the OEM's and with the design people. Our objective is the elimination, or containment and collection of leakage from Therminol FR systems.

In addition we must control the disposal of any Therminol FR collected from leaks or from the change out of the fluid in the system.

The following is proposed as a means for eliminating the release of any Therminol FR from a system so that the fluid does not become an environmental containment."

[MONS 099539, "Letter from J. R. Fallon (St. Louis General Office) to C. L. Clay, et al.: Therminol FR Systems – Containment And Disposal Of Leakage," June 3, 1970.]

Note: The phrase "**environmental containment**" should be: environmental contaminant.

Doc ID # 8333 Exhibit #

361.
06/05/70

John Mason to The Editor of Evening Star: Mason said that "Monsanto Company has been very concerned about this possible threat to the environment since it first came to our attention two years ago." However, many Monsanto documents indicate that this is not true.

"I have read Mr. John Lannan's 'PCB's May Rival DDT as Environment Threat,' which appeared in the May 31 edition of the Evening Star and find that basically the article is a rather good summary of events to date. However, there are two points discussed in the article that I am sure were very confusing to Mr. Lannan and deserve further clarification.

The first statement indicates that I did not agree that PCB's can be toxic to fish although 'leakage from a plant on the Escambia River in Alabama produced a major fish kill.' We have actively sought cooperation and information from State, Federal, university and international laboratories regarding the toxicity of PCB's to living organisms. No one to our knowledge is aware of any fish kill anywhere in the world attributed to PCB exposure. We are aware of studies conducted at the Gulf Breeze, Florida, laboratories of the Bureau of Commercial Fisheries on the effect of one type of PCB on juvenile shrimp. These studies indicated that fairly high concentrations were required to adversely affect the shrimp."

"Monsanto Company has been very concerned about this possible threat to the environment since it first came to our attention two years ago. At that time, we began a program which includes strictly monitoring our manufacturing operations, development of alternate products and phasing out of those applications where we believe PCB might be escaping and lingering in the environment."

[M13675-76, "Letter from John Mason (Assistant General Manager, Organic Chemicals Division) to The Editor, Evening Star," June 5, 1970.]

Doc ID # 2151 Exhibit # P-0365

362.
06/08/70

Letter from J. R. Savage (General Office, Monsanto) to Coriew, Williams, and Macdonald: To determine how much PCB go to atmosphere.

"The attached memo from Bill Papageorge points out an area for study which has not been previously emphasized. While the nature of the process and the product seem to preclude substantial losses to the atmosphere, we should not be complacent." [MONS 098240, 06/08/1970]

Doc ID # 482 Exhibit # P-0367

"One of the first questions from semi-knowledgeable legislators and control agency personnel is always "how much goes up your stacks?" It will do little good to tell them how sure we are, if we have no data."

[MONS 098240, "Letter from J. R. Savage (General Office, Monsanto) to E. W. Coriew (WOK Plant), H. L. Williams (Anniston Plant) and P. Macdonald (Newport)," June 8, 1970.]

Doc ID # 482 Exhibit # P-0367

Also See: MONS 098935, and 098994.

Doc ID # 9326 Exhibit # P-0352

363.
06/12/70

Haggart to K. H. Gartner -- Toxicity of Pydraul: The first batch of mice used for testing Pydraul 201 all died.

"I was sorry to hear that the first batch of mice used for testing Pydraul 201 by Prof. Benthe in Masburg all died. However, as you know the SSCA test described in the Third Report (copy attached) starts off with a dose of Pydraul which may in fact be too high and cause the deaths of all the mice.

In view of the fact that Prof. Benthe accuses us of being somewhat unhelpful in revealing the exact composition of our Pydrauls beyond the data sent you in my memo of 9th March (copy attached); I think it is wiser at this stage that we do not reveal the presence of chlorinated Terphenyl in the formulation as this will be one of the key ingredient in our new re-formulated Pydraul range. We are at the moment endeavouring to purchase all Bayer's Terphenyl output (strictly confidential information) and we would not like to reveal a new potential application or appreciable tonnage for these raw materials.

I would suggest therefore that you send Malorney the attached toxicity screen to show him a token of our good will."

[MONS 100040, "Letter from J. M. Haggart to K. H. Gartner: Toxicity of Pydraul," CONFIDENTIAL, June 12, 1970.]

Note: *The copy is too blurring to read in some places.*

Doc ID # 483 Exhibit # P-0371

364.

06/18/70

Letter from Congressman William F. Ryan to Mr. John Mason, Assistant General Manager, Monsanto Company: Congressman Ryan was not satisfied with Monsanto's response to his questions.

"Despite your letter of April 28 I am most disturbed by the PCB danger and what I consider Monsanto's unwillingness to deal candidly with a dangerous situation." [MONS 087863-64, 06/18/1970]

Doc ID # 6543 Exhibit # P-0372

"While you specifically answer some questions I raised in my April 9 letter, you also chose to ignore others." [MONS 087863-64, 06/18/1970]

Doc ID # 6543 Exhibit # P-0372

"I asked Monsanto to fully cooperate with scientists doing independent research on PCBs. In return, I was assured that Monsanto scientists have met with others investigating the problem. The two are not the same. If Monsanto truly wanted outside opinions it would offer its findings to men like Dr. Robert Risebrough, who are widely known for the PCB research." [MONS 087863-64, 06/18/1970]

Doc ID # 6543 Exhibit # P-0372

"I asked that Monsanto state clearly whether during the manufacturing process Aroclor is released to the environment, and in what form and quantities, and what control measures are in effect or being developed." [MONS 087863-64, 06/18/1970]

Doc ID # 6543 Exhibit # P-0372

Your letter said, "...we have stated clearly our total commitment to pollution abatement. Production of polychlorinated biphenyls came under even stricter scrutiny when it appeared as a possible environmental hazard. We have improved production techniques and are continually upgrading pollution abatement devices in our plants." [MONS 087863-64, 06/18/1970]

Doc ID # 6543 Exhibit # P-0372

"I consider that a vague reply. Surely you must know specifically what quantity of PCBs is escaping during the manufacturing process. And if you do not know, then certainly, now is the time to findout." [MONS 087863-64, 06/18/1970]

Doc ID # 6543 Exhibit # P-0372

"You also avoided a specific reply to the question of what controls are now in effect. It is not enough for you to assure me that you are doing your best. I want to know how efficient and effective your best is."

[MONS 087863-087864, "Letter from Congressman William F. Ryan to Mr. John Mason, Assistant General Manager, Monsanto Company," June 18, 1970.]

Doc ID # 6543 Exhibit # P-0372

06/18/70 Monsanto finally realized and acknowledged the difficulty with PCBs in biodegradation.

"I have become increasingly concerned about biodegradability of Aroclor. All comments I have heard indicate that someone is doing something, but no one seems to know results. It was reported that MCS-1016 (1242B) takes 2000 times longer to biodegrade than SAB. If we assume that SAB takes one day, then it would take 5.5 years for Aroclor to degrade. Thus it seemed paradoxical that anyone would consider Aroclor biodegradable.

It has now been reported that Aroclor 1242, 1254, and 1260 have been found in the environment. Accordingly, I could visualize Monsanto spending \$500,000 or more to install distillation facilities that would be valueless because the material is not biodegradable."

[MONS 098507, "Letter from R. M. Kountz to Dr. R. E. Howard: Biodegradability of Aroclor," PERSONAL & CONFIDENTIAL, June 18, 1970.] [*believe Bates No. is incorrect*]

Doc ID # 18878 Exhibit # P-0388

366.

06/24/70

Letter from Vos to Keller: Dibenzofurans were reported to be found in PCB. Also, "gas chromatographic analyses of a sample of the rubber mat and of the liver of a severely affected cow revealed a peak pattern which was very indicative for PCB." In addition, "probably penta- and hexachloronaphthalene" were also present.

"Enclosed you will find a photocopy of the manuscript concerning the identification of chlorinated dibenzofurans in PCB. We use fractionatic GC/mass spectrometry techniques; the details are given in the manuscript which is not for general distribution since it is not yet accepted by the Editors of the Journal of Food and Cosmetics Toxicology.

During the visit of you and your colleagues at our Institute we mentioned a. o. severe lesions (hyperkeratosis) in cattle. The floor of the stable in which the animals were housed was covered with second-hand conveyor belts, covered with a new anti-slip layer. Gas chromatographic analyses of a sample of the rubber mat and of the liver of a severely affected cow revealed a peak pattern which was very indicative for PCB, as we also mentioned during your visit, Mass spectrometric analyses of the rubber revealed compounds with molecular weights of probably penta- and

hexachloronaphthalene, well known for their hyperkeratotic action in cattle."

[MONS 201005, "Letter from J. G. Vos to Dr. R. E. Keller (Applied Sciences Section, Monsanto)," June 24, 1970.] **[believe Bates No. is incorrect]**

Doc ID # 6954

Exhibit # P-0373

367.
06/30/70

Letter from Keller to W. B. Papageorge: Dr. Vos' found chlorinated dibenzofurans in PCB. Monsanto planned to determine whether they could use the technique to find chlorinated dibenzofurans in their Aroclor products.

"The attached letter and manuscript have been received from Dr. J. G. Vos at the University of Utrecht. It is in reply to our request for details of their work on the identification of chlorinated dibenzofurans in PCB. Please note that this manuscript has been sent on a confidential basis and it is not for general distribution.

We will attempt to provide chlorinated naphthalenes requested for gas chromatography work by Vos. Bill Richard thinks we might be able to obtain these commercially. Dr. Emery is asked by copy of this memo to determine if we have any of these compounds in SRC.

Drs. Dietrich and Emery are asked by copy of this memo to please review the manuscript and determine the difficulty of applying this technique to our Aroclor products. Assuming this is within our capabilities with a reasonable amount of effort, we will look at Aroclor products used at Bio-Test for feeding studies and compare results with those for current production grade materials."

[MONS 099146, "Letter from R. E. Keller to W. B. Papageorge, (General Offices): Chlorinated Dibenzofurans - PCB," June 30, 1970.]

Doc ID # 9392

Exhibit # P-0374

Also See: MONS 201004.

Doc ID # 487

Exhibit #

368.

July 70

Monsanto said "Control of emissions is therefore concerned with the prevention of leakage and spillage and safe disposal of any material which escapes in this way." The actual situation in Anniston plant indicated that PCBs got into the environment also in other ways.

"Manufacture

The PCB's are manufactured by the chlorination of biphenyl produced by cracking benzene. The process is a relatively simple, high-yield reaction which takes place in a closed system with no inherently difficult emission problems. There are no stack gases or water streams which are in contact with the product during the manufacturing process. Control of emissions is therefore concerned with the prevention of leakage and spillage and safe disposal of any material which escapes in this way.

High priority is given to maintenance of all equipment and curbs and drip pans have been provided to collect leaks where they occur. We are constructing catch basins in the main sewer of each of our PCB plants as an added safety measure."

[MONS 035604, "Polychlorinated Biphenyls, Control of Escape to the Environment," July 1970.]

Doc ID # 21086 Exhibit # P-0008

369.

July 1970

Public Relations Report by Organic Chemicals Division, Monsanto: New York Times reported "birth defects" in animals caused by PCBs.

"The New York Times ran a story on July 15 quoting recent evidence that PCB causes birth defects in animals. In reply to this newest charge, and in an attempt to minimize the use of the story, the division issued a news release on July 16. Our story emphasized there is no evidence of birth defects caused by PCB." [MONS 035839, July, 1970]

Doc ID # 488 Exhibit # P-0375

"Assistance was provided the Anniston plant in preparing replies to possible press queries regarding mercury pollution and the naming of Monsanto in a recent class action based on the 1899 Refuse Act."

[MONS 035839, "Public Relations Report by Organic Chemicals Division, Monsanto," July 1970.]

Doc ID # 488 Exhibit # P-0375

370.
07/70

Monthly Report: "Anniston plant, together with all industry in Alabama, has been named in a class action suit".

"Construction of the Aroclor process sewer pump is approximately 75% complete and proceeding as scheduled to meet the improved startup date of 9/1/70." [M09792, , July 1970]

Doc ID # 1509 Exhibit # P-0376

"Pollution Control

Report on Aroclor losses was issued during July." "Anniston plant, together with all industry in Alabama, has been named in a class action suit by the Bass Anglers Sportsman Society for alleged violation of 1899 Federal Refuse Act."

[M09792-93, "J. C. Landwehr, Technical Service Department, Anniston Plant: Monthly Report," COMPANY CONFIDENTIAL, July 1970.]

Doc ID # 1509 Exhibit # P-0376

371.
07/06/70

Letter from W. B. Papageorge to Mr. D. K. Cavanaugh: Much better control is needed.

"To prevent the escape of PCB's to the environment calls for a level of control and housekeeping many of use have never been asked to achieve in the past."

[M13689, "Letter from W. B. Papageorge, Manager of Environmental Control (Monsanto) to Mr. D. K. Cavanaugh (Espey Manufacturing Company, New York)," July 6, 1970.]

Doc ID # 2206 Exhibit # P-0377

372.
07/07/70

Letter from George to Lewis: Employees from the customers could have exposed to high concentrations of PCBs in the air.

"First, let us consider the welfare of your employees. Aroclors, being chlorinated hydrocarbons, should not be permitted to exceed 0.5 to 1.0 milligram per cubic foot of air in the work area. In your operation, in spite of an operating ventilation system, the presence of Aroclor was noticeable by the blue haze present and insensitive as I have become, the amount was high enough to cause eye irritation which persisted for several hours, after the exposure.

Another area of employee exposure is direct skin contact with the liquid Aroclor. Contact should be eliminated by operating changes or by providing protective gloves and clothing."

[MONS 087413, "Letter from W. B. George to Mr. Gene Lewis (P. R. Mallory Company)," July 7, 1970.]

Doc ID # 489

Exhibit # P-0378

373.
07/13/70

Papageorge to B.W.C. (WGK): According to Papageorge, "Areas which could experience spillage, leakage, etc. to a high degree are not as yet tied to the new catch basin." "The few trenches I noted in some of the areas are not tied in to any collection system. Most of the surface is covered with crushed limestone, some of which is covered with Aroclor. There is no control of surface drainage through the outdoor areas."

"I was, however, disappointed that those areas which could experience spillage, leakage, etc. to a high degree are not as yet tied to the new catch basin. Specifically, I am referring to the drumming station, tank car and tank truck loading spots, the storage tank area, the residue handling area and the trash collecting bin. The few trenches I noted in some of the areas are not tied in to any collection system. Most of the surface is covered with crushed limestone, some of which is covered with Aroclor. There is no control of surface drainage through the outdoor areas.

I recommend that these areas be paved, curbed and drained through your new catch basin or possibly a second basin if the drainage system layout requires it.

I encourage your interest in controlling atmospheric emissions and recommend you accelerate your efforts in completing your emission audit. Consideration should be given to the use of condensers, entrainment separators, drowning jets and interconnection of vents

to provide for transfer of vapor from vessel to vessel rather than free exhaust to the atmosphere."

[MONS 098182, "Letter from W. B. Papageorge to B. W. Conlew (?) - WGK," July 13, 1970.]

Note: (?) = Name is too blurring to read.

Doc ID # 492

Exhibit # P-0381

374.

07/13/70

Papageorge talked about Monsanto's "concern regarding the contamination of the environment with polychlorinated biphenyls (Monsanto's Aroclors)".

"You are probable aware of our concern regarding the contamination of the environment with polychlorinated biphenyls (Monsanto's Aroclors).

Monsanto's Therminols (FR Series) contain Aroclors. In order to stay in this business, we are insisting that heat transfer system be designed to assure minimum loss by leakage or vaporization."

"I am interested in reviewing Monsanto's system design and comparing it with the design we propose to our customers. Will your office please send me a copy of P2.1 Std. 19 'Selection Guide - Piping for Heat Transfer Fluids', as well as any other information available."

[MONS 098181, "Letter from W. B. Papageorge to W. G. Canham," July 13, 1970.]

Doc ID # 491

Exhibit # P-0380

375.

07/14/70

Progress Report: The measurements showed: "MCL report Air determinations, Aroclor plant 1959 gave results from 0.6 mg/m³ to 6.3 mg/m³," which is higher than the limit.

"PROBLEM:

To report progress and plan of operation for sampling of plant atmospheres for P.C.B. contamination."

"SUMMARY:

Earlier M.C. and M.CL reports on PCB in the atmosphere were examined.

MCC report number 2892 Aroclor in Gases 1953 gave results from 0.35 mg/m³ to 5.0 mg/m³.

MCL report Air determinations, Aroclor plant 1959 gave results from 0.6 mg/m³ to 6.3 mg/m³.

Limits are 0.5 to 1 mg/m³.

Three plants were surveyed and a list was drawn up of twelve suitable sample points."

[MONS 056701, "R. Thomas, Technical Services Department: Progress Report -- Environmental Contamination by P.C.B. (Atmospheric)," July 14, 1970.]

Note: In the original, 0.35 mg/m³ is incorrectly shown as 0.35 mg/m². The original is wrong in unit.

Doc ID # 4965 Exhibit #

376.

07/15/70

The New York Times ran a story on July 15 quoting recent evidence that PCB causes birth defects in animals.

[MONS 035839, "Public Relations Report by Organic Chemicals Division, Monsanto," July 1970.]

Doc ID # 488 Exhibit # P-0375

377.

07/16/70

Monsanto News - For Release Immediately: Monsanto's executive responded to the "birth defects" charges caused by PCBs.

"Monsanto Company, sole U.S. producer of an industrial chemical called polychlorinated biphenyl (PCB), today said that recent political charges and sensational headlines about the chemical causing 'a major ecological crisis' completely ignore voluntary actions the company has taken to restrict use of the material." [M13495, July 16, 1970]

Doc ID # 17284 Exhibit # P-0383

"Commenting on a recent report that PCB can induce birth defects in animals, Minckler said 'Monsanto is not aware of any scientific

data that indicates polychlorinated biphenyls may cause birth defects. The results of comprehensive toxicity studies, sponsored by Monsanto and using the usual species of laboratory animals, have failed to produce such effects." [M13496, July 16, 1970]

Doc ID # 17284 Exhibit # P-0383

"Although loss of PCB from our manufacturing plants has been negligible, we have further tightened up our production techniques and installed new pollution abatement devices," the Monsanto executive said."

[M13498, "News - For Release Immediately, Monsanto (St. Louis)," July 16, 1970.]

Doc ID # 17284 Exhibit # P-0383

378.
07/17/70

River die-away studies indicated Aroclors 1242, 1248 and 1254 were un-degraded.

"I reviewed our biodegradation studies with R. Munch, R. Kountz, S. Tucker, E. Emery and J. Savage on Thursday, July 16, 1970.

1. Monsanto-USA Studies

River die-away studies indicated Aroclor 1221 disappears, Aroclors 1242, 1248 and 1254 were undegraded."

"3. Environment Samples

Investigators in both Europe and USA find isomers in wildlife that resemble those in Aroclor 1254. Predominant homologs present in Aroclor 1242 are usually not found except close to industrial plants. Since large quantities of Aroclor 1242 are produced and released to the environment, degradation must be occurring." [MONS 098588, July 17, 1970]

Doc ID # 495 Exhibit # P-0384

"In summary, emphasis on this work has been accelerated within the past three months, the work is progressing as planned and our facilities are being utilized to the practical limit."

[MONS 098588-90, "Letter from W. B. Papageorge to H. S. Bergen," July 17, 1970.]

Doc ID # 495 Exhibit # P-0384

Also See: MONS 098177.

Doc ID # 496 Exhibit #

379.

07/20/70

Letter from Wright (Anniston Plant) to G. W. Miller, et al.: Wright said, "it is necessary that a routine sampling program be set up" to sample the major loss sources to the water and/or air.

"I. To determine the effectiveness of Aroclor clean-up efforts, it is necessary that a routine sampling program be set up. The samplers which have been used during the recent waste audit should provide the capability to sample the major loss sources.

Sampler locations:

- a. Warehouse sewer – located at southeast corner of warehouse.
- b. Acid sewer sampler – located in process sewer between Bldg. 28 and office building.
- c. Influent and effluent from Aroclor sump – These samplers should be located at the new Aroclor sump when it is completed.

This memo will serve as a request to implement this sampling program on a routing daily basis. I would suggest that the operator who is responsible for collecting the four samples from the limestone pit be made responsible for collecting these four samples." "It is imperative that the operators be impressed with the fact that new bottles be used and extreme care exercised when collecting these samples due to the sensitivity and the importance of these tests. Collection of the acid sewer and warehouse samples can begin immediately, and the sump sampling should begin as soon as the sump is installed."

[M 29284, "Letter from E. G. Wright (Anniston Plant) to G. W. Miller, J. E. Mundy, and T. E. Lackey: Sampling of Atmosphere and Water for Aroclor Losses," July 20, 1970.]

Doc ID # 31558 Exhibit # P-0385

380.
07/21/70

Anniston Progress Report: Aroclor losses from the Anniston Plant used to be > 250 lbs/day.

"Aroclor losses from the Anniston Plant for the period April 15 through June 30, 1970, averaged 16 lbs/day. This is a considerable improvement over losses of > 250 lbs./day for a comparable period during 1969. (Note: > 250 lbs./day is used for the 1969 figure because improved analytical methods and actual measurement of material from the catch tank and coalescer have shown that the losses were approximately 10 times as high as was reported in 1969.) This reduction has been primarily achieved by an educational program and resulting changed operating habits plus HCl organics removal projects. Other projects are being installed and evaluated which will further reduce these losses toward the Business Group goal of 10 ppb." [DSW 013791, July 21, 1970]

Doc ID # 19 Exhibit # P-0386

"A. HCl Sewer: Since the installation of a catch tank in the HCl gas line and a coalescer in the acid stream, the Aroclor content in the waste acid stream has been greatly reduced. (i.e., Approximately 200 pounds of organic material is being removed by these two projects.)" [DSW 013791-92, July 21, 1970]

Doc ID # 19 Exhibit # P-0386

"B. Chlorinated and Still Room Sewers: At times these sewers had a two phase flow. The quantity of the Aroclor phase could not be determined. However, these two sewers are being routed through the Aroclor sump. When the Aroclor sump is completed, and put into operation, the Aroclor phase can then be quantified. The sump will also provide a means for recovering this second phase, which under present conditions eventually makes its way out of the plant." [DSW 013791-92, July 21, 1970]

Doc ID # 19 Exhibit # P-0386

"When the sump is installed in these sewers, a daily sample will be taken and analyzed to monitor the efficiency of the sump."

[DSW 013791-92, "Technical Services Department: Progress Report," Anniston Plant, Alabama, July 21, 1970.]

Doc ID # 19 Exhibit # P-0386

381.

07/23/70

In Japan, "There is intense public and governmental interest in chemical contaminants; hence, DDT and other polychlorinated pesticides have been banned." Thus, Monsanto's representative in Japan worried that for PCBs, "An official action by the FDA will quite probably be followed by similar action in Japan".

"Kaneka in Japan has not told us of their plans with respect to PCB environmental contamination. As Mr. Lida has stated, the most significant problem has involved Kaneclor's exposures to people because of defective equipment in heating oil used by a customer. This has sensitized Japan toward better inspection and better control of subject installations, but at the moment, there is no problem in evidence about PCB contamination of other types.

It seems probable to me that Kaneka will continue to sell to the entire market wherever they can, and to the best of their ability will export their products into the United States to help fill the vacuum which Monsanto's program has created.

There is intense public and governmental interest in chemical contaminants; hence, DDT and other polychlorinated pesticides have been banned (within a few days after U. S. action, and the pronouncements of FDA in the U.S.A. are followed very closely). You may know there has been no report of PCB action affecting birds or shell fish, although in Japan, someone is sure to be "looking" after the reports published in the U.S.A. An official action by the FDA will quite probably be followed by similar action in Japan."

[MONS 098506, "Letter from J. R. Durhand (Tokyo) to Mr. W. B. Papageorge (St. Louis, MO): PCB Contamination," July 23, 1970.]

Doc ID # 499**Exhibit # P-0387**

382.

07/24/70

Letter from Wheeler to Park: FDA was establishing a Guideline for regional offices and state food laboratories "whether in departments of health or agriculture to seize and destroy fish and milk which contain levels of PCB's above 5 ppm and 0.2 ppm respectively."

"Attached is a page from Food Chemical News of July 20, 1970, reference to the above subject.

This adoption of "administration guideline levels" does not constitute a FDA regulation. It is, however a basis for FDA regional offices and state food laboratories whether in departments of health or agriculture to seize and destroy (or declare unfit for human consumption) fish and milk which contain levels of PCB's above 5 ppm and 0.2 ppm respectively."

[MONS 100010, "Letter from Wheeler to P. S. Park: FDA Guideline for PCB's in Foods," July 24, 1970.]

Doc ID # Exhibit #

383.

07/27/70

Letter from Wheeler to W. B. Papageorge: States around Lake Michigan started investigation and survey on PCBs discharges to the Lake.

"More important, the Mount committee has received a directive from the "super" committee made up of the governors of the states draining into Lake Michigan telling the Mount committee to proceed posthaste with additional investigations of the PCB's.

I believe several sub-committees were established one of which includes Birdsall as chairman and members Lloyd Laeschow and Carlow Fetterolf of the Wisconsin and Michigan Departments of Natural Resources respectively. This sub-committee was given the assignment of initiating a letter survey to all industries discharging to Lake Michigan to determine who uses PCB, how much, what for, how much they may be loosing to the Lake or its tributaries.

Birdsall asked if you could meet with his sub-committee to help them in selecting what industries and companies should be surveyed. This might then help reduce the number of companies to be contacted."

[MONS 098909, "Letter from Elmer P. Wheeler (Medical Department) to W. B. Papageorge," July 27, 1970.]

Doc ID # 9290 Exhibit #

384.

07/28/70

Letter from John to Papageorge: "A news release on Monsanto's recent actions to curb the use of PCB was distributed on July 16." However, according to Monsanto, "use of our story by the press has been light".

"A news release on Monsanto's recent actions to curb the use of PCB was distributed on July 16. It was primarily a rebuttal to recent stories that PCB caused birth defects, but included a complete background of voluntary actions taken to solve the PCB problem. Copies went to all news media who have carried PCB stories in the past two years.

Use of our story by the press has been light, so far, as evidence by the attached Xerox copies.

MONSANTO MAGAZINE has been notified of the division's interest in a PCB story. I assume we have shelved, for the moment, our thought to present the story idea to the Wall Street Journal, science writers for AP and UPI, or to one of the trade publications."

[MONS 099532, "Letter from E. V. John (World Headquarters) to Mr. W. B. Papageorge: PCB Summary Status Report," July 28, 1970.] ***[believe Bates No. is incorrect]***

Doc ID # 481

Exhibit # P-0366

385.

07/28/70

Letter from Papageorge to Mason: Milk from Wisconsin was contaminated by PCBs during transportation by a tank truck, which previously shipped NCR coating formulations. John Birdsall was particularly concerned that "many industries are using Aroclors and are not aware of the PCB problem". Papageorge said that the NCR Aroclor application was a major one of Monsanto, and "a use that Monsanto was keeping secret."

"Yesterday, July 26, 1970, I was discussing by telephone Aroclor applications with Mr. John Birdsall, Vice President, Wisconsin Alumni Research Foundation, Madison, Wisconsin. Mr. Birdsall was attempting to get customer names and applications of Aroclors in the Lake Michigan area."

"He is particularly concerned that many industries are using Aroclors and are not aware of the PCB problem. To demonstrate the point he related an incident which occurred recently and which again emphasizes the complexity of the PCB problem."

"A few weeks ago Mr. Birdsall's office received a call from a candy manufacturer in Illinois seeking help in determining the cause for the blue color in a tank truck shipment of sweetened condensed milk from Wisconsin. After sample analyses and a few quick phone calls, the WARF laboratories traced the blue color to NCR coating

formulations which had been shipped in the tank truck to a paper coating plant. Mr. Birdsall was deeply concerned that the paper coating plant was not aware of PCB in the formulation and the tank truck operator had not received instructions on the proper method for washing the truck or precautions warning against use of the truck for hauling milk."

"I do not believe that Mr. Birdsall recognizes the NCR Aroclor application as a major one, nor did he indicate in anyway that he had accidentally discovered a use that Monsanto was keeping secret."

[MONS 098176, "Letter from W. B. Papageorge to John Mason," July 28, 1970.]

Doc ID # 501

Exhibit # P-0389

386.
08/1970

Monthly Report: "Aroclor losses during August increased to a level of 7280 ppb in plant effluent, equal to 88 #/day." Some measures were being taken to reduce Aroclor losses to the sewer and plant effluents. All of them were easy and should have been taken long time ago.

"In early August, the Alabama Water Improvement Commission informed the plant that FDA had furnished them with fish flesh analyses from samples taken in the Chocoolocco-Coosa River Watershed, indicating appreciable levels of Aroclor as well as DDT metabolites. Mercury was also present at low levels. The plant's previous informational contacts with AWIC had prepared them for receiving this news. Due to a high level of public concern about a ban on fishing in some state streams having high mercury level, an intensive program was started immediately to correct remaining major Aroclor discharges. This program will be discussed with AWIC in September."

"Current Level

Aroclor losses during August increased to a level of 7280 ppb in plant effluent, equal to 88 #/day. This increase corresponds to high turbidity of the effluent from limestone inert material as the settling capacity of the final acid treatment pit has deteriorated since last clean-out. Process research studies indicates that removal of solids will result in removal of Aroclor."

"Plant Effluent Suspended Aroclor Control

The Aroclor department sump was put into service on August 12, three weeks ahead of target, and is controlling at the 100 ppb level in department effluent waters. Second phase is being separated and a high-Aroclor scum is being collected on sump surface." [MONS 033880, August 1970]

Doc ID # 504 Exhibit # P-0836

"Final Effluent Treatment

July and August samples from Aroclor sources indicated that the final neutralization pit is now a major remaining source of plant effluent levels. Previous practice in pit cleanout has not been adequate to remove accumulated material, and limestone inert solids apparently are an effective adsorbent in the pit environment. A two phase program based on these facts is underway: 1) a second, uncontaminated pit will be put into service by mid-September to permit shutdown and decontamination of the permanent pit and to develop procedures for alternate operation-cleanout without loss of neutralization or solids-settling capability. Concurrently, gross introductions of Aroclor into the sewer system are being stopped with the Aroclor department sump, new operating and housekeeping procedures, and cleanout of potential collection points in the sewer system. This program is targeted for mid-September completion and should reduce plant effluent to the 200-300 ppb level that is seen in source point water phase analyses. An initial reduction in water use - 100 gpm out of 700 gpm has been accomplished through a checkoff list."

2) Longer term, immediate stops are being taken to develop feasibility and costs of effluent solids-Aroclor reduction through continuous coagulation and clarification." "Six projects for water reduction and improved housekeeping are underway and are being expedited.

1. Installation of concrete pads and curbs in major spill areas to replace chat.
2. Reuse water in Aroclor department still jets and blow-tank scrubbers (reduce water-Aroclor contact target - 100 gpm)..."

[MONS 033880-881, "V. R. Haupt, Technical Service Department, Anniston Plant: Monthly Report - Aroclor Wastes," CONFIDENTIAL, Read and Destroy, August 1970.]

Doc ID # 504 Exhibit # P-0836

387.

08/1970

Various leaks and contamination sources of Aroclors were reviewed and summarized.

"Aroclor – Process Leaks

To Eliminate/Control Aroclor Leaks, thus Reducing Pollution Load On The Sump." [DSW 014462]

Doc ID #816 Exhibit # P-0398

"3. Drumming Station At The Warehouse

Problem: Spillage at the drumming station represents a large source of pollution which gets washed down into the sewer. The major problem area is the manual station." [DSW 014464]

Doc ID # 816 Exhibit # P-0398

"4. Westside Floor Area

Problem: Drainage and wash water are not being directed to the right place. Rainwater from the roadway mixes with spillage and seeps underneath the existing floor. Wash water & rain from the other directions does the same thing or stands in pools. In addition the existing trench around the liquid chlorinators leaks."

"5. Sewer-drain on the Eastside of Aroclor

Problem: Spillage and lack of area definition as shown by the whole area covered with montar(?). In addition the sewers (operating and ground level) are plugged up and in a sad state of repair." [DSW 014466]

Doc ID # 816 Exhibit # P-0398

"6. Montar Drum-out Stations

Problem: Spills & drips..." [DSW 014467]

Doc ID # 816 Exhibit # P-0398

"7. Flexible hose junction on transfer lines

Problem: Even under proper operation spillage occurs upon hose disconnection as evidence by the ever present bucket."

"8. Transfer Equipment

Problem: Pump Leaks". [DSW 014468]

Doc ID # 816 Exhibit # P-0398

"9. Aroclor Tank Farm

Problem: Sample spillage". [DSW 014469]

Doc ID # 816 Exhibit # P-0398

[DSW 014462-69, "Aroclor - Process Leaks: To Eliminate/Control Aroclor Leaks, thus Reducing Pollution Load on the Sump," August 1970.]

Notes:

1. No date was given for the document. The date here is estimated based on the document immediately before this one.
3. (?) = The word is too blurring to read.

Doc ID # 816 Exhibit # P-0398

388.

08/03/70

Letter from Krull and Pierle (WGK) to Papageorge: All points of potential Aroclor air emission were identified at WGK Plant. Monsanto said "Obvious problem areas such as the Therminol furnaces in Departments 239, 245, 248 and 255 will receive immediate attention."

"As a first step, all points of potential Aroclor air emission were identified. These are summarized in the attached list. Observations made at the time of inspection are included.

The plant pollution group has received equipment which should enable us to quantify this amount of Aroclor being lost to the atmosphere from all points where a flow is occurring. Sources like Therminol vent lines that are only breathing will be sampled, but data will be more qualitative than quantitative. Sampling will also be done at various plant locations to determine whether or not there is a detectable amount outside using or producing areas. Sampling

will begin in August. Level of air losses will be determined and a reduction program laid out by the end of the month. Obvious problem areas such as the Therminol furnaces in Departments 239, 245, 248 and 255 will receive immediate attention."

[MONS 099039, "Letter from W. A. Krull and M. A. Pierle (WGK) to Mr. W. B. Papageorge (General Offices): Aroclor Air Pollution Control," August 3, 1970.]

Note: *Part of the document is too blurring to read.*

Doc ID # 9343 Exhibit #

389.

08/05/70

The Monsanto representative scared at the involvement of the British conservancy organisations on the PCB issue. The Irish sea bird incident was mentioned.

"Much as I appreciate Jim's role and consider it important to have these people on our side, I must admit that the thought of getting all the heads of the British conservancy organisations involved scares me stiff! It looks, however, as though I can no longer escape and will have to meet these people for the suggested dinner and presentation on the evening of 24th September. As I say, it is basically important to educate these people and give them rational scientific background, and we shall make every effort to put across a factual picture and prevent emotional or incorrect interpretation of the information we submit. I am presently thinking of having Dick Baxter and Don Cameron participate on behalf of Monsanto.

Where the subject of the NERC report on the Irish sea bird incident is concerned, we have in fact been in constant touch with those people during the preparation of their report, and were shown a draft of the final version. The whole matter is under control and we do not require further help in this area. Jim Hancock has been informed accordingly."

[MONS 098494, "Letter from H. N. Dahlstrom (Brussels) to J. Mason (St. Louis): PCB Problem in U.K.," August 5, 1970.]

Doc ID # 508 Exhibit #

390.

08/06/70

Letter from Tucker to Papageorge: PCBs were found in a number of fish collected from the Choccolocco Creek. Many of them had high concentrations of PCBs.

"During the October 1969 semi-annual survey of the Choccolocco Creek, a number of fish were collected, quick frozen, and shipped to us for PCB residue analysis. The results of our analysis of these samples for PCB's are shown in the table accompanying this memo.

Selected extracts were also submitted for GC/Mass verification of our findings. The results of the GC/Mass analysis are also shown in the table.

A few select extracts, high in PCB's, will also be screened for polychlorinated terphenyls (PCT's) by GC/Mass." [MONS 099775, August 6, 1970.]

Doc ID # 509

Exhibit # P-0392

<u>Common Name</u>	Number in Composite Sample	ppm PCB's Calculated as Aroclor 1254		OR Log Number
		<u>Wet Weight</u>	<u>Lipid</u>	
<u>Choccolocco Creek @ Hwy 78 Bridge (Station #4), ~3 mi. above confluence with Snow Creek</u>				
Gizzard Shad	4	77.7	1240	252
	6	29.3	798	279
Alabama Hogsucker	3	2.23	138	275
Golden Shiner	1	0.45	79.4	270
Blacktail Shiner	3	---	16.5	269
Green Sunfish	5	0.45	127	271
Bluegill	1	1.12	43.2	272
Bluegill	24	16.0	1170	278*
Bluegill	2	0.28	27.9	273
Longear Sunfish	7	61.9	4260	280*
Redear Sunfish	2	---	308	266*

Redear Sunfish	6	0.79	199	277
Largemouth Bass	4	2.73	273	276
Black Crappie	6	3.20	361	281
	2	2.44	176	274
Bandad Sculpin	5	----	57.5	265
Crayfish	4	1	1.50	267
Snails	5	----	44.4	268

[MONS 099776, August 6, 1970] (Continued on next page)

Doc ID # 509

Exhibit # P-0392

<u>Common Name</u>	Number in Composite Sample	ppm PCB's Calculated as Aroclor 1254		OR Log Number
		<u>Wet Weight</u>	<u>Lipid</u>	
<u>Chocolocco Creek @ Hwy 21 Bridge (Station #5), ~1 mi. below confluence with Snow Creek</u>				
Tadpole	1	1	9450	264
<u>Chocolocco Creek @ Hwy 95 Bridge, ~7-8 mi. below confluence with Snow Creek</u>				
Stoneroller	3	630	4520	253*
Blacktail Shiner	3	1097	37800	254
Warmouth	1	128	17590	258
Green Sunfish	6	----	7970	259
Largemouth Bass	1	684	9720	257
Frogs	2	323	4700	260*

Choccolocco Creek @ Hwy 109 Bridge, ~15 mi. below
confluence with Snow Creek

Goldfish	1	307	4290	263
Gold Shiner	3	170	3920	262
Blacktail Shiner	4	176	2390	261*

Choccolocco Creek @ Hwy 190 Bridge

Snails	20	25.1	6610	255*
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[MONS 099776-77, August 6, 1970]

Doc ID # 509 Exhibit # P-0392

[MONS 099775-77, "Letter from E. S. Tucker (Technology Department) to W. B. Papageorge (General Offices): PCB Content of Choccolocco Creek Fish," August 6, 1970.]

Doc ID # 509 Exhibit # P-0392

391.
08/07/70

Anniston was discharging to Snow Creek 16#/day of PCB. The liquid aroclors were frequently observed in the sewer of Aroclor department. Joe Crockett tried to handle the Monsanto PCB problem quietly without release of information to the public at that time.

"Following are the moves underway resulting from the FDA findings of high levels of PCB in fish taken from Choccolocco Creek downstream from it's confluence with Snow Creek.

Status

- (1) We are presently discharging to Snow Creek about 16#/day of PCB (down from 250#/day in '69). Measurements of departmental waste streams show a total loss of only 2#/day. The discrepancy is believed due to; (a) sampling problems in departmental waste streams where two-phase systems of water and free aroclors may be present, and (b) possible pickup of PCB by leaching previously deposited PCB from the limestone neutralization pit which also acts as a settling basin.
- (2) Work to further reduce losses presently underway:

- (a) Sump is being installed at the aroclor department to capture free aroclors from the 275 gpm flow. This is believed to be the largest departmental source of sewer loss because of the liquid aroclors frequently observed.
- (b) Curbing is being installed at drum loading area with dry pick up of spilled aroclors planned.
- (3) Joe Crockett, Secretary of the Alabama Water Improvement Commission, will try to handle the problem quietly without release of the information to the public at this time. He believes that FDA will not precipitately in this matter (he did not advise how FWQA might react). Dr. Myers, Director of Public Health of Alabama, wants toxicity information on PCB's and this will be conveyed personally to him by Jack Garrett next week." [MONS 033851, August 7, 1970]

Doc ID # 6088 Exhibit # P-0393

"Problem

- (4) "(D) Fish, Mud and Water Sampling – Since our fish samples from nearby Choccolocco Creek also showed high levels of PCB's, we are instituting more sampling to determine extent of the problem." [MONS 033854, August 7, 1970]

Doc ID # 6088 Exhibit # P-0393

[MONS 033851-54, "Letter from Paul B. Hodges to Mr. H. S. Bergen, Jr.: Anniston– PCB –Cleanup Program," CONFIDENTIAL-F. Y. I. and Destroy, August 7, 1970.]

Doc ID # 6088 Exhibit # P-0393

Also See: DSW 013198.

Doc ID # 20072 Exhibit #

392.

08/17/70

Letter from Papageorge (St. Louis) to G. L. Jessee (Anniston): "we are still using considerable quantities of sand to keep the floors in department partially dry".

"I was, however, disappointed that we are still using considerable quantities of sand to keep the floors in department partially dry. This long standing practice creates sand disposal problems as well as a difficult floor scraping and cleaning problem. Our efforts should be directed at preventing Aroclor from getting on the floor. Spills and leaks should be under extremely tight control so that the

department has a 'bone dry' appearance." [DSW 013196, August 17, 1970]

Doc ID # 20071 Exhibit # P-0400

"I have concerns regarding the contamination of Aroclors from the bulk storage, drumming, tank car and tank truck loading areas. The crushed rock areas should be replaced with concrete pavement, curbing and drainage to the interceptor basin. The amount of Aroclor on the drumming area floor appeared excessive and could overload the small sump which is in the present drainage channel from this area."

[DSW 013196, "Letter from W. B. Papageorge (St. Louis) to G. L. Jessee (Anniston)," August 17, 1970.]

Doc ID # 20071 Exhibit # P-0400

393.
08/17/70

Letter from Garrett to Landwehr (Anniston Plant): Samples collected from Choccolocco Creek and the Martin-Logan Reservoir showed PCBs. AWIC required Monsanto to do daily analysis for PCB's in the effluent of Anniston and submit weekly summaries. Crockett told Landwehr that "if this PCB issue hits the Alabama press, the Alabama Water Improvement Commission would be forced to close Choccolocco Creek and the Martin-Logan Reservoir to commercial and sport fishing".

"I have enclosed a copy of the data given me by the State of Alabama water pollution authorities on the PCB analyses in Choccolocco Creek and the Martin-Logan Reservoir. These data are collected by the U.S. FDA and are the basis of FDA contact with the Alabama authorities. You will notice that this is the general trend that our own sample show in connection with PCB.

While I was in Alabama, J. L. Crockett, Jr., Chief Engineer of the Alabama Water Improvement Commission, recommended that when we sample fish for PCB analysis that we get samples above and below the Martin-Logan Reservoir. He further suggested that our control program should be written up and submitted to the state as a report covering our past efforts, present status and our future plans in connection with limiting PCB in the Snow Creek effluent. He also said that the state did require that we do daily analysis for PCB's in our effluent and submit weekly summaries to the Water Improvement Commission in Montgomery.

Crockett told me that if this PCB issue hits the Alabama press, the Alabama Water Improvement Commission would be forced to close Choccolocco Creek and the Martin-Logan Reservoir to commercial and sport fishing unless we can prove that the contamination level does not reach the reservoir. The State of Alabama has no choice but to follow the guidelines of the FDA which calls for no more than 5 ppm PCB in fish."

[MONS 098653, "Letter from Jack T. Garrett (Medical Department) to J. C. Landwehr (Anniston Plant)," August 17, 1970.]

Doc ID # 814 Exhibit # P-0397

394.
08/18/70

According to July Status Report, Aroclor losses in Anniston Plant during July averaged 3,280 ppb in the plant effluent. This is equal to 36 pounds/day of Aroclor.

"Anniston

Current Level

Aroclor losses during July averaged 3280 ppb in the plant effluent. This is equal to 36 pounds/day of Aroclor.

Plant Effluent Suspended Aroclor Control

Aroclor sump construction continues. Revision requesting an additional \$4500 has been prepared. This was necessitated by unforeseen ground water problems. Completion by 9/1/70 still appears possible."

[MONS 044662, "PCB Environmental Problem: July Status Report," August 18, 1970.]

Doc ID # 5995 Exhibit # P-0401

Also See: DSW 013028.

Doc ID # 20040 Exhibit #

395.
08/20/70

A project to concrete the tank farm for \$16,000 has been deferred. "This project consisted of concreting the entire tank area, curbing, expansion joints, facilities for area drainage and a sump to catch the second phase."

"1. Tank car loading area

A. Problem-spillage from loading line and catch drum

B. Comments

- a shallow concrete pad can be placed underneath the three car spot points for 2000 ea. This will differ from Niran's pad by having the rails set on the wooden ties laying on the concrete. This has been deferred in an effort to control spillage by operational and loading arm changes." [MONS 036174]

Doc ID # 4721 Exhibit # P-0402

"2. Aroclor tank farm

A. Problem - sample spillage and leaks

B. Comments

- A project to concrete the tank farm for \$16,000 has been deferred. This project consisted of concreting the entire tank area, curbing, expansion joints, facilities for area drainage and a sump to catch the second phase. This also included the catch drum pad and a curb for the truck pad mentioned above in 2. Production has decided to use a "sand box" approach to contain spills. If necessary curbs can be installed around each liquid Aroclor pump and sample point.

The question was raised as to where the tank farm run off water should be directed. The sump was mentioned as a possible place. This is not acceptable because the volume of water from a heavy rain would overload the sump. There is no good answer because any water that contacts PCB should be directed through the final treatment; however, a rain will overload this system too. The best answer is to keep rain water out of contact with PCB." [MONS 036174-75]

Doc ID # 4721 Exhibit # P-0402

[MONS 036174-176, "JWM: Pollution -- West of Warehouse," August 20, 1970.]

Doc ID # 4721 Exhibit # P-0402396.
08/31/70

Letter from Papageorge (Monsanto) to Dr. B. M. Continelli: Papageorge claimed that there were no any poisoning cases with Aroclors.

"Monsanto has manufactured Aroclors for about 40 years and throughout the period we have not observed any harmful effects on our employees or our customer's employees. Extensive animal testing being conducted for Monsanto has not revealed any evidence of deformity in the usual laboratory animals. We are therefore disturbed by the article's reference to birth defects in animals. To our knowledge no laboratory has evidence to confirm this statement." "I regret I cannot refer you to articles concerning poisoning cases with Arcolors, because after exhaustive search we have not found a single reported incident."

[M11810, "Letter from W. B. Papageorge, Manager of Environmental Control of Monsanto, to Dr. B. M. Continelli," August 31, 1970.]

Doc ID # 1617 Exhibit #397.
08/31/70

Letter from Etheredge and Williams (Anniston, Alabama) to Miller, and Attachment: Water survey in Aroclor area was conducted in Anniston Plant.

"We are attaching results of Aroclor Area Water Survey which was made on 8/28/70.

This also includes a summary of TSD studies and proposals to reduce water usage in Aroclor, Acid Area." [DSW 014583, August 31, 1970.]

Doc ID # 11628 Exhibit # P-0404**"WAREHOUSE & PACKAGING AREA**

1. The water from this area now running into sanitary sewer is estimated at 100 GPM.
2. Surface water running off bank, from Aroclor storage tank area, to railroad track at Aroclor loading dock enters a perforated underground pipe. Aroclor from spillage around docks can

enter this pipe which drains into neutralization pit. Water also enters this underground pipe through two open drains along railroad track. A steel separator tank located west of neutralization pit has been installed to separate solids." [DSW 014586]

Doc ID # 11628 Exhibit # P-0404

[DSW 014583-86, "Letter from Johnnie Etheredge and Mark Williams (Anniston, Alabama) to G. W. Miller," and "Attachment," August 31, 1970.]

Doc ID # 11628 Exhibit # P-0404

398.

Sept. 1970 Anniston Plant, Monthly Report: The old limestone pit in Anniston was overloaded with and discharged solids containing PCB:

"Current Level: Aroclor losses during September averaged 32#/day (2600 ppb). Fluctuation of losses occurred and were caused by:

1. The old limestone pit was overloaded with and discharged solids containing PCB.
2. Use of detergent to clean the Aroclor department resulted in emulsification and decreased efficiency of the department sump.
3. Variable sewerage of Muriatic Acid which, at high rates, causes PCB carrythrough from old limestone pit.
4. The new limestone pit not discharging any PCB to the plant effluent." [MONS 033847, September 1970]

Doc ID # 826 Exhibit #

"We are now able to inform them that the new limestone pit was started up on September 23. To date the PCB level in this pit effluent has been from 0-3 ppb on five 24-hour composite samples (corresponding plant effluent was 90-240 ppb or 1.1-2.8 #/day). [MONS 033847, September 1970]

Doc ID # 826 Exhibit #

"This supports the premise for interim action that Anniston's major discharge originated in the old limestone pit."

[MONS 033847, "Anniston Plant, Technical Services Department: Monthly Report," CONFIDENTIAL, September 1970.]

Doc ID # 826 Exhibit #

Also See: DSW 013188, **CONFIDENTIAL**, Read and Destroy.

Doc ID # 20068 Exhibit # P-0408

399.

09/04/70

Letter from F. D. Ramsey to E. G. Wright: Aroclors loss to atmosphere.

"Operations show that HCl gas not converted to Muriatic Acid is by-passed to the scrubbing jets and sewerred. Based on acid produced, sold, and by-passed for the months of April, May, and June, an average day resulted in 4500 #/hr. of HCl off-gas. Calculations based on vapor pressures, the temperatures that the HCl come in contact with, and the ppm of Aroclor in acid - yields the following results:

0.6 lb./hr. or 14.4 lb./day of PCB in vapor form reaches the jets;

2.1 lb./hr. or 50.5 lb./day of PCB in acid produced;

Total = 64.9 lb./day of PCB passes the HCl knockout tank.

Assuming 100% contact at the jets, 0.47 lb./hr. or 11.8 #/day of PCB is sewerred with the remaining 0.11 lb./hr. or 2.6 lb./day being lost to the atmosphere. Poor efficiency at the jets increases the loss of PCB to the atmosphere considerably."

[DSW 014031, Monsanto, "Letter from F. D. Ramsey to E. G. Wright: Aroclor Losses to the Atmosphere," September 4, 1970.]

Doc ID # 22 Exhibit # P-0410

400.

09/08/70

The Food and Drug Administration issued a guideline regarding maximum concentration of PCB in food.

"The Food and Drug Administration has issued a guideline regarding maximum concentration of PCB in food. This is not a regulation but simply a guide for various testing agencies to use in judging when a food product may be classed as contaminated with PCB. Because chlorinated materials have displayed persistence in nature and have entered our food chain the FDA has issued guidelines for many materials among which is PCB.

The upper limit on PCB content in milk is 0.2 ppm and in other food it is 5.0 ppm.

Whenever necessary you should discuss these guidelines with your Therminol FR users or prospects."

[MONS 098401, "J. R. Fallon to C. L. CLAY, et al.: Therminol FR Fluids (Polychlorinated Biphenyls – PCB)," September 8, 1970.]

Doc ID # 828 Exhibit # P-0414

401.

09/09/70

Carbon beds removed PCBs efficiently from wastewater in the pilot study: PCBs concentration was reduced from 1,000-3,000 ppb down to 0-15 ppb. The removal efficiency was over 99%.

"In the 13 day pilot run, initial concentrations of 1000-3000 ppb Aroclor in waste water were reduced to a range of 0-15 ppb upon passing through a series of packed carbon beds.⁽¹⁾ at an average flow rate of 25 cc/min. Over 99% of Aroclor removal occurred in the prefilter. This unusual reduction is believed to be due to the filtration of solids on which Aroclor was adsorbed. At higher flow rates (0.5 gpm/ft.²) through the prefilter, these solids plugged the prefilter."

[MONS 036139, "I. Ransaw: Anniston, Aroclor Pollution Study," September 9, 1970.]

Doc ID # 830 Exhibit # P-0415

402.

09/11/70

Letter from Wheeler to Papageorge: Three recent PCB Publications, which talked about the toxicity and effects of PCBs.

"Attached are copies of three articles which appeared in the May-June Issue of the "Bulletin of Environmental Contamination and Toxicology".

The first one mentions Aroclor 1268 in connection with egg shell thickness in a mallard duck experiment.

The other two deal with toxicity to marine organisms and solubilizing PCB's in lab experiments with such species."

[MONS 099166, "Letter from Elmer P. Wheeler to W. B. Papageorge: Three recent PCB Publications," September 11, 1970.]

Doc ID # 9395 Exhibit #

403.
09/14/70

Progress Report, Anniston, Alabama Plant: Solid and liquid wastes from Packing Station – Air Scrubber Waste Disposal alone were estimated to be 600,000 #/yr, in which 25% was Aroclor and Biphenyl, and 75% was water.

"The wastes covered in this report will total 33 million pounds per year. The water that is in the different sludges is about 12% of the total. The Montars are the largest contributor. Montars 1, 4, 5 and 9 are 60% of the projected total.

Liquid wastes that can be collected without absorbents and handled as liquids at ambient temperatures will be one million pounds per year.

The solids will weigh 32 million pounds per year. This includes sludges, fiber drums, Brink Mist Eliminator cartridges, glass, filter cartridges, etc." [M 28810, September 14, 1970]

Doc ID # 2609 Exhibit # P-0416

"Background

Waste materials that presently are disposed by dumping must soon be disposed by a more acceptable means. This is a report of all miscellaneous solid and liquid wastes that Monsanto of Anniston presently has, or can now project to have. Considerable detail is included on many of the waste jobs to indicate the accuracy, significance, and the reliability of the information." [M 28811]

Doc ID # 2609 Exhibit # P-0416

"Details

XI. (Job 370-310) Aroclor – Packing Station – Air Scrubber Waste Disposal.

1. Amount of Wastes. 600,000 #/yr. ⁽¹⁶⁾
This is an estimate based on 4 drums/day.

2. Size of wastes. 10,000 cu.ft./yr. ⁽¹⁶⁾
Basis is again 4 drums/day.
3. Composition of wastes. ⁽²⁾
Water 75%
Aroclor and Biphenyl 25%" [M 28818]

Doc ID # 2609 Exhibit # P-0416

[M 28810-18, "D. J. Johnson, Progress Report, Anniston, Alabama Plant: Miscellaneous Solid And Liquid Wastes," COMPANY CONFIDENTIAL, September 14, 1970.]

Doc ID # 2609 Exhibit # P-0416

404.
09/16/70

Letter from Wright to Landwehr: Answers to questions concerning FDA Data on Choccolocco Creek Fish. Please note the answer to Question 4 is contradictory.

"On 9/14/70, I discussed the questions which you raised concerning PCB levels which the FDA reported for Choccolocco Creek fish. These questions were discussed with Dr. Tucker and a general summary of his answers along with the questions is listed below."

Questions:

"3. Can he explain fact that the trend in total components and PCB are together?

ans.: The length of time which fish are exposed to polluted water will probably explain the increase in PCB concentrations with relationship to the increase in DDT, TDE, DDE, etc.

4. Are these analysis typical of other analysis from a stream similar to Choccolocco Creek?

ans.: These levels are typical of the Mississippi River, however, PCB levels in Mississippi River fish are lower due to the larger dilution factor."

"Should any legal action ever be taken which might concern this data or any similar data, I would recommend that we consult very closely with Dr. Tucker since his experience with this type data should prove invaluable."

[MONS 098645-46, "Letter from E. G. Wright (Anniston Plant) to J. C. Landwehr: Answers to Questions Concerning FDA DATA on Choccolocco Creek Fish," September 16, 1970.]

Doc ID # 832 Exhibit # P-0417

405.
09/17/70

Four dogs on the Monsanto Aroclor two-year dog feeding study died since the beginning of the study. Causes were analyzed.

"Four dogs on the Monsanto Aroclor two-year dog feeding study have died since the beginning of the study, and the gross and mieresample diagnosis has been peritonitis. Peritonitis is usually a result of trauma as a result of one of the following:

1. Occidental penetration
2. Surgical laterveation
3. Perforations of the gastrointestinal tract
4. Rupture of abdominal abscesses
5. Inflammation of abdominal organs

Upon autopsy, all of these animals had a fluid filled abdomen and severe fibrous adhesions, which are evidence of a long standing condition. Occidental wounds and surgery can be eliminated as possible causes, and evidence of perforation of the gastrointestinal tract could not be found in any of the cases. The mesenteric lymph nodes in all these animals appeared to be cystic, perhaps the result of a previous abcess.

In light of the above findings, the most likely course of the peritonitis is an acute inflammation of the gastrointestinal tract which spread to the mesenteric lymph audes, in which abcesses formed. These abcesses later ruptured into the abdominal cavity, causing the peritonitis which caused steady deterioration of the animals, finally leading to their deaths. Because of the length of infection, a large amount of fibrous organisation occurred in the peritoneal cavity."

[M 42565, "Letter from J. F. Vondruska to JCC, MLK and DL," September 17, 1970.]

Note: The document is too blurring to read.

Doc ID # 3707 Exhibit # P-0418

406.

09/18/70

Letter from Paul B. Hodges to Toby Bell (Anniston)," (CONFIDENTIAL): Hodges worried that "The emissions are considerably increased with 9/13/70 at 6.25 ppm;" and "Obviously, having to report these gross losses multiplies, enormously, our problems because the figures would appear to indicate lack of control."

"In reviewing your proposed letter to Joe Crockett with Legal, et al., we requested latest emissions data on the flow to Snow Creek. We had hoped that it might show an improvement over the 1st week in September and thus demonstrate a favorable trend to Crockett. Instead, the emissions are considerably increased with 9/13/70 at 6.25 ppm (or about 80 lbs. of PCB for the day). From the Legal standpoint, there is extreme reluctance to report even the relatively low emission figures because the information could be subpoenaed and used against us in legal actions. Obviously, having to report these gross losses multiplies, enormously, our problems because the figures would appear to indicate lack of control."

[DSW 014095, "Letter from Paul B. Hodges (Monsanto at St. Louis) to Toby Bell (Anniston)," CONFIDENTIAL, September 18, 1970.]

Doc ID # 833

Exhibit # P-0419

407.

09/21/70

Letter from Neal and Peterson at JFQ Plant to Gatens, et al: Aroclor use at JFQ. "Every means possible must be taken to prevent these Aroclors from entering our waste effluent or being absorbed in the ground. Tank washings will be sent to the toxic dump and used material will be destroyed by incineration at WGK." Compare the measures taken in JFQ to those in Anniston Plant, the difference is obvious and significant.

"Summary

PCB type Aroclors are used or handled in 4 departments at JFQ. Losses to the plant waste effluent greatly exceed Monsanto's self imposed limitation of 10 ppb and immediate corrective action is required to meet the 12/31/70 deadline for compliance. Every means possible must be taken to prevent these Aroclors from entering our waste effluent or being absorbed in the ground. Tank washings will be sent to the toxic dump and used material will be destroyed by incineration at WGK. The magnitude of the volatile losses to the atmosphere will be determined."

"PCB's are believed to hamper reproduction in birds and act as a low-level poison in the environment. Some are highly resistant to degradation. Consequently, there is concern over their possible buildup in the environment."

[MONS 098222, "Letter from R. C. Neal and A. E. Peterson (J. F. Queeny Plant) to P. F. Gatens, et al.: Aroclor Use at JFQ," CONFIDENTIAL, September 21, 1970.]

Doc ID # 834 Exhibit #

408.
09/22/70

Monsanto received the data of two-year chronic oral toxicity studies on rats and dogs including the data of reproduction studies for rats and chicken.

"Elmer Wheeler has just received copies of the status summaries of the two-year chronic oral toxicity studies on rats and dogs, the three generation rat reproduction study and the chicken reproduction, toxicity and residue study.

We believe we should show this information with agencies and laboratories in the U.K. and Europe and would like to know if you concur. We thought that copies should be sent to the University at Utrecht, the Folkhausen Institute in Stockholm, the Nature Conservancy, BIBA and any others you might recommend."

[MONS 098493, "Letter from W. B. Papageorge to D. S. Cameron: PCB - Toxicity Studies," September 22, 1970.]

Doc ID # 835 Exhibit # P-0420

409.
09/23/70

Monsanto planned to take air samples at Krummrich plant to determine PCB concentrations in the air with the frequency of 2 samples/week.

"The following air sampling program is an addition to the total Aroclor sampling program as established in a memo from M. Pierle to W. Engman dated August 5, 1970.

<u>TYPE</u>	<u>SOURCE</u>	<u>FREQUENCY</u>
Air	Different locations within Department 246	2 samples/week

The air sampling program will be conducted for approximately two months with the results being distributed on a weekly basis."

[MONS 098220, "Letter from M. R. Foresman (Krummrich) to W. C. Engman: Sampling Program For Aroclor Losses," CONFIDENTIAL, September 23, 1970.]

Doc ID # 836 Exhibit #

410.

09/25/70

Letter from Savage to Peterson at JFQ Plant: "we cannot justify capital in CD for curbs, etc."

"Comments on the PCB situation at JFQ:

1. Central Drumming

We are now under an edict to eliminate all PCB's from our industrial fluid (Pydraul) line by the end of the first quarter of 1971. We therefore will not be using any PCB's in Central Drumming (note that Aroclor 5442 and 5432 are not PCB's). Therefore, we cannot justify capital in CD for curbs, etc. on this basis, although housekeeping or "routine" pollution considerations might still justify some expenditure.

It is certainly true that extreme care must be exercised to avoid losses during the next few months."

[MONS 098221, "Letter from J. R. Savage (General Office) to Mr. A. E. Peterson (J. F. Queeny Plant): PCB Pollution," September 25, 1970.]

Doc ID # 837 Exhibit #

411.

09/29/70

Animal experimentation has confirmed that chlorinated biphenyls and naphtalenes can produce liver damage.

"Already in 1899 Herxheimer described a condition that he called chloracne, which was caused by chlorinated biphenyls or chlorinated naphtalenes."

"Animal experimentation has confirmed that chlorinated biphenyls and naphtalenes can produce liver damage of this kind. Chlorinated biphenyls and naphtalenes can be absorbed by the skin, by inhalation or by ingestion."

[MONS 034661, "PCB Conference, Stockholm, PCB – effects on mammals by Matha Berlin," September 29, 1970.]

Doc ID # 839

Exhibit # P-0422

412.

Oct. 70

Anniston planned to achieve 0.1 lb/day in the plant effluent. However, the samples taken in 1974, two years after the termination of production of PCB, the effluent from Anniston Plant to Snow Creek was still at 37 ppb, much higher than 0.1 lb/day based on the flow rate at that time. In 1995, the stormwater runoff from the Anniston Plant still contained PCB.

"Objective: Polychlorinated biphenyl (PCB) is present in plant effluent. Actions are being taken to limit this pollution to a minimum to achieve plant goal of 0.1 lb./day in plant effluent."

[MONS 056616, "Progress Report To Alabama Water Department Commission (October 1970): Four Phase Program Summary and Phase I Results, Effluent Control -- Aroclor," Report Issued on March 23, 1970 and updated in October 1970.]

Doc ID # 4961

Exhibit # P-0440

413.

10/70

The Anniston Plant is now engaged in a statistical survey to determine the accuracy and precision of this sampling program and analytical method.

"The Anniston Plant is now engaged in a statistical survey to determine the accuracy and precision of this sampling program and analytical method. The preliminary data now available indicates that with 95% confidence in replicate testing, for the analytical portion alone, a precision range of $\pm 3\%$ of level is expected. The similar anticipated range for sampling appears to be approximately $\pm 50\%$ of level. Equipment is now being obtained for a study of the sampling program to determine the cause and provide means to reduce this variability. This study will include such factors as replicate sampling at the same point, effects of sampling at points near the center of the stream as opposed to near the conduit walls, effects of sampling at various heights from the bottom of the conduit, etc."

[MONS 056626, "Sampling and Analytical Procedure," October 1970.]

Doc ID # 4961 Exhibit # P-0440

414.

Oct. 1970

Monsanto issued its initial report on PCB concentrations in the Plant effluent to AWIC, which covered from September 18 to October 20, 1970.

[MONS 056609-10, "Letter from J. C. Landwehr (Anniston Plant) to G. L. Jessee," CONFIDENTIAL, October 26, 1970.]

Doc ID # 863 Exhibit # P-0443

415.

Oct. 70

Anniston Plant, Monthly Report: Four high daily losses (1000-4000 ppb) occurred in Anniston effluent in October 1970.

"Aroclor losses during Oct averaged 3#/d (405 ppb). Four high daily values (1000-4000 ppb) account for 1.8 lb./day - neglecting those, October average is 1.3 lb./day. Actions now being taken to reduce upsets." [DSW 013900, October 1970]

Doc ID # 26 Exhibit # P-0423

"A meeting was held with the AWIC Technical Staff. They were satisfied with the progress made at Anniston on the PCB problem. Plant effluent levels will be reported monthly."

"Project & Evaluation: 1. Input data to define magnitude of solid waste disposal problem was published in October. Later work has indicated that Montar 5 contains very little PCB. If confirmed, this reduces PCB containing bulk solids by 10 MM pounds per year."

[DSW 013900, "Anniston Plant Technical Service Department Monthly Report," CONFIDENTIAL, Read and Destroy, October 1970.]

Doc ID # 26 Exhibit # P-0423

416.

10/01/70

Mason planned to go to Anniston with Papageorge to have detailed discussion about the PCB contaminated fish collected in Anniston.

"This morning I met with John Eck to discuss with him the current position on PCB contaminated fish at Anniston. Overall, he considers that we are doing everything necessary in this area, but he thought it would be useful if we could obtain additional

information on the exact location of PCB deposits and have a better idea of where the fish are picking up the material.

In view of this, I think it would be useful if you and I could tour Anniston to discuss the subject in more detail, both with our consultants and with the plant personnel involved. Would you please contact me on your return to the office, so that we can arrange a visit?

Convenient dates from my point of view would be 6th, 7th October or 15th, 16th October."

[MONS 098219, "Letter from John Mason to W. B. Papageorge: PCB/fish – Anniston," October 1, 1970.]

Doc ID # 840

Exhibit # P-0424

417.
10/05/70

Congressman Snyder sent a letter to the Secretary of Department of Agriculture and Secretary of Department of Health, Education and Welfare. He stated in his letter that "several of his constituents, who are dairy farmers, could not sell their milk in the State of Ohio because it contained Aroclor 1254."

"The letter was addressed to Secretary Hardin, Department of Agriculture and Secretary Richardson, Department of Health, Education and Welfare."

"In his letter Congressman Snyder stated that several of his constituents, who are dairy farmers, could not sell their milk in the State of Ohio because it contained Aroclor 1254. The Congressman was seeking information which he could send to his constituents advising them how to prepare their silos to receive new silage without becoming contaminated with Aroclor 1254. He was also seeking funds for his constituents similar to those available when registered pesticides are involved in food contamination.

Mr. Nash indicated he knew nothing about Aroclors and would therefore suggest to the Congressman that his constituents should contact Monsanto Company. Mr. Nash wanted to inform Monsanto of his intent. He also stated that no funds are available since Aroclor 1254 is not a registered pesticide. I informed him we of course wish to help if our product was truly involved, but I had personal doubts about the presence and source of Aroclor. I also informed him we had never, to my knowledge, recommended that Aroclor 1254 been used in coatings which could get into food

products and therefore had no unique experience regarding silo coatings."

