REPORT TO

MONSANTO COMPANY

TWO-YEAR CHRONIC ORAL TOXICITY WITH AROCLOR 1254 IN ALBINO RATS

NOVEMBER 12, 1971

IBT NO. B7298

I. Introduction

At the request of Monsanto Company, a two-year chronic oral toxicity study was conducted using albino rats to determine the potential toxicity of Aroclor 1254, Lot No. AK-38. The following report represents the results of this investigation.



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II. Summary

A two-year chronic toxicity study was conducted using albino rats fed diets containing 1 (T-I), 10 (T-II) or 100 (T-III) ppm Aroclor 1254. Food consumption was not altered in any test group. Body weight gains of test and control animals did not differ after 3 or 12 months of testing. After 24 months females fed 100 ppm Aroclor 1254 had gained less weight than the control females. Weight gains of the male rats did not differ from the controls. The number of animals dying and the time at which death occurred did not differ among test and control groups.

Hematological and clinical blood chemistry studies conducted after 3, 6, 9, 12, 18, or 24 months did not reveal any affects related to Aroclor 1254. Urine analyses failed to reveal any difference between test and control rats.

At sacrifice after 3, 6, or 12 months on test, organ weights, organ to body weight and organ to brain weight ratios disclosed several randomly occurring intergroup differences. The lack of any consistent dose related response and the absence of any deleterious histopathologic change confirm that these differences were not related to the ingestion of Aroclor 1254.

At the final sacrifice after 24 months on test, the absolute liver weight and liver to body weight or brain weight ratios were significantly elevated in both T-III males and females. Histologic examinations of the livers from the T-III group revealed several animals with vacuolar change.

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This lesion is morphologically indicative of fatty degeneration. Specific fat stains confirmed the presence of fat in these vacuoles. Focal hypertrophy and focal hyperplasia were also found in the livers from animals fed Aroclor 1254.

Hyperplasia of the urinary bladder was found in animals from the control group and from each of the test groups. This hyperplasia was usually associated with cystitis.

None of the tumors found could be related to the ingestion of Aroclor 1254 and are considered normal for a random population of rats this age.

Respectfully submitted,

INDUSTRIAL BIO-TEST LABORATORIES, INC.

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III. Procedure

A. Experimental Animals

The animals employed in the test were Charles River Strain* albino rats. Four hundred rats (200 male and 200 female) were selected for the experiment, ear-punched with the animal number assigned and housed individually in standard wire-bottomed steel rat cages. Each cage bore a color-coded card identifying the rat with respect to project number, dietary level assignment, individual number and sex.

B. Organization of Groups

A structural outline of the experiment is given in Table I.

TABLE I

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Outline of Experiment

Group	Number of Animals Male	Females	Dietary Level (ppm)
Control	50	50	None Administered
T-I	50	50	1
T-II	50	50	10
T-III	50	50	100

* Charles River Breeding Laboratories, North Wilmington, Mass.

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C. Diets, Feeding and Food Consumption

All diets were prepared in the central diet room of this laboratory. The basic ration from which all diets were constructed was a standard, pulverized stock rat ration*. The diet for any given test group was prepared by blending the calculated amount of Aroclor 1254 with a pre-weighed portion of the stock ration in a Hobart mixer.

Fresh diets were prepared each week and every rat was offered an amount of food sufficient for ad libitum feeding.

Food consumption was recorded for five rats of each sex in every group weekly for the first three months and monthly for the next nine months. Thereafter, periodic spot checks were made.

D. Body Weights and Weight Gains

Initially, the body weight of each rat in every group was determined and recorded. Thereafter, individual weighings were made weekly for the first 13 weeks and monthly thereafter until the conclusion of the investigation.

E. Mortality and Reactions

Checks for mortality and abnormal behavioral reactions were made daily throughout the investigation.

F. Hematologic Studies and Urine Analyses

Blood studies, including determinations of hemoglobin concentration, hematocrit value, erythrocyte count and both total and differential

* Purina Rat Chow, Ralston Purina Co. St. Louis, Mo.

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leukocyte counts, were conducted upon five males and five females from both the control and 100 ppm groups.

Urine analyses for the presence of glucose, albumin, microscopic elements, and determinations of pH and specific gravity were conducted upon urine samples at the same time intervals and from the same animals as those employed for the blood studies.

These studies were conducted after 3, 6, 9, 12, 18, and 24 months of feeding.

G. Clinical Blood Chemistry Studies

Determinations of blood urea nitrogen concentration (BUN), serum alkaline phosphatase activity (SAP), fasted blood glucose concentration and serum glutamic-pyruvic transaminase activity (SGPT) were conducted after 3, 6, 9, 12, 18, and 24 months of feeding upon the same rats as were the routine blood studies.

H. Pathologic Studies

When an animal succumbed during the test period, a gross autopsy was performed. In those case when postmortem autolysis was not advanced, representative tissues were taken and preserved in ten percent formalin solution for possible future histopathologic study.

After 3, 6, and 12 months of testing, five animals of each sex from each group were sacrificed and subjected to complete gross pathologic examinations.

Absolute organ weights were recorded and organ to body weight and organ to brain weight ratios computed. The following organs were

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included: liver, kidneys, spleen, gonads, heart and brain. These data were then subjected to statistical analysis. An Analysis of Variance was conducted first and significant effects disclosed by that treatment were further studies by "t"-tests.

