

Monsanto

FROM: J. D. Hinchey - T3A - 4-4869

DATE: August 25, 1981

cc: P. E. Berteau - G2MD
B. J. Warner - T250
G. J. Levinskas - G2WF
P. R. Michael - NIE

SUBJECT: Statistical Analysis of
PCB Content of Monkey Tissue
REFERENCE: (S-81-SS-2)

TO: J. H. Craddock - A2SA

Attached is a summary of the statistical analyses performed on the data from Beverly Warner's report "PCB Content of Monkey Tissue," MDA-041, May 7, 1979. This information may be used as a section of any further reports by MRC or OMEH, or as a starting point for additional statistical analysis as needed.

John D. Hinchey
John D. Hinchey

JDH:bjs

attachment

MONS 022370

Statistical Analysis of PCB Content of Monkey Tissue

INTRODUCTION

This report covers the statistical analysis of analytical data collected from a subacute feeding study on the concentrative effects of polychlorinated biphenyls on adult Rhesus monkeys and their offspring. (Report MDA-041, "PCB Content of Monkey Tissue" - Beverly J. Warner, 7 May 1979). The following description of the study is the introduction from that report.

"This study is designed to determine the concentrative effects of polychlorinated biphenyl (PCB) compounds in a subacute feeding program involving forty-eight adult Rhesus monkeys and their subsequent offspring.

The Rhesus monkeys were fed Aroclor 1254 (a PCB compound composed of 12 carbon atoms and 54% chlorine per PCB molecule) as a supplement to their diet. The feeding study was conducted by Litton Bionetics, Kensington, Maryland, for a period of one year. Fat tissue biopsies of the adult animals were taken by the Litton Laboratory and shipped to MRC for the analysis of PCB content periodically during the feeding study (approximately every two months) and during an eight-month relaxation period following the feeding study. In addition to the adult fat samples analyzed, numerous infant skin and fat samples, and colostrum (milk), placenta, and blood serum samples were analyzed on an intermittent basis. At the termination of the project, liver biopsies were also provided for all adult animals and several infants. In all, in excess of seven hundred individual analyses were performed for PCB by various extraction techniques followed by electron capture gas chromatography (EC-GC). The analysis techniques utilized and the data accumulated are presented in the following sections of this report."

The statistical analysis centers primarily on the adult fat and adult liver samples which had relatively complete and well-balanced data. No samples were excluded. Data were not complete for the baby skin, baby fat and milk samples, but these are presented for inspection, with statistical analyses where applicable.

All the data treated were assumed to be log-normally distributed, and averages and confidence limits were calculated on this basis and converted back to the original scale.

SUMMARY OF RESULTS

Adult Fat Samples (male and female)

PCB level in adult fat samples for animals fed the highest amount of PCB is significantly higher than control from one month through 20 months. Average PCB in tissues for this period is 28.2 PPM (wet weight basis) and 53.5 PPM (lipid weight basis).

PCB level in adult fat samples for animals fed the medium level of PCB is significantly higher than control from 4 months through 20 months. Average PCB in tissues for this period is 13.2 PPM (wet weight basis) and 20.5 PPM (lipid weight basis).

PCB level in adult fat samples for animals fed the low level of PCB is significantly higher than control from 7 months through 20 months. Average PCB in tissues for this period is 2.8 PPM (wet weight basis) and 4.2 PPM (lipid weight basis).

PCB level in adult fat samples for control animals (no PCB fed) averaged 0.30 PPM (wet weight basis) and 0.55 PPM (lipid weight basis) for the period from 1 to 20 months.

Adult Liver Samples - 20 Months (male and female)

PCB level in adult liver samples increased in proportion to the amount fed. On a wet weight basis, the control samples averaged 0.076 PPM, low level samples averaged 0.4 PPM, medium level samples 0.81 PPM and high level samples 2.43 PPM. On a lipid weight basis, these results were 2.2 PPM, 10 PPM, 23 PPM and 75 PPM respectively.

Baby Skin Samples

PCB levels found in baby skin samples increased with increasing PCB in parents' diet, and with sampling time up to 7/31/78 (insufficient data for statistical analyses).

Baby Fat Samples

PCB levels found in baby fat samples increased with increasing PCB in parents' diet, and with sampling time up to 7/31/78 (insufficient data for statistical analysis).

Milk Samples

There was a significant increase of PCBs in milk as a function of the PCB level in the feed. The data were too widely scattered to determine what kind of model best fit the data. The linear model gave the following equation:

$$\text{Amt. PCB in milk} = 0.094 + 0.0097 (\text{amt. PCB fed}). \quad \text{The correlation coefficient was } 0.92, \text{ significant at } 99.9\% P < 0.001.$$

DESCRIPTION OF STATISTICAL APPROACH

Adult Fat Samples - Wet Weight and Lipid Weight Basis

Table I shows the output from a computer program which calculates the 95% confidence limits of the mean of the amount PCB found in the adult fat samples. The program converts the data to logarithms, calculates the mean

and standard deviation of PCB found for each level fed at each sampling time. It then calculates 95% confidence limits of the means of the logarithms. This information is converted back to PPM, and 95% confidence limits of the mean are reported in PPM and as percent of the mean.

Table II is a summary of the averages by month for each level of PCB fed. Table III gives specific statistical conclusions by month.

Figures 1a and 1b are composite plots of the means and 95% confidence limits of PCB found for each level fed vs. sampling time. The test for significance was based on the degree to which the 95% confidence limits of the means overlapped. The least significant difference (95% level) between the means is approximately 2.828 standard deviations. When there is no overlap of the 95% confidence limits, the means are approximately 4 standard deviations apart. The individual comparisons can be confirmed using Students' t test.

Adult Liver Samples - End of Study

The procedure for calculating confidence limits of the means is the same as in Adult Fat Samples. Figures 2a and 2b show the means and confidence limits of the means for PCBs found at each level of PCB fed.

