BIOLOGICAL CONSULTANTS

*Water Pollution · Water Quality · Biological Surveys · Fishery Biology*

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Mr. J. T. Bell, Plant Chief Chemist
Monsanto Company
Anniston, Alabama 36201

Dear Mister Bell:

On August 15, 1971, we submitted to Mr. Eugene Wright an interim report on the fish residue data for our survey. An additional copy of this report is transmitted for your own files. In the interim report we formulated a number of broad comparisons using the residue data for the December, 1970 and March, 1971 survey trips.

Using the additional residue data you sent to us May 30, 1972, we are now in a position to report on the entire first year of the survey, specifically the December, 1970, March, 1971, June, 1971, and September, 1971 trips. For this purpose we will discuss residue data for a number of the principal species that are considered to be most appropriate for our purposes. After a general review of the entire body of data we have decided to use the Aroclor 1254 data for this purpose. Wet-weight values for Aroclor 1254 lack parentheses; lipid values for Aroclor 1254 are in parentheses.

1) Bluegill, Lepomis macrochirus

| | Choccolocco Cr., Sta. 3 Highway 9 | Choccolocco Cr., Sta. 7 Martha Williams, Hwy.95 | Chocco. Cr., Sta. 10 Highway 77 |
|---|---|---|---|
| Dec-1970 | 0.71 (14.22) | 13.16 (208.33) | 4.17 (125.00) |
| Mar-1971 | 0.11 (2.47) | 23.81 (1,500.00) | 5.44 (312.50) |
| Jun-1971 | 0.02 (0.75) | 8.16 (155.00) | 5.65 (160.00) |
| Sep-1971 | 2.48 (24.75) | No data | 12.32 (215.63) |

The object here is to compare the residue levels of control fishes not exposed to Aroclor 1254 (see values for Sta. 3 which is in the headwaters well above the Monsanto plant at Anniston) with residue levels of fishes below the plant and hence exposed to Aroclor 1254 due to location (Sta. 7 & Sta. 10). It is obvious that the fishes below the source of P.C.B. s in Choccolocco Creek have concentrated the residue to a greater degree than those fishes resident upstream from the source.

| | Aker Creek | Cane Creek | Stemley Bridge | Coosa River, Clear Creek |
|---|---|---|---|---|
| Dec-1970 | 0.42 (3.33) | 0.24 (10.00) | 1.04 (28.57) | 0.45 (6.00) |
| Mar-1971 | 0.19 (6.17) | 0.24 (3.20) | No data | 0.70 (31.07) |
| Jun-1971 | 0.01 (0.33) | 0.14 (4.67) | 2.50 (54.17) | 0.73 (15.00) |
| Sep-1971 | 0.05 (0.89) | 0.64 (19.00) | 1.74 (29.38) | 0.83 (19.23) |

In the first comparison for bluegill we examined residue data for fishes restricted to Choccolocco Creek, with controls above the Monsanto outfall and exposed fishes located below the outfall. In the second comparison we are comparing residue levels in fishes located geographically above the confluence of Choccolocco Creek and the Coosa River with residue levels in fishes located geographically below the confluence of Choccolocco Creek and the Coosa River. Aker and Cane Creeks are located above the confluence and Stemley Bridge and Clear Creek are located below the confluence of Choccolocco Creek and the Coosa River.

This comparison indicates generally higher residue levels for Stemley Bridge and Clear Creek as compared with Aker and Cane Creeks upstream. Secondly, one notes that the values for Stemley Bridge are slightly higher than those at Clear Creek. In general then one can conclude that P.C.B. residues are indeed carried as far downstream as the Stemley Bridge and Clear Creek stations, however it is apparent that these residue levels are far below the levels found in Choccolocco Creek at Stations 7 and 10 (see page 1), as indicated by the residues concentrated in the fish tissues.

2) Blacktail shiner, Notropis venustus

| | Choccolocco Cr., Sta. 3 Highway 9 | Choccolocco Cr., Sta. 7 Martha Williams, Hwy.95 | Chocco. Cr.,Sta. 10 Highway 77 |
|---|---|---|---|
| Dec-1970 | 1.18 (17.75) | No data | 65.00 (478.10) |
| Mar-1971 | 0.52 (17.60) | 117.18 (1,250.00) | 32.50 (406.25) |
| Jun-1971 | 0.14 (3.30) | 7.76 (102.20) | 2.50 (35.00) |
| Sep-1971 | 0.46 (6.83) | 53.90 (1,133.33) | No data |

Again we are comparing residue levels in fishes above the Monsanto outfall with fishes in Choccolocco Creek below the outfall. Station 3 is above and Stations 7 and 10 are below. It is obvious that the fishes below the outfall are concentrating the P.C.B. residue to a greater degree than those above.

3) Stoneroller, Campostoma anomalum (Same comparison; dates as for blacktail shiner, this page; only exception is that we have no data for Stations 7 and 10 and have used other stations for the comparison.)

| | Choccolocco Cr., Sta. 3 | Shoal Creek | Choccolocco Cr., Sta. 8, Hwy.9 |
|---|---|---|---|
| Dec-1970 | 0.37 (1.17) | 0.018 (0.94) | 16.85 (121.09) |
| Mar-1971 | 0.26 (4.33) | 0.08 (6.00) | 45.00 (675.00) |
| Jun-1971 | 0.01 (0.25) | 0.04 (1.10) | No data |
| Sept-1971 | 0.90 (5.63) | None found | 32.07 (812.50) |

Here we are comparing two stations above the Monsanto outfall (Choccolocco Creek Station 3 and Shoal Creek, which is upstream from Station 3), and Station 8 at the Highway 93 crossing. Again, it is obvious that the fishes below the outfall have concentrated the P.C.B. residue to a greater degree than those fishes above the outfall both in Choccolocco Creek (Station 3) and in Shoal Creek.