Complete microscopic examinations were conducted upon the tissues and organs from all control and 100 ppm group animals sacrificed after 3, 6, or 12 months of testing. The following tissues and organs were included in the examinations: heart, trachea, lungs, liver, pancreas, esophagus, stomach, small intestine (duodenum, jejunum and ileum), caecum, colon, spleen, lymph nodes, kidneys, urinary bladder, gonads, prostate gland, seminal vesicles, uterus, pituitary gland, adrenal glands, salivary glands, thyroid gland, parathyroid glands, skeletal muscle, sternum, bone, peripheral nerve, spinal cord and brain (cerebrum, cerebellum and pons).

The aforementioned tissues were prepared and stained with Hematoxylin-Eosin stain.

After two years of feeding, all surviving animals were sacrificed and subjected to complete gross pathologic examination.

The absolute weights of the liver, kidneys, spleen, gonads, heart and brain were recorded immediately after sacrifice.

Microscopic examinations were conducted upon tissues and organs from selected animals dying during the experiment and upon all animals from the final sacrifice.

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Tissues and organs examined were the same as those previously mentioned.

I. Tumor Incidence and Classification

A tabulation of the incidence of tumor formation in each group was made at the conclusion of the investigation. In addition, tumor data for individual animals including location, weight, size and pathologic classification were recorded.

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IV. Results

A. Body Weights and Weight Gains

The male and female body weight data are assembled in Table II. The data in this table also include the 3, 12 and 24 month total weight gains.

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TABLE II

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Body Weight and Total Weight Gain Data

Summary of Mean Values

Dietary Level of Aroclor 1254 (ppm)	Sex	Body Weight (grams) Week: 0	1	2	3	4	5	6	7	8	9	10	11	12	13	90-Day Total Weight Gain (grams/rat)
Control	M	133	203	245	313	362	373	391	409	424	440	440	449	467	474	341
	F	136	178	190	219	244	254	259	265	270	276	281	278	290	288	152
1	M	133	206	253	322	364	373	396	425	436	457	470	483	490	509	376
	F	136	171	190	213	235	246	248	250	259	270	270	274	279	285	149
10	M	133	209	251	325	375	394	402	410	432	453	470	488	494	508	376
	F	136	171	194	220	243	263	289	293	281	272	276	274	280	288	152
100	M	133	207	260	324	365	375	295	419	428	440	450	469	480	486	353
	F	136	174	197	223	242	254	276	290	281	268	270	274	277	280	144

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TABLE II continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Body Weight and Total Weight Gain Data

Summary of Mean Values

Dietary Level of Aroclor 1254 (ppm)	Sex	Body Weight (grams) Month: 4	5	6	7	8	9	10	11	12	12-Month Total Weight Gain (grams/rat)
Control	M	498	533	565	593	622	642	667	688	701	568
	F	297	310	322	333	345	359	374	383	390	254
1	M	522	550	581	604	633	658	680	715	725	592
	F	289	295	307	322	333	340	354	367	380	244
10	M	529	567	593	621	642	667	681	700	726	593
	F	300	308	321	330	341	354	367	380	392	256
100	M	495	521	541	562	586	608	627	642	664	531
	F	292	300	306	316	321	326	332	340	347	211

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TABLE II continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Body Weight and Total Weight Gain Data

Summary of Mean Values

Dietary Level of Aroclor 1254 (ppm)	Sex	Body Weight (grams) Month: 13	14	15	16	17	18	19	20	21	22	23	24	24-Month Total Weight Gain (grams/rat)
Control	M	728	746	759	768	769	767	760	758	739	726	687	642	509
	F	426	444	466	481	500	515	533	547	551	550	564	551	415
1	M	760	780	807	800	802	795	786	769	750	728	715	656	523
	F	401	426	476	483	493	510	521	532	537	542	553	540	404
10	M	746	774	824	780	804	826	823	821	813	800	767	762	629
	F	421	433	485	466	475	481	485	492	298	500	471	500	364
100	M	688	714	735	730	733	726	716	700	685	652	628	656	523
	F	360	367	392	374	381	394	393	398	401	400	395	411	275**

** Statistically significant at the 99 percent confidence limit.

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B. Food Consumption

The data obtained from the food consumption measurements conducted during the first 12 months of feeding are summarized in Table III.

These data revealed no significant difference between test and control rats. The periodic checks conducted during the remainder of the investigation also revealed no outstanding differences between test and control animals.