[MONS 098491, "Letter from W. B. Papageorge to File," October 5, 1970.]

Doc ID # 841

Exhibit # P-0428

418.

10/06/70

Papageorge's PCB Environmental Problem -- September Status Report: As early as in 1970, Monsanto was afraid to get involved in legal actions on PCB's. "However, it was emphasized that we must continue to emphasize to all remaining users of PCB's the importance of preventing escape to the environment and we must ensure that these warnings are fully documented..."

"Performance against the PCB plan was reviewed with the CMC on September 14. Overall the committee was satisfied with the progress which has been made and complimented the various departments in the Division who have been involved in the action. However, it was emphasized that we must continue to emphasize to all remaining users of PCB's the importance of preventing escape to the environment and we must ensure that these warnings are fully documented so that they will support the action we have taken in this area should we become involved in legal actions."

[M 39251, "Letter from W. B. Papageorge to W. S. Clark, et al.: "PCB Environmental Problem -- September Status Report," October 6, 1970.]

Doc ID # 4875

Exhibit # P-0429

419.

10/07/70

September PCB Report: In Anniston, "Average PCB loss for the month was high at 2600 ppb or 32 lbs/day".

"Anniston Plant, PCB Levels In Snow Creek: Average PCB loss for the month was high at 2600 ppb or 32 lbs/day, largely as a result of one very bad day (400 lbs). Contributing causes were:

1. The old limestone pit was overloaded and solid sludges were carried through,
2. Detergent cleaning of the department,
3. Sewering of excessive amounts of muriatic acid."

"Since the new limestone bed was placed in service on September 23, pit effluent has been at 0 - 3 ppb PCB's."

"However, leaching of PCB's from the creek bed resulted in a plant effluent level of 90 - 240 ppb or 1.1 - 2.8 lbs/day, gradually declining. The plant believe that the new pit can handle ordinary upsets and peak loads."

[DSW 013902, "September PCB Report," October 7, 1970.]

Also See: MONS 099026.

Note: Please note that 400 lbs/day PCB correspond to 32,500 ppb PCBs in the effluent for that period of time.

Doc ID # 27

Exhibit # P-0430

420.

10/13/70

Letter from Wheeler to Papageorge: Extremely high concentrations of PCBs were found in human fat. The PCBs levels were up to 200 to 600 ppm. Monsanto wanted to check the results.

"Enclosed is a copy of a publication concerning the findings of PCB's in human fat.

You will note that it is "emphasized that the origin of the PCB materials ---- is uncertain at this time."

Secondly, the levels of 200 ppm and 600 ppm found are rather frightening. I am sure Bob Keller and Scott Tucker will want to critically review the analytical techniques and the chromatograms as they relate to quantitation."

[MONS 098666, "Letter from Elmer P. Wheeler (Medical Department) to W. B. Papageorge: PCB's in Human Adipose Tissue," October 13, 1970.]

Doc ID # 849

Exhibit # P-0433

Also See: MONS 099168.

Doc ID # 9397

Exhibit #

421.

10/13/70

Letter from Randal Graham to customers: "The significance of this information is no longer can we dump scrap Aroclor" "down the sewer."

"The significance of this information is no longer can we dump scrap Aroclor or spent transformer (????)rel down the sewer. Indiscriminate dumping of such material can lead to serious repercussions for the electrical industry. For this reason Monsanto is building an incinerator which will be ready some time during the first part of 1971."

[M 39207 "Letter from Randal Graham, Senior Fluids Specialist of Monsanto, to customers," October 13, 1970.]

Note: xxx = The document is too blurring to read.

Doc ID # 11331 Exhibit # P-0434

422.

10/15/70

Active carbon study indicated that PCB concentrations could be reduced from 600-2,000 ppb down to NDA (10 ppb) by carbon columns.

"A series of four 5 inch diameter columns (each packed to a bed depth of 5.5 feet with calgon filtrasorb 300 carbon) was placed on stream 10/2 at the Aroclor Sump. To-date the unit has been operating with minimum difficulties at an average flow rate of 2 gpm/ft². (≈1000 cc/min.). The available test results indicate an Aroclor reduction in the range (600-2,000 ppb) in the influent to (NDA 10ppb) in the effluent of the first columns. Since there has been no indication of a break through in the first column, plans are now to increase the flow to 4 gpm/ft².

In a 4 day pilot run, initial concentrations of 40-150 ppb in the effluent of the new limestone pit were reduced to an essentially NDA upon passing through a filter (4 inch diameter tube packed to 5.5 inch depth with carbon) at a flow of 100 cc/min. Tests are now being run under the same conditions utilizing sand as the filtering media."

[MONS 036141, "I. Ransaw: Mid-Month Report -- Aroclor Pollution Study," October 15, 1970.]

Doc ID # 850 Exhibit # P-0435

423.

10/19/70

Monsanto initiated a project to provide "for paving, trenches, curbs, and sewers in storage and loading areas."

"Monsanto has announced a program intended to eliminate entry of PCB's (polychlorinated biphenyl) into the environment." [MONS 036154, October 19, 1970]

Doc ID # 851 Exhibit # P-0436

"This project provides for paving, trenches, curbs, and sewers in storage and loading areas, so that leaks and spills, if any, do not enter ground waters or by-pass the catch basins." [MONS 036155, October 19, 1970]

Doc ID # 851 Exhibit # P-0436**"XVI. FINANCE**

This non-earnings project is consistent with our position that "closed system" applications pose no threats to the ecology. Extending disposal service to customers assists in partially offsetting total operating costs while strengthening our marketing relationships. Since a corporate review has resulted in the decision to remain in the Aroclor business, this project is needed to help implement the current strategy." [MONS 036161, October 19, 1970]

Doc ID # 851 Exhibit # P-0436

[MONS 036154-61, "Letter from H. L. Minckler, General Manager, to Mr. E.J. Bock, President: Appropriation Request for Plant W. G. Krummrich & Anniston," October 19, 1970.]

Doc ID # 851 Exhibit # P-0436

424.
10/20/70

Through Europe and even in Sweden where the Government was more concerned than elsewhere – the pressure against Aroclor regarding pollution was coming mainly from Monsanto.

"Pollution

The delegate from France who is the technical representative of Prodelec said that through Europe and even in Sweden where the Government is more concerned than elsewhere – the pressure against Aroclor regarding pollution is coming mainly from Monsanto. He does not share our views and said that Prodelec does not intend to stop sales to non-electrical outlets. Bayer's technical representative also indicated feeling that the pressure is mainly from Monsanto's actions but conceded that eventually it may go this way.

We give these comments as a prelude to the following analysis and reasoning applied to the situation in Sweden, by Prodelec." [MONS 098432, October 20, 1970]

Doc ID # 856 Exhibit # P-0439

"H. Our findings are expected to help justify the money to be spent for a fractionating column which is probably something we should have had years ago to bring Monsanto quality up to competition levels."

[MONS 098434, "Letter from P. G. Benignus (St. Louis) to H. S. Bergen (HBERG): International Electrotechnical Commission IOB, Brussels Mtg.," October 20, 1970.]

Doc ID # 856 Exhibit # P-0439

425.
10/20/70

Letter from Keller to Papageorge: Monsanto's tests indicated that Aroclor 1200 series "do contain varying amounts of polychlorinated naphthalenes."

"The attached report by Dr. Mieure shows that Aroclor 1242, 1242B, 1254 and 1260 contains no detectable polychlorinated dibenzofurans. Aroclor 5442 contains detectable tetrachloro-dibenzofuran at 1-3 ppm. Competitive Prodelec Phenoclop DP6 contains considerably more dibenzofurans."

"On this basis, the Aroclor 1200 series sent for feeding studies at Bio-Test appears free (<1-5 ppm) of furan contaminants which might bias the results. It will be noted, however, that these products do contain varying amounts of polychlorinated naphthalenes. Would toxicity results from feeding studies be affected by these impurities?"

[MONS 100082, "Letter from R. K. Keller (Technology Department) to W. B. Papageorge (General Offices): Furans in Aroclor Products," October 20, 1970.]

Doc ID # 855 Exhibit # P-0438

Also See: MONS 201232, and MONS 099167.

Doc ID # 855 9396 Exhibit # P-0438

426.

10/20/70 Letter from Mieure to Keller: Study demonstrated that Aroclor did contain impurities. "Each of the Aroclor 1200 series contains polychlorinated naphthalenes at varying levels. The Aroclor 5442 contains polychlorinated anthracene or phenanthrens."

"Researchers at the University of Utrecht, The Netherlands, have reported finding low levels of polychlorinated dibenzofurans in competitive polychlorinated biphenyls. They also analyzed Aroclor 1260, lot AK-3, and did not detect any oxygenated impurities. Because of the reported high toxicity of polychlorinated dibenzofurans, a study was undertaken to determine if these, or related, compounds exist as impurities in our products. This memo contains the preliminary results of this study."

"Low levels (about 25 ppm) of polychlorinated dibenzofurans were confirmed in Phenoclor D. P. 6, a competitor to Aroclor 1260 from Prodelec (France). Aroclor 5442 appears to contain about 2 ppm polychlorinated dibenzofurans; none were detected in any other Aroclor studied. However, each of the Aroclor 1200 series contains polychlorinated naphthalenes at varying levels. The Aroclor 5442 contains polychlorinated anthracene or phenanthrens. Results are summarized in the accompanying table."

[MONS 201233, "Letter from Mieure (Technology Department) to R. E. Keller: Impurities In Aroclor," October 20, 1970.]

Doc ID # 854 Exhibit # P-0437

Also See: MONS 202064.

Doc ID # 853 Exhibit #

427.

10/21/70 Anniston told AWIC in its written Progress Report that the discharge of PCBs was in the range of 1-5 lbs/day. However, the records indicated the actual daily discharge of total PCBs during that period was much higher than that range.

"At the present time our discharge is in the range of 1-5 lb./day total mono and polychlorinated biphenyl homologs. Many of these are degradable by biological and metabolic action if introduced into the environment. We are in the process of developing more sophisticated analytical and computational techniques to report to you analyses of our discharge of the same homologs which are reported in biological samples. This level will be considerably lower than the above range. However, our abatement and waste

treatment work is directed toward removal of all homologs whether or not they are degradable."

[MONS 056615, "Letter from J. C. Landwehr to J. L. Crockett (AWIC): Progress Report To Alabama Water Department Commission (October 1970), Abatement of Polychlorinated Biphenyl Discharges to Snow Creek," Personal & Confidential, October 21, 1970.]

Doc ID # 4961 Exhibit # P-0440

428.

10/26/70

Monsanto told AWIC again that presently the total discharge of PCB from its effluent was in the range of 1-5 lbs/day, with the latest trend being toward the 1 lb/day end of the range, which is not true. Mr. Crockett insisted again on knowing what the effluent levels of PCB were, and promised that the PCB Reports would not be available to the public unless Monsanto released them.

"Since he (Crockett) insisted again on knowing what effluent levels were, we verbally informed him that we were presently discharging total Aroclors in the range of 1-5 lbs./day with the latest trend being toward the 1 lb./day end of the range. To his questions on past discharges, we informed him that current discharges were down from recent past ranges by 1/5 to 1/10, but qualified this answer that high recent past numbers were a result of higher water effluent flow and high solids content in the old limestone neutralization pit.

In conjunction with this information, a lengthy discussion of the technical complexity of Aroclor or PCB numbers resulted in Mr. Crockett's agreeing that any written effluent level reports would be held confidential by the Technical Staff and would not be available to the public until or unless Monsanto released it. Mr. Crockett also changed his past position from wanting a weekly report to accepting a monthly report of 24 hour cumulative effluent sample results. The initial report and transmittal letter is attached. The second report will cover October 21 through 31, and all reports thereafter will cover whole months."

[MONS 056609, "Letter from J. C. Landwehr (Anniston Plant) to G. L. Jessee," CONFIDENTIAL, October 26, 1970.]

Doc ID # 863 Exhibit # P-0443

Also See: DSW 013988, and M39249.

Doc ID # 28 5402 Exhibit # P-0441

429.
10/26/70

The data indicated the presence of naphthalene in biphenyl and anthracene or phenanthrene and dibenzofuran in Santowax R used in the manufacture of Aroclors. These contaminants, such as naphthalene, would substantially increase the toxicity of PCBs. Anniston Plant was instructed to detect the presence of the contaminants.

"Recent data from Dr. J. P. Mieure's work indicates the presence of naphthalene in biphenyl and anthracene or phenanthrene and dibenzofuran in Santowax R used in the manufacture of Aroclors."

"The naphthalene, anthracene or phenanthrene could be present in the benzene used in the diphenyl unit or could be co-produced with the biphenyl, terphenyl and quarterphenyl.

The dibenzofuran could result from oxygen containing contaminants in the benzene or, more likely, be formed because of the presence of the promoter, acetone.

The Anniston Plant should design and create a program for determining the source or sources of these contaminants."

[MONS 210783, "Letter from W. B. Papageorge to J. R. Savage," October 26, 1970.]

Note: the copy is too blurring for identification clearly.

Doc ID # 860 Exhibit # P-0442

Also See: MONS 201231.

Doc ID # Exhibit #

430.
10/26/70

Hall to Gentlemen: Vacuum fluids, Santovac I and Santovac II, do contain polychlorinated biphenyls (PCBs).

"As a supplier of vacuum fluids, namely Santovac I and Santovac II, which do contain polychlorinated biphenyls (PCBs) we wish to inform you that the FDA announced a guideline for PCBs of 5 ppm in fish and 0.2 ppm in milk.

Therefore, control of waste and spills is imperative. In no case should the material be discharged directly to streams."

[M19271, "Letter of David Hall to Gentlemen," October 26, 1970.]

Doc ID # 2897

Exhibit # P-0444

431.

10/28/70

Letter from Wright to Landwehr: The October 1970 sampling from storm sewer (36") indicated that the average PCB concentration of samples from seven different days was 1,021 ppb. Based on a flow rate of 20 gpm, this source alone represented a loss of 0.24 lbs/day. Samples were taken from the sewer pipe not from the ditch.

"During October several grab samples were collect from the storm sewer (36") and analysis for P.C.B. These samples were collected to determine whether or not the storm sewer was contributing to the P.C.B. content in the plant effluent. The results of these samples are listed below. Note: All samples were collect from the sewer pipe rather than the ditch.

<u>Date</u>	<u>Aroclor Conc. (P.P.B.)</u>
10/5	158
10/6	920
10/15	3,200
10/19	900
10/20	1,800
10/21	370
10/22	225
10/23	750
10/26	867
Average	1,021 P.P.B.

This 1,201 P.P.B. of Aroclor based on a 20 GPM flow amounts to 0.24# /day of P.C.B. Since we are now down to a 1-5#/day level in the plant effluent, this represents a sizeable loss of Aroclor.

For this reason, I would like to recommend that we contact the people how did the sewer relining job and have the sewer checked for leaks as well as plug off the unknown flow in this sewer.

Elimination of this Aroclor source will then make our pit effluent and plant effluent values agree more closely as well as lowering our total poundage lost."

[MONS 099217, "Letter from E. G. Wright (Anniston Plant) to J. C. Landwehr: P.C.B. in Plant Storm Sewer," October 28, 1970.]

Doc ID # 865

Exhibit # P-0445

432.

10/29/70

Letter from Wright (Anniston Plant) to Taffee: A new sump was built at the plant dump drain. Samples collected from the ditch up-stream from the sump showed elevated concentrations of PCBs.

"This memo will serve to bring you up to date on our observation on the new sump which has been constructed at the dump drain. Andy Bonds has been visually inspecting the sump every day and has collected samples of the ditch up-stream from the sump. His observations are as follows:

1. There is practically no water flow down the hill from the dump, except during rainy periods. This would indicate that there are no springs feeding this ditch.
2. The Aroclor phase in the ditch seems to be stable except during periods of rainfall.
3. The sump has collected approximately 2-3 gallons of Aroclor since it was built.
4. Some material does float on the water in the sump.
5. No second phase has been observed in the sump effluent.

Several samples have been collected from the ditch up-stream from the sump. The results are as follows.

<u>Date</u>	<u>Aroclor Conc. (P.P.B.)</u>
10/15	64,800 (1242 only)
10/21	35,000 (1242 only)
10/22	2,800 (1242 only)

The samples taken on 10/15 and 10/21 were taken from the ditch and contained visible Aroclor. The sample taken on 10/22 was taken from the top of the sump. These samples show that the sump is very definitely retaining the second phase.

We will continue to observe the sump, but we plan to sample it only when it is over-flowing to the creek. If you disagree with this approach, please let me know."

[MONS 099216, "Letter from E. G. Wright (Anniston Plant) to W. F. Taffee: New Sump below Plant Dump," October 29, 1970.]

Doc ID # 866

Exhibit # P-0446

433.

11/02/70

Letter from John to Papageorge: According to The Dayton Journal Herald, "Milk had been removed from the market due to higher than acceptable levels of PCB, calves have died and some members of one family became ill."

"Two press queries were handled during the month. Science News, following an interview with Dr. Risebrough, called us to ask why we had not released production and sales figures. The reporter also asked about toxicity studies now under way. The Dayton Journal Herald wrote a lengthy article on the fate of local farmers in the area. Milk had been removed from the market due to higher than acceptable levels of PCB, calves have died and some members of one family became ill. The farmers have related their bad luck to the presence of PCB in the area, and charged "foot dragging" by Monsanto, the State of Ohio and the FDA in alerting them to the problem. Although the story prominently mentioned Monsanto, it did refer to PCB as a 'new problem' and one in which Monsanto is playing a major role to solve."

[MONS 099531, "Letter from E. V. John (World Headquarters) to Mr. W. B. Papageorge: October PR Report -- Polychlorinated Biphenyl," November 2, 1970.]

Doc ID # 383

Exhibit # P-0834

434.

11/02/70

Letter from Bell (Anniston, Monsanto) to Miere: Anniston samples were sent out for analysis on the impurity of polychlorinated dibenzofurans in Aroclors.

"As discussed with Bill Richard, I am forwarding Anniston samples for analysis on the matter of polychlorinated dibenzofurans in Aroclors."

"In addition, I will be forwarding from Jerry Brown, two samples of crude conversion material prepared in the laboratory pilot unit.

These samples are similar with the exception that cemene (?) was employed as promoter to prepare one sample and acetone as promoter in the other."

"Other samples which should be considered as this data is being developed are: (1) concentrates from the Porocel columns. (2) Montar 9, (3) Liquid Aroclors before and after distillation and (4) caustic treated Aroclor 5460."

[MONS 201235, "Letter from J. T. Bell (Anniston, Monsanto) to J. P. Mieux," Company Confidential, November 2, 1970.]

Note: (?) = Word is too blurring to read.

Doc ID # 869

Exhibit # P-0450

435.

11/03/70

A very simple sump was designed to collect solid Aroclors in the waste streams, which should have been done long time ago. But it was not.

"Aroclor Waste Sump Design

Aroclor leaks and spills are possible sources of effluent contamination. A correctly designed sump can become a successful collection system. Because it is heavy and nearly insoluble in water, 300-400 PPB, Aroclor will collectively settle in this system. Monsanto's present sump yields an effluent below solubility level."

"Process water containing Aroclor enters the sump where the Aroclor settles to the bottom and gradually fills a pump suction pit. It is recommended, for greater sump efficiency, to send only Aroclor containing water to the sump. From the pit, Aroclor can be pumped out with one's own pump."

[DSW 014405-06, "Aroclor Waste Sump Design," November 3, 1970.]

Doc ID # 11590

Exhibit # P-0006

436.

11/10/70

Investigation revealed that "each of the Aroclor 1200 series contains polychlorinated naphthalenes at varying levels." Aroclor losses from Anniston Plant during October averaged 3#/day (405 ppb). Four high daily values (1000 - 4000 ppb) accounted for 1.8 lb/day.

"Impurities in Aroclor

Researchers at the University of Utrecht, The Netherlands, have reported finding low levels of polychlorinated dibenzofurans in competitive polychlorinated biphenyls. They also analyzed Aroclor 1260, Lot AK-3, and did not detect any oxygenated impurities. Because of the reported high toxicity of polychlorinated dibenzofurans, a study was undertaken to determine if these, or related compounds exist as impurities in our products.

Low levels (about 25 ppm) of polychlorinated dibenzofurans were confirmed in Phenoclor D.P. 6, a competitor to Aroclor 1260 from Prodelec (France). Aroclor 5442 appears to contain about 2 ppm polychlorinated dibenzofurans; none were detected in any other Aroclor studied. However, each of the Aroclor 1200 series contains polychlorinated naphthalenes at varying levels. The Aroclor 5442 contains polychlorinated anthracene or phenanthrene. The Aroclor 1242, 1254, and 1260 samples are the same lots tested for toxicity by Industrial Bio-Test Laboratories." [MONS 044668, November 10, 1970]

Doc ID # 5996 Exhibit # P-0454

"Anniston PlantPCB Level In Sewer

Aroclor losses during October averaged 3#/day (405 ppb). Four high daily values (1000 - 4000 ppb) account for 1.8 lb/day – neglecting those, October average is 1.3 lb/day. Actions are now being taken to reduce upsets.

Alabama Water Improvement Commission Contacts

A meeting was held with the AWIC technical staff. They were satisfied with the progress made at Anniston on the PCB problem. Plant efficient level will be reported monthly." [MONS 044671, November 10, 1970]

Doc ID # 5996 Exhibit # P-0454

Newport Plant (September)PCB Levels In Atmosphere

TSD progress Report No. 2 on Job No. 27/7139/2392 was issued on 15th October giving results obtained to date on sampling of plant atmosphere for PCB contamination. Results are:

	<u>Area</u>	<u>PCB mg/m³ air</u>	<u>Comments</u>
1.	Drumming	0.38	Indoors. 2 roller doors ope
2.	Chlorination	0.59	Enclosed area, large roller
	(ground floor)	0.13	Door open
3.	Santolube 900	0.23	Indoors, Normal process con
4.	4-NDPA	0.94	Outdoors
	(expansion tank)	Pract. Nil	Outdoors
5.	Aroclor control	0.28	Indoors
	room		
6.	Chlorination	0.12	Chlorinators shutdown
	(1 st floor)		
		0.19	Chlorinators operating
		0.12	" "
7.	Airblowing room	0.39	Indoors. Normal process
			conditions"

[MONS 044674]

Doc ID # 5996 Exhibit # P-0454

[MONS 044667-74, "PCB Environment Problem, October Status Report," November 10, 1970.]

Doc ID # 5996 Exhibit # P-0454

437.
11/10/70

Board of Trade in U.K. was considering classifying polychlorinated biphenyls as hazardous materials. A study was undertaken to determine if polychlorinated dibenzofurans or related compounds existed as impurities in Monsanto's products; the former is highly toxic and was found in competitive PCBs.

"EUROPE:

Board of Trade in U.K. is considering classifying polychlorinated biphenyls as hazardous materials." [MONS 206495, November 10, 1970]

Doc ID # 10036 Exhibit # P-0455

"Impurities in Aroclor

Researchers at the University of Utrecht, The Netherlands, have reported finding low levels of polychlorinated dibenzofurans in competitive polychlorinated biphenyls. They also analyzed Aroclor 1260, Lot AK-3, and did not detect any oxygenated impurities. Because of the reported high toxicity of polychlorinated dibenzofurans, a study was undertaken to determine if these, or related compounds exist as impurities in our products." [MONS 206496- 206497, November 10, 1970]

Doc ID # 10036 Exhibit # P-0455

"PCB Level In Sewer

Aroclor losses during October averaged 3 #/day (405 ppb). Four high daily values (1000-4000 ppb) account for 1.8 lb/day – neglecting those, October average is 1.3 lb/day. Actions now being taken to reduce upsets."

[MONS 206500, "Letter from W. B. Papageorge to P. J. A. Marsh, et al.: PCB Environmental Problem -- October Status Report," November 10, 1970.]

Doc ID # 10036 Exhibit # P-0455

438.

11/11/70

Letter from Savage to John Mason: Anniston was expecting a water flow rise due to the addition of Niran production in the following year. Thus, it needed to install Project 3690 in order to avert a rise in PCB losses.

"Anniston Project 3690 "Install Fume Collection and Scrubbing Systems For the HCl Loading Docks and Storage Tanks" (\$35,000 Capital) has urgency from the PCB standpoint, in that it will reduce water flows through the Aroclor sewer system. If completed before Niran starts up early next year with a corresponding rise in water flows, a rise in PCB losses will be averted. This has gained urgency because we now report daily loss figures to the Alabama Water Improvement Commission."

"This is a General Chemicals Group project. While they are in general agreement with the proposed project because of improvement in water cost, fume conditions and maintenance expense, these benefits would not justify early approval in the present capital crunch. They have, therefore, left it to the Fluids

Group to determine whether the PCB aspect of the project makes it urgent."

"Confirming our discussion, we will proceed with the project."

[MONS 098218, "Letter from J. R. Savage to Mr. John Mason (General Office)," November 11, 1970.]

Doc ID # 876

Exhibit # P-0457

439.

11/11/70

Letter from Papageorge to Benignus: Based on the cost, Papageorge was against to having the incinerator to treat PCBs' solid wastes. He said that "I recommend using properly operated landfill until they are declared illegal". He knew that "The capacitor manufactures have discouraged the utilities from using landfills" because of legal concern.

"Below are my comments concerning Mr. Casey's letter.

1. Item 2 of Don Olson's letter was appropriate in February because there was no evidence that PCB's with lower chlorine content were being discovered in the environment. Since then, there has been increasing evidence that PCB's similar to Aroclor 1248 and Aroclor 1242 are being identified especially near industrial plant effluents. There is also evidence that these lower chlorinated materials are having adverse effects on some species of wildlife."

"4. Installation of the Krummrich incinerator is estimated to cost close to one-half million dollars. Installation of a properly designed and instrumented smaller unit may cost a quarter million dollars. To justify even the small unit, the quantity of askarel to be destroyed must be substantial. In my opinion very few of our customers will be able to justify an incinerator of their own.

5. Solid waste soaked with askarel can be safely destroyed with properly designed equipment which is also very costly. We are now getting ready to test the practicality of decomposition by pyrolysis, destruction of the resulting gases at high temperatures and scrubbing of the stack gases to absorb the HCl which is formed. The economics is not now known. I estimate that the cost to handle, ship and destroy solid waste will be discouragingly high. I recommend using properly operated landfill until they are declared illegal.

6. The capacitor manufactures have discouraged the utilities from using landfills. I can understand their concern, which I suspect is legally motivated, but for the time being landfills are the only practical solution anyone has to offer."

[MONS 098192, "Letter from W. B. Papageorge to P. G. Benignus," November 11, 1970.]

Doc ID # 874 Exhibit # P-0456

440.

11/20/70

Letter from Tucker to Papageorge: PCBs were found with Mississippi River fish.

"The following table contains some more data that we have accumulated on the PCB content of Mississippi River fish with the exception of OR Log No. 415 which was apparently obtained from a river in Tennessee. These fish were obtained via H. Horner who initially analyzed them for mercury."

"The ppm PCBs reported are calculated on the wet weight of fillets taken from each fish. These is really nothing too startling about the data with the exception that they are in some cases a little high and the fact that the isomer distribution of the PCBs was markedly altered, making calculations difficult." [MONS 100022, November 20, 1970]

Doc ID # 8468 Exhibit # P-0463

<u>Sample Description</u>	<u>OR Log No.</u>	<u>Maximum ppm PCBs found</u>	
		<u>Aroclor 1242</u>	<u>Aroclor 1254</u>
Perch - Miss. R. Below WGK 8-8-70	408	2.07	0.69
White Perch - Miss. R. at Gray's Pt.	409	0.14	0.02
Perch - Miss. R. below E. Carondelet 9-9-70	410	ND	0.07
Carp - Miss. R. at foot of MacArthur Bridge 8-6-70	411	0.75	1.16

Large Catfish - Miss. R. above MacArthur Bridge 8-20-70	412	3.80	ND
Catfish - Miss. R. below WGK	413	1.33	6.70
Carp - Miss. R. below WGK 8-8-70	414	0.35	ND
Bass from Big Sandy R. In Tennessee 8-1-70	415	0.06	ND
Stripped Bass - Miss. R. below WGK 8-1-70	416	2.39	6.10
Jack Salmon - Miss. R. below WGK 8-8-70"	417	3.76	0.37

[MONS 100022-23, "Letter from E. Tucker to W. B. Papageorge,"
November 20, 1970.]

Doc ID # 8468 Exhibit # P-0463

441.
11/20/70

Monsanto made changes to its biodegradation program for PCBs.

"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)."

[MONS 098486, "Letter from E. S. Tucker to R. E. Keller: Biodegradation Testing Program," November 20, 1970.]

Doc ID # 880 Exhibit # P-0462

442.
12/29/70

Air samples were collected in Anniston from November 5 to 24, 1970. Because there had been very little manufacture of Liquid Aroclors at Anniston during this period, the PCBs concentrations

detected in the plant air were "considerably lower than the levels reported by Monsanto at Newport in September, 1970." Further air sampling was to be conducted in January to gather more reliable data on PCB losses to the atmosphere.

"Listed below is the data which has been collected to date on P.C.B. losses to the atmosphere at Anniston. These samples were collected primarily in the ambient air at each designated location.

<u>Date</u>	<u>Sampling Location</u>	<u>P.C.B. Concentration</u> <u>mg/m³</u>	<u>Comments</u>
11/5	Aroclor Still Room	.376 X 10 ⁻³	1 still on Aroclor 1242
11/6	Tank Car Loading Platform	.273 X10 ⁻³	Loading Aroclor 1254 car
11/6	Aroclor Still Room	.095 X 10 ⁻³	Holding Aroclor 1242 in #3 Blend Tank
11/9	Tank Car Loading Platform	.246 X 10 ⁻³	Loading Aroclor 1242 Car
11/17	Tank Car Loading Platform	Results not available	Loading Aroclor 1254 Car
11/17	Warehouse Drumming Area	.573 X 10 ⁻³	Drumming Out Aroclor 1242
11/23	Aroclor Still Room	1.068 X 10 ⁻³	Distilling Aroclor 1242
11/24	Montar Hood	8.630 X 10 ⁻³	Drawing Aroclor 1242 Bottoms

This data indicates that the ambient air in the Anniston Plant manufacturing locations is considerably lower than the levels reported by Monsanto at Newport in September, 1970. This is probably because there has been very little manufacture of Liquid

Aroclors at Anniston during this period." [MONS 098287, December 29, 1970]

Doc ID # 907 Exhibit # P-0485

"Some problems have been encountered in sampling and analysis at Anniston which account to some degree for the low values. The prime sampling problem is the inefficiency of the scrubbers at very high sampling volumes. (i. e., The scrubber is not 100% efficient at high air flow rates)."

"Plans are to continue sampling during January in an attempt to gather more reliable data on P.C.B. losses to the atmosphere. This data will be communicated to you as soon as it can be obtained."

[MONS 098287-88, "Letter from E. G. Wright (Anniston Plant, Alabama) to W. B. Papageorge: P.C.B. Levels in Ambient Air, at Anniston Plant," December 29, 1970.]

Doc ID # 907 Exhibit # P-0485

443.
11/30/70

The Anniston Star obtained figures from the FDA showing unusually high levels of PCB in fish samples taken from Choccolocco Creek. Monsanto made the reporter to visit the plant and to report on the newspaper that the PCB problem was relatively new, was being solved by Monsanto and, at this point, was no cause for public alarm.

"The Anniston Star, Anniston, Ala., somehow obtained figures from the FDA which showed unusually high levels of PCB in fish samples taken from Choccolocco Creek. A Star reporter contacted the Anniston plant for comments on the data and information about our PCB production operations there. Public relations prepared replies to specific questions.

Plant management convinced the reporter to visit the plant for a firsthand view of what the plant was doing to eliminate PCB escape to the environment. A factual front-page feature appeared in the Star Sunday, November 22, edition reflecting the value of cooperation with news media planning PCB stories.

Quoting both plant management and the Alabama Water Improvement Commission, the feature emphasized the PCB problem was relatively new, was being solved by Monsanto and, at this point, was no cause for public alarm."

[MONS 099530, "Letter from E. V. John to Mr. W. B. Papageorge: November PR Report," November 30, 1970.]

Doc ID # 373 Exhibit # P-0187

444.
12/1970

Monthly Report: Aroclor losses during December averaged 1.5 lbs./day. (321 ppb). Test results demonstrated that "Bentonite Clay and Betz Polymer 1175 combination is very effective in removing solids from Limestone Pit effluent", which would effectively reduce Aroclor concentrations in the effluent.

"Current Level

Aroclor losses during Dec averaged 1.5 lbs./day. (321 ppb). The breakdown of the numbers is:

26 Day average	182 ppb	0.8 lbs./day
2 Day pumping from old Limestone Pit	39	0.2
1 Day detergent wash of Aroclor dept.	58	0.3
2 Day removal collected PCB & solids in first Part of new Limestone Pit	42	0.3
Total average:	321 ppb	1.5 lbs./day

From this it is obvious that we can no longer detergent wash the Aroclor department. When the second Limestone Pit is completed, the losses from digging and pumping should be eliminated. Two pits will allow switching to a clean pit when one becomes saturated with PCB."

"Spills

Shutting the Aroclor department down for the New Years Day holiday caused the Therminol system surge tank to overflow when a valve leaked. The Therminol was caught in the department sump and no Therminol entered the plant effluent." [DSW 013912]

"Projects and Evaluations"

2. Laboratory tests conducted by Betz Laboratory representative in our Anniston laboratories indicates that Bentonite Clay and Betz Polymer 1175 combination is very effective in removing solids from Limestone Pit effluent."

[DSW 013912-13, "V. R. Haupt, Technical Service Department, Anniston Plant: Monthly Report - Aroclor Wastes," CONFIDENTIAL, Read and Destroy, December 1970.]

Doc ID # 30

Exhibit # P-0465

445.

12/07/70

PCB level from Anniston in November 1970 was as high as 1,410 ppb compared to an average of 246 ppb from Newport and 495 ppb from Krumarich Plant.

"One very important objective of our PCB environmental control program was to control the losses of PCB in our plants to achieve a maximum of 50 ppb in the waste water effluent by 1-1-71 and 10 ppb by 9-1-71.

During the month of September, Newport reported an average of 246 ppb. During November Anniston reported 1410 ppb and the Krumarich Plant reported 495 ppb.

Because of the seriousness of the PCB problem this level of performance cannot be allowed to continue. I do not recall that any of the plants have been denied a resource they requested to achieve the stated objectives.

We do not have the luxury of unlimited time to combat this problem. What do we need to reduce losses quickly?"

[MONS 098345, "Letter from W. B. Pagageorge (St. Louis) to J. R. Savage," December 7, 1970.]

Doc ID # 20055

Exhibit # P-0475

446.

12/07/70

Aroclor losses during November averaged 25 #/day (4620 ppb). An Australia Company also expressed concern on PCB contamination.

"Through our Australian organization we have received an inquiry from the Electracity Trust of South Australia. They have recently

received correspondence from General Electric Company, U.S.A., concerning the problems with Askarel Liquid Dielectric. As a result, they are requesting information from Monsanto as to the arrangements in Australia for the disposing of contaminated materials. We anticipate other inquiries from other parts of the world." [MONS 099406, December 7, 1970]

Doc ID # 889 Exhibit # P-0474

"EUROPE:

1. The decision has been taken to cease sales to non-controllable applications in the UK by 1 March, 1971." [MONS 099408, December 7, 1970]

Doc ID # 889 Exhibit # P-0474

"Environmental Program – U.S.

Analysis of a second set of Mississippi River fish collected above and below the WGK plant has been completed. The levels found in fillets from these fish ranged from 0.2 ppm to as high as 8 to 9 ppm total PCB's."

"Shrimp from Escambia Bay, fat and liver from a dead pig found near the Anniston landfill, GE plant water samples, Delaware River phthalic acid, and a U.S. Steel plant water effluent sample have also been analyzed for PCB's." [MONS 099410, December 7, 1970]

Doc ID # 889 Exhibit # P-0474

"MANUFACTURING:

W. G. Krummrich Plant

PCB Levels In the Atmosphere

Sampling program has been completed. Only significant area of loss is at the mix tanks due primarily to the nitrogen purge. Loss is in the range of 4 to 5 lbs/day. Plans are to replace the nitrogen purge with a nitrogen blanket." [MONS 099414, December 7, 1970]

Doc ID # 889 Exhibit # P-0474

"Anniston Plant

PCB Levels in Sewer

Aroclor losses during November averaged 25 #/day (4620 ppb). One high value accounted for 18 #/day, neglecting this the November average would be 7 #/day (1410 ppb). Based on knowledge of plant operations and performance of abatement devices in November, much of the high level data is due to sample contamination."

"Spills

Minor leaks were contained by use of sand and disposal in drums. No spills occurred."

[MONS 099406-415, "Letter from W. B. Papageorge to P. J. A. Marsh, et al.: PCB Environmental Problem -- November Status Report," December 7, 1970.]

Doc ID # 889 Exhibit # P-0474

447.

12/14/70

Anniston effluent samples were in a range from 10 – 300 ppb during November and December 1970. "3 – 5 Samples per month are high, 1000 ppb – 10,000 ppb". However, "When 1221 values are subtracted out (for reporting to AWIC) levels are reduced to 1/2 or 1/3 of total Aroclor value".

"This will restate the points we discussed today on reported Aroclor losses.

- November and December experience tells us that the majority of Anniston effluent samples are in a range from 10 ppb – 300 ppb with many of these at or below the 100 ppb level. (Data attached)
- 3 – 5 Samples per month are high, 1000 ppb – 10,000 ppb, some of these can be interpreted and explained as to probable cause, some cannot be and are preceded and followed by low values. These high values greatly increase monthly average ppb values."
- "When 1221 values are subtracted out (for reporting to AWIC) levels are reduced to 1/2 or 1/3 of total Aroclor value.

- Since the regulatory agencies are interested in lbs./day, discharged and much of our effort is directed toward reducing waste water flow, results should be viewed on a lbs./day basis rather than concentration only.

The pilot clarifier we have obtained from Biodize is scheduled to be installed this week. This action is the step required to keep moving on the 9-1-71 target for 10 ppb."

[MONS 099001, "Letter from J. C. Landwehr (Anniston Plant) to W. B. Papageorge (General Offices): Aroclor Reported Losses, Anniston," December 14, 1970.]

Doc ID # 9329 Exhibit # P-0478

Also See: MONS 099213.

Doc ID # 894 Exhibit #

448.

12/14/70

Letter from Papageorge to Richard: Monsanto was planning to perform another "Biodegradation Test Program". Papageorge said that "the information we seek from these studies is important to the business groups concerned".

"Upon reviewing S. Tucker's 'Biodegradation Test Program' dated November 20, 1970 I find that it is:

1. A listing of the products now under active study with estimated dates of completion of the work.
2. A listing in order of priority within business groups of products we hope to study sometime in the future.

No attempt has been made to target the starting and completion dates for the future work. Since the information we seek from these studies is important to the business groups concerned, the coordination of related studies, the preparation of other plans and the formation of sound business decisions are affected.

In addition I am concerned that we have not highlighted the possibility that unless this work is stretched out over several years we do not now have the resources to handle it."

[MONS 098189, "Letter from W. B. Papageorge to W. R. Richard," December 14, 1970.]

Doc ID # 896 Exhibit #

449.
12/14/70

Reported Aroclor Losses in Anniston: "3 – 5 Samples per month are high, 1000 ppb – 10,000 ppb".

"This will restate the points we discussed today on reported Aroclor losses.

- November and December experience tells us that the majority of Anniston effluent samples are in a range from 10 ppb – 300 ppb with many of these at or below the 100 ppb level. (Data attached)
- 3 – 5 Samples per month are high, 1000 ppb – 10,000 ppb; some of these can be interpreted and explained as to probable cause, some cannot be and are preceded and followed by low values. These high values greatly increase monthly average ppb values.
- A statistical/multiple sampling program is underway to improve sampling analytical results precision and accuracy. Initial results are inconclusive; present experiments will be completed by year end.
- When 1221 values are subtracted out (for reporting to AWIC) levels are reduced to 1/2 or 1/3 of total Aroclor value.
- Since the regulatory agencies are interested in lbs./day, discharged and much of our effort is directed toward reducing waste water flow, results should be viewed on a lbs./day basis rather than concentration only."

[DSW 013819, "Letter from J. C. Landwehr to W. B. Papageorge: Aroclor Reported Losses, Anniston," December 14, 1970.]

Doc ID # 31 Exhibit # P-0476

450.
12/15/70

Letter to Mr. J. L. Crockett, Jr., Technical Staff Director, AWIC: Anniston reported to AWIC the losses of Aroclor 1242 and 1254 in November 1970. The monthly average was 8.85 lbs/day.

"Attached you will find the daily Aroclor 1242 & 1254 losses from the Anniston Plant for the month of November 1970."

"At your request, we are also reporting to you the average daily flow and a #/day figure in this report.

Average flow = 500 GPM or 720 M gals./day

Average (1242 & 1254) = 1.476 P.P.M.

Average # Aroclor 1242 & 1254 = 8.85 #/day

We do not feel that the sample which was taken on the 29th is representative of the plant effluent on this date. If this abnormally high concentration (28 P.P.M.) is neglected the values for the month of November are much more in line with the October values. The averages, excluding this value, for November are as follows:

Average (1242 & 1254) = .323 P.P.M.

Average # Aroclor 1242 & 1254 = 1.94 #/day"

[DSW 013111, "Letter to Mr. J. L. Crockett, Jr., Technical Staff Director, Alabama Water Improvement Commission," December 15, 1970.]

Doc ID # 20053 Exhibit # P-0479

451.

12/21/70

Letter from Tucker to Papageorge: PCB Content of HOG Fat and Liver Samples Sent from Anniston.

Estimated

	<u>Aroclor 1242</u>		<u>Aroclor 1254</u>	
	<u>Lipid Weight</u>	<u>Wet Weight</u>	<u>Lipid Weight</u>	<u>Wet Weight</u>
Fat	1.12%	0.03%	1.92%	0.05%
Liver	0.16%	69 ppm	0.14%	92 ppm

E. G. Wright should be contacted for details regarding the source of these samples, etc."

[MONS 099860, "Letter from E. S. Tucker to W. B. Papageorge (General Offices): PCB Content of HOG Fat and Liver Samples Sent from Anniston," December 21, 1970.]

Doc ID # 902 Exhibit # P-0480

452.

12/22/70

USDA published a public relation notice, PR Notice 70-25, which commented PCBs and PCTs.

"On October 29, 1970, The U.S. Department of Agriculture published a public relations notice, PR Notice 70-25, which commented on both polychlorinated biphenyls (PCBs) and polychlorinated terphenyls (PCTs). This notice has caused considerable stir and deserves some clarification. So that you will be able to answer inquiries from your customers on this matter, here is the position Monsanto has taken. A copy of the notice is attached.

Monsanto has been one of the leaders in the world community as far as studying the problems and potential problems of PCBs and PCTs in the environment. As a result of these studies, we have established that PCBs do exist in the environment and that they probably do cause problems in some species of marine life and birds. As a result of these findings, Monsanto has taken several actions to prevent the spread of these products in the environment, among these being our request on April 13, 1970 to the U.S. Department of Agriculture that they not approve the use of PCBs in insecticides. On the other hand, to our knowledge, there is no data which has established PCTs as a problem in the environment. Hence, Monsanto does not believe that there is any present substantiation for the statements in PR Notice 70-25 as they relate to polychlorinated terphenyls."

[MONS 098485, "Letter from W. S. Clark (General Offices) to Regional Managers, and Field Sales Representatives," December 22, 1970.]

Doc ID # 904 Exhibit # P-0481

453.

12/24/70

Letter from Savage to Landwehr (Anniston): Monsanto required Anniston to keep its PCB pollution capital and expense to minimum. "I cannot agree that the 'Toxicological Account will be \$10M/month in 1971.'" "We simply cannot afford it. Project Development work, in particular, is unrealistic."

"At a meeting on December 9, 1970, it was decided that we would move toward total liquid Aroclor production at WGK and, to quote from the minutes (J.L. Gorder has a copy),

'PCB pollution capital at Anniston should be held to a minimum consistent with the phase-out and reasonable control of chlorinated terphenyl'.

"While only capital is mentioned, expense is also important.

Your 12/15 memo confirms that we will complete three major expenditures --

- 1) Limestone pit clean-out (\$17,000 expense)
This is needed to attain the continuing benefits of the second pit already installed. Two pits, well managed, are probably needed to give reasonable control of chlorinated terphenyl.
- 2) Reactor-clarifier pilot unit (\$11,000 expense).
- 3) Biological consultants (\$4,500 more in '70, \$18,000 in '71).
Since PCB's may persist in streams for a while after production is stopped, this expenditure is probably needed through '71.

I cannot agree that the 'Toxicological Account will be \$10M/month in 1971. (\$6700 over present budget)...' We simply cannot afford it. Project Development work, in particular, is unrealistic. Even with liquid Aroclor production suspended, we may fail to make 10 ppb by 9/1/71 because of sludges in the stream bed, but a waste treatment system is no answer to that."

[MONS 099820, "Letter from J. R. Savage to Mr. J. C. Landwehr (Anniston Plant)," December 24, 1970.]

Note: Here, \$10 M = \$10,000 based on other related documents, not \$10 million.

Doc ID # 905

Exhibit # P-0482

454.

12/29/70

Air samples were collected in Anniston from November 5 to 24, 1970. Because there had been very little manufacture of Liquid Aroclors at Anniston during this period, the PCBs concentrations detected in the plant air were "considerably lower than the levels reported by Monsanto at Newport in September, 1970." Further air sampling was to be conducted in January to gather more reliable data on PCB losses to the atmosphere.

"Listed below is the data which has been collected to date on P.C.B. losses to the atmosphere at Anniston. These samples were collected primarily in the ambient air at each designated location.

<u>Date</u>	<u>Sampling Location</u>	<u>P.C.B. Concentration</u> <u>mg/m³</u>	<u>Comments</u>
11/5	Aroclor Still Room	.376 X 10 ⁻³	1 still on Aroclor 1242
11/6	Tank Car Loading Platform	.273 X10 ⁻³	Loading Aroclor 1254 car
11/6	Aroclor Still Room	.095 X 10 ⁻³	Holding Aroclor 1242 in #3 Blend Tank
11/9	Tank Car Loading Platform	.246 X 10 ⁻³	Loading Aroclor 1242 Car
11/17	Tank Car Loading Platform	Results not available	Loading Aroclor 1254 Car
11/17	Warehouse Drumming Area	.573 X 10 ⁻³	Drumming Out Aroclor 1242
11/23	Aroclor Still Room	1.068 X 10 ⁻³	Distilling Aroclor 1242
11/24	Montar Hood	8.630 X 10 ⁻³	Drawing Aroclor 1242 Bottoms

This data indicates that the ambient air in the Anniston Plant manufacturing locations is considerably lower than the levels reported by Monsanto at Newport in September, 1970. This is probably because there has been very little manufacture of Liquid Aroclors at Anniston during this period." [MONS 098287, December 29, 1970]

Doc ID # 907

Exhibit # P-0485

"Some problems have been encountered in sampling and analysis at Anniston which account to some degree for the low values. The

prime sampling problem is the inefficiency of the scrubbers at very high sampling volumes. (i. e., The scrubber is not 100% efficient at high air flow rates)."

"Plans are to continue sampling during January in an attempt to gather more reliable data on P.C.B. losses to the atmosphere. This data will be communicated to you as soon as it can be obtained."

[MONS 098287-88, "Letter from E. G. Wright (Anniston Plant, Alabama) to W. B. Papageorge: P.C.B. Levels in Ambient Air, at Anniston Plant," December 29, 1970.]

Doc ID # 907 Exhibit # P-0485

455.
12/29/70

In December 1970, 134 fish samples were collected in Anniston area for analyzing PCB residues.

"This memo will serve to set the priorities which will be followed on analyzing the December, 1970 fish samples for P.C.B. residues. Due to the large number of samples (134) and the time and expense required to analyze these samples, we will first analyze the minimum number which Drs. Gunning and Suttikus feel are the ones necessary to ascertain the extent of the residual P.B.C. problem.

These consist of the six target species of fishes at all ten of the sampling stations. This will reduce the number of separate samples from 134 down to approximately 55-60 samples." "Reducing the number of analysis on these samples will also speed up completion of the results."

[MONS 098217, "Letter from E. G. Wright (Anniston, Alabama) to J. T. Bell, J. C. Landwehr, and M. D. Turner: Priority on P.C.B. Residue Analysis," December 29, 1970.]

Doc ID # 906 Exhibit # P-0484

456.
1971

In 1971, PCB was banned in Sweden.

457.
1971

In 1971, the problem of polychlorinated biphenyls (PCBs) became of national concern in the United States of America due to several reported accidental contamination of foods.

"The problem of polychlorinated biphenyls (PCBs) became of national concern in 1971, when several accidental contaminations of foods were reported. In addition, the extent of the environmental contamination, and its persistence, were not precisely known. Subsequently, various regulatory actions were taken by the concerned agencies involved and, with the cooperation of the only U.S. producer, the situation was felt to be under control." "Then, in 1975, the reported high levels of contamination, with PCBs, of Hudson River fish, refocused national attention on this environmental contaminant. It was soon apparent that the action and control measures of the early 1970's had not succeeded in totally reducing, or even substantially alleviating the problems associated with this environmental pollutant."

[M07598, "Final Report of the Subcommittee on the Health Effects of Polychlorinated Biphenyls and Polybrominated Biphenyls," July 1976.]

Doc ID # 1322 Exhibit # P-0789

458.
1971

- 1) Sales of chlorinated biphenyl-based fluids in Hydraulic Fluids were discontinued.
- 2) Sales of most chlorinated biphenyls plasticizers were terminated in 1970, with phaseout completed in 1971.
- 3) Sales in PCBs in miscellaneous industrial uses were ended in 1971.

[MONS 211565, "Polychlorinated Biphenyls, PCB's, A Report on Uses, Environmental and Health Effects and Disposal," 1979 (?).]
Note: No date is available for the Report.

Doc ID # 7716 Exhibit # P-0802

459.
1971(?)

Epidemiologic study on 'Yusho', a poisoning caused by rice oil contaminated with polychlorinated biphenyls was conducted and the results were published by Masanori Kuratsune, et al from the Department of Public Health, Faculty of Medicine, Kyushu University, Japan. The report indicated that "The majority of the babies were small for their periods of gestation." "The affected school children were compared with matched unaffected children for growth. The gains of the affected boys in height and weight was shown to have decreased after the poisoning" by PCBs.

"Sporadic outbreaks of a peculiar skin disease which was later called as 'Yusho' were first reported in Fukuoka-Ken (Fukuoka prefecture), Japan, in early October 1968. It was characterized by such symptoms as follicular accentuation, acneform eruption, pigmentation of the skin and nails, hypersecretion of the Meibomian gland, increased sweating at Palms, feeling of weakness, and numbness in limbs. The epidemic spread not only over Fukuoka-Ken but also over 20 other prefectures in the western part of Japan, producing about 1,000 patients. In order to clarify the cause of the epidemic we conducted an epidemiologic investigation of 325 patients seen in Fukuoka-Ken from October 1968 until January 1969, under a close cooperation with the health departments.

1. Descriptive epidemiologic study

Ninety-nine percent of the patients were affected during 1968 and 55 percent of the cases were concentrated from June to August. The geographical distribution of the patients as observed by calculating crude incidence rates did not indicate any common socioeconomic or environmental factor which might be connected with the disease. A distinct familial aggregation was noted because the 325 patients belonged to 112 families. Both sexes, irrespective of age, were shown to be equally affected."

[MONS 062998, 1971]

Doc ID # 22224 Exhibit # P-0621

"4. Toxic agent

The chemical study group of the disease (Chief: Prof. H. Tsukamoto, Kyushu University) discovered that the canned K rice oil produced or shipped on February 5, 1968 and used by some of the patients had been contaminated with about 2,000 ppm of Kanechlor 400, a brand of polychlorinated biphenyls, which is considered to have leaked from the heating pipe of the oil in the process of production. Skin fat collected from the patients also contained Kanechlor."

"The minimum total dose of Kanechlor 400 to cause the disease was estimated to be around 0.5 g."

"5. Other observations

Thirteen women consisting of 10 with Yusho and two unaffected and one status-unspecified wives of patients were shown to have delivered 10 live born and two stillborn infants

during the specified period. These infants and fetuses had grayish darkbrown stained skin, nail, and gingiva, and an increased eye-discharge at birth. As they grew older, their stained skin gradually faded. The majority of the babies were small for their periods of gestation.

The affected school children were compared with matched unaffected children for growth. The gains of the affected boys in height and weight was shown to have decreased after the poisoning, while the affected girls showed no definite change in this respect.

Many patients with Yusho are still tortured by the disease even after more than 3 years. To cure them and to prevent another epidemic of Yusho, all possible world-wide cooperative efforts are highly desired."
[MONS 063002, 1971]

Doc ID # 22224 Exhibit # P-0621

[MONS 062997-63002, "Epidemiologic study on 'Yusho', a poisoning caused by rice oil contaminated with polychlorinated biphenyls" by Masanori Kuratsune, et al from the Department of Public Health, Faculty of Medicine, Kyushu University, Japan, 1971 (?)]

Note: ? = Estimated.

Doc ID # 22224 Exhibit # P-0621

460.
01/07/71

The PCB levels in the air at the Anniston Plant were determined. However, the data were not provided in this letter.

"The data contained in your letter of December 29, 1970 is very informative in that it gives us an idea of the PCB levels in the air to which our employees could be exposed.

Since we are lacking information on air movement at each location it is very difficult to equate the PCB concentration found to the amount of PCB eventually entering the environment.

For air pollution control purposes, a more meaningful measurement could result from the analysis of vapors from known sources and a measure or estimate of the rate, duration, and frequency of the vapor flow. Sources would include tank vents, jet exhausts, tank

car and tank truck openings, drumming locations as well as leaks and spills, which must be infrequent.

To communicate effectively performance in controlling vapor losses, I believe we must report these losses in actual pounds per day averaged over a period of time versus a target."

[MONS 098205, "Letter from W. B. Papageorge to E. G. Wright (Anniston Plant): PCB Levels In Air - Anniston Plant," January 7, 1971.]

Doc ID # 519 Exhibit # P-0491

461.

01/07/71

The average losses of Aroclors 1242 and 1254 in December 1970 reported to AWIC were 0.460 lbs/day with an average concentration of 104 ppb. Monsanto requested "that this data be held as confidential material".

"Attached you will find the daily Aroclor 1242 and 1254 losses from the Anniston Plant for the month of December, 1970. The average numbers are as follows:

Average flow = 384 GPM or 553 Mgals./day

Average (1242 & 1254) = .104 P.P.M.

Average # Aroclor 1242 & 1254 = .460 #/day

We are continuing in our efforts to define the precision and accuracy of our sampling and analytical methods. We are making progress in this endeavor as can be noted by the daily data. However, we would ask again that this data be held as confidential material."

[DSW 014755, "Letter from Eugene G. Wright, Pollution Control Engineer, Anniston Plant, to Mr. J. L. Crockett, Jr., Technical Staff Director, Alabama Water Improvement Commission," January 7, 1971.]

Note: here "M" gals = 1,000 gallons.

Doc ID # 2639 Exhibit # P-0492

462.

01/08/71

Letter from Papageorge to Marsh, et al.: According to the Monthly Report, the Aroclor losses during December 1971 in Anniston effluent averaged 1.5 lbs/day (321 ppb).

"A U. S. Dept. of Agriculture press release announcing the banning of both polychlorinated biphenyls and polychlorinated terphenyls in pesticide formulations has generated a considerable number of inquiries from our chlorinated terphenyl customers. Inquiries made to representatives of the U.S.D.A to establish reasons for including terphenyls have been answered with vague generalities. Formal protest is being prepared and will be forwarded." [MONS 099633, January 8, 1971]

Doc ID # 8349 Exhibit # P-0493

"W. G. Krummrich Plant
PCB Levels in the Atmosphere

A sampling station will be shared with the Chlorine Department to monitor PCB content of air downwind from the Aroclor Department. Samples will be taken every other week starting the week of 1/11/71." [MONS 099640-41, January 8, 1971]

Doc ID # 8349 Exhibit # P-0493

"Anniston Plant
Current Level – Aroclor Wastes

Aroclor losses during Dec. averaged 1.5 lbs/day (321 ppb). The breakdown of the numbers is:

26 Day average	182 ppb	0.8 lbs/day
2 Day pumping from old Limestone Pit	39	0.2
1 Day detergent wash of Aroclor Dept.	58	0.3
2 Day removal collected PCB & solids in first Part of new Limestone Pit	42	0.2
Total average:	321 ppb	1.5 lbs/day

From this it is obvious that we can no longer detergent wash the Aroclor department. When the second Limestone Pit is completed, the losses from digging and pumping should be eliminated. Two pits will allow switching to a clean pit when one becomes saturated with PCB." [MONS 099643, January 8, 1971]

Doc ID # 8349 Exhibit # P-0493

[MONS 099633-43, "Letter from W. B. Papageorge to P. J. A. Marsh, et al.: PCB Environmental Problem -- December Status Report," January 8, 1971.]

Doc ID # 8349 Exhibit # P-0493

463.
01/11/71

Filtration could substantially reduce the PCBs' concentrations in the effluent down to less than 10 ppb.

"The filtration and column adsorption phases of the work plan issued 9/9/70 have been completed. A report on the filtration study will be issued by 1/15/71. The data generated in the column study is being compiled for a cost estimate.

The following conclusions were drawn from the filtration study:

- a. Aroclor levels of the plant effluent were reduced to 10 ppb by filtration of the neutralization pit solids on which Aroclor was adsorbed and by adsorption on the filtering media.
- b. The removal of 200-1000 ppm of solids in the plant effluent is a primary concern in any final clean up system."

[MONS 098556, "Ishmeal Ransaw, PR&D Work Plan in Anniston: Aroclor Pollution Study," January 11, 1971.]

Doc ID # 522 Exhibit # P-0494

464.
01/13/71

Letter from John to Streeter: Monsanto tried to get a copy of the film entitled 'Are We Killing the Gulf', which contains references to Monsanto and PCB.

"Recently, a film titled 'Are We Killing the Gulf' was aired on several Gulf Coast TV stations. I have been told it contains references to Monsanto and PCB. Therefore, it could be of interest to various people at the general offices site.

Would you please contact the producer of the film, KTRC-TV in Houston, to see if it is available to us and at what cost."

[MONS 099808, "Letter from E. V. John (World Headquarters) to Mr. Hward F. Streeter," January 13, 1971.]

Doc ID # 8400 Exhibit # P-0496

465.
01/14/71

It was reported that at sufficient dosages, Aroclor 1254 did have an effect on ring neck pheasant reproduction behavior and survival of chicks.

"Attached is a pre-publication copy of an article reporting the results of PCB's on pheasant reproduction, etc. I think we can assume that there will be more and more of these appearing based on the samples we have provided various institutions in the last two years.

The data show that at sufficient dosages, Aroclor 1254 does have an effect on ring neck pheasant reproduction behavior and survival of chicks. Interestingly, there was no significant effect on eggshell thickness."

[MONS 098428, "Letter from Elmer P. Wheeler (Medical Department, St. Louis) to W. B. Papageorge," January 14, 1971.]

Doc ID # 527 Exhibit # P-0498

466.
01/15/71

Research and Development Report from Anniston Plant: Adsorption worked effectively on removing PCBs.

"Aroclor was removed from the plant effluent by filtration of the neutralization pit solids on which Aroclor was adsorbed and by adsorption on the filtration media. Aroclor concentrations (100-8,000) in the plant effluent were consistently reduced to 10 ppb upon passing through a four (4) inch diameter tube (packed to a bed depth of 5.5 inch with activated carbon) at flow rates up to 350 cc/min. In the sand filtration study conducted under similar operation conditions, the Aroclor levels in the effluent were not consistently reduced to the target level (<10 ppb).

[DSW 014331, Anniston Plant, "Research and Development Report," COMPANY CONFIDENTIAL, January 15, 1971.]

Doc ID # 37 Exhibit # P-0500

467.

01/15/71

Letter from Carr to Churchill, et al.: Carr cautioned Churchill to pay special attention to the "article on the UK PCB situation, which appeared in this month's issue of the Ecologist." He suggested to have "a previously cleared PCB "position paper" and answers to key questions on hand for use at short notice" in order to get sympathy from the press.

"I should like to draw your special attention to the attached article on the UK PCB situation which appeared in this month's issue of the Ecologist.

An article on PCBs was originally scheduled to appear in the October issue of this magazine under the somewhat sensational heading: 'The PCB Story – Ecological Havoc Wrought By a Toxic Industrial Chemical'."

"We have received a large number of inquires from the national and trade press since the Ecologist's article appeared and we have been able to deal with them without any difficulty or delay. Most people wanted verification and details of the voluntary ban.

This latest stage in the continuing PCB saga re-emphasizes the importance of having a previously cleared PCB "position paper" and answers to key questions on hand for use at short notice. Certainly, events are proving that the press is sympathetic and reluctant to criticize an organization that recognizes it has a problem of this magnitude and is seen to be taking active and responsible steps on its own initiative to curb it."

[MONS 099501, "Letter from John Carr to J. Churchill, et al.: PCB Article – Ecologist Magazine," January 15, 1971.]

Doc ID # 8325 Exhibit # P-0554

468.

01/15/71

Letter from Papageorge to F. Macdonald: PCB levels in atmosphere in Newport Plant were determined, and Papageorge said that the report "is excellent and very useful".

"R. Thomas' report on Technical Services Department Job 21/7139/2392 'Environmental Contamination by PCB (Atmospheric)' dated December 30, 1970 is excellent and very useful in defining the atmospheric PCB exposure our employees are experiencing."

"As a measure of the PCB's entering the environment from your plant's gaseous effluents the information has its shortcomings because we have no measure of the air movement through each of the locations tested."

"A more meaningful set of data could possibly be obtained by identifying the sources of atmospheric contamination such as tank vents, jet exhausts, vacuum pump exhausts, drumming station losses, tanker openings and known leaks and spills which should be very infrequent. A determination of the PCB content of the gases from these sources could be made from sample analysis. This concentration, along with the rate of gas flow, duration of flow and frequency of occurrence could be used to arrive at a good estimate of the amount of PCB being lost."

"To effectively communicate performance in controlling vapor losses, I believe we must report these losses in actual pounds per day averaged over a period of time versus an established target loss."

[MONS 098203, "Letter from W. B. Papageorge to F. Macdonald (Newport): PCB Level In Atmosphere - Newport Plant," January 15, 1971.]

Doc ID # 529 Exhibit #

469.

01/18/71

Letter from E. G. Wright to W. B. Papageorge: P.C.B. Losses to Atmosphere at Anniston Plant were discussed. Wright wrote that "Should the sales forecast increase in the future, we will again initiate the air sampling program and develop further data to determine whether or not air losses from the Anniston Plant do pose a serious problem."

"I have also included on this sheet the theoretical losses which we would expect if the plant was operating at design capacity (53 M #/yr.). The samples which were used to calculate the measured losses were taken in November, 1970 when the plant was operating at a rate equivalent to 3 M #/yr. This partially explains the very low values which were obtained from actual sampling.

Since production will be much lower in 1971 (i.e. 4 M#/yr.), the daily maximum value loss will be considerably lower. This lower rate will decrease the maximum theoretical daily loss to approximately .93#/day. Provided that the measured losses compare to the

theoretical losses as is shown in the attached data, the actual losses will be negligible.

Should the sales forecast increase in the future, we will again initiate the air sampling program and develop further data to determine whether or not air losses from the Anniston Plant do pose a serious problem."

[DSW 014057, "Letter from E. G. Wright to W. B. Papageorge: P.C.B. Losses to Atmosphere at Anniston Plant," January 18, 1971.]

Doc ID # 38

Exhibit # P-0502

470.

01/20/71

Letter from J. C. Landwehr to J. R. Savage: Estimates for 1971 Aroclor Waste expenses were revised.

"This revises estimates of my 12/15/70 memo for 1971 Aroclor Waste expenses. The rough numbers discussed with you on 1/18/71 have been further reviewed with some additional reductions being made. Expenditures under items 1 - 3 have been previously approved and are within approved budgets. Item 4 expenditures will be made only if necessary after review with the Production Superintendent concerned on a case basis.

1a) Completion of Limestone Pit Upgrade to give Anniston two pits for switch operation with demonstrated capability not to exceed 2 lbs./day PCB on a monthly average basis with 6 pH without phosphoric acid or 4.5 pH with.

(TSD - \$3000, Mach. - \$7000): 1971 Expense \$10,000

[DSW 13774, "Letter from J. C. Landwehr to J. R. Savage (General Offices): Anniston - 1971 Aroclor Waste Costs," January 20, 1971.]

Doc ID # 33

Exhibit # P-0503

471.

01/21/71

The effluent flow increased while the PCB concentration remained to be constant. Thus, with the increase of flow in the effluent, the total loss of Aroclor in the effluent was expected to be increased by 0.76 #/day.

"This memo will serve to inform you of what effect the increased flow due to the Nian incinerator scrubber will have on the P.C.B. levels leaving the Anniston Plant. This additional flow is anticipated to be approximately 200 gpm. This 200 gpm added to the average

December flow by $\cong 385$ gpm makes the total flow 585 gpm (a 52% increase).

In the past, the Aroclor concentration of the effluent stream has not changed drastically when the flow was reduced. Therefore, we do not expect this change when increasing the flow. If this holds true, then the Aroclor losses (#/day) should increase with this additional flow.

Assuming that the concentration does remain relatively constant at about the same level as December (i.e. $\cong 320$ P.P.B.), we would expect an increase in Aroclor losses of .76 #/day.

It is not known exactly why the concentration does not change with the flow, but it is thought to be related to the fact that the retention time is shorted considerably by increasing the flow. This results in less time for absorption and settling to take place."

"The effect of both of these flow changes will be to increase the total plant effluent flow by some 50 gpm and the daily Aroclor losses by some .20 #/day provided there is no concentration change."

[MONS 098286, "Letter from E. G. Wright (Anniston, Alabama) to J. L. Corder, P. B. Hodges, C. L. Jessee, L. C. Lahman, and W. B. Papageorge: Increase in Effluent Flow due to Start-up of Niran Incinerator," January 21, 1971.]

Doc ID # 532 Exhibit # P-0505

472.
01/25/71

Discharge of PCB had substantial impact on environment. For example, discharging 1,040 lbs of PCB would contaminate one trillion pounds of water to a level of one part per billion.

"You will recall that at the IEC-IOB meeting in Brussels Pierre Jay of Prodelec kindly gave me his detailed analysis reflecting Prodelec's views that they are not the source of PCB pollution in Sweden, as result of their sale of Pyralene 1499 to Liljeholmens, the sole user of askarel in Sweden.

Consequently we analyzed all the materials given in the attached list. Without giving the exact detail findings, for all practical purposes the higher PCB contents are about the same for all. The only exception is our proposed MCS-1016 where we have gone to great means to remove the higher PCBs.