4) Longear sunfish, Lepomis megalotis

| | Choccolocco Creek, Sta. 3 Highway 9 | Choccolocco Creek, Sta. 10 Highway 77 |
|---|---|---|
| Dec-1970 | 0.43 (0.93) | 2.86 (150.00) |
| Mar-1971 | 0.17 (0.66) | 18.75 (1,200.00) |
| Jun-1971 | 0.07 (2.05) | 4.63 (105.00) |
| Sep-1971 | 0.09 (2.83) | 25.86 (416.67) |

This is a comparison of residue levels from fishes taken above the Monsanto outfall at Station 3 with fishes taken below the outfall at Station 10. Again one can see that the residue level is very high in this segment of Choccolocco Creek as indicated by the amount taken up in fish tissues.

| | Aker Creek | Cane Creek | Stemley Bridge | Clear Cr., Coosa R. |
|---|---|---|---|---|
| Dec-1970 | 0.04 (0.57) | 0.13 (4.55) | 1.21 (36.25) | 0.36 (12.75) |
| Mar-1971 | 0.05 (3.30) | 0.13 (2.13) | 1.14 (50.00) | 0.14 (9.00) |
| Jun-1971 | None found | 0.04 (0.75) | 0.62 (14.23) | 0.43 (10.57) |
| Sep-1971 | 0.03 (0.73) | 1.18 (27.50) | 2.15 (48.86) | 0.29 (7.27) |

In this comparison we are looking at levels in fishes located geographically above the confluence of Choccolocco Creek and the Coosa River (Aker and Cane Creeks) and residue levels in fishes located geographically below the confluence (Stemley Bridge and Clear Creek); this same comparison was made for the bluegill on page 2 of this report.

This comparison shows higher residue levels for Stemley Bridge fish specimens than are to be found in Aker and Cane Creek specimens. We also see that the Clear Creek specimens do not have levels as high as the Stemley Bridge specimens, again due to the fact that Stemley Bridge is closer to the residue source in Choccolocco Creek. Although we know little or nothing as to how the residues from P.C.B.'s are transported in the aquatic environment, one could visualize that movement of materials into the Clear Creek area would be made difficult by its location with respect to the entirety of Logan Martin Reservoir, whereas Stemley Bridge area would be in the line of direct transport.

5) Largemouth bass and spotted bass, Micropterus, all species combined.

| | Aker Creek | Cane Creek | Stemley Bridge | Clear Creek, Coosa River |
|---|---|---|---|---|
| Dec-1970 | No data | No data | 1.95 (41.00) | 0.68 (27.00) |
| Mar-1971 | 0.13 (5.60) | 0.06 (1.50) | 1.46 (59.25) | 0.66 (15.39) |
| Jun-1971 | 0.01 (0.29) | 0.03 (2.00) | 0.50 (10.75) | 0.66 (15.83) |
| Sep-1971 | 0.77 (16.04) | 0.77 (16.04) | 1.08 (33.50) | 0.41 (8.75) |

This comparison shows generally lower residue levels for Aker and Cane Creek specimens which were collected well above the confluence of the Coosa River and Choccolocco Creek, and generally higher residue levels for fish specimens collected at Stemley Bridge and Clear Creek below the confluence of Choccolocco Creek with the Coosa River. As in the other comparisons we have made, however, the residue levels of the Stemley Bridge and Clear Creek fish specimens are far lower than residue levels for the several stations in the lower part of Choccolocco Creek, namely Stations 7, 8, and 10.

Discussion:

1) The data for the first year of the survey indicate clearly that the fishes below the Monsanto outfall have concentrated the P.C.B. residues to a very high level. The highest values obtained for fishes were at Stations 7, 8 and 10 in Choccolocco Creek. Secondly, fishes below the confluence of Choccolocco Creek and the Coosa River concentrate the P.C.B. residues to a greater degree than do their counterparts upstream from the confluence. However, the relative amounts are much smaller in the Coosa River (Logan Martin Reservoir) than in Choccolocco Creek below the outfall.

2) We continue to find deformed, sick and lethargic fishes in our collections, particularly at Stations 7, 8 and 10. Since the residue levels are highest at these stations it is apparent to us that there is a cause and effect relationship.

3) As consultants we recommend that Monsanto Company continue to follow the residue levels of fishes in Choccolocco Creek, Shoal Creek, the Coosa River and tributaries for some years to come in order to discover the details of the breakdown process with respect to time. The residual nature of P.C.B.'s complicates the environmental problem, as well as the very large quantity of P.C.B.'s that have been added to Choccolocco Creek in past years.

Mr. Turner is to be commended for the fine job he did in running the many samples over the past year. The uniformity of the body of data clearly indicates that his analyses are sound and repetitive.

Thank you for your consideration. If there are any questions relevant to this report please let us know.

Very truly yours,

Royal D. Suttkus, Ph.D.
Gerald E. Gunning, Ph.D.
Biological Consultants

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