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TABLE III

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Food Consumption Data

Summary of Mean Values

Dietary Level of Aroclor 1254 (ppm)	Sex	Food Consumption (grams/rat/seven days) Week: 1	2	3	4	5	6	7	8	9	10	11	12	13	Average Food Consumption (grams/rat/seven days)
Control	M	94	160	175	163	137	137	225	197	204	188	191	194	196	174
	F	73	140	144	107	104	133	208	154	165	151	146	150	151	140
1	M	112	148	156	168	148	214	160	193	218	186	184	187	189	174
	F	87	117	108	118	113	203	105	137	149	144	144	147	146	132
10	M	116	139	148	164	163	221	201	199	216	191	192	200	199	181
	F	90	109	107	114	121	193	159	134	144	150	151	152	149	136
100	M	116	172	163	185	231	185	189	198	185	197	189	189	121	187
	F	89	141	98	129	129	190	146	146	145	139	137	146	193	152

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TABLE III continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Food Consumption Data

Summary of Mean Values

Dietary Level of Aroclor 1254 (ppm)	Sex	Food Consumption (grams/rat/seven days) Month: 4	5	6	7	8	9	10	11	12	Average Food Consumption (grams/rat/seven days)
Control	M	196	189	168	147	163	184	179	170	187	176
	F	148	154	136	121	138	152	160	141	127	142
1	M	189	181	184	198	190	190	197	152	190	186
	F	141	159	147	162	145	150	151	123	126	145
10	M	190	191	189	196	190	188	191	186	163	187
	F	139	138	148	148	150	145	138	142	149	144
100	M	179	168	190	179	187	182	197	180	188	183
	F	148	141	144	162	163	151	148	141	137	148

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C. Mortality and Reactions

A frequency distribution of natural deaths occurring during the investigation appears in Table IV.

No untoward behavioral reactions were noted among any of the animals employed in the investigation.

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TABLE IV

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Mortality Data

Frequency Distribution of Deaths

Dietary Level (ppm)	Sex	Frequency Distribution of Deaths Months: 1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	Total Dead Number Tested*
Control	M	0	0	0	2	1	7	6	9	25/35
	F	0	0	0	1	3	5	7	3	19/35
1	M	0	0	0	2	5	6	8	9	30/35
	F	2	0	0	1	2	1	5	3	14/35
10	M	0	0	0	1	3	5	8	10	27/35
	F	0	1	1	4	2	3	4	7	22/35
100	M	0	0	1	3	2	5	7	9	27/35
	F	1	0	2	4	4	2	4	6	23/35

* Does not include the five animals of each sex from every group sacrificed for interim pathologic studies.

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D. Hematologic and Clinical Blood Chemistry Studies

Mean male and female hematologic and clinical blood chemistry data are summarized in Tables V through IX.

Values for all parameters investigated were within the normal range for the albino rat. No significant differences between test and control values were observed.

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TABLE V

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Hematologic Data

Summary of Mean Values

Dietary Level (ppm)	Sex	Total Leukocyte Count (thousands/mm^3) Month: 3	6	9	12	18	24	Erythrocyte Count (millions/mm^3) Month: 3	6	9	12	18	24
Control	M	14.0	15.4	10.1	11.1	9.9	11.2	8.1	8.2	8.7	8.8	7.6	6.5
	F	9.1	9.4	6.7	7.6	8.8	7.6	7.5	7.7	7.3	7.8	7.7	6.8
100	M	15.1	15.2	10.9	11.0	9.8	10.2	7.5	7.7	8.1	7.7	8.0	8.0
	F	11.6	12.2	7.3	8.7	6.6	11.8	7.5	7.6	7.7	6.9	7.3	6.4

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TABLE VI

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Hematologic Data

Summary of Mean Values

Dietary Level (ppm)	Sex	Hemoglobin Concentration (g/100 ml) Month: 3	6	9	12	18	24	Hematocrit Value (%) Month: 3	6	9	12	18	24
Control	M	17.1	17.7	15.7	17.6	16.1	13.6	51	49	48	50	41	35
	F	16.9	17.4	14.1	16.7	16.4	14.6	50	47	43	46	42	38
100	M	15.6	17.6	13.8	15.6	15.7	15.3	47	47	42	44	41	40
	F	16.5	17.8	13.9	14.5	14.5	12.7	48	47	42	40	37	32

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TABLE VII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Hematologic Data

Summary of Mean Values

Dietary Level (ppm)	Sex	Differential Leukocyte Count (Number of Cells per Hundred) Lymphocytes Month: 3	6	9	12	18	24	Neutrophils Month: 3	6	9	12	18	24
Control	M	82.0	86.6	80.4	78.8	79.0	65.4	16.0	11.4	18.6	20.6	20.0	32.2
	F	83.0	86.6	86.8	89.0	70.2	61.4	15.4	11.6	11.8	10.0	29.2	36.0
100	M	88.2	79.6	85.8	85.2	69.8	68.0	10.8	20.2	13.8	14.2	29.0	30.2
	F	92.2	92.0	79.6	84.6	79.0	61.0	7.4	7.8	20.2	15.0	20.4	37.6

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TABLE VII continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Hematologic Data

Summary of Mean Values

Dietary Level (ppm)	Sex	Differential Leukocyte Count (Number of Cells per Hundred) Monocytes Month: 3	6	9	12	18	24	Eosinophils Month: 3	6	9	12	18	24
Control	M	0.6	0.0	0.0	0.4	0.2	1.2	1.4	2.0	1.0	0.2	0.8	1.6
	F	0.6	0.0	0.0	0.0	0.2	1.0	1.0	1.8	1.4	0.2	0.6	1.6
100	M	0.0	0.0	0.0	0.0	0.0	0.8	1.0	0.2	0.4	0.6	1.2	1.0
	F	0.0	0.0	0.0	0.0	0.0	1.0	0.4	0.2	0.2	0.4	0.6	0.4

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TABLE VII continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Hematologic Data