Thus we found Pyralene 1499-1500 and 1500S quite similar to Aroclor 1242 regarding higher PCB.

Without burdening the reader with all of Mr. Jay's calculations of the pollution situation in Sweden, the following will suffice. He concluded introducing 90 pounds of higher PCB per year into the Swedish environment. However, based on our analysis of Pyralene 1499 we conclude that the amount is 1,040 lbs. per year, from Liljeholmens capacitor operation."

"Put into terms of ecological considerations and particularly sea eagles in the case of Sweden, this level of higher PCB would contaminate one trillion pounds of water to a level of one part per billion."

[MONS 098294, "Letter from P. G. Benignus (St. Louis) to P. J. A. Marsh (Brussels)," January 25, 1971.]

Doc ID # 535

Exhibit # P-0839

473.

01/28/71

Bergen made comments on the new compound trichlorobiphenyl oxide. Monsanto was trying to include it as one of the substitutes for Aroclor 1242 if PCB's were banned by government agencies.

"Thank you for your comments on trichlorobiphenyl oxide. This information was most timely and one that we must consider quite carefully.

While I certainly agree that it may be to Monsanto's advantage to come up with something more relating to Aroclors we certainly cannot hide our head in the sand about competitive type technologies in this important area. This, of course, is even further emphasized because of our won interest in DPO, as well as competition from Dow and Stauffer. We must be knowledgeable about this whole area of dielectric fluid competition. If PCB's were ruled out tomorrow by government agencies it seems quite likely to me this could be the closest thing to F.R. dielectric material and if this should happen, we better know about it and be prepared to do something about it. Consequently, I am asking W. Richard, W. Papageorge, R. Munch and J. Savage to get this fully involved in their programs."

[MONS 098254, "Letter from H. S. Bergen to P. G. Benignus: AROCLOR 1242 Dielectric vs. Trichlorobiphenyl Oxide, Dielectric," January 28, 1971.]

Doc ID # 538 Exhibit #

474.

01/29/71

Letter from W. B. Papageorge (St. Louis) to J. Savage: High levels of PCB in the effluent would continue because of the PCB's trapped in the soil and in the sewer systems.

In his inter-office Memorandum, Mr. W. B. Papageorge pointed out that "During the year as the plants gained tighter control of known sources of PCB pollution, it became increasingly obvious that high levels would continue because of the PCB's trapped in the soil and in the sewer systems. Clean-up of these sources can be economically impractical."

"Our studies in Anniston designed to develop methods for removing PCB's from dilute water streams were intended to provide us with a method for removing PCB's from isolated small waste streams. It appears that the PCB contamination is so widespread that all of the plant's effluent must be treated. This would result in a system more complex and costly than anyone had anticipated and approaches tertiary treatment which at W. G. Krummrich plant is scheduled for completion by 1973."

"For 1971 I am proposing that 1 pound per day of PCB in the water effluent be achieved in our plants by Sept. 1971 and 1 pound per day to the atmosphere by year end. These are levels which I believe the regulatory agencies might tolerate."

[DSW 013414, "Letter from W. B. Papageorge (St. Louis) to J. Savage: PCB in Plant Effluent," Jan. 29, 1971.]

Doc ID # 20138 Exhibit # P-0507

Also See: DSW 013850, and M39221.

Doc ID # 40 5399 Exhibit #

475.

02/1971

E. S. Tucker, Aroclor Defense - 1970 PCB Support Analysis: in 1970, Monsanto analyzed 486 samples. "The air, water, and sediment samples contained materials most typical of Aroclor 1242,

1248, 1254 and/or 1260. The milk, shrimp, and fish samples most often contained PCB's typical of Aroclor 1254-Aroclor 1260."

"SUMMARY

The attached table summarizes results of the work done during 1970 on the detection of PCB's in environmental materials. It covers a total of 486 samples which were analyzed during 1970. PCB's typical of our Aroclor products were found in

- Water and sediment from 4 manufacturing sites, 13 customer sites, 12 U.S. rivers, 1 U.K. river and Lake Michigan.
- Air at the Anniston Plant and at the Appleton Coated Paper Co.
- Fish from Lake Michigan and 8 U.S. rivers.
- Human fat from a midwest biopsy specimen.
- Milk from Maryland, Ohio, and Massachusetts dairy farms.
- Shrimp from Escambia Bay, Florida.

The air, water, and sediment samples contained materials most typical of Aroclor 1242, 1248, 1254 and/or 1260. The milk, shrimp, and fish samples most often contained PCB's typical of Aroclor 1254-Aroclor 1260.

RESULTS

See attached table."

The following is part of the attached table.

Location of Manufacturing or User Site	Associated Waterway	Sample Matrix	No. of samples	1242	1248	1254	PCB Level
Industrial							
Anniston Plant Anniston, Ala.	Snow Creek	Water	26	X	X	X	ppb-ppm
	Choccolasso Creek	Sediment	5	X	X	X	ppb-ppm
	Coosa River	Fish	35		X	X	ppb-ppm

[MONS 063092-94, E. S. Tucker, Monsanto Company, Organic Chemicals Division, Applied Sciences Section, "Aroclor Defense - 1970 PCB Support Analysis," CONFIDENTIAL, February 1972.]

Doc ID # 543

Exhibit # P-0508

476.

02/02/71

Letter from Early to Papageorge: Campbell had 180,000 lbs. of chicken on hand that was contaminated with PCB. "In addition, a number of poultry farmers within several counties of up-state New York, also have a large number of chickens that are also contaminated with PCB."

"A meeting was held here in Washington yesterday with representatives from Campbell Soup, Agway, U. S. Department of Agriculture and the Food and Drug Administration for the purpose of discussing the recent problem of polychlorinated biphenyl, contamination in chickens. Apparently Campbell, as of now, has 180,000 lbs. of chicken on hand that is contaminated with PCB. In addition, a number of poultry farmers within several counties of up-state New York, also have a large number of chickens that are also contaminated with PCB. In fact, one farmer alone has 30,000 chickens that are significantly contaminated. PCB residues have been found in the chickens, eggs and, to some extent, in feeds. One batch of feed analyzed contained 12 p.p.m. Several individual chickens analyzed were found to contain as much as 40 p.p.m. PCB.

After apparently much discussion among these 4 parties, FDA agreed to allow all chickens containing 5 p.p.m. or less in their fat to be processed through normal commercial channels. Those chickens with greater than 5 p.p.m. in their fat would have to go through a salvaging procedure whereby the skin and fat of the chickens must be removed and discarded."

"FDA was very careful to point out that they are by no means establishing a level of 5 p.p.m. of PCB as an allowable residue."

"As of now, no one is sure exactly how PCB is getting into these chickens and Campbell's and Agway along with FDA will continue their efforts to determine the source of contamination."

[MONS 100011, "Letter from Jack D. Early (Washington, D. C.) to W. B. Papageorge," February 2, 1971.]

Doc ID # 8465

Exhibit # P-0511

477.

02/02/71

PCBs were found in milk samples from GE, Pittsfield.

"Two sets of milk samples from GE, Pittsfield, from the same dairy herd have been analyzed for PCB's. The first set of samples were sent in thermos bottles and although the inner liners were broken during shipment, enough sample was obtained for analysis. A second sample was requested to verify the PCB levels found in the first set.

The level observed are shown in the following table:

<u>OR</u> <u>Log No.</u>	<u>Sample</u> <u>Description</u>	<u>Wet Weight</u> <u>(Whole Milk)</u>	<u>Lipid Weight</u> <u>(Butterfat)</u>	<u>Average</u> <u>Hexane</u> <u>Soluble Fat</u>
A-1	Hand milked	---	--*	
A-2	Hand milked	52 ppb	1.90 ppm	
B-1	Machine milked	49 ppb	1.79 ppm	3.56%
B-2	Machine milked	44 ppb	1.61 ppm	
1	Composite from	67 ppb	1.77 ppm	
2	Milk storage	59 ppb	1.54 ppm	3.83%
3	Tanks	70 ppb	1.83 ppm	

*Sample lost during analysis

It is interesting to note that the observed alterations in the GC chromatograms of this milk extract are similar to those seen in the past.

Just to be sure that the drinking water is the source of the problem, I have asked them to send us a sample of the cattle feed."

[MONS 098682, "Letter from E. S. Tucker to W. B. Papageorge: Analysis of GE Pittsfield Milk Samples for Polychlorinated Biphenyls," February 2, 1971.]

Doc ID # 548

Exhibit # P-0510

478.

02/03/71

Letter from Dr. Kelly, Medical Director at Monsanto to Dr. Quinby: Incidents related PCBs were reported in 1930s to 1950s.

"The literature indicates that there was a number of incidents of industrial effects in the late 1930's from the use of a waxy material composed of chlorinated naphthalenes, chlorinated biphenyls and chlorinated diphenyl ether. I submit, however, that there have been few instances reported since 1940 concerning ill effects in workers exposed to the chlorinated biphenyls or chlorinated terphenyls when used alone. In the rare cases that have been reported, the recommended procedures for safe handling and usage have been ignored." [M13617, February 3, 1971]

Doc ID # 2125 Exhibit # P-0512

"Monsanto has been aware that in the early and mid-1950's there was some use of PCB's as extenders for pesticides where the formulations were applied to field crops or, in the case of research sponsored in New York State not participated in by Monsanto, on forests for attempted control of elm tree disease." [M13617, February 3, 1971]

Doc ID # 2125 Exhibit # P-0512

"As I have indicated earlier, there were incidences of occupational illness in the late 1930's and perhaps early 1940's. I believe that facts are as indicated above that these were from uses where the polychlorinated biphenyls were used in conjunction with other chlorinated hydrocarbons. I would also point out that the number of instances may have been exaggerated since at that time one state health or labor department after another published bulletin after bulletin referring to the original cases. In this way there may have been some magnification of the seriousness of the situation. I repeat again for emphasis that we know the cases that occurred did not involve the use of polychlorinated biphenyls alone."

[M13618, "Letter from Dr. R. E. Kelly, Medical Director at Monsanto, to Dr. O. E. Quinby (Consulting Toxicologist, Wenatchee, Washington)," February 3, 1971.]

Doc ID # 2125 Exhibit # P-0512

479.

02/03/71

Letter from Vick to Dean, et al.: Vick wrote that "Analyses of muscle from croaker and menhaden taken from Bayou" "indicated a PCB concentration slightly in excess of 7 ppm." He was worrying that "it is probably that the FDA has taken samples for analyses."

"Dr. Duke has established sampling stations in the Escambia River and in the local bays." [MONS 100024, February 3, 1971]

Doc ID # 8469

Exhibit # P-0513

"Routine sampling of oysters in Escambia Bay near the eastern end of sample Station V and just off White Point in East Bay showed a maximum PCB content of 1.9 ppm with the latest values less than 0.5 ppm; this may be normal seasonal variation and Dr. Duke believes that the PCB content of oysters has plateaued.

Analyses of muscle from croaker and menhaden taken from Bayou Texar indicated a PCB concentration slightly in excess of 7 ppm. There was one analysis for each of the two species. There are apparently other analyses indicating levels less than the FDA 5 ppm action level, and it is probably that the FDA has taken samples for analyses."

[MONS 100024-25, "Letter from J. J. Vick to B. T. Dean, et al.: Polychlorinated Biphenyls," February 3, 1971.]

Doc ID # 8469

Exhibit # P-0513

480.
02/04/71

Monsanto planned "to examine the rat tissue, fish samples, milk samples, chicken samples, etc., for evidence of biodegradable vs. non-biodegradable chlorinated biphenyl isomers".

"I would like to set a target date of Monday, February 8, to have a written document which could help answer G.E.'s questions on MCS 1016, its degradation rate; and why MCS 1016 is a better fluid in the environment than Aroclor 1242 and Aroclor 1254."

"We were to examine the rat tissue, fish samples, milk samples, chicken samples, etc., for evidence of biodegradable vs. non-biodegradable chlorinated biphenyl isomers.

For our internal use this document should also review the Ruabon reports on which isomers will and won't degrade. We need to evaluate which isomers in MCS 1016, MCS 1043 may cause problems and evaluate the chances that culture Cs or solubilization of particular isomers will result in a biodegradation of refraction isomers such as 4, 4'."

[MONS 098574, "Letter from W. R. Richard (Research Center) to E. S. Tucker: Biodegradation Rates and Nature's Evidence of Biodegradation - Chlorinated Biphenyls," February 4, 1971.]

Doc ID # 556 Exhibit # P-0514

481.

02/04/71

The average losses of Aroclors 1242 and 1254 in January 1971 reported to AWIC were 1.130 lbs/day with an average concentration of 216 ppb. On January 17, 19, and 20, the Aroclor concentrations were 1,220, 1,660 and 2,234 ppb, respectively.

"Attached you will find the daily Aroclor (1242 and 1254) losses from the Anniston Plant for the month of January 1971. The average numbers are as follows:

Average flow = 504 gpm or 726 Mgals./day

Average concentration (1242 & 1254) = 0.216 ppm

Average # Aroclor (1242 & 1254) = 1.130 #/day

Please note that the values are somewhat higher for the month of January as compared to December. This is the result of plant construction which was conducted on January 17, 19, and 20. This construction is a part of the overall effort to reduce Aroclor losses.

If you have any questions regarding this data, please contact us. Again, we would request that this data be held as confidential material."

[DSW 014753-4, "Letter from Eugene G. Wright, Pollution Control Engineer, Anniston Plant, to Mr. J. L. Crockett, Jr., Technical Staff Director, Alabama Water Improvement Commission," February 4, 1971.]

Doc ID # 11652 Exhibit # P-0515

482.

02/05/71

"Anniston Plant: Aroclor losses during January averaged 1.8#/day (307 ppb). This was up from December."

[DSW 013443, "January 1971 PCB Report, Monsanto," February 5, 1971.]

Doc ID # 20148 Exhibit # P-0516

Also See: MONS 098337.

Doc ID # 557 Exhibit #

483.

02/05/71

Letter from Brown (Anniston, Monsanto) to Richard: Anniston PR&D developed data and thoughts concerning impurities in the Polyphenyl Process.

"This memo will summarize recent data and thoughts developed by Anniston PR&D concerning impurities in the Polyphenyl Process.

The following is a listing of the impurities identified in the polyphenyl Products at various times by PR&D and by Organic Research by GC/MS:

Impurities Estimated Typical Concentrations

- | | |
|-----------------------|-----------------------|
| 1. Naphthalene | 0-50 ppm in Biphenyl |
| 6. Phenanthrene | 3000 ppm in Santowax |
| 7. Phenyl Naphthalene | 1000 ppm in Santowax" |

"There have been questions from time to time concerning the amount of Toluene permissible in the Benzene feed stock. Historically this has been kept < 10 ppm to limit the Methyl Biphenyl Production. Analyses of the Benzene recycle in the plant over the past year showed 2000-3000 ppm Toluene in this material. This indicated that Toluene was actually formed in the tube or was accumulating in the recycled Benzene from the $\approx$ 5 ppm Toluene in the virgin Benzene. The latter was felt to be very unlikely." [MONS 202533, February 5, 1971]

Doc ID # 8674 Exhibit #

"Apparently Toluene acts as a building block for the formation of other impurities listed earlier."

"Attempts to explain this exothermic reaction lead us to believe that apparently these impurities have undergone an addition type chlorination during the chlorination step. When the mass is treated with NaOH at elevated temperature, HCl is stripped off and reacts immediately with the caustic." [MONS 202534]

Doc ID # 8674 Exhibit #

[MONS 202533-34, "Letter from J. L. Brown (Anniston, Monsanto) to W. R. Richard: Polyphenyl Impurities," February 5, 1971.]

Doc ID # 8674 Exhibit #

484.
02/08/71

Letter from Papageorge to Marsh, et al.: 1. High PCBs concentrations were detected in fatty tissue of food in New York State; 2. In the January Status Report, it also revealed that "Aroclor concentrations (100–8,000 ppb) in the plant effluent were consistently reduced to 10 ppb" by use of activated carbon adsorption.

"PCB's as high as 40 ppm in fatty tissue have been detected in chicken in New York State. EPA and USDA agreed to permit 180,000 pounds to be released for food use if PCB content does not exceed 5 ppm in salvaged edible parts. Sources of PCB has not been determined." [MONS 099646, February 8, 1971]

Doc ID # 8350 Exhibit # P-0517

"Aroclor Pollution Study – Anniston

Aroclor was removed from the plant effluent by filtration of the neutralization pit solids on which Aroclor was adsorbed and by adsorption on the filtration media. Aroclor concentrations (100–8,000 ppb) in the plant effluent were consistently reduced to 10 ppb upon passing through a four (4) inch diameter tube (packed to a bed depth of 5.5 inch with activated carbon) at flow rates up to 350 cc/min. In the sand filtration study conducted under similar operating conditions, the Aroclor levels in the effluent were not consistently reduced to the target level (< 10 ppb). The present of 200–1000 ppm of solid particles (size range 1.5 – 250 μ) tended to blind the filter, thus setting a maximum limit on the pressure and flow at which the unit had to be operated." [MONS 099654, July 23, 1971]

Doc ID # 8350 Exhibit # P-0517

"Conclusion

1. Aroclor is removed from the plant effluent by the filtration of the solids on which Aroclor was adsorbed.

2. Aroclor is adsorbed on activated carbon within a very short adsorption zone.
3. The effectiveness of sand in removing Aroclor is not sufficient at the experimental bed depth.
4. Solids removal is a primary concern in any final clean-up method." [MONS 099655]

Doc ID # 8350 Exhibit # P-0517

[MONS 099646-55, "Letter from W. B. Papageorge to P. J. A. Marsh, et al.: PCB Environmental Problem, January Status Report," February 8, 1971.]

Doc ID # 8350 Exhibit # P-0517

Also See: DSW 013612.

Doc ID # 20172 Exhibit #

485.
02/08/71

The State of Florida informed Monsanto to take action immediately to prevent PCB's from getting into the river and bay, otherwise, it would face penalty.

"The State of Florida informed Monsanto's Pensacola Textile plant it must take emergency measures to prevent PCB's from entering the Escambia River estuary and bay and within 30 days have an approved permanent solution or face a penalty of \$5,000 per day. No PCB's are present in the plant effluent. The 2.5 ppb PCB's which were detected are being extracted from sediment contaminated prior to the summer of 1969."

[DSW 013612, "PCB Environmental Problem, January Status Report," February 8, 1971.]

Doc ID # 20172 Exhibit #

486.
02/18/71

Letter from Hood (Brussels) to Rodgers: The Environment Preservation Authority in Sweden requested the Swedish Government "to forbid by law import, manufacture or use of PCB's from the 1st January 1972".

"The Environment Preservation Authority in Sweden has requested the Swedish Government to forbid by law import, manufacture or use of PCB's from the 1st January 1972. This request is based on

an investigation carried out in Sweden about the amount of PCB found in birds and fishes in the Baltic Sea and from an alarming report from Japan. It is the high amounts of PCB's found in these animals and the long breaking-down-period of this substance that has caused this action. The high rate of PCB's in rice for eating purposes found in Japan, has contributed to this action from the Swedish authorities."

[MONS 099894, "Letter from T. Hood (Brussels) to Mr. B. Rodgers (Monsanto): PCB/Sweden," February 18, 1971.]

Doc ID # 8435 Exhibit #

487.
02/18/71

The Japanese public was very nervous about pollution problems of PCBs due to a recent report from "Asahi". Representatives of Monsanto in Japan sought for information and counter-measures, etc. from their US headquarters (Monsanto).

"Since Japan Broadcasting Corporation reported about the international conference on oceanic pollution held in Rome, Italy last December (as reported to you in Mr. Fujii's letter of December 29, 1970), the PCB pollution problem has come up before us as an important subject. With this background, the Welfare Ministry and National Hygienic Laboratory have started investigations for fact-finding.

Meanwhile, the "Asahi", one of the biggest newspapers in Japan, carried a sensational article dealing with a laboratory report issued by Ehime University on alleged PCB pollution. Attached is full translation of the newspaper article in which reference was also made to industrial uses for PCB and PCB manufactures in Japan including MMK.

The Japanese public is so nervous about pollution problems that we are afraid that the "Asahi" report will result in presentation of another pollution subject before the Japanese people.

Faced with such a new development of the situation, we would greatly appreciate it, if you would keep us well informed about any development of the situation in the US, results of your studies, counter-measures, etc."

[MONS 098395, "Letter from Mr. K. Murakami to Mr. W. B. Papageorge: PCB Pollution," February 18, 1971.]

Doc ID # 563 Exhibit # P-0518

488.

02/19/71

Letter from John, Public Relations Manager to Mrs. J. Gaillard: PCB was used in "Open Systems".

"In the early 1960s we suggested -- through our product literature -- that PCB could be used in other applications such as specialty paints, adhesives, chlorinated rubber, sealants, etc. These we call "open systems." [M13687, February 19, 1971]

Doc ID # 2205 Exhibit #

"You are probably correct in saying our financial statement would not be hurt substantially if we quit making PCB. But that is not really the issue."

[M13687, "Letter from E. V. John, Public Relations Manager to Mrs. J. Gaillard," February 19, 1971.]

Doc ID # 2205 Exhibit #

489.

02/26/71

Letter from John to Papageorge: John wrote that "Chemical Week asked what we would do differently if PCB were introduced as a new product today".

"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 chicken in New York state."

[MONS 099529, "Letter from E. V. John (World Headquarters) to William B. Papageorge: February 1971 PR Report, Polychlorinated Biphenyl," February 26, 1971.]

Doc ID # Exhibit #

490.

March 71

"Aroclor losses during February 1971 averaged 1.95 lbs./day (182 ppb)."

[DSW 013411, Monsanto, "Anniston Plant, Technical Services Department: Monthly Report," March 1971.]

Doc ID # 20136 Exhibit # P-0509

491.

March 71

Monsanto Specialty Products: "Analyses confirmed that a bakery by-product meal from Agway contains about 750 ppm polychlorinated biphenyl typical of Aroclor 1248."

"A research representative of Agway Company was instructed on the technique Monsanto uses to analyze biological samples for PCB's. During his visit, commercial chicken chow, chicken muscle and eggs were analyzed for PCB's. EC gas chromatography indicated that PCB's were present in all samples analyzed including an egg composite extracted in Agway's Research laboratories. The presence of tri, tetra, and pentachloro biphenyls in the Agway extract was confirmed by GC/Mass as well as EC/GC. The estimated levels of PCB's (as Aroclor 1248) found in the feed ranged from 0.10 to 0.17 ppm and in the muscle from 0.29 to 1.55 ppm."

[MONS 059807, April 1970.]

Doc ID # Exhibit #

"Analysis of a second composite egg sample from 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 from Agway confirmed this suspicion. 480 ppb PCB was found and the EC chromatogram of the meal extract was almost identical to carrier 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."

[MONS 059808, March 1971]

Doc ID # Exhibit #

"Aroclor Environmental Program

Analyses confirmed that a bakery by-product meal from Agway contains about 750 ppm polychlorinated biphenyl typical of Aroclor 1248. The source of the PCB is unknown."

[MONS 059807-09, Monsanto, "Specialty Products," March 1971.]

Doc ID # Exhibit #

492.

03/03/71

Level of Aroclor losses during February 1971 from Anniston effluent averaged 1.95#/day (182 ppb). It is worthwhile to notice that in WGK, it was said that "to replace the nitrogen purge with a nitrogen blanket" "will reduce air pollution about 5 lbs/day," but still it "is insignificant compared to losses from some Therminol units."

"A. W. G. Krummrich Plant

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." [MONS 098341, March 3, 1971]

Doc ID # 569 Exhibit # P-0522

"B. 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

Project and Evaluations

2. Installation of the reactor-clarifier. Experimental facilities for evaluating PCB removal by powdered adsorbent 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."

[MONS 098342, "Letter From J. R. Savage to Mr. W. B. Papageorge (General Office): February 1 PCB Report," March 3, 1971.]

Doc ID # 569

Exhibit # P-0522

493.

03/03/71

The average losses of Aroclors 1242 and 1254 in February 1971 reported to AWIC were 1.09 lbs/day with an average concentration of 102 ppb.

"Attached you will find the daily Aroclor (1242 and 1254) losses from the Anniston Plant for the month of February 1971. The averages are as follows:

Average flow = 892 gpm or 1.285 million gals./day

Average concentration (1242 & 1254) = 0.102 P.P.M.

Average # Aroclor (1242 & 1254) = 1.09 #/day

If you have any questions regarding this data, please contact us."

[DSW 014751, "Letter from Eugene G. Wright, Pollution Control Engineer, Anniston Plant, to Mr. J. L. Crockett, Jr., Technical Staff Director, Alabama Water Improvement Commission," March 3, 1971.]

Doc ID # 11651

Exhibit # P-0523

494.

03/04/71

Letter from Garrett to Oneson: Excessive exposure to Askarel "causes skin defatting and will create a chapped-like appearance" on the skin.

"I have attached a copy of the Medical Department statement covering Askarel fluids. In answer to the specific questions posed by Mr. J. M. Graham of the subject company, I would answer them as follows:

1. Exposure to skin: Workers should not have repeated or prolonged exposure to Askarel fluids because of their solvent properties. Excessive exposure causes skin defatting and will create a chapped-like appearance on the workers' skin.
2. Inhalation exposure: At room temperature Askarel fluids pose no inhalation problems because of extremely low vapor pressure. If the fluid is handled at elevated temperatures, proper exhaust ventilation should be used."

[MONS 098922, "Letter from Jack T. Garrett (Medical Department, St. Louis) to T. W. Oneson (Monsanto Canada Ltd.)," March 4, 1971.]

Doc ID # 9297 Exhibit # P-0524

495.
03/08/71

Letter from Johnson to Papageorge: Dr. Price and his Department had "analyzed 2,000 to 3,000 samples of human fat for pesticides including Aroclors." They discovered that "a few have been found over 100 ppm but the vast majority are in the 1 to 10 ppm range."

"I talked to Dr. Price of the Michigan Department of Public Health today. They apparently have analyzed 2,000 to 3,000 samples of human fat for pesticides including Aroclors. He states that a few have been found over 100 ppm but the vast majority are in the 1 to 10 ppm range. He identified the material as Aroclor 4465 because the chromatographic pattern they found best fit the sample of 4465 we had sent them. He presented this material at a FDA in-house conference in May of 1970."

[MONS 100032, "Letter from M. N. Johnson, M. D. (Medical Department) to W. B. Papageorge," March 8, 1971.]

Doc ID # 8471 Exhibit # P-0525

496.
03/10/71

Letter from Tucker to Papageorge: Up to 747 ppm of Aroclor 1248 was found, and confirmed in the Agway bakery by product meal sample.

"EC/GC analysis of the Agway bakery by product meal sample confirmed that Aroclor 1248 is present in the sample submitted to us. The level found by duplicate analyses was 747 ± 11 ppm.

The presence of this much Aroclor 1248 in the sample, combined with the fact that the material is unaltered Aroclor 1248, indicates that the meal is probably contaminated by direct contact with either Aroclor 1248 or a product containing Aroclor 1248. Likewise, these observations would eliminate recycled paper as the dominant PCB source."

[MONS 099188. "Letter from E. S. Tucker (Technology Department) to W. B. Papageorge: AGWAY-PCB Content of Bakery by Product Meal," March 10, 1971.]

Doc ID # 9413 Exhibit #

497.

03/11/71

Letter from John to Carr: John reminded Carr to prepare a "news release to counter possible adverse publicity" to Monsanto from the report by TIMES, which mentioned a government report to be issued soon on the Irish Sea incident caused by PCBs.

"After reading the TIMES, Fed. 13, 1971, article, ("Report Urges Study of Coastal Waters") which mentioned a government report to be issued soon on the Irish Sea incident, it occurred to me this might be a good time to start preparing a news release to counter possible adverse publicity from the report. I expect you probably already have plans in this direction, but just wanted to reinforce such a plan from this side."

[MONS 099497, "Letter from Edward V. John (World headquarters - St. Louis) to Mr. John D. Carr (London)," CONFIDENTIAL, March 11, 1971.]

Doc ID # 8323 Exhibit #

498.

03/19/71

Letter from S. Uneno to W. B. Papageorge: "PCB pollution problem has loomed large in Japan".

"As reported previously, PCB pollution problem has loomed large in Japan, MITI has started studying the possibility of applying environmental regulations to PCB while customers have come to request PCB toxicity data and its substitute."

[MONS 070873, "Letter from S. Uneno to W. B. Papageorge, St. Louis, Org. Div., St. Louis," March 19, 1971.]

Doc ID # 5173 Exhibit # P-0527

499.

03/22/71

A Kyushu University's report warned the public of a possible environmental pollution caused by PCB used in carbonless carbon paper, which was referred by a top ranking newspaper in Japan.

"As Mr. Murakami reported to you in his letter of February 19, PCB pollution problem was taken up for the first time by the "Asahi", one of the biggest newspapers in Japan, on February 9.

Following the "Asahi", the "Yomiuri" and the "Mainichi", both known as top-ranking newspapers, carried pollution articles in their February 26 issues, referring to a Kyushu University's report which warns the public of a possible environmental pollution caused by PCB used in carbonless carbon paper.

Again, February 27 issue of the "Yomiuri" reported on the attitude of the governmental authorities against the PCB pollution problem.

Attached are summary translations of the newspaper articles for your information."

[MONS 098396, "Letter from S. Uneno, Product Director, Division C, to Mr. W. B. Papageorge: PCB Pollution," March 22, 1971.]

Doc ID # 575 Exhibit #

500.

03/29/71

Letter from Papageorge to S. Unono: Papageorge said that "We have never claimed instant or complete degradation, but we have claimed that the isomers which are the most persistent have been removed".

"I appreciate your concern regarding the environmental acceptability of the various materials which are being offered by Monsanto Company as replacements for the conventional polychlorinated biphenyl products.

Laboratory tests have shown that Aroclor 1221, HB-40 and MIPB easily degrade, therefore assuring us they will not continue to accumulate in the environment.

The difference in degradability between Aroclor 1242 and MCS 1016 (formerly Aroclor 1242B) is a matter of degree. We have never claimed instant or complete degradation, but we have

claimed that the isomers which are the most persistent have been removed. We believe this represents a step in the right direction."

[MONS 098201, "Letter from W. B. Papageorge to S. Unono - Tokyo," March 29, 1971.]

Doc ID # 579 Exhibit #

501.
03/30/71

Letter from Keller to File: Human tissues from all over the United States were analyzed. "Levels usually range around a few ppm but occasionally get as high as 100-200 ppm polychlorinated biphenyls."

"Human tissues from all over the United States have been analyzed in this manner. Levels usually range around a few ppm but occasionally get as high as 100-200 ppm polychlorinated biphenyls. In some instance, the chromatograms most nearly resemble Aroclor 4465. Dr. Price realizes that this is a chlorinated biphenyl/terphenyl mixture and is reserving judgment on what he is really seeing. We agreed that he undoubtedly is looking at the PCB portion. Aroclor 1254 also has been found in human fat and he gave the following reference for this work involving their samples - Biros, Walker, Medbery, Bulletin of Environmental Contamination and Toxicology, Volume 5, p. 317, 1970."

"All human fat examined has had detectable pesticide residues and about one-half of these had detectable PCB's."

[MONS 099187, "Letter from R. E. Keller to File: Aroclor - Michigan Department of Health - Dr. Price," March 30, 1971.]

Doc ID # 9412 Exhibit # P-0528

502.
04/71

Monthly Report: Aroclor losses during April 1971 averaged 0.65 lbs./day (71 ppb).

"Aroclor losses during April '71 averaged 0.65 lbs./day (71 ppb)."

[DSW 013407, "V. R. Haupt, Technical Service Department, Anniston Plant: Monthly Report," CONFIDENTIAL, Read and Destroy, April 1971.]

Doc ID # 11976 Exhibit # P-0531

503.

04/02/71

In Monsanto's 1971 Management Plan for PCB problem, it admitted "Polychlorinated biphenyls have been identified as environmental contaminants and studies have indicated that they are involved in producing adverse effects." It said "Our overall objective continues to be the management of the polychlorinated biphenyl environmental contamination problem to minimize the adverse effects on Business Group, Division or Corporate objectives." It tried to "maintaining the corporate image of Monsanto as a responsible and respected member of industry worldwide."

I. "THE PROBLEM:

Polychlorinated biphenyls have been identified as environmental contaminants and studies have indicated that they are involved in producing adverse effects noted in some species of fowl, mammals and marine life. Monsanto is a major producer of polychlorinated biphenyls worldwide.

II. BASIC STRATEGY:

Our strategy for 1971 will continue the pattern followed in 1970. We will continue to assume an aggressive posture worldwide working closely with our customers, coproducers and regulatory agencies to prevent precipitous action.

III. OBJECTIVES:

Our overall objective continues to be the management of the polychlorinated biphenyl environmental contamination problem to minimize the adverse effects on Business Group, Division or Corporate objectives while maintaining the corporate image of Monsanto as a responsible and respected member of industry worldwide.

Objectives supporting the overall objective are as follows:

1. The polychlorinated biphenyls content of all effluent from Monsanto plants will be reduced and effectively controlled.

IV. ACTION PLAN:

1. Action - All plants to achieve a target of less than 1 pound per day in water effluent.

Date - September, 1971."

[MONS 041654-55, "Management Plan - 1971 Polychlorinated Biphenyl Environmental Problem," April 2, 1971.]

Doc ID # 4771 Exhibit # P-0532

504.

04/05/71

PCBs were mentioned as pollutants in food at the ACS meeting.

"Attached are several pages from this week's Food Chemical News with mention of environmental pollutants in food as discussed by FDA personnel.

PCB's were mentioned on several occasions. One of particular interest may be the papers described on "page 22" identified by the red ink."

[MONS 098332, "Letter from Elmer P. Wheeler to W. B. Papageorge: Mention of PCB's in papers at ACS Meeting," April 5, 1971.]

Doc ID # 582 Exhibit #

505.

04/08/71

Letter from Kelly: Kelly agreed that Monsanto should have an informal discussion with Dr. Upholt of EPA on the PCB problem.

"I agree with the suggestion in your memo that Monsanto should have an informal discussion with Dr. Upholt, Staff Director of the Pesticides Advisory Committee to EPA. I think Messrs, Papageorge and Wheeler could probably accomplish Monsanto's purpose in such a discussion, but if you feel my presence is necessary, I will be happy to accompany them."

[MONS 099682, "Letter from R. Emmet Kelly, M. D.: Meeting with Dr. Upholt - EPA," April 8, 1971.]

Doc ID # 8358 Exhibit # P-0533

506.

04/15/71

Monsanto treated its discussion on PCBs with the UK Government confidentially until the 'New Scientist' insisted on an interview.

"I am attaching copy of a letter received from Dr. Martin Holdgate, one of the senior men in the UK Government's Department of the

Environment, which now enjoys ministry status. He is the top authority on the marine pollution problem in the Government."

"On the Government side our discussions are being treated confidentially, and we have succeeded in maintaining a low profile. The same was generally true of the press until recently a journalist, working for the 'New Scientist', picked up the story and insisted on an interview. I finally had to succumb, and you will, no doubt, be seeing the resulting article through the official PR channels." [MONS 098397, April 15, 1971]

Doc ID # 584 Exhibit # P-0838

"We understand that the US situation is substantially different in many aspects, and I sincerely hope that no damage will result from the 'new Scientist' article."

[MONS 098397-98, "Letter from HN Dahlstrom (Brussels, Monsanto) to J. Mason (St. Louis)," April 15, 1971.]

Doc ID # 584 Exhibit # P-0838

507.
04/21/71

Monsanto said the problems related to chlorinated terphenyls from Swift "are evidently more related to acute toxicity than to environmental problems". Monsanto emphasized that "Our current PCB content in our chlorinated terphenyl line is less than 0.4% by weight", and they "fully expect that the chlorinated terphenyl products will remain in our product line."

"I have just received a rather torrid letter from Mr. Marks of Swift and Company, Ltd."

"While Swift's problems are evidently more related to acute toxicity than to environmental problems, I thought some comments on terphenyls and their ecological significance might be helpful to you at this time. As you know, we made our decision last spring to withdraw PCBs from open system applications. Needless to say, this decision was made only after much deliberation and evaluation of the data available to us. Based on this study, we concluded that it would be in the best interests of Monsanto, our customers, and the environment to stop selling PCBs into open system applications. We believe that this was a good decision based on the facts available at that time." [MONS 098562, April 21, 1971]

Doc ID # 587 Exhibit #

"Our current PCB content in our chlorinated terphenyl line is less than 0.4% by weight. We are bringing a plant modification project on stream at the end of this year which will reduce this level to approximately 0.01%. We are confident that this is a level which will not cause any environmental problems.

When Monsanto made its decision last spring to withdraw chlorinated biphenyls from open system applications, and to leave chlorinated terphenyls on the market, we considered all the information which was available to us at that time. The comments given above summarized some of the thinking that went into that decision. Since last spring, we have continued our studies and our evaluations, and have not as yet formed any new data which would tend to change our decision. We fully expect that the chlorinated terphenyl products will remain in our product line."

[MONS 098562-63, "Letter from Willis S. Clark to M. J. Harrison (London): Swift and Company, LTD.," April 21, 1971.]

Doc ID # 587 Exhibit #

508.
05/05/71

Toxicity study results with animals demonstrated that Aroclor 1254 significantly increased the size of the liver and also the percent lipid in the liver.

"The Bulletin of Environmental Contamination and Toxicology which we receiver today included seven articles concerning polychlorinated biphenyls."

"The second article on metabolism will be of interest in relation to our current analysis of tissues from the animals being studied at Industrial Bio-Test Laboratory. Further, the summary indicates 'male rats were orally dosed with Aroclor 1254 and residues were found in all tissue analyzed, with the greatest concentration in the fat..... Aroclor 1254 significantly increased the size of the liver and also the percent lipid in the liver. Aroclor 1254 was found to potentiate the toxicity of carbon tetrachloride in the rat."

"The third article reports data from the Gulf Breeze Laboratory which lead to the conclusion 'that chronic exposure to Aroclor 1254 increased susceptibility of test pinfish and spot to disease, and also appeared to be toxic to these fish'.

The fourth article dealing with microsomal enzyme activity in pregnant rabbits indicates that Aroclor 1221 is less active in the induction of enzyme activity as compared to Aroclor 1254.

The fifth article indicates that one marine diatom 'Cylindrotheca closterium', absorbed and concentrated the polychlorinated biphenyl (Aroclor 1242) 900 to 100 times above the level in sea water. At 0.1 ppm concentration in sea water, PCB's inhibited growth and diminished levels of RNA and chlorophyll of this marine diatom'."

[MONS 099140, "Letter from Elmer P. Wheeler to W. B. Papageorge: PCB Publication," May, 5, 1971.]

Note: The document is too blurring to read.

Doc ID # 9387 Exhibit # P-0542

509.

05/06/71

Letter from Savage to Papageorge: Current level of Aroclor losses during April 1971 from Anniston Plant averaged 0.65 lbs/day (71 ppb).

**"B. Anniston Plant
PCB Levels in Sewer**

Current level Aroclor losses during April 1971 averaged 0.65#/day (71 ppb).

Project Evaluations

1. #1 HCl pit will not be used until PR&D solids removal work is completed.
#2 HCl pit is performing well enough to permit this delay.
2. Samples from 36 storm sewers recently repaired to avoid infiltration show definite decrease in PCB. Further analytical work required to determine magnitude.
3. Engineering work resumed on collection and disposal of spent carbon from HCl Department. Premise target is 6/1."

[MONS 099014-15, "Letter from J. R. Savage to W. B. Papageorge: April 1971 PCB Report," May 6, 1971.]

Doc ID # 9335 Exhibit # P-0543

Also See: DSW 013407, April 1971.

Doc ID # 11976 Exhibit # P-0531

510.

05/07/71

Letter from E. S. Tucker to W. B. Papageorge: High concentrations of Aroclor 1221, a component of Aroclor 5060, were found in Industrial effluents.

Aroclor 1221, a component of Aroclor 5060, was observed in all three effluent samples at the levels shown in column I of the table.

<u>Sample No.</u>	<u>Sample Description</u>	<u>Aroclor 1221</u>	<u>Total Organic Chlorine</u>	<u>Estimated Aroclor 5460 Content</u>
1.	Effluent below Screen #1	4.1 ppm	29.6 ppm	28.7 ppm
2.	Effluent below Screen#2	478 ppm(?)	14.8 ppm	13.9* ppm
3.	Effluent from 6 Industrial Sewer Trench	4.3 ppm	1.8 ppm	0.9 ppm

*Calculated assuming that the real level of Aroclor 1221 was closer to an average of values obtained for 1 & 3.

[MONS 098674, "Letter from E. S. Tucker to W. B. Papageorge," May 7, 1971.]

Doc ID # 592 Exhibit #

511.

05/18/71

Letter from S. Uneno (Tokyo) to Papageorge: Uneno told Papageorge in his letter that "it would be difficult to promote the sale of PCB related products in Japan without establishing a systematic strategy".

"Thank you very much for your prompt action of sending us information and data about the environmental problems of PCB's, PCT's and other related products at my request of March 19, 1971. They are very interesting and useful to us.

After a careful review of the data received and analysis of the situation facing us here, we have come to conclude that it would be difficult to promote the sale of PCB related products in Japan without establishing a systematic strategy including not only presentation to customers of data explaining that products are free from pollution but also supply of such information as to degradation and disposal."

[MONS 099134, "Letter from S. Uneno (Product Director, Division C, Tokyo) to Mr. W. B. Papageorge (St. Louis): PCB Environmental Problems," May 18, 1971.]

Doc ID # 9383 Exhibit #

512.

05/20/71

Japan paper manufactures discontinued the use of PCB in advance any action from the Government.

Anniston Plant had 70 ppb in its sewer in April 1971.

"JAPAN:

In advance of any action by the government, the manufacturers of pressure-sensitive copy paper, including NCR Japan, have all discontinued the use of chlorinated biphenyl. Thus, NCR Japan has stopped using both MMK's Aroclor and the competitive product, Kaneclor, and has returned stocks to the manufacturer. So, as of this moment, no new encapsulated PCB's are being processed. It will take some while for the inventory of copy paper to be replaced. In spite of some deficiencies, a by-product, KA Oil, is being used as a replacement; this is a refined hi-boiler bottoms from a petroleum cracking operation in which Kaneka cracks naphtha to mixed ethylene and acetylene – the bottoms are a great mixture of all kinds of aromatics. Odor is a problem, but the price is right and apparently some kerosene can be utilized as diluent." [MONS 099397, May 20, 1971]

Doc ID # 594 Exhibit # P-0546

"Anniston Plant

PCB Levels In Sewer

Current level Aroclor losses during April 1971 averaged 0.65 #/day (71 ppb)."

[MONS 099397, "Letter from W. B. George to P. J. A. Marsh, et al.: PCB Environmental Problem -- April Status Report," May 20, 1971.]

Doc ID # 594 Exhibit # P-0546

513.

05/27/71

Letter from Uneno to Durland (Tokyo): Uneno wrote that "The PCB pollution problems has been taken up with great emphasis as one of the environmental subjects in Japan since the end of" 1970. And it was "brought up by the National Diet for discussion."

"The PCB pollution problems has been taken up with great emphasis as one of the environmental subjects in Japan since the end of last year and brought up by the National Diet for discussion. Such trends of public opinion have compelled the authorities concerned to take legislative steps for preventing alleged PCB pollution and paper manufacturers had to immediately stop using PCB for carbon-less carbon paper production, which has lead to gloomy effect on its electrical and heat transfer uses.

Under these circumstances, in spite of the excellent properties of PCB, condenser manufacturers in Japan are giving serious consideration to a possibility of a switch-over from PCB to something else."

[MONS 099889, "Letter from S. Uneno to Dr. J. R. Durland (Tokyo)," May 27, 1971.]

Doc ID #8433**Exhibit #**

514.

06/71

Monthly Report: Aroclor losses during June 1971 averaged 1.01 lbs./day (122 ppb).

"Aroclor losses during June '71 averaged 1.01 lbs./day (122 ppb). Breakdown of numbers are:

Normal level	49 ppb	0.41 lbs./day
Digging in HCl neutralization pit	<u>73</u> ppb	<u>0.60</u> lbs./day
Totals	122 ppb	1.01 lbs./day

[DSW 013922, "V. R. Haupt, Technical Service Department, Anniston Plant: Monthly Report -- Aroclor Wastes," CONFIDENTIAL, Read and Destroy, June 1971.]

Doc ID # 11977**Exhibit # P-0547**

515.

06/16/71

Details were discussed about Pond Experiments with Aroclors.

"In our recent discussion with the National Swedish Environment Protection Board, it was suggested that a demonstration of acceptability for PCB products might be possible in some form of pond experiment.

We have given a little thought to this and it comes to us that such an experiment could form a basis for demonstrating environmental acceptance. Presumably a pond containing numerous forms of life, ranging from micro-organisms to sizable fish, constitutes a miniature eco-system which xxx and partition chemicals in a way similar to a much broader natural environment. Analysis of fish from such a pond treated with chemicals being tested, should indicate the nature and extent of any accumulation.

In the case of Aroclor, for example, it could be mixed with sand in the pond and the limited solubility would control the rate of uptake. For water-soluble chemicals, some form of controlled addition would be necessary to simulate actual conditions.

I suggest that we should investigate the possibility of some experiments of this type with various Aroclor products, including A1016, and perhaps initiate some discussions with environmental authorities in the UK and North America, as well as in Sweden."

[MONS 098673, "Letter from H. A. Vodden: Pond Experiment," June 16, 1971.]

Note: xxx = The document is too blurring to read.

Doc ID # 599

Exhibit #

516.

06/18/71

Letter from Laughton to All Member Producers: The use of Aroclor -1254 in the coating material caused a PCB residue problem in the milk, which made quite a few members be excluded from the market.

"A few of our member have been excluded from the market because of a residue or chemical problem in their milk, due to silage that has been stored in concrete silos that have been coated with an apoxy coating containing the chemical ARCLOR-1254.

This chemical has been used in various silo apoxy coatings over a wide milk production area. One coating in particular has gone

under the trade name of CUMAR. This coating leaves a residue in a silage that, when fed to dairy animals, is deposited in that fat of the animal and shows up in milk as hydrocarbon—very similar to DDT."

[MONS 099870, "Letter from C. K. Laughton (General Manager, Milk Inc.) to All Member Producers," IMPORTANT - PLEASE READ, June 18, 1971.]

Doc ID # 8422 Exhibit #

517.
06/23/71

Application for Discharge Permit to Snow Creek: When Monsanto Anniston submitted its Application for Discharge Permit to AWIC, it didn't mention anything directly about PCBs, and did not consider that PCBs in its discharges to Snow Creek could be "hazardous to human or animal life using water from, or existing in, the receiving waters".

"Attached is a copy of Monsanto's application to the Corps of Engineers for a discharge permit. This application pertains to the Monsanto (Anniston) Plant's discharge into Snow Creek.

We request that the Water Improvement Commission consider this application and provide the certification which is required under Section 21 (b) (1) of the Federal Water Pollution Control Act." [DSW 014757, June 23, 1971]

Doc ID # 11654 Exhibit # P-0551

"25. Remark:

We believe that all substances considered hazardous by plant standards, which are known to be involved in operations contributing to this discharge, have been inventoried and are controlled to insure that, except as otherwise described herein, there is no reasonable possibility of their discharge in quantities that would be hazardous to human or animal life using water from, or existing in, the receiving waters." [DSW 014763, June 23, 1971]

Doc ID # 11654 Exhibit # P-0551

[DSW 014757-63, "Letter from G. L. Jessee (Plant Manager) to Mr. J. L. Crockett, Jr. (Technical Staff Director, Water Improvement Commission): Application for Discharge Permit to Snow Creek," June 23, 1971.]

/ Doc ID # 11654 Exhibit # P-0551

518.

07/1971

Monthly Report: Flocculation-clarification demonstrated good results on removing PCBs.

"PR&D work on PCB Removal by flocculation-clarification is complete with good results. Additional work obtaining design data which was not originally planned has also been completed."

[M09806, "J. C. Landwehr, Technical Service Department, Anniston Plant: Monthly Report," July 1971.]

Doc ID # 1511 Exhibit #

519.

07/1971

Monsanto Company: Policy Statement. In its Policy Statement, Monsanto said that "Included among its community responsibilities is a concern for and an interest in the public welfare and comfort with regard to environmental pollution." It also said that "Always be concerned for the public interest." This is obviously not true.

"Environmental Evaluation of Proposed New Products and Processes

Monsanto, recognizing the need for control and reduction of environmental degradation, diligently and systematically assesses the impact of proposed new products and processes on the environment. A positive assessment is a condition for commercialization. This assessment includes the premise that in the future the standards for environmental acceptability will be more demanding."

"Pollution Control

Monsanto has always recognized its responsibilities to the public, to its shareowners, to its employees, to its customers and to the communities in which it operates.

Included among its community responsibilities is a concern for and an interest in the public welfare and comfort with regard to environmental pollution.

The role of government in pollution control and the need for Monsanto cooperation with government officials in proper circumstances is recognized.

The pollution control policy is:

- A. Always be concerned for the public interest.
- B. Regard pollution control as part of the 'cost of doing business.'
- C. Insure that new operations will meet existing pollution regulations and be adaptable to meet foreseeable pollution regulations.
- D. Install and operate pollution abatement facilities on existing operations to meet existing regulations.
- E. Continue to devote research and engineering funds to the development of improved processes which eliminate or minimize pollution.
- F. Cooperate with appropriate government agencies, including participation in the development of rules and regulations.
- G. Maintain relations with industrial and technical organizations in programs to combat pollution."

[DSW 117325, "Monsanto Company: Policy Statement," page-D-II-8, July, 1971.]

Doc ID # 11266 Exhibit # P-0552

520.

07/07/71

Letter from Palm (Stockholm) to Marsh: Sweden was proposing that "import, manufacture and sales of PCB or of substances, material and products containing such substances (PCB) is forbidden."

"Reference is made to your inquiry about the formulation of the Swedish proposed law for PCB-handling.

The proposal given for this law states the following: "The National Environmental Board proposes that import, manufacture and sales of PCB or of substances, material and products containing such substances (PCB) is forbidden. Possibility for exception from this (?) can be given mainly with regard to PCB in electrical

transformers and such larger electrical capacitors which are called Power (correction) capacitors. The board furthermore proposes that special rules should be made for the handling of PCB containers, scrapped PCB containing equipment, PCB containing waste material etc. The new rules are suggested to come in forth 1st of January 1972.

In order to facilitate the change over within industry, according to the board PCB can be used in limited quantities even after January and for a limited time of period. This will be possible through special licenses in such individual case.

The above proposal for law has been submitted to a number of bodies of government character of which all have approved in principal."

[MONS 099826, "Letter from O. Palm (Stockholm) to P. Marsh: PCB Sweden," July 7, 1971.]

Note: (?) = *Too blurring to read.*

Doc ID # 8406 Exhibit #

521.

07/12/71

Letter from Chantrell to Mursh and Vodden: Chantrell wrote that "Dahlstrom has agreed that we give whatever assistance we can to the U. K. Government group operating within the Central Unit on Environmental Pollution."

"H. N. Dahlstrom has agreed that we give whatever assistance we can to the U. K. Government group operating within the Central Unit on Environmental Pollution, under the Department of the Environment, which will present a report to the O.E.C.D. sector group on "The Unintended Occurrence of Chemicals in the Environment" in Paris, October 19-27. This follows a request for assistance from Iain Prestt, deputy director of the Unit and number two to Dr. Holdgate, the Unit's director."

[MONS 099500, "Letter from Steve Chantrell (London) to P. J. A. Mursh and A. Vodden: PCBs/OECD Report," CONFIDENTIAL, July 12, 1971.]

Doc ID # 8325 Exhibit # P-0554

522.

07/12/71

Letter from Papageorge to Bergen: Papageorge wanted to strengthen Monsanto's defense position by having more information of the effect of Aroclors 1016, 1221 and 5432 on birds and fish.

"To strengthen our defense position, we must have more information of the effect of Aroclor 1016, 1221 and 5432 on birds and fish.

These studies were not programmed or budgeted for 1971. The chicken reproduction studies are estimated to cost \$20,000. The fish sub-acute studies will probably cost \$25,000."

"I recommend we proceed with these studies."

[MONS 098199, "Letter from W. B. Papageorge to H. S. Bergen: Toxicity Studies -- Aroclor 1016, 1221 And 5432," July 12, 1971.]

Doc ID # 802**Exhibit #**

523.

07/16/71

Monsanto was notified of a significant PCB contamination of chicken feed at several chicken farm locations caused by the use of Therminol FR Fluids. The purchaser (East Coast Company) had never been told about the potential hazards in dealing with FR fluid.

"Jack, during your vacation we have been notified of a significant PCB contamination of chicken feed at several chicken farm locations. Upon your return you should review this in some detail with Don Roush. It appears that the source of the PCB contamination is a company by the name of East Coast Terminal in Wilmington, North Carolina, a fish mill processor. Since May of this year, this company has purchased 9 drums of Therminol FR fluid. Additional quantities were purchased by them in August and December of 1970. To date, we have not been able to establish that East Coast Terminal ever received a letter notifying them of potential hazards in dealing with FR fluid. To prevent this type of thing from happening again in the future, several procedures need be established."

[MONS 098400, "Letter from T. L. Gossage to J. R. Fallon: Therminol FR Fluids," July 16, 1971.]

Doc ID # 804**Exhibit #**

524.
07/19/71

As a result of a leak of Therminol FR Series Products from drying equipment, fish meal was contaminated in East Coast Terminals. Monsanto admitted that its control of end uses of the Therminol FR Series "is far from satisfactory".

"The problem we are experiencing due to East Coast Terminals contaminating fish meal as a result of a leak in their (Holo-Flite) drying equipment makes it clear that our control of end uses of the Therminol FR Series is far from satisfactory. We must take immediate action to terminate sales of Therminol FR Series products to the following accounts where there appears to be a potential danger of food or animal feed contamination:

LIST NO. 1

Badger Byproducts
BSP Corporation
Commodity Pasteurizing
* East Coast Terminals
National Byproducts
Rietz Corporation
Sav A Stop
Patterson Company

* Action already taken

All of these accounts must be visited this week (July 19-23) and advised of our decision."

[MONS 098252, "Letter from John Mason to J. R. Fallon: Therminol FR Series Products," July 19, 1971.]

Doc ID # 806 Exhibit # P-0555

525.
07/23/71

Letter from Kelly to John: Kelly thought that it was very probable that Monsanto would be asked by the question, "is there any hazard to eating chicken with PCB in their tissues?" He suggested answering the question immediately in order to create a better impression for Monsanto.

"There is a good probability that one of the questions we will be asked concerning the meal episode is, "is there any hazard to eating chicken with PCB in their tissues?" While it would be more appropriate for this question to be referred to the Medical

Department, in many instances it would probably create a better impression if the question were answered immediately."

[MONS 099663, "Letter from R. E. Kelly (M. D.) to Mr. H. V. John," July 23, 1971.]

Doc ID # 8353 Exhibit #

Also See: MONS 098938.

Doc ID # 9305 Exhibit #

526.

07/27/71

Letter from Tucker to Papageorge: The level of PCB's present in the raw milk sample received from Ohio Department of Agriculture was as high as 4.27 ppm.

"Analysis of the raw milk sample received from J. V. Chambers, Laboratory Supervisor, Ohio Department of Agriculture, FDD Laboratory for PCB's has been completed. The sample was analyzed in duplicate in accordance with Analytical Chemistry Method No. 70-1, 'Analysis of Biological Materials for Polychlorinated Biphenyls'.

The level of PCB's present in the raw milk sample was estimated to be 4.27 ± 0.02 ppm. The maximum PCB level, because of the alteration (see Figure I), was estimated by comparison of the total area of the electron capture (EC) envelope of the milk extracts to a calibration curve prepared by plotting the total area of the EC envelope of the most similar product (Aroclor 1254) vs the concentration of the product injected.

Comparison of the chromatograms in Figure I demonstrates that the residue in the milk has undergone considerable isomeric alteration relative to the original product and that the alteration is equivalent to that which is observed when a laboratory animal is deliberately exposed to Aroclor 1254."

[MONS 099131, "Letter from E. S. Tucker to W. B. Papageorge (General Offices): PCB Analysis," July 27, 1971.]

Doc ID # 9381 Exhibit #

Also See: MONS 099868.

Doc ID # 8421 Exhibit #

527.
07/30/71

Letter from John to Papageorge: USDA started to investigate "the extent to which some poultry in the Southeast United States might be contaminated with PCB."

"A USDA news release on July 23 announced the agency was investigating the extent to which some poultry in the Southeast United States might be contaminated with PCB. A leak in a heat-transfer system which processes fish meal, used as an ingredient in chicken feed, apparently was the source of contamination. The Department's action prompted nationwide headlines and follow-up stories by major East Coast newspapers."

[MONS 099528, "Letter from E. V. John to Mr. William B. Papageorge: PCB Report - Public Relations," July 30, 1971.]

Doc ID #

Exhibit #

528.
07/30/71

The 1242 effects on hatchability were noted at concentration levels as low as 4 ppm in the diets of parents.

"CONCLUSION:

The summary of data to date indicates several areas of concern. Primary is the apparent effects on reproductive processes of the PCBs. Although the chicken is known to be sensitive to this class of compounds, reacting in a manner similar to its reaction to the chick edema factor, none the less a real effect has been recorded. While results vary for the three aroclors studied, for the 1242 effects on hatchability were noted at levels as low as 4 ppm in the diets of parents.

For the rat decreases of litter size or increases in stillborns are seen at levels of 100 ppm in parents fed 1254 and 1260. Since for 1254 these effects were magnified for the $F_{1a,b}$ to c , it is possible that successive generations may show an increased severity in effect.

For the dogs it is conjectural what histology is reflected by the increased serum alkaline phosphatase.

Our conclusions at this time are that pending completion of studies in progress we are in a poor position to recommend guideline levels for contamination. This lack of complete toxicologic data when

coupled with our essential lack of information about background levels of contamination in foodstuffs in general, makes it all the more imperative that we resist setting guidelines on anything more than a case by case basis at this time."

[M 42595-96, "H. Blumenthal, Ph.D., (Acting Deputy Director, Division of Toxicology), Memorandum For The Record," July 30, 1971.]

Note: *The original word used in the last paragraph is "then" not "than".*

Doc ID # 3734 Exhibit # P-0556

529.
Aug. 71

The Public Relation Report mentioned that "Assistance was given Anniston plant management prior to a visit there by Congressman Nichols. At a press conference which followed he emphasized Monsanto's efforts to control pollution at the plant." The Report also frankly mentioned that "Close cooperation with Ralston-Purina's PR department resulted in balanced reports when the company withdrew fish food contaminated with PCB."

"A statement was prepared to cover press inquiries on PCB resulting from Senate toxic substances hearings in Washington. Our present position is no comment until current investigations by FDA and USDA, as well as the public hearings, have been completed. Although the statement is being rigidly adhered to; background information has been sent to editors who are unfamiliar with the PCB issue (i.e.: the St. Louis Post-Dispatch is planning an article based on the published abstract of Industrial Bio-Test toxicity studies)." [MONS 043159]

Doc ID # 5953 Exhibit #

"Close cooperation with Ralston-Purina's PR department resulted in balanced reports when the company withdrew fish food contaminated with PCB. Stories mentioned there was no danger to humans from PCBs at the extremely low guideline levels set by the FDA.

Assistance was given Anniston plant management prior to a visit there by Congressman Nichols. At a press conference which followed, he emphasized Monsanto's efforts to control pollution at the plant." [MONS 043160]

Doc ID # 5953 Exhibit #

[MONS 043159-60, "E. V. John: Public Relations Report," August 1971.]

Doc ID # 5953 Exhibit #

530.
08/71

Monthly Report: Flocculation-clarification demonstrated good results on removing PCBs.

"Report No. 3 of PR&D Aroclor Pollution Study was issued 8-20-71. This is the final report on this project and covers a flocculation-clarification process for removing trace quantities of Aroclor from a solid-containing waste water."

[DSW 014994, "J. C. Landwehr, Technical Service Department, Anniston Plant: Monthly Report -- Aroclor Wastes," August 1971.]

Doc ID # 11680 Exhibit #

531.
08/05/71

Letter from Fallon to Papageorge: USDA believed that "they are finding A-1242 in the chickens".

"USDA request sample of Aroclor 1242. They found PCB in chickens and need the A-1242 for analytical work. Mr. Roach said that they already have samples of the other Aroclors. They believe they are finding A-1242 in the chickens."

[MONS 098593, "Letter from J. R. Fallon to W. B. Papageorge," August 5, 1971.]

Doc ID # 915 Exhibit #

532.
08/05/71

Letter from Savage to Papageorge: The July 1971 monthly report from Anniston Plant indicated that excess rain resulted in increased PCBs concentrations and loss in the effluent.

"B. Anniston Plant

I. Current level

Aroclor losses during July 1971 average 2.14 lbs./day (240 ppb). Breakdown of numbers are:

Normal level	140 ppb	1.24 lbs./day
Ruptured Muriatic Acid tank	45	0.40

Excessive Rain	55	0.50
	-----	-----
Total	240 ppb	2.14 lbs./day

The month of July had an unusual amount of intermittent rain which may have caused the normal level to go above 1.0 lbs./day. Since our flow measurement is one per day it would not pick up the occasional cloudburst."

[MONS 099007-08, "Letter from J. R. Savage to Mr. W. B. Papageorge: July 1971 Manufacturing Report, PCB Control," August 5, 1971.]

Doc ID # 9333 Exhibit # P-0558

533.

08/06/71

Letter from Hosmer to Tucker: FDA advised the American Tobacco Company that the crackers sold by one of their subsidiaries contain PCB, "which was doubtless absorbed from the paper wrapping around the crackers".

"Mr. Preston H. Leake of the American Tobacco Company called to tell me that the FDA has advised them that the crackers sold by one of their subsidiaries contain PCB, which was doubtless absorbed from the paper wrapping around the crackers. Mr. Leake stated that they are trying to develop a suitable GLC method for PCB in paper. He asked whether we could supply him with a reference standard of PCB to be used to establish the method and whether I could supply any suggestions concerning analytical methods or techniques which would be helpful.

I pointed out that our PCB was not a pure compound but could contain as many as 52 isomers and related compounds and committed to send him a sample. I also gave him Map Morner's name and phone number for advice and consultation about methods."

[MONS 099130, "Letter from D. B. Hosmer (General Offices) to Scott E. Tucker (John F. Queeny): Polychlorinated Biphenyls, Telephone Call from American Tobacco Company," August 6, 1971.]

Doc ID # 9380 Exhibit #

534.

08/11/71

Letter from Vodden to Baxter: Suggestions were made to run 'Pond Experiment' of PCBs on biodegradation outside Monsanto in order to increase the credibility of the tests and at the same time to reduce Monsanto's expenditure quite considerably.

"At the Specialty Products meeting in Newport on 22 July it was suggested that we should explore the possibility of persuading outside organizations to establish the feasibility of pond experiments for testing PCB products against environmental accumulation. It was thought that an independent assessment of the credibility of such tests would make acceptance by regulatory authorities more likely, and, of course, the cost-saving element of the exercise could reduce Monsanto's expenditure in such work quite considerably."

[MONS 098670, "Letter from H. A. Vodden to R. A. Baxter: Pond Experiment," August 11, 1971.]

Doc ID # 918**Exhibit #**

535.

08/15/71

Letter from Drs. Suttikus and Gunning to Wright (Anniston): Biological consultants told Anniston (Monsanto) that there was no improvement on PCB residues from fishes collected from Choccolocco Creek, the Coosa River and tributaries. They said, "At this point we would have to say that the data are detrimental to Monsanto", and suggested Anniston to use the effluent data to improve Monsanto's public image.

"As we stated to you in Anniston some weeks ago, we have worked up the P.C.B. residue data as we have received them from you and intended to report on them formally at the end of the first year of our survey of Choccolocco Creek, the Coosa River and tributaries. However, considering the unfavorable publicity Monsanto Company recently received as a result of the congressional sub-committee report, we felt it imperative that we submit an interim report to Monsanto Company at this time in order to insure that both parties (Monsanto and consultants) may know where we presently stand with regard to the P.C.B. residue analyses." [MONS 099771, August 15, 1971]

Doc ID # 8387**Exhibit # P-0565**

"Analysis I

We must conclude then for Analysis I that no improvement in fish residue levels, all species combined, is indicated." [MONS 099771-2, August 15, 1971]

Doc ID # 8387 Exhibit # P-0565

"Analysis III

At this point we would have to say that the data are detrimental to Monsanto." [MONS 099772, August 15, 1971]

Doc ID # 8387 Exhibit # P-0565

"Analysis IV

In the future we must be able to demonstrate considerable decreases in residue levels here if we are to show environmental improvement." [MONS 099772, August 15, 1971]

Doc ID # 8387 Exhibit # P-0565

"Our field observations over the past few years and continuing up until the present time show that the greatest number of deformed fishes have been found at Match Williams (Station 7) and stations immediately below 7. We also see the greatest number of fishes that are either sick or listless in these areas. Of course visual observations won't tell us what caused these fishes to become deformed or sick but we must consider the total observations as a crude indication that something is indeed wrong in these areas.

In summary, there is nothing we can do with the residue data at this point that would allow Monsanto to counteract the unfavorable public opinion that may result from the congressional subcommittee report (which we have not seen). Perhaps the June, 1971 data will show a decrease that is not apparent at this point--we can only hope that this will be the case.

Let us point out one additional aspect of the problem that might allow Monsanto Company to derive some favorable publicity. It is our impression that your plant data will show that the plant effluent has been cleaned up tremendously and that on a pound for pound basis you are putting very little residue into Choccolocco Creek at the present time in comparison with past years. Certainly you would not want to give the figures in a news release, but would it not be helpful to state categorically that the effluent is relatively clean at the present time? We fully realize that Monsanto

Company officials are in a better position to judge the merits of such a release than we are. It is simply passed along for what it is worth.

We are very sorry that we can't paint a brighter picture at the present time. However, we all know that we have to study these situations carefully and that we must be able to document any claims of environmental improvement before they are released for public consumption." [MONS 099773, August 15, 1971]

Doc ID # 8387 Exhibit # P-0565

[MONS 099771-73, "Letter from Drs. R. D. Suttikus and G. E. Gunning to Mr. Eugene Wright, Pollution Control Engineer, Monsanto Company (Anniston)," August 15, 1971.]

Doc ID # 8387 Exhibit # P-0565

536.
08/20/71

Research and Development Report from Anniston Plant: Pilot study demonstrated that "Single stage treatment with bentonite clays achieved an 86% reduction of Aroclor." A very efficient reduction was achieved by an extremely cheap way by use of Bentonite clay.

"Summery: Solids-contact Classifier Study Using Bentonite Clay

Powdered bentonite (high silica) clay treatment of 204,430 gal. of plant waste water in a single stage solids-contact classifier was evaluated in this pilot scale investigation. The efficiency of bentonite clay for removing Aroclor and coagulating inert suspended solids was evaluated at clay dosages of 15, 30, 120, 240 and 480 ppm and flows of 2.5 or 5 gpm. A cationic polyelectrolyte dosage of 1.5 ppm was used throughout this phase of the study.