Least squares lines were determined for the average PCBs found vs. amount PCB fed. For lipid weight samples

$$\begin{aligned}\text{PPM found (lipid)} &= 4.6 + 0.71 (\text{PPM in feed}). \text{ For wet weight} \\ \text{samples PPM found (wet)} &= 0.20 + 0.022 (\text{PPM in feed}).\end{aligned}$$

Both these equations were significant at 99.9% ($p < 0.001$)

Baby Skin Samples

Table IV shows average PPM found on wet weight basis in baby skin as related to level fed to parents, and sampling time. Lipid weight results are not shown because of extreme variation in lipid weight to sample weight ratio.

Baby Fat Samples

Table IV shows average PPM on wet basis, presented as indicated in paragraph under Adult Fat Samples.

Milk Samples

Table V shows the average PPM found in milk samples, presented as related to PCBs consumed.

DISCUSSION

The foregoing analysis of the data is an attempt to describe the effects of various levels of PCB in the diet on the resulting amount of PCB found in the animal tissues. No attempt was made to fit any sort of theoretical model, but the adult fat data may be sufficiently consistent to support such an approach. In addition, we have not tried to relate PCB levels to toxicology data, but recommend that this be done when the latter are available.

ACKNOWLEDGMENT

The assistance of J. L. Davis (Environmental Sciences) in running the computer calculations of means and confidence limits is gratefully appreciated.

TABLE I
Calculation of Confidence Limits

S-81-SS-2
Page 5

TABLE 5 CONTROL WET

MEAN = 739604

95% (2 SIGMA) CONFIDENCE LIMITS ARE 572997 TO 979111
95% LIMITS AS % OF MEAN ARE 77.49% TO 130.713%

TABLE 5 LOW WET

MEAN = 495098

95% (2 SIGMA) CONFIDENCE LIMITS ARE 3534 TO 693411
95% LIMITS AS % OF MEAN ARE 71.3797% TO 140.096%

TABLE 6 MEDIUM WET

MEAN = 585042

95% (2 SIGMA) CONFIDENCE LIMITS ARE 395958 TO 864421
95% LIMITS AS % OF MEAN ARE 67.6802% TO 147.754%

TABLE 6 HIGH WET

MEAN = 688215

95% (2 SIGMA) CONFIDENCE LIMITS ARE 3634 TO 1,30336
95% LIMITS AS % OF MEAN ARE 52.8032% TO 189.382%

TABLE 6 CONTROL LIPID

MEAN = 1,71628

95% (2 SIGMA) CONFIDENCE LIMITS ARE 361068 TO 8,15809
95% LIMITS AS % OF MEAN ARE 21.0378% TO 475.335%

TABLE 6 LOW LIPID

MEAN = 76315

95% (2 SIGMA) CONFIDENCE LIMITS ARE 471852 TO 1,23428
95% LIMITS AS % OF MEAN ARE 61.8296% TO 161.735%

TABLE 6 MEDIUM LIPID

MEAN = 915273

95% (2 SIGMA) CONFIDENCE LIMITS ARE 524646 TO 1,59674
95% LIMITS AS % OF MEAN ARE 57.3213% TO 174.455%

TABLE 6 HIGH LIPID

MEAN = 953255

95% (2 SIGMA) CONFIDENCE LIMITS ARE 443374 TO 2,0495
95% LIMITS AS % OF MEAN ARE 46.5116% TO 215%

TABLE 7 CONTROL WET

MEAN = 235899

95% (2 SIGMA) CONFIDENCE LIMITS ARE 109157 TO 509798
95% LIMITS AS % OF MEAN ARE 46.273% TO 216.109%

TABLE 7 LOW WET

MEAN = 422089

95% (2 SIGMA) CONFIDENCE LIMITS ARE 2,391 TO 763059
95% LIMITS AS % OF MEAN ARE 55.3049% TO 180.816%

TABLE 7 MEDIUM WET

MEAN = 1,23347

95% (2 SIGMA) CONFIDENCE LIMITS ARE 461048 TO 3,29998
95% LIMITS AS % OF MEAN ARE 37.3782% TO 267.536%

TABLE 7 HIGH WET

MEAN = 10,7164

95% (2 SIGMA) CONFIDENCE LIMITS ARE 2,71151 TO 15,4531
95% LIMITS AS % OF MEAN ARE 25.6417% TO 141.559%

MONS 022375

TABLE 7 CONTROL LIPID

MEAN = 387914
 95% (2 SIGMA) CONFIDENCE LIMITS ARE 140902 TO 1,3074
 95% LIMITS AS % OF MEAN ARE 36.3325 % TO 275.236 %

S-81-SS-2

Page 6

TABLE 7 LOW LIPID

MEAN = 534091
 95% (2 SIGMA) CONFIDENCE LIMITS ARE 289713 TO 994604
 95% LIMITS AS % OF MEAN ARE 54.2442 % TO 184.351 %

TABLE 7 MEDIUM LIPID

MEAN = 2,13993
 95% (2 SIGMA) CONFIDENCE LIMITS ARE 653289 TO 7,00941
 95% LIMITS AS % OF MEAN ARE 30.5285 % TO 327.563 %

TABLE 7 HIGH LIPID

MEAN = 14,1806
 95% (2 SIGMA) CONFIDENCE LIMITS ARE 6,8624 TO 29,303
 95% LIMITS AS % OF MEAN ARE 48.3929 % TO 206.642 %

TABLE 8 CONTROL WET

MEAN = 515025
 95% (2 SIGMA) CONFIDENCE LIMITS ARE 380366 TO 697355
 95% LIMITS AS % OF MEAN ARE 73.854 % TO 135.402 %

TABLE 8 CONTROL LIPID

MEAN = 654461
 95% (2 SIGMA) CONFIDENCE LIMITS ARE 458312 TO 934557
 95% LIMITS AS % OF MEAN ARE 70.029 % TO 142.798 %

TABLE 9 CONTROL WET

MEAN = 881472
 95% (2 SIGMA) CONFIDENCE LIMITS ARE 598969 TO 1,29722
 95% LIMITS AS % OF MEAN ARE 67.951 % TO 147.165 %

TABLE 9 LOW WET

MEAN = 984053
 95% (2 SIGMA) CONFIDENCE LIMITS ARE 550077 TO 1,68958
 95% LIMITS AS % OF MEAN ARE 57.0588 % TO 175.258 %

TABLE 9 MEDIUM WET

MEAN = 5,99341
 95% (2 SIGMA) CONFIDENCE LIMITS ARE 4,01158 TO 8,95433
 95% LIMITS AS % OF MEAN ARE 66.9331 % TO 149.403 %