Summary of Mean Values

Dietary Level (ppm)	Sex	Differential Leukocyte Count (Number of Cells per Hundred) Basophils Month: 3	6	9	12	18	24
Control	M	0.0	0.0	0.0	0.0	0.0	0.0
	F	0.0	0.0	0.0	0.0	0.0	0.0
100	M	0.0	0.0	0.0	0.0	0.0	0.0
	F	0.0	0.0	0.0	0.0	0.0	0.0

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TABLE VIII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Hematologic Data

Summary of Mean Values

Dietary Level (ppm)	Sex	Serum Glutamic-Pyruvic Transaminase Activity (Dade Units) Month: 3	6	9	12	18	24	Blood Urea Nitrogen Concentration (mgs %) Month: 3	6	9	12	18	24
Control	M	38	48	45	45	42	36	17	15	12	10	14	15
	F	33	39	38	42	32	30	14	16	15	9	13	11
100	M	33	32	43	50	38	41	14	15	13	12	11	15
	F	32	46	49	61	46	78	16	15	13	14	13	15

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TABLE IX

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Hematologic Data

Summary of Mean Values

Dietary Level (ppm)	Sex	Fasted Blood Glucose Concentration (mgs %) Month: 3	6	9	12	18	24	Serum Alkaline Phosphatase Activity (King-Armstrong Units) Month: 3	6	9	12	18	24
Control	M	128	123	89	88	138	99	28.6	24.7	21.5	20.3	16.2	22.3
	F	130	118	115	92	134	109	18.9	17.8	10.6	11.9	16.8	20.2
100	M	109	113	129	128	124	115	35.4	23.2	27.4	27.1	14.6	23.5
	F	120	107	124	113	132	107	17.1	18.1	19.3	16.7	10.0	21.6

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E. Urine Analyses

Mean male and female urine analyses data are summarized in Tables X through XII.

No differences were noted between the urine from control and test animals at the intervals of examination.

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TABLE X

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Urine Analyses Data

Summary of Mean Values

Dietary Level (ppm)	Sex	Glucose Month: 3	6	9	12	18	24	Albumin Month: 3	6	9	12	18	24
Control	M	n	n	n	n	n	n	n	n	t	t	+2	+3
	F	n	n	n	n	n	n	n	n	n	n	t	+2
100	M	n	n	n	n	n	n	n	n	t	t	t	+2
	F	n	n	n	n	n	n	n	n	t	t	t	+3

Key:
n = negative
t = trace; less than 30 mg/100 ml urine
+1 = 30 to 100 mg/100 ml urine
+2 = 100 to 300 mg/100 ml urine
+3 = 300 to 500 mg/100 ml urine
+4 = more than 500 mg/100 ml urine

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TABLE XI

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Urine Analyses Data

Summary of Mean Values

Dietary Level (ppm)	Sex	Microscopic Elements Month: 3	6	9	12	18	24	pH Month: 3	6	9	12	18	24
Control	M	N	n	n	n	n	+1	7	7	6	7	7	6
	F	n	n	n	n	t	t	8	8	7	8	6	6
[illegible]	M	n	n	n	n	t	t	7	7	6	7	6	6
	F	n	n	n	N	t	t	8	8	7	7	6	6

Key:
N = Normal
n = negative
t = trace; less than 5 per low power field
+1 = 5 to 10 per low power field
+2 = 10 to 15 per low power field
+3 = more than 15 per low power field

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TABLE XII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Urine Analyses Data

Summary of Mean Values

Dietary Level (ppm)	Sex	Specific Gravity Month: 3	6	9	12	18	24
Control	M	1.029	1.022	1.033	1.027	1.042	1.051
	F	1.020	1.019	1.025	1.024	1.032	1.039
100	M	1.018	1.021	1.029	1.027	1.037	1.027
	F	1.020	1.018	1.023	1.022	1.029	1.031

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F. Pathologic Studies

1. Three-Month Sacrifice

a. Gross Pathologic Findings

No outstanding differences were noted between test and control rats upon gross pathological examination.

b. Organ Weight and Organ to Body and Organ to Brain Weight Ratio Data

The results of the statistical analyses conducted on absolute organ weights, organ to body weight and organ to brain weight ratios are summarized in Tables XIII through XVIII.

Significant differences between a test group and the control group are designated by asterisks following the test values.

Organ weights, organ to body weight and organ to brain weight ratios disclosed several randomly occurring intergroup differences. The lack of any consistent dose related response and the absence of any deleterious histopathologic change confirm that these differences were not related to the ingestion of Aroclor 1254.

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TABLE XIII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Three-Month Sacrifice

Summary of Mean Values

Organ: Liver

Dietary Level of Aroclor 1254 (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	21.4	13.0	4.13	4.16	10.3	6.82
1	24.0	13.5	4.34	4.34	11.7	6.85
10	22.8	13.1	4.59	4.29	10.9	6.85
100	28.0*	13.8	5.25	4.89	14.6**	7.11

* Statistically significant difference at the 95 percent confidence level.
** Statistically significant difference at the 99 percent confidence level.