Conclusions that can be drawn from this study are as follows:

1. Pilot plant influent averaged 360 ppb Aroclor and 55 ppm suspended solids during study. Single stage treatment with bentonite clays achieved an 86% reduction of Aroclor and an 80% reduction in suspended solids. Average residual Aroclor and solids concentrations were 50 ppb and 11 ppm, respectively. A coagulation system consisting of ≥ 15 ppm bentonite clay and Betz cationic polyelectrolyte 1170 was quite

effective in removing suspended solids at flows of 2.5 and 5 gpm.

2. 216,830 gal. of waste water was treated before blowdown. The solids in the overflow did not increase until the sludge pool had risen above the bottom of the center well. Better settling was achieved once the height of the sludge blanket was sufficient to enhance growth of the incoming floc. Steady state conditions for solids removal were generally reached after a 16-24 hour period."

[MONS 040519-20, "Research and Development Report from Anniston Plant by Ishmeal Ransaw," August 20, 1971.]

Doc ID # 919 Exhibit #

537.

08/25/71

Letter from Papageorge to Marsh: Papageorge wrote that "it is difficult to deny that DDT (or PCB's) are not present in the environment."

"We have no supporting evidence to substantiate professor G. R. Lee's results of DDT-soil studies at the University of Wisconsin and described in the Los Angeles Times article you sent.

Professor Lee has consistently supported extreme analytical precision and has achieved a reputation by casting analytical doubts. There may well be some laboratories which are submitting erroneous reports but it is difficult to deny that DDT (or PCB's) are not present in the environment."

[MONS 099129, "Letter from W. B. Papageorge to Mr. P. J. A. Marsh (Brussels): DDT Analysis – University of Wisconsin," August 25, 1971.]

Doc ID # 9379 Exhibit #

538.

08/25/71

Letter from Papageorge to P. J. A. Marsh, et al.: Extensive quantities of meal used in animal feed were contaminated with PCB's. In Anniston, "Aroclor losses during July, 1971 overage 2.14 lbs./day (240 ppb)". The Report attributed the excess losses of PCB's to rain. But why?

"Equipment failure in a fishmeal sterilizing unit using Therminol FR-1 as the heat source resulted in the contamination of extensive

quantities of meal used in animal feed. The U.S. Department of Agriculture and Food and Drug Administration are conducting testing, quarantine and confiscation programs in the Southeast U.S. on poultry, eggs and feed." [MONS 099558]

Doc ID # 8341 Exhibit #

"Anniston Plant

Current Level

Aroclor losses during July, 1971 overage 2.14 lbs./day (240 ppb). Breakdown of numbers are:

Normal level	140 ppb	1.24 lbs./day
Ruptured Muriatic Acid tank	45	0.40
Excessive rain	<u>55</u>	<u>0.50</u>
Total	240 ppb	2.14 lbs./day"

[MONS 099563]

Doc ID # 8341 Exhibit #

"The month of July had an unusual amount of intermittent rain which may have caused the normal level to go above 1.0 lbs./day. Since our flow measurement is one per day it would not pick up the occasional cloudburst." [MONS 099564]

Doc ID # 8341 Exhibit #

[MONS 099558-64, "Letter from W. B. Papageorge to P. J. A. Marsh, et al.: PCB Environmental Problem, July Status Report," August 25, 1971.]

Doc ID # 8341 Exhibit #

539.
08/26/71

Letter from Papageorge to Savage: Papageorge said that "It is my personal belief that in the near future the Krummrich Plant effluent will be sampled by a regulatory agency and I do not believe 2 pounds per day will be acceptable".

"I note in a recent report from the Krummrich Plant on PCB pollution control the reference to favorable progress toward achieving the target of 2 pounds of PCB's per day in the effluent as set by the Business Group."

"The 1971 plan for management of the PCB problem established target of 1 pound per day in the water effluent and 1 pound per day to the atmosphere. Since these represent the different ways in which PCB's could be introduced into the environment with different methods of control and measurement, we should not take the total of 2 pounds per day as applying only to the water effluent and neglect to consider atmospheric pollution."

"It is my personal belief that in the near future the Krummrich Plant effluent will be sampled by a regulatory agency and I do not believe 2 pounds per day will be acceptable. I suspect that we will have considerable discussion with 1 pound per day, but I am hopeful we can convince the appropriate authorities that it is a proper target."

[MONS 098198, "Letter from W. B. Papageorge to J. R. Savage," August 26, 1971.]

Doc ID # 823 Exhibit # P-0564

540.
09/71

Monthly Report: Aroclor losses during September 1971 averaged 0.56 lbs./day (71 ppb). Six air pollution complaints were received during September due to Montar, etc. Air samples were taken during the month.

"Aroclor losses during Sept. '71 averaged 0.56 lbs./day (71 ppb)."

"Air Pollution:

1. Six air pollution complaints were received during September. Four of these complaints were from Montar bottom pump-out, and two were caused by SO₂."

"Water Pollution:

2. Monsanto management has made the decision to comply with the E.P.A. request to submit data on plant effluents. This data is very similar to the type of information submitted to the Corps of Engineers with some additional requirements. The E.P.A. requests data on plant effluents to municipal sewer systems which means that the Anniston Plant will have to gather all of

this data on the Parathion treatment plant's effluent. Work will begin during October in this area.

1. Fifty water samples were analyzed for P.C.B. during September. Six fish samples have been started for the September survey."

[DSW 013375-376, "V. R. Haupt, Technical Service Department, Anniston Plant: Monthly Report -- Aroclor Wastes," CONFIDENTIAL, Read and destroy, September 1971.]

Doc ID # 11978 Exhibit #

541.

09/01/71

Letter from John to Papageorge: Based on information from FDA, "a Washington Evening Star article said Monsanto had inadvertently shipped a PCB-containing product to the Wilmington, N. C., plant which then leaked into and contaminated fish meal processed there."

"As a result of an interview with an FDA spokesman, a Washington Evening Star article said Monsanto had inadvertently shipped a PCB-containing product to the Wilmington, N. C., plant which then leaked into and contaminated fish meal processed there. Follow-up inquiries came from the Local St. Louis press as well as AP and UPI asking Monsanto to confirm or deny the FDA statement. To avoid more rounds of headlines, a "no further comment" statement was prepared and used on request."

[MONS 099527, "Letter from E. V. John to Mr. William B. Papageorge: PCB Progress Report – August," September 1, 1971.]

Doc ID # Exhibit #

542.

09/01/71

Anniston - August 1971: EPA and AWIC representatives went to Anniston to take samples. Anniston was worry about that "It is not known at this time what will happen as a result of this sampling."

"B. Anniston, August 1971

Current Level

Aroclor losses during August '71 averaged 0.28#/day (32 ppb).

On August 19 two E.P.A. (Environmental Protective Agency) representatives Mr. D. Cofara, P. London and a

representative of the A.W.I.C. (Alabama Water Improvement Commission) J. L. Crockett, Jr. visited the plant to collect several samples for PCB analysis by the SE water lab (EPA) in Athens, Georgia. These samples were requested by the Justice Department in Washington. A composite sample was furnished to them (plant effluent on Aug 18 PCB - 196 PPB). They also collected samples from Choccolocco Creek both upstream and downstream. A meeting was conducted with these people and Monsanto's action toward eliminating PCB from the plant effluent was reviewed. It is not known at this time what will happen as a result of this sampling. Any information received from these samples will be communicated to the appropriated persons when it is received."

[DSW 013872, "Letter from Vince Haupt to Mr. J. R. Savage, General Offices: Status - PCB Pollution Control Program," September 1, 1971.]

Doc ID # 42 Exhibit #

543.

09/07/71

Letter from Wright (Anniston) to Corder, et al.: P.C.B. Residue Data from the June Fish Collection and an Interim Report from the Consultants. The results indicated that "there has been no significant reduction in P.C.B. concentration between the experimental fish and the controls."

"Attached is a copy of the residue data which was gathered from the June fish collection. This data has been sent to the consultants for their comparison with the previous data.

Also attached is a copy of an interim report which we received from Drs. Gunning and Suttikus. Since this report is from only two sets of residue data (December 1970 and March 1971), only two conclusions can be drawn. These conclusions are (1) Monsanto has an excellent analytical method and (2) there has been no significant reduction in P.C.B. concentration between the experimental fish and the controls."

[MONS 099770, "Letter from E. G. Wright (Anniston) to J. L. Corder, G. L. Jessee, P. B. Hodges, and W. B. Papageorge: P.C.B. Residue Data from June Fish Collection and an Interim Report from the Consultants (Drs. Gunning and Suttikus)," September 7, 1971.]

Doc ID # 8387 Exhibit # P-0565

544.

09/07/71

Richard reported highly chlorinated biphenyls degraded slower than lower chlorinated biphenyls.

"Summary for discussion on PCB's with FDA:

1. Lower chlorinated biphenyls degrade faster than more highly chlorinated biphenyls (Aroclor 1221 faster than Aroclor 1254 and Aroclor 1260).

[MONS 099127, "Letter from W. R. Richard to John Mason: Polychlorinated Biphenyls Research Summary," September 7, 1971.]

Doc ID # 9377 Exhibit #

545.

09/12/71

On September 12, 1971, all open dumps in the State of Alabama were converted to land-fill operations.

"September 12, 1971, all open dumps in the State of Alabama will be converted to land-fill operations. This law applies to municipalities, but it also applies to any private dump operation which might pose a water pollution problem or health hazard. In light of the attention of P.C. B. has received, it is highly probable that the Monsanto (P.C.B.) dump area could be classified as a serious water pollution source."

[DSW 013822, "Letter from Monsanto Anniston, Alabama to J. L. Corder (Monsanto): Recommendation of Task Force on Plant Dump," March 31, 1970.]

Doc ID # 41 Exhibit #

546.

09/14/71

Papageorge presented Monsanto's PCB Program at ANSI Committee C-107 meeting in 1971. As expected, he tried to defend Monsanto's position on PCB. However, Papageorge mentioned that "There is a growing concern that we should be considering to a greater degree chronic effects of all these materials rather than relying on the old acute studies that used to serve as a screening for many, many chemicals." Referring the impact of PCBs to man, he said "It is difficult to combat emotions, as you know, and the references in the popular press to hazardous poisons and birth defects."

"We at Monsanto first heard of PCB's as potential environmental contaminants in early 1967 when we received copies of a talk given in Sweden by Professors Widmark and Jensen of the University of Stockholm. In their paper they described how they were able to identify a material which had been interfering with pesticide analyses as being polychlorinated biphenyls."

"There is a growing concern that we should be considering to a greater degree chronic effects of all these materials rather than relying on the old acute studies that used to serve as a screening for many, many chemicals. I have sketchy data on marine life. We know that it does build up in the marine environment and there is, of course, the published evidence that it does affect the fish eating birds." [MONS 041636, September 14, 1971]

Doc ID # 931 Exhibit # P-0566

"PCB's were used in transformers as an insulating cooling fluid because they are more resistant to breakdown, less apt to explode and burst into flames and cause property damage and human injury.

Through the years, additional uses were found for these materials because of these properties that I mentioned earlier. They gradually at first, and of course with increasing amounts, ended up in applications that Monsanto through its in-house usage referred to as plasticizer usages. That is not a very good description, but it fit our needs for many years, and you'll find us using that expression. These are uses such as in paint formulations, the specialty ink uses, the plasticizer in sealants, adhesives, and paper coatings of all sorts.

There was a use that was a real thorn in our side and you'll see at least some of the earlier articles on PCB's referring to pesticide use. There were some studies conducted by the Department of Agriculture in which PCB's were used to extend the effect of life of pesticides such as lindane." [MONS 041637-38, September 14, 1971]

Doc ID # 931 Exhibit # P-0566

"The other uses were extremely small in private formulations that were used to spray or coat hard surfaces – shelving, corners of floors and all for the typical crawling type insects such as the roach and silverfish."

"Other major uses include the use in hydraulic fluids which are fire resistant. Monsanto marketed these fluids under its trademark Pydraul." [MONS 041638, September 14, 1971]

Doc ID # 931

Exhibit # P-0566

"Another fairly widespread application of PCB's is the use of these fluids as heat transfer media to achieve high temperatures, have a fire resistant transfer fluids, and avoid the installation of high pressure equipment. These materials were ideally suited for this application. We thought at one time that these were adaptable to close control and proper maintenance where we could logically call them closed systems. Some recent evidence indicated that were wrong and I will get into that when I discuss our present applications.

One application that was a fairly significant one and one that in our thinking is associated with coating is the use in carbonless reproduction paper. With the emphasis on recycling paper wastes and with the persistence of PCB's there is a problem developing in that PCB's are being found in many paper products and many of these paper products end up in food packaging." [MONS 041639, September 14, 1971]

Doc ID # 931

Exhibit # P-0566

"We feel we have good technical data to justify our staying in the business for limited applications. But we can not overlook the emotions that have set in. And believe me there are many and they are deep. It is difficult to combat emotions, as you know, and the references in the popular press to hazardous poisons and birth defects, which have not been substantiated, are most difficult to overcome. Although we talk about persistent versions of PCB and degradable versions of PCB I suspect, and this is a personal opinion, that there would be many who just discount this kind of information. This is a very real problem; in my opinion it is a difficult problem." [MONS 041644, September 14, 1971]

Doc ID # 931

Exhibit # P-0566

"I will attempt to summarize... I think we can conclude that PCB's are in the environment. There is no question about it. Many of these PCB's are manmade and were introduced to the environment because of our lack of understanding of what these materials can do to the environment. In this country Monsanto, as sole producer, has attempted to improve the situation by limiting the applications to

which these materials are used. Studies today would indicate that these PCB's are not and cannot be classified as highly toxic. There is still a lot of information that is needed to help us determine the long term effect on human beings. We feel that the properties of these materials make them, at least as of today, the most suitable material for use in transformers, capacitors and heat transfer systems. We also believe that under proper conditions we can control the amount of these that do enter the environment to the point where the adverse effects are not great and that the benefits we derive far outweigh the minor adverse effects that we might notice." [MONS 041647-48]

Doc ID # 931 Exhibit # P-0566

[MONS 041633-48, "W. B. Papageorge, Monsanto's PCB Program, Presented at ANSI Committee C-107 Meeting," September 14, 1971.]

Doc ID # 931 Exhibit # P-0566

Also See: M11786.

Doc ID # 1615 Exhibit #

547.

09/14/71

Letter from Keller to Papageorge, et al.: Monsanto set up a special "Interim Task Group" to handle laboratory support needed for environmental polychlorinated biphenyl and terphenyl problems, which increased markedly since July 1, 1971.

"The level of laboratory support needed for environmental polychlorinated biphenyl and terphenyl problems has increased markedly since July 1. In order to better meet current needs, we have set up an interim task group to concentrate totally on biodegradation and PCB/PCT problems. Effective immediately, Dr. Scott Tucker, Group Leader of the Analytical Chemistry Group, will devote full time to and have responsibility for this task group."

"Other business group and division analytical projects normally assigned to the Analytical Chemistry Group will be covered by the Spectroscopy Group during this interim period."

[MONS 098678, "Letter from R. E. Keller to W. B. Papageorge, W. R. Richard, M. W. Farrar, F. B. Zienty, and W. K. Johnson: Applied Sciences Interim Task Group," September 14, 1971.]

which these materials are used. Studies today would indicate that these PCB's are not and cannot be classified as highly toxic. There is still a lot of information that is needed to help us determine the long term effect on human beings. We feel that the properties of these materials make them, at least as of today, the most suitable material for use in transformers, capacitors and heat transfer systems. We also believe that under proper conditions we can control the amount of these that do enter the environment to the point where the adverse effects are not great and that the benefits we derive far outweigh the minor adverse effects that we might notice." [MONS 041647-48]

Doc ID # 931 Exhibit # P-0566

[MONS 041633-48, "W. B. Papageorge, Monsanto's PCB Program, Presented at ANSI Committee C-107 Meeting," September 14, 1971.]

Doc ID # 931 Exhibit # P-0566

Also See: M11786.

Doc ID # 1615 Exhibit #

547.
09/14/71

Letter from Keller to Papageorge, et al.: Monsanto set up a special "Interim Task Group" to handle laboratory support needed for environmental polychlorinated biphenyl and terphenyl problems, which increased markedly since July 1, 1971.

"The level of laboratory support needed for environmental polychlorinated biphenyl and terphenyl problems has increased markedly since July 1. In order to better meet current needs, we have set up an interim task group to concentrate totally on biodegradation and PCB/PCT problems. Effective immediately, Dr. Scott Tucker, Group Leader of the Analytical Chemistry Group, will devote full time to and have responsibility for this task group."

"Other business group and division analytical projects normally assigned to the Analytical Chemistry Group will be covered by the Spectroscopy Group during this interim period."

[MONS 098678, "Letter from R. E. Keller to W. B. Papageorge, W. R. Richard, M. W. Farrar, F. B. Zienty, and W. K. Johnson: Applied Sciences Interim Task Group," September 14, 1971.]

Doc ID #932 Exhibit #

548.

09/14/71

Letter from Paton to Marsh: Aroclor 1221 was used in the Open Systems. The potential impacts of Aroclor 1221 to the environment were discussed in detail. Paton said "At present my view is negative as I could see PCB in underground cables becoming a bit like DDT – getting into crops, birds eating insects and on and on wherever imagination takes you."

"I read it just after we had decided to discontinue immediately Aroclor 1221 as a dye carrier in U.S.A. This action was taken as the heat from FDA et al. has gone up a few degrees recently. Our policy has to be (at least in U.S.A.) one of not selling PCB in "open" systems. Since the FDA seems to be veering from PCB "persistence" to PCB "existence", the Aroclor 1221 position becomes untenable. It does contain ~25% PCB (i.e. 2-chlorobiphenyl and higher). True it degrades quickly (in the PCB context) but there is every chance the PCB from A-1221 could be picked up before degradation gets close to completion."

"We will contact Geigy today to inform them of the need for a quick conversion as we plan to supply no more Aroclor 1221." [MONS 098867, September 14, 1971]

Doc ID # 9278 Exhibit #

"I have also read A. Arpino's memo of September 9 on Pirelli's proposed usage of Aroclor 1221 and 1242 or blends of the two." "At present my view is negative as I could see PCB in underground cables becoming a bit like DDT – getting into crops, birds eating insects and on and on wherever imagination takes you."

"I can imagine Aroclor either being used in the plastic insulation or else as a waterproofing filler between the cables inside a sheath."

"In either case the sheath can get cut and PCB "escape" into the soil."

[MONS 098867-68, "Letter from Cumming Paton to P. J. A. Marsh: Aroclor 1221," CONFIDENTIAL, September 14, 1971.]

Doc ID # 9278 Exhibit #

549.

09/22/71

Cumming Paton, News Release on PCBs: "A government task-force has been established to coordinate investigations into PCB contamination".

"A government task-force has been established to coordinate investigations into PCB contamination of food and other products.

Six Federal agencies are represented:

FDA
USDA
Environmental Protection Agency (EPA)
Council on Environmental Quality
Office of Science and Technology
National Institute of Environmental Health Sciences".

[MONS 071467, Cumming Paton, "H.E.W. News Release on PCBs," Sales Information Bulletin No. 54, September 22, 1971.]

Doc ID # 6305 Exhibit #

550.

09/28/71

PCBs were found in a lot of samples coming from various locations during the month of September 1971.

"SUMMARY

During the month of September ~60 environmental and research samples have been analyzed for polychlorinated biphenyls (PCB's) by electron capture gas chromatography. Analysis of these samples represents a minimum man power expenditure of 210 hours.

PCB's typical of our Aroclors, have been found at levels below and above action levels in:

- Fish meal, soybean meal and meat meal (animal and poultry fed components)
- Paperboard and polyethylene film (food packing materials)
- Environmental samples from three customer sites (oil, sediment, and water)
- Two Monsanto products
- Fish and sewer effluents from two Monsanto manufacturing sites".

/ [MONS 204918, "Progress Report by W. J. Litschgi and E. S. Tucker," CONFIDENTIAL, September 28, 1971.]

Doc ID # 9940 Exhibit #**551.****09/29/71**

The Aroclor toxicity indicated that There is significant liver injury associated with the T III level of all three compounds, A, B and C.

"I have completed a histopathologic evaluation of a series of rat tissues form IBT B7298. There is significant liver injury associated with the T III level of all three compounds, A, B and C. The compound associated lesions consist of vacuolar change, focal hypertrophy and focal hyperplasia. In addition there were lesions of inflammation, necrosis, fibrosis and minor degeneration in these groups, which although seen in the controls and lower test groups, were more severe and frequent in the T III groups.

The vacuolar change was not seen in the control animals and was observed in a few of the lower test groups. It was a frequent finding in the T III groups. This lesion is morphologically indicative of fatty degeneration but a series of fat stains should be done on livers with these lesions to confirm the specific nature of the vacuolar change. The hypertrophic change was focal and often limited to the central lobular area were groups of cells were swollen to 2 or three times their normal size with clear pink homogeneous cytoplasm. The hyperplasia was associated with the same cells and appeared to be an extension of the hypertrophic lesion. The hyperplastic cells were also usually hypertrophic. The most severe examples of hyperplasia appeared as nodular growths with limited compression of the surrounding normal hepatic tissue."

[M 42598. "Letter from Dr. Ward R. Richter, (D. V. M., M.S. Diplomat, American College of Veterinary Pathologists) to M. L. Keplinger: Aroclor 5422 - Final Report," September 29, 1971.]

Note: *The document is too blurring to read in some places.*

Doc ID # 3736 Exhibit # P-0567**552.****09/30/71**

Progress Report, Anniston, Alabama Plant: The Report admitted that for the sewer system, except about 25% of the system which was installed or repaired subsequent to 1967, probably all of the joints in the system are leaking." When talking about the neutralization pit, it also said that "solids removal during operation adversely affects PCB levels in the effluent". The "profit improvement program" deferred some on-going pollution programs

since 1969. For the landfill, the Report said, "The disposal area has been operating as a sanitary landfill since June 10, 1971."

"With a new and strong Air Pollution Control Law in Alabama, a stronger Water Pollution Control Act and the September 1971 effective dated for Alabama's Solid Wastes Control Act, plus the Corps of Engineers permit requirements under the 1899 Refuse Act, compliance requires several projects spanning repair, plant improvement, pollution control and new installation definitions. These projects and projects deferred since the beginning of the 'profit improvement program' in 1969 are summarized in Tables I, II and III. This approach is chosen to identify and collect in one place those capital and expense costs of meeting regulatory body requirements, and those plant improvement jobs deferred since 1969 or identified in subsequent years, which are now felt to be non-discretionary. These include projects to protect investment, maintain or improve security, prevent larger expenditures to correct a problem later, correct safety hazards or provide improved facilities." [DSW 014552-53]

Doc ID # 938 Exhibit #

"1. Regulatory Requirements

Water pollution control requirements are expected to become increasingly restrictive over the next few years at both the State and Federal levels. Industry representation on the Alabama Water Improvement Commission (the State level water regulatory body) has been eliminated in the latest legislation. PCB is receiving federal and state attention and tight limits will undoubtedly be set. We have submitted the first part of the application for the Corps of Engineers waste discharge permit prior to the July deadline and are presently typing Part B of the permit for submission prior to Oct 1. At the municipal level we are faced with a situation of reducing the amount of solids in our waste stream to the City to meet ordinance requirements.

A separate solid waste disposal regulatory problem faces us in complying with the Alabama Solid Wastes Disposal Act which became effective September 12, 1971. This requires that solid wastes be disposed of in a landfill approach, in such a manner that neither air nor water pollution results. It also bans open burning of combustible wastes." [DSW 014554]

Doc ID # 938 Exhibit #

"II. Actions required**A. Air**

We are presently aware of the fact that we considerably exceed the present Federal guidelines and would expect State standards to be similar to the existing Federal guidelines. Meeting present Federal guidelines will require expenditure of \$1.5MM to reduce emissions by 90% with submission of a project probably early in 1973." [DSW 014454-55]

Doc ID # 938 Exhibit #

"B. Water

Visual observation of ground cover conditions over the acid sewer areas, inspection of selected portions of the sewer system by digging test holes and the rapid corrosion of cast iron and steel pipe in areas traversed by the acid sewer lead us to the conclusion that with the exception of approximately the 25% of the system which was installed or repaired subsequent to 1967, probably all of the joints in the system are leaking. This allows infiltration of ground water in times of wet weather; it allows exfiltration of acid wastes, some of which contain polychlorinated biphenyl; and also allows the escape of free chlorine and Muriatic Acid fumes. These conditions are all undesirable and, if the money were available today, our recommendation would be to repair or replace the entire sewer system." [DSW 014556]

Doc ID # 938 Exhibit #

"III. Solid Wastes

The disposal area has been operating as a sanitary landfill since June 10, 1971. Work started in April is still continuing to provide adequate drainage and access for all weather operation, to repair the waste burner and provide an access ramp to it, and to provide a 6 ft. security fence around the landfill area. Completion of this work will allow us to comply with the open burning prohibition and other portions of the Solid Wastes Act which became effective Sept. 12, 1971." [DSW 014558]

Doc ID # 938 Exhibit #

"IV. HCl Neutralization Facility

In 1970 the No. 1 (oldest) HCl pit was rebuilt to conform with the plan of settling out Solids, thereby reducing PCB levels in the effluent and removing solids during operation. Subsequent experience has indicated that pit life is doubled but that solids removal during operation adversely affects PCB levels in the effluent. Since there is some indication that PCT (the terphenyl based solid Aroclors) may also be objectionable to regulatory bodies, the decision has been made to provide for "switch operation" of the two existing neutralization pits. This allows cleaning by pumping but without raising PCB levels. The No. 2 pit had been on-stream approximately one year prior to its shutdown and was definitely in need of cleaning. In order to provide for the desired type of operation, several repairs/modifications are required. These have been detailed in a memo to J. R. Savage dated Sept. 15, 1971. In summary, to accomplish the necessary work and to maintain the appearance of the pit area will require an expenditure of \$31,000 capital and \$20,000 expense." [DSW 014559]

Doc ID # 938 Exhibit #

[DSW 014552-59, "W. F. Taffee, Technical Services Department, Anniston, Alabama Plant: Progress Report," COMPANY CONFIDENTIAL, September 30, 1971.]

Doc ID # 938 Exhibit #

Also See: M28855

Doc ID # 2612 Exhibit # P-0640

553.
10/1971

From the desk of W. B. Papageorge, Control of Polychlorinated Biphenyl Pollution In The United Kingdom: "The installation of sumps and interceptor pits in the factory drainage system, coupled with a regular monitoring of all effluent, should enable any loss from factories to be kept at an absolute minimum.

"These discoveries led to consideration as to how the residues of PCB were getting into the environment. The high levels being found in freshwater and marine species suggested that contamination of inland waterways and direct contamination of the sea must be major factors. The most obvious ways in which this could come about are through pipelines from factories, as a result of atmospheric pollution following inefficient incineration (the PCB residues eventually being washed out with rain and again ending

up in waterways and the sea), and in sewage sludge dumped into the sea (9)."
[MONS 071176]

Doc ID # 5183 Exhibit #

"The installation of sumps and interceptor pits in the factory drainage system, coupled with a regular monitoring of all effluent, should enable any loss from factories to be kept at an absolute minimum. Complete destruction by incineration can be achieved if a temperature of 800 °C is maintained for at least 10 seconds."
[MONS 071177, October 1971]

Doc ID # 5183 Exhibit #

[MONS 071171, and 071176-77, from the desk of W. B. Papageorge, an official paper by the U.K. Government, in consultation with Monsanto, a version of which has been submitted for consideration to the OECD sector group on the Unintended Occurrence of Chemicals in the Environment: "Control of Polychlorinated Biphenyl Pollution In The United Kingdom," October 1971.]

Doc ID # 5183 Exhibit #

554.
10/01/71

Letter from Camargo and Paton to Tucker, et al.: Camargo told Tucker that "The U. N. will hold a conference on the Human Environment in the Spring of 1972. A group of Nobel scientists intend to sponsor a resolution that will ask for global restrictions on production and use of PCBs."

"Here is a status report by country:

1. U.S.A. and Canada

Monsanto has voluntarily banned sales of PCB for all applications except dielectrics and a few restricted heat transfer systems.

2. UK

Monsanto follows the same voluntary ban as in U.S.A.

3. Sweden

The Swedish Government has banned the import of all PCBs and PCB-containing products except for the dielectric industry.

4. Holland

As the attached news item shows Holland is actively considering a ban on PCBs.

6. U.N.

The U. N. will hold a conference on the Human Environment in the Spring of 1972. A group of Nobel scientists intend to sponsor a resolution that will ask for global restrictions on production and use of PCBs."

[MONS 100051-52, "Letter from F. J. Camargo and C. Paton to J. E. Tucker, et al.: Polychlorinated Biphenyl Products," October 1, 1971.]

Doc ID # 8477 Exhibit #

555.

10/01/71

Letter from Dennistoun to Members of the Governors' 5-State Interdisciplinary Council: The Memorandum emphasized that "Considerable concern is currently evident over the presence of PCB's in the environment." More measures were listed and to be taken by the Council "to safeguard further human health and environmental quality".

"The members of the 5-State Interdisciplinary Pesticide Council, in their meeting on September 30, 1971, adopted the following statement with respect to the area of PCB's and their effect on the environment:

Considerable concern is currently evident over the presence of PCB's in the environment. It is noteworthy that this situation has been promptly recognized by industry, state and federal agencies, and many positive moves have already taken place to decrease the problem. To safeguard further human health and environmental quality, the following points are concurred in by the Governors' Interdisciplinary Pesticide Council.

1. That in light of the 5 ppm PCB action level established by the USFDA, the state agencies responsible for food protection enforce the guideline on commercial foods. The state agencies should further refrain from participating in the distribution of fish collected at state weirs.
2. In view of the moderate toxicity of PCB's and the fact that sport caught fish are a less significant food resource than

commercially caught fish, the state agencies should make an effort to publicize the fact that certain sport caught fish do exceed the 5 ppm PCB FDA guideline and the use of these fish as a staple food resource should be avoided. NOTE: (Identify fish and sources)

3. The state agencies should initiate industrial and municipal waste surveys to identify PCB source and initiate enforcement action to eliminate these sources. NOTE: Monsanto Chemical Company has indicated a willingness to accept unused stock or waste PCB's. [MONS 098974, October 1, 1971]

Doc ID # 9321 Exhibit #

4. The state agencies maintain a close liaison with the FDA and other federal agencies to be appraised of the most recent research, and if additional research concerning PCB toxicity or environmental impact becomes available it will be considered by the state agencies quickly and with due respect for public health."

[MONS 098974-75, "Letter from Rollin M. Dennistoun, Ph.D. (State of Minnesota, Department of Agriculture) to Members of the Governors' 5-State Interdisciplinary Council," Memorandum, October 1, 1971.]

Doc ID # 9321 Exhibit #

556.
10/10/71

The Aroclor toxicity study showed that "There were liver lesions in all three compounds as previously described." In addition two animals had hepatomas.

"I have completed a histopathologic evaluation of an additional series of rat tissues from IBT B7296. The observations can be summarized as previously reported on September 29, 1971. There were liver lesions in all three compounds as previously described. In addition two animals had hepatomas, 445 and ex. 3 in the B III group. I believe that these lesions are related to the compound. They are a progression of the hyperplastic lesion observed in many of the animals. Many of the severe hyperplastic lesions were difficult to distinguish from hepatoma and another pathologist might label them hepatoma. The transition from hyperplasia in this series is a matter of degree rather than a precise morphologic differentiation. I chose to call those hepatoma which

caused distinct compression of the normal parenchyma and were made up of large hypertrophic cells. In this series of animals there seems to be a progression of severity of liver lesions from degenerative changes to hypertrophy to hyperplasia to hepatoma.

There were no other compound associated lesions. All of the others reported are lesions of spontaneous disease and they are not unusual for the rat."

[M 42601 "Letter from Ward R. Richter, (D.V.M., M.S., Diplomat, American College of Veterinary Pathologists) to Monsanto," October 10, 1971.]

Doc ID # 3738 Exhibit # P-0569

557.
10/13/71

Rat reproduction studies with Aroclors were conducted. The primary findings were lesions in the liver. Lesions in bladders of rats were also found.

"I spoke with: Renate D. Kimbrough, M.D. ...
today regarding her observation of bladder tumors in rats fed AROCLOR 1260.

The observations of Ves and Koeman (Toxicol. and Applied Pharmacol. 17, 656-668, 1970) on polychlorinated biphenyls led them to undertake rat reproduction studies with AROCLOR 1254 (Lot AK38) and 1260 (Lot AK3). The materials were obtained from Glasgow at FDA. Their primary findings have been lesions in the liver, and Dr. Kimbrough plans to present a paper on the liver lesions at the 1972 spring meeting of the Society of Toxicology. In addition, she has seen 2 lesions in the bladders of rats fed AROCLOR 1260. The first occurred in a female which died after 6 months on test. This was diagnosed as a malignant anoplastic carcinoma of the bladder. The second was in a male killed after 8 months on test. The first diagnosis was of epithelial hyperplasia. Sections of both bladders were sent to ACI for diagnosis to Drs., Strauss (?) and Katherine Snell. The diagnosis of carcinoma in the female was confirmed. The lesion in the male was not resolved. Some pathologists believe it is a carcinoma, others believe it is hyperplasia." [M 42603, October 13, 1971]

Doc ID # 9281 Exhibit # P-0570

"Dr. Kimbrough stated that they were trying to analyze the AROCLOR 1260 sample for impurities, but were having some difficulty with their equipment." [M 42603, October 13, 1971]

"As a final note, Dr. Kimbrough expressed concern over whether PCB's presented an additional hazard to the employees who manufacture it. I told her that because of the chloracne and liver hazards, there had been medical supervision of the employees. However, I would raise this point with Drs. Kelly and Johnson for their review."

[M 42603-04, "Letter from George J. Levinskas to File: AROCLOR® 1260," October 13, 1971.] [also MONS 098891-92]

Note: *The document is too blurring to read.*

Doc ID # 9281 Exhibit # P-0570

Also See: M40616-17; and Deposition Exhibit: Levinskas - 6, May 27, 1987; Cecil Scott, et al. vs Monsanto Company, No. B-84-1103-CA, In the United States District Court for the Eastern District of Texas, Beaumont Division.

Doc ID # 3439 Exhibit #

558.

10/13/71

Cumming Paton: "Government agencies may not maintain this attitude if there is evidence of PCBs still being used in areas where food supplies (in the widest sense) can be contaminated either directly or indirectly." Monsanto knew the seriousness of PCBs contamination to food supplies.

"Attached is a copy of Food Chemical News (October 4, 1971 issue) which covers the recent FDA Press Conference on PCBs. At present the FDA opposes a ban on sales of PCBs but this should not lead to complacency on the part of any user of PCBs. Government agencies may not maintain this attitude if there is evidence of PCBs still being used in areas where food supplies (in the widest sense) can be contaminated either directly or indirectly. This means we must continue our efforts on heat transfer fluid conversions in 'peripheral' applications. We must make sure that pollution control is being practiced in plants where PCBs can still be used (e.g. dielectrics). We must encourage PCB users to return waste fluid to W.G.K. for incineration."

"Your cooperation is appreciated and if the Product Group or management in St. Louis can help you further in customer contacts, please let me know. We will give field sales all the help we can."

[MONS 071428, Cumming Paton: "FDA Press Conference On PCBs," Sales Information Bulletin No. 57, Monsanto, October 13, 1971.]

Doc ID # 6299 Exhibit #

559.

10/14/71

A letter on the pollution aspects of PCBs was sent to customers.

"Customer Notification

A letter on the pollution aspects of PCBs will be sent to customers. This is being cleared with the Legal Department.

ANSI

An S.I.B. has been written on the formation of Committee C107 of ANSI. This committee will address itself to the problems PCBs pose for the dielectric industry."

[MONS 098558-59, "Letter from Cumming Paton (Monsanto) to H. R. Ford, et al.: Status of PCBs," October 14, 1971.]

Doc ID # 943 Exhibit #

560.

10/14/71

Kimbrough to Lavinskas: US EPA's Dr. Kimbrough sent Monsanto's Dr. Lavinskas a copy of the article on bladder cancer published in the U.K.

"Enclosed is a copy of the article on bladder cancer in the U.K. that I mentioned on the phone. Another article that discusses this problem is one by Case, R.A.M.: Tumours of the Urinary Tract as an Occupational Disease in Several Industries. Ann. Roy. Coll. Surg. Engl. 39:213-235, 1966.

Does Monsanto have a cytology screening program? If this is not the case it may be prudent to set up a cytology screening program where workers would submit about a 200 cc early morning urine specimen once a year."

[M11802, "Letter from R. D. Kimbrough, M. D. (US EPA), to Dr. George Lavinskas," October 14, 1971.]

Doc ID # 11350 Exhibit #

561.

10/18/71

Letter from Mieure and Tucker to Richard: Analysis of Polychlorinated Biphenyl Products for Chlorinated Dibenzofurans.

"Per your recent request, analysis of polychlorinated biphenyl products for chlorinated dibenzofurans has been completed. The products analyzed were MCS 1016, Kaneclor KC-300, Prodelec Phenoclor DP-6, and Bayer Clophen A-60. No chlorinated dibenzofurans were detected in MCS 1016 or Kaneclor KC-300. The lower detection limit was about 2 ppm. Tetra and pentachlorodibenzofuran were detected in both the Bayer and Prodelec products.

These results confirm the previous work in our laboratories and the original work reported by J. G. Vos, et al, at the University of Utrecht."

"We currently have no reliable method for analyzing for low levels of chlorinated dibenzofurans in polychlorinated terphenyl products."

[MONS 201022, "Letter from J. P. Mieure and E. S. Tucker to W. R. Richard (General Offices): Analysis of Polychlorinated Biphenyl Products from Chlorinated Dibenzofurans," October 18, 1971.]

Doc ID # 944 Exhibit #

562.

10/20/71

Monsanto realized that "it is important that PCBs be kept out of the food chain." They also told its customer that "We want to remind your firm of the extreme care that must be taken by users of Santovac 1 and Santovac 2 fluids to prevent any entry into the environment through spills, leakage, use, disposal, vaporization or otherwise." However, did they strictly follow these disciplines in Anniston Plant? The answer is "NO".

"Following are four paragraphs we have been using to explain the situation to our customers:

As indicated on their labels, Santovac 1 and Santovac 2 contain polychlorinated biphenyls (PCBs) of various types. As you are aware, PCBs have increasingly come under the scrutiny of various governmental agencies and scientific laboratories. In some studies, certain PCBs have been found to be persistent, an environmental contaminant and possibly injurious to certain forms

of bird, aquatic and animal life. Accordingly, it is important that PCBs be kept out of the food chain.

We want to remind your firm of the extreme care that must be taken by users of Santovac 1 and Santovac 2 fluids to prevent any entry into the environment through spills, leakage, use, disposal, vaporization or otherwise. Some specific applications where these fluids should definitely not be used are in vacuum systems involving food or food-related products, animal feeds, pharmaceutical products, packaging materials involving any of such items and buildings where any of these items are manufactured or stored."

[MONS 098402, October 20, 1971]

Doc ID # 945 Exhibit # P-0572

"If your vacuum system involves any of the mentioned applications, or if your system is such that entry into the environment cannot be prevented, you should replace Santovac 1 and 2 with non-PCB fluids immediately. Please contact your pump supplier for his recommended replacement product.

Used Santovac 1 and 2 should be returned to Monsanto Company, W. G. Krummrich Plant, Sauget, Illinois 62201, Attention: Supervisor Dept. 246 for proper disposal."

[MONS 098402-03, "Letter from R. E. Hatton to T. W. Oneson, Santovac – A. Schonbeck And Co., Ltd.," October 20, 1971.]

Doc ID # 945 Exhibit # P-0572

563.

10/21/71

Letter from Holzapfel to Plant Managers: The potential contamination of PCBs was discussed when they were used as heat transfer media or hydraulic fluids. Holzapfel warned "the situation on PCB's is so touchy that any such accident could be disastrous in overall consequences."

"As we investigate uses of PCB's as heat transfer media or hydraulic fluids, we continue to uncover applications where foodstuffs contamination is possible. Even though probability of such contamination is highly remote, the situation on PCB's is so touchy that any such accident could be disastrous in overall consequences. We simply cannot afford to take any chances."

[MONS 099485, "Letter from F. J. Holzapfel to Plant Managers: PCB Potential Contamination," October 21, 1971.]

Also See: MONS 098266.

Doc ID # 8317 Exhibit #

564.

10/23/71

Monsanto's PCB was discovered in the food in Taipei, Taiwan, and resulted in an outcry from the public.

"There has been a considerable amount of publicity in the local press as a result of the discovery of PCB's in food packaging and the unfavourable press in the United States demanding a ban on these products. We have not commented officially and do not propose to do so but would appreciate your comments and assistance on a number of points."

[MONS 098365, "Letter from H. S. Hill (Monsanto in Taipei) to Dr. Cumming Paton (St. Louis): PCB/ Environment," October 23, 1971.]

Doc ID # 949 Exhibit #

565.

10/26/71

Monsanto saw that it did not have sufficient information and lacked conviction required for them to present their case at ANSI, barely even on an interim basis.

"5. This puts all emphasis on the questions of migration and how biodegradable is Aroclor 1016 in terms of realistic conditions of organisms and time and also knowledge about what is formed after biodegradation."

"6. The time is rapidly approaching when we (the speaker may be Dr. Pozefsky of GE) will have to stand up before ANSI and give understandable and convincing evidence about this regarding Aroclor 1016. His only source of the essential data and information is our group at Monsanto. The information available at this time is not sufficient and lacks conviction required for us to present our case at ANSI, barely even on an interim basis."

[MONS 098309, "Letter from P. G. Benignus (Monsanto) to General Electric," October 26, 1971.]

Doc ID # 947 Exhibit # P-0573

566.

10/28/71

Letter from Keller to Bergen: Report on Alleged Dioxins and Benzofurans in PCB's.

"Your reference memo cites the following from Food and Chemical News.

"FDA's Mildred Porter described work with a method that separated three Chlorodioxins, including the highly toxic 2, 3, 7 -Trichlorodibenzo-p-dioxin, from polychlorinated biphenyls detected in fish and wildlife."

I have since talked with Mrs. Porter to put the above in better perspective. Her work has dealt only with analytical method development with known mixtures of di, tri and tetrachlorodibenzo-p-dioxins and PCB's. She has done no work on the determination of dioxin residues in fish or wildlife nor is such work planned. She is not aware of work being planned by others. The objective of her study was to determine if dioxins would be found with PCB methodology being used by the FDA. Upon finding the PCB's and dioxins chromatograph together, she extended to technique to separate dioxins. It was thought that someone might find such a procedure useful in the future.

Mrs. Porter has since terminated this project. She emphasized that the procedure is really more a technique than a finished method. She agreed to send me a rough manuscript of the paper she presented at the October 11-14 national meeting of the AOAC in Washington. The above quote was taken from this presentation. The paper will appear in the November issue of JOAC."

[MONS 099809, "Letter from R. E. Keller to H. S. Bergen (General Offices): Report on Alleged Dioxins and Benzofurans in PCB's," October 28, 1971.]

Doc ID # 955 Exhibit #

567.
10/28/71

Letter from Keller to Richard: Impurities of Dioxins and Benzofurans were reported to be present as impurities in PCBs.

"The data shown on the confidential attachment from a European manufacturer shows that tetrachlorodibenzo-p-dioxin has an acute toxicity to rabbits at least 30X that for tetrachlorodibenzofuran. Regulatory agencies, including the EPA, are currently imposing 0.1 ppm max. for tetrachlorodibenzo-p-dioxin in 2, 4, 5-T and hexachlorophene. On this basis, a 2 ppm max. level should be acceptable for furans.

If we are required to push the detection to 0.1 ppm, we will need to synthesize furans and develop more sensitive methods. This will be costly, and difficult technically, especially for PCT products."

[MONS 201000, "Letter from R. E. Keller to W. R. Richard: Alleged Dioxins And Benzofurans In PCB's - Inputs For Report," October 28, 1971.]

Doc ID # 9071 Exhibit #

568.
10/28/71

Letter from Levinskas to Dr. Keplinger: Levinskas planned a visit to Dr. Kimbrough of EPA to discuss bladder pathology in rats fed by Aroclor 1260.

"I spoke with Dr. Renate Kimbrough of the EPA in Chamblee, Georgia regarding our proposed visit to her to discuss bladder pathology in rats fed this product. I indicated to her that we expected to have all of the available bladders examined by the latter part of November, and that we would confirm a specific date beforehand. The express purpose of the visit is to exchange information, i.e., view the slides she has, and let her see any slides that Don turns up which may be of interest. This was agreeable to her. She suggested that we might bring extra slides for referral to NCI, if we so desired."

"After Don has finished his evaluation of the bladder sections, and after you and he have had a change to review his schedule, I would appreciate a couple of dates that would be convenient for a trip to Chamblee so that I may schedule a visit there."

[M40619, "Letter from George J. Levinskas, Ph. D., (Mgr., Product Evaluation) to Dr. Moreno L. Keplinger (Industrial Bio-Test Laboratories, Inc.): AROCLOR® 1260," October 28, 1971.]

Doc ID # 3440 Exhibit #

Also See: Deposition Exhibit, Levinskas - 7, May 27, 1987; Cecil Scott, et al. vs Monsanto Company, No. B-84-1103-CA, In the United States District Court for the Eastern District of Texas, Beaumont Division.

569.
10/29/71

According to Monsanto, PCBs were found at a lot of different areas and materials.

"SUMMARY

PCB's typical of our Aroclor products have been found at levels below and above recommended guidelines in:

- Coated paper and paper coatings
- Machine oils and plant effluents from one customer manufacturing site
- Fourteen Monsanto Industrial Chemical Company products from four manufacturing sites
- Chicken Chow used as feed by Industrial Bio-Test Laboratories
- Sewer effluents from one Monsanto Plant site
- Tissue turkey extracts from the U.S.D.A.
- Two competitive products." [M 41160, October 29, 1971]

Doc ID # 3506 Exhibit #

"PCT's typical of Aroclor 5432 were found in:

- Plant effluent samples from one customer manufacturing site."

"A table showing the sample sources, types, and the levels and type of Aroclor found as well as the support objective is presented in the details section." [M41161, October 29, 1971]

Doc ID # 3506 Exhibit #

[M 41160-61, "Progress Report (by W. J. Litschgi and E. S. Tucker), October 1971: Environmental Analytical Program-Toxicology Support Studies," CONFIDENTIAL, October 29, 1971.]

Doc ID # 3506 Exhibit #

Also See: MONS 202097.

Doc ID # 8636 Exhibit #

570.
10/29/71

Letter from Richard to Munch: Aroclor 1242 – Aroclor 1016, Soil Leaching.

"Al Posefsky is right about landfill. What information can we put together from the soil samples in Florida about leaching?

The point Paul makes about degradation products is also valid. We should see if product does go to CO₂. Purdue studies suggest radioactive carbon as possible analytical tool to prove disappearance path."

[MONS 098675, "Letter from W. R. Richard to R. H. Munch: Aroclor 1242 – Aroclor 1016, Soil Leaching," October 29, 1971.]

Doc ID # 956 Exhibit # P-0574

571.
Nov. 71

Monthly Report of PCBs concentrations in effluents from Anniston Plant would start to be submitted to Mr. White, an EPA official.

"A second copy of our existing monthly reports on PCB effluents to Mr. Crockett will be forwarded to Mr. White via Mr. Crockett."

[DSW 013480, "Meeting at Southwest Regional Office of EPA," COMPANY CONFIDENTIAL, Monsanto, November 11, 1971.]

Doc ID # 20152 Exhibit #

572.
11/71

Monthly Report: Total Aroclor losses during November 1971 averaged 0.32 lbs./day (41 ppb). The values reported to the AWIC and EPA were lower than these numbers.

"Total Aroclor losses during November 1971 averaged 0.32 lbs./day (41 ppb). The Aroclor (1242 and 1254) losses reported to the E.P.A. and the State of Alabama averaged 0.19 lbs./day (24 ppb)."

[DSW 013349, "E. G. Wright, Technical Service Department, Anniston Plant: Monthly Report -- Aroclor Wastes," CONFIDENTIAL, Read and destroy, November 1971.]

Doc ID # 11975 Exhibit #

573.

11/02/71 Letter from Haislmaier to Slayton: "Vinyl Maid extrudes plastics which go into food containers. They are presently using Therminol FR-1."

"Phil, this is a report on the Therminol accounts you asked me to follow up in your memo of October 12, 1971.

Vinyl Maid, Inc., Springfield, Mass."

"Vinyl Maid extrudes plastics which go into food containers. They are presently using Therminol FR-1, however, will be happy to change to whatever we suggest as a replacement. They have six machines which use approximately 15 gallons each for a total consumption of approximately 90 gallons. I told Mr. Eveyly that we would be in contact with him in the near future. Somebody should follow up at this account and make sure we do replace the Therminol FR-1. Let me know what you want to do with this account."

[MONS 098903, "Letter from P. G. Haislmaier to Mr. P. L. Slayton (New York): Therminol FR Accounts," November 2, 1971.]

Doc ID # 9288 Exhibit #

574.

11/11/71

On November 11, 1971, Monsanto met with U. S. EPA regarding the Refuse Act suit by the Federal Department of Justice on PCB pollution, etc. EPA representatives expressed their concern on the high concentrations of PCBs in the Anniston Plant's effluent. Also, "There was considerable discussion concerning the limiting level of PCB that should be permitted in the discharge."

Monsanto told EPA at the meeting that:

"Gene Jessee carefully pointed out that our production of PCB's had been greatly reduced in January 1971 and discontinued in August 1971. It was explained that current PCB emissions in the liquid effluent primarily resulted from our inability to make a complete separation of biphenyl from other polyphenyls."

"Mr. Jessee stated that equipment would be installed to vastly improve this separation by July 1, 1972, and that by that time a further reduction in PCB in effluents would be effected." [DSW 013479-80, 11/11/71]

| Doc ID # 20152 Exhibit #

However, the actual situation was different from what Monsanto told the EPA representatives as detailed in Dr. Matson's Expert Report dated August 31, 1999.

"It was suggested by Mr. White that it might be desirable to dredge Snow Creek. I believe we convinced him that this is undesirable."

"There was considerable discussion concerning the limiting level of PCB that should be permitted in the discharge. Mr. White suggested "no detectable amount." Mr. Crockett and the Monsanto personnel pointed out that this was an undesirable approach. The preferred concept was explained as a reduction in aqueous volume accompanied by a concentration reduction (reduced pounds per day). This appeared to be accepted."

"As a result of the meeting, the following agreements were reached:

1. Mr. Crockett and Mr. White will agree upon an interim permissible level for PCB emissions to be provided in the Refuse Act permit. Obviously, Mr. Crockett will press for a number in excess of our 0.3 lbs/day current level.
2. The permissible PCB will be reviewed again when our new separation equipment is in operation as of July 1, 1972 to arrive at a new permit level.
3. A summary report outlining our past work and future plans will be written and sent to the EPA office via Mr. Crockett's office.
4. A second copy of our existing monthly reports on PCB effluents to Mr. Crockett will be forwarded to Mr. White via Mr. Crockett.
5. Monsanto is ready and willing to meet with the Federal EPA personnel concerning the PCB problems whenever requested and will feel it a privilege to describe our program.
6. EPA can come and sample our effluents in a mutual program at any time they want to do this. (I believe they will use our data.)"

"We received strong indications that the Southeastern Regional EPA Office will recommend strongly against a Refuse Act suit by the Federal Department of Justice on PCB pollution."

[MONS 040071-73, "Letter from D. B. Hosmer to Monsanto, J. T. Garrett, D. B. Hosmer, G. L. Jessee, and J. P. Landwehr: Meeting at Southwest Regional Office of EPA," COMPANY CONFIDENTIAL, November 11, 1971.]

Doc ID # 961 Exhibit #

Also See: DSW 013479-81.

Doc ID # 20152 Exhibit #

575.

11/11/71

PCBs were present in some of Monsanto's pharmaceutical products. Monsanto worried that "An outside laboratory would likely find the PCB's reported in the above pharmaceutical and food ingredient products." Thus, they hoped that "the levels found would be put in proper perspective when reported to the press and others."

"Because of current work by regulatory agencies on probing for PCB's – we have looked at some of our key chemical products to determine if contamination exists. Overall, the products are within the very tight limits of 0.5 ppm max. PCB for food products such as eggs. On this basis, the following products, part of which are non-edible, would be expected to meet any rigid guide lines that might be set in the future.

Aspirin
Maleic Anhydride
Sodium Saccharin
Saccharin
Cresyl Diphenyl Phosphate
Santicizer 334F
Santicizer 711
Santicizer 160
Vanillin

Details of this work for 1971 production materials are summarized in the attached table. Results show that PCB's, typical of Aroclor 1242 and/or 1248, are found at levels less than 0.5 ppm in Saccharin, cresyl diphenyl phosphate, Santicizer 334F, Santicizer 711, Santicizer 160 and vanillin.

Aspirin, maleic anhydride and sodium saccharin contain no detectable (<0.1 ppm) PCB.

An outside laboratory would likely find the PCB's reported in the above pharmaceutical and food ingredient products. We have to hope that the levels found would be put in proper perspective when reported to the press and others. The much lower body intake of these products relative to foods should provide for a much higher permissible level of PCB's.

We plan no additional work at this time."

[MONS 098331, "Letter from R. E. Keller to W. B. Papageorge: PCB's In Products," CONFIDENTIAL, November 11, 1971.]

Doc ID # 960 Exhibit #

576.
11/24/71

Cumming Paton, Pollution Is Everyone's Problem: "one might get the impression that pollution was almost the sole result of Monsanto's product line".

"From the publicity being given to PCBs one might get the impression that pollution was almost the sole result of Monsanto's product line. Get rid of Aroclor® and Therminol® fluids and the problem would be solved."

"P.S. Please use my own write-up discreetly. Do not xerox it for customer distribution."

[MONS 071430, Cumming Paton, "Pollution Is Everyone's Problem," November 24, 1971.]

Doc ID # 11953 Exhibit #

577.
11/30/71

Much more extensive alterations of the homolog distributions were observed with all of the products fed during the toxicity study of Aroclors.

"Alterations of the homolog distributions were observed with all of the products fed and were much more extensive than previously noted in any of the other tissue residue studies.

Selected tissue samples from the 'Toxicity, Reproduction, and Residue Study of Aroclor in White Leghorn Chickens' (IBT J7300) have also been analyzed and the data subjected to multiple regression analysis. Acceptable equations for predicting tissue residues and egg residues were determined, and the tissue storage

levels predicted in the remaining samples. The excising, compositing and analysis of the chick samples collected from this study will be completed shortly."

"The tissues in hand from the animals fed PCB's are being analyzed at this time."

[M 41158-59, "Progress Report, November-December 1971: Environmental Analytical Program-Toxicology Support Studies," CONFIDENTIAL, November 30, 1971.]

Doc ID # 3505 Exhibit #

578.
11/30/71

Monsanto released "figures to the United States Department of Commerce showing the company's U.S. production and sales of polychlorinated biphenyl (PCB) from 1960 through estimated 1971."

"WASHINGTON, D.C., Nov. 30 – Monsanto Company announced today it has released figures to the United States Department of Commerce showing the company's U.S. production and sales of polychlorinated biphenyl (PCB) from 1960 through estimated 1971.

Closed – system electrical uses ranged from 11,000 tons per year to 20,000 tons per year during the period.

The report also shows Monsanto voluntarily reduced its nonelectrical sales of PCB from the high of 16,000 tons in 1970 to 4,400 tons in 1971. Substantial further reduction will be accomplished in 1972, the company said."

[DSW 009997, "NEWS of Monsanto, For Release Immediately," November 30, 1971.]

Doc ID # Exhibit #

579.
12/06/71

Letter from Papageorge to Dr. Donald J. Baumgartner, USEPA: "Control of loss can be exercised by proper handling, storage and disposal methods."

"In mid-1970 Monsanto had announced its intention of discontinuing by August 30, the sale of PCB's to non-controllable open system application such as specialty paints, adhesives, paper coatings, soalants(?), industrial and hydraulic fluids."

"Control of loss can be exercised by proper handling, storage and disposal methods. To achieve this objective we are cooperating with our customers in the regenerative or disposal by incineration of waste PCB liquids."

[M39038, "Letter from W. B. Papageorge, Manager of Environmental Protection to Dr. Donald J. Baumgartner, National Environmental Research Center, Environmental Protection Agency," December 6, 1971.]

Doc ID # 3572 Exhibit #

Also See: DSW 009979.

Note: (?) = word is too blurring to read.

Doc ID # 11354 Exhibit #

580.
12/9/71

Holly Farms Sues For \$68 Million: "Holly Farms Poultry Industries Inc., of Wilkesboro, has filed a \$68-million suit against several companies" for PCB contamination.

"Holly Farms Poultry Industries Inc., of Wilkesboro, has filed a \$68-million suit against several companies it claims were responsible for Holly Farm's having to destroy thousands of contaminated chickens and eggs."

"The Willies County poultry processor said the birds and eggs contained PCB, a chemical potentially toxic to humans."

[MONS 069839, North Wilkeksboro, N. C. Journal-patriot, "Holly Farms Sues For \$68 Million," December 9, 1971.]

Doc ID # 6437 Exhibit #

581.
12/21/71

The Greensboro Record: "PCB 'May cause' Birth Defects".

"A Japanese Researcher told a worldwide gathering of scientists yesterday that the industrial chemical PCB, used in food processing, is suspected of causing still births, birth defects and retardation of growth."

[MONS 069879, "The Greensboro Record: PCB 'May cause' Birth Defects," December 21, 1971.]

Doc ID # 11938 Exhibit # P-0583

582.

12/22/71

Richard to Tucker: Monsanto planned to publish a paper on the biodegradation of several types of Aroclors. Richard asked Tucker to add the related results from his own tests and literature.

"The "white paper" as started by Alf Vodden, added to by Ralph Munch (and others) needs your contributions. Perhaps you have done this already. If not, would you please add a section documenting that Aroclor 1254-1260 type compounds are found in weathered biological specimens using your own experimental stuff plus what can be used from the literature.

The paper needs your inputs on degradation of PCB's as measured by bacteria (yours and Vodden's), by fish birds, rats, dogs from deliberate feeding studies. It should have rates and isomers degraded.

The paper needs the compositions of Aroclor 1016, 1043, 1042, 1254, 1260 and how these relate to the softer biodegradable isomers and the harder isomers. Perhaps we have feeding studies on Aroclor 1016, Aroclor 1221, Aroclor 1109."

[MONS 098676, "Letter from W. R. Richard to E. S. Tucker," December 22, 1971.]

Doc ID # 981 Exhibit #

583.

12/29/71

Drum leakage increased PCB pollution from Monsanto.

"There are other unlisted cases of drum leakage. In light of extremely drastic steps being taken to protect Monsanto and its executives against PCB pollution, I do not foresee how we can continue to have drum leakage, using drums inferior to competition."

"Historically from all around the world and now specifically from Taiwan where we are trying to capture the market all five potential customers report our quality as received in our drums is inferior to competitive material. Yet as produced our quality is as good as or even superior." "Our drum package needs structural improvement and evidently also improvement regarding product quality."

[MONS 098298, "Letter from P.G. Benignus (Monsanto) to H. S. Bergen, et al.: Drum Breakage of Capacity Aroclor and Transformer Askarel," December 29, 1971.]

Doc ID # 986

Exhibit #

584.

12/29/71

Monsanto conducted toxicological studies of the chlorinated biphenyls and other compounds, and planned to use the information to determine its policy decisions relating to the manufacture and sale of these materials.

"Confirming our recent discussion, toxicological studies of the chlorinated biphenyls, chlorinated terphenyls and brominated quaterphenyls will be curtailed to conform to recent policy decisions relating to the manufacture and sale of these materials.

Current studies are too advanced to terminate at this time and final reports should be available within weeks.

I will arrange with Bionomics, Inc., Hingham, Massachusetts for acute fish toxicity studies of Aroclor 1016, Aroclor 1242, and DDT. This study will cost approximately \$10,000 and hopefully will result in information to help us determine the need for more detailed long term residue studies.

No further studies of biphenyls-terphenyls-quaterphenyls are proposed for 1972."

[MONS 098206, "Letter from W. B. Papageorge to H. S. Bergen (General Office)," December 29, 1971.]

Doc ID # 985

Exhibit # P-0587

585.

12/29/71

Letter from Papageorge to Paton, et al.: Several scientists requested a meeting with Monsanto to discuss "in depth the environmental significance of the published PCB production and sales information".

"As a direct result of our offer to discuss in depth the environmental significance of the published PCB production and sales information, Dr. Edward D. Goldberg, Scripps Institution of Oceanography, Dr. Robert W. Risebrough, Bodega Marine Laboratory, and Dr. George Harvey, Woods Hole Oceanographic Institution have requested a meeting with Monsanto."

[MONS 098298, "Letter from P.G. Benignus (Monsanto) to H. S. Bergen, et al.: Drum Breakage of Capacity Aroclor and Transformer Askarel," December 29, 1971.]

Doc ID # 986 Exhibit #

584.
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Monsanto conducted toxicological studies of the chlorinated biphenyls and other compounds, and planned to use the information to determine its policy decisions relating to the manufacture and sale of these materials.

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Current studies are too advanced to terminate at this time and final reports should be available within weeks.

I will arrange with Bionomics, Inc., Hingham, Massachusetts for acute fish toxicity studies of Aroclor 1016, Aroclor 1242, and DDT. This study will cost approximately \$10,000 and hopefully will result in information to help us determine the need for more detailed long term residue studies.

No further studies of biphenyls-terphenyls-quaterphenyls are proposed for 1972."

[MONS 098206, "Letter from W. B. Papageorge to H. S. Bergen (General Office)," December 29, 1971.]

Doc ID # 985 Exhibit # P-0587

585.
12/29/71

Letter from Papageorge to Paton, et al.: Several scientists requested a meeting with Monsanto to discuss "in depth the environmental significance of the published PCB production and sales information".

"As a direct result of our offer to discuss in depth the environmental significance of the published PCB production and sales information, Dr. Edward D. Goldberg, Scripps Institution of Oceanography, Dr. Robert W. Risebrough, Bodega Marine Laboratory, and Dr. George Harvey, Woods Hole Oceanographic Institution have requested a meeting with Monsanto."

"Dr. Goldberg promised to forward to me a list of questions which will help us in our preparations. As soon as we have determined what information they are seeking, I will arrange a short meeting to review our objectives and approach."

[MONS 098990, "Letter from W. B. Papageorge to C. Paton, W. R. Richard, and E. S. Tucker," December 29, 1971.]

Doc ID # 9326

Exhibit # P-0352

586.
70-72

Monsanto phased out sales of PCBs for "open applications" that could lead to environmental release. These uses, which reduced the company's PCB sales by 64 percent, included heat-transfer fluids, hydraulic fluids, plasticizer applications, and miscellaneous uses.

[MONS 002321-22, "PCB Production History Fact Sheet," May 1982.]

Doc ID # 4318

Exhibit # P-0811

587.
71-72

The Chester River in the Upper Chesapeake Bay was monitored, and PCB residues were found with sediment concentrations ranging from non-detectable to 300 µg/kg.

"During the period 1971 to 1972, the Chester River in the Upper Chesapeake Bay was monitored. PCB residues were found with sediment concentrations ranging from nondetectable to 300 µg/kg. The level detected at any one time depends on river flow rates (Clark and Murdock 1972). During 1974, bottom sediment was sampled from various lakes and rivers in Connecticut. The data indicated widespread contamination, particularly in highly developed areas. Levels up to 3,500 µg/kg were recorded (U.S. EPA 1976).

[MONS 218697, "Polychlorinated Biphenyls," 1979.]

Doc ID # 10513

Exhibit # P-0803

588.
1972

Aroclor manufacturing facility in Anniston was dismantled in 1972.

[p. 107, "Deposition of Robert L. Cheever, Environmental Specialist, taken in the Law Suit of Dyer," September 3, 1998.]

589.

1972

Phaseout of PCB's in Heat Transfers was completed in 1972.

"Heat Transfer -- Between 1970 and 1972, a task force of Monsanto engineers worked closely with customers to replace chlorinated biphenyls fluids with material of equivalent thermal stability but with unavoidable lower fire resistance. Phaseout was completed in 1972.

[MONS 211565, "Polychlorinated Biphenyls, PCB's, A Report on Uses, Environmental and Health Effects and Disposal," 1979 (?).]
Note: No date is available for the Report.

Doc ID # 7716

Exhibit # P-0802

590.

01/13/72

Monthly PCB Report -- December 1971: "Total Aroclor losses during December 1971 averaged 0.72 lb./day (73 ppb)."

"B. Anniston Plant

I. Current Level In Sewers

Total Aroclor losses during December 1971 averaged 0.72 lb./day (73 ppb). The Aroclor (1242 and 1254) losses reported to the E.P.A. and the State of Alabama averaged 0.37 lbs./day (37 ppb). This 0.41 lbs./day increase in total Aroclor losses in December over November is a result of being forced to change back to the #2 limestone pit because of a lining failure in the #1 pit."

[DSW 013925, "Letter from J. R. Savage to W. B. Papageorge: Monthly PCB Report, December 1971," January 13, 1972.]

Doc ID # 35

Exhibit # P-0597

591.

01/14/72

Letter from Greene to Berndt, et al.: Monsanto said that obviously, users of PCBs "should avoid sewerage, any possibility of contaminating water supplies, feeding areas for wildlife open dumps where scavengers might have access to the fluids or materials or containers which have had contact with the fluids."

"It will come as no surprise to any of you that the Monsanto Board has approved MICC's discontinuance of sales of polychlorinated biphenyls and terphenyls for certain end uses in the domestic market. Their implementation program is described in two attachments. (W. R. Corey memo of 12/27/71 and Paton/Clark memo 12/17/71). As you see, International has been instructed to implement a program overseas which is consistent with the U. S. policy but which recognizes some essential differences in the problems involved." [MONS 100059, January 14, 1972.]

Doc ID # 8479 Exhibit #

7. "We also cannot offer overseas the disposal services offered in the U. S., and it is doubtful that the kind of high temperature incineration (2000° F) facilities necessary are available in your areas. The business group has agreed to prepare a description of suitable disposal techniques for the guidance of your customers as far as this may be possible. We certainly cannot accept responsibility for supervising each customer's disposal, but we will try to tell him methods to avoid, at least.

Obviously, he should avoid sewerage, any possibility of contaminating water supplies, feeding areas for wildlife open dumps where scavengers might have access to the fluids or materials or containers which have had contact with the fluids."

[MONS 100059-60, "Letter from E. Greene (St. Louis) to J. P. Berndt, et al.," January 14, 1972.]

Doc ID # 8479 Exhibit #

592.

01/18/72

Monsanto said "the problem of environmental contamination by PCB's is so great that we concluded that we should adopt the same drum we currently use for shipment of Niran."