TABLE 9 HIGH WET

MEAN = 20,0999
 95% (2 SIGMA) CONFIDENCE LIMITS ARE 14,3207 TO 28,2113
 95% LIMITS AS % OF MEAN ARE 71.2475 % TO 140.356 %

TABLE 9 CONTROL LIPID

MEAN = 1,23991
 95% (2 SIGMA) CONFIDENCE LIMITS ARE 818999 TO 1,87713
 95% LIMITS AS % OF MEAN ARE 66.0533 % TO 151.393 %

TABLE 9 LOW LIPID

MEAN = 1,96499
 95% (2 SIGMA) CONFIDENCE LIMITS ARE 95486 TO 4,04372
 95% LIMITS AS % OF MEAN ARE 48.5936 % TO 205.788 %

TABLE 9 MEDIUM LIPID

MEAN = 7.51267

95% (2 SIGMA) CONFIDENCE LIMITS ARE 4.6515 TO 12.4444

95% LIMITS AS % OF MEAN ARE 61.1743 % TO 163.574 %

S-81-55-2

Page 7

TABLE 9 HIGH LIPID

MEAN = 12.0139

95% (2 SIGMA) CONFIDENCE LIMITS ARE 21.9312 TO 47.905

95% LIMITS AS % OF MEAN ARE 68.1501 % TO 146.735 %

TABLE 10 CONTROL WET

MEAN = 3.27594

95% (2 SIGMA) CONFIDENCE LIMITS ARE .0792726 TO .773315

95% LIMITS AS % OF MEAN ARE 32.0172 % TO 312.332 %

TABLE 10 LOW WET

MEAN = 4.40969

95% (2 SIGMA) CONFIDENCE LIMITS ARE 1.80674 TO 1.07627

95% LIMITS AS % OF MEAN ARE 40.922 % TO 244.069 %

TABLE 10 MEDIUM WET

MEAN = 7.45852

95% (2 SIGMA) CONFIDENCE LIMITS ARE 5.48193 TO 10.1479

95% LIMITS AS % OF MEAN ARE 73.4989 % TO 136.057 %

TABLE 10 HIGH WET

MEAN = 24.3932

95% (2 SIGMA) CONFIDENCE LIMITS ARE 14.2319 TO 41.8095

95% LIMITS AS % OF MEAN ARE 58.3437 % TO 171.398 %

TABLE 10 CONTROL LIPID

MEAN = 4.12967

95% (2 SIGMA) CONFIDENCE LIMITS ARE 1.27952 TO 1.3339

95% LIMITS AS % OF MEAN ARE 30.9595 % TO 323.903 %

TABLE 10 LOW LIPID

MEAN = 6.77586

95% (2 SIGMA) CONFIDENCE LIMITS ARE .262462 TO 1.74929

95% LIMITS AS % OF MEAN ARE 38.7349 % TO 258.165 %

TABLE 10 MEDIUM LIPID

MEAN = 8.85754

95% (2 SIGMA) CONFIDENCE LIMITS ARE 6.38339 TO 12.2906

95% LIMITS AS % OF MEAN ARE 72.0673 % TO 138.759 %

TABLE 10 HIGH LIPID

MEAN = 35.6485

95% (2 SIGMA) CONFIDENCE LIMITS ARE 16.7222 TO 75.9958

95% LIMITS AS % OF MEAN ARE 46.9085 % TO 213.181 %

TABLE 11 CONTROL WET

MEAN = 1.62668

95% (2 SIGMA) CONFIDENCE LIMITS ARE .102031 TO .259342

95% LIMITS AS % OF MEAN ARE 62.7234 % TO 159.43 %

TABLE 11 LOW WET

MEAN = 2.52308

95% (2 SIGMA) CONFIDENCE LIMITS ARE 1.82661 TO 3.43007

95% LIMITS AS % OF MEAN ARE 72.9746 % TO 137.034 %

TABLE 11 MEDIUM WET

MEAN = 8.48146
95% (2 SIGMA) CONFIDENCE LIMITS ARE 5.83161 TO 12.3354
95% LIMITS AS % OF MEAN ARE 68.7572 % TO 145.439 %

S-81-55-2

Page 8

TABLE 11 HIGH WET

MEAN = 20.5028
95% (2 SIGMA) CONFIDENCE LIMITS ARE 10.4364 TO 40.2786
95% LIMITS AS % OF MEAN ARE 50.9023 % TO 196.455 %

TABLE 11 CONTROL LIPID

MEAN = 213713
95% (2 SIGMA) CONFIDENCE LIMITS ARE 122103 TO 374053
95% LIMITS AS % OF MEAN ARE 57.1344 % TO 175.026 %

TABLE 11 LOW LIPID

MEAN = 2.77841
95% (2 SIGMA) CONFIDENCE LIMITS ARE 1.80326 TO 4.28089
95% LIMITS AS % OF MEAN ARE 64.9027 % TO 154.077 %