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TABLE XIV

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Three-Month Sacrifice

Summary of Mean Values

Organ: Kidneys

Dietary Level of Aroclor 1254 (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	4.03	2.49	0.782	0.802	1.95	1.31
1	4.30	2.62	0.778	0.845	2.09	1.32
10	4.05	2.61	0.821	0.852	1.94	1.36
100	4.21	2.74	0.792	0.975	2.19	1.42

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TABLE XV

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Three-Month Sacrifice

Summary of Mean Values

Organ: Spleen

Dietary Level of Aroclor 1254 (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	0.766	0.578	0.150	0.184	0.371	0.302
1	0.942	0.668	0.167	0.217	0.454	0.338
10	0.766	0.586	0.154	0.191	0.368	0.308
100	0.814	0.542	0.153	0.192	0.425	0.281

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TABLE XVI

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Three-Month Sacrifice

Summary of Mean Values

Organ: Gonads

Dietary Level of Aroclor 1254 (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	3.60	0.114	0.698	0.0370	1.74	0.0599
1	3.50	0.134	0.637	0.0431	1.70	0.0675
10	3.55	0.110	0.720	0.0361	1.70	0.0568
100	3.82	0.120	0.718	0.0426	1.99	0.0618

GBRN002294

LEXOLDMON002631

TABLE XVII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Three-Month Sacrifice

Summary of Mean Values

Organ: Heart

Dietary Level of Aroclor 1254 (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	1.59	1.05	0.307	0.339	0.767	0.551
1	1.56	1.02	0.283	0.332	0.756	0.516
10	1.49	0.984	0.302	0.322	0.713	0.515
100	1.58	0.992	0.297	0.352	0.817	0.512

GBRN002295

LEXOLDMON002632

TABLE XVIII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Three-Month Sacrifice

Summary of Mean Values

Organ: Brain

Dietary Level of Aroclor 1254 (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Final Body Weights of Sacrificed Rats (g)	
	Males	Females	Males	Females	Males	Females
Control	2.07	1.91	0.402	0.616	518	314
1	2.07	1.99	0.376	0.647	553	311
10	2.09	1.91	0.424	0.625	499	307
100	1.95	1.94	0.366	0.688	434	281

GBRN002296

LEXOLDMON002633

c. Histopathologic Findings

Histopathologic examination of tissues and organs taken from all animals from both the control and 100 ppm groups was conducted.

Tables XIX and XX list all histopathologic changes noted.

All of the lesions noted in the microscopic examination of tissues were those of spontaneous disease and are not unusual for the albino rat. The most frequent findings were lesions in the trachea and lungs, indicating chronic murine pneumonia. These occurred in the control as well as the rats fed Aroclor 1254.

LEXOLDMON002634

TABLE XIX

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Three-Month Sacrifice

Group: Control

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
5 Males	Trachea	Tracheitis	1	1.0
	Lung	Chronic respiratory disease	1	1.0
	Urinary Bladder	Hyperplasia	3	1.0
5 Females	Lung	Chronic respiratory disease	1	1.0

All other tissues and organs were normal histologically.

Grading System

0.5 = minimal
1.0 = slight
2.0 = mild
3.0 = moderate
4.0 = severe
5.0 = extreme

LEXOLDMON002635

TABLE XX

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Three-Month Sacrifice

Group: 100 ppm

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
5 Males	Trachea	Tracheitis	1	1.0
	Lung	Chronic respiratory disease	3	1.0
5 Females	Trachea	Tracheitis	1	1.0

All other tissues and organs were normal histologically.

Grading System

0.5 = minimal
1.0 = slight
2.0 = mild
3.0 = moderate
4.0 = severe
5.0 = extreme

LEXOLDMON002636

2. Six-Month Sacrifice

a. Gross Pathologic Findings

No outstanding differences were noted between test and control animals.

b. Organ Weight and Organ to Body and Organ to Brain Weight Ratio Data

The results of the statistical analyses conducted on absolute organ weights, organ to body weight and organ to brain weight ratios are summarized in Tables XXI through XXVI.

Organ weights, organ to body weight and organ to brain weight ratios disclosed several randomly occurring intergroup differences. The lack of any consistent dose related response and the absence of any deleterious histopathologic change confirm that these differences were not related to the ingestion of Aroclor 1254.

LEXOLDMON002637

TABLE XXI

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Six-Month Sacrifice

Summary of Mean Values

Organ: Liver

Dietary Level of Aroclor 1254 (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	22.9	13.1	3.74	3.77	11.7	6.71
1	16.1**	10.3*	3.01**	3.11**	7.45**	5.54*
10	12.9**	9.54*	2.81**	2.94**	6.29**	4.99*
100	19.2	12.4	4.14	4.40	10.0	6.39

* Statistically significant difference at the 95 percent confidence level.
** Statistically significant difference at the 99 percent confidence level.

GBRN002301

LEXOLDMON002638

TABLE XXII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Six-Month Sacrifice

Summary of Mean Values

Organ: Kidneys

Dietary Level of Aroclor 1254 (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	4.04	2.79	0.664	0.806	2.06	1.43
1	3.80	2.58	0.715	0.784	1.75*	1.39
10	3.22*	2.50	0.703	0.780	1.57*	1.31
100	3.23*	2.43	0.700	0.861	1.68*	1.25

* Statistically significant difference at the 95 percent confidence level.