"Although we had no failures with the new drum, the problem of environmental contamination by PCB's is so great that we concluded that we should adopt the same drum we currently use for shipment of Niran. This is an ICC 5B drum and is equipped with extra heavy chimes."

"The Anniston plant has kept records on failures of their Niran drums for several years. Prior to 1971 they were using an ICC 17C drum which is a full 16 gauge drum but does not have the extra heavy chimes. They adopted the ICC 5B drum in late 1970 or early

1971. Since that time they have shipped 50 to 60,000 drums and have had a total of 42 failures is as follows:

- 14 - leaks at side seams
- 10 - leaks at bottom seams
- 6 - leaks at top chimes
- 6 - punctured drums
- 4 - drums that were dropped
- 2 - drums with faulty flange fittings

Obviously we would prefer that we do not have any failures but we all know this is unrealistic."

[MONS 098406, "Letter from E. M. Potter (St. Louis) to H. S. Barga: Aroclor Drums," January 18, 1972.]

Doc ID # 988 Exhibit # P-0599

593.

01/18/72

Letter from Munch to Vodden: Munch said that they were trying to complete a report on PCBs. Also, they had a lot of confusions regarding the data in half lives, which needed to be clarified.

"We are very concerned that we have not received the additional data to fill in Table 3, Appendix 2 and any other text or data you wish to contribute for our joint P.C.B. report. This report should be finished if it is to have any value. Scott Tucker has finished the appendices he was to write and the report has been circulated for comment.

Also, there are several questions concerning data given in Report No. 2, Job No. 660 10 122 13 which we would like to clear up.

1. Are we correct that the data given in Table I of the above report are for 1242 and 1016 with added biphenyl?
2. We assume that the data in Table II also were obtained using added biphenyl and that they were obtained not on separate samples of the compounds listed but by following the disappearance of the corresponding peaks from a degradation experiment on Aroclor 1016.
3. We understand that the data given in Table 2 of Appendix 2 of the P.C.B. report are for individual isomers studied separately with or without biphenyl as noted in the table and using the bacterial culture noted in the table.

4. We are confused by the considerable difference in half lives given for the same compound in the two tables. Do you have a good explanation for such differences as those between 2,4' – 26 days in Table II and 2-5 days in Table 2 or 2,3,4' – 26 days in Table II and 2-3 days in Table 27."

[MONS 098991, "Letter from Ralph H. Munch to H. A. Vodden," January 18, 1972.]

Doc ID # 9326 Exhibit # P-0352

594.

01/19/72

Letter from G. L. Jessee, Plant Manager to Mr. John C. White, EPA: Jessee told White that "Prior to July 1, 1972 all operations at the Anniston Plant which would have required a stepwise PCB reduction program will be terminated."

"During our conversation in December you will recall that I made the following points:

1. Subsequent to our meeting in November the subject was taken under further advisement by high level executives in the company.
2. The final decision made by this executive group could alter the course of action presented to you in November.
3. It would therefore be premature to stipulate, as your letter requested, that our presentation to you was the final and totally committed course of action.
4. The final point being that regardless of final decision, July 1, 1972 was still a firm commitment date by which resolution of the situation would have been implemented at the Anniston Plant."

"Prior to July 1, 1972 all operations at the Anniston Plant which would have required a stepwise PCB reduction program will be terminated."

[DSW 009987, "Letter from G. L. Jessee, Plant Manager to Mr. John C. White, Environmental Protection Agency," January 19, 1972.]

Doc ID # 11357 Exhibit # P-0842

595.

01/27/72

Letter from Kamper (International Division) to All Monsanto Agents and Representatives in the Latin American Area: Kamper wrote that "The ban on further sales of PCB heat transfer fluids" became effective, and "applies to local stocks as well as to indent sales."

"Announcement of our withdrawal of Therminol FH* products from the market was made in F. J. Camargo's January 19 memo and January 7 cable.

No shipments of FR will be made after January 31, 1972." [MONS 100068, January 27, 1972]

Doc ID # 8482 Exhibit #

"The ban on further sales of PCB heat transfer fluids applies to local stocks as well as to indent sales. Let us know what materials you have in stock, and how you would propose disposing of them."

[MONS 100068-69, "Letter from N. J. Kamper (International Division, St. Louis) to All Monsanto Agents and Representatives in the Latin American Area: PCB - Heat Transfer Fluids," January 27, 1972.]

Doc ID # 8482 Exhibit #

596.

01/31/72

Toxicity study using chickens indicated that after six months exposure to Aroclors, the average PCB lipid storage level found in the tissues were very high.

"The average PCB lipid storage level found in the tissues (male and female), for each product after six months exposure are shown in the following table.

PCB Lipid Storage Level (PPM)

<u>Feed Level</u>	<u>1 PPM</u>	<u>10 PPM</u>	<u>100 PPM</u>
Aroclor 1242	28	196	2356
Aroclor 1254	53	317	4080
Aroclor 1260	65	417	5176

Tissue and sex differences were also apparent in the data; the following patterns were observed:

- 1) At low exposure, muscle>fat>liver.
- 2) At high exposure, muscle>liver≥fat.
- 3) All cases, male>female." [M 41155, January 31, 1972]

Doc ID # 3504 Exhibit #

"PCB residues in the muscle, fat and egg tissues from animals fed the 30-day recovery diet were significantly lower, while the PCB residues in the liver were only slightly less. Remobilization of the residues in the animals subjected to the highest exposure was noticeably slower."

[M 41155-56, "Progress Report (by W. M. Mess and E. S. Tucker): January 1972: Environmental Analytical Program-Toxicology Support Studies," CONFIDENTIAL, January 31, 1972.]

Doc ID # 3504 Exhibit #

597.
02/1972

Letter from Paul De Falco, Jr., Regional Administrator, EPA Region IX to Mr. E. J. Bock, President and CEO of Monsanto: EPA Region IV asked Monsanto to provide a list of all shipments of PCB's to Los Angeles County, California.

"Information available to this office indicates that quantities of polychlorinated biphenyls are being discharged to the Pacific Ocean via the Los Angeles County Sanitation District's sewerage system. In order to take steps to bring about a reduction in this discharge, it is necessary that the points of entry of this material into the sewerage system be determined.

To assist us in making that determination, it is requested that you provide us with the following information:

1. A list of all shipments of polychlorinated biphenyls by Monsanto to Los Angeles County, California within the past eighteen (18) months with the name and address of each addressee as well as the quantity delivered.

2. A similar listing of all sales of polychlorinated biphenyls made by the Central Solvents and Chemicals Company, Los Angeles, California."

[DSW 009989, "Letter from Paul De Falco, Jr., Regional Administrator, United States Environmental Protection Agency Region IX to Mr. E. J. Bock, President and Chief Executive Officer, Monsanto Company," February 1972.]

Note: No specific date can be determined.

Doc ID # 11358 Exhibit #

598.
02/1971

E. S. Tucker, Aroclor Defense - 1970 PCB Support Analysis: in 1970, Monsanto analyzed 486 samples. "The air, water, and sediment samples contained materials most typical of Aroclor 1242, 1248, 1254 and/or 1260. The milk, shrimp, and fish samples most often contained PCB's typical of Aroclor 1254-Aroclor 1260."

"SUMMARY

The attached table summarizes results of the work done during 1970 on the detection of PCB's in environmental materials. It covers a total of 486 samples which were analyzed during 1970. PCB's typical of our Aroclor products were found in

- Water and sediment from 4 manufacturing sites, 13 customer sites, 12 U.S. rivers, 1 U.K. river and Lake Michigan.
- Air at the Anniston Plant and at the Appleton Coated Paper Co.
- Fish from Lake Michigan and 8 U.S. rivers.
- Human fat from a midwest biopsy specimen.
- Milk from Maryland, Ohio, and Massachusetts dairy farms.
- Shrimp from Escambia Bay, Florida.

The air, water, and sediment samples contained materials most typical of Aroclor 1242, 1248, 1254 and/or 1260. The milk, shrimp, and fish samples most often contained PCB's typical of Aroclor 1254-Aroclor 1260.

RESULTS

See attached table."

[MONS 063092-93, E. S. Tucker, Monsanto Company, Organic Chemicals Division, Applied Sciences Section, "Aroclor Defense - 1970 PCB Support Analysis," CONFIDENTIAL, February 1972.]

Doc ID # 543

Exhibit # P-0508

599.

02/01/72

Letter from Papageorge to Oneson: Monsanto said that its handling procedures in its manufacturing plants of PCBs "are those we have used for many years and are based on the normal good industrial hygiene practices followed by most responsible industries".

"Responding to Mr. Vernon Mulhall's inquiry I have attached copies of the only available articles I have relating PCBs to humans. One article simply notes the presence of PCBs in human tissue and the other describes the Japanese incident in which high levels of PCB were accidentally ingested with contaminated cooking oil.

Safe handling procedures in our manufacturing plants are those we have used for many years and are based on the normal good industrial hygiene practices followed by most responsible industries. These involve the existence of proper ventilation, the use of protective clothing and the exercising of personal cleanliness by the employees. I have attached a copy of the page on Toxicity and Safe Handling from Monsanto Technical Bulletin 306A and a copy of the Hygienic Guide Series on Chlorodiphenyls."

[MONS 098212, "Letter from W. B. Papageorge to Mr. T. Oneson (Montreal)," February 1, 1972.]

Doc ID # 997

Exhibit #

600.

02/01/72

Letter from Papageorge to Holzapfel: The Air and Water News reported Monsanto's 'easily obtainable health data'. However, facing the coming OSHA visit, Papageorge felt that Monsanto didn't "have such basic data as a list of employees who have involved in the manufacture of PCBs." He also worried that "Since the PCB problem has been of some concern for over three years it seems to me we are extremely vulnerable to severe criticism for not taking any unique action."

"I will attempt to summarize our discussion we had last week during which I expressed my personal concern that the emotions now being associated with PCBs would adversely affect us through an OSHA inspection.

In December two incidents occurred which are somewhat related. At a PCB meeting in North Carolina I was approached by a Dr. Powell, a former Monsanto employee and now a chemist with the National Institute of Environmental Health Science, who asked if it were possible for government personnel to inspect the PCB producing unit at Sauget, Illinois. I did not commit Monsanto to any visit but informed Dr. Powell we would certainly give serious consideration to a request from a responsible representative of government. He then indicated that he was assigned the task of setting inspection standards for OSHA and was going to recommend that the Monsanto PCB unit be used as a prototype. As yet we have received no formal request to visit the plant.

The December 27, 1971 issue of Air and Water News contains an item referring to PCBs, the Occupational Safety and Health Institute, Monsanto's "easily obtainable health data" and Dr. Terry Davies', Council of Environmental Quality, indication that a health study involving Monsanto's clinical data would be recommended.

It is my understanding that the medical program for our PCB employees is no different than for the other employees at a plant. To date we do not have such basic data as a list of employees who have involved in the manufacture of PCBs. Since the PCB problem has been of some concern for over three years it seems to me we are extremely vulnerable to severe criticism for not taking any unique action.

I recognize the problems associated with special medical programs but in this instance the "lets do nothing stance" can also lead to serious problems.

You indicated that the W. G. Krummrich plant was ready for a normal OSHA inspection." [MONS 098213, February 1, 1972]

Doc ID # 8991 Exhibit # P-0602

"To better prepare the plant for the inevitable visit we need a recommendation from the Medical Department regarding the appropriate medical action we should take.

I will arrange with Dr. Kelly for a meeting to review our approach."

[MONS 098213-14, "Letter from W. B. Papageorge to Mr. F. J. Holzafel: OSHA-PCB," February 1, 1972.]

Doc ID # 8991 Exhibit # P-0602

601.
02/04/72

Briefing Memorandum – PCBs (prepared by the Office of Research): Different types of applications of PCBs were discussed. It was estimated that "the total input to the aquatic environment " "is 4,000 tons per year". It recommended that "The allowable discharge should not be more than an amount that will result in 0.01 ppb in the receiving water at mean annual flow". "Japanese experience with the Yushu incident suggests that a total intake of ½ gram was enough to cause overt symptoms in man."

"For the last several months there has been an interagency task force on PCB's. It is now drawing together a document for publication. While there are many gaps in information about sources, occurrence, and effects of PCB's there is enough known that we probably should consider some actions in EPA at this time. The salient facts follow:

Amount Manufactured

Monsanto is the sole manufacturer of PCB's in the United States. In 1970 its domestic sales were about 36,000 tons in a number of different grades. That was approximately twice the amount manufactured in 1960. 1971 expected value were down to about half the 1970 figure. While formerly used as a dielectric fluid in transformers and capacitors, as a hydraulic fluid and lubricant where fire retardant characteristics are important, as a plasticizer, as an additive to paints, pesticides and numerous other products, and in encapsulating for carbonless carbon paper most uses have now been eliminated by Monsanto."

"Sources to the Environment

Air. There are no reliable data on PCB concentrations in air. Four measurements have been made that suggest presence in three different cities." "We do need to learn about PCB's in air as a transport mechanism."

"Sources in air probably include open burning at dumps and possibly unburned particulate from incinerators. Vaporization is

known to occur from plastics. Complete incineration is not likely to result in PCB residues in air." [MONS 098860, February 4, 1972]

Doc ID # 16623 Exhibit #

"Water. PCB's enter the aquatic environment from both industrial and municipal sewer outfalls. The usual treatment of municipal sewage (including combined industrial-municipal) results in PCB's being present in both sludge and liquid effluent. The total amount of municipal effluent ranges from less than 1 ppb to a few tens of ppb. Some industrial outfalls contain hundreds of ppb. The estimate of the total input to the aquatic environment by Dr. Sarofim of Harvard is 4,000 tons per year. I think that number may be high, particularly with the decreased use of PCB's. Furthermore, Dr. Saofim's estimate includes accidental discharges."

"Dump. Dr. Sarofim estimate the largest amount of PCB's ends up in dumps -- 20,000 tons in 1970. So long as the dumps are not burned, there probably is relatively little transfer to other parts of the environment."

"Effects of PCB's

PCB's have been shown experimentally to kill shrimp and some fish at concentrations as low as 1 ppb in water. The Food and Drug Administration has establish a guideline of 5 ppm in fish. Japanese experience with the Yushu incident suggests that a total intake of ½ gram was enough to cause overt symptoms in man."

"Concentration Factors

Fish, shrimp, and crabs are known to concentrate PCB's from levels in water by factors of up to 75,000 with exposure levels as low as 0.1 ppb for fish and 0.06 for shrimp."

"Recommendations

EPA should establish guidelines for PCB's in water of 0.01 ppb which will be sufficiently low that concentrations in fish should not exceed 5 ppm. 0.01 ppb is 1/500,000 of 5 ppm, and thus this concentration should not result in PCB levels in fish as high as the 5 ppm guideline of FDA. The 0.01 ppb level is sufficiently low that fish and other aquatic organism should not be damaged.

In operational terms, we should limit PCB discharges under the 1899 permit procedures. The allowable discharge should not

be more than an amount that will result in 0.01 ppb in the receiving water at mean annual flow, assuming uniform mixing." [MONS 098861, February 4, 1972]

Doc ID # 16623 Exhibit #

"We should sample sewage sludges from time to time now that PCB use is decreasing and should consider prohibiting dumping of such sludges at sea if the PCB levels do not drop."

[MONS 098860-62, "Briefing Memorandum — PCB's (Prepared by the Office of Research)," February 4, 1972.]

Doc ID # 16623 Exhibit #

602.
02/07/72

Letter from Bergen To Buckley: Monsanto said that its decision to cease making and selling PCBs was taken with a view to reducing the ecological hazards involved with these products. However, based on the other documents, what they did in Anniston was not consistent with this policy.

"Will Clark and Jim Springgate have passed your memo along to me in as much as our business group has the product responsibility for the whole biphenyl/terphenyl family tree and all budgeted profitability related to it.

We are not interested in licensing process details for the manufacture of Aroclor 5460, nor do we have patents on this subject. Our reason for not wanting to license knowhow on any of the PCB's/PCT's is that Monsanto has decided that on a worldwide basis we should cease making and selling these materials. The only exception is for material being used in closed electrical systems. This decision was taken with a view to reducing the ecological hazards involved with these products. To further promote the products by selling technology to others allowing them to make them would only be defeating our purpose and would not be in accordance with our policy."

[MONS 098330, "Letter from H. S. Bergen To G. H. Buckley: Thomas Chemicals/Aroclor 5460," February 7, 1972.]

Doc ID # 999 Exhibit #

603.

02/20/72

Letter from Vodden to Baxer and Papageorge: Monsanto studied Bayer's market policy on PCB in Europe.

"Business Situation

1. Bayer have now stated that their marketing policy for P.C.B. products is as follows:

- (a) No sales of P C B's to new customers for open applications since 1st January 1972.
- (b) Sales to existing customers for open applications will be terminated by 30th June 1972, except to German Mines.
- (c) Closed applications are transformers, for which pentachlorobiphenyl will be supplied. For capacitors, only low chlorine (<5) P.C.B. materials will be supplied. In response to questions, Bayer defined the low chlorine product as containing less than one per cent of penta and higher."

"3. Bayer and the other European P.C.B. producers will not ask their customers for indemnities, but some progress has been made towards agreed wording for warning customers and users of the pollution hazards of P.C.B's."

[MONS 099690, "Letter from H. A. Vodden to R. A. Baxer and W. B. Papageorge: Industrial Chemical (Europe) Environmental Studies," CONFIDENTIAL, February 20, 1972.]

Doc ID # 9049

Exhibit # P-0604

604.

02/21/72

Monsanto's Office in Taiwan was "making a serious attempt to retain our existing dielectric Aroclor business". The Office asked Monsanto to acknowledge that "it is not possible" that "the March 31st deadline is a declaration of Monsanto's intention not to do business" in the Asia-Pacific area.

"Eric's comment in his Feb. 2 memo, may still turn out to be a correct analysis. However we have not accepted the customers initial reactions as final and Eric has been working with our customers toward an acceptance of the "hold harmless" agreement. If we are unable to get their acceptance, we will cease to do business in Aroclor dielectrics after March 31st."

"While the customers are partly aware of the environmental problem, they have not had the exposure to it that Monsanto's U.S. customers have and we are also asking something from them which our competitors are not. We cannot expect them to react with the same sense of urgency. We are making a serious attempt to retain our existing dielectric Aroclor business, but we require some assistance in our efforts. I understand that you are well occupied in the Sates and may not be able to give immediate attention to Taiwan, but in these circumstance I feel it is realistic for Monsanto to acknowledge that it is not possible to support the effort in the Asian-Pacific area and that the March 31st deadline is a declaration of Monsanto's intention not to do business in this area. The alternative is to extend the deadline until such time as meaningful support could be given."

[MONS 098565-66, "Letter from R. S. Hill (Taipei) to Mr. P. G. Benignus: Aroclor-Dielectrics/Taiwan," February 21, 1972.]

Doc ID # 9135 Exhibit #

605.
02/23/72

PCB contamination had occurred in nine flocks of poultry in an operation in Thorndike, Maine. "Samples of feed representing the previous week's supply analyzed 88-578 ppm PCB's as unaltered Aroclor 1242."

"Mr. Schilte informed me that he believed PCB contamination had occurred in nine flocks of poultry in an operation in Thorndike, Maine.

On February 10-11, 1972 mortality was noticed in the flocks of 10-11 day old broilers. The symptoms were judged by Ralston Purina people to be similar to those experienced by PCB contaminated flocks. Samples of the feed currently used were analyzed and no detectable PCB was found. Samples of feed representing the previous week's supply analyzed 88-578 ppm PCB's as unaltered Aroclor 1242. Ingredients used in the feed were sampled and PCB was found in poultry by-product meal at 11-13 ppm. This PCB was identified as metabolized (altered) PCB suggesting PCB in the feed came from another source.

Purina made a check of other poultry producers in the area and determined that Maplewood Farms (name given to me in confidence) was having difficulties for several weeks which were attributed to "salt" and "air seo".

The only common ingredient used in both feeds is claimed to be meat fat from Pine State Rendering Company, Mr. Mendelsohn, President. Mr. Schilte indicated there may be some financial relationship between Kaplewood Farms and Pine State Rendering.

The FDA and USDA have been informed and are active. FDA is insisting on a maximum of 5 ppm in fat tissue in birds permitted for food use.

Purina is no longer owner of the operation but apparently the incident occurred at a time that Purina feels some responsibility.

Purina is meeting with FDA and USDA personnel, Dr. V. Wodicka and Dr. A. Kolby were mentioned, in Washington, D.C. on Friday, February 25, 1972. Objective is to get the agencies to relax the 5 ppm guideline. Mr. Schilte asked if I or some other Monsanto representatives would also go to Washington to help. I told him that the FDA had all of Monsanto's data and we had nothing new to contribute. I also expressed concern that a discussion in this area could result in a lower guideline being established."

[MONS 098210-211, "Letter from W. B. Papageorge to File," February 23, 1972.]

Note: *The word "air seo" is too blurring to read.*

Doc ID # 1005 Exhibit #

606.

02/23/72

USDA Monitoring Maine: USDA announced that "it had initiated a monitoring program for all poultry produced in Maine, after learning that some broiler and roaster chickens had been contaminated with polychlorinated biphenyls (PCB)."

"WASHINGTON, February 23, 1972 – The United States Department of Agriculture today announced it had initiated a monitoring program for all poultry produced in Maine, after learning that some broiler and roaster chickens had been contaminated with polychlorinated biphenyls (PCB).

USDA's Consumer & Marketing Service said that 10 lots of birds – approximately 200,000 – were contaminated with PCBs and that the feed was suspected as the source of contamination."

"C&MS said none of the 200,000 birds being held would be released into human food channels unless they comply with PCB guidelines established by the federal Food and Drug

Administration. Birds not in compliance would be destroyed, C&MS said."

[MONS 061360, USDA Monitoring Maine: "Poultry For PCB Contamination," February 23, 1972.]

Doc ID # 7719 Exhibit #

607.

02/25/72

Letter from Papageorge to File: According to Dr. A. C. Kolbye, "about 50 flocks were involved at present but statewide monitoring is far from complete". "Dr. Kolbye is very disturbed by this incident and feels he has been placed in an untenable position because of his previous defense of PCB's."

"Telephoned Dr. A. C. Kolbye, FDA, Washington, D. C. at 8:00 a.m. Friday, February 25, 1972 to review his knowledge of the Maine PCB-poultry situation. He qualified all of his statements, repeatedly, by stating he had limited information, therefore, could not reach any conclusions.

He stated that Pine State Rendering Company is suspected as being the source of the PCB but Pine State strongly denies using PCB's. Pine State Rendering has a sterilizing unit but no information is available regarding its design or heat source. There is a possibility that plastic film containing PCB's used in meat packaging may have been processed with the scrap meat.

Dr. Kolbye indicated that about 50 flocks were involved at present but statewide monitoring is far from complete. He also stated emphatically that the 5 ppm PCB in fat guideline would be rigidly followed in determining acceptability of poultry for human use.

Dr. Kolbye is very disturbed by this incident and feels he has been placed in an untenable position because of his previous defense of PCB's. He offered to call and report results of his discussions with the Ralston-Purina representatives."

[MONS 098419, "Letter from W. B. Papageorge to File," February 25, 1972.]

Doc ID # 1006 Exhibit # P-0606

608.

02/29/72

The incident of PCB-poultry contamination was reviewed. A heated discussion took place between USDA and FDA. Finally, a guideline was developed.

"Reviewed by telephone on February 29, 1972 the PCB-poultry incident in Maine with Mr. LeRoy Schilte, Ralston Purina, St. Louis, Missouri."

"Purina representatives met with representatives of FDA and USDA in Washington, D.C. on Friday, February 28. FDA was represented by Meaors, Wodicka, Kolbye, Ramae, Quinn, Duggen, Schrafner and Swanson. USDA was represented by Mesars, Fullerton and MacEnroe."

"Purina asked that chickens with PCB content in the fatty tissue up to 40 ppm be released for human use. They did not expect approval. A heated discussion took place between USDA and FDA regarding methods of flock sampling and application of guidelines. Finally agreement was reached that flocks would be retained if a ten-bird composite sample had 4.5 ppm PCB in the fatty tissue. If PCB levels exceed 5.5, birds must be destroyed. If level fell between 4.5 and 5.5 individual bird analysis would be permitted if each bird did not exceed 10 ppm PCB in its fatty tissue. Mr. Schilte believes this guideline will be followed for all future cases as well as the current."

[MONS 098422, "Letter from Mr. W. B. Papageorge to File of Monsanto: PCB-Poultry - Maine," February 29, 1972.]

Doc ID # 1008**Exhibit #**

609.

03/1972

Report of USDA AD HOC Group On PCB's, Agriculture's Responsibility Concerning PCB's: "At the point of manufacture and the plants where PCB products are processed, they can escape through ventilation and exhaust systems." "The Environmental Protection Agency will prohibit industrial effluents from contaminating water, and a standard of 0.01 ppb is being established for levels of PCB's in rivers and lakes."

"One entry to man is via the birds and mammals which have fed on contaminated fish. Another route is through residues on food which have been wrapped in papers and plastics containing PCB's. A third route is through milk."

"The exact nature of PCB entry into the environment is not understood, but several scientists have speculated on possible major sources. Sewage outfalls and industrial disposals into waterways are two principal means suggested by scientists. It has been estimated that 4,000 tons per year entered waterways from dumpage and leakage of lubricants, hydraulic fluid, and heat transfer fluids. In most cases contamination can be traced to some industrial area. Residues have been found in water, sewage sludge, and bottom sediments. Levels in water are usually less than a part per billion; in sewage and sediments, tens to hundreds of parts per billion; and in sewage sludge, a few parts per million."
[MONS 069664, March 1972]

Doc ID # 5145 Exhibit # P-0609

"Although the rivers and streams appear to be the primary routed into the environment, the atmosphere also appears to be a major means of entry. It has been estimated by Adel Sarofim of MIT that approximately 1500 tons have escaped into the atmosphere in past years from plasticized materials containing PCB's. Burning PCB-containing materials results in volatilization unless the temperature exceeds 980 F. Some of the oxides are more toxic than the parent materials. PCB's have been found in precipitation and in airborne particulates in the United States and in snow collected in Sweden. The levels found in these studies were in insufficient quantities to determine the specific levels. At the point of manufacture and the plants where PCB products are processed, they can escape through ventilation and exhaust systems."
[MONS 069665, March 1972]

Doc ID # 5145 Exhibit # P-0609

"According to the Interdepartmental Task Force Report, the Federal Government has taken several new actions to deal with the PCB problem. The Environmental Protection Agency will prohibit industrial effluents from contaminating water, and a standard of 0.01 ppb is being established for levels of PCB's in rivers and lakes."
[MONS 069675, March 1972]

Doc ID # 5145 Exhibit # P-0609

"A review of past occurrences is valuable as it allows the planning for future controls. In this instance, if the PCB problems had been carefully evaluated during the first two occurrences, later

outbreaks would have been predicted and possibly prevented by proper corrective action."

"The first occurrence of PCB was caused by transfer from silo wall coating to animal feed and then through milk cows in the late fall of 1969." "The next farm animal incident did not occur until February 1971."
[MONS 069678, March 1972]

Doc ID # 5145 Exhibit # P-0609

[MONS 069660, 069664-65, 069675, and 069678, "Agriculture's Responsibility Concerning PCB's, Report of USDA AD HOC Group On PCB's," (Draft Copy), March 1972.]

Doc ID # 5145 Exhibit # P-0609

610.
3/7/72

Cumming Paton: "Proposed Tougher Legislation On PCBs" by FDA: "F.D.A.'s plan would ban the use of PCBs in all applications except dielectrics."

"Attached is an article from the Wall Street Journal of March 6 on tougher legislation for PCBs being proposed by U.S. F.D.A.

1. F.D.A.'s plan would ban the use of PCBs in all applications except dielectrics.
2. F.D.A. is expected to set PCB level at 5 ppm in food packaging materials (recycled or otherwise). This will take into account the "background" level of PCB already in the environment.
3. Tougher PCB levels will be set for foods. Proposals are:

Infant food	0.1 ppm
Eggs	0.5 ppm
Fish	5.0 ppm
Poultry	5.0 (in fat, not the whole bird therefore a lot tougher)
Milk	may be "toughened" below 0.2

4. Proposed restrictions would be issued for 60-day comment period and then republished, probably for an immediate effective date. Thus, these significant restrictions are likely to be no more than 90 days away."

[MONS 071429, Cumming Paton, "Proposed Tougher Legislation On PCBs," Sales Information Bulletin No. 72, March 7, 1972.]

Doc ID # 11952 Exhibit #

611.
03/08/72

Letter from Bergen and Greene to Berndt, et al.: A notable policy change was made by Monsanto. Bergen wrote "A decision has been made to permit continuing PCB sales ex-U.S. and Canada directly to manufacturers of capacitors and transformers, without hold harmless agreements..."

"As I telexed some of you, there has been a notable change in PCB policy. A decision has been made to permit continuing PCB sales ex-U.S. and Canada directly to manufacturers of capacitors and transformers, without hold harmless agreements, provided a recheck with the local counsel indicates we will be reasonably protected if we rely on a full warning to customers and obtain acknowledgement of the warning.

Our program is essentially complete for these limited PCB sales in the U. K., Europe and Eastern Europe. Before expanding the program to other areas ex-U. S. A. and Canada, we need as promptly as possible to get confirming advice from you that local counsel concur with what we believe to be the local situation in substantially all countries."

[MONS 100065, "Letter from H. S. Bergen and E. Greene (St. Louis, General Office) to J. P. Berndt, et al.: PCB Dielectric Sales," March 8, 1972.]

Doc ID # 8481 Exhibit # P-0613

612.
03/09/72

Letter from Munch to Papageorge: Per WBP's request, Munch made comments on handling askarels in the manufacture of capacitors. He listed a lot of supporting data needed for Monsanto to convince the ANSI Committee C-107.

"You have asked for my comments on the latest draft of ANSI committee C-107 proposed guidelines for handling askarels in the manufacture of capacitors. They are as follows:

3. They will not be convinced unless we supply supporting data. The data needed are:

- a) Proof that the lower PCB's do degrade more rapidly than the higher ones.
- b) The best possible data on rates of degradation by all mechanisms – photo, bio, oxidative or others.
- c) Data on toxicity.
- d) Data on migration of PCBs through soil.
- e) Data showing how much the already accomplished industry actions will reduce PCB input, particularly higher PCB input, to the environment."

[MONS 099453, "Letter from R. H. Munch to W. B. Papageorge (General Offices)," March 9, 1972.]

Doc ID # 8308 Exhibit # P-0615

613.

03/09/72

The ASTM March 1972 Meeting in Washington DC decided to document at ASTM the methodology for "Detection and determination of PCBs in the Environment".

"I. PCBs:

On behalf of industry and Government it is important to document at ASTM the methodology for "Detection and Determination of PCBs in the Environment". To do this a new Section was formed under D-27 and they appointed me as chairman to get the work done, especially as Monsanto developed methods will be used.

II. Method For Determining The Higher Chlorinated PCB Content of Aroclor 1016:

This also must be documented as an ASTM method to cover our official specification maximum of 0.4%. As Earl Morrison of the City of Los Angeles Light, Water and Power already heads an ASTM section on gas chromatography my committee delegated to his section the work to study Monsanto's method and draw it up into the official ASTM form."

[MONS 098420, "Letter from P. G. Benignus to H.S. Bergen to H. S. Bergen, et al.: ASTM – Washington DC Meeting, March 1972," March 9, 1972.]

Doc ID # 18873 Exhibit #

614.

03/15/72

The Japan Economic Journal reported some Tokyo food samples and marine life were "polluted" with PCB. "... the metropolitan administration at least plans to seek rigid central government control on the known use of PCB (in various applications)."

"Howard, with regards to the referenced letter, perhaps it might be worthwhile to review our situation in Japan.

First, there is some question in my mind whether the Ministry of International Trade and Industry has actually banned PCB's in any application. On February 29, 1972, the Japan Economic Journal reported some Tokyo food samples and marine life "polluted" with PCB according to tests of the Tokyo Metropolitan Government. "This was the first official finding by a Japanese municipal administration." The article goes on to say "... the metropolitan administration at least plans to seek rigid central government control on the known use of PCB (in various applications)." The definite implication is that there is no current legislation." [MONS 098327, March 15, 1972]

Doc ID # 9048**Exhibit #**

"Based on all of the above, I recommend we answer as follows:

1. We will not bear any of the cost to drain and incinerate old fluids.
2. We will accept PCT-Pydraul inventory back if it is received in St. Louis in drums that can be resold as returned, if it is received in St. Louis prior to May 1, 1972, and if Mitsubishi pays the freight."

[MONS 098327-28, "Letter from C. L. Bradford to H. S. Bergen, Mitsubishi Corporation," March 15, 1972.]

Doc ID # 9048**Exhibit #**

615.

03/18/72

Nihon Keizai Shimbun, Tokyo: "Complete Ban of PCB to be Notified by MITI"

"Considering the seriousness of the case of high concentration of PCB (Poly Chlorinated Biphenyl) having been detected in mother's milk, the Ministry of International Trade & Industry (MITI) decided on March 17 to notify early next week the

industries concerned that the use of PCB in transformers, condensers, etc. of household electric appliances, which cannot be recovered or collected, will be prohibited."

"The use of PCB in such products like paints and adhesives which come in direct contact with human body was already prohibited effective January."

"By the decision of MITI, the use of PCB will be almost completely prohibited except for larger transformers, etc. of power companies, the supervision and recovery of which could be done fully."

[MONS 071147, Nihon Keizai Shimbun, Tokyo: "Complete Ban of PCB to be Notified by MITI," March 18, 1972.]

Doc ID # 5181 Exhibit # P-0616

616.
03/22/72

Japanese Government set very stringent regulatory requirements to continue using PCB. Katayama said in his letter that "The grand funeral of PCB in Japan is close at hand."

"The Ministry of International Trade and Industry (MITI) issued notice yesterday to almost every industrial association concerned, as summarized in the following:

- a. No electrical machinery and equipment which contain PCB must be manufactured after Sep. 1, 1972.
- b. No heat exchange equipment must be produced after July 1, 1972 which use PCB as a transfer medium.
- c. Exceptions to the above are those which are sold to the specific users and which can be returned after use to the producers or, manufacturers for PCB disposal. They must periodically report to the ministry how PCB is used, shipped, stored, recovered, returned and disposed, including machinery, in addition to the quantity dealt with and so and so forth.

Every user of PCB-containing machinery and equipment will have to be recorded and registered in the official list to insure strict supervision in the future.

d. Import of such machinery and equipment will be possible only if permission is granted by the Government, after September 1, 1972.

e. PCB containing machinery and equipment already in use must be identified and reported to the authorities so that the disposal of PCB is to be made complete."

[MONS 098324, March 22, 1972]

Doc ID # 1018 Exhibit #

"You will understand that the above action is not the total ban of PCB usage. However, who can meet such stringent regulatory requirements to continue using PCB, other than non-civil organizations?"

"I think the latest happening sensationally moved the Government to this direction – the analysis of mothers' milk in Osaka showed PCB level of 0.7 to 0.1 PPM, as against the FDA's 0.2 maximum level for cows' milk. In the Diet committee the Welfare Minister was at a loss when asked if or not babies can drink milk with 0.7 PPM PCB without any danger to their healthy growth.

You might recall Yodo River flows from Lake Biwn to Osaka Bay. Two capacitor plants are located by the Lake-Nichicon's and Nisshin Electric's. Samples of the soil were taken from the vicinity of Nichicon to run analysis of PCB with an unfortunate result showing 1,000 PPM PCB!" [MONS 098325, March 22, 1972]

Doc ID # 1018 Exhibit #

"The grand funeral of PCB in Japan is close at hand."

"P.S. Just before I had this letter typed, Kaneka announced that they decided to discontinue the production of Kaneclor by the end of June, which was confirmed by myself today with Kaneka.

Also Nichikon was forced to terminate their production of PCB capacitors at the end of April." [MONS 098326]

Doc ID # 1018 Exhibit #

[MONS 098324-26, "Letter from T. Katayama to Mr. P. G. Benignus (St. Louis): PCB In Japan," March 22, 1972.]

Doc ID # 1018 Exhibit #

617.

03/23/72

Letter from M.J. Moore (Scientist Representative) to Roberts: PCB was found in the milk of nursing mothers in Japan. Japanese Government (MITI) ordered 23 industrial organizations to discontinue use of polychlorinated biphenyl (PCB).

"On Tuesday, March 21 the Japanese Government (MITI) ordered 23 industrial organizations to discontinue use of polychlorinated biphenyl (PCB). The order follows weeks of controversy during which PCB was found in the milk of nursing mothers. The notification by MITI requested the industries to suspend production of electric appliances and parts containing PCB by September 1 of this year. As a result of the ban manufacturers are expected to switch from PCB to mineral oil."

[MONS 099689, "Letter from M.J. Moore (Scientist Representative) to R. W. Roberts (R & D Manager, GE): Government Stops use of PCB," March 23, 1972.]

Doc ID # 8360 Exhibit #

618.

03/24/72

Letter from Easley to Corey: Warren received a draft of the report on PCB from Burger, which was expected to be issued in about a week.

"I saw Ed Burger today and was surprised to be handed a draft of the report for my perusal. He expects it to issue in about a week and promises to alert us prior to its release. Announcement will be made jointly by the regulatory agencies concerned – EPA, FDA and USDA. A news conference is possible but not yet determined. (We have known that Sarofin and others are preparing a report. Burger says this report is separate from the Task Force report. It will be issued in a few months by NIEHS and will deal with production and environmental impact, not with utility of PCBs.)"

[MONS 099696, "Letter from K. Warren Easley (Washington, D. C.) to W. R. Corey: PCB Task Force Report," March 24, 1972.]

Doc ID # 8362 Exhibit #

619.

03/29/72

Letter from Essley to Papageorge: Essley complained about Professor Darnell's comments on PCB at the United Nations' PCB

meeting, and said that he "did not think anything of consequence on PCB would happen as a result of comments made at Houston."

"Here is what I have been able to accomplish to date on the various items that arose during the recent tour you and I made around Washington.

Dr. Richard Teske (Bureau of Veterinary Medicine, FDA. Laboratory located at Beltsville.) is planning to sponsor a research project on the up-take of PCB in domestic animals."

"Dr. Ken Johnson, WCA, says that there was not much discussion of PCB at the Houston-United Nations meeting. Dr. Razneat Darnell, Professor of Oceanography and Biology, Texas A&M, did mention PCB, carelessly lumping it with DDT and PVC as chlorinated hydrocarbons of concern, but said nothing new nor startling. He spoke of the importance of protecting the marine environment, discussed long-term ecological changes, and pointed out that persistent chemicals such as chlorinated hydrocarbons can have a deleterious effect. Ken did not think anything of consequence on PCB would happen as a result of comments made at Houston."

[MONS 099700, "Letter from K. Warren Essley (Washington, D. C.) to W. B. Papageorge," March 29, 1972.]

Doc ID # 8363 Exhibit #

620.
04/03/72

Recently, Japanese took action of banning all PCB's for all uses including dielectric use. Monsanto worried that this "may cause a political and emotional reaction both in the U.S. and abroad." They tried to set a new "Dielectric Fluids Strategy".

"There are several things I feel strongly about and they are as follows:

1) The recent Japanese action of banning all PCB's for all uses including dielectric use may cause a political and emotional reaction both in the U.S. and abroad. We must explain why their reaction is different from ours (Paul Benignus is writing this up). We must alert our people, as well as our customers on this move. The Japanese announcement will add fuel to the fire that replacements are possible and both internal and external uneasiness will result. We must anticipate this and develop the plans to handle this situation.

2) The Monsanto special undertaking and the requirements for either \$50 million net worth or suitable insurance coverage will trigger the smaller manufacturers, in particular, to look for substitutes. Having talked to practically all of these on the telephone myself and some in person, I know they would rather pay \$1.00/pound for a product for which they do not have to sign a special undertaking or take the necessary insurance coverage. These are companies who make specialized capacitors. The large volume power capacitor users will be much more responsive to the price and less concerned with the net worth or insurance coverage requirements.

On the other hand, Westinghouse and others have told me they are concerned that the Government-- or even Monsanto-- might legislate against them and 'they must be prepared for the alternatives'.

Therefore, in my mind for whatever reason there is a distinct need for replacement products and we must let the industry know that we are doing about it and that we have some alternatives to offer them. I think our basic strategy is clear in that we will point up the significant improvements we have made already with 1016, as well as getting more biodegradation information via the pond experiments to which we last week reached agreement with Peter Marsh."

[MONS 098416-17, "Letter from H. S. Bergen to R. H. Munch: Dielectric Fluids Strategy," April 3, 1972.]

Doc ID # 1024 Exhibit #

621.

04/05/72

The average losses of Aroclors 1242 and 1254 in March 1972 reported to AWIC were 0.40 lbs/day with an average concentration of 46 ppb. Again, Monsanto requested "that this data be held as confidential material".

"Attached you will find the daily Aroclor (1242 and 1254 - polychlorinated biphenyls) losses from the Anniston Plant for the month of March 1972.

The average daily losses are as follows:

Average flow = 733 GPM

Average concentration = 0.046 ppm
(Aroclor 1242 and 1254 - polychlorinated biphenyls)

Average pounds Aroclor = 0.40 pounds/day
(Aroclor 1242 and 1254 - polychlorinated biphenyls)

If you have any questions concerning this data, please contact us.
Again, we request that this data be held as confidential material."

[DSW 014749, "Letter from J. T. Bell, Plant Chief Chemist, Anniston Plant, to Mr. J. L. Crockett, Jr., Technical Staff Director, Alabama Water Improvement Commission," April 5, 1972.]

Doc ID # 2636 Exhibit # P-0622

622.

04/06/72

The Federal government was going to recommend that PCB levels in effluent streams be virtually reduced to zero.

"It is believed that a pending paper from the Office of Science and Technology, an element of the executive branch of the Federal government, will recommend that polychlorinated biphenyl (PCB) levels in effluent streams be virtually reduced to zero. The paper will recommend that no PCB's will be detected in the plant effluent stream and PCB levels from the department will be a maximum of 0.01 parts per billion (ppb)."

[MONS 098745, "Letter from Edward E. Stewart (Technical Services Department) to Mr. A. E. Leisy: PCB Loss Control Program Status, (Krummrich)," COMPANY CONFIDENTIAL, April 6, 1972.]

Doc ID # 1030 Exhibit #

623.

04/07/72

Letter from Cutchens to Jennings: Cutchens told Jennings that "A survey of the north ditch drainage make-up area reveals that a rather large section of plant property is contaminated with PCB."

"A survey of the north ditch drainage make-up area reveals that a rather large section of plant property is contaminated with PCB. A map locating the sampling points around the yarn plant is attached."

"The water sample from the roof of the yarn plant was taken at various points on the roof immediately after a large rain, i.e. it was

not concentrated via evaporation. The PCB was Aroclor 1248 which is in contrast to the Aroclor 1254 found in all other samples listed in this report. Since the water sample contained a relatively high level of Aroclor 1248, one would expect the roof-tar sample to contain a rather high level. An attempt was made to analyze a sample of roof-tar for PCB. A clear PCB pattern could not be obtained because of excessive interference, but there were certain indications that the sample contained PCB. The best estimate is 100 ppm calculated as Aroclor 1254."

[MONS 099898-99, "Letter from Charles E. Cutchens to D. S. Jennings: PCB Survey," CONFIDENTIAL, April 7, 1972.]

Doc ID # 8437 Exhibit #

624.
04/07/72

Quote of Polychlorinated Biphenyls: "Extreme care should be taken to prevent any spills, leakage, disposal vaporization or otherwise. When such accidents occur, the product must be collected and not allowed to enter the environment."

"WARNING -

Some studies have shown that polychlorinated biphenyls may be persistent, an environmental contaminant and possibly injurious to certain form of bird, aquatic and animal life.

Use of this product must be restricted to applications which can be controlled so that entry into the environment does not occur and for applications in which it cannot come into contact with food, animal feedstuffs or pharmaceuticals.

Extreme care should be taken to prevent any spills, leakage, disposal vaporization or otherwise. When such accidents occur, the product must be collected and not allowed to enter the environment."

"PRECAUTIONS -

HARMFUL SUBSTANCE if taken internally or if in prolonged contact with the skin CAUSES IRRITATION of skin and eyes.

Keep container properly closed.
Store away from food and drink.
Do not eat or smoke when using.
Avoid breathing vapours, mists or fumes.

Avoid contact with eyes or prolonged contact with skin.
Do not reuse contaminated clothing.
Wash product from skin with soap and water.
Wash eyes by flushing with water."

[MONS 062224, N. J. Kamper, "Polychlorinated Biphenyls," April 7, 1972.]

Doc ID # 1031 Exhibit #

625.

04/13/72

Monsanto did not agree with two important recommendations of Task Force on PCB's: water quality standard of 0.01 ppb PCB's and zero detectable PCB's in discharges.

"The Task Force for PCB's, with representatives from various Federal agencies including FDA, EPA, USDA and coordinated through the Office of Science and Technology, will soon release its voluminous report on the PCB's problem. Monsanto has cooperated with the involved agencies and had some insight into what would appear in the report. We agreed generally with nearly all of the report recommendations, but could not concur with two recommendations (as we understood them):

- (1) Water quality standard for PCB's to be set at 0.01 ppb for rivers and lakes.
- (2) Zero detectable level in discharges from plants producing or using PCB'."

[MONS 028739-40, "Minutes of Meeting – 4/13/72 in EPA Offices, Washington, D. C.: PCB – Allowable Discharge from Producing/Using Plants," April 13, 1972.]

Doc ID # 1034 Exhibit #

626.

04/18/72

Letter from Moore to Bellamy: The Japanese Health and Welfare Minister promised that "his ministry will set provisional national standards to control contamination of foodstuffs in Japan by PCB."

"N. Saito, Health and Welfare Minister, promised Friday (April 14) that his ministry will set provisional national standards to control contamination of foodstuffs in Japan by PCB. These standards are expected to be published within the next two months. They are expected to be even more stringent than existing standards in foreign countries. The possibility exists that all fish and marine

products taken from badly contaminated coastal areas will be banned from domestic or export markets."

"Japan has only two manufacturers of PCB: Kanegafuchi Chemical Industries Co. and Mitsubishi Monsanto Chemical Co., a semi-American firm. Mitsubishi Monsanto stopped production in March and Kanegafuchi will discontinue production in June. These two companies will be made to retrieve about 70% of the PCB now in use as a heat transmitting medium and dispose of it in a manner specified by MITI."

[MONS 099665, "Letter from M. J. Moore (Scientific Representative) to W. D. Bellamy (GE R& D Center): More on the PCB Problem," April 18, 1972.]

Doc ID # 8353 Exhibit #

627.
04/19/72

Letter from Tucker to Horner (WGK) and Bell (Anniston): PCB Methodology - Accuracy and Precision.

"Accompanying this memo are two Statistics special studies which are intended to give to all concerned a feeling for the precision and accuracy of the "estimated PCB levels" currently being reported by both internal and external analytical laboratories.

The first special study, #72-5, illustrates the accuracy and precision attainable by two experienced Monsanto laboratories analyzing the simplest matrix (pure water) encountered via equivalent methods under conditions eliminating any potential sampling problems.

Analysis of the laboratory data indicates that on the average, two experienced laboratories analyzing any equivalent individual sample containing relatively high PCB level (500 ppb) would report 87.5% of the level really present and that 95% of the time the value reported could be expected to fall in the range of 32.3 - 142.7% of the actual level present."

"The data also illustrates that it is 10 times more difficult to identify the specific Aroclor present than it is to estimate the total PCB level in the sample, especially if the laboratory personnel involved are not highly experienced in interpreting electron capture chromatograms. Because of this fact we have, for some time now, recommended that the analytical results be reported as the "estimated total PCB level", referencing the appropriate Aroclor or Aroclors used as the standard or standards.

It also should be pointed out that all laboratories doing PCB analysis have a definite reagent or laboratory background of apparent PCB's."

[MONS 099871, "Letter from E. S. Tucker to H. J. Horner (WGK) and J. T. Bell (Anniston): PCB Methodology -- Accuracy and Precision," April 19, 1972.]

Doc ID # 8423 Exhibit #

628.
04/24/72

US EPA established the policy that "will restrict knowing discharges to the lowest achievable level by placing all present discharges on an implementation schedule which will seek to bring about no discharge from known sources of contamination as rapidly as possible". Compared to what happened in Anniston, obviously, Anniston Plant did not follow this policy.

"Until further notice, the following policy should be followed by the permit program with respect to processing of permits for sources of Polychlorinated Biphenyl discharges. It is understood, of course, that by reason of the District Court injunction in Kalur v. Resor, no permit may be actually issued at the presentation.

It is the policy of the Environmental Protection Agency that all discharges to the aquatic environment involving Polychlorinated Biphenyls (PCB's) be restricted to the lowest possible level. The goal of the policy is to achieve levels in the environment sufficiently low that fish and other aquatic organisms will not be damaged, that accumulation in edible fish will not exceed the FDA guidelines of 5 parts per million in the edible portion. To implement this policy, we will restrict knowing discharges to the lowest achievable level by placing all present discharges on an implementation schedule which will seek to bring about no discharge from known sources of contamination as rapidly as possible. It must be recognized that there are reservoirs of PCB's in sewer systems and in waterways as a consequence of previous use. We should anticipate a decline over the next several months of PCB discharges from these sources as the sources are gradually cleaned out." [MONS 098858, April 24, 1972]

Doc ID # 9277 Exhibit #

"The desired limit in water is 0.01 parts per billion. Our best indicator of PCB contamination in various waters, however, will be residues in fish or in other aquatic organisms."

[MONS 098858-59, "Letter from John R. Quarles, Jr. (Assistant Administrator for Enforcement and General Counsel, US EPA) to All Regional Administrators: Policy on PCB's," April 24, 1972.]

Doc ID # 9277

Exhibit #

629.

04/28/72

Letter from E. P. Wheeler to Otis: Monsanto conducted toxic study, and wanted to hold up its publication of the chicken work. Wheeler had a big concern about Drinker's earlier work in 1930's in inhalation.

"I guess Kap's sending me the chronic rats and dominant lethal and chicken study on the 18th of April finally stilled me to move." [MONS 094891, April 28, 1972]

Doc ID # 1037

Exhibit #

"First of all, I agree we should hold up the publication of the chicken work until the current study is completed." [MONS 094891, April 28, 1972.]

Doc ID # 1037

Exhibit #

In any case, I think the work is worthy of review even though it was inhalation data particularly since Drinker's earlier work in '37 is frequently mentioned and this again concerned inhalation."

"I hope to get copies of all of the studies in the hands of Bill Papageorge, Scott Tucker and the lawyers next week. I do not anticipate a lot of changes from them and hope that the attorneys agree that we can go ahead with publication."

[MONS 094891-92, "Letter from E. P. Wheeler to Otis Fancher," April 28, 1972.] Also See: M 40653-54.

Note: The document is too blurring to read.

Doc ID # 1037

Exhibit #

630.

May 72

The Federal Interagency Task Force in its Report of May 1972 concluded that "PCB's were highly persistent, could be found in all

parts of the environment, could 'bioaccumulate' to relatively high level in fish, and could have serious adverse effects on human health."

[M15493, EPA, "Conference Proceedings," March 1976.]

Doc ID # 1987 Exhibit # P-0783

631.
May 72

Interdepartmental Task Force on PCBs, Washington D.C., Polychlorinated Biphenyls and the Environment: "Both production and domestic sales of PCBs roughly doubled between 1960 and 1970. If one assumes a constant rate of growth of domestic sales since 1930, the cumulative sales in North America by 1970 would be of the order of 500,000 tons."

"PCBs have been discovered to have a widespread distribution in the environment, and some environmental occurrences have been associated with adverse effects on certain forms of animal life."

[MONS 065121, May 1972]

Doc ID # 3367 Exhibit # P-0624

"2. PCBs have been used so widely over such a long period that they are ubiquitous. Even a total cessation of manufacturing and use of PCBs would not result in the rapid disappearance of the material, and ultimate disappearance from the environment will take many years. The elimination of non-essential uses and prohibition of discharges from essential uses will result in gradual elimination from the environment."

"3. PCBs were first identified as potential food contaminants in 1966. Three principal sources or routes of contamination of food have been identified. General environmental contamination has resulted in PCB residues in some fresh water fish. Prohibition of PCB discharges into water will result in the reduction of such residues."

[MONS 065122, May 1972]

Doc ID # 3367 Exhibit # P-0624

"Both production and domestic sales of PCBs roughly doubled between 1960 and 1970. If one assumes a constant rate of growth of domestic sales since 1930, the cumulative sales in North America by 1970 would be of the order of 500,000 tons. (1)

Corresponding data on production and use of PCBs outside the United States are not available. Current estimates suggest that total U. S. production represents roughly one-half of the total world production.

As can be see in Table 1, the majority of the PCB material produced in the U. S. was marketed domestically. Between 1963 and 1971, the proportion of the production which was exported averaged 13 percent."

[MONS 065124, May 1972]

Doc ID # 3367 Exhibit # P-0624

[MONS 065110, 065121-122, and 065124, Interdepartmental Task Force on PCBs, Washington D.C.: "Polychlorinated Biphenyls and the Environment," May 1972.]

Doc ID # 3367 Exhibit # P-0624

632.

05/01/72

PCBs production in Anniston stopped.

[M10949, "Letter from Daniel E. Cooper, Assistant Sanitary Engineer of Water Improvement Commission, State of Alabama, to Mr. Gene L. Jessee, Plant Manager, Monsanto, Anniston, Alabama," November 13, 1972.]

Doc ID # 994 Exhibit # P-0659

633.

05/01/72

The average losses of Aroclors 1242 and 1254 in April 1972 reported to AWIC were 0.38 lbs/day with an average concentration of 47 ppb. Again, Monsanto requested "that this data be held as confidential material".

"Attached you will find the daily Aroclor (1242 and 1254 - polychlorinated biphenyls) losses from the Anniston Plant for the month of April 1972.

The average daily losses are as follows:

Average flow = 681 gpm

Average concentration = 0.047 ppm

(Aroclor 1242 and 1254 - polychlorinated biphenyls)

Average pounds Aroclor = 0.38 pounds/day
(Aroclor 1242 and 1254 - polychlorinated biphenyls)

If there are any questions concerning this data, please contact us.
Again, we request that this data be held as confidential material."

[DSW 014747, "Letter from J. T. Bell, Plant Chief Chemist, Anniston Plant, to Mr. J. L. Crockett, Jr., Technical Staff Director, Alabama Water Improvement Commission," May 1, 1972.]

Doc ID # 11649 Exhibit # P-0625

634.

05/02/72

Letter from Roush to Miller: Therminol-FR samples were analyzed for DBF impurity.

"Bill Papageorge has requested we assemble samples of Therminol FR heat transfer fluids and forward them to Scott Tucker for a dibenzylfuran analysis on the mass spectrometer. As discussed with you on April 21, samples of the following Therminol FR material in your lab should be sent immediately to Scott Tucker for analysis."

[MONS 201031, "Letter from D. E. Roush to Dave Miller: Therminol-FR Samples for DBF Analysis," May 2, 1972.]

Doc ID # 8553 Exhibit #

635.

05/14/72

U.S. Environmental Protection Agency, Environmental News on PCBs: The Federal Government task force pointed out that "--The chemicals can have serious adverse effects on human health".

"A Federal Government task force on the chemicals known as PCBs – polychlorinated biphenyls – today issued a report recommending that all current uses of the chemicals, except use in electrical capacitors and transformers, be discontinued."

[MONS 069644, May 14, 1972]

Doc ID # 5144 Exhibit #

"--The chemicals can have serious adverse effects on human health, but, so far as is now known, these adverse effects will not occur as a result of the levels of PCBs currently in the environment.

--PCBs are highly persistent and can be found in almost all parts of the environment."

[MONS 069644-645, U.S. Environmental Protection Agency: "Environmental News," For Release, Sunday, May 14, 1972.]

Doc ID # 5144 Exhibit #

636.

05/23/72

Letter from Paton to Papageorge: To analyze used PCB fluid for chlorodibenzofurans impurity.

"Confirming our discussions there may be a need to analyze used PCB fluid from other sources besides heat transfer for chlorodibenzofurans. If you want to pursue analysis of scrap capacitor, transformer and Pydraul fluids please alert Paul Gann. He will arrange to collect such fluids from material returned to Sauget for incineration and deliver the samples to Scott Tucker."

[MONS 201033, "Letter from Cumming Paton to W. B. Papageorge: Used PCB Fluid Analysis," May 23, 1972.]

Doc ID # 19070 Exhibit #

637.

05/30/72

Monsanto was trying to figure out the possible policy of EPA on PCBs pollution, and realized that it was possible that EPA "will consider the effects of residual PCB due to past losses".

"Attached is a copy of an EPA guideline addressed to the regional administrator relating to the control of PCB's from plant effluents.

From conversation with Dr. John Buckley, EPA, I understand that the EPA does not plan to monitor the PCB levels in natural water systems, but will observe PCB levels found in fish and other aquatic creatures for evidence of PCB discharges.

I also suspect that the EPA will use available legal means, such as grand juries, to obtain customer information from Monsanto to identify potential PCB polluters.

It appears that the EPA will approach each location considered to be a significant source of PCB and review plans and schedules for curtailing PCB losses. The ultimate objective is zero detectable losses, but no time target is being mentioned at present. Note that

EPA is aware and will consider the effects of residual PCB due to past losses."

[MONS 098364, "Letter from Papageorge to H. S. Bergen, et al.: EPA Policy on PCB's," May 30, 1972.]

Doc ID # 1043 Exhibit #

638.

06/1972

Canadian Packaging: Canada started "a nation-wide survey of food packaging materials" looking for PCBs.

"A nation-wide survey of food packaging materials for 15 types of food products has been launched by the federal health protection branch in Ottawa because of possible contamination by a group of plastic chemicals known as polychlorinated biphenyls. According to Toronto Globe and Mail, PCBs are related structurally to hydrochlorinated pesticides such as DDT. They are long-lived chemicals often used as heat exchangers and plasticizers."

[MONS 069863, "60-13 Canadian Packaging," June 1972.]

Doc ID # 11936 Exhibit #

639.

06/01/72

EPA set the guidelines on discharges of PCB's from manufacturers/users: 1) Water quality limit of 0.01 ppb; and 2) Allowable discharges – policy is stepwise reduction to no "knowing" discharge. The facts obtained from the Anniston Plant indicate that it did not strictly follow these guidelines even after it stopped production of PCBs.

"In conjunction with the report "Polychlorinated Biphenyls and the Environment" recently released by the federal "Task Force on PCB's", EPA has sent guidelines to the regional offices stating policy on discharges of PCB's from manufacturers/users. Bill Papageorge obtained a copy of these guidelines and they are attached for your use. Please use them with discretion as they are not documents for the general public.

In general, these guidelines fit our expectations from the conference in Washington 4/13/72 (see reference - minutes of that conference). Critical points:

- (1) Water quality limit of 0.01 ppb – not to be monitored directly, but to be based on fish studies – if water is less than 0.01 ppb, fish will not exceed 5 ppm.
- (2) Allowable discharges – policy is stepwise reduction to no “knowing” discharge. From a more practical standpoint, discharges will be limited to that amount which will not result in more than 0.01 ppb in the stream at mean annual flow, assuming complete mixing. Effects of background levels relative to this discharge limit are not discussed, so we don’t know whether or not we can discharge the full allowance for the Mississippi River (9.7#/day @ 180,000 cu ft/sec). In the 4/13/72 Washington meeting, EPA had indicated that about 2-4#/day appeared reasonable from us. [MONS 098255, June 1, 1972]

Doc ID # 595 Exhibit #

- (3) Effects of previous discharges of PCB’s to the environment are recognized along with acknowledgment that considerable time will be involved in the diminution of these effects.

Strategy for dealing with federal authorities in the near future (and probably Illinois authorities later) needs to be developed. We suggest that the WGK Plant arrange for a meeting at which this strategy can be discussed."

[MONS 098255-56, "Letter from Paul B. Hodges to G. L. Bratsch, et al.: EPA Policy on PCB's, PCB's -- Allowable Discharge from Producing/Using Plants," June 1, 1972.]

Doc ID # 595 Exhibit #

640.

06/01/72

The average losses of Aroclors 1242 and 1254 in May 1972 reported to AWIC were 0.48 lbs/day with an average concentration of 88 ppb. Again, Monsanto requested "that this data be held as confidential material".

"Attached you will find the daily Aroclor (1242 and 1254 - polychlorinated biphenyls) losses from the Anniston Plant for the month of May, 1972.

The average daily losses are as follows:

Average flow = 450 gpm

Average concentration = 0.088 ppm
(Aroclor 1242 and 1254 - polychlorinated biphenyls)

Average pounds Aroclor = 0.48 pounds/day
(Aroclor 1242 and 1254 - polychlorinated biphenyls)

If there are any questions concerning this data, please contact us.
Again, we request that this data be held as confidential material."

[DSW 014745, "Letter from J. T. Bell, Plant Chief Chemist, Anniston Plant, to Mr. John M. Bolton, Technical Staff Director, Alabama Water Improvement Commission," June 1, 1972.]

Doc ID # 2635 Exhibit # P-06226

641.

06/29/72

Letter from J. J. Roder to H. R. Ford: The Coastal Chemical people "have been working on Mr. Clark very diligently to make him feel secure in the selection of PCBs".

"It is very apparent in speaking with Mr. Clark that the Coastal Chemical people have been working on Mr. Clark very diligently to make him feel secure in the selection of PCBs. His arguments about the capabilities of PCBs only killing a few fish was apparently memorized from previous Roger Irwin statements."

[MONS 098596, "Letter from J. J. Roder to H. R. Ford: Placid Oil Co. Dallas, Texas," June 29, 1972.]

Doc ID # 1048 Exhibit #

642.

07/04/72

The Japan Economic Journal: "Contamination from PCB becomes serious".

"Contamination due to polychlorinated biphenyl (PCB), described as a new form of pollutant, is spreading gradually, and there are strong fears that its effects may be handed down to posterity unless suitable measures are taken."

"This was revealed in an interior report announced by the Science & Technology Agency recently on special researches being conducted by it on prevention of PCB contamination."

[MONS 070198, The Japan Economic Journal: "Contamination from PCB becomes serious," July 4, 1972.]

Doc ID # 5157 Exhibit # P-0629

643.

07/05/72

Letter from G. L. Jessee to Mr. John C. White: Monsanto informed Mr. White that "effective May 1, 1972 all PCB related manufacturing operations at Monsanto's Anniston, Alabama plant were terminated."

"In November 1971, Monsanto personnel met with you, your staff, and Mr. Crockett of the Alabama Water Improvement Commission, to discuss the PCB abatement program for the Anniston Plant. During this discussion, a commitment was made to have the problem resolved by July 1, 1972.

As you will recall I informed you in early 1972 that we would not follow the original plan discussed with you in November but would cease all PCB related manufacturing operations by mid-year.

This memo is to inform you that effective May 1, 1972 all PCB related manufacturing operations at Monsanto's Anniston, Alabama plant were terminated."

[DSW 010349, "Letter from G. L. Jessee, Plant Manager to Mr. John C. White, Director, Environmental Protection Agency," July 5, 1972.]

Doc ID # 11380 Exhibit # P-0630

644.

07/07/72

The average losses of Aroclors 1242 and 1254 in June 1972 reported to AWIC were 0.18 lbs/day with an average concentration of 32 ppb. Monsanto requested "that this data be held as confidential material".

"Attached you will find the daily Aroclor (1242 and 1254 - polychlorinated biphenyls) losses from the Anniston Plant for the month of June, 1972.

The average daily losses are as follows:

Average flow = 475 GPM

Average concentration = 0.032 PPM
(Aroclor 1242 and 1254 - polychlorinated biphenyls)

Average pounds Aroclor = 0.18 pounds/day
(Aroclor 1242 and 1254 - polychlorinated biphenyls)

If there are any questions concerning this data, please contact us. Again, we request that this data be held as Confidential Material."

[DSW 014743, "Letter from J. T. Bell, Plant Chief Chemist, Anniston Plant, to Mr. John M. Bolton, Technical Staff Director, Alabama Water Improvement Commission," July 7, 1972.]

Doc ID # 2634 Exhibit # P-0631

645.
07/17/72

Letter from Papageorge to Slowikowski: Papageorge discussed with Bill Aloisi the toxicity and persistence of various Aroclors.

"I called Bill Aloisi, Brown Company, Kalamazoo, Michigan and discussed the Hoerner Waldorf letter relating to PCBs which he had received.

We covered in general the toxicity and persistence of various Aroclors.

He appeared satisfied with my comments and stated that written confirmation of our discussion was not required."

[MONS 099557, "Letter from W. B. Papageorge to Mr. W. H. Slowikowski (Hoerner Waldorf Corporation): Memo, WHS to WBP on July 5, 1972)," July 17, 1972.]

Doc ID # Exhibit #

646.
08/02/72

The average losses of Aroclors 1242 and 1254 in July 1972 reported to AWIC were 0.02 lbs/day with an average concentration of 3 ppb. Again, Monsanto requested "that this data be held as confidential material".

"Attached you will find the daily Aroclor (1242 and 1254 - polychlorinated biphenyls) losses from the Anniston Plant for the month of July 1972.

The average daily losses are as follows:

Average flow = 435 GPM

Average concentration = 0.003 PPM
(Aroclor 1242 and 1254 - polychlorinated biphenyls)

Average pounds Aroclor = 0.02 pounds/day
(Aroclor 1242 and 1254 - polychlorinated biphenyls)

If there are any questions concerning this data, please contact us.
Again, we request that this data be held as confidential material."

[DSW 014741, "Letter from J. T. Bell, Plant Chief Chemist, Anniston Plant, to Mr. John M. Bolton, Technical Staff Director, Alabama Water Improvement Commission," August 2, 1972.]

Doc ID # 2633 Exhibit #

647.

09/05/72

The average losses of Aroclors 1242 and 1254 in August 1972 reported to AWIC were 0.000 lbs/day with an average concentration of 0.000 ppm. Monsanto requested "that this data be held as confidential material".

Please note that the record indicated that the analysis results of Aroclor concentrations in the Plant Effluent for all the 31 days in August 1972 were 0.000 ppm. This is impossible. Technically and practically, it was unbelievable to get 0.000 ppm for Aroclor concentrations for the whole month for Anniston Plant at that time. In any laboratories, there is always a detection limit for any chemical compounds including PCBs. The GC-MS at Anniston Plant would not be so accurate and sensitive to have a detection limit of less than 0.0005 ppm at that time in order to get the provided values by Anniston. In summary, technically, it is not possible at that time for the samples analyzed in Anniston Plant to achieve the results provided for the whole month of August 1972.

"Attached you will find the daily Aroclor (1242 and 1254 - polychlorinated biphenyls) losses from the Anniston Plant for the month of August 1972.

The average daily losses are as follows:

Average flow = 443 GPM

Average concentration = 0.000 ppm

(Aroclor 1242 and 1254 - polychlorinated biphenyls)

Average pounds Aroclor = 0.000 pounds/day
(Aroclor 1242 and 1254 - polychlorinated biphenyls)

If there are any questions concerning this data, please contact us.
Again, we request that this data be held as confidential material."