TABLE 11 MEDIUM LIPID

MEAN = 11.5644
95% (2 SIGMA) CONFIDENCE LIMITS ARE 7.85842 TO 17.0182
95% LIMITS AS % OF MEAN ARE 67.9533 % TO 147.16 %

TABLE 11 HIGH LIPID

MEAN = 38.0384
95% (2 SIGMA) CONFIDENCE LIMITS ARE 11.8584 TO 76.09
95% LIMITS AS % OF MEAN ARE 39.4775 % TO 253.309 %

TABLE 12 CONTROL WET

MEAN = 728571
95% (2 SIGMA) CONFIDENCE LIMITS ARE 487622 TO 1,30222
95% LIMITS AS % OF MEAN ARE 55.9482 % TO 178.737 %

TABLE 12 LOW WET

MEAN = 2.88638
95% (2 SIGMA) CONFIDENCE LIMITS ARE 2.14402 TO 3.88577
95% LIMITS AS % OF MEAN ARE 74.2808 % TO 134.624 %

TABLE 12 LOW WET

MEAN = 2.88638
95% (2 SIGMA) CONFIDENCE LIMITS ARE 2.14402 TO 3.88577
95% LIMITS AS % OF MEAN ARE 74.2808 % TO 134.624 %

TABLE 12 MEDIUM WET

MEAN = 12.4318
95% (2 SIGMA) CONFIDENCE LIMITS ARE 8.79351 TO 17.5755
95% LIMITS AS % OF MEAN ARE 70.7339 % TO 141.375 %

TABLE 12 HIGH WET

MEAN = 39.9265
95% (2 SIGMA) CONFIDENCE LIMITS ARE 28.8245 TO 55.3124
95% LIMITS AS % OF MEAN ARE 72.1757 % TO 138.551 %

TABLE 12 CONTROL LIPID

MEAN = 1.8385
95% (2 SIGMA) CONFIDENCE LIMITS ARE .530677 TO 2.83229
95% LIMITS AS % OF MEAN ARE 51.1002 % TO 195.694 %

TABLE 12 LOW LIPID

MEAN = 4.30031

95% (2 SIGMA) CONFIDENCE LIMITS ARE 2.7913 TO 5.8093

95% LIMITS AS % OF MEAN ARE 66.4545 % TO 150.472 %

TABLE 12 MEDIUM LIPID

MEAN = 17.3318

95% (2 SIGMA) CONFIDENCE LIMITS ARE 11.3194 TO 26.538

95% LIMITS AS % OF MEAN ARE 65.3096 % TO 153.117 %

S-81-SS-2

Page 9

TABLE 12 HIGH LIPID

MEAN = 97.9947

95% (2 SIGMA) CONFIDENCE LIMITS ARE 58.0866 TO 165.322

95% LIMITS AS % OF MEAN ARE 59.2752 % TO 168.705 %

TABLE 13 CONTROL WET

MEAN = 3.37182

95% (2 SIGMA) CONFIDENCE LIMITS ARE 1.298679 TO 4.78911

95% LIMITS AS % OF MEAN ARE 39.5001 % TO 128.801 %

TABLE 13 LOW WET

MEAN = 1.94429

95% (2 SIGMA) CONFIDENCE LIMITS ARE 0.70744 TO 5.91349

95% LIMITS AS % OF MEAN ARE 36.32 % TO 142.739 %

TABLE 13 MEDIUM WET

MEAN = 1.1593

95% (2 SIGMA) CONFIDENCE LIMITS ARE 0.2775 TO 2.0394

95% LIMITS AS % OF MEAN ARE 25.1204 % TO 127.993 %

TABLE 13 HIGH WET

MEAN = 19.9255

95% (2 SIGMA) CONFIDENCE LIMITS ARE 10.6201 TO 29.2304

95% LIMITS AS % OF MEAN ARE 50.5327 % TO 147.492 %

TABLE 13 CONTROL LIPID

MEAN = 1.12762

95% (2 SIGMA) CONFIDENCE LIMITS ARE 0.337241 TO 1.18724

95% LIMITS AS % OF MEAN ARE 53.2967 % TO 187.629 %

TABLE 13 LOW WET LIPID

MEAN = 5.6438

95% (2 SIGMA) CONFIDENCE LIMITS ARE 3.20953 TO 9.92415

95% LIMITS AS % OF MEAN ARE 56.8682 % TO 175.445 %

TABLE 13 MEDIUM LIPID

MEAN = 33.5652

95% (2 SIGMA) CONFIDENCE LIMITS ARE 16.6111 TO 33.4306

95% LIMITS AS % OF MEAN ARE 70.4899 % TO 141.864 %

TABLE 13 HIGH LIPID

MEAN = 114.285

95% (2 SIGMA) CONFIDENCE LIMITS ARE 62.6862 TO 208.357

95% LIMITS AS % OF MEAN ARE 54.8507 % TO 182.313 %