GBRN002302

LEXOLDMON002639

TABLE XXIII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Six-Month Sacrifice

Summary of Mean Values

Organ: Spleen

Dietary Level of Aroclor 1254 (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	0.752	0.684	0.122	0.196	0.384	0.350
1	0.830	0.602	0.155	0.182	0.384	0.324
10	0.588	0.594	0.128	0.184	0.287	0.311
100	0.684	0.512	0.150	0.180	0.356	0.264

GBRN002303

LEXOLDMON02640

TABLE XXIV

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Six-Month Sacrifice

Summary of Mean Values

Organ: Gonads

Dietary Level of Aroclor 1254 (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	3.55	0.0960	0.593	0.0279	1.81	0.0492
1	3.67	0.0922	0.691	0.0280	1.70	0.0496
10	3.30	0.0868	0.724	0.0272	1.61	0.0454
100	3.44	0.104	0.747	0.0364	1.79	0.0536

GBRN002304

LEXOLDMON002641

TABLE XXV

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Six-Month Sacrifice

Summary of Mean Values

Organ: Heart

Dietary Level of Aroclor 1254 (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	1.70	1.05	0.282	0.302	0.867	0.538
1	1.58	1.04	0.298	0.316	0.731	0.559
10	1.44	1.03	0.314	0.320	0.702	0.539
100	1.40	1.02	0.301	0.361	0.729	0.526

GBRND02305

LEXOLDMON002642

TABLE XXVI

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Six-Month Sacrifice

Summary of Mean Values

Organ: Brain

Dietary Level of Aroclor 1254 (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Final Body Weights of Sacrificed Rats (g)	
	Males	Females	Males	Females	Males	Females
Control	1.96	1.95	0.320	0.560	613	348
1	2.16	1.86	0.404*	0.562	534	331
10	2.05	1.91	0.447**	0.593	459	322
100	1.92	1.94	0.414**	0.681*	464	285

* Statistically significant difference at the 95 percent confidence level.
** Statistically significant difference at the 99 percent confidence level.

GBRN002306

LEXOLDMON002643

c. Histopathologic Findings

Histopathologic examination of tissues and organs taken from all animals from both the control and 100 ppm groups was conducted.

Tables XXVII and XXVIII list all histopathologic changes noted.

All of the lesions noted in the microscopic examination of tissues were those of spontaneous disease and are not unusual for the albino rat. The most frequent findings were lesions in the trachea and lungs, indicating chronic murine pneumonia. These occurred in the control as well as the rats fed Aroclor 1254.

LEXOLDMON002644

TABLE XXVII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Six-Month Sacrifice

Group: Control

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
5 Males	Trachea	Tracheitis	2	1.5
		Focal tracheitis	2	1.0
	Lung	Focal pneumonitis	1	0.5
		Hyperemia	2	1.0
	Liver	Focal pericholangitis	1	1.0
	Skeletal Muscle	Focal inflammation	1	1.0
5 Females	Trachea	Focal tracheitis	1	1.0
	Lung	Hyperemia	2	2.5
	Liver	Hyperemia	1	1.0
		Pericholangitis	1	0.5
	Kidney	Focal inflammation	1	1.0

All other tissues and organs were normal histologically.

Grading System

0.5 = minimal
1.0 = slight
2.0 = mild
3.0 = moderate
4.0 = severe
5.0 = extreme

LEXOLDMON002645

TABLE XXVIII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Six-Month Sacrifice

Group: 100 ppm

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
5 Males	Trachea	Tracheitis	2	2.0
		Focal tracheitis	1	1.0
	Lung	Focal pneumonitis	3	0.5
	Liver	Focal pericholangitis	1	2.0
	Kidney	Focal nephritis	1	0.5
5 Females	Heart	Myocarditis	1	0.5
	Trachea	Focal tracheitis	3	0.5
	Lung	Focal pneumonitis	4	1.0
		Hyperemia	1	1.0
	Kidney	Focal nephritis	2	3.0

All other tissues and organs were normal histologically.

Grading System

0.5 = minimal
1.0 = slight
2.0 = mild
3.0 = moderate
4.0 = severe
5.0 = extreme

GBRN002309

LEXOLDMON002646

3. Twelve-Month Sacrifice

a. Gross Pathologic Findings

Gross pathologic findings among test animals were not significantly different from those noted in control animals.

b. Organ Weight and Ratio Data

The mean organ weight and ratio data collected at the 12-month sacrifice are presented in Tables XXIX through XXXIV.

Statistically significant differences, are designated by asterisks following the test group value.

Organ weights, organ to body weight and organ to brain weight ratios disclosed several randomly occurring intergroup differences. The lack of any consistent dose related response and the absence of any deleterious histopathologic change confirm that these differences were not related to the ingestion of Aroclor 1254.

LEXOLDMON002647

TABLE XXIX

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Twelve-Month Sacrifice

Organ Weight and Ratio Data

Summary of Mean Values

Organ: Liver

Dietary Level (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	22.1	15.5	3.79	3.52	10.8	7.72
1	20.6	12.9	3.09*	3.41	9.89	7.29
10	23.5	14.6	3.52	4.34	11.2	7.34
100	27.1*	12.2	4.58*	3.43	12.7	6.30

* Statistically significant difference at the 95 percent confidence level.

Bio-Test Laboratories, Inc.