[DSW 014739, "Letter from J. T. Bell, Plant Chief Chemist, Anniston Plant, to Chief Administrative Officer, Alabama Water Improvement Commission," September 5, 1972.]

Doc ID # 2632 Exhibit # P-0637

648.
10/03/72

The average losses of Aroclors 1242 and 1254 in September 1972 reported to AWIC were 0.02 lbs/day with an average concentration of 5 ppb. Monsanto requested "that this data be held as confidential material".

"Attached you will find the daily Aroclor (1242 and 1254 - polychlorinated biphenyls) losses from the Anniston Plant for the month of September 1972.

The average daily losses are as follows:

Average flow = 372 GPM

Average concentration = 0.005 ppm
(Aroclor 1242 and 1254 - polychlorinated biphenyls)

Average pounds Aroclor = 0.02 pounds/day
(Aroclor 1242 and 1254 - polychlorinated biphenyls)

If there are any questions concerning this data, please contact us.
Again, we request that this data be held as confidential material."

[DSW 014737, "Letter from J. T. Bell, Plant Chief Chemist, Anniston Plant, to Mr. James W. Warr, Acting Chief Administrative Officer, Alabama Water Improvement Commission," October 3, 1972.]

Doc ID # 2631 Exhibit # P-0642

649.
10/12/72

Letter from Gene L. Jessee (Plant Manger) to James W. Warr, (Acting Chief Administrative Officer of AWIC): Jessee said, "Since

1970, the Anniston Plant has been submitting to your office a monthly confidential summary of polychlorinated biphenyl loss to Snows Creek. At that time, the plant was manufacturing these materials". In this letter, he requested again that "this monthly confidential summary no longer be required by" AWIC.

Please note that since November 1971, Anniston Plant submitted to the AWIC and EPA the "monthly confidential summary" of losses to Snow's Creek of Aroclors 1242 and 1254. Jessee said in the letter that "At that time, the plant was manufacturing these materials". This is not true at all. At least, since 1971, there was no production of Aroclors 1242 and 1254 in the Anniston Plant. For details, please see: Exhibit D, DSW 011964-65.

Doc ID # 19996 Exhibit #

"Since 1970, the Anniston Plant has been submitting to your office a monthly confidential summary of polychlorinated biphenyl loss to Snows Creek. At that time, the plant was manufacturing these materials and effectively reducing losses contained in the water effluent. Our efforts were coordinated through Mr. J. L. Crockett, then Director of the AWIC Technical Staff and the monthly summaries were part of this plants efforts to advise the AWIC of improvements within our operations.

All Polychlorinated biphenyl related manufacturing ceased May 1, 1972. During May, the manufacturing equipment was cleaned. In the following months a significant drop of polychlorinated biphenyl losses has occurred (June: 0.18 lbs/day; July, 0.02 lbs/day; August, 0.00 lbs/day; September, 0.02 lbs/day).

Based on this analytical data, I respectfully request that this monthly confidential summary no longer be required by your office. A similar request was submitted on July 13, to Mr. John M. Bolton from which I did not receive a reply. As in the earlier request, I would be pleased to arrange a meeting of this plant's technical representatives with you for clarification of any questions which may arise from this request."

[M00224, "Letter from Gene L. Jessee (Plant Manger) to James W. Warr (Acting Chief Administrative Officer, Alabama Water Improvement Commission)," October 12, 1972.]

Note: there is a few grammar mistakes in the letter. But no changes have been made to the Original.

Doc ID # 1232

Exhibit # P-0646

650.

Nov. 72

Total average Aroclor losses in November 1972 were as high as 0.77 lbs/day with an average concentration of 143 ppb. During the same month the total average Aroclor losses of 1242 and 1254 was still at 0.48 lbs/day, and with an average concentration of 88 ppb.

[DSW 011945, 012346 & 012374, "Letter from W. B. Papageorge (Manager, Product Acceptability, Process Chemicals Division) to Mr. Earl J. Stephenson (Director, Enforcement Division, Environmental Protection Agency), and Attachments," Exhibit N, December 11, 1975.]

Doc ID # 1690

Exhibit # P-0773

651.

11/04-08

1972

The highest daily concentration of total PCB's losses in the Plant Effluent in November 1972 was as high as **860 ppb** (November 4, 1972) with a daily losses of PCB's at the level of 4.76 lbs/day. On that same day, the Aroclor 1242 and 1254 concentrations in the Plant Effluent to Snow Creek reached **480 ppb**, and had daily losses of 2.55 lbs/day. Immediately following November 4, 1972, for three days in series, there was no any samples taken and/or analyzed. **Why? The reason is unknown at this point. However, it is quite strange and doubtful.**

On November 8, 1972, three days later, when the sampling was re-started, the total average Aroclor losses in the Plant Effluent to Snow Creek were still at 710 ppb, and the daily losses were 3.38 lbs/day. On that day, the Aroclor 1242 and 1254 concentrations in the Plant Effluent to Snow Creek remained to be at the level of 400 ppb, and had daily losses of 1.90 lbs/day.

Compared these numbers to what Jessee said in his letter dated on October 12, 1972, there is a huge difference. Did Monsanto tell AWIC or EPA this important piece of information? There is a big 'Question' mark for that.

[DSW 011945, 012346 and 012374, "Letter from W. B. Papageorge (Manager, Product Acceptability, Process Chemicals Division) to Mr. Earl J. Stephenson (Director, Enforcement Division, Environmental Protection Agency), and Attachments," Exhibit N, December 11, 1975.]

Doc ID # 1690 Exhibit # P-0773

652.

11/10/72

Letter from W. F. Taffee to J. R. Savage: Aroclor Dismantling was ready to be started.

"I. Dismantling

A dismantling contract has been let and we are ready to start physical dismantling of the remaining Aroclor production department. The attached sketch shows the area to be dismantled, which includes the 'old' Biphenyl stills, the Liquid Aroclor production facilities, and the 1965 Solid Aroclor installation (Areas 2, 4, 6, 7, 8, and 10)."

[DSW 013931, "Letter from W. F. Taffee to J. R. Savage: Aroclor Dismantling", November 10, 1972.]

Doc ID # 44 Exhibit # P-0648

653.

11/13/72

Letter from Cooper (Alabama Water Improvement Commission) to Mr. Gene L. Jessee: Cooper notified Jessee that because "all polychlorinated biphenyl related manufacturing ceased on May 1, 1972", Anniston may "discontinue monthly monitoring of polychlorinated biphenyl losses to Snows Creek."

"Per your recent telephone conversation with Charles Horn, it is understood that all polychlorinated biphenyl related manufacturing ceased on May 1, 1972. Your plant may, therefore, discontinue monthly monitoring of polychlorinated biphenyl losses to Snows Creek. Officials of the Environmental Protection Agency have been consulted and have indicated their agreement with this office.

Should you return to this process in the future, please advise, so that the monitoring program may be reinstated."

[M10949, "Letter from Daniel E. Cooper (Assistant Sanitary Engineer, Alabama Water Improvement Commission) to Mr. Gene L. Jessee (Plant Manager, Monsanto Company, Anniston, Alabama)," November 13, 1972.]

Doc ID # 994 Exhibit # P-0649

Also See: DSW 012347.

Doc ID # Exhibit #654.
12/72

Biological Consultants told Monsanto that "As stated many times previously Consultants have found a rather large number of deformed fishes below the point of effluent discharge, as well as many fishes that were hemorrhaging or exhibiting various degrees of nervous system damage." "Since these fishes are found in parts of the stream that were characterized by high P.C.B. levels, one must admit the possibility that debilitation is due directly to P.C.B's or to other products manufactured by Monsanto Company."

"Introduction:

For the past two years (November, 1970 to November, 1972) consultants have conducted a biological survey of the streams affected by Monsanto Company's prior discharge of polychlorinated biphenyls at Anniston, Alabama. The streams and areas studied were: Choccolocco Creek, Coosa River, Logan Martin Reservoir, Cheaha Creek, Cane Creek, Aker Creek. The survey consisted of two separate but related parts: 1) An ichthyological survey of the waters designed to determine species composition and relative abundance of the various species of fishes present with the goal of ascertaining any possible effects the Monsanto effluent might have on the fish populations, and 2) a residue analysis conducted by Monsanto Company using fishes from ten (10) stations supplied by Consultants. We have interpreted the residue findings on a trip-by-trip basis during the first two years of the present study as they have been made available by Monsanto employees. In this connection we have worked rather closely with Mr. J. T. Bell, Plant Chief Chemist, and Mr. Donald Turner of the Anniston plant who made the actual analyses.

General Background:

As stated many times previously Consultants have found a rather large number of deformed fishes below the point of effluent discharge, as well as many fishes that were hemorrhaging or exhibiting various degrees of nervous system damage. These instances are on record at the Monsanto Plant, Anniston. Since these fishes are found in parts of the stream that were characterized by high P.C.B. levels, one must admit the possibility that debilitation is due directly to P.C.B's or to other products manufactured by Monsanto Company. [MONS 043540, December 1972]

Doc ID # 5948 Exhibit # P-0832

In a past summary report covering an analysis of five sets of P.C.B. data for trips made during December, 1970; March, 1971; June, 1971; September, 1971; and December, 1971, we have shown that there was no decrease in P.C.B. levels during this time, that is to say the levels within a given species of fish have remained fairly constant, although there have indeed been some fluctuations as one would expect. After subsequent examination of the residue data for the June, 1972 sample of fishes we reported that there seemed to be some real decreases in residue levels, but that the September, 1972 sample would be more definitive in this respect since this would be the first sample of fishes collected after complete stoppage of P.C.B. effluents from the Anniston Plant."

[MONS 043539-41, "Royal D. Suttikus, Ph.D. and Gerald E. Gunning, Ph.D. (Biological Consultants): Final Progress Report to Monsanto Company -- Residue Data, November, 1970 to November, 1972," December 1972.]

Note: No date is given for the Report. December 1972 is the estimated date.

Doc ID # 5948 Exhibit # P-0832

655.

12/01/72

Minutes of Meeting: Pond study was conducted. "Preliminary data indicates that Aroclor 1242 and Aroclor 1016 build up in the fish more rapidly than does Aroclor 1254."

"Pond Study

The ponds were doped by sprinkling ~1 kg of fluid coated sand into each. The MCS 1238 pond will not be dosed until the weather breaks in March or April, 1973. The ponds are being monitored by period removal of the fish for residue analysis. Preliminary data indicates that Aroclor 1242 and Aroclor 1016 build up in the fish more rapidly than does Aroclor 1254 (Table I). These results are attributed to the higher water solubility of the low chlorinated products. Water samples taken from the Aroclor 1242 pond contained ~0.1 ppb PCBs. Water samples from the other ponds have not been analyzed yet."

"Some problems with fish mortalities are still being experienced. However, the deaths are being attributed to fungal infections and not to the presence of PCBs."

"The long term objectives of these experiments is to demonstrate that Aroclor 1016 is better product than Aroclor 1242 and Aroclor 1254 from an environmental point of view and to determine if the fluids effect the reproduction and survival of the fish."

[MONS 202093, "Minutes of Meeting," December 1, 1972.]

Doc ID # 8621 Exhibit # P-0652

656.
71-72

Letter from W. B. Papageorge to Mr. Earl J. Stephenson (Director, Enforcement Division, Environmental Protection Agency), Exhibit D: Monsanto's response to EPA's questionnaire indicate that at least from 1971 to 1972, there was no production of Aroclors 1242 and 1254 at all in the Anniston Plant.

**"Products Containing Polychlorinated Biphenyls
and/or Polychlorinated Terphnyls**

**Production - Anniston, Alabama*
(Thousands of Pounds)**

<u>Product</u>	<u>1971</u>	<u>1972</u>
Aroclor 1221	1962	---
Aroclor 5060	387	---
Aroclor 5432	6220	1272
Aroclor 5460	13983	6861
Montar 5	4905	1879

" * " = Production terminated in 1972."

[DSW 011945, 011964-65, "Letter from W. B. Papageorge (Manager, Product Acceptability, Process Chemicals Division) to Mr. Earl J. Stephenson (Director, Enforcement Division, Environmental Protection Agency), and Attachments," Exhibit D, December 11, 1975.]

Doc ID # 1690 Exhibit # P-0773

657.

02/14/73

Press Release of OECD: OECD "Takes Major Decision With Regard To The Control" of PCBs. The Release also said that "The most serious accident involved human poisoning following leakage of heat transfer fluid in a rice oil pasteurization plant in Japan in 1968."

"OECD Council Takes Major Decision With Regard To The Control Of Certain Toxic Chemicals"

OECD Member countries have agreed to control the manufacture and trade of industrial chemicals known as Polychlorinated Biphenyls (PCBs)*, the use of which may lead to the contamination of the environment. This is the first international agreement aimed at limiting the production and use of chemicals in order to protect the environment. Only a limited number of uses, specifically listed in the OECD Council Decision and including, in particular, applications where the non-flammability of PCBs is an essential factor, would be authorized. The Decision also allows for production of PCBs for use in closed systems, such as condensers and transformers in large electrical equipment, which present minimal risks for the environment."

"The agreement recommends that Member countries in implementing the Decision give priority attention to the elimination of PCB uses in such products as heat transfer fluids for food processing, animal feed and pharmaceuticals; adhesives and sealants; hydraulic liquids, other than in mining, and lubricating oils; vacuum pump fluids and cutting oils; also pesticides."

"The OECD action stems from the widespread concern of Governments, following a series of accidents. The persistence and toxicity of PCBs first became apparent with the discovery in 1966 of traces in poisoned fish and wild birds. Accidents during the past four years have included the occurrence of PCBs in chickens caused by absorption from PCB-containing plastic wrappers; the discovery of PCBs in food wrappings due to recycling of copying paper in the production of paper pulp; the occurrence of PCBs in milk from cows given feed contaminated by PCBs through herbicides or silos where it had been stored (U.S.A., 1969, 1970, and 1971). The most serious accident involved human poisoning following leakage of heat transfer fluid in a rice oil pasteurization plant in Japan in 1968."

[MONS 060996, Organization For Economic Co-Operation And Development (OECD): "Press Release," February 14, 1973.]

Doc ID # 7169 Exhibit # P-0666658.
02/27/73

Letter from Gunning to Bell and the Attached Report from Biological Consultants to Monsanto: Large number of deformed fishes were found below the Anniston Plant discharge point. The PCB's levels in the fishes "have remained fairly constant".

"General Background:

As stated many times previously Consultants have found a rather large number of deformed fishes below the point of effluent discharge, as well as many fishes that were hemorrhaging or exhibiting various degrees of nervous system damage. These instances are on record at the Monsanto Plant, Anniston. Since these fishes are found in parts of the stream that were characterized by high P.C.B. levels, one must admit the possibility that debilitation is due directly to P.C.B's or to other products manufactured by Monsanto Company." [DSW 014598]

Doc ID # 2617 Exhibit # P-0667

"In a past summary report covering an analysis of five sets of P.C.B. data for trips made during December, 1970; March, 1971; June, 1971; September, 1971; and December, 1971, we have shown that there was no decrease in P.C.B. levels during this time, that is to say the levels within a given species of fish have remained fairly constant, although there have indeed been some fluctuations as one would expect." [DSW 014599]

Doc ID # 2617 Exhibit # P-0667

[DSW 014596-99, "Letter from Gerald E. Gunning to Mr. J. T. Bell (Plant Chief Chemist)," and the attached Report: "Final Progress Report to Monsanto Company, Residue Data, November, 1970 to November, 1972," by Royal D. Suttikus, Ph. D. and Gerald E. Gunning, Ph. D., (Biological Consultants, New Orleans, Louisiana); February 27, 1973.]

Doc ID # 2617 Exhibit # P-0667659.
05/04/73

Monsanto admitted that increasing evidence showed that polychlorinated biphenyls were being identified as environmental contaminants.

"With increasing evidence that polychlorinated biphenyls were being identified as environmental contaminants and that some mammals, birds and marine life were being affected, Monsanto began in 1970 a program to terminate the sales of PCBs to those applications for which alternative materials were available." [MONS 091681, May 4, 1973.]

Doc ID # 7010 Exhibit # P-0672

"The problem of disposing of solid wastes containing polychlorinated biphenyls continue to plague us. Ideally, disposal should be made by exposing the waste to high temperature incineration. Unfortunately, we have not been able to locate commercial incinerators capable of reaching the high temperatures required. Additionally, the problem of segregating and collecting the waste material still remains to be solved. Lacking proper incineration, the only recourse available is the use of authorized, properly-managed dry landfills."

[MONS 091681-82, "Letter from W. B. George to Ms. Mary A. Appelhof," May 4, 1973.]

Doc ID # 7010 Exhibit # P-0672

660.

07/06/73

U.S. Department Of Health, Education, And Welfare (HEW) NEWS For Immediate Release: "The Food and Drug Administration today issued final regulations designed to limit human exposure to PCB's (polychlorinated biphenyls) from foods, food packaging materials and animal feeds."

"The Food and Drug Administration today issued final regulations designed to limit human exposure to PCB's (polychlorinated biphenyls) from foods, food packaging materials and animal feeds.

FDA's action would prevent potential long-term exposure to consumers by:

1. Prohibiting industrial use of PCB's in plants engaged in manufacturing, handling and storing animal feeds, foods and food packaging materials.

2. Establishing temporary safe tolerances for PCB's in animal feeds and in certain foods as a result of unavoidable environmental contamination.
3. Establishing a temporary tolerance for PCB's in paper food packaging. Packaging separated from the food by a barrier which prevents PCB migration is exempt from the temporary tolerance."

[MONS 061015, U.S. Department Of Health, Education, And Welfare (HEW): "News for Immediate Release," July 6, 1973.]

Doc ID # 7172 Exhibit # P-0674

661.
07/13/73

Letter from W. B. Papageorge to Dr. Martha Sager of USEPA: Monsanto said "As more data were developed and the environmental controversy grew, Monsanto took steps intended to reduce the entry of PCB into the environment". However, actually, the situation in Anniston Plant was not as Monsanto said.

"When questions about the effect of PCB on the environment first surfaced, Monsanto Company reviewed its product line and the applications for these products. As more data were developed and the environmental controversy grew, Monsanto took steps intended to reduce the entry of PCB into the environment. The company stopped the sale of PCB for use in various applications, except where no acceptable alternatives were available."

[M 38656, "Letter from W. B. Papageorge, Manager of Product Acceptability to Dr. Martha Sager, Chairman, Effluent Standards and Water Quality Information Advisory Committee, Environmental Protection Agency," July 13, 1973.]

Doc ID # 3406 Exhibit # P-0675

Also See: DSW 010390.

Doc ID # 19937 Exhibit #

662.
1972-74

Data from USGS indicated that the number of states having PCB contaminated sediments increased from 5 to 13 from 1972 to 1974. PCB Levels in the Sediments from the Santa Barbara Basin increased from 31 to 100 µg/kg (dry weight) from 1940 to 1967 period.

"An evaluation of the degree of PCB contamination throughout the United States indicates regional variation. In Table 1.15 residue data from the United States Geological Survey (USGS) are summarized for 1972 through 1974. These data show an increase in the geographical dispersion of PCBs. In 1972, 5 states measured PCBs in bottom sediment; in 1973, 8 states, and in 1974, 13 states reported contamination with these compounds (U.S. EPA 1976)." [MONS 218697, 1979]

Doc ID # 10513 Exhibit # P-0803

"The Great Lakes are not only the dominant water areas of the St. Lawrence drainage system, but also constitute approximately 98 percent of the total freshwater volume of the United States. Based on the results presented in Table 1.14, 30 µg/kg to 150 µg/kg are chosen as low and high estimates for PCBs in sediment. The estimated range of PCB burden in the sediment of the St. Lawrence drainage area amounts to approximately 700×10^3 kg to $3,500 \times 10^3$ kg, thus representing the greatest PCB reservoir in the continental United States."

"The drainage area of the Gulf of Mexico contains sediment with concentrations that range from non-detectable to 530 µg/kg, excluding samples taken in the vicinity of heavy industrial contamination. Samples below 30 µg/kg were in the majority; thus 10 µg/kg and 50 µg/kg are considered reasonable low and high estimates, indicating a PCB load of 100×10^3 kg to 500×10^3 kg stored in the bottom sediments."

"In a 1975 study using fish samples from Green Bay, Lake Michigan, PCB concentrations in the edible tissues ranged from 10.0 mg/kg to 20.0 mg/kg in lake trout, 5.1 mg/kg to 51.6 mg/kg in carp, and 3.2 mg/kg to 5.6 mg/kg in yellow perch (Kleinert 1976)."

"Large difference in concentrations of PCBs have been reported in fish taken from the Hudson River. For example, yellow perch had PCB levels of 16.0 mg/kg to 38.0 mg/kg and the content in goldfish ranged from 45 mg/kg to 900 mg/kg (New York State Department of Environmental Conservation 1978). Elsewhere in various fresh water of New York State, the PCB content of fish ranged generally from 0.2 mg/kg to 2.1 mg/kg, although a few species had as much as 14 mg/kg." [MONS 218701, 1979]

Doc ID # 10513 Exhibit # P-0803

"PCB Levels in Dated Sediments from the Santa Barbara Basin ($\mu\text{g/kg}$, dry weight)" are shown below. [MONS 218705]

Doc ID # 10513 Exhibit # P-0803

Date	PCB Concentrations
"1940 - 1945	31
1947 - 1952	49
1955 - 1960	66
1962 - 1967	100" [MONS 218705]

Doc ID # 10513 Exhibit # P-0803

[MONS 218697-705, "Polychlorinated Biphenyls," A Report prepared by the Committee on the Assessment of Polychlorinated Biphenyls in the Environment, Environmental Studies Board Commission on Natural Resources, National Research Council; National Academy of Sciences, Washington D.C., 1979.]

Doc ID # 10513 Exhibit # P-0803

663.

07/16/73

Statement by Monsanto Company For the Effluent Standards:

"When questions about the effect of PCB on the environment first surfaced, Monsanto Company reviewed its product line and the applications for these products. As more data were developed and the environmental controversy grew, Monsanto unilaterally, began to take steps intended to reduce the entry of PCB into the environment." [M09914, July 16, 1973]

Doc ID # 1528 Exhibit # P-0676

"The Task Force report (copy attached) stated under "Findings, Conclusions and Recommendations," page 4, item 5: 'Housekeeping is particularly important in the manufacture, use and disposal of PCBs'." [M09918, July 16, 1973]

Doc ID # 1528 Exhibit # P-0676

"-- Finally, Monsanto Company supports the Interdepartmental Task Force report and recommends the allowable concentrations of PCB in rivers and lakes be established at 0.01 ppb."

[M09920, "Statement by Monsanto Company For the Effluent Standards and Water Quality Information Advisory Committee, Environmental Protection Agency," July 16, 1973.]

Doc ID # 1528 Exhibit # P-0676

664.

12/27/73

US EPA proposed toxic pollutant effluent standards for each of the nine listed substances, which included polychlorinated biphenyls (PCBs) in the Federal Register.

[MONS 000490, US EPA, "Final Decision: Proposed Toxic Pollutant Effluent Standards for Polychlorinated Biphenyls (PCBs)," January 19, 1977.]

Doc ID # 82 Exhibit # P-0792

665.

04/02/74

Two years after the termination of production of PCBs in the Monsanto Anniston Plant, PCBs were still surprisingly found to be at a level of 37 ppb from the Plant Effluent. Also, high concentrations of PCBs were found in the settling basin, and in the sediments in Choccolocco Creek, and Logan Martin Lake.

"Samples were obtained by Julio Munoz at Anniston to determine PCB residual levels at Anniston. Samples were taken on 3/27 and 3/28 at locations as follows:

- A. Plant Effluent stream from that portion of plant where Aroclors were once manufactured, stored and loaded -- this covers main part of plant and flow was about 600 gpm." (37 ppb)
- B. Three grab samples were taken on 3/27/74 at:
 - a) Influent to south limestone pit. (89 ppb)
 - b) From settling basin in the former Aroclor manufacturing area. (3,700 ppb)
 - c) Effluent from Niran operations flow to Anniston treating plant. Flow about 625 gpm. (< 10 ppb)
- C. Samples of water and sludge were obtained outside the plant on 3/28/74 at:

- a) Bridge upstream of Martin Williams bridge on Choccolocco Creek. (691 ppb - sediment; water < 10 ppb.)
- b) At Martin Williams bridge on Choccolocco Creek. (1,000 ppb -- sediment; water: 10 ppb.)
- c) Choccolocco Creek at Highway 93. (21,700 ppb -- sediment; water: 10 ppb.)
- d) Stemley bridge on Logan Martin Lake. (313 ppb -- sediment; water: 10 ppb.)

[MONS 029102-03, "Letter from Edward E. Stewart to Mr. P. E. Heisler, PCB Plan," CONFIDENTIAL, April 2, 1974.]

Doc ID # 137 Exhibit # P-0688

Note: For all the PCB concentration data, see DSW 013681-82.

Doc ID # 45 Exhibit # P-0691

Also See: DSW 013541.

Doc ID # 20160 Exhibit #

666.
09/27/74

Landfills are a reluctant second choice for disposal (of PCBs).

[MONS 029193, "Letter from J. G. Bryant to D. Wood: Minutes of 'Safe Handling of PCB Fluids and Materials for Disposal of Waste Fluids' and 'Industrial Benefits of Polychlorinated Biphenyl Dielectric Fluids'," September 27, 1974.]

Doc ID # 5649 Exhibit # P-0703

667.
10/15/74

Letter from Joseph K. Wagoner to Emmett Kelly, Monsanto: Research results "suggests PCB's are carcinogenic in animals".

"As you are aware, the Occupational Safety and Health Act gives the National Institute for Occupational Safety and Health (NIOSH) legislated authority and responsibility for the conduct of industry-wide studies of the effect of long-term, low-level exposure to industrial materials, processes, and stresses on the potential for illness, disease or loss of functional capacity in occupationally exposed adults."

"A tremendous quantity of research has demonstrated that environmental exposure to polychlorinated biphenyls (PCB's)

causes serious impairment of the functions of the liver. This impairment subsequently affects a variety of enzyme systems as is indicated in several articles in the literature. A recent article by Nobuyuki, Nagosky, et al. entitled 'Histopathologic Studies on Liver Tumorigenesis Induced in Nise by Technical Polychlorinated Biphenyls and Its Promoting Effect on Liver Tumors Induced by Benzene Hexachloride' suggests PCB's are carcinogenic in animals. However, results that evaluate long-term health effects in humans from either acute or chronic exposure to PCB's are not available."

[M 39195, "Letter from Joseph K. Wagoner, S. D. Hyg. Director, Division of Field Studies and Clinical Investigations, Department of Health, Education, and Welfare, to Emmett Kelly, M.D. Medical Director, Monsanto Chemical Corp.," October 15, 1974.]

Doc ID # 154 Exhibit # P-0706

Also See: DSW 019343.

Note: the document is too blurring to read.

Doc ID # 154 Exhibit # P-0706

668.
11/06/74

Six laboratory workers in Monsanto were investigated for their exposure. Liver abnormality was found, but not conclusive, according to Monsanto.

"This investigation was prompted by the safety suggestion of Mr. Jim Pace dated June 29, 1974. He suggested that a possible Aroclor in bodies with people working with the material might be harmful to the laboratory workers. The procedure for handling this investigation was as follows: blood tests were done on the people who had personal contact with the chemical, the samples were submitted to Mr. Orville Hicks in the General Offices for Aroclor determination, and the remaining blood samples were submitted to Clinical Laboratories in St. Louis for liver function tests.

There were two individuals, had confirmed elevations of abnormal liver function test. Although these were relatively small they should be taken into consideration. Both of these individuals had no detectable PCB in their blood.

In summary, six laboratory workers were investigated for their exposure to PCB and it's possible teratogenic, carcinogenic and patho physiological effects. The amount of PCB detected was

extremely low. The amount of abnormality discovered in the battery of the liver function test was not conclusive in that there was no consistency to the reported abnormality."

"In summary, six laboratory workers were investigated for their exposure to PCB and it's possible teratogenic, carcinogenic and patho physiological effects. The amount of PCB detected was extremely low. The amount of abnormality discovered in the battery of the liver function test was not conclusive in that there was no consistency to the reported abnormality."

[MONS 004134, "Letter from R. D. Osland, M.D., (W. G. Krummrich Plant) to P. E. Heisler: PCB Investigation," Company Confidential, November 6, 1974.]

Doc ID # 157 Exhibit # P-0707

Also See: MONS 029664.

Doc ID # 160 Exhibit # P-0708

669.

11/07/74

Workers working in the Monsanto laboratory expressed concern for contacting PCBs. Two people were found to have liver abnormalities, which Monsanto said were not PCBs work-related.

"FYI – We have a potentially emotional problem in the Lab you should be aware of. One of the shift leaders, in the Lab expressed concern over personal health hazards related to sampling of PCB'S – either as Aroclor per cc or as sewer samples. We discussed with Heisler and set up to run blood tests. Results are per attached memo.

As I read this and as I understand the medical interpretation, we do not have a problem related to PCB's. However, the emotion can well come from the apparently unrelated liver abnormalities found with both has been a rabble rouser in the past and may or may not create problems. ... is less likely to, in our judgement."

"Despite this potential we need to feed back to those who participated and plan to do so quickly. Hap will tell all of them that no problems from PCB's were detected and advise them that they can talk to Dr. Osland to get more info if they care to. He will advise ...of the detection of the liver abnormality, stressing absolute lack of any PCB detection and strongly recommend that they see Dr. Osland."

[MONS 029665, "Letter from Gill Hippe to Bob Flint," November 7, 1974.]

Note: "..." = *blank spaces in the original document.*

Doc ID # 160

Exhibit # P-0708

670.

12/06/74

Letter from Papageorge to Mieure: Chlorinated Dibenzofurans were found as impurities in PCBs. The former is more toxic than PCBs.

"Attached is a copy of a paper which is being offered for publication in the "Bulletin of Environmental Contamination and Toxicology." Dr. Kimbrough has solicited our comments. If you or any of the recipients of copies of this memo have any comments to offer, please submit them to me by December 16." [MONS 201607, December 6, 1974]

Doc ID # 8593

Exhibit # P-0713

"Recent reports and past findings indicate that impurities found in some technical products may result in disease following exposure. Chloracne, X-disease and the chick edema factor are classic examples of disease resulting from exposure to chlorinated compounds, contaminants in the same, or both¹. Chlorinated dibenzodioxins (CDD) and chlorinated dibenzofurans (CDF) have been the most implicated as contaminants of polychlorinated biphenyls (PCB)." [MONS 201609, December 6, 1974]

Doc ID # 8593

Exhibit # P-0713

"Urine of rats following prolonged exposure to a polychlorinated biphenyl (Aroclor 1254^R) and the Aroclor 1254^R itself were analyzed for the presence of other chlorinated moieties by mass spectrometry. In urine pentachlorobiphenyl (M^+/e 324), the fragment resulting from loss of 70 mass units, and a molecular ion at m^+/e 304 with an isotopic cluster indicative of 4 Cl in addition to other PCB isomers below M^+/e 230 were observed. One fraction (V) of the Aroclor 1254^R florisil elution itself contained various PCB isomers and the molecular ion M^+/e 304 with an isotopic cluster indicative of 4 Cl. This molecular ion M^+/e 304 from urine as well as Aroclor 1254^R compared favorably with the standard tetrachlorodibenzofuran and was also present in methylated urine of rats fed Aroclor 1254^R." [MONS 201609]

Doc ID # 8593 Exhibit # P-0713

[MONS 201607-09, "Letter from W. B. Papageorge to J. P. Miere, (PCBs - Chlorinated Dibenzofurans)," and the "attached paper," December 6, 1974.]

Doc ID # 8593 Exhibit # P-0713

671.
12/06/74

Letter from Johannasen to G. Roush: "AROCLOR 1254 has been under test at NCI in their bioassay operation program since September 1972".

"In a recent phone conversation between Dr. R. Kimbrough (CDO) and G. J. Levinskas, Dr. Kimbrough expressed the belief that NCI had recently contracted out a carcinogenicity study involving AROCLOR 1254. Consequently, I made a call to Dr. Sidney Siegel at NCI. Dr. Siegel indicated that he had no knowledge of an outside contract with AROCLOR 1254 and further stated he doubted there was one. He did tell me that AROCLOR 1254 has been under test at NCI in their bioassay operation program since September 1972. He reported that the experimental part of the study had been completed as of October, 1974. His expectations are that the necessary histopathology will be completed within the next 6 months, at which time a meeting could be set up for discussion of the test results."

[M40626, "Letter from Frederick R. Johannasen to G. Roush: AROCLOR 1254," December 6, 1974.]

Also See: Deposition Exhibit, Levinskas - 10, May 27, 1987; Cecil Scott, et al. vs Monsanto Company, No. B-84-1103-CA, In the United States District Court for the Eastern District of Texas, Beaumont Division.

Doc ID # 3443 Exhibit # P-0712

672.
1975

In 1975, once again, PCBs became the national focus in the United States because of the reported high levels of contamination, with PCBs, of Hudson River fish.

"Then, in 1975, the reported high levels of contamination, with PCBs, of Hudson River fish, refocused national attention on this environmental contaminant. It was soon apparent that the action and control measures of the early 1970's had not succeeded in

totally reducing, or even substantially alleviating the problems associated with this environmental pollutant."

[M07598, "Final Report of the Subcommittee on the Health Effects of Polychlorinated Biphenyls and Polybrominated Biphenyls," July 1976.]

Doc ID # 1322 Exhibit # P-0789

673.

1975(?)

Quality Criteria for Water: Regarding the PCBs' concentration in water, the document pointed out that "a criterion of less than 0.01 µg/l for all fishes appears necessary".

"RATIONALE:

Exposure to PCB's is known to cause skin lesions (Schwartz and Peck, 1943) and to increase liver enzyme activity that may have a secondary effect on reproductive processes (Risebrough, 1969; Street, et al., 1968; Wasserman, et al., 1970). It is not clear whether the effects are due to the PCB's or their contaminants, the chlorinated dibenzofurans, which are highly toxic (Bauer, et al., 1961; Schultz, 1968; Varrett, 1970). While chlorinated dibenzofurans are a by-product of PCB production, it is not known whether they are also produced by the degradation of PCB's (NAS, 1974)."

"From both laboratory and river system studies, many aquatic organisms appear to bioconcentrate PCB mixtures containing 3, 4, 5, and 6 chlorine atoms per molecule approximately 3×10^3 to 2×10^5 times the concentration in the water."
[MONS 067422]

Doc ID # 5123 Exhibit # P-0004

"Since monitoring data on the Great Lakes consistently indicate concentrations equal to or less than .01 µg/l, a criterion of less than 0.01 µg/l for all fishes appears necessary."
[MONS 067423]

Doc ID # 5123 Exhibit # P-0004

[MONS 067422-23, "Quality Criteria for Water," U.S. Environmental Protection Agency, 1975(?)]

Note: the date is estimated based on the document. No publishing date was given on the document.

Doc ID # 5123**Exhibit # P-0004**674.
01/1975

William Papageorge, A Case Study* -- Polychlorinated Biphenyls: It was listed as the No. 1 objective of Monsanto Company's management that "Minimize the potential for the entry of polychlorinated biphenyls into the environment." However, the measures taken at Anniston Plant before and at that time period was not in agreement with that stated objective of the Company.

"Objectives

The objectives of Monsanto Company's management in arriving at the polychlorinated biphenyl marketing policy were and continue to be as follows:

1. Minimize the potential for the entry of polychlorinated biphenyls into the environment.
2. Eliminate the potential for the entry of polychlorinated biphenyls into the environment."

[MONS 069397, William Papageorge, Monsanto, "A Case Study*: Polychlorinated Biphenyls," January 1975.]

Doc ID # 5137**Exhibit # P-0720**675.
01/31/75

A meeting was held to review sections of liver tissues from Dr. Kimbrough's 2-year study. There were definite liver adenocarcinomas in Kimbrough's study.

"The purpose of this meeting was to review sections of liver tissue from Dr. Kimbrough's 2-year study in which female rats were fed 100 ppm of AROCLOR 1260.

Drs. Kimbrough and Squire had studied and classified the findings. Dr. Levitt, either a visiting fellow or a post-doctoral trainee did not participate to any great extent. He was mentioned as having a good knowledge of liver.

Three conclusions can be drawn.

1. In our earlier study, the severity of liver lesions was greater in females than in males.
2. To a large extent, substantially the same type of lesions were observed in both studies except that the lesions seemed to be

more advanced in Kimbrough's study. Although there was some variation in terminology, the findings were reasonably close.

3. There were definite liver adenocarcinomas in Kimbrough's study. Dr. Richter expressed the view later that 2 animals in our study approached the type of lesion Kimbrough had observed, but there was agreement by Drs. Gordon and Richter that Dr. Kimbrough's rats had developed a lesion which they had not observed in our earlier study with AROCLOR 1260."

[MONS 046518, George J. Levinskas: "Aroclor 1260 -- Meeting at NCI," January 31, 1975.]

Doc ID # 4807 Exhibit # P-0723

676.
02/1975

Evaluation of Dr. Paul L. Wright: When Dow informed Monsanto "they had encountered lung tumors in rats fed maleic anhydride and that they felt they had to report these findings to the Food and Drug Administration (FDA) at once", Monsanto sent Wright to talk to Dow. Wright persuaded Dow to postpone the report, and at the same time, Monsanto started to take a series of actions. Eventually, it successfully prevented "FDA from publicly proclaiming that maleic anhydride was a suspect carcinogen".

"Dr. Paul L. Wright has performed his regular duties exceedingly well and has, in addition, completed a specific "ad hoc" assignment with dispatch and distinction.

Dow informed us that they had encountered lung tumors in rats fed maleic anhydride and that they felt they had to report these findings to the Food and Drug Administration (FDA) at once under their "product stewardship" program. Dr. Wright was asked to contact Dow's toxicologists for details of their findings. This he did, and by his personal and professional efforts he convinced Dow personnel that while they had an obligation to report their findings to FDA, it would be foolhardy to act precipitously. Instead, Dr. Wright advised Dow to defer contacting FDA until they had thoroughly evaluated their findings and a subsequent course of action had been developed to allow resolution of questions which undoubtedly would be raised by their report of tumors. Dow agreed to this.

Dr. Wright then contacted the Process Chemicals business group and informed them of Dow's findings. He proposed a dual course of action. The first step was a commitment to support a repeat of

the feeding study to determine whether Dow's findings were reproducible. The results of such a study would not necessarily resolve FDA's concern over the potential carcinogenicity of maleic anhydride, but the intent to conduct the study promptly would serve to forestall precipitous action against the product by FDA. The subsequent step was to provide assurance to FDA that a thorough investigation of the toxicity of maleic anhydride would be undertaken, either by Monsanto alone or in cooperation with others. This proposal was acceptable to the business group, and Dr. Wright so informed Dow."

"Subsequently, Dr. Wright accompanied Dow personnel to FDA when they presented their findings on maleic anhydride. FDA's toxicologists reviewed the data and the proposed plans of actions. They concluded that while the questions of carcinogenicity would need to be resolved, there was no apparent need for immediate prohibition of maleic anhydride or polymers containing maleic anhydride in food contact applications. Thus, we believe that Dr. Wright played a singular, outstanding role in preventing FDA from publicly proclaiming that maleic anhydride was a suspect carcinogen. Because of the many uses of maleic anhydride in food contact polymers, this was a significant accomplishment."

[M 40710-11, "Deposition Exhibit of Levinskas, #37 (May 27, 1987): Evaluation of Dr. Paul L. Wright," February 1975.]

Doc ID # 3489 Exhibit # P-0747

677.
02/02/75

D. E. Gordon's Trip Report: "Dr. Kimbrough found a rather high incidence of hyperplastic (nodular hyperplasia) and neoplastic (hepatomas, carcinomas) lesions in the liver of the test animals".

"In summary, Dr. Kimbrough found a rather high incidence of hyperplastic (nodular hyperplasia) and neoplastic (hepatomas, carcinomas) lesions in the liver of the test animals. The slides were subsequently reviewed by Dr. Robert Squire, Head of the Tumor Pathology Branch of The National Cancer Institute, who concurred with her findings, although, the terminology he used in classification of the lesions varied slightly from Dr. Kimbrough's. In this regard, it was his impression that all hyperplastic nodules should be regarded as "pre-cancerous lesions" and the term "hepatomas" be deleted and re-classified as carcinomas or neoplastic nodules. This classification system was based on a Liver Tumor Workshop that was held on Dec. 11-13, 1974 in Silver Springs, Maryland which

was attended by a small group of pathologists from the regulatory agencies, research laboratories and industry."

[M 40643-44, "D. E. Gordon, D. V. M., Ph. D.: Trip Report," February 2, 1975.]

Doc ID # 31481 Exhibit # P-0724

678.

02/03/75

Letter from Richter to Gordon: Regarding the Aroclor study, Richter said "I would conclude from an examination of their material that Dr. Kimbrough's study demonstrated carcinogenicity".

"I wish to summarize my observations of the lesions seen in Dr. Kimbrough's study of Aroclor 1260 and comparison of diagnoses with Dr. Kimbrough and Dr. Squire.

- 1.) The criteria that I used for diagnosis of the lesions are similar to what they used.
- 2.) My evaluation tends to be a little more conservative than theirs. For example: they would call some of my hepatomas carcinoma but with some question.
- 3.) Therefore, if we both read the same slides there might be a little variation in numbers of lesions in the different categories but no major difference.
- 4.) Dr. Squire and Dr. Kimbrough are using a new and revised terminology for the categories...
- 5.) However, the lesions in Dr. Kimbrough's study were more severe than those in the Bio-Test study. The lesions that she and Dr. Squire are calling carcinoma are also carcinomas by my criteria. I would conclude from an examination of their material that Dr. Kimbrough's study demonstrated carcinogenicity."

[M 40646-47, "Letter from Ward R. Richter, D.V.M. to Dr. Donovan Gordon," February 3, 1975.]

Doc ID # 7502 Exhibit #

679.

03/24/75

Letter from Dr. Gordon to Dr. Levinskas: Trip Report regarding the discussion with NCI on Aroclor 1260.

"I am enclosing the trip reports prepared by Dr. Richter and myself regarding our meeting at N.C.I. on January 31, 1975 with Drs. Kimbrough and Squire on Aroclor 1260 (IBT No. 622-07298).

The micro-slides of the liver sections from all these animals and those from Aroclor 1242 and 1254 will be forwarded today, under separate cover. We are also mailing the reports relevant to these studies today."

[M 40642, "Letter from D. E. Gordon, D. V. M., Ph. D. to Dr. Levinskas," March 24, 1975.]

Doc ID # 3447 Exhibit #

680.

03/24/75

Industrial Bio – Test Laboratories, Inc.: "There were seven hepatomas detected among seven of the animals at the highest treatment level (100 ppm) of the 24-Month Sacrifice."

"In most instances, the spectrum of treatment-related histopathological findings in the liver from this re-evaluation did not differ significantly from that previously reported in our original report dated November 12, 1971. There were seven hepatomas detected among seven of the animals at the highest treatment level (100 ppm) of the 24-Month Sacrifice. No hepatocellular carcinomas were observed. The other treatment-related lesions reported are regarded as degenerative or hyperplastic in nature and they are morphologic manifestations of an adaptive response of the liver associated with biotransformation of the test material. In general, the latter findings were confined primarily to test animals of the 6-, 12- and 24-Month Sacrifices, and they were dose-related in incidence and severity."

[MONS 070146, D. E. Gordon, D.V.M., Ph. D. Section Head, Pathology, and M. L. Keplinger, Ph. D. Manager, Toxicology of Industrial Bio – Test Laboratories, Inc., "Report to Monsanto Company: Two – Year Chronic Oral Toxicity Study With Aroclor 1260 In Albino Rats; Histopathological Evaluation of Additional Liver Sections," March 24, 1975.]

Doc ID # 181 Exhibit #

681.

05/27/75

Letter from Kaley, II to Keller: Pomerantz of FDA reported showed data of the of DBF (Chlorinated Dibenzofurans) homologs found in Aroclors.

"The paper of most interest to Applied Sciences was that presented by I. H. Pomerantz of FDA on Analytical Studies of Chlorinated Dibenzofurans. After a brief history of the occurrence of DBF in various products, he showed data of the DBF homologs found in Aroclors.

<u>Aroclor</u>	<u>DBF by Cl #</u>
1221	0
1016	2
1242	2,3,4
1254	4,5

He stated that the DBFs occur at one to several ppm, but showed no numerical data. Further, he indicated preliminary toxicity data for DBFs are like those for CDDs, but again showed no data. Lastly he showed no actual chromatograms of Aroclor solutions containing DBFs although the thrust of his paper was the analytical detection and measurement of the DBFs in Aroclor fluid. His conclusion that DBFs are best separated on polar columns has been known to us for some time."

[MONS 202322, "Letter from R. G. Kaley, II to R. E. Keller: 5th Annual Symposium on Recent Advances in the Analytical Chemistry of Pollutants -- Trip Report," May 27, 1975.]

Doc ID # 8538 Exhibit # P-0731

682.

06/13/75

Letter from Papageorge to Bergen, et al.: Plans were developed at Monsanto's meeting to analyze chlorinated dibenzofuran impurity in PCBs.

"During the PCB-chlorinated dibenzofuran discussion on June 10, the following plan was developed.

1. Arrange for the preparation of the required furan standards.
Responsibility: Keller/Mieure/Munch
2. Refine analytical methodology to achieve detection levels of at least 0.1 ppm for each furan homolog.
Responsibility: Keller/Mieure
3. Arrange with outside laboratory to confirm accuracy and reproducibility of methodology.

Responsibility: Keller/Mieure

4. Arrange with P. J. Marsh and R. A. Baxter for discussion with Bayer for possible mutual exchange of information relating to furan analyses.

Responsibility: Keller/Wood

5. Analyze Aroclor products produced at Sauget and Newport. Samples to include currently produced material as well as material produced prior to 1970.

Responsibility: Keller/Mieure"

[MONS 202320, "Letter from W. B. Papageorge to H. S. Bergen, et al.: PCB - Furan Discussion," June 13, 1975.]

Doc ID # 9493 Exhibit #

683.
06/16/75

Recently, FDA claimed to have detected chlorinated dibenzylfurans in Aroclor, which made Monsanto to worry about the increased publication about these toxic contaminants.

"You will recall that Dutch researchers (Voss et al) found furans in chlorinated biphenyls produced by Prodelec and Bayer some four years ago.

Recently FDA has claimed to have detected these products in Aroclor and we will possibly see increased publication about these toxic contaminants develop.

It would be appropriate to establish a technical dialogue with Bayer if they have carried out "in house" work in this area and Ralph Much will be writing to Dick Baxter about this.

We need to develop our own methods to determine if indeed the chlorinated dibenzylfurans are present and what is the potential hazard."

[MONS 206969, "Letter from D. Wood to J. N. Haggart: Chlorinated Dibenzylfurans," June 16, 1975.]

Doc ID # 189 Exhibit #

Also See: MONS 202314.

Doc ID # Exhibit #

684.

06/25/75

Letter from Munch to Mieure: Monsanto planned to investigate the presence of Chlorodibenzofurans in PCBs.

"Bill Richard and I have contacted Dick Baxter to see whether or not there is any concern about traces of chlorodibenzofurans in chlorinated biphenyl products in Europe.

He indicated that he had not heard any concern about the chlorinated biphenyl products but had heard some about pentachlorophenol.

We told Baxter of our program to establish whether or not there are chlorodibenzofurans in our chlorinated biphenyl products and asked him to have Alf Vodden contact Bayer to see if they had any information or analytical methods."

"We requested samples of Aroclor 1342, 1254, and 1260 and of Bayer and Prodelec equivalents to be included in your study."

[MONS 202318, "Letter from R. H. Munch to J. P. Mieure," June 25, 1975.]

Doc ID # 9491 Exhibit #

685.

06/27/75

Certain liver changes occurred in varying degree with the different Aroclors.

"Certain liver changes occur in varying degree with the different Aroclors that are subject to several interpretations, as well as nomenclature and classification." [MONS 053861, June 27, 1975]

"In the case of liver changes, the EPA and the National Cancer Institute have adopted the view that in the extreme any material which induces liver microsomal enzymes is a suspect carcinogen. In addition, focal hyperplasia of the liver produced by chemicals is being classified as a premalignant change and the chemicals involved are being classified as suspect carcinogens."

[MONS 053861-62, "Dr. J. C. Calandra: Review of the Technical and Regulatory Aspects of Aroclors," June 27, 1975.]

Doc ID # 190 Exhibit #

686.

July 1975

Environmental Science and Engineering, Inc. prepared a Report for U.S. EPA entitled "Environmental Polychlorinated Biphenyl Contamination Near Sites of Manufacture and Use".

"Polychlorinated biphenyls (PCBs) have a basic chemical structure as follows:

From one to ten chlorine atoms may be attached to the structure resulting in 210 possible isomers. PCB's have certain physical properties; including high heat capacity, chemical stability, and excellent dielectric properties which make them highly desirable for a number of industrial uses. Concern has been expressed in recent years over the widespread dispersion of PCB's in the environment. These compounds are suspected to have significant adverse effects on organisms at the top of the food web, including man."

[M10453, "Environmental Polychlorinated Biphenyl Contamination Near Sites of Manufacture and Use," prepared for U. S. EPA by Environmental Science and Engineering, Inc., July 1975.]

Doc ID # 22130 Exhibit # P-0736

687.

07/02/75

Letter from Mieure to Munch: Monsanto was devising methodology to determine chlorodibenzofuran content in Aroclor products and available competitive PCBs.

"We are currently devising methodology capable of determining the chlorodibenzofuran content of PCBs with a targeted lower detection limit of 0.1 ppm per homolog. As soon as this method is validated, we will analyze W. G. Krummrich and Newport Aroclor products and available competitive PCBs."

[MONS 202319, "Letter from J. P. Mieure to R. H. Munch: Chlorodibenzofurans in PCBs," July 2, 1975.]

Doc ID # 193 Exhibit #

688.

07/09/75

Letter from Papageorge to Potter: Monsanto had been trying to keep the profitable Aroclor product line viable for the first half of 1975.

"I have reviewed my activities for the first half of 1975 and I believe the following, although difficult to quantify, contributed or will contribute in the future to overall divisional performance income."

"(1) Most of my efforts have been related to PCBs, working not only with Monsanto personnel but also with representative of Federal and State agencies, individual customers, our customers' customers, and electrical trade associations. Areas of specific interest include toxicity of PCBs, presence in the environment (Lake Michigan, silos), analytical procedures, contaminants (furans) and proposed effluent standards. Although interest in PCBs remains high, I see no indications that regulatory measures leading to a ban on PCBs are being seriously considered. In the Great Lakes area, despite all the emotions being generated the 'bans' which are proposed appear to be potential legal support for Monsanto's restricted marketing policy."

"In summary, our willingness to respond as a cooperative, responsible manufacturer continues to help keep a profitable product line viable.

(2) I have participated with others and independently in programs designed to impress on business group and manufacturing personnel the significance of the proper application of MICC's Product Acceptability practices and the adverse consequences on performance income which could result from poor compliance. This activity does not directly contribute to performance income but hopefully will eventually insure that negative impacts on profits will be eliminated or at least minimized."

[MONS 200031, "Letter from W. B. Papageorge to R. G. Potter: MBR - Profit Contribution Product Acceptability - First Half 1975," July 9, 1975.]

Doc ID # 195

Exhibit # P-0739

689.

08/08/75

New Times published articles stating that there were 16 PCB's related deaths in Japan from the Yusho tragedy.

[MONS 204926, "Memorandum for the Record of a Telephone Conversation between Mr. Jeffrey Tannenbaum (Wall Street Journal) and Dr. Raymond E. Shapiro (Epidemiology Unit, HFF-108)," August 19, 1975.]

Doc ID # 604 Exhibit #690.
08/19/75

Memorandum for the Record of a Telephone Conversation between Monsanto representative and the Wall Street Journalist.

"Mr. Tannenbaum had been referred to this office by Mr. John Wessel (ACC). He had talked with Mr. Wessel about PCBs in foods, the subject having arisen from two articles in the New York Times, August 8, 1975 and August 17, 1975.

The article in the New York Times, by implication, stated that there were 16 PCB's related deaths in Japan from the Yusho tragedy. Mr. Tannenbaum asked if I was aware of this information and whether we had further details. I told him that to the best of our knowledge we did not have any data and would appreciate receiving anything he might obtain on this matter.

He then asked whether PCBs would be banned from foods since it is a carcinogen. Mr. Tannenbaum was aware of the PCBs review in Vol. 7 of the IARC reports wherein it was pointed out that it produced hepatocarcinoma in the mouse. He was also aware of the unpublished paper by Kimbrough and Squire showing it produced hepatocarcinomas in rats. I pointed out to Mr. Tannenbaum that the 'ban' or the Delaney Amendment applied only to food additives. Environmental unavoidable contaminants which might get into foods call for scientific judgement as to permissible levels; i.e., Delaney does not apply."

[MONS 204926, "Memorandum for the Record of a Telephone Conversation between Mr. Jeffrey Tannenbaum (Wall Street Journal) and Dr. Raymond E. Shapiro (Epidemiology Unit, HFF-108)," August 19, 1975.]

Doc ID # 604 Exhibit #691.
08/19/75

Letter from Baxter to Keller: European producers almost had no response yet on the issue of Chlorinated Dibenzofurans in PCBs.

"Reference your memo of August 15th, Alf Vodden has had some contact with the Bayer technical people and they have promised to come back to us after the vacation period."

"From the preliminary discussions it seemed that Bayer had not done any serious in-house work on the analysis of dibenzofurans in PCBs.

Predelec were even less forthcoming and didn't want to commit.

Now that Risebrough's paper has appeared in Nature we may see more infer by the European PCB producers. We will keep you in the picture."

[MONS 202312, "Letter from R. A. Baxter to R. E. Keller (St. Louis): Chlorinated Dibenzofurans," August 19, 1975.]

Doc ID # 8636 Exhibit #

692.
08/25/75

Letter from Papageorge to Bergen: Papageorge saw there was no future for PCBs due to the increasing pressure from the nation, and recommended a program for an orderly phase-out of the manufacture and sale of PCBs.

"The PCB situation in the U. S. has, in my opinion, reached the emotional turning point from which I see no real success irrespective of the resources committed or strategies devised by Monsanto to stay in the PCB business.

EPA is using PCBs to attempt to get highly desired legislation passed by Congress. Activities in New York and around the Great Lakes are creating pressures which will force EPA to arrive at effluent standards which will be unrealistic."

"Our customers have now reached the point at which they would be receptive to alternative solutions and are seeking leadership.

I strongly recommended Monsanto assume this leadership and, with key customer input, announce a program for an orderly phase-out of the manufacture and sale of PCBs."

[MONS 028678, "Letter from W. B. Papageorge to H. S. Bergen: PCBs," August 25, 1975.]

Doc ID # 607 Exhibit # P-0746

693.
8/29/75

Letter from David Wood to W. B. Papageorge: "Dr. Allen called about Dibenzylfurans and Dioxins in Chlorinated Biphenyls".

"Dr. Allen called about Dibenzylfurans and Dioxins in Chlorinated Biphenyls as a result of his reading the Risebrough paper. He is concerned about levels of these compounds in the Aroclors which he is using for his U. of Wisconsin feeding studies since he is unclear as to potential interferences in results which can be ascribed to PCB per se or contaminants in PCB."

[MONS 075432, "Letter from David Wood to W. B. Papageorge: Telephone Call Report," August 29, 1975.]

Doc ID # 6358 Exhibit #

694.
09/17/75

Letter from Dr. George Roush, Jr., to Corporate Administrative Committees: "Between now and the end of November, FDA, EPA, and NIOSH will conduct hearings on various aspects of the PCB's in foods and the environment."

"State and federal agency activities related to PCB's continue to require Medical Department attention to support business group efforts. Recent public hearings in Wisconsin served as a forum for Mr. Schweitzer, of EPA's Toxic Substances Office, to make his pitch again in support of the Toxic Substances Control Act now being considered in Congress. Between now and the end of November, FDA, EPA, and NIOSH will conduct hearings on various aspects of the PCB's in foods and the environment."

"Questions from outside Monsanto about the long-term health effects of chemicals used in two Monsanto plants on the workers in the plants have required organization of epidemiological studies. These require acquisition of data on individual work assignments within the plant over long periods of time, collection of death certificates of deceased employees, and comparison of causes of death with frequency of cause to some segment of the general population. We will have to do much more epidemiology in the future although clear cut conclusions are almost impossible."

[M 40614, "Letter from George Roush, Jr., M. D. to Corporate Administrative Committees: Monthly Comments -- Medical Department," CONFIDENTIAL, September 17, 1975.]

Doc ID # 32529 Exhibit # P-0748

Also See: Deposition Exhibit: Levinskis - 5, May 27, 1987; Cecil Scott, et al. vs Monsanto Company, No. B-84-1103-CA, In the

United States District Court for the Eastern District of Texas,
Beaumont Division.

695.

09/30/75

Letter from Keller to Papageorge: Chlorinated Dibenzofurans in PCBs.

"Overall, we have not yet achieved the total capabilities needed for determination of 0.1 ppm chlorinated dibenzofurans in PCB products. It is our understanding that justification for continuing this analytical research is based on showing that the level of chlorinated dibenzofurans is below toxicological significance (<0.1 ppm). Even though the odds of success are not high, we plan to continue with one additional man month of effort on this project. Recipients are asked to advise us if they are not in agreement."

[MONS 202296, "Letter from R. E. Keller to W. B. Papageorge: Chlorinated Dibenzofurans in PCBs," September 30, 1975.]

Doc ID # 613 Exhibit #

696.

10/17/75

Letter from the Office of Enforcement, U. S. EPA to Monsanto on October 17, 1975: PCBs were found in air, water, and fish in several areas of the United States.

"Recent governmental sampling data indicate the presence of Polychlorinated Biphenyls (PCBs) and comparable chemical substances in the air, in water bodies, and in fish in several areas of the country."

[M10514, "Letter from Office of Enforcement, U. S. EPA to Monsanto," October 17, 1975.]

Doc ID # 1681 Exhibit # P-0757

697.

10/17/75

Letter from Gordon to Levinskas: Aroclor lesions in the rat liver were found by Dr. Pour.

"I am returning the black and white photomicrographs of Aroclor lesions in the rat liver that were taken by Dr. Pour at the Eppler Institute in Omaha, Nebraska and delivered to me by Jim Hill. I found his report interesting, although I do not concur with his classification and interpretation of some of the liver lesions."

"Per your request, I am also enclosing a copy of Dr. Kimbrough's findings and report on Aroclor 1260 in the rat which you sent to me earlier in the year."

[M 40674, "Letter from Donovan E. Gordon, D. V. M., Ph. D. to George J. Levinskas, Ph. D.," October 17, 1975.]

Doc ID # 31503 Exhibit #

698.

10/28/75

PCB Exposure Control: This Report disclosed that "Current data indicate that PCB type materials may be more hazardous to working personal than had previously been considered." Thus, "the control of exposure of workers where PCB's are manufactured or used should be reexamined and made more restrictive."

1. Premise

"Current data indicate that PCB type materials may be more hazardous to working personal than had previously been considered. Base on these facts, the control of exposure of workers where PCB's are manufactured or used should be reexamined and made more restrictive. Currently the American Conference of Governmental Industrial Hygienists (ACGIH) shows threshold limit values for chlorodiphenyl (42% chlorine) (Aroclor 1254) of 0.5 mg/M³.

The two routes of entry of importance in PCB manufacture and use are vapor inhalation and skin absorption. Very limited analysis in the AROCLOR department indicates that the airborne concentrations are below these numbers. Although there is no evidence that skin absorption presents a significant hazard, it is probable that skin exposure does occur.

2. Recommended Methods of Control

A. Vapor Inhalation

Vapor inhalation is a problem only when AROCLOR is heated above ambient temperature. Where vapor exposure is possible, air supplied respiratory protection must be worn. An airborne control limit for all PCB vapor exposure must be set as low as is practicable and certainly below the standard for PCB with the lowest TLV currently listed in 29 CFR 1910.93 which

is chlorodiphenyl (54% chlorine) (AROCOLOR 1254). Routine air monitoring must be conducted.

B. Skin

Any operation, particularly maintenance operations, where liquid PCB's or PCB mists can come in contact with the skin, skin protection including gloves and suitable impervious clothing must be used. Where heated AROCLOR is present resulting in vapor exposure, air supplied respiratory equipment and impervious clothing both must be used."

"D. Environment Contamination

We would recommend that all means be exercised, either through engineering changes or through work practice changes to minimize environmental releases, either by air water or through solid residues."

[MONS 045854-55, "PCB Exposure Controls," October 28, 1975.]

Doc ID # 6028 Exhibit # P-0761

Also See: MONS 047705-06.

Doc ID # 4832 Exhibit #

699.
10/28/75

Liver carcinomas were observed in female Sherman Strain rats fed AROCLOR 1260. But Monsanto said, "Public concern for the AROCLORS is not related to the use of these fluids".

"Recently, we were informed that in a study by Kimbrough liver carcinomas were observed in female Sherman Strain rats fed AROCLOR 1260 for 20 ½ months. This prompted us to re-examine livers from male and female rats of the Charles River strain which had been fed AROCLOR 1242, AROCLOR 1254 or AROCLOR 1260 for two years in earlier studies conducted for Monsanto Company." [MONS 047703, October 28, 1975]

Doc ID # 6199 Exhibit #

"There are several factors which must be considered in the continued use of the AROCLORS:"

"d) Public concern for the AROCLORS is not related to the use of these fluids, but are related to the control of AROCLORS during the charging of condensers and capacitors, and in the recovery of the fluids from used equipment."

[MONS 047703-04, "PCB's," October 28, 1975.]

Doc ID # 6199 Exhibit #

700.

11/17/75

National Conference on Polychlorinated Biphenyls was held in Chicago, Illinois from November 17 to 19, 1975.

"On November 17-19, 1975, a National Conference on Polychlorinated Biphenyls, sponsored by the Environmental Protection Agency in cooperation with the Department of Agriculture, Council on Environmental Quality, Department of Health, Education, and Welfare and Department of the Interior, was held in Chicago, Illinois. This conference brought together the latest data, and scientific expertise, to consider all aspects of the various problems associated with PCBs, and the means for their possible resolution."

[M07598, "Final Report of the Subcommittee on the Health Effects of Polychlorinated Biphenyls and Polybrominated Biphenyls," July 1976.]

Doc ID # 1322 Exhibit # P-0789

Also See: M15476, EPA, "Conference Proceedings," March 1976.

Doc ID # 1987 Exhibit # P-0783

701.

11/20/75

Monsanto issued its Position Paper on PCBs.

"1. The Problems

The Possible, but as yet unproven, toxic – carcinogenic effects of PCB's is perceived as so great by segments of the government, environmentalists and the public that Monsanto, as the sole US supplier, must choose an alternative to its current posture of continued production with limited distribution."

[MONS 051311, "Monsanto: Position Paper," November 20, 1975.]

Doc ID # 4809 Exhibit # P-0765

702.

12/11/75

Letter from W. B. Papageorge to Mr. Earl J. Stephenson (Director, Enforcement Division, Environmental Protection Agency), and Attachments: Monsanto sent EPA its response to EPA's questionnaire dated October 17, 1975. It contains a lot of valuable information on the PCB's issue.

"Attached is a response to the questionnaire which accompanied Mr. Stanley Legro's letter dated October 17, 1975.

To the best of my knowledge and belief, the information contained in this response represents the best information available to Monsanto."

[DSW 011945-xxxx, "Letter from W. B. Papageorge (Manager, Product Acceptability, Process Chemicals Division) to Mr. Earl J. Stephenson (Director, Enforcement Division, Environmental Protection Agency), and Attachments," December 11, 1975.]

Doc ID # 1690 Exhibit # P-0773

703.

12/22/75

Letter from W. B. Papageorge to Mr. Earl J. Stephenson (Director, Enforcement Division, Environmental Protection Agency), and Attachments: Monsanto sent EPA the "corrections, additions and comments" to its previous response to EPA's questionnaire dated October 17, 1975. The new information did not affect the conclusion that at least from 1971, there was no production of Aroclors 1242 and 1254 in Anniston Plant.

"I have carefully reviewed the information I forwarded to you on December 11 and have the following corrections, additions and comments to offer." [DSW 012385, December 22, 1975]

Doc ID # 1691 Exhibit # P-0773

"2(d) Products distributed thru Monsanto's Anniston, Alabama unit included the Aroclor 6000 series as well as those shown on Exhibit D." [DSW 012386]

Doc ID # 1691 Exhibit # P-0773

[DSW 012385-xxxx, "Letter from W. B. Papageorge (Manager, Product Acceptability, Process Chemicals Division) to Mr. Earl J.

Stephenson (Director, Enforcement Division, Environmental Protection Agency), and Attachments," December 22, 1975.]

Doc ID # 1691 Exhibit # P-0773

704.

12/22/75

Monsanto prepared questions and answers for EPA Press Conference.

"The conference contained no surprises and no new information other than EPA's plan to invite interested parties to a meeting in Washington in mid-January. The information presented was basically a summary of that presented in November at the PCB Symposium in Chicago."

[MONS 051291, "Monsanto, PCB Preparedness: Q&A - Re EPA Press Conference," December 22, 1975.]

Doc ID # 632 Exhibit # P-0774

705.

12/22/75

Letter from Russell E. Train, Administrator, USEPA, to Mr. John Hanley, President, Monsanto: "For at least five years, the Federal Government and the manufacturing industry have been aware that polychlorinated biphenyls (PCBs) pose a threat to human health and the environment."

"For at least five years, the Federal Government and the manufacturing industry have been aware that polychlorinated biphenyls (PCBs) pose a threat to human health and the environment. Last month, at EPA's National Conference on Polychlorinated Biphenyls in Chicago, leading experts clearly documented the fact that PCBs are pervasive in environment, are causing disruption and economical harm to commercial fishing in many areas and are creating a serious potential health hazard to the public. While certain voluntary measures have been initiated in the past, the widespread and persistent occurrence of PCBs underscores the failure of existing practices to adequately control the escape of PCBs into the environment.

Today I announced a broad EPA program of regulatory and non-regulatory actions to reduce the levels of PCBs in the environment. My statement, (which is enclosed), stated that we must, as a society, accept and work toward a goal of totally eliminating the production, importation and use of PCBs as rapidly as possible. Toward that end, I am asking you, as a principal

member of the PCB industry, to commit yourself to a deliberate and expeditious search for alternatives."

[M 39197, "Letter from Russell E. Train, Administrator, USEPA, to Mr. John Hanley, President, Monsanto Chemical Company," December 22, 1975.]

Doc ID # 633 Exhibit # P-0775

Also See: DSW 012433.

Doc ID # 633 Exhibit # P-0775

706.
1976

TSCA was officially passed in the United States in 1976, which specifically regulates manufacture, processing, distribution in commerce, or use of PCBs.