TABLE 14 CONTROL WET

MEAN = 2.92217

95% (2 SIGMA) CONFIDENCE LIMITS ARE 0.139416 TO 6.12492

95% LIMITS AS % OF MEAN ARE 47.7006 % TO 209.401 %

MONS 022379

TABLE 14 LOW WET

MEAN = 3.35533

95% (2 SIGMA) CONFIDENCE LIMITS ARE 2.19354 TO 5.13245

95% LIMITS AS % OF MEAN ARE 65.3749 % TO 152.964 %

TABLE 14 MEDIUM WET

MEAN = 20.2384

95% (2 SIGMA) CONFIDENCE LIMITS ARE 10.7382 TO 38.1474

95% LIMITS AS % OF MEAN ARE 53.0587 % TO 188.471 %

S-81-SS-2

Page 10

TABLE 14 HIGH WET

MEAN = 95.8365

95% (2 SIGMA) CONFIDENCE LIMITS ARE 70.9561 TO 129.414

95% LIMITS AS % OF MEAN ARE 74.0465 % TO 135.05 %

TABLE 14 CONTROL LIPID

MEAN = 64.4225

95% (2 SIGMA) CONFIDENCE LIMITS ARE 15.1198 TO 274.491

95% LIMITS AS % OF MEAN ARE 23.4698 % TO 426.079 %

TABLE 14 LOW LIPID

MEAN = 6.32952

95% (2 SIGMA) CONFIDENCE LIMITS ARE 3.53561 TO 11.3312

95% LIMITS AS % OF MEAN ARE 55.8591 % TO 179.022 %

TABLE 14 MEDIUM LIPID

MEAN = 28.9138

95% (2 SIGMA) CONFIDENCE LIMITS ARE 12.8817 TO 64.8987

95% LIMITS AS % OF MEAN ARE 44.5522 % TO 224.456 %

TABLE 14 HIGH LIPID

MEAN = 165.53

95% (2 SIGMA) CONFIDENCE LIMITS ARE 103.773 TO 264.04

95% LIMITS AS % OF MEAN ARE 62.6913 % TO 159.512 %

TABLE 15 CONTROL WET

MEAN = 129589

95% (2 SIGMA) CONFIDENCE LIMITS ARE .059196 TO .283689

95% LIMITS AS % OF MEAN ARE 45.6799 % TO 218.915 %

TABLE 15 LOW WET

MEAN = 3.28322

95% (2 SIGMA) CONFIDENCE LIMITS ARE 1.55393 TO 3.1238

95% LIMITS AS % OF MEAN ARE 70.5301 % TO 141.784 %

TABLE 15 MEDIUM WET

MEAN = 15.8592

95% (2 SIGMA) CONFIDENCE LIMITS ARE 10.5148 TO 23.893

95% LIMITS AS % OF MEAN ARE 66.3385 % TO 150.742 %

TABLE 15 HIGH WET

MEAN = 42.3203

95% (2 SIGMA) CONFIDENCE LIMITS ARE 28.537 TO 62.7609

95% LIMITS AS % OF MEAN ARE 67.431 % TO 148.3 %

TABLE 15 CONTROL LIPID

MEAN = 22506

95% (2 SIGMA) CONFIDENCE LIMITS ARE .0227565 TO .696186

95% LIMITS AS % OF MEAN ARE 32.3276 % TO 309.333 %

TABLE 15 LOW LIPID

MEAN = 3.93395

95% (2 SIGMA) CONFIDENCE LIMITS ARE 2.21305 TO 6.99304

95% LIMITS AS % OF MEAN ARE 56.2552 % TO 177.761 %

MONS 022380

TABLE 15 CONTROL LIPID

MEAN = 116.175

95% (2 SIGMA) CONFIDENCE LIMITS ARE 71.1216 TO 161.2284

95% LIMITS AS % OF MEAN ARE 61.2196 % TO 138.347 %

TABLE 15 HIGH LIPID

MEAN = 116.175

95% (2 SIGMA) CONFIDENCE LIMITS ARE 71.1216 TO 161.2284

95% LIMITS AS % OF MEAN ARE 61.2196 % TO 138.347 %

S-31-55-2

Page 11

TABLE 16 CONTROL WET

MEAN = 120.773

95% (2 SIGMA) CONFIDENCE LIMITS ARE 65.8181 TO 175.7279

95% LIMITS AS % OF MEAN ARE 54.5181 % TO 145.434 %

TABLE 16 LOW-WET

MEAN = 13.8617

95% (2 SIGMA) CONFIDENCE LIMITS ARE 9.65428 TO 17.6717

95% LIMITS AS % OF MEAN ARE 73.913 % TO 135.294 %

TABLE 16 HIGH WET

MEAN = 10.0199

95% (2 SIGMA) CONFIDENCE LIMITS ARE 4.30186 TO 23.3385