6BRN002311

LEXOLDMON002648

TABLE XXX

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Twelve-Month Sacrifice

Organ Weight and Ratio Data

Summary of Mean Values

Organ: Kidneys

Dietary Level (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	4.04	3.19	0.692	0.738	1.97	1.58
1	4.09	2.75	0.618	0.728	1.98	1.55
10	4.64	2.76*	0.697	0.817	2.21	1.39
100	4.39	2.78*	0.740	0.796	2.06	1.44

* Statistically significant difference at the 95 percent confidence level.

GBRN002312

LEXOLDMON002649

TABLE XXXI

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Twelve-Month Sacrifice

Organ Weight and Ratio Data

Summary of Mean Values

Organ: Spleen

Dietary Level (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	0.778	0.796	0.133	0.183	0.380	0.396
1	0.714	0.484*	0.107	0.129	0.344	0.271
10	0.904	0.548	0.135	0.161	0.430	0.275
100	0.754	0.976	0.126	0.280	0.352	0.517

* Statistically significant difference at the 95 percent confidence level.

GBRN002313

LEXOLDMON002650

TABLE XXXII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Twelve-Month Sacrifice

Organ Weight and Ratio Data

Summary of Mean Values

Organ: Gonads

Dietary Level (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	3.46	0.116	0.592	0.0275	1.70	0.0574
1	3.68	0.111	0.557	0.0294	1.78	0.0624
10	3.68	0.0918	0.550	0.0270	1.75	0.0461
100	3.56	0.121	0.603	0.0334	1.67	0.0624

GBRN002314

LEXOLDMON02651

TABLE XXXIII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Twelve-Month Sacrifice

Organ Weight and Ratio Data

Summary of Mean Values

Organ: Heart

Dietary Level (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	1.71	1.23	0.293	0.286	0.835	0.609
1	1.68	1.13	0.255	0.301	0.812	0.635
10	1.84	1.08**	0.275	0.322	0.875	0.544*
100	1.69	1.14	0.284	0.325	0.795	0.589

* Statistically significant difference at the 95 percent confidence level.
** Statistically significant difference at the 99 percent confidence level.

GBRND02315

LEXOLDMON002652

TABLE XXXIV

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Twelve-Month Sacrifice

Organ Weight and Ratio Data

Summary of Mean Values

Organ: Brain

Dietary Level (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Final Body Weight of Sacrificed Animals (grams)	
	Males	Females	Males	Female	Males	Females
Control	2.04	2.02	0.35	0.474	584	439
1	2.08	1.78	0.315	0.475	665	380
10	2.10	1.99	0.315	0.591	669*	338*
100	2.14	1.93	0.361	0.552	596	355

* Statistically significant difference at the 95 percent confidence level.

GBRN002316

LEXOLDMON002653

c. Histopathologic Findings

Histopathologic examination of tissues taken from each rat sacrificed from the control and 100 ppm groups after 12 months of testing was conducted.

Tables XXXV and XXXVI list all histopathologic changes noted.

LEXOLDMON002654

TABLE XXXV

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Twelve-Month Sacrifice

Group: Control

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
5 Males	Trachea	Tracheitis	1	1.0
	Lung	Chronic respiratory disease	2	1.0
	Urinary Bladder	Calculus	1	1.0
5 Females	Trachea	Tracheitis	1	1.0
	Lung	Chronic respiratory disease	1	1.0
	Colon	Parasites	1	1.0

All other tissues and organs were normal histologically.

Grading System

0.5 = minimal
1.0 = slight
2.0 = mild
3.0 = moderate
4.0 = severe
5.0 = extreme

LEXOLDMON002655

TABLE XXXVI

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Twelve-Month Sacrifice

Group: 100 ppm

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
5 Males	Lung	Chronic respiratory disease	4	1.0
5 Females	Heart	Focal myocarditis	1	1.0
	Trachea	Tracheitis	1	1.0
	Lung	Chronic respiratory disease	1	1.0
	Adrenal	Congestion	1	1.0

All other tissues and organs were normal histologically.

Grading System

0.5 = minimal
1.0 = slight
2.0 = mild
3.0 = moderate
4.0 = severe
5.0 = extreme

LEXOLDMON002656

4. Final Sacrifice

a. Gross Pathologic Findings

Gross pathologic findings among test animals were not significantly different from those noted in control animals.

b. Organ Weight and Ratio Data

The mean organ weight and ratio data collected at the final sacrifice are presented in Tables XXXVII through XLII.

Statistically significant differences, are designated by asterisks following the test group value.

Absolute liver weight, liver to body weight and liver to brain weight ratios were significantly elevated in both male and female rats fed 100 ppm Aroclor 1254. Other organ weights, organ to body weight and organ to brain weight ratios disclosed several randomly occurring intergroup differences. The lack of any consistent dose related response and the absence of any deleterious histopathologic change confirm that these differences were not related to the ingestion of Aroclor 1254.

LEXOLDMON002657

TABLE XXXVII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Summary of Mean Values

Final Sacrifice

Organ: Liver

Dietary Level (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	22.0	16.3	3.47	3.05	10.10	8.42
1	19.5	16.1	2.99	3.10	8.76*	8.31
10	23.9	19.5	3.21	3.84*	11.40*	10.30
100	30.2**	32.1**	4.75**	8.62**	14.10**	17.10**

* Statistically significant difference at the 95 percent confidence level.
* Statistically significant difference at the 99 percent confidence level.