"The discovery of the widespread environmental occurrence, the increased general environmental concern, and the apparent link to carcinogenesis prompted a public outcry which culminated in the United States in 1976 with the regulation of PCBs by the Toxic Substances Control Act (TSCA), PL 94-469 (U.S. Congress, 1976). Section 6(e) of TSCA specifically regulates manufacture, processing, distribution in commerce, or use of PCBs. The U.S. Environmental Protection Agency (EPA) was charged with rule promulgation and enforcement. The EPA was also given latitude to grant exemptions to the ban if the manufacture, processing, distribution in commerce, or use is totally enclosed or will not present an unreasonable risk of injury to health or the environment. The EPA subsequently promulgated a series of rules on the various aspects of the law."

[Mitchell D. Erickson, "Analytical Chemistry of PCBs," Butterworth Publishers, Boston, An Ann Arbor Science Book, 1992.]

Also See: MONS 223453.

Doc ID # 10868 Exhibit #P-0005

707.
1976

Serum levels of gamma glutamyl transpeptidase and plasma triglyceride levels were found to increase significantly with increases in serum PCB levels.

"In 1976, the Monroe County Board of Health conducted biochemical tests among Bloomington, Indiana residents exposed to PCBs. Serum levels of gamma glutamyl transpeptidase and plasma triglyceride levels were found to increase significantly with increases in serum PCB levels."

[MONS 010850, "A Mortality Study of Workers Exposed to Polychlorinated Biphenyls by Judith A. Zack, David C. Musch," 1976.]

Note: No date is available for the document.

Doc ID # 74

Exhibit # P-0794

708.

01/02/76

U.S. EPA Administrator stated at the Chicago Conference that 3 years later after the previous conference, PCB Compounds were found at higher levels than before and that drinking water is now being contaminated.

"In accordance with the request of the Chairman, the following is a summary of the proceedings of the National Conference on Polychlorinated Biphenyl Compounds held in Chicago from November 19, 1975 through November 21, 1975.

Mr. Russell Train, Administrator, U.S. Environmental Protection Agency, opened the proceedings by acknowledging the various groups represented and with a hope that the conference would raise the level of understanding of the problems associated with Polychlorinated Biphenyl Compounds rather than provoking more arguments. He recounted the history of the previous conference on PCB Compounds and the results that were recommended. However, he stated that 3 years later, PCB Compounds are found at higher levels than before and that drinking water is now being contaminated. Although he indicated that the EPA will continue to address the PCB problem under the FWPCA, he called for the rapid enactment of a toxic substance control act to deal with the problems before the fact and not on a case by case basis." [MONS 052241, January 2, 1976]

Doc ID # 636

Exhibit # P-0781

"The Honorable Daniel P. Reed, Department of the Interior, presented an emotional statement on PCBs as a national problem and that we, as a country, are in trouble. He alleged that PCBs may destroy our endangered species and called for a total ban on PCBs." [MONS 052250, January 2, 1976]

Doc ID # 636 Exhibit # P-0781

[MONS 052241-50, "Letter from R. E. Wills, Jr. to PCB AD HOC Committee," January 2, 1976.]

Doc ID # 636 Exhibit # P-0781

709.
01/27/76

Substitute for House Bill No. 5619 of Michigan: "A bill to prohibit the manufacture, sale, and use in this state of polychlorinated biphenyls, terphenyls, higher polyphenyls, or mixtures thereof and certain items, products, and materials containing certain concentrations of those compounds..."

"A bill to prohibit the manufacture, sale, and use in this state of polychlorinated biphenyls, terphenyls, higher polyphenyls, or mixtures thereof and certain items, products, and materials containing certain concentrations of those compounds; to provide for labeling and reporting requirements concerning polychlorinated biphenyls, terphenyls, higher polyphenyls, or mixtures thereof and for their disposal; to prescribe the powers and duties of the director of the department of natural resources and certain other state officers; to provide exemptions; and to provide penalties."

[MONS 061934, State of Michigan, "Substitute for House Bill No. 5619," As Passed the House January 27, 1976.]

Doc ID # 7746 Exhibit # P)-0782

710.
02/01/76

The Monsanto's evaluation of Wright said that Wrights' "excellent analysis and synthesis of widely scattered observations played a prominent role in forestalling EPA's promulgation of unrealistic regulations to limit discharges of polychlorinated biphenyls".

"Dr. Wright's professional and personal characteristics have contributed significantly to Monsanto's image at EPA. He has shown unusual perseverance and dedication, frequently involving his won time, to review and interpret large volumes of data which he subsequently organized for presentation to EPA officials. Particularly noteworthy were his efforts on polychlorinate biphenyls (Aroclors) and chlorinated isocyanurates (ACL products). In the former instance, his excellent analysis and synthesis of widely scattered observations played a prominent role in forestalling EPA's promulgation of unrealistic regulations to limit discharges of

polychlorinated biphenyls. EPA's proposed regulations would have precluded the use of these materials by Monsanto's customers."

"Overall, by virtue of the qualities of leadership which Dr. Wright has displayed, he has made an important contribution to Monsanto's image at EPA. That favorable image will become increasingly important to Monsanto as the areas of interaction with EPA multiply."

[M 40713, "Evaluation of Dr. Paul L. Wright," February 1, 1976.]

Doc ID # 3490 Exhibit #

Also See: Deposition Exhibit of Levinskas, #38 (May 27, 1987).

Doc ID # 3490 Exhibit #

711.

04/27/76

Report on Paulsboro, N.J. Mobil Oil Plant Study: "For the R & D employees classified as 'yes' to exposure to Arochlor 1254, the respective P values are highly significant (Table F)."

"In the Fall of 1975, the Medical Director and the management at Mobil Oil became aware of possible health hazards due to exposure to polychlorinated biphenyls (PCBs) among two small groups of employees at their Paulsboro, New Jersey plant. Although PCB has not been in use for some time, the possibility exists that late effects such as cancer or liver disease could result from such exposure. The latter has been noted in experimental animals.

A thorough examination of available medical records was promptly made by Dr. J. Rodney Meredith, Medical Director of the plant. These records were supplemented with other sources of information with regard to exposure to PCB."

[MONS 065086, April 27, 1976]

Doc ID # 684 Exhibit # P-0785

"Resume of Literature

Rats fed Arochlor showed more liver abnormalities including hepatocellular carcinomas than did control rats."

"The results of applying a mixture of isomers of chlorinated biphenyls to the skin of guinea pigs, rats and rabbits were: (1)

changes of the liver among guinea pigs (2) liver and skin changes among rats and rabbits.

Reproductive failure has been noted in monkeys exposed to PCB."

[MONS 065088, April 27, 1976]

Doc ID # 684 Exhibit # P-0785

"FINDINGS

The following is a resume of the preliminary analysis of this data (Table E):

1. Eight cancers were observed in the total population versus 5.7 expected. This difference is not statistically significant. However, of the 8 cancers, 5 (62.5%) were either melanoma (3) or cancer of the pancreas (2). This compares with an expected percentage of about 5 percent of all cancers in the general population.
2. One melanoma occurred among the refinery employees. The remaining two melanomas and the two cancers of the pancreas occurred only among the 31 (60%) of the R & D employees who were listed as exposed to contact with Arochlor 1254. The percentages that these cancers are to all cancers found, as compared with expected percentages based on the general population, are highly significant (Table F).
3. Looking at the data for all study employees on a rate basis or risk of developing cancer (the preferred type of analysis), 3 melanomas were observed versus only 0.1 expected, and 2 cancers of the pancreas observed versus only 0.2 expected (Table E). For the R & D employees classified as 'yes' to exposure to Arochlor 1254, the respective P values are highly significant (Table F)."

[MONS 065094, April 27, 1976]

Doc ID # 684 Exhibit # P-0785

[MONS 065084, 065086-88, and 065094, Anita K. Bahn, M.D., Sc. D. Professor of Community Medicine (Epidemiology)*, Department of Community Medicine, University of Pennsylvania, School of Medicine: "Report On Paulsboro, N.J. Mobil Oil Plant Study," April 27, 1976.]

Doc ID # 684 Exhibit # P-0785

712.

05/28/76

Environmental Protection Agency published its Effluent Standard for PCBs (Draft) in 40 C.F.R. Part 129.

"Regulation of discharges under the Act cannot, by itself, guarantee an ample margin of safety for all organisms and human health even if all point source discharges were prohibited, in light of the serious environmental problem which already exists. Data available to the Agency indicate that the standards proposed at this time will however result in maximum feasible progress, within the inherent limitations of point source discharge control, towards the degree of protection for aquatic and other organisms and human health envisioned under the Act, and are technologically achievable by industry without serious adverse economic impact. The Agency will continue to review the standards established in this rulemaking as additional data become available to determine whether further protection, including more stringent standards, is necessary and feasible."

[MONS 061050, Environmental Protection Agency, 40 C.F.R. Part 129, "Water Program: Pollutant Effluent Standards -Polychlorinated Biphenyls," DRAFT, May 28, 1976.]

Doc ID # 7181 Exhibit # P-0786

713.

06/1976

State of Illinois, Polychlorinated Biphenyls - Health Effects and Recommendations: "Known toxic effects of PCBs in humans include chloracne, pigmentation of the skin and hands, distinctive hair follicles, excessive eye discharge, and swelling of the eyelids."

"Environmental levels of PCBs remain quite high. They may be found in certain foods, especially fish in which PCB levels may be as much as a million times higher than the levels of the surrounding waters because PCBs become concentrated in fatty tissues."

[MONS 070694]

Doc ID # 2993 Exhibit # P-0787

"Animal studies have revealed that PCBs can adversely affect numerous organ systems including the liver, kidney, adrenal gland, spleen, and skin."

"Despite the numerous research articles indicating the toxicity of PCBs for animal species and their possible implications for human beings, the best available knowledge of the effect of PCBs on man comes from the 'Yusho' incident in which over 2,000 Japanese people became intoxicated by consuming PCB-contaminated rice oil. Many of the toxic effects which the afflicted Japanese people experienced were similar to results reported in animal studies. The lesions of the skin, facial swelling, and neurological disorders were similar to results reported in animal studies. Known toxic effects of PCBs in humans include chloracne, pigmentation of the skin and hands, distinctive hair follicles, excessive eye discharge, and swelling of the eyelids."
[MONS 070695-96]

Doc ID # 2993 Exhibit # P-0787

[MONS 070694-96, The Environmental Health Resource Center, State of Illinois, Institute for Environmental Quality, Samuel G. Booras, Director: "Polychlorinated Biphenyls, Health Effects and Recommendations," June 1976.]

Doc ID # 2993 Exhibit # P-0787

714.
July 76

Department of Health, Education and Welfare published "Final Report of the Subcommittee on the Health Effects of Polychlorinated Biphenyls and Polybrominated Biphenyls."

[M07584, "Final Report of the Subcommittee on the Health Effects of Polychlorinated Biphenyls and Polybrominated Biphenyls," July 1976.]

Doc ID # 1322 Exhibit # P-0789

715.
07/23/76

US EPA published proposed toxic pollutant effluent standards for polychlorinated biphenyls (PCBs) in the Federal Register, which included a prohibition on discharge of PCBs by any manufacturer and stringent limitations on discharges by manufacturers of transformers and capacitors.

[MONS 000487, US EPA, "Final Decision: Proposed Toxic Pollutant Effluent Standards for Polychlorinated Biphenyls (PCBs)," January 19, 1977.]

Doc ID # 82 Exhibit # P-0792

716.
9/7-8/76

Fish samples were collected in Weiss Lake, Alabama State.

[MONS 211750, "Letter from James W. Warr, Chief Administrative Officer (AWIC), to Mr. William T. Willis, Director (Department of Public Health of Alabama State)," September 24, 1976.]

Doc ID # 10064 Exhibit # P-0790

717.
09/09/76

Fish samples were collected in Choccolocca Creek, Logan Martin areas, Alabama State.

PCBs concentrations in the fishes from the above two samplings (9/7-8/76 and 9/9/76) ranged from 0.519 to 40.25 ppm.

[MONS 211750, "Letter from James W. Warr, Chief Administrative Officer (AWIC), to Mr. William T. Willis, Director (Department of Public Health of Alabama State)," September 24, 1976.]

Doc ID # 10064 Exhibit # P-0790

[PCBs Concentration Data based on MONS 211753-57, "Laboratory Report from Alabama Department of Agriculture and Industries Pesticide Residue Laboratory Division," September 20, 1976.]

Doc ID # 10064 Exhibit # P-0790

718.
09/24/76

James W. Warr, Chief Administrative Officer (AWIC) sent a letter to Mr. William T. Willis, Director (Department of Public Health of Alabama State), and gave him the information of PCB concentrations from fish samples.

"I am enclosing a copy of the PCB analytical data from fish samples collected in Weiss Lake on September 7-8, and from Choccolocca Creek, Logan Martin area on September 9, 1976."

[MONS 211750, "Letter from James W. Warr, Chief Administrative Officer (AWIC), to Mr. William T. Willis, Director (Department of Public Health of Alabama State)," September 24, 1976.]

Doc ID # 10064 Exhibit # P-0790

719.

01/19/77

US EPA published "Final Decision: Proposed Toxic Pollutant Effluent Standards for Polychlorinated Biphenyls (PCBs)"

[MONS 000487-642, US EPA, "Final Decision: Proposed Toxic Pollutant Effluent Standards for Polychlorinated Biphenyls (PCBs)," January 19, 1977.]

Doc ID # 82**Exhibit # P-0792**

720.

01/19/76

(1977?)

United States Environmental Protection Agency, Environmental News For Immediate Release: Environmental Protection Agency Administrator Russell E. Train today announced the issuance of final regulations which totally prohibit the discharge of polychlorinated biphenyls (PCBs) into waterways by certain industrial plants." "The regulations prohibit any discharge of PCBs by manufacturers of PCBs." EPA also pointed out that "Industries must meet the standards within one year. EPA analysis indicates that affected industries have the technology available to them to comply with the regulations without excessive impact on the economy or on product prices at the consumer level."

"EPA Issues Final PCB Water Pollution Standards

Environmental Protection Agency Administrator Russell E. Train today announced the issuance of final regulations which totally prohibit the discharge of polychlorinated biphenyls (PCBs) into waterways by certain industrial plants."

'As a result of a formal and extensive review of our previous proposals, I have concluded that a total prohibition of direct discharges into the Nation's waters is fully justified,' said Train. 'PCBs have been shown to be highly toxic, persistent and non-biodegradable. Also, there is reason to believe that PCBs may cause cancer in humans.'

'The present problem of PCB contamination in the environment is so severe that in many waters throughout the United States PCB loads are already in excess of the criterion in our proposals,' Train said. 'The final regulations being issued today represent significant progress in reducing future contamination of the environment by PCBs.'

[MONS 061122, January 19, 1976]

Doc ID # 82**Exhibit # P-0792**

"The regulations prohibit any discharge of PCBs by manufacturers of PCBs. Plants which use PCBs in the production of electrical transformers and capacitors are subject to a similar discharge prohibition. These industries are the principal specific (or 'point') sources of PCB discharges to the Nation's waterways."

"EPA's standards were developed to protect human health and organisms in the aquatic food chain. Laboratory tests conducted with a wide range of aquatic animals and mammals have demonstrated a variety of toxic effects, including liver damage, tumors and reproductive problems. EPA believes that the standards will provide an ample degree of safety to organisms which are likely to be exposed."

"Industries must meet the standards within one year. EPA analysis indicates that affected industries have the technology available to them to comply with the regulations without excessive impact on the economy or on product prices at the consumer level. Most of the affected industries are expected to gradually eliminate their use of PCBs altogether over the next year."

"EPA proposed toxic pollutant effluent standards for PCBs in the July 23, 1976 Federal Register. Extensive hearings on the proposals were conducted by EPA during the period August through November 1976, during which much evidence was received on toxicity and the technological and economic feasibility of the proposed regulatory program. Testimony was received from a large number of witnesses, including representatives from both environmental groups and industry."

[MONS 061123, January 19, 1976(1977?)]

Doc ID # 82**Exhibit # P-0792**

"Also, the newly enacted Toxic Substances Control Act prohibits the manufacture of PCBs after January 1, 1979 and prohibits all PCB processing and distribution in commerce after June 1, 1979."

[MONS 061122-125, United States Environmental Protection Agency: "Environmental News For Immediate Release," January 19, 1977 (1976?).]

Note: The document was dated January 19, 1976. However, it should be January 19, 1977.

Doc ID # 82**Exhibit # P-0792**

721.

04/19/77

Monsanto said "As far back as 1970 we began to warn our customers of the potential environmental problems associated with PCBs and the need to prevent the entry of this material into the environment."

"Q: As the only domestic producer of polychlorinated biphenyls (PCBs), what is Monsanto going to do about the PCB contaminated oils found recently in (Frontenac, Mo.; Franklin County, Mo.; Cedar Falls, Iowa; etc.)?"

"A: As far back as 1970 we began to warn our customers of the potential environmental problems associated with PCBs and the need to prevent the entry of this material into the environment. Detailed instructions have been provided to our customers on how to properly dispose of PCB dielectric insulating fluids. In addition, Monsanto continues to provide whatever technical assistance it can to firms and agencies seeking information on PCBs."

[MONS 001880-81, "PCB Position Statement At 1977 Annual Meeting," April 19, 1977.]

Doc ID # 4283**Exhibit #**

722.

06/24/77

"In reviewing the animal toxicity data on skin irritation," Eley "noted that Aroclor R 1016 did result in a severe degree of irritation when held in continuous contact with rabbit skin."

"In our earlier discussion I probably led you to believe that PCB's were not that acutely toxic. However, in reviewing the animal toxicity data on skin irritation, I noted that Aroclor R 1016 did result in a severe degree of irritation when held in continuous contact with rabbit skin. Although we have not experienced this degree of reaction among workers handling PCB's, it is advisable that particular care be taken in preventing skin and eye contact."

[MONS 002927, "Letter from Bruce W. Eley to Robert P. Carter, Industrial Hygienist Aluminum Company of America (1501 Alcoa Building Pittsburgh, Penn.15219)," June 24, 1977.]

Doc ID # 4347**Exhibit #**

723.

July 77

All chlorinated biphenyl production was halted by Monsanto in July 1977.

[M07546, Monsanto Company, "Submission to the Subcommittee on Oversight and Investigations of the Committee on Interstate and Foreign Commerce, U. S. House of Representatives," November 16, 1979.]

Doc ID # 1184 Exhibit #

724.

07/27/77

Letter from D. Wood to Mr. Richard J. Kotis: A lot of papers and references have been published on PCBs in various aspects.

"Thank you for your letter dated July 19, enclosing the Synopsis of a research proposal on PCB's. Since 1966 there has been a great deal of research into various aspects of PCB control.

As an example of the current body of knowledge I am attaching the bibliography of referenced studies supporting the EPA's criteria document on PCB's; you will note there are 417 studies.

References 83-128 relate to studies of PCB in aquatic environment. Citations from 300 to 349 relate to metabolism of PCB's. References 350 - 417 include reports on surveys of PCB levels in various water systems.

A more recent versar contract with EPA covered possible methods of reducing PCB levels and assessed economics of carbon treatment and other methods."

[MONS 000133, "Letter from D. Wood, Market Manager, to Mr. Richard J. Kotis, President (AFTMA)," July 27, 1977.]

Doc ID # 3909 Exhibit #

725.

Sept. 77

All customer shipments were completed by Monsanto.

[M07546, Monsanto Company, "Submission to the Subcommittee on Oversight and Investigations of the Committee on Interstate and Foreign Commerce, U. S. House of Representatives," November 16, 1979.]

Doc ID # 1184 Exhibit #

726.
10/77

The industrial manufacture of PCBs was stopped in the United States in October 1977 because it had been discovered that PCBs would accumulate and persist in the environment and could cause toxic effects. Some commercial PCB mixtures are known in the United States by their industrial trade name, Aroclor.

[MONS 224860, "Toxicological Profile for Selected PCBs (Aroclor)," November 1987.]

Doc ID # 10879 Exhibit #

727.
12/09/77

Various methods of cleaning up of PCBs were reviewed. It was realized many of them would be either enormously expensive or difficult, and some of them such as dredging at the mouth of the river may have negative impact on the environment.

"I discussed the problem of cleaning up PCB's in the environment with Mary Gibbs, Jim Mieux and Bill Adams (our resident aquatic biologist). Even in areas such as the Hudson River or Lake Michigan where PCB's are somewhat more concentrated than in the environment generally, we came up with no reasonable approaches to their removal. Such suggestions as dredging or covering over the lake or river bottom with silt are either enormously expensive (see article attached) or are likely to have a more negative impact on the environment than simply leaving the PCB's there. Several well known biologists are coming to the opinion that the best solution is simply to leave the PCB's alone and allow them to biodegrade. A possible proposal for Mr. Hanley might be to cite quotations from recognized authorities as for example, Dr. Howard Johnson of Michigan State University. We could propose other names if you wish.

In certain situations, dredging at the mouth of the river might be warranted as feasible, but again enormously expensive and necessary for a period of many years for the PCB's to be washed down the river.

We considered several possible responses that might be developed for Mr. Hanley: (1) Even if there were a practical (although expensive) method to remove PCB's from the environment, the expenditure of those funds to prevent discharge into the environment of chemicals currently being manufactured would be a much more cost effective utilization of the funds to improve the

environment; (2) Monsanto has behaved responsibly in its performance on PCB's. As soon as it became clear that PCB's accumulated in the environment and posed a potential problem we withdrew from sales to open systems. We confined sales to use in the electrical industry where there were not available substitutes, where the benefits to society were high in terms of preventing fires and explosions, and where discharge of PCB's to the environment could be controlled. It makes no more sense to penalize Monsanto for the currently perceived environmental problem than it does to reward Monsanto for the benefits to society, in the form of lower insurance premiums, savings of lives, property damage prevention and lower use of electricity, which resulted from use of PCB's."

[MONS 000232-33, "Letter from W. C. Hammann to L. A. Miller: Clean Up PCB's," December 9, 1977.]

Doc ID # 769 Exhibit # P-0793

728.
1978(?)

Monsanto Research Corporation: Monsanto was studying the Aroclor content in tissues. "These include baby skin and fat tissue, adult skin and fat tissue placenta samples, and milk (colostrum) samples."

"This report is designed to be used as an interim report to update the status of the program to determine the Aroclor 1254 content of monkey tissue resulting from an oral feeding program. Numerous samples of several sample types have been analyzed to date. These include baby skin and fat tissue, adult skin and fat tissue placenta samples, and milk (colostrum) samples.

The samples reported in this report have been received during May, June and August 1978. Subsequent interim reports will be issued at later dates to include the backlogged samples received."

[MONS 061781, Monsanto Research Corporation, "Report," COMPANY CONFIDENTIAL, 1978(?).]

Doc ID # 7741 Exhibit #

729.
02/17/78

Letter from McKee to Dr. Barry Commoner: Dr. Commoner said "Monsanto knew back in the 1930s that PCBs caused skin disorders." McKee disagreed.

"Ever since you mentioned to us that Monsanto knew back in the 1930s that PCBs caused skin disorders, we have been searching the records and contacting former managers for a response. We believe we now have the facts in perspective and want to share them with you.

Here is what we found:

Although PCBs were tested repeatedly by Monsanto for nearly half a century, the material was never convicted of causing skin disease. In fact, each case of skin irritation attributed to PCBs was traced to (correctable) impurities in the manufacturing process.

In 1933, when a skin disease began appearing among Swann Chemical Company workers in the PCB pilot production facility at Anniston, Alabama, the company immediately launched a medical investigation.

It was determined from the study that the skin eruptions were related to impurities in the intermediate steps of the manufacturing process and not to the final product (PCBs).

As a result of this investigation, steps were taken to eliminate the impurities, and the manufacturing process was changed to a closed system in which all chemical reactions occur in sealed pipes and vessels. This permanently alleviated the problem. Patch tests conducted with PCBs (then and later) never produced any evidence of irritation. The outcome of this study was made public by two Atlanta, Georgia, dermatologists who had served as consultants during the investigation. ("The Archives of Dermatology and Syphilology," Vol. 33, P. 1027, 1936).

Monsanto, which later purchased Swann, did not experience any cases of skin disease among PCB workers during more than 40 years of PCB manufacture. However, over the years Monsanto continued to sponsor animal studies with PCBs. The results of these tests helped us determine safe exposure levels inside the plants.

In the late 1940s and early 1950s, outbreaks of skin disease occurred on board ships that used PCBs in insulating capacities. However, studies of these incidents again traced the problem to other materials."

[MONS 002476-77, "Letter from James E. McKee Jr. (Director of Public Relations) to Dr. Barry Commoner, Center for the Biology of Natural Systems, Washington University," February 17, 1978.]

Doc ID # 4329 Exhibit #

720.

04/17/78

Study was conducted for more than one year to investigate the effect of PCB's on the reproductive performance of the rhesus monkey. "There is a possible effect of PCB's on female fertility," and "Three deaths have occurred among the females in the high dose group."

"J.G. Laveglia and myself visited Litton Bionetics on April 4 and 5, 1978, to discuss with Dr. David Martin and co-workers the reproduction study on rhesus monkeys fed 0, 5, 25, and 100 µg/kg of Arochlor 1254. A brief audit of data generated so far was conducted and everything appeared to be in order.

The study has now been underway for a little over a year with the animals being bred after 6 months of feeding (i.e. since October 1, 1977). Although no definite conclusions can be drawn at this time, two observations are of concern;

- (1) There is a possible effect of PCB's on female fertility; there has been one pregnancy out of an original eight animals in the high dose group, six out of eight in the medium, five out of eight in the low dose and eight out of eight in the control group. In addition, in the high dose group there were two resorptions or abortions in animals that had been pregnant.
- (2) Three deaths have occurred among the females in the high dose group. At least two of these deaths appear to be related to the abnormal hematological findings in those females and may be suggestive of bone marrow suppression. No other deaths that can be related to PCB's have occurred."

[MONS 000100, "Letter from Peter E. Berteau to J. C. Weber: Effect of PCB's on the Reproductive Performance of the Rhesus Monkey," April 17, 1978.]

Doc ID # 776 Exhibit # P-0795

731.

04/18/78

Dr. Tillman said "Repeated ingestion of small quantities of PCB's is an entirely different matter. This was the case in the Yusho incident." Various findings caused by PCB contamination have been listed in the letter.

"Repeated ingestion of small quantities of PCB's is an entirely different matter. This was the case in the Yusho incident. Here, small quantities of the material would be absorbed and stored in the body and chronic toxic effects have been identified in this situation. In Yusho there was repeated ingestion and the symptoms and signs resulting from this began to occur in 1968. The objective findings resulting from this include the following:

acne-like skin eruptions on the face, the buttocks and in areas where two skin surfaces are in contact.

skin pigmentation

swelling of the eyelids

inhibition of growth and abnormal teeth in children

smaller than average infants at birth

total body pigmentation at birth ..."
[MONS 003327, April 18, 1978]

Doc ID # 4402 Exhibit # P-0796

"In addition, the persons exposed complained of the following symptoms:

fatigue

headache

abdominal pain

numbness and pain in the extremities

cough and sputum

menstrual disturbances" [MONS 003328, April 18, 1978]

Doc ID # 4402 Exhibit # P-0796

[MONS 003327-28, "Letter from Ernest Tillman, M. D., to Monte C. Throdahl: Health Effects of PCB's," April 18, 1978.]

Doc ID # 4402 Exhibit # P-0796

732.

05/26/78

The non-human primate study indicated that "Reduced fertility is clearly evident in females on 100 µg/kg."

"For your information, prior to a meeting later today, the following summary provides the most current information regarding the above mentioned study. The most recent data were obtained today in a telephone conversation with Dr. David Martin of Litton Bionetics."

"RESULTS

1. Fertility

Thus, female fertility is significantly affected at the 100 µg/kg level. Male fertility, as determined by semen evaluation, has been unaffected. [MONS 002959, May 26, 1978]

Doc ID # 4361**Exhibit # P-0797**

2. Mortality

No deaths have occurred in the low or medium dose groups. Three (3) deaths have occurred in the high dose group. Markedly diminished granulopoiesis was evident upon histological examination of the bone marrow of each of these animals.

3. Hematology

Significantly reduced values of several hematological parameters became evident in the high dose group beginning at month 10 (January 1, 1978) and also at month 12 (March 1, 1978). Significantly reduced hemoglobin was evident in the females, only in the medium dose group at month 12 only.

4. Biochemistry

Possible effects on certain liver function enzymes may be evident in the high dose group, although it is difficult to draw any conclusions. However, there was significantly increased serum iron in the high dose group at months 10 and 12. This finding may be related to the hematological observations and this possibility is being explored further.

5. Clinical Signs

Two (2) of 4 males and 3 of 8 females in the high dose group showed classical signs of PCB toxicity (e.g. edema and wrinkling of eyelids) beginning to be evident during the fourth quarter of

feeding. Chloracne has not been noted however." [MONS 002960, May 26, 1978]

Doc ID # 4361 Exhibit # P-0797

"CONCLUSIONS

"The findings so far roughly parallel those of Allen, except for the absence of chloracne. Reduced fertility is clearly evident in females on 100 µg/kg. No signs of a teratogenic effect are evident however. Possible blood dyscrasias are evident at 100 µg/kg, although this situation may be reversing itself even though administration of the PCB intoxication are evident only at 100 µg/kg. Thus, a tentative no-effect level of 25 µg/kg/day with respect to all these parameters can be established (this level is 25 times higher than that established by FDA for human intake of PCB's)."

[MONS 002959-61, "Letter from Peter E. Berteau to J. C. Weber (Monsanto): Non-human Primate Study With A PCB Conducted At Litton Bionetics," May 26, 1978.]

Doc ID # 4361 Exhibit # P-0797

733.
06/20/78

Research results demonstrated that "Freshwater Fish have shown the concentration of PCB's in fish tissues to remain constant from 1969-1975."

"The National Pesticide Monitoring Programs-Contaminant Residues in Freshwater Fish have shown the concentration of PCB's in fish tissues to remain constant from 1969-1975. There are now indications that PCB distribution may have decreased from 1969-1977, but final judgment awaits the results of the 1976 and 1977 analysis.

The symposium revealed that a lot of research is still being done on PCB's and the environment."

[MONS 002009, "Letter from M. E. Klaus to W. C. Hammann, et al.: International Symposium on the Analysis of Hydrocarbons and Halogenated Hydrocarbons," June 20, 1978.]

Doc ID # 4290 Exhibit #

734.

12/12/78

Letter from Peter E. Berteau to Bionetics: Various toxic effects of PCBs from the tests were discussed. Dr. Berteau said "In view of the findings, we need to decide whether we are likely to be obligated to inform EPA or other government agencies of them under TOSCA regulations."

"Prior to sacrifice, 4/8 females in the 100 µg/kg group have died and 1/4 males in that group. These deaths appear to be related to complications arising from depression of hematological parameters (pancytopenia) and can tentatively be attributed to PCB administration. Except for 1 female which developed this syndrome and survived until terminal sacrifice (4-6 weeks), this lesion was fatal. No deaths have occurred below the 100 µg/kg dose that can be attributed to PCB's. Visible signs of PCB toxicity (eyelid puffiness, chloracne, etc.) were evident in most animals surviving 100 µg/kg. Signs of toxicity in adult animals fed 25 µg/kg are not clearly apparent. Reproductive function was markedly reduced in females fed 100 µg/kg, but not at lower doses. Male fertility (semen evaluation) was unaffected at any dose. Infant monkeys have done less well, and evidence of PCB toxicity may be apparent in those born to mothers fed 25 µg/kg and possibly at 5 µg/kg. However, because of the protocol, infants received varying amounts of PCB's from their respective mothers because of the June 1 cessation of feeding PCB's when many animals were nursing. Thus, little in utero information can be expected from this study.

Upon our arrival December 4, 1978, Dr. Siebold (Pathologist, Litton) gave a slide presentation on some of the observations found in tissues of animals fed PCB's which had died or been sacrificed during the study. Among these findings were: Meibomian gland, squamous metaplasia, atrophy and impaction of duct. Skin changes, squamous impaction of hair follicles, loss of sebaceous glands. Thymus, cystic changes in the medulla, reactive involution. Stomach, metaplasia of the gastric gland. Liver, necrosis. Bile duct, hyperplasia. Pancreatic duct, hyperplasia, acina atrophy. Kidney, cortical dysplasia in the infants. Bone marrow, diminished cellularity. Heart, squamous metaplasia of the epicardium."

"In view of the findings, we need to decide whether we are likely to be obligated to inform EPA or other government agencies of them under TOSCA regulations. In any case, we recommend that the additional tissues be examined and that the costs be funded. These 2 matters should comprise the areas of emphasis at the December 14, 1978, meeting. In addition, the difficulty in obtaining analyses

from MRC Dayton should also be addressed. The final report cannot be issued until these analytical data have been obtained."

[MONS 000096-97 "Letter from Peter E. Berteau to Bionetics (Memo: JCW to PEB, et al., 12-11-78)," December 12, 1978.]

Doc ID # 3902 Exhibit # P-0801

735.
1979

Chlorinated biphenyls (PCBs) were banned in the U. S.

"Chlorinated biphenyls (PCBs) were banned (except for certain applications) in the U. S. in 1979."

[MONS 211565, "Polychlorinated Biphenyls, PCB's, A Report on Uses, Environmental and Health Effects and Disposal," 1979 (?)]
Note: No date is available for the Report.

Doc ID # 7716 Exhibit # P-0802

Also See: MONS 002321-22, "PCB Production History Fact Sheet," May 1982.]

Doc ID # 4318 Exhibit # P-0811

736.
1979

PCB manufacturing and sales data were released by Monsanto (1957 through 1978, in Thousands of Pounds):

	1957	1958	1959	1960
US Production	(1)	(1)	(1)	37,919
Domestic Sales	32,299	26,061	31,310	35,214
US Export Sales	(2)	(2)	(2)	(2)

Domestic Sales By PCB Grade				
Aroclor 1221	23	16	254	103
Aroclor 1242	18,222	10,444	13,598	18,196
Aroclor 1248	1,779	2,559	3,384	2,827

Aroclor 1254	4,461	6,691	6,754	6,088
Aroclor 1260	7,587	5,982	6,619	7,330
	1961	1962	1963	1964
US Production	36,515	38,363	44,734	50,833
Domestic Sales	37,638	38,043	38,132	44,869
US Export Sales	(2)	(2)	3,647	4,096

Domestic Sales By PCB Grade				
Aroclor 1221	94	140	361	596
Aroclor 1242	19,827	20,654	18,510	23,571
Aroclor 1248	4,023	3,463	5,013	5,238
Aroclor 1254	6,294	6,325	5,911	6,280
Aroclor 1260	6,540	6,595	7,626	8,535
	1965	1966	1967	1968
US Production	60,480	65,849	75,309	82,854
Domestic Sales	51,796	59,078	62,466	65,116
US Export Sales	4,234	6,852	8,124	11,231

Domestic Sales By PCB Grade				
Aroclor 1221	369	528	442	136
Aroclor 1242	31,533	39,557	43,055	44,853
Aroclor 1248	5,565	5,015	4,704	4,894
Aroclor 1254	7,737	7,035	6,696	8,891

Aroclor 1260	5,831	5,875	6,417	5,262
	1969	1970	1971	1972
US Production	76,389	85,054	45,417	38,600
Domestic Sales	67,194	73,061	34,301	32,242
US Export Sales	10,624	13,651	10,648	6,388

Domestic Sales By PCB Grade				
Aroclor 1221	507	1,476	2,215	26
Aroclor 1242	45,491	48,588	21,981	5,537
Aroclor 1248	5,650	4,073	213	0
Aroclor 1254	9,822	12,421	4,661	6,115
Aroclor 1260	4,439	4,890	1,725	414
	1973	1974	1975	1976
US Production	42,178	40,118	29,710	29,592
Domestic Sales	37,742	34,406	25,611	24,329
US Export Sales	8,346	5,395	5,712	4,744

Domestic Sales By PCB Grade				
Aroclor 1221	35	57	28	20
Aroclor 1242	6,200	6,207	6,435	4,418
Aroclor 1248	0	0	0	0
Aroclor 1254	7,976	6,185	6,328	1,584

Aroclor 1260	0	0	0	0
	1977	1978		
US Production	13,330	0		
Domestic Sales	12,701	0		
US Export Sales	1,548	0		

Domestic Sales By PCB Grade				
Aroclor 1221	0	0		
Aroclor 1242	51	0		
Aroclor 1248	0	0		
Aroclor 1254	1,566	0		
Aroclor 1260	0	0		

Note: (1) = Production figure unavailable during year indicated.
 (2) = U.S. Export Sales figure unavailable during year indicated.

[MONS 211566-67, "Polychlorinated Biphenyls, PCB's, A Report on Uses, Environmental and Health Effects and Disposal," 1979 (?).]
 Note: No date is available for the Report.

Doc ID # 7716 Exhibit # P-0802

737.

May 79

The manufacture, sale and distribution of PCBs were banned by the U. S. EPA acting under authority granted by the Toxic Substances Control Act of 1976.

[M01556-61, "Notice of Filing Documents in Support of Monsanto Company's Motion to Dismiss or, in the Alternative, Motion for a Stay, -- Andrew Bowie, et al. vs Monsanto Company, in the United States District Court for the Northern District of Alabama Eastern Division," June 3, 1997.]

Doc ID # 1133 Exhibit #

738.

05/31/79

A rule promulgated on May 31, 1979 by USEPA categorized the use, concentration, and type (liquid or nonliquid) of PCBs.

"A rule promulgated on May 31, 1979 (EPA, 1979d, Velie and Kuntz, 1982; EPA, 1983d) categorized the use, concentration, and type (liquid or nonliquid) of PCBs. Portions of this rule were declared invalid by a U.S. Court of Appeals and several rules have since been issued to satisfy the court-ordered changes."

[Mitchell D. Erickson, "Analytical Chemistry of PCBs," Butterworth Publishers, Boston, An Ann Arbor Science Book, 1992.]

Also See: MONS 223453.

Doc ID # 10868 Exhibit # P-0005

739.

09/11/79

Washington Post: Federal researchers discovered that a little known but highly toxic chemical compound has contaminated fish in Lake Michigan and in several major rivers in the Northeast and Midwest. This compound is a by-product of PCB, and is up to 1,000 times as toxic as PCBs, and is known as polychlorinated dibenzofurans (PCDF). "The compound can cause birth defects and is suspected to be a carcinogen".

"Federal researchers yesterday said they have discovered that a little known but highly toxic chemical compound has contaminated fish in Lake Michigan and in several major rivers in the Northeast and Midwest.

Dr. David Stalling, a scientist with the U.S. Fish and Wildlife Service's laboratory in Columbia, Mo., said the compound, known as polychlorinated dibenzofurans (PCDF), is up to 1,000 times as toxic as PCBs, which were banned by the Environmental Protection Agency in 1976 as a hazard to humans.

A second member of the research team that found the PCDF traces in the fish said the compound can cause birth defects and is suspected to be a carcinogen.

Stalling said that PCDF had not been spotted by chemical investigators before because it is a PCB byproduct that can be detected only by the use of recently developed and highly

sophisticated laboratory equipment. The compound has, in effect, quietly hitchhiked behind PCBs, he said, although it can be far more powerful.

Stalling said PCDF is released in a highly concentrated form when PCBs are heated but not totally incinerated at temperatures of more than 800 degrees centigrade. Such releases can occur, he said, during manufacturing processes using PCBs and inside electrical equipment, such as transformers and capacitors, where PCB have been widely used as lubricants and coolants."

[MONS 201592, "Washington Post," September 11, 1979.]

Doc ID # 15579 Exhibit #

740.
10/04/79

Letter from J. L. Brown to D. E. Cayard: Anniston submit its Long Range Solid Waste Disposal Plan for review.

"A Rough Draft of the Long Range Solid Waste Disposal Plan for Anniston is attached for your review. In addition, please handle any legal review that may be necessary."

[DSW 082496]

Doc ID # 10218 Exhibit # P-0805

"Anniston Plant Long Range Solid Waste Disposal Plan

With the imminent promulgation of regulations mandated by the Resource Conservation and Recovery Act (RCRA) and the Alabama Solid Waste Management Act of 1978 (ASWMA), disposal of wastes defined as "hazardous" will be much more stringently regulated than in the past. A greater variety of materials will require more costly disposal procedures, thus increasing the cost of disposal to land. Alabama Regulations will be patterned after RCRA, therefore, compliance with one will assure compliance with the other."

"The Anniston Plant currently generates approximately 11.5 M pounds per year of solid waste. A breakdown of this waste and current costs for disposal are included in Appendices A and B."

[DSW 082496-97, "Letter from J. L. Brown to D. E. Cayard" and attachment, October 4, 1979.]

Doc ID # 10218 Exhibit # P-0805

741.

10/18/79

The recent contamination of animal feed in Billings, Montana, made the Department of Agriculture been severely criticized for the delays in its part of testing PCBs in that situation.

"Derr called regarding the recent contamination of animal feed in Billings, Montana. The Department of Agriculture has been severely criticized for the delays in its part of testing PCBs in that situation. They are having to respond to considerable pressure from congress, particularly from Representative McGuire of New Jersey. Assistant Director Foreman of the Department of Agriculture has asked Derr's Group to design rules which will identify where PCBs exist in food processing plants and will withdraw such source so that future contamination will not occur.

Derr asked for information on application of PCBs which might be found in food processing plants. The most likely areas of interest will be on transformers and capacitors in moving equipment and ovens such as microwave ovens, baking ovens and on power factor correction capacitors on incoming power voltage lines. They will be checking any frying and vegetable oil deodorizing units for previous PCB heat transfer use. It may raise the issue of Silo paints again.

Don expressed concern that because of the present political pressures on the Department policy may dictate that their approach to the food processing industry is overactive. He asked us to keep in touch with him as issues developed.

I believe that we should keep close to this issue since it may become a widespread public issue and could cause severe disruptions in the food processing industry."

[MONS 000110, "Letter from D. Wood to J. R. Ortiz, et al.: Telephone discussion with Donald Derr, U.S. Department of Agriculture, Washington, D. C.," October 18, 1979.]

Doc ID # 3907 Exhibit #

742.

11/16/79

Monsanto submitted Report to Congress on November 16, 1979. In this Report, Monsanto claimed that:

- 1) "Monsanto has been responsive to health questions about chlorinated biphenyls over the years. Those responses have

been consistent with "state of the art" procedures available at the time questions were raised." [M07570]

Doc ID # 1184 Exhibit #

- 2) "This consisted of periodic physical examinations, good work practices to ensure personal cleanness of employees, adequate ventilation of the work areas, and overall good industrial hygiene practices." [M07571]

Doc ID # 1184 Exhibit #

- 3) During the years Monsanto made chlorinated biphenyls, the quantity of waste produced was relatively low and consisted chiefly of distillation residuals, after separation of the useful product mix." [M07581]

Doc ID # 1184 Exhibit #

- 4) "Until 1971 these residuals were landfilled. From 1971 to 1977, production waste was incinerated."

[M07570-81, Monsanto Company, "Submission to the Subcommittee on Oversight and Investigations of the Committee on Interstate and Foreign Commerce, U. S. House of Representatives," November 16, 1979.]

Doc ID # 1184 Exhibit #

743.

12/21/79

Monsanto planned to discuss "the report and supplement to the monkey reproduction study conducted with a polychlorinated biphenyl by Litton-Bionetics," and wanted to "work up a final report".

"Enclosed are copies of the report and supplement to the monkey reproduction study conducted with a polychlorinated biphenyl by Litton-Bionetics. As I mentioned during our telephone conversation, I would like you to review it critically, to meet with us at Monsanto to discuss your reaction to it, and after we have had our discussion, to meet with us and Litton personnel to work up a final report."

[MONS 002796, "Letter from George J. Levinskas, Ph.D., Director, Environmental Assessment and Toxicology, to Mr. R. D. Harbison, Division of Pediatric Clinical Pharmacology, Vanderbilt Medical Center, Nashville, TN 37232," December 21, 1979.]

Doc ID # 4343 Exhibit #744.
1980?

Report on Histopathological re-evaluation of livers from rats treated with AROCLOR: Much higher rate of liver problem was observed from rats fed by Aroclor.

"A total of 549 slides, submitted for consultation from Monsanto Company, were said to represent liver tissues from 540 albino rats continuously fed diet containing 1 (T-1), 10 (T-11), or 100 (T-111) ppm AROCLOR 1242 (A group=157 liver sections), 1254 (B group=176 liver sections) and 1260 (C group=211 liver sections), and sacrificed at intervals of 3, 8, 14, and 24 months. A study with AROCLOR 1260 in albino rats revealed no carcinogenic effects. However, investigators conducted another experiment with AROCLOR 1260 and reported induction of hepatocellular carcinoma in 26 of 184 experimentals, while the ration in controls was 1 out of 173. In addition in the same study 146 of 184 experimental rats showed neoplastic nodules. From this study, Dr. Kingrough and other NCI consultants (Dr. Robert Squire and Morton Levitt) concluded that AROCLOR 1260 had a hepatocarcinogenic effect when fed in the diet of female Sherman strain rats.

Histopathologic evaluation of additional liver sections from rats of a 2-year chronic oral toxicity study of AROCLOR 1242, 1254 and 1260 by Dr. Gordon of Industrial BIO-TEST Laboratories Inc. indicated that all 3 lots of AROCLOR were slightly tumorigenic at levels of 100 ppm, when fed continuously in the diet for 2 years. Additional material from the latter experiments has been submitted for re-evaluation as to whether there are apparent reasons for the varying results obtained by the two laboratories and suggestions regarding possible additional animal testing."

[MONS 043697, "Report on Histopathological re-evaluation of livers from rats treated with AROCLOR," Date = ? (~ 1980).]

Note: *No date is available for the Report.*

Doc ID # 5969 Exhibit #745.
03/18/80

Professor Reimers wrote to Monsanto in an effort to use prior Monsanto data on PCB's collected around Anniston plant between 1968-1975.

"Upon your request, we are sending you this letter which is a request for permission to utilize prior Monsanto data on PCB's collected around your Anniston plant between 1968-1975. Currently, we are conducting field and laboratory investigations on the translocation and environmental control of polychlorinated biphenyls (PCB's). Enclosed is a copy of the abstract on half-life of PCB's in fish, a xerox of the slides to be used, a draft of Ms. Vitter's thesis on fish collected near your plant, a copy of your data being utilized (no lipid data was used in this study), and a copy of SFI internal review of our project.

This assessment of your original and our subsequent data indicated even a greater drop in PCB's (Aroclor's 1254 and 1260) than had been reported to you before. The half-life of these stable PCB mixtures was in the less than 2 1/2 years instead of the speculated 50 to 100 years. However, this half-life information cannot be published unless we receive permission from your company to use your data in our analysis. By permission to use your data Tulane hopes to give Monsanto some invaluable information on the effect of PCB's in the environment."

[MONS 000765, "Letter from Dr. Robert S. Reimers (Associate Professor) to Mr. J. Coleman Weber," March 18, 1980.]

Doc ID # 3987 Exhibit #

746.
05/08/80

Letter from Jerry L. Brown to Mr. Alfred S. Chipley: the leachate collection and transport system were to be installed in the landfill area.

"It was a pleasure to meet with you and members of your staff on May 6 to discuss the Solid Waste Program of the Anniston Plant. As agreed in the meeting, I am attaching copies of the following:

1) A brief engineering description of the leachate collection and transport system to be installed."

"4) A brief summary of leachate contamination concentration."

[DSW 082477, "Letter from Jerry L. Brown to Mr. Alfred S. Chipley, Director, Division of Solid Waste and Vector Control, Environmental Health Administration, Montgomery, Alabama", May 8, 1980.]

Doc ID # 10216 Exhibit #

747.

06/26/80

Monsanto tried to change the main body of the report. However, Cardy and Seibold disagreed, and "want to include Table C with the 25% incidence of direct morphologic effects in a low dose infant."

"Enclosed is an interoffice memorandum from Richard H. Cardy, a pathologist at Litton Bionetics to David P. Martin, study director for the study involving the feeding of PCB's to monkeys. As you will gather, neither Cardy nor Seibold are willing to allow much change in the content of page 31 (enclosed) of the main body of the report. In talking with David Martin last week, I understand that they still want to include Table C with the 25% incidence of direct morphologic effects in a low dose infant. Both David Martin and I agreed that since we are not pathologists we would like to "get out from under" this controversy. As a pathologist, you indicated that you would be willing to talk with Seibold. Perhaps you would do so and at least try to arrange for deletion or modification of Table C.

I hope we can come up with a report that is acceptable to both Litton and Monsanto."

[MONS 002720, "Letter from Peter E. Berteau to W. E. Ribelin: Histopathological Quantification of Lesions from PCB Study," June 26, 1980.]

Doc ID # 4342**Exhibit # P-0807**

748.

07/22/80

PCB Levels in a Community with Exceptional Exposure to DDT, Triana, Alabama: Investigation found that "the geometric mean serum level of polychlorinated biphenyls (PCB) of 458 persons in a community-wide study was 17.2 parts per billion." Suggestion of not eating fish was made to the residents in the area.

"SUMMARY

The geometric mean serum level of polychlorinated biphenyls (PCB) of 458 persons in a community-wide study was 17.2 parts per billion, with 80%-90% having levels within the range found in other community groups. PCB levels were found to be directly related to age--the older the age group, the higher the PCB level--even when controlled for other variables positively associated with PCB level: male sex, fish consumption, serum cholesterol level, and alcohol consumption. No major point source of PCB contamination was found, and fish taken in the drainage of a major population center

had mean PCB levels below the current enforceable Food and Drug Administration tolerance of 5 parts per million. Serum PCB levels were positively associated with measured blood pressure, with gamma-glutamyl transpeptidase level (a liver function test), and with serum cholesterol level, all independent of major confounding variables. These findings, along with the unknown remote consequences of PCB accumulation in the body, support our recommendation for Triana residents to avoid eating fish taken from contaminated areas."

[MONS 012266, "Letter from John A. Liddle, Ph. D., and David D. Bayee, Ph. D. (Chronic Diseases Division Bureau of Epidemiology) to Director, Center for Disease Control: PCB Levels in a Community with Exceptional Exposure to DDT, Triana, Alabama," Public Health Service-CDC-Atlanta, EPI-79-44-4, July 22, 1980.]

Doc ID # 5513 Exhibit #

749.
12/03/80

Assessment of Hydrogeologic Conditions at the Solid-Waste Landfill Area, Monsanto Company, Anniston, Alabama: "Since the 1950's, this landfill has received waste products from the Monsanto Anniston plant site. These waste products were disposed of into a series of trenches at the landfill site which were reportedly dug to a depth of 5 to 10 ft."

"During the investigation, 32 borings were installed from which soil samples were taken and chemically and physically analyzed. Included in the assessment were the data collected from six monitor wells and 14 cased borings. The information indicates that, at three locations, ground water containing landfill material has migrated a short distance away from the trenches in which the waste products were buried."
[DSW 082674-75]

Doc ID # 10225 Exhibit #

"RECOMMENDATIONS

Depending upon the analysis of the monitoring data from the first six-month sampling program, it is conceivable that some additional monitor wells might have to be installed. We therefore recommend an intermediate data analysis after a six months period and a meeting with representatives of Monsanto to discuss the findings and to plan future action."
[DSW 082676-77]

Doc ID # 10225**Exhibit #****"INTRODUCTION**

In May 1980, Geraghty & Miller, Inc., was retained by Monsanto Agricultural Products Company to provide Hydrogeologic consulting services in connection with the company's 30-acre landfill at the Anniston, Alabama plant (see Figure 1). Since the 1950's, this landfill has received waste products from the Monsanto Anniston plant site. These waste products were disposed of into a series of trenches at the landfill site which were reportedly dug to a depth of 5 to 10 ft. Over the years, the State and Monsanto regularly inspected the landfill."

[DSW 082678]

Doc ID # 10225**Exhibit #**

[DSW 082669, 082674-78, "Assessment of Hydrogeologic Conditions at the Solid-Waste Landfill Area, Monsanto Company, Anniston, Alabama", Prepared for Monsanto Agricultural Products Company, Anniston, Alabama", by Geraghty & Miller, Inc., Consulting Ground-Water Hydrologists and Geologists, December 3, 1980.]

Doc ID # 10225**Exhibit #**

750.

01/20/81

Gaffey disagreed with the findings of a paper. The authors of the paper "find the excess liver cancer to be "consistent with" findings of liver effects in animals, thus implying (without saying so) that the excess is occupational." However, Gaffey had to admit, "past exposures were probably higher than the current levels."

"As far as I can determine from the written account, the study appears to be a good one as far as design and data collection are concerned. The industrial hygiene measurements are of course of little significance to the study, except to suggest that past exposures were probably higher than the current levels.

However, I disagree entirely with the conclusions concerning liver cancer and I believe that the conclusions about rectal cancer should be weakened.

The authors find the excess liver cancer to be "consistent with" findings of liver effects in animals, thus implying (without

saying so) that the excess is occupational (top of pages 15 and 17). In fact, there is an inverse relationship between the occurrence of liver cancer and both duration (Table 5) and latency (Table 4) of exposure, so that the pattern is just the reverse of what one would expect of an occupational cancer. Further, 2 of the 3 live cancers occurred within 10 years of the beginning of exposure, so they are unlikely to be occupational no matter what.

The excess of rectal cancer is described as "surprising" (Page 17). However, the NCI Cancer Atlas shows high values for rectal cancer mortality in the Northeastern U.S., with a fair number of counties in New York and Massachusetts, where the plants were located, having rates above the 90th percentile for all U.S. counties. This makes it completely unsurprising that the study population shows an excess of rectal cancer, although I would not quarrel with the need to investigate further."

[MONS 002337, "Letter from William R. Gaffey to D. L. Coleman, M.D.: NIOSH PCB Study," January 20, 1981.]

Doc ID # 4321 Exhibit # P-0808

751.

03/06/81

Letter from E. J. Jurevic, Plant Manager of Anniston to Mr. James W. Warr, AWIC: Anniston submitted its application for NPDES permit renewal. For stormwater runoff, no mention was made to PCB's.

"In accordance with the requirements of the Alabama Water Improvement Commission, the Clean Water Act, and regulations promulgated thereunder, the enclosed application is submitted for renewal of the NPDES permit and the State Indirect Discharge Permit for Monsanto Company's Anniston, Alabama Plant.

The application has been signed on behalf of Monsanto by a principal executive officer at least the level of vice president, as required by 40 CFR Number 122.6."

"V.17 Stormwater Management

Runoff from areas where the potential for contamination exists is drained to appropriate treatment facilities, e.g. biological treatment, oil-water separators, etc. Uncontaminated runoff is discharged directly to the local open storm drainage system."

[DSW 111124 and 111221, "Letter from E. J. Jurevic, Plant Manager of Anniston to Mr. James W. Warr, Chief Administrative Officer, Alabama Water Improvement Commission, Montgomery, Alabama," Confidential, March 6, 1981.]

Doc ID # 21781 Exhibit #

752.

03/12/81

"The two PCB incidents in New York State in February continues to have extremely high press and media visibility within New York and across the nation." PCBs in meters of gas pipelines were detected at concentrations as high as 2000-3000 ppm.

"The two PCB incidents in New York State in February continues to have extremely high press and media visibility within New York and across the nation.

Transformer Fire

The transformer fire occurred after hours in a 17-story State office building involving about 100 gallons of transformer fluid, 50% PCB - 50% Trichlorobenzene." [MONS 003338, March 12, 1981]

Doc ID # 4404 Exhibit #

"Natural Gas Line Contamination

PCB's were detected in natural gas pipelines and meters in Long Island in early February. In condensate in meters concentrations as high as 2000-3000 ppm were detected. (The condensate occurred as a result of a number of factors, all happening at the same time, i.e., very cold weather, high gas velocities (flow rates) in the system and high concentrations of high-molecular weight hydrocarbons in the gas -- C4 to C9's).

Since the first discovery on Long Island, gas transmission lines all across the country have been sampled and found to contain trace levels of PCB's as contaminants. Levels in the vapor in pipelines are of the order of 1 ppb or less have been identified.

The media, government and health officials reaction to this incident has tempered significantly over the past months. All responsible sources have publicly stated that there is no health hazard. Programs to sample, identify and remove contaminants are being developed. However, in the past week the PCDOP(?) Issue has emerged here and sampling programs will be modified to include

analyses for this possible co-contaminant." [MONS 003339, March 12, 1981]

Doc ID # 4404 Exhibit #

[MONS 003338-39, "Letter from J. M. Craddock to C. F. Callis and M. C. Throdahl: Major New York Issues - Status Report," March 12, 1981.]

(?) = The word is too blurring to read.

Doc ID # 4404 Exhibit #

753.

04/22/81

Monsanto funded "two outside research projects exploring new and innovative technologies for degradation of PCB's."

"Monsanto is currently funding two outside research projects exploring new and innovative technologies for degradation of PCB's at

- 1) New York University Medical Center Institute of Environmental Medicine Prof. Merrill Eisenbud, Director Dr. C. C. Lee, Project Director
- 2) Massachusetts Institute of Technology Prof. George M. Whitesides, Principal Investigator

These projects have been in progress since late 1979."

[MONS 002331, "Letter from J. H. Craddock to J. T. Nolan: PCB Outside Research Projects," April 22, 1981.]

Doc ID # 15194 Exhibit #

754.

06/10/81

Mr. Raymond Cesta's "employees had requested the medical department for evaluation because of their worries about health hazards and specifically about the possibility of dioxin contamination of PCB's and the health effects alleged from 'agent orange'." The results indicate that these "workers do have higher than background levels of blood PCB's."

"Received a call from Mr. Raymond Cesta, Industrial Hygiene Engineer for Eastern Airlines. His inquiry concerned some of their employees who had been exposed to inhalation of PCB's via explosion of capacitors and clean-up therefore. His employees had

requested the medical department for evaluation because of their worries about health hazards and specifically about the possibility of dioxin contamination of PCB's and the health effects alleged from 'agent orange'.

Their workers do have higher than background levels of blood PCB's, but that health effects due to this are certainly not evident and not well worked out.

We discussed the supposed cancer hazard evidence, particularly the Kimbrough Studies and the controversy surrounding these and the fact that other studies of worker populations have not shown an increase in cancer incidents, after sufficient lead time or lag time to have these effects manifest themselves. I closed stating that he should be reassuring to his employees that if an exam show no effects that they should not have concern for long-term effects of the casual exposure that he described."

[MONS 003041-42, "Letter from Donald L. Coleman, M. D. to John Craddock," June 10, 1981.]

Doc ID # 4378 Exhibit #

755.
12/17-18
1981

PCB Meeting - December 17 & 18, 1981: PCB's, Where are they?
The fate of PCBs were estimated at the meeting by experts.

PCB's – Where Are They?

<u>ITEM</u>	<u>Amount - M lbs</u>
Environmentally Biodegraded	30
Incinerated	25
Landfill	290
In the Environment	150
Currently in Electrical Service	750
In Use - Miscellaneous	8

	1,253

[MONS 002327, "PCB Meeting," December 17 & 18, 1981.]

Doc ID # 4319 Exhibit #

756.
1982

In 1982, a rule on use of PCBs in closed and controlled manufacturing processes was promulgated.

"In 1982, a rule on use in closed and controlled manufacturing processes was promulgated (EPA, 1982c; Velie and Kuntz, 1982; EPA 1983d). The rule excludes PCBs in products or wastes below the practical limit of quantitation."

[Mitchell D. Erickson, "Analytical Chemistry of PCBs," Butterworth Publishers, Boston, An Ann Arbor Science Book, 1992.

Also see MONS 223453.]

Doc ID # 10868 Exhibit # P-0005

757.
May 82

Monsanto's PCB Production History Fact Sheet.

"1929 - Swann Chemical Company, Anniston, Ala., began producing PCBs.
[MONS 002321, May 1982]

Doc ID # 4318 Exhibit # P-0811

1935 - Monsanto Chemical Company, St. Louis, Mo., purchased Swann and continued PCB production.

1970 - The presence of PCBs in the U.S. environment was confirmed.

1970-72 - Monsanto phased out sales of PCBs for "open applications" that could lead to environmental release. These uses, which reduced the company's PCB sales by 64 percent, included heat-transfer fluids, hydraulic fluids, plasticizer applications, and miscellaneous uses.

1972 - Monsanto limited PCB sales to selected customers solely for use in "totally enclosed" electrical equipment. A federal task force recommended that Monsanto continue production for these uses until effective substitutes were developed so as not to disrupt electrical power transmission in the U.S.

1976 - The Toxic Substances Control Act (TSCA) was enacted; it includes provisions for the total regulation of PCBs.

1977 - Monsanto voluntarily halted PCB production for its sole remaining use as a dielectric (cooling, insulating) fluid for electrical equipment.

1979 - EPA issued rules under TSCA banning future manufacture of PCBs."

[MONS 002321-22, "PCB Production History Fact Sheet," May 1982.]

Doc ID # 4318 Exhibit # P-0811

758.

06/30/82

Tests demonstrate that "this material on rubber gloves would remove PCBs, at least in order of magnitude, better than washing with soap and water."

"Tests done by an eastern electric company showed that this material on rubber gloves would remove PCBs, at least in order of magnitude, better than washing with soap and water. Many electric utilities have a need for a waterless hand cleaner to give to their employees that have to deal with PCBs at sites remote from locations where running water and soap are available to wash up after handling PCB-contaminated material. We are seeking to see that this material does not have any enhancing effect in skin penetration so that we can recommend it or similarly formulated materials with confidence that it would not adversely effect the rate of absorption in the direction of increasing it."

[MONS 003073, "Letter from Donald L. Coleman, M.D. Director, Occupational Medicine and Epidemiology, to Howard Maibach, M.D.," June 30, 1982.]

Doc ID # 4388 Exhibit #

759.

1983

Laboratory tests of PCBs showed disturbances of liver function and fat metabolism, and there were clinical reports suggestive of some abnormalities in the children of Yusho mothers.

"Before the Yusho incident in 1968, published studies of the health effects of PCBs, with the exception of Meigs et al (1954), were

essentially clinical studies of occasional accidental severe exposures. In the following decade ten epidemiologic studies were published (in addition to the many reports on the Yusho incident itself), all but one of which dealt with occupationally exposed populations, and only one of which studied the relationship between cancer and PCB exposure (Gaffey, 1982)."

"The Evidence as of 1978:

The Yusho incident of 1968 at first appeared to be a classic example of the effects of a massive ingestion of PCBs. Over 1000 Japanese became ill after eating a cooking oil contaminated with Kanechlor 400, a PCB compound of Japanese manufacture. The most common acute symptoms observed were hyperpigmentation and acne-like lesions, central nervous system symptoms, discharge from the eyes, and vomiting and diarrhea. These symptoms were dose related, and some of them persisted for as long as six years. Laboratory tests showed disturbances of liver function and fat metabolism, and there were clinical reports suggestive of some abnormalities in the children of Yusho mothers (NIOSH, 1977)."
[MONS 210807, 1983?]

Doc ID # 4520 Exhibit #

"There were nine other published cross-sectional studies of symptoms and biochemical parameters related to PCB exposure, one of which was non-occupational, and one occupational study of cancer morbidity and mortality.

In summary, the occupational studies found chloracne or other dermatitis, and mild liver function abnormalities in the absence of clinical illness, to be associated with PCB exposure."
[MONS 210808-09, 1983?]

Doc ID # 4520 Exhibit #

"Recent Studies:

The seven cross-sectional studies completed since 1978 address a broader range of health effects than did the pre-1978 studies, and in some cases used formal statistical techniques to take account of confounding variables such as age, sex and weight. Two of the studies, Fischbein et al (1979) and Smith et al (1982) evaluated their findings in relation to higher chlorinated and lower chlorinated PCBs separately. The studies' findings can be classified under five general headings: dermatologic effects, liver function, fat metabolism, other objective findings, and reported symptoms and

illnesses. The cohort mortality studies, although they collected data on all causes of death, were concerned primarily with cancer."

[MONS 210806-09, William R. Gaffey, Monsanto, "Recent Epidemiologic Studies of PCBs," 1983?]

Note: No date is given for the document. 1983 is the estimated year.

Doc ID # 4520 Exhibit #

760.
Jan. 85

"The Attorney General brought to Monsanto's attention a matter of polychlorinated biphenyls (PCB's) in the sediments of Snow Creek, downstream of Monsanto's Anniston, Alabama site."

[M00398, "Letter from David K. Denner, Plant Manager of Anniston Plant, Alabama to Mr. Donald Siegelman, Attorney General, State of Alabama," April 15, 1988.]

Doc ID # 1118 Exhibit #

761.
Feb. 85

"Representatives of Monsanto met with members of the Attorney General's staff to discuss the findings and plan a course of action."

[M00398, "Letter from David K. Denner, Plant Manager of Anniston Plant, Alabama to Mr. Donald Siegelman, Attorney General, State of Alabama," April 15, 1988.]

Doc ID # 1118 Exhibit #

762.
02/26/85

Letter from R. Craig Kneisel, Assistant Attorney General, State of Alabama to Mr. Joe Broadwater Director, ADEM: High PCBs were found in Snow Creek around 1985. "The levels found in some places" of Snow Creek "were in excess of 400ppm and were as high as 198ppm in sediments approximately 1-1 ½ miles from the plant."

"On Monday, February 25, 1985, members of the Attorney General's staff met with representatives of Monsanto Chemical Company concerning the finding by this office of PCBs in Snow Creek sediments. The levels found in some places were in excess of 400ppm and were as high as 198ppm in sediments approximately 1-1 ½ miles from the plant. The analytical

information on the samples is quite voluminous and we would be glad to transmit any of it which you might want."

[M00253, "Letter from R. Craig Kneisel, Assistant Attorney General, State of Alabama to Mr. Joe Broadwater Director, Alabama Department of Environmental Management," February 26, 1985.]

Doc ID # 1071 Exhibit # P-0819

763.

Mar. 85

Additional discussion was held between Monsanto and ADEM and the Attorney General's office to develop a mutually acceptable sampling program to define the situation.

[M00398, "Letter from David K. Denner, Plant Manager of Anniston Plant, Alabama to Mr. Donald Siegelman, Attorney General, State of Alabama," April 15, 1988.]

Doc ID # 1118 Exhibit #

April 85

Additional discussion was held between Monsanto and ADEM and the Attorney General's office to develop a mutually acceptable sampling program to define the situation.

[M00398, "Letter from David K. Denner, Plant Manager of Anniston Plant, Alabama to Mr. Donald Siegelman, Attorney General, State of Alabama," April 15, 1988.]

Doc ID # 1118 Exhibit #

May 85

A sampling protocol (in Snow Creek) was proposed.

[M00398, "Letter from David K. Denner, Plant Manager of Anniston Plant, Alabama to Mr. Donald Siegelman, Attorney General, State of Alabama," April 15, 1988.]

Doc ID # 1118 Exhibit #

06/18/85

"The sediments (in Snow Creek) were sampled by representatives of Monsanto, Attorney General's office and ADEM."

[M00398, "Letter from David K. Denner, Plant Manager of Anniston Plant, Alabama to Mr. Donald Siegelman, Attorney General, State of Alabama," April 15, 1988.]

Doc ID # 1118 Exhibit #

10/02/85 A meeting was held among representatives of Monsanto, attorney General's staff, ADEM, and EPA Region IV to review the results of the sediment sampling and plan the next course of action.