95% LIMITS AS % OF MEAN ARE 42.933 % TO 232.921 %

TABLE 16 CONTROL LIPID

MEAN = 13349

95% (2 SIGMA) CONFIDENCE LIMITS ARE 223398 TO 502053

95% LIMITS AS % OF MEAN ARE 66.7061 % TO 149.911 %

TABLE 16 MEDIUM LIPID

MEAN = 24.9736

95% (2 SIGMA) CONFIDENCE LIMITS ARE 17.3947 TO 35.8546

95% LIMITS AS % OF MEAN ARE 69.6523 % TO 143.57 %

TABLE 16 HIGH LIPID

MEAN = 34.5144

95% (2 SIGMA) CONFIDENCE LIMITS ARE 17.3062 TO 68.8334

95% LIMITS AS % OF MEAN ARE 50.1419 % TO 199.434 %

TABLE 18 CONTROL WET

MEAN = 434785

95% (2 SIGMA) CONFIDENCE LIMITS ARE 243576 TO 776094

95% LIMITS AS % OF MEAN ARE 56.0222 % TO 178.501 %

TABLE 18 LOW WET

MEAN = 3.82133

95% (2 SIGMA) CONFIDENCE LIMITS ARE 2.55449 TO 3.57349

95% LIMITS AS % OF MEAN ARE 84.5484 % TO 118.275 %

TABLE 18 MEDIUM WET

MEAN = 15.5034

95% (2 SIGMA) CONFIDENCE LIMITS ARE 10.3717 TO 23.1741

95% LIMITS AS % OF MEAN ARE 66.8996 % TO 149.478 %

TABLE 18 HIGH WET

MEAN = 43.2059

95% (2 SIGMA) CONFIDENCE LIMITS ARE 21.9232 TO 85.1495

95% LIMITS AS % OF MEAN ARE 50.7413 % TO 197.078 %

MONS 022381

TABLE 18 CONTROL LIPID

MEAN = 1.48024

95% (2 SIGMA) CONFIDENCE LIMITS ARE .6698 TO 3.27131

95% LIMITS AS % OF MEAN ARE 45.2493 % TO 220.998 %

TABLE 18 LOW LIPID

MEAN = 5.06448

95% (2 SIGMA) CONFIDENCE LIMITS ARE 4.22522 TO 5.07045

95% LIMITS AS % OF MEAN ARE 83.4284 % TO 119.863 %

S-81-SS-2

Page 12

TABLE 18 MEDIUM LIPID

MEAN = 38.589

95% (2 SIGMA) CONFIDENCE LIMITS ARE 15.5027 TO 90.2344

95% LIMITS AS % OF MEAN ARE 42.7652 % TO 233.835 %

TABLE 18 HIGH LIPID

MEAN = 97.0857

95% (2 SIGMA) CONFIDENCE LIMITS ARE 45.5477 TO 206.94

95% LIMITS AS % OF MEAN ARE 46.9149 % TO 213.152 %

TABLE 19 CONTROL WET

MEAN = 436251

95% (2 SIGMA) CONFIDENCE LIMITS ARE 332376 TO 572588

95% LIMITS AS % OF MEAN ARE 76.1892 % TO 131.252 %

TABLE 19 LOW WET

MEAN = 2.30818

95% (2 SIGMA) CONFIDENCE LIMITS ARE 1.82215 TO 2.90364

95% LIMITS AS % OF MEAN ARE 79.2174 % TO 126.235 %

TABLE 19 MEDIUM WET

MEAN = 14.8178

95% (2 SIGMA) CONFIDENCE LIMITS ARE 9.40518 TO 20.8927

95% LIMITS AS % OF MEAN ARE 67.0944 % TO 149.044 %

TABLE 19 HIGH WET

MEAN = 32.4199

95% (2 SIGMA) CONFIDENCE LIMITS ARE 24.127 TO 43.5633

95% LIMITS AS % OF MEAN ARE 74.4202 % TO 134.372 %

TABLE 19 CONTROL LIPID

MEAN = 970779

95% (2 SIGMA) CONFIDENCE LIMITS ARE 332683 TO 2.60413

95% LIMITS AS % OF MEAN ARE 35.7424 % TO 279.78 %

TABLE 19 LOW LIPID

MEAN = 2.94958

95% (2 SIGMA) CONFIDENCE LIMITS ARE 2.30066 TO 3.79154

95% LIMITS AS % OF MEAN ARE 77.9995 % TO 129.206 %

TABLE 19 MEDIUM LIPID

MEAN = 17.2633

95% (2 SIGMA) CONFIDENCE LIMITS ARE 11.6183 TO 25.651

95% LIMITS AS % OF MEAN ARE 67.3007 % TO 148.587 %

TABLE 19 HIGH LIPID

MEAN = 43.6318

95% (2 SIGMA) CONFIDENCE LIMITS ARE 31.0827 TO 61.2473