BBRN002321

LEXOLDMON002658

TABLE XXXVIII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Summary of Mean Values

Final Sacrifice

Organ: Kidneys

Dietary Level (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	5.57	3.48	0.877	0.646	2.57	1.79
1	5.52	3.68	0.868	0.706	2.48	1.88
10	5.63	3.47	0.761	0.717	2.70	1.84
100	4.74	3.44	0.749	0.899*	2.21	1.82

* Statistically significant difference at the 95 percent confidence level.

GBRN002322

LEXOLDMON002659

TABLE XXXIX

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Summary of Mean Values

Final Sacrifice

Organ: Spleen

ietary Level (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
ontrol	1.15	0.96	0.182	0.181	0.520	0.492
1	1.26	1.06	0.189	0.237	0.568	0.562
10	1.57	0.86	0.220	0.175	0.749	0.462
100	1.04	0.66	0.164	0.174	0.489	0.352

GBRN002323

LEXOLDMON002660

TABLE XL

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Summary of Mean Values

Final Sacrifice

Organ: Gonads

Dietary Level (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	2.52	0.123	0.397	0.0222	1.15	0.0628
1	3.19	0.204	0.482	0.0390	1.43	0.1010
10	3.28	0.135	0.445	0.0283	1.58*	0.0707
100	3.44	0.128	0.547	0.0316	1.60*	0.0666

* Statistically significant difference at the 95 percent confidence level.

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GBRN002324

LEXOLDMON002661

Institute BIO-TEST Laboratories, Inc.

TABLE XLI

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Summary of Mean Values

Final Sacrifice

Organ: Heart

Dietary Level (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Organ/Brain Weight Ratio (g/g)	
	Males	Females	Males	Females	Males	Females
Control	1.87	1.54	0.294	0.288	0.860	0.795
1	1.98	1.55	0.303	0.302	0.889	0.805
10	2.08	1.37	0.279	0.282	0.998*	0.727
100	1.94	1.50	0.304	0.386**	0.909	0.803

* Statistically significant difference at the 95 percent confidence level.
** Statistically significant difference at the 99 percent confidence level.

GBRN002325

LEXOLDMON002662

TABLE XLII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Organ Weight and Ratio Data

Summary of Mean Values

Final Sacrifice

Organ: Brain

Dietary Level (ppm)	Organ Weight (g)		Organ/Body Weight Ratio (g/100 g)		Final Body Weight of Sacrificed Animals (grams)	
	Males	Females	Males	Female	Males	Females
Control	2.18	1.95	0.342	0.362	642	551
1	2.22	1.94	0.347	0.376	656	540
10	2.08	1.88	0.279	0.388	762	500
100	2.13	1.88	0.340	0.486**	656	411**

** Statistically significant difference at the 99 percent confidence level.

GBRN002326

LEXOLDMON002663

c. Histopathologic Findings

Histopathologic examination of tissues and organs taken from all animals sacrificed after 24 months on test was conducted.

Tables XLIII through XLVI list all histopathologic changes noted. Table XLVII contains the results of the histopathologic examination of the urinary bladders.

Significant liver injury was found in animals fed 100 ppm Aroclor 1254 (T-III). The compound associated lesions consisted of vacuolar change, focal hypertrophy and focal hyperplasia. In addition, there were lesions of inflammation, necrosis, fibrosis and minor degeneration, were more severe and frequent in the T-III group.

The vacuolar change was not seen in the control animals but was observed occasionally in livers from T-I (1 ppm) and T-II (10 ppm) animals. It was frequent in the T-III animals. This lesion is morphologically indicative of fatty degeneration. Formalin-frozen sections of livers from representative animals which displayed vacuolar changes were stained with Oil Red 0 to reveal the presence of fat. The vacuolar lesion in the cytoplasm of these cells was positively idenified as fat.

The hypertrophic changes found in the liver was focal and often limited to the central lobular area where groups of cells were swollen to two or three times their normal size with clear pink homogeneous cytoplasm. The hyperplasia was associated with the same cells and appeared

LEXOLDMON002664

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.

The minor lesions of degeneration, hepatitis, ductule cell proliferation, necrosis and focal lymphoid infiltration seen in the control animals and the T-I and T-II groups are lesions of spontaneous disease and are not related to the Aroclor 1254. This level of liver disease is not unusual in rats of this age.

Hyperplasia of the transitional epithelium was present in the urinary bladder of animals from the control group and each of the test groups. This lesion was usually associated with cystitis. The most severe changes were associated with the presence of mineralized calculi in the bladder lumen.

All of the other lesions in other tissues found in these animals are related to spontaneous disease and they are not unusual for old rats.

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TABLE XLIII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Final Sacrifice

Group: Control

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
11 Males	Heart	Chronic focal myocarditis	3	1.0
	Trachea	Tracheitis	3	1.0
	Lung	Chronic respiratory disease	9	1.0
	Liver	Focal degeneration	1	1.0
		Ductile hyperplasia	2	1.0
	Stomach	Chronic gastritis	1	1.0
	Spleen	Hemosiderosis	3	1.0
	Kidney