[M00398, "Letter from David K. Denner, Plant Manager of Anniston Plant, Alabama to Mr. Donald Siegelman, Attorney General, State of Alabama," April 15, 1988.]

Doc ID # 1118 Exhibit #

05/27/86 The proposed Snow Creek Sediment Removal Protocol (from Monsanto) was discussed with and transmitted to representatives of the Attorney General's Office and ADEM.

[M00398, "Letter from David K. Denner, Plant Manager of Anniston Plant, Alabama to Mr. Donald Siegelman, Attorney General, State of Alabama," April 15, 1988.]

Doc ID # 1118 Exhibit #

764.

01/31/87 "Review of files for 1986 resulted in a determination that there was a lack of interim status monitoring data. Also there was a lack of statistical evaluation associated with this monitoring."
[M00375, "Alabama Department of Environmental Management (ADEM): Memorandum," January 13, 1987.]

Doc ID # 1116 Exhibit #

765.

02/26/87 Redington and Pierle to Potter and Reding: Environmental Status of Anniston Plant.

"The status of environmental program and issues at the Anniston Plant was reviewed with Mr. Hal Corbett on February 26, 1987."

"A number of future potential environmental issues were identified, which will require continued monitoring and sensitivity. Hal agreed, however, that the plant's assessment, program and corrective action efforts are doing about what should be done given our understanding of site issues."

[DSW 119459, "Letter from D. B. Redington and M. A. Pierle to R. G. Potter and N. L. Reding: Environmental Status -- Anniston Plant," February 26, 1987.]

Doc ID # 11749 Exhibit #

766.

04/17/87

The list of the 100 most significant hazardous substance was published in the *Federal Register* on April 17, 1987.

[MONS 224854, "Toxicological Profile for Selected PCBs (Aroclor)," November 1987.]

Doc ID # 10879 Exhibit #

767.

08/11/87

Deposition of Witness Papageorge.

"A: At the Anniston plant any waste water from the PCB unit would be directed into a settling pond. At that point the PCB's, which were heavy, would settle."

[M25646, "Deposition of Witness, William B. Papageorge," August 11, 1987.]

Note: This was not true for the situation in Anniston Plant prior to 1969.

Doc ID # 2314 Exhibit #

768.

11/87

Toxicological Profile Data for Selected PCBs (Aroclor-1260, -1254, -1248, -1242, -1232, -1221, and -1016) were published in November 1987 by Oak Ridge National Laboratory under DOE Interagency Agreement No. 1452-1425-A1.

[MONS 224852, "Toxicological Profile for Selected PCBs (Aroclor)," November 1987.]

Doc ID # 10879 Exhibit #

769.

04/15/88

Letter from Denner, Plant Manager of Anniston Plant to Mr. Donald Siegelman, Attorney General, State of Alabama:

"In January 1985, the Attorney General brought to Monsanto's attention a matter of polychlorinated biphenyls (PCB's) in the sediments of Snow Creek, downstream of Monsanto's Anniston, Alabama site. In February 1985, representatives of Monsanto met

with members of the Attorney General's staff to discuss the findings and plan a course of action."

[M00398, "Letter from David K. Denner, Plant Manager of Anniston Plant, Alabama to Mr. Donald Siegelman, Attorney General, State of Alabama," April 15, 1988]

Doc ID # 1118 Exhibit #

770.
08/10/88

Deposition of William B. Papageorge Taken on Behalf of the Plaintiff, August 10 and 11, 1988.

[M 47237- , "Deposition of William B. Papageorge," August 10 and 11, 1988.]

Doc ID # 3814 Exhibit #

771.
1989

Monsanto reinstalled an asphalt cap over the former Aroclor manufacturing area inside the plant.

"Q: In 1989 Monsanto allocated \$60,000 for construction to be done at the Anniston plant to put an asphalt cap over the section of the plant where PCBs were manufactured, right?

A: Yes."

[p. 105-6, "Deposition of Robert L. Cheever, Taken on Behalf of the Plaintiff," in the 30th Judicial Circuit Court for St. Clair County, Alabama, Pell City Division, September 3, 1998.]

772.
1989-90

Monsanto dredged PCBs contaminated sediments out of a portion of Snow Creek, and sent them to a hazardous waste landfill. The contractors working on the Monsanto's Snow Creek project were instructed to throw their clothes away after they came in contact with the soil.

"Q: The document in the Hinds case that we've talked about in the past that describes some of the area of your testimony says that you were responsible for a remediation of Snow Creek which was completed in 1989 through 1990. Is that the attorney-general issue that you've just discussed with me?

A: Yes. I was not responsible for the project.

Q: What did Monsanto do as far as remediating Snow Creek, if anything?

A: My recollection is that they -- we conducted a sampling survey to try to delineate, to the best of our ability, the areal extent, potential contamination or known contamination that we could measure, and then it was dredged. The material that was removed was stockpiled on-site and then disposed of in accordance to waste regulations at the time." [pp. 49-50, September 3, 1998.]

"Q: Monsanto would have never dredged any sediment out of Snow Creek if it didn't find any PCBs, would it have? Isn't that common sense?

A: I believe that's correct." [p.50, September 3, 1998.]

"Q: Monsanto voluntarily agreed to cooperate with the State of Alabama and dredge sediment out of a portion of Snow Creek, correct?

A: That's correct.

Q: And the reason Monsanto did that is because PCBs were present in the silt sediment, correct?

A: That's correct." [p.51, September 3, 1998.]

"Q: But when the contractors went out on Snow Creek in the Monsanto remediation project to remove PCBs from Snow Creek, they were instructed to throw their clothes away after they came in contact with the soil, weren't they?"

"THE WITNESS: I don't know that the -- I'm not aware of the procedures that were used in the cleanup of that remediation of Snow Creek.

Q: But it wouldn't surprise you to know that they threw their clothes in a solid waste landfill when they were through or when they came into contact?

A: No, it doesn't surprise me at all.

Q: Okay. And that's because of the potential hazardous human effects of PCB exposure, isn't it?"

"THE WITNESS: It's good industrial hygiene practice."
[pp.53-54, September 3, 1998.]

"Q: Did Monsanto, in this snow Creek remediation, take the soils to a place called a "mill," a landfill called a "mill," in Alabama, are you aware of that?

A: I believe they were.

Q: And a mill is a hazardous waste landfill, isn't it?

A: That's correct." [p. 56, September 3, 1998.]

[p. 49-56, "Deposition of Robert L. Cheever, Taken on Behalf of the Plaintiff," In the 30th Judicial Circuit Court for St. Clair County, Alabama, Pell City Division, September 3, 1998.]

773.
08/90

Guidance on Remedial Actions for Superfund Sites with PCB Contamination: The recommended PCB Action Level for residential area is 1 ppm.

"A summary of the guidelines discussed in this section is presented in Table 3-1.

TABLE 3-1

Recommended Soil Action Levels – Analytical Starting Points
(Considers ingestion, inhalation, and dermal contact only)

<u>Land Use</u>	<u>PCB Action Levels (ppm)</u>
Residential	1 ppm
Industrial	10 – 25 ppm"

[M 39297, " Guidance on Remedial Actions For Superfund Sites With PCB Contamination," Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, August 1990.]

Doc ID # 5406 Exhibit # P-0822

774.

11/03/92

Deposition Exhibit #1073: Listing of Toxicity and Related Studies of Polychlorinated Biphenyls.

"HARVARD SCHOOL OF PUBLIC HEALTH

1. Experiments to determine the possible toxicity of the following substances:

-- chlorinated diphenyl #1268
mixture of chlorinated diphenyl and
chlorinated diphenyl benzene #5460
Dated September 15, 1938

THE BARNARD FREE SKIN AND CANCER HOSPITAL
St. Louis, Missouri

2. Project W-31 Aroclor (1254) report on Patch Testing, dated December 22, 1949.

THE KETTERING LABORATORY
Cincinnati, Ohio

1. The Toxicity of the Fogs Formed by Dropping Pydraul F-9, Aroclor 1248, and Tricresyl Phosphate, Upon the Surface of a Heated Inconel – dated March 11, 1953.
3. The Toxicity of the vapor of Aroclor 1242 and of Aroclor 1254, dated June 28, 1955.

SCIENTIFIC ASSOCIATES
St. Louis, Missouri

1. The Acute Oral Toxicity (LD₅₀) of Aroclor 1254 for Rats, dated November 10, 1953.
2. The Acute Oral Toxicity (LD₅₀) of Aroclor 1242 for Rats, dated December 11, 1953.

INDUSTRIAL BIO-TEST LABORATORIES, INC.
Northbrook, Illinois

- 1. Subacute Dermal Toxicity of Aroclor 1221, March 28, 1963.
- 2. Acute Toxicity Studies With Aroclor 122, Aroclor 5442, and MCS 1016, March 25, 1971. IBT No. A9378.

- 3. Toxicity, Mutagenic, Teratogenic, Reproduction, and Residue Studies As To Various Aroclors in Rats, Chickens, Mice and Dogs – November 17, 1971.
- 4. Ninety-Day Subacute Oral Toxicity Study With Aroclor 1221 in Beagle Dogs, December 30, 1971. IBT No. C9885.
- 5. Four-Day Static Fish Toxicity Studies With Aroclor 1221, Aroclor 5432, Aroclor 5442, Aroclor 5460, and MCS 1016 In Bluegills and Channel Catfish, January 12, 1972. IBT No. A9380.
- 6. 90-Day Subacute Oral Toxicity Study With Aroclor 1221 In Albino Rats, April 28, 1972. IBT No. B9888.
- 7. Toxicity, Reproduction and Residue Study With Aroclor 1221 In White Leghorn Chickens, June 20, 1972. IBT No. J900.

BIOLOGICAL CONSULTANTSNew Orleans, La.

- 1. Interim Report – Fish Residue Analyses dated August 15, 1971.
- 2. Report covering December 1970, March 1971, June 1971 and September, 1971 – Fish Residue Data – dated June 9, 1972.
- 3. Final Progress Report, Residue Data, November 1970 to November, 1972 via letter dated February 27, 1973.

YOUNGER LABORATORIESSt. Louis, Missouri

1. Toxicological Investigation of OS-95 dated February 22, 1958.
2. Toxicological Investigation of OS-95 dated October 20, 1958.
3. The Toxicity of the Thermal Decomposition Products of OS-95, dated December 8, 1958.
4. Oral Toxicity (LD₅₀) Rats and Skin Absorption (MLD) Rabbits – Various Aroclors, dated June 25, 1962.
- 5. Toxicological Investigation Of: Aroclor 1221 dated June 13, 1962. Monsanto Project No. Y-62-41. Oral LD₅₀ (rats) and Skin Absorption MLD (Rabbits).
- 6. Toxicological Investigation of: MCS 1109-Lot KA 801 dated October 27, 1971." [M 41128]

Doc ID # 3500**Exhibit #**

"MONSANTO INDUSTRIAL CHEMICALS COMPANY
Applied Sciences Section
St. Louis, Missouri

- 1. Determination of Polychlorinated Biphenyl Residues in Albino Rats from a two-year Chronic Oral Toxicity Study dated October, 1971 -- W. M. Mees, E. S. Tucker, W. J. Litschgi. Special Study 71-7, Job #1348006.
- 2. Determination of Polychlorinated Biphenyl Residues in Beagle Dog Tissues from a Two-Year Oral Chronic Toxicity Study, dated December, 1972."
- "3. Determination of Polychlorinated Biphenyl Residues in White Leghorn Chickens from a Toxicity, Reproduction and Residue Study with Aroclor 1242, Aroclor 1254, and Aroclor 1260, dated March, 1973."

[M 41126-29, "Listing of Toxicity and Related Studies of Polychlorinated Biphenyls," from "Deposition Exhibit #1073," November 3, 1992.]

Doc ID # 3500 Exhibit #

775.
1993

Alabama Power Company found PCBs on its property, which was the former landfill site of Monsanto, and started to negotiate with Monsanto.

"A: 1993, excuse me."

"A: What I remember is that Alabama Power contacted Monsanto, and told us that they had found some material leaching on their property, and that that was, that's what started a conversation about that property." [p.151, June 30, 1999]

"Q: Still bottoms, waste from production?"

"A: At a later time, when we had more specific analysis, yes, I think that's how, I think that was the conclusion."

[p.151-6, "Deposition of Bill Defer, Plant manager for what is now Solutia in Anniston (1991-1994), taken in the Law Suit of Swift," June 30, 1999.]

776.

04/23/93

Monsanto confirmed from the its tests that what leaching from the Alabama Power property, the former Monsanto landfill site, were PCB still bottoms.

"Q: Take a look at the first page. It says PCB still bottoms, Santotar, Slag, parathion one year. What does that mean?"

"A: Well, that's a list of products." [p.223, June 30, 1999.]

"Q: Well, confirmed as PCB still bottoms on April 23rd, you all did the confirmation, didn't you?"

"A: Yes, I think I indicated earlier that we did."

[p.223-224, "Deposition of Bill Defer, Plant manager for what is now Solutia in Anniston, 1991-1994, taken in the Law Suit of Swift," June 30, 1999.]

777.

Late 1993

The reacquisition of the landfill (West End) from Alabama Power by Monsanto was finalized in late 1993 due to the discovery of PCBs on the landfill.

"Q: What did he tell you about the reacquisition of the landfill from Alabama Power?"

"A: ...I think it was finalized in late 1993."

[p.14-15, "Deposition of Jack Mayausky, Plant manager at Anniston Plant; corporate representative re public/press relations re pollution, taken in the Law Suit of Wilson," November 22, 1995.]

778.

Late 1993

(?)

Monsanto made a agreement with Alabama Power Company, and requested it keep information as confidential.

"Deposition Exhibit No. 11 was marked for identification." [p.248, Exhibit #11, June 30, 1999.]

"Q: Yes. Would you read that for the record?"

"Grantor, therefore, agrees not to reveal information the Grantee identifies as confidential, preliminary or settlement information to persons outside the Grantor, its attorneys and/or consultant when so requested by Grantee."

"In this agreement, Alabama Power Company is the Grantor, are they not?"

"A: I think so, yes."

"Q: And Monsanto is the Grantee?"

"A: Yes."

[p.248-9, Exhibit #11, "Deposition of Bill Defer, Plant manager for what is now Solutia in Anniston (1991-1994), taken in the Law Suit of Swift," June 30, 1999.]

779.
11/15/93

Monsanto was named in the first of a number of lawsuits "in which plaintiffs claim to have sustained personal injuries or property damage as a result of the discharge of hazardous substances, including polychlorinated biphenyls ("PCBs"), from its Anniston, Alabama plant site."

[DSW 065172, "Form 10-K, Securities and Exchange Commission, Monsanto Company," 1996.]

Doc ID # 24424 Exhibit #

780.
1994

Around 1994, high PCB's concentrations up to 200,000 parts per million was found in the sediment from the Mars Hill property.

"Q: Why did you decide to go ahead and remove the sediment from the Mars Hill property?"

"A: Because we found a particularly high level in one spot. We felt like we needed to take immediate action on it."

"Q: What was the high level?"

"A: It ranged from 200,000 parts per million to 60,000 parts million on the low end."

[p.66-67, "Deposition of Jack Mayausky, Plant manager at Anniston Plant; corporate representative re public/press relations re pollution, taken in the Law Suit of Wilson," November 22, 1995.]

781.
1994

Monsanto found PCB's in the stormwater run off from its West End Landfill area.

"Q: Over the past year or so..." "The sentence that says, 'In the course of our information-gathering, we unexpectedly discovered trace levels of polychlorinated biphenyls in stormwater in ditches on our property.' Did I read that correctly?"

"A: Yes, sir."

[p.244, "Deposition of Jack Mayausky, Plant manager at Anniston Plant; corporate representative re public/press relations re pollution, taken in the Law Suit of Wilson," and DSW 040173, Plaintiff's Exhibit, #7, November 22, 1995.]

782.
03/18/94

West End Landfill of Anniston: "On April 7, 1993 Alabama Power Company employees discovered a hardened tar-like material which had apparently seeped from an exposed hillside", which was later confirmed to be PCB's. "Initial screening tests indicate that the material contains at least 3% PCBs."

"Under authority of the Comprehensive Environmental Response, compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA) and a cooperative agreement between the U.S. Environmental Protection Agency and the Alabama Department of Environmental Management (ADEM), a preliminary Assessment (PA) was conducted at the West End Landfill in Anniston Calhoun County, Alabama. The purpose of this investigation was to collect information concerning conditions at the West End Landfill site sufficient to assess the threat posed to human health and the environment and to determine the need for additional investigation under CERCLA/SARA or other action. The scope of the investigation included review of available file information, a comprehensive target survey and an onsite reconnaissance."
[M21823]

Doc ID # 3061 Exhibit #

"On April 7, 1993 Alabama Power Company employees discovered a hardened tar-like material which had apparently seeped from an exposed hillside and certain carbon electrodes commonly associated with chemical manufacturing. The Company began immediately to investigate and assess the site. Preliminary

analysis of samples of the material revealed significant concentrations of Polychlorinated Biphenyls (PCBs). Initial screening tests indicate that the material contains at least 3% PCBs. The contamination at the site is not consistent with the location and operation of the electrical substation. According to Monsanto, the southern half of the substation property was used as a landfill prior to Alabama Power Company's ownership in 1961(Attachment C).

The types of waste sources at the site are a pile of approximately 300 square feet of PCB contaminated material removed from a drainage flume, the landfill of approximately 13.3 acres, and approximately 20 acres of contaminated soil on site. The actual amount of disposal at the site is unknown."

[M21824]

Doc ID # 3061 Exhibit #

"4.3 Surface Water Conclusions

A release of PCB's to surface water has been demonstrated. The Special Studies Section of the Alabama Department of Environmental Management conducted a fish tissue study for Choccolocco Creek and its tributaries. These studies took place in the Fall and Winter of 1993 respectively. The results are as follows:

Tissue from 18 of the 19 fish collected exceeded the FDA action limit for total PCB's with concentrations ranging from 2.1 to 38.4 ppm. Four fish exceeded the FDA action limit of 1.0 ppm for Mercury. Fourteen additional fish were found to have detectable concentrations of mercury ranging from 0.25 to 0.91 ppm."

[M21827]

Doc ID # 3061 Exhibit #

[M21823-24, M21827, "West End Landfill, Prepared by: Jerry Cheatwood, Special Projects, Site Assessment Unit," March 18, 1994.]

Doc ID # 3061 Exhibit #

783.
~94-95

PCBs were still found from the storm water run-off close to the plant area in nearly 25 years later after the Anniston plant stopped the production of PCBs.

"Q: I'm going to refer you back to Plaintiff's Exhibit 9..." [p.71-72, December 11, 1995.]

"Q: In paragraph 2 you said that in cooperation with ADEM, you've been conducting sampling programs in the area east of the plant. Did ADEM tell y'all to do this testing?"

"A: ADEM asked us to sample the stormwaters. Based on that finding in stormwater, we moved to sample the sediment."

"Q: In that same paragraph, it says towards the bottom that PCB's have not been made at the Anniston plant in nearly 25 years, so the source of the trace levels of PCB's detected in the stormwater was not apparent."

"A: Yes."

"Q: Do you understand now where it's coming from?"

"A: Not entirely. We found it in the sediment but we still don't understand entirely where it's coming from."
[pp.74-76, Volume 2, December 11, 1995.]

"Q: Have PCB's been detected in the stormwater runoff from that landfill?" (Note: the south landfill.)

"Mr. PECK: The south landfill again?"

"Q: (By Mr. Howard) Yes."

"A: Yes, they have been." [pp.103-104, December 11, 1995]

[pp.71-72, pp.74-76, pp.103-104, "Deposition of Jack Mayausky, Plant manager at Anniston Plant; corporate representative re public/press relations re pollution, taken in the Lawsuit of Wilson," Volume 2, December 11, 1995.]

Note: The actual sampling date will be determined by searching for Exhibit #9 of this Deposition.

784.

Early 1995 High PCBs concentrations were detected on the Monsanto property east of Clydesdale in early 1995 (drainage and south landfill). PCBs concentrations in soils ranged from ND to 203,000 ppm.

"Per your request during our meeting on March 17, 1995, I am forwarding the latest data that we have from the investigation of our property east of Clydesdale. We have been doing field screening of the surficial soils along the drainage from the south landfill and have sent samples to Savannah Labs for confirmatory analysis. Samples were taken from the center of the drainage ditch (designate as C) and at 25 and 50 feet points (designated as R25 or L25) on both sides. The first number in the sample identification indicates the distance down the ditch moving north from Highway 202. The results of this screening are below:

10C	1340 ppm	600C	1510 ppm (3800 ppm)
10L25	ND	600L25	9.6 ppm
10L50	45.6 ppm	600L50	1.4 ppm
10R25	45.6 ppm	600R25	7.7 ppm
10R50	51 ppm (72 ppm)	600R50	ND
197C	ND	805C	1990 ppm
197L25	21.8 ppm (38 ppm)	805L25	ND
197L50	134 ppm	805L50	ND
197R25	ND	805R25	ND
197R50	2.3 ppm	805R50	ND
400C**	203000 ppm	1000C	3130 ppm
400L25	1190 ppm	1000L25	262 ppm
400L50	22.2 ppm	1000L50	7 ppm
400R25	63 ppm	1000R25	30.6 ppm
400R50	37 ppm	1000R50	46 ppm

** = Resampled on 3/15/95 and results not yet received."

[DSW 024474-75, "Letter from J. S. Mayausky, Plant Manager to Mr. Poole, Chief of Land Division, ADEM," March 20, 1995.]

Notes:

- 1) Sample showing 203,000 ppm PCBs concentration was resampled on 3/15/95 and results not yet received according to the Letter referred; and
- 2) The exact sampling date will be searched based on the laboratory records or other sources.

Doc ID # 21893 Exhibit # P-0827

785.
03/15/95

Deposition of Gerald Miller, Laboratory chemist for Monsanto; production supervisor for aroclor department; discharges of PCBs

from plant, taken in the Law Suit of Sewell. Miller admitted that "I did observe globules in the discharge from the plant."

"Q. (By Mr. Davis) Describe for me, in as much detail as you can, how PCB's were getting into the plant discharge.

A. Two sources of discharge come to mind from the production facility. The off-gas from the aroclor production facility was hydrogen chloride gas which was subsequently scrubbed down with water to produce muriatic acid. This hydrogen chloride off-gas contained vapors of PCB which were subsequently scrubbed down with water, and to some extent discharged through the plant effluent."

"Q: You scrubbed it down with water. Describe for me how the water gets from there to the creek.

A: The resultant muriatic acid was either placed in storage and subsequently sold. But as memory serves me, in many instances the production of muriatic acid exceeded market demand, therefore some portion of it was sewered. This material was routed through the sewer system to the area of the plant known as the limestone pit or the neutralization pit where the muriatic acid was subsequently neutralized, solids collected, and discharged to the plant outfall.

Q: When you say the production exceeded demand, was that routinely, or on one particular occasion, or what are you talking about?

A: Suffice it to say I can only say that frequently that situation occurred."

[M 39225-226]

Doc ID # 5401 Exhibit #

"Q. I thought you had already. Tell me the next source then. The first source is some of it got sewered because there was excess supply of the muriatic acid?

A. Correct.

Q. And it contained some PCB's?

A. Correct.

Q: What's the second source?

A. The second source would be still jets and plant wash-up or cleanup.

Q: Describe it for me.

A. Well, plant wash-up and cleanup is routine housekeeping chores. Certainly there had been spills on the floor of production areas. Those were washed up, cleaned up, and subsequently discharged into the sewer. Still jets obviously contained some degree of PCB vapor."

[M 39227-28]

Doc ID # 5401 Exhibit #

"Q. So at least in substance, when you washed down the inside of a building that produced PCB's, the contaminated water would go into floor drains and into the sewer system?

A. Not a sanitary sewer system like you're talking about. A plant sewer system.

Q. Pipes under the ground under the plant?

A. Correct.

Q. And those pipes would eventually result in the water from those pipes going into Snow Creek?

A. I don't know that for a fact. I presume that."

[M 39229]

Doc ID # 5401 Exhibit #

"Q. The plant had been there since the 1930's, right?

A. That's my understanding, yes.

Q. And so do you know of any prior occasion that anybody had gone down to talk to the state of Alabama about PCB's being released?

A. Not to my knowledge."

[M 39231, March 15, 1995]

Doc ID # 5401 Exhibit #

"Q: ... The reason I was going to ask you that is you had said earlier that you could look at the discharges and see PCB's in it, and I was curious as to whether you also observed globules of PCB's in Snow Creek?

A. I don't specifically remember having been on Snow Creek and observing globules. I did observe globules in the discharge from the plant."

[M 39238]

Doc ID # 5401 Exhibit #

[M 39224-229, 39231, 39238, "The Deposition of Gerald Miller," Gordon And Ritta Sewell, d/b/a/ Sewell's Fish Market, Plaintiff, vs. Monsanto Company, Defendant; Case Number: CV-94-AR-778-E, in the United States District Court for the Northern District of Alabama Eastern Division, March 15, 1995.]

Doc ID # 5401 Exhibit #

786.

04/12/95

Deposition of Robert Jones, Monsanto's Environmental Supervisor at Anniston Plant, taken in the Law Suit of Wilson.

787.

07/07/95

Comments from Renate D. Kimbrough on 'Preliminary Risk Assessment for Monsanto Chemical Company in Anniston, Alabama'.

"Review by Renate D. Kimbrough, M.D. of a document entitled: 'Preliminary Risk Assessment for Monsanto Chemical Company in Anniston, Alabama'."

[M20931]

Doc ID # Exhibit #

"Recommendation:

It is recommended that prior to any attempts at a risk assessment a better understanding of present pathways of exposure be developed. Any PCB measurement results should be validated as to their accuracy and only current measurement results should be utilized for any future risk assessments."

[M20931-33, "Comments from Renate D. Kimbrough, M.D., D.A.B.T", July 7, 1995.]

Doc ID # Exhibit #

788.

10/05/95

Monsanto's property purchase program was officially kicked off in its Alabama Anniston Plant neighborhood.

"Q: The program began on October 2nd, 1995. That's the buy-out program, is that right?"

"A: I think the community meetings were on Thursday of that week, whatever date that was. That's when it was officially kicked off."

"Q: Why is Monsanto offering this program?"

"A: Monsanto is working with the Alabama Department of Environment Management to develop a plan to manage the PCBs found on our property and in some adjacent areas. In order to implement the management program we would like to own the properties in the program area." [DSW 040138]

Doc ID # 22707 Exhibit #

[p.222, "Deposition of Jack Mayausky, Plant manager at Anniston Plant; corporate representative re public/press relations re pollution, taken in the Law Suit of Wilson;" DSW 040173, Plaintiff's Exhibit, #7; and Plaintiff's Exhibit, DSW 040138, November 22, 1995.]

Doc ID # 22707 Exhibit #

789.

Oct. 1995

PCB's were still found in the Anniston Plant Outfalls in October 1995 sampling after heavy rain. By that time, the production of PCBs has been stopped for almost 24 years.

"Q: when is the last time you had your outfalls tested for the presence of PCB's, if you know?"

"A: There was a sampling done in October '95 that I am aware of. I believe it was a significant rain event."

"Q: Do you know if those readings showed the presence of PCB's?"

"A: Yes, they did."

[p.184, "Deposition of Jack Mayausky, Plant manager at Anniston Plant; corporate representative re public/press relations re pollution, taken in the Lawsuit of Wilson," Volume 2, December 11, 1995.]

790.
11/22/95

Deposition of Jack Mayausky, Plant manager at Anniston Plant; corporate representative re public/press relations re pollution, taken in the Law Suit of Wilson.

791.
12/11/95

Deposition of Jack Mayausky, Plant manager at Anniston Plant; corporate representative re public/press relations re pollution, taken in the Law Suit of Wilson.

792.
1996

Alabama Department of Public Health published: "Health Consultation for the Monsanto Company Site, Anniston, Calhoun County, Alabama."

[p.37, U.S. Department of Health and Human Services, Public Human Services, Agency for Toxic Substances and Disease Registry: "Public Comment Release of Health Consultation -- Evaluation of Soil, Blood & Air Data from Anniston, Alabama," CERCLIS No. ALD004019048, February 14, 2000.]

Note: NO Bate Number available.

793.
1996

Alabama Department of Public Health published: "Cobbtown/ Sweet Valley Community PCB Exposure Investigation for the Monsanto Company Site, Anniston, Calhoun County, Alabama."

[p.37, U.S. Department of Health and Human Services, Public Human Services, Agency for Toxic Substances and Disease Registry: "Public Comment Release of Health Consultation -- Evaluation of Soil, Blood & Air Data from Anniston, Alabama," CERCLIS No. ALD004019048, February 14, 2000.]

Note: No Bate Number available.

794.
1996

Alabama Department of Public Health (ADPH) published: "Health Consultation for the Monsanto Company Site, Anniston, Calhoun County, Alabama".

[p.39, U.S. Department of Health and Human Services, Public Human Services, Agency for Toxic Substances and Disease Registry: "Public Comment Release of Health Consultation -- Evaluation of Soil, Blood & Air Data from Anniston, Alabama," CERCLIS No. ALD004019048, February 14, 2000.]

Note: **No Bate Number available.**

795.
1996

Consent Order No. 96-054-CHW from ADEM to Monsanto: "That in order to minimize the risk of exposure to PCBs of people living in contaminated areas around the East Drainage Ditch, Monsanto shall undertake the following measures: ... "

"In 1935, Monsanto purchased Swann Chemical Company as its new Phosphate Division. In 1954, the Phosphate Division became the Inorganic Division with headquarters in St. Louis, Missouri. In the early 1970's, the site was transferred to the Agricultural Products Company, now called Monsanto Company, which has since maintained control."
[M21985]

Doc ID # 3069 Exhibit #

"ORDER

Based upon the foregoing FINDINGS and pursuant to §§ 22-22A-5(10), 22-22A-5(12), 22-22A-5(18), and 22-30-19, Code of Alabama 1975, as amended, and with the consent of Monsanto it is hereby ORDERED:

- A. That in order to minimize the risk of exposure to PCBs of people living in contaminated areas around the East Drainage Ditch, Monsanto shall undertake the following measures:
 - (1) Within (7) days of issuance of this Order, Monsanto shall begin efforts to relocate all residents located in dwellings that were sampled for PCB dust levels as found in Attachment I.
 - (2) Within twenty-one (21) days of this Order, Monsanto shall certify to the Department the completion of relocation efforts.
 - (3) Relocations required by Paragraphs A.(1) and A.(2) shall be required until such time as it is satisfactorily

demonstrated that the risk of exposure at a given location (e.g., house and property) has been satisfactorily mitigated.

- (4) It shall not be a violation of this Order if a resident refuses to be relocated at all, or refuses to be relocated within the timeframes set out in Paragraph A.(2).
 - (5) Monsanto shall offer to attempt to mitigate exposure for those residents who refuse to be relocated or who delay relocation pursuant to Paragraph A.(4).
 - (6) Monsanto shall offer weekly dust removal services to the Bethel Missionary Baptist Church, located at 801 Boynton Avenue, and to the Mars Hill Missionary Baptist Church, located at 1508 W. 6th Street, both located in Anniston, AL.
- B. That in order to address potential PCB contamination in areas A, B, C and D, as identified in Attachment II, Monsanto shall undertake the following measures: ...
- C. That in order to address other off-site areas to the west of the West End Landfill, to the north of the facility, and to the east of the facility that may have the potential for PCB contamination, Monsanto shall undertake the following measures: ...

[M21986-87]

Doc ID # 3069 Exhibit #

[M21984-7, "Alabama Department of Environmental Management, Consent Order No. 96-054-CHW, In The Matter Of: Monsanto Company Anniston, Calhoun County, Alabama, 1996.]

Doc ID # 3069 Exhibit #

796.
1996

Form 10-K, Securities and Exchange Commission, Monsanto Company, 1996: Monsanto Company was named in a number of lawsuits. Among them, one "notice seeks statutory penalties of \$25,000 per day for a period of more than 5 years, for a total of \$45,625,000."

"On November 15, 1993, the Company was named in the first of a number of lawsuits in which plaintiffs claim to have sustained personal injuries or property damage as a result of the discharge of hazardous substances, including polychlorinated biphenyls ("PCBs"), from its Anniston, Alabama plant site. The following matters are currently pending: (a) The Company is a defendant in a case pending in Circuit Court in St. Clair County, Alabama which has been certified as a class action on behalf of all property owners in a specified area along waterways near the plant. Plaintiffs claim loss in the value of their property and seek compensatory and punitive damages in an unspecified amount. (b) The Company is a defendant in eight additional cases brought in Circuit Court in Calhoun County, Circuit Court in St. Clair County, Circuit Court in Taladega County or in U.S. District Court in the Northern District of Alabama on behalf of 1,641 individual plaintiffs who own or rent homes or own or operate businesses along waterways near the plant or who attend churches near the plant. One of the cases pending in U.S. District Court seeks certification of a plaintiff class. An additional case has been filed in Circuit Court in Calhoun County by one of the churches near the plant. The individual plaintiffs claim to have suffered various personal injuries and fear future disease; they assert the need for medical monitoring and claim to have suffered loss in the value of their property or commercial injury. They seek compensatory and punitive damages of \$3 million or in unspecified amounts for each individual, and \$20 million for the church. (c) The Company has also received notice of a potential Citizen Suit pursuant to Resource Conservation and Recovery Act Section 7002(a) (1) (B) on behalf of four individuals who are plaintiffs in one of the suits pending in Circuit Court in Calhoun County. The notice claims that hazardous substances, including PCBs, have been released from the Anniston plant and pose an imminent threat to health and the environment. The notice seeks statutory penalties of \$25,000 per day for a period of more than 5 years, for a total of \$45,625,000. The Company believes that it has meritorious defenses to all of these matters, including lack of proximate cause of any physical injury or property damage, lack of imminent threat to health or the environment and lack of negligence or other improper conduct. The Company is vigorously defending these actions."

[DSW 065172]

Doc ID # 24424 Exhibit #

[DSW 065172, "Form 10-K, Securities and Exchange Commission, Monsanto Company", 1996.]

Doc ID # 24424 Exhibit #

797.

01/17/96

"On January 17, 1996, the Alabama Department of Public Health (ADPH) issued a Health Consultation for the Monsanto Company plant in Anniston, Alabama."

[M20920, "Monsanto Company Comments on: 'Health Consultation, Monsanto Company, Anniston, Calhoun County, Alabama', CERCLIS NO. ALD004019048, prepared by Alabama Department of Public Health", 1996.]

Doc ID # Exhibit #

798.

02/20/96

Deposition of James Olson, SUNY toxicologist, taken in the Law Suit of Wilson.

799.

March 96

Mars Hill Missionary Baptist Church in March 1996 sued Monsanto and alleged that PCBs from the Anniston Plant had contaminated the Church's property, causing a loss of value in the property.

["Exhibit #3, Deposition of Kevin Cahill, Manager of public affairs at St. Louis; Monsanto Fund board member, taken in the Law Suit of Swift," May 19, 1999.]

800.

03/18/96

Monsanto started its "Property Purchase Program" for the 600, 700, 800 and 900 blocks of Montrose Avenue in Anniston.

[M 39266, "Monsanto Property Purchase Program", March 18, 1996.]

Doc ID # 5404 Exhibit #

801.

04/05/96

U. S. EPA, "Memorandum":

"Releases from SWMUs and AOCs have contaminated surface water at concentrations above relevant action levels. The Monsanto facility manufactured PCBs from the mid 1930's until 1971 and had held a permit to discharge its process wastewater from the operation to Snow Creek. In addition, PCB contaminated materials were disposed of in the onsite landfills. In the early 1970's fish tissue samples collected from Choccolocco Creek, downstream of

the confluence with Snow Creek, indicated elevated PCB concentrations. Sediment sampling conducted by Monsanto and ADEM in the mid 1980's found elevated PCB concentrations in Snow Creek sediments downstream from the former plant discharge point." [M01997, U. S. EPA, "Memorandum," April 5, 1996.]

Doc ID # 1170 Exhibit #

"Soils at the facility and in residential areas adjacent to the facility are contaminated with PCBs at concentrations above the action level of 1.0 ppm. As part of the Health Consultation, surficial soil sampling was conducted in the yards of the residences surrounding the facility. PCBs were detected in the soils of residences on the east side of the facility at concentrations ranging from 0.51 ppm to 496 ppm with an average concentration of 33.48 ppm. Residences on the west side of the facility exhibited lower concentrations of PCBs, with concentrations ranging from 1.2 ppm to 19 ppm with an average concentration of 5.26 ppm." [M01998-99, 04/05/1996]

Doc ID # 1170 Exhibit #

"Based on the above discussion, human exposures to contaminated soil are not controlled and control measure are necessary at this time." [M01999, 04/05/1996]

Doc ID # 1170 Exhibit #

"Releases to air from soil and sediments contaminated by SWMUs and AOCs at the facility is occurring. Dust samples were taken from 31 houses and two churches in the neighborhood on the east side of the facility as part of the Health Consultation. PCBs were detected at concentrations ranging from 0.45 ppm to 192 ppm. The average concentration was 19.17 ppm. The Alabama Department of Public Health and ATSDR state that the action level for PCBs in dust is the same as that for soils, 1.0 ppm." [M01999, 04/05/1996]

Doc ID # 1170 Exhibit #

"Based on the above discussion, human exposures to air contamination are not controlled, and controls are necessary at this time."

[M01999, U. S. EPA, "Memorandum," April 5, 1996.]

Doc ID # 1170 Exhibit #

802.

06/26/96

"Health Consultation, Cobbtown/Sweet Valley Community PCB Exposure Investigation, Anniston, Calhoun County, Alabama" was completed, which was prepared by Alabama Department of Public Health, June 26, 1996.

[M20937, Monsanto Company Comments on: "Health Consultation, Cobbtown/Sweet Valley Community PCB Exposure Investigation, Anniston, Calhoun County, Alabama," June 26, 1996.]

Doc ID # 3082 Exhibit #

Also See: DSW 045140

Doc ID # 22767 Exhibit #

803.

07/15/96

Affidavit of T. Randolph Gray: "Monsanto was negligent and reckless, and failed to comply with industry and public health standards, in polluting the environment with PCBs during the time it manufactured PCBs in Anniston, and thereafter in allowing PCBs to continue to be discharged."

"Affidavit of T. Randolph Gray"

"2. I am familiar with the location of the Monsanto Anniston Plant, and with the topography and geology of the area surrounding the plant. I have studied the area and the flow of water and PCB contamination from the area of the Monsanto Anniston Plant. I also have reviewed documents produced by Monsanto Anniston Plant. I also have reviewed documents produced by Monsanto and the plaintiffs. I have reviewed maps, aerial photographs and documents relating to the Monsanto site. I have taken photographs and performed dye studies of surface stream flows. In addition, I have reviewed documents produced by the State of Alabama and the United States Environmental Protection Agency. I have spoken to various residents of the area adjacent to Monsanto's Anniston Plant. Based on my experience, knowledge and the above review, I have concluded:

- a. The Monsanto plant's sewer system dumps into open ditches which lead from the plant through adjoining neighborhoods to Snow Creek.

- b. Landfills contaminated with PCBs are also on Monsanto's property. Open ditches lead from these landfills through adjoining neighborhoods to Snow Creek.
- c. Snow Creek leads from the area around the Monsanto plant, through Anniston, until it flows into Choccolocco Creek, approximately five (5) miles below the plant. Choccolocco Creek leads into Lake Logan Martin.
- d. Monsanto or activities on Monsanto property caused the PCB contamination of the area around the plant, the ditches leading from the plant property, and Snow Creek. The pollution resulted from direct discharges, rainwater runoff and airborne pollution.
- e. PCBs continue to be discharged today from Monsanto's property as a result of the PCB contaminated sewer system, landfills, and ditches.
- f. The ditches leading from Monsanto's plant and landfills regularly flood the adjoining neighborhood's yards and streets near Monsanto's property, spreading PCB-contaminated soil around the neighborhood. When the contaminated soils dry, they are further dispersed by the wind and other elements.
[M 39210]

Doc ID # 1234 Exhibit #

- g. Monsanto was negligent and reckless, and failed to comply with industry and public health standards, in polluting the environment with PCBs during the time it manufactured PCBs in Anniston, and thereafter in allowing PCBs to continue to be discharged."

[M39211]

Doc ID # 1234 Exhibit #

[M 39209-211, Affidavit of T. Randolph Gray, "Walter Owens, Clay Albright, Bobby Lewis, Jill McCullars, on behalf of themselves and others similarly situated, Plaintiffs, v. Monsanto Company, Defendant," CV 96 PT 0440 E, In the United States District Court Northern District of Alabama Eastern Division, July 15, 1996.]

Doc ID # 1234 Exhibit #

804.
1997

Solutia came into existence in 1997. "Solutia is a spun-off organization from Monsanto."

["Deposition of Robert L. Cheever, Taken on Behalf of the Plaintiff," In the 30th Judicial Circuit Court for St. Clair County, Alabama, Pell City Division," p. 6, September 3, 1998.]

805.
April 1997

RFI/CS Work Plan, "For the Anniston, Alabama Facility": The Work Plan indicates that "There are 12 storm-water outfalls currently at the Facility, designated DSN 001 and DSN 003 through DSN 013." "In the immediate area around the Facility, drainage is through ditches leading towards Snow Creek. Snow Creek eventually drains into Choccolocco Creek, which empties into Lake Logan Martin on the Coosa River."

"The model recognizes that, within the property boundaries, there have been many different industrial processes and waste disposal practices over the 80 years of the Facility's operation. Manufacturing processes have included production of para-nitrophenol, parathion and polychlorinated biphenyls (PCBs). Waste disposal practices have included two landfills, various surface impoundments and retention basins. Previous investigations at the site identified several areas which required further investigation and/or remediation. Monsanto has addressed these areas as they have been encountered, and has conducted various remedial actions over the past 17 years. All of these actions have been designed to control source areas and mitigate impacts to potential off-site receptors (AOC B)." [M08828, April 1997]

Doc ID # 22750 Exhibit #

"In the immediate area around the Facility, drainage is through ditches leading towards Snow Creek. Snow Creek eventually drains into Choccolocco Creek, which empties into Lake Logan Martin on the Coosa River." [M08844, April 1997]

Doc ID # 22750 Exhibit #

"There are 12 storm-water outfalls currently at the Facility, designated DSN 001 and DSN 003 through DSN 013 in the National Pollution Discharge Elimination System (NPDES) Permit. DSN 002 is the non-storm-water-discharge point from the Facility wastewater treatment facility (WWTF) to the City of Anniston

publicly owned treatment works (POTW). The locations of outfalls are presented on Figure 5, which shows the Facility and southern area drainage patterns and outfall discharge points. Table 4 provides a summary of outfall descriptions." [M08844, April 1997]

Doc ID # 22750 Exhibit #

"DSN 001, DSN 003, DSN 004 and DSN 005 receive storm water from the production areas. DSN 006 receives storm water from the West End Landfill. DSN 007 through DSN 011 and DSN 013 receive storm-water run-off from the South Landfill. DSN 012 receives the combined flows of DSN 001 and DSN 013."

[M08844, Golder Associates, "RFI/CS Work Plan: For the Anniston, Alabama Facility," April 1997.]

Doc ID # 22750 Exhibit #

806.

04/24/97

Monsanto made comments to the following two documents:

"Enclosed please find Monsanto Company's comments on two documents:

Health Consultation, Monsanto Company, Anniston, Calhoun County, Alabama, CERCLIS NO. ALD004019048, January, 1996.

Health Consultation, Cobbtown/Sweet Valley Community, PCB Exposure Investigation, Anniston, Calhoun County, Alabama, June 26, 1996."

[M20917, "Letter from Robert G. Kaley, II Ph.D., Director, Environmental Affairs to Mr. Brian J. Hughes, Ph.D., MPH., DABT, Environmental Toxicologist, Alabama Department of Public Health," April 24, 1997.]

Doc ID # 3030 Exhibit #

807.

06/03/97

Notice of Filing Documents in Support of Monsanto Company's Motion to Dismiss or, in the Alternative, Motion for a Stay:

"While the specific characteristics such as color, viscosity, average molecular weight, boiling point, and physical state (solid or liquid) varied among Monsanto's Aroclor products, all PCBs have very low solubilities in water. Additionally, all PCBs attach readily to and

bind strongly to particulate matter such as sediment." [M01565, June 3, 1997.]

Doc ID # Exhibit #

"Exhibits F and G show that Monsanto found PCBs at varying levels in the bottom of the drainage ditches that flow the area of the South Landfill and the Anniston plant to an area just south of Bethel Missionary Baptist Church. The drainage ditch flows underground from Bethel Missionary Baptist Church until it resurfaces north of 10th Street. These reports also show that Monsanto found areas outside of these drainage ditches where PCBs were present at various levels."

[M01569, "Notice of Filing Documents in Support of Monsanto Company's Motion to Dismiss or, in the Alternative, Motion for a Stay," Andrew Bowie, et al. vs Monsanto Company, in the United States District Court for the Northern District of Alabama Eastern Division," June 3, 1997.]

Doc ID # Exhibit #

808.
May-Dec.
1997

On May 21, June 3 and 16, July 1 and 16, August 5 and 20, September 3 and 17, October 15, November 3 and 22, December 1, 10 and 22, Dr. Hermanson conducted an air sample monitoring study at Mars Hill Site, and Carter Street Site. The PCBs concentrations in the air at the Mars Hill Site were much higher than those detected at Carter Street Site. Results and conclusions have been presented in his Expert Report.

[M. H. Hermanson, "Report of Mark H. Hermanson, Ph.D., Mars Hill Missionary Baptist Church v. Monsanto," Exhibit 3, June 5, 1998.]
Note: "Bate Numbers" are not available.

809.
11/12/97

Deposition of Alan Faust, Manager of remedial projects for Solutia, taken in the Law Suit of Massey.

810.
11/12/97

Papageorge's Exhibit dated on November 12, 1997, Management Plan Polychlorinated Biphenyl Environmental Problem: "Increasing evidence has been noted that indicates PCB in ubiquitously present in the environment and is resulting in damage to the ecological system."

"The presence of materials identified as polychlorinated biphenyl (PCB) in marine environments was first noted by Professors G. Widmark and S. Jensen of the Institute of Analytical Chemistry, Stockholm, Sweden and reported in November, 1966. Since then and with increasing frequency, other investigators have identified PCB in marine and animal life. Increasing evidence has been noted that indicates PCB is ubiquitously present in the environment and is resulting in damage to the ecological system. Monsanto is a major producer of PCB (Aroclors) worldwide and has been mentioned in many of the reports."

[M07207, Monsanto, "Management Plan Polychlorinated Biphenyl Environmental Problem," Papageorge's Exhibit No. 9 dated on November 12, 1997.]

Doc ID # 411 Exhibit #

811.
02/18-
02/19/98

Monsanto conducted "Session 1" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston, Birmingham, and Gadsden.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 1 through 8, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," April 1998 (Note: this date is estimated).]

Note: "Bate Numbers" are not available.

812.
02/19-
02/20/98

Monsanto conducted "Session 2" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston, Birmingham, and Gadsden.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 1 through 8, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," April 1998 (Note: this date is estimated).]

Note: "Bate Numbers" are not available.

813.
02/23-

02/24/98 Monsanto conducted "Session 3" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston, Birmingham, and Gadsden.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 1 through 8, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," April 1998 (Note: this date is estimated).]

Note: "Bate Numbers" are not available.

814.

02/24-

02/25/98

Monsanto conducted "Session 4" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston, Birmingham, and Gadsden.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 1 through 8, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," April 1998 (Note: this date is estimated).]

815.

03/31/98

Deposition of William B. Papageorge, Chemical engineering consultant, taken in the Law Suit of Mars Hill.

816.

04/08-

04/09/98

Monsanto conducted "Session 5" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 1 through 8, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," April 1998 (Note: this date is estimated).]

Note: "Bate Numbers" are not available.

817.

04/09-

04/10/98

Monsanto conducted "Session 6" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 1 through 8, Mars Hill Missionary Baptist Church v.

Monsanto Company: Alabama Ambient PCBs Measurement Program," April 1998 (Note: this date is estimated).]
Note: "Bate Numbers" are not available.

818.

04/14-

04/15/98

Monsanto conducted "Session 7" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston, Birmingham, and Gadsden.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 1 through 8, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," April 1998 (Note: this date is estimated).]
Note: "Bate Numbers" are not available.

819.

04/15-

04/16/98

Monsanto conducted "Session 7" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 1 through 8, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," April 1998 (Note: this date is estimated).]
Note: "Bate Numbers" are not available.

820.

04/23/98

Deposition of G. J. Levinskas, Manager of product assessment/ environ assessment in toxicology, taken in the Law Suit of Mars Hill.

821.

05/21/98

Deposition of William B. Papageorge, Chemical engineering consultant, taken in the Law Suit of Mars Hill.

822.

05/22/98

Deposition of Robert L. Cheever, Project/environmental engineer; currently environ/safety/health engineer of Queeney plant, taken in the Law Suit of Mars Hill.

823.

06/05/98

Based on his PCBs ambient air sample study conducted at Mars Hill and Carter Street Sites, and his experience in this field, Dr. Hermanson concluded: "Mars Hill showed concentrations during

December of 1997 that are 40 times the level at a non-contaminated site I sampled along Lake Michigan in December of 1991. It is more than four times the level found in Bloomington, TN in December of 1987." Dr. Hermanson's data indicated that "Most of the PCBs are in the vapor phase" instead of particulates.

"Under my direction, samples were taken in the Anniston area to measure the level of PCBs in the ambient air."

"I personally visited the site and viewed the terrain, property and structures in question. I formed the opinion then, based on my experience with monitoring the air near other PCB landfills, that the air around the church would test high for the presence of PCBs. The data has shown this to be correct. There is unquestionably a higher level of PCBs in the air around the church than is seen near uncontaminated sites."

"The data also show characteristics trends which were to be expected. Most of the PCBs are in the vapor phase as should occur for these semi-volatile substances. Concentrations are higher in warmer weather than in cooler weather. The levels in the Mars Hill samples are higher than those at the Carter Street site which is farther from the landfill and the retention basin. This is consistent with what I have seen at other sites I have studied."

"What is unusual about the results is the concentration of PCB. Mars Hill showed concentrations during December of 1997 that are 40 times the level at a non-contaminated site I sampled along Lake Michigan in December of 1991. It is more than four times the level found in Bloomington, TN in December of 1987. Bloomington had, or has, several Superfund PCB sites in the vicinity. PCB air contamination in Bloomington and the Great Lakes area are well established and considered a pathway of concern. The area around the Mars Hill church is worse."

"The remediation performed to date does not appears to have resolved this problem and is not likely to resolve same. The clay and membrane caps on landfills are designed to limit the downward migration of water through the waste cells. While they may impede it, they do not prevent the upward migration of vapors. This is called 'off-gassing'. Since I understand Monsanto has acknowledged there are millions of pounds of PCBs in the landfills, the landfills will off-gas for many years. Landfilling is not an acceptable means of disposal for large quantities of PCBs such the PCB manufacturing wastes generated by Monsanto in Anniston. This has been known for many years. High temperature

incineration is the only truly effective method to eliminate this PCB pathway."

"The primary source of the airborne PCBs at the church is the Monsanto property including the landfills, settling basin, 'remediated properties,' etc."

[M. H. Hermanson, "Report of Mark H. Hermanson, Ph.D., Mars Hill Missionary Baptist Church v. Monsanto," Exhibit 3, June 5, 1998.]

Note: "Bate Numbers" are not available.

824.

06/16/98

Letter from Carrick Mollenkamp (The Wall Street Journal) to Mr. Kevin Cahill (Director of Public Relations, Solutia Inc.): Mollenkamp raised a lot of good questions to Monsanto based on its internal Memos.

"Thank you for allowing me to meet with you this week. Among the topics I would like to discuss are documents that discuss polychlorinated biphenyls, or, PCB's. I've enclosed the documents and marked certain segments that discuss the PCB's.

Among the questions I have:

1. What is the company's assessment today of PCB's?
2. Why has the company acquired the land surrounding the Anniston plant?
3. When did Monsanto learn of the potential health hazards of PCB's?
4. In a 1/23/69 internal memo, it is noted, "with the likelihood that the attention now being focused on the presence of Aroclors in natural waters will draw attention to any Aroclor being sewerred in our production plant outfalls, we should begin to protect ourselves." Could you please explain this memo?
5. In a 5/26/69 memo, it is noted, "We can anticipate that the Feds will be looking at creek, river or lake water and mud samples below Anniston for PCB's." Did the company at his time have a concern about PCB's?
6. In a 10/26/70 memo, it is noted in reference to an AWIC official, "Crockett agreed that "any written effluent level reports would be held confidential by the technical staff and would not be available to the public." Per this memo, was this at the request of Monsanto?
7. In a 3/30/70 memo, it is noted, "When are we going to tell our customers not to use any Aroclor in any paint formulation that contacts food, feed, or water for animals or humans? I think it is

very important that this be done." Why was it important that this be done?

8. In a 2/26/87 memo, it is noted, "It should be made clear, however, that no monies have been reserved for a major site cleanup program. The basic assumption ...is that any current contamination can best be contained in one place. A requirement for removal and disposal of contaminated soil or to deal with significant changes in current regulations on idle sites would require major, undefined expenditures." In this case, why was the company trying to avoid these costs?"

[NO.384, P002-003, "Letter from Carrick Mollenkamp (The Wall Street Journal) to Mr. Kevin Cahill (Director of Public Relations, Solutia Inc.)," June 16, 1998.]

825.

06/22/98

Agreement to Settle Lawsuit by Mars Hill Missionary Baptist Church vs Monsanto reached.

"Anniston, AL -- Solutia, Inc. announced today that an agreement in principal has been reached to resolve a lawsuit brought by Mars Hill Missionary Baptist Church in March 1996. The Church is located in a neighborhood immediately east of Solutia's Anniston Plant. Solutia's predecessor, Monsanto Company, manufactured polychlorinated biphenyls (PCBs) at that plant from 1935 to 1971, and the lawsuit alleges that PCBs from the Anniston Plant have contaminated the Church's property, causing a loss of value in the property."

["Exhibit #3, Deposition of Kevin Cahill, Manager of public affairs at St. Louis; Monsanto Fund board member, taken in the Law Suit of Swift," May 19, 1999.]

826.

09/03/98

Deposition of Robert L. Cheever, Environmental Specialist at the Anniston plant (1983-90), taken in the Law Suit of Dyer.

827.

10/02/98

Monsanto Plant Location History and Neighborhood Demographic Study: The history around the Anniston Plant indicated that "A closer look at the area within about ten blocks to the east of the plant, however, shows a dramatic racial change in makeup after Swann built."

"A Health Consultation prepared in January 1996 by the Alabama Department of Public Health estimated population within one mile

of Monsanto by means of a geographic information system. According to that study, 5,926 people lived in the designated area, 56% white and 44% black.

A closer look at the area within about ten blocks to the east of the plant, however, shows a dramatic racial change in makeup after Swann built. Also, whereas black and white families lived in closer approximation in the 1910s and 1920s--even on the same blocks--a more distinct separation of races within the general area occurred over time."

[p.16, "Monsanto Plant Location History and Neighborhood Demographic Study" by Grace Hooten Gates, Ph.D., for Lightfoot, Franklin & White, L.L.C., October 2, 1998.]

828.

10/22/98

Deposition of Mike Foresman, Director of remediation management group, Solutia, taken in the Law Suit of Dyer.

829.

10/22-

10/23/98

Monsanto conducted "Session 9" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston, Birmingham, and Gadsden.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 9 through 11, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," November 1998 (Note: this date is estimated).]

Note: "Bate Numbers" are not available.

830.

10/28/98

Deposition of Michael A. Pierle, Vice president of environmental safety and health for Solutia, taken in the Law Suit of Dyer.

831.

10/29/98

Deposition of Jeffrey Felder, Director of product stewardship, Solutia.

832.

10/29-

10/30/98

Monsanto conducted "Session 10" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 9 through 11, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," November 1998 (Note: this date is estimated).]

Note: *"Bate Numbers" are not available.*

833.

11/05-

11/06/98

Monsanto conducted "Session 11" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 9 through 11, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," November 1998 (Note: this date is estimated).]

Note: *"Bate Numbers" are not available.*

834.

11/24-

11/25/98

Monsanto conducted "Session 12" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 12 through 14, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," December 1998 (Note: this date is estimated).]

Note: *"Bate Numbers" are not available.*

835.

12/12-

12/13/98

Monsanto conducted "Session 13" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 12 through 14, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," December 1998 (Note: this date is estimated).]

Note: *"Bate Numbers" are not available.*

836.

12/17-

12/18/98 Monsanto conducted "Session 14" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 12 through 14, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," December 1998 (Note: this date is estimated).]
Note: "Bate Numbers" are not available.

837.

01/07/99 | Deposition of Robert G. Kaley, II, Analytical chemist in industrial chemical division of Monsanto; in 1985 accepted position with EHS, taken in the Law Suit of Abernathy.

838.

01/14/99 | Deposition of Norman Madison, former lab technician for Monsanto, taken in the Law Suit of Abernathy.

839.

01/15/99 | Deposition of Gene Arnett, Retired lab technician and lab supervisor, taken in the Law Suit of Abernathy.

840.

01/20/99 | Deposition of Donald Curry, Chemical operator for Monsanto, taken in the Law Suit of Abernathy.

841.

01/30-

01/31/99 Monsanto conducted "Session 16" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Session 16, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," February 1999 (Note: this date is estimated).]
Note: "Bate Numbers" are not available.

842.

02/20-

02/21/99 Monsanto conducted "Session 17" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Session 17, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," February 1999 (Note: this date is estimated).]

Note: "Bate Numbers" are not available.

843.
02/27-
02/28/99

Monsanto conducted "Session 18" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Session 18, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," March 1999 (Note: this date is estimated).]

Note: "Bate Numbers" are not available.

844.
03/04/99

Deposition of Mike Foresman, Former Monsanto maintenance/environmental engineer, production super., environ manager of chemical intermediates division; project manager on regional wastewater treatment plant; currently environ/safety/health team leader at Solutia, taken in the Law Suit of Abernathy.

845.
03/20-
03/21/99

Monsanto conducted "Session 19" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Session 19, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," March 1999 (Note: this date is estimated).]

Note: "Bate Numbers" are not available.

846.
03/24-
03/25/99

Monsanto conducted "Session 20" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Session 20, Mars Hill Missionary Baptist Church v. Monsanto

Company: Alabama Ambient PCBs Measurement Program," April 1999 (Note: this date is estimated).]

Note: *"Bate Numbers" are not available.*

847.

04/23-

04/24/99

Monsanto conducted "Session 21" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 21 and 22, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," May 1999 (Note: this date is estimated).]

848.

04/27-

04/28/99

Monsanto conducted "Session 22" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 21 and 22, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," May 1999 (Note: this date is estimated).]

Note: *"Bate Numbers" are not available.*

849.

May 1999

EPA received data involving individual PCB measurements for 1,409 persons from Community Group 1 (CG1).

"Blood PCB measurements"

In May 1999, EPA received data involving individual PCB measurements for 1,409 persons from CG1. Approximately 1,000 of these persons had current addresses in zip codes surrounding the Solutia facility (i.e., 36201, 36202, and 36203) (Figures 2 and 3). The data included each person's name, total PCB level measured in blood serum, date of birth, and date the serum was drawn. Of the 1,409 persons, 1,400 were reported as having a 'positive' total serum PCB level." [p. 4, February 14, 2000]

"The detected PCB values in the community group ranged from 3.0 to 2,111.5 µg/L. The average for the entire group (detects and non-detects) was 14.2 µg/L, and for the 95th percentile was 49.6 µg/L.

More than half of the persons tested had blood PCB levels above the detection limit of 5 µg/L."

"The blood PCB levels measured for a large number of persons (hundreds and as many as a thousand) in this group are high when compared with blood levels for the rest of the U.S. population [9, 10]."

"ATSDR estimates that the 95th percentile of the typical U.S. population range may now be as low as 10 µg/L." [p. 5, February 14, 2000]

"In addition, the blood PCB levels reported for many of the community members are higher than levels reported for many who worked daily with PCBs and who were studied for health effects decades ago [13]. There were 41 persons with blood PCB levels above 100 µg/L and 1037 persons with blood PCB levels above 10 µg/L. There were 521 persons (17% of the entire group) with PCB levels above 20 µg/L (Table 2)."

"Two children less than 6 years of age had blood PCB levels between 10 and 20 µg/L, and one 12-year-old had a blood PCB levels of 26 µg/L. Five persons aged 20 to 30 years had levels ranging from 23.8 to 46.9 µg/L." [p. 6, February 14, 2000]

"There may be more people with high blood PCB levels in the Anniston area."

"Therefore, it is prudent to assume that other persons from the Anniston area also have high blood PCB levels." [p. 7, February 14, 2000]

"Some of the blood data indicate that elevated PCB exposures occurred in the past few years. For example, elevated blood PCB values recorded for children (Table 5) indicate that exposures occurred as recently as 1994." [p. 8, February 14, 2000]

"The unusually high blood PCB levels seen in some individuals could conceivably have been caused by high exposures in the past. However, uncertainties in the soil and air sampling (i.e., regarding areas covered and whether there are hot spots) do not allow us to rule out a current source as sufficient cause for the high blood levels." [p. 20, February 14, 2000]

[U.S. Department of Health and Human Services, Public Human Services, Agency for Toxic Substances and Disease Registry:

"Public Comment Release of Health Consultation -- Evaluation of Soil, Blood & Air Data from Anniston, Alabama," CERCLIS No. ALD004019048, February 14, 2000.]

Note: **No Bate Number available.**

850.

05/19/99

Deposition of Kevin Cahill, Manager of public affairs at St. Louis; Monsanto Fund board member, taken in the Law Suit of Swift.

851.

05/22-

05/23/99

Monsanto conducted "Session 23" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 23 and 24, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," June 1999 (Note: this date is estimated).]

Note: "Bate Numbers" are not available.

852.

05/23-

05/24/99

Monsanto conducted "Session 24" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 23 and 24, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," June 1999 (Note: this date is estimated).]

Note: "Bate Numbers" are not available.

853.

June 99

On June 28 to July 1, 1999, EPA conducted an air monitoring study in and around the former Monsanto Anniston Plant, Alabama. Aroclor-1242 was detected in all the sites investigated, even in the background site. It was revealed that "PCB-1242 concentrations in air were highest through the 3 day study at Site B formally the "Miller Property".

"On June 28 to July 1 the Region IV, Science and Ecosystem Support Division (SESD) conducted an air monitoring study in and around the Solutia facility located in Anniston, Alabama. The investigation was requested by the EPA Region IV, RCRA Programs Branch."

"Site A thru D (see Map 1) were located within fenced properties owned by Solutia in the city of Anniston, Alabama." "Site E was established at Wellborn High School as a background site. It was used to collect ambient air samples that ascertain the general area, but is not affected by the Solutia complex."

"PCB-1242 concentrations in air were highest through the 3 day study at Site B formally the "Miller Property" located between the railroad tracks and 10th Street near Crawford Avenue. The PCB concentrations were generally highest when it rained during the first 2 days of the study. On the first day of the study when the winds were primarily westerly, Site E Wellborn High School approximately one and a half miles was not impacted by PCBs. However, on the last 2 days of the study when wind direction was variable, PCB-1242 in air was found at Welborn High School 10 times lower than the other sites. No PCB-1254 was detected at Site E "Wellborn High School" during the study."

Co-located samples collected at Site A and Site A-Duplicate reproduced very well for PCB-1242. However, because of very low concentrations of PCB-1254 some variability was shown."

[USEPA Region IV, "Science and Ecosystem Support Division: Laboratory Results of PCB Air Study, Anniston, Alabama, June 28 to July 1, 1999," August 17, 1999.]

Note: "Bate Numbers" are not available.

854.
06/12-
06/13/99

Monsanto conducted "Session 25" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Session 25, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," June 1999 (Note: this date is estimated).]

Note: "Bate Numbers" are not available.

855.
06/24/99

Deposition of Joseph Landwehr, Chemical engineer/technical services superintendent at Monsanto (improved all processes at plant), taken in the Law Suit of Swift.

856.

06/28-
06/29/99

Monsanto conducted "Session 26" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Session 26, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," July 1999 (Note: this date is estimated).]

Note: "Bate Numbers" are not available.

857.
06/29-
06/30/99

Monsanto conducted "Session 27" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 27 and 28, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," July 1999 (Note: this date is estimated).]

Note: "Bate Numbers" are not available.

858.
06/30/99

Deposition of Ishmael Ransaw, Physical organic chemist for Monsanto at Anniston Plant; initially worked on parathion unit and then Aroclor, taken in the Law Suit of Swift.

859.
06/30/99

Deposition of Bill Defer, Plant manager for what is now Solutia in Anniston, 1991-1994, taken in the Law Suit of Swift.

860.
06/30-
07/01/99

Monsanto conducted "Session 28" of "Alabama Ambient PCBs Measurement Program" to determine PCBs concentration in the ambient air in Anniston area.

[ENSR Consulting and Engineering, "Ambient PCB Concentrations, Sessions 27 and 28, Mars Hill Missionary Baptist Church v. Monsanto Company: Alabama Ambient PCBs Measurement Program," July 1999 (Note: this date is estimated).]

Note: "Bate Numbers" are not available.

861.

07/07/99 Deposition of Beth Rusert, Managing editor of Monsanto magazine, taken in the Law Suit of Swift.

862.

12/06/99 Alabama Department of Public Health (ADPH) published: "Solutia Incorporated/Monsanto Company, Anniston, Calhoun County, Alabama. CERCLIS No. ALD004019048 Prepared by Alabama Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry".

[p.37, U.S. Department of Health and Human Services, Public Human Services, Agency for Toxic Substances and Disease Registry: "Public Comment Release of Health Consultation -- Evaluation of Soil, Blood & Air Data from Anniston, Alabama," CERCLIS NO. ALD004019048, February 14, 2000.]

Note: **No Bate Number available.**

863.

02/14/00 Public Comment Release of Health Consultation: "Evaluation of Soil, Blood & Air Data from Anniston, Alabama".

The Executive Summary says:

"(1) Exposures to PCBs in soil in parts of Anniston present a public health hazard. PCBs in residential soil present a public hazard of cancerous and non-cancerous health effects for persons with prolonged exposure. PCBs in residential soils in some areas may present a public health hazard for thyroid and neurodevelopmental effects after exposure durations of less than 1 year."

"(2) PCB exposures may have been more severe in the past. However, the fact that young children have elevated levels of PCBs indicates that exposure may still occurring at high levels."

"(3) Exposure to PCBs in the air present an indeterminate public health hazard."

"(4) ... We are concerned about the potential for health effects at this site." [p.1, February 14, 2000]

[U.S. Department of Health and Human Services, Public Human Services, Agency for Toxic Substances and Disease Registry: "Public Comment Release of Health Consultation -- Evaluation of Soil, Blood & Air Data from Anniston, Alabama," CERCLIS No. ALD004019048, February 14, 2000.]

Note: **NO Bate Number available.**