95% LIMITS AS % OF MEAN ARE 71.2457 % TO 140.373 %

FIGURE 1a

PCB in Adult Fat Samples - Wet Weight Basis

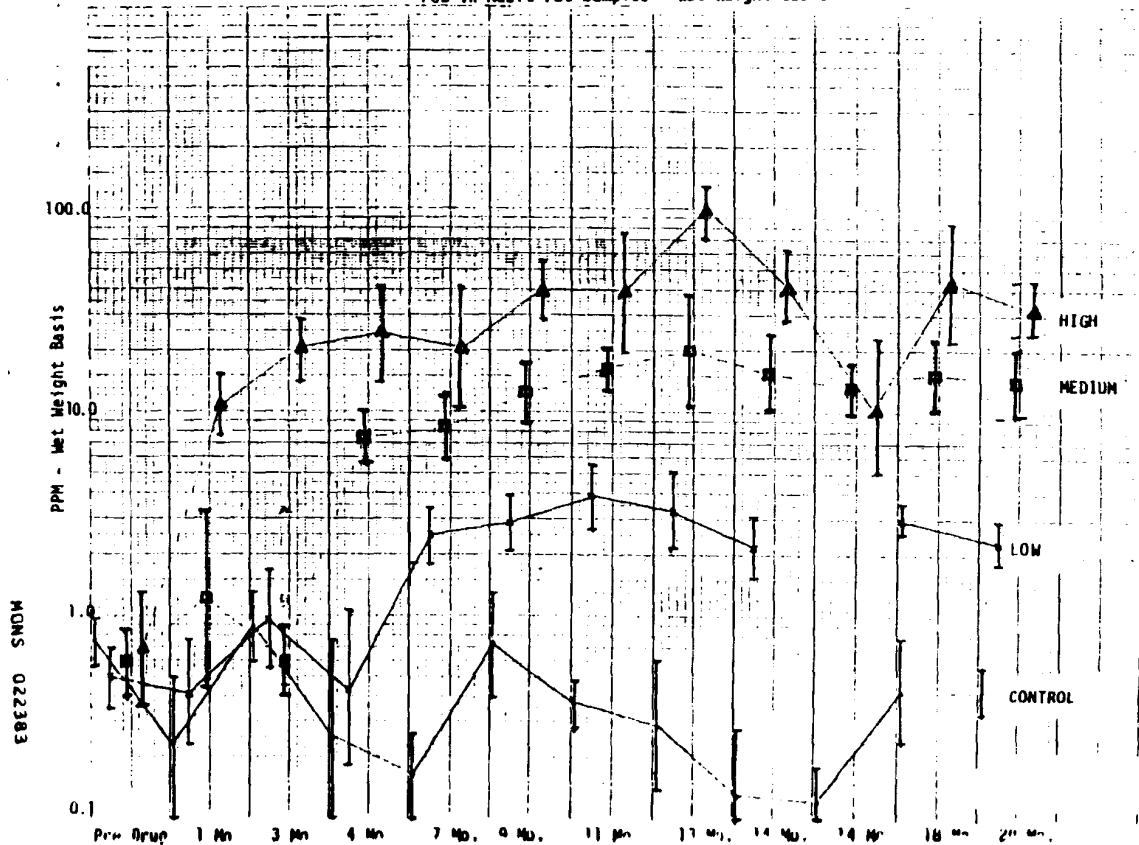


FIGURE 1b

PCB in Adult Fat Samples - Lipid Weight Basis

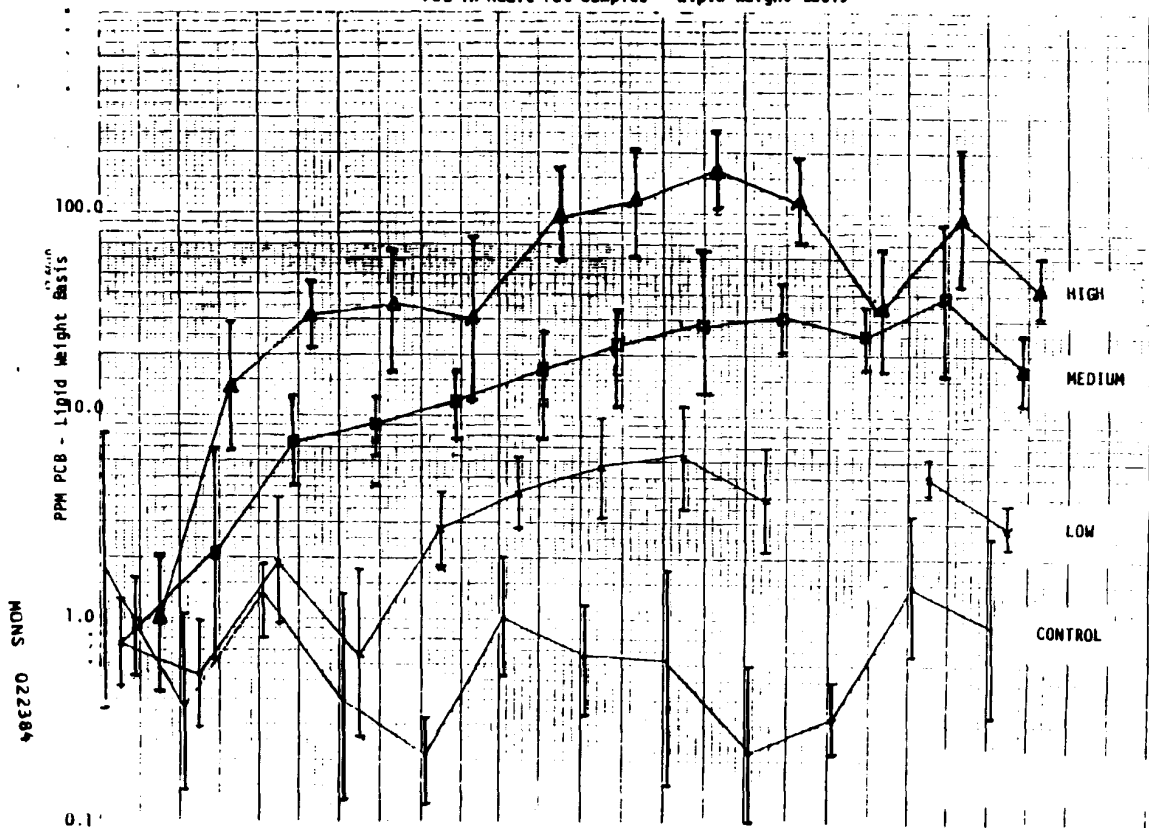


TABLE II

Averages (See Basis) - Treatments and Control

PPM	Table 6 Initial	Table 7 1 Mo.	Table 9 3 Mo.	Table 10 4 Mo.	Table 11 7 Mo.	Table 12 9 Mo.	Table 13 11 Mo.	Table 14 12 Mo.	Table 15 14 Mo.	Table 16 16 Mo.	Table 18 18 Mo.	Table 19 20 Mo.
<u>Wt. Hg. Basis</u>												
Control	0.749	0.236	0.001	0.240	0.163	0.729	0.372	0.292	0.130	0.121	0.435	0.436
Low	0.495	0.422	0.964	0.441	2.503	2.886	3.864	3.355	2.203	--	3.021	2.300
Medium	0.505	1.233	5.993	7.469	8.481	12.432	16.352	20.238	15.860	13.061	16.503	14.018
High	0.608	10.916	20.100	24.393	20.503	39.937	30.926	95.827	42.320	10.020	43.210	32.420
<u>Lipid Hg. Basis</u>												
Control	1.716	0.308	1.240	0.413	0.214	1.039	0.633	0.644	0.255	0.335	1.480	0.931
Low	0.763	0.534	1.965	0.670	2.770	4.200	5.644	6.330	3.914	--	5.065	2.950
Medium	0.915	2.140	7.609	8.858	11.564	17.332	23.565	28.914	30.869	24.974	34.589	17.263
High	0.963	14.181	32.034	35.649	30.030	97.995	114.285	165.530	116.175	34.514	97.086	43.612

TABLE III
Individual Statistical Comparisons
Adult Fat Samples
PCB Found - Wet Weight Basis

1. Pre Drug - No significant differences found.
2. 1 Month - Control significantly lower than pre drug control.
- High level significantly higher than all others.
3. 3 Month - Control significantly higher than 1 month control.
- High level significantly higher than all others.
4. 4 Month - High level significantly higher than all others.
- Medium level significantly higher than low and control.
- Medium level significantly higher than 1 and 3 months medium.
5. 7 Months - All levels differ significantly from one another.
- Low level significantly higher than 4 months low.
6. 9 Months to 20 Months - Levels remain significantly different except for sharp drop in 16 Month high level data. No further increase in amount found.

PCB Found - Lipid Weight Basis

1. Pre Drug - No significant differences found.
2. 1 Month - High level significantly higher than low and control.
3. 3 Month - High, medium and low significantly different from one another. High and medium significantly higher than control.
4. 4 Month - Same as 3 Month.
5. 7 Months - High and medium significantly higher than low and control.
Low significantly higher than control.
6. 9 Months - All levels significantly different from one another.
7. 9 Months to 20 Months - High and medium differ significantly from low and control.
- High significantly higher than medium except 18 and 20 months.
- Low significantly higher than control except 20 months.

Figure 2a

5-21-55-2

Page 17

Adult Liver Samples - Wet Wt. Basis

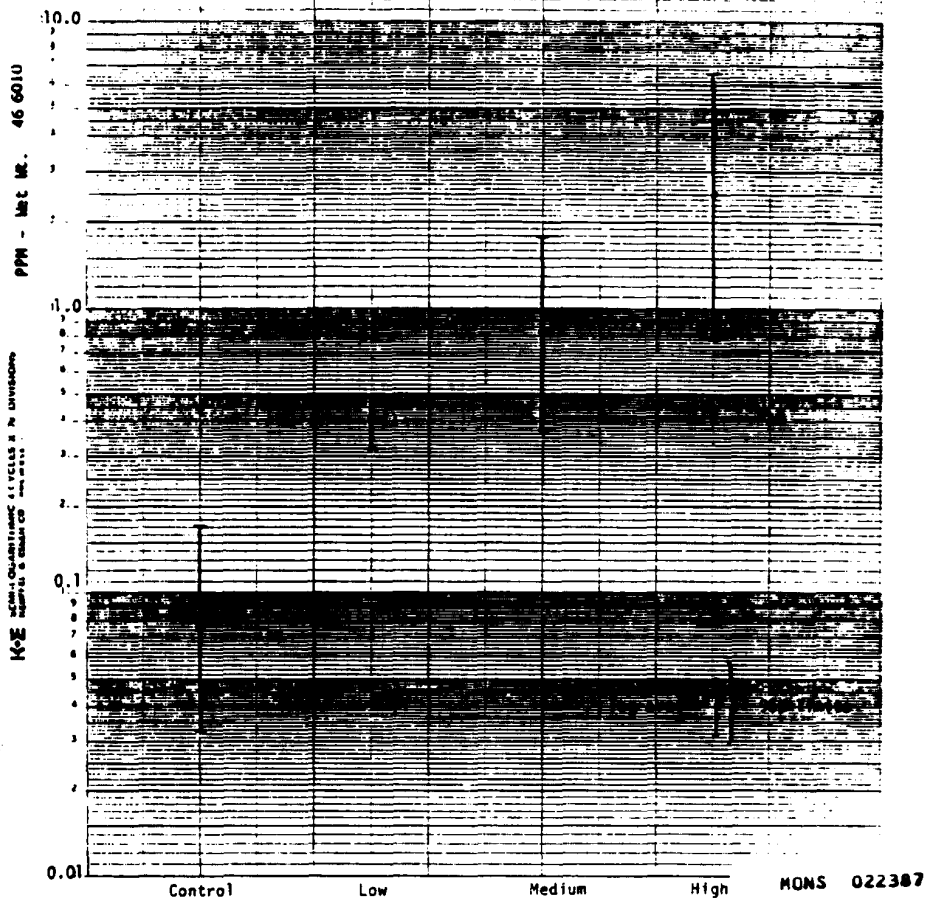


Figure 2b
Adult Liver Samples - Lipid Wt. Basis

S-81-55-2
Page 18

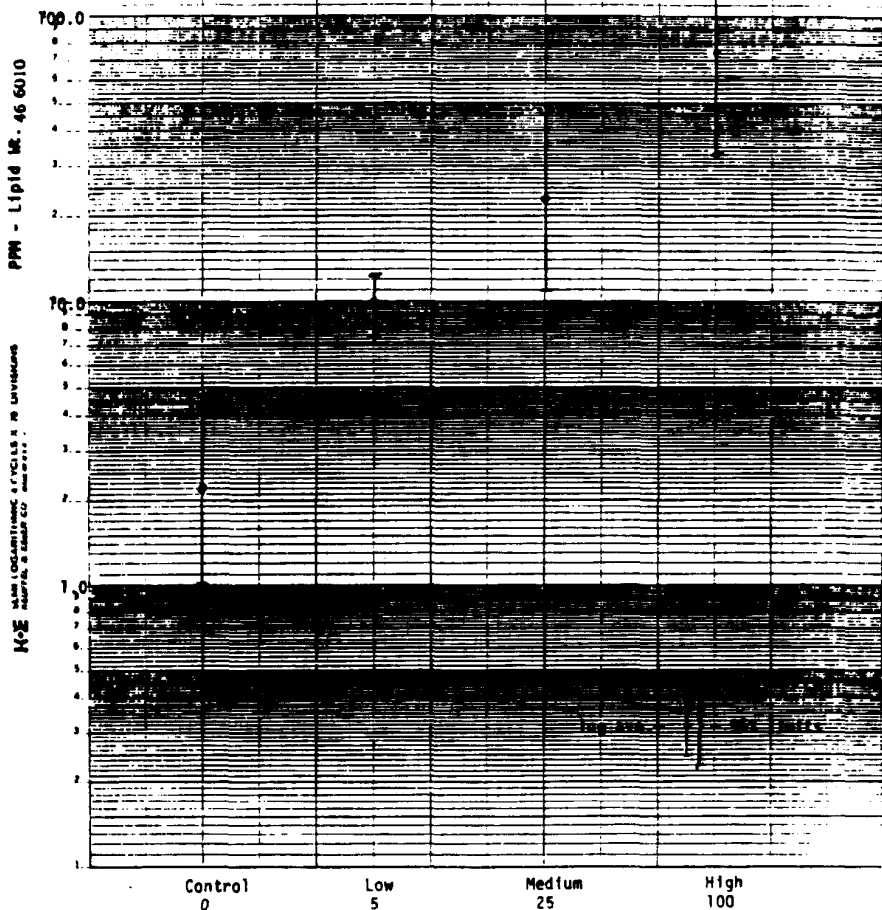


TABLE IV

Baby Skin - Wet Weight Basis - Averages (PPM)

<u>Sample Taken</u>	<u>Level Fed</u>			
	<u>Control</u>	<u>Low</u>	<u>Medium</u>	<u>High</u>
5/24-6/9/78	.083	.175	1.45	1.82
6/19-6/30/78	.396	2.26	2.92	13.80
7/6-7/31/78	.826	2.42	16.60	--
8/8-10/10/78	.650	6.84	13.84	--
10/27-12/11/78	--	1.53	12.59	--

Baby Fat - Wet Weight Basis - Averages (PPM)

<u>Sample Taken</u>	<u>Level Fed</u>			
	<u>Control</u>	<u>Low</u>	<u>Medium</u>	<u>High</u>
6/19-6/30/78	1.04	2.03	8.32	--
7/6-7/31/78	0.70	10.69	98.17	108.89
8/8-10/10/78	0.61	9.04	--	38.90
10/27-12/11/78	--	0.76	18.11	--

TABLE V
PPM PCB Found in Milk Samples

<u>Level Fed</u>	<u>PCB Found</u>
Control (0.00)	.08
	.01
	.03
	.20
	.02
	.03
Low (5 PPM)	0.22
	0.01
	0.01
Medium (25 PPM)	
	0.42
	0.51
	0.46
	0.45
High (100 PPM)	
	0.95

PREPARED BY: John D. Hinchen Date: 8/27/81
J. D. Hinchen
Senior Research Specialist

Applied Sciences
Computer Sciences/
Statistics Group

/bjs

MONS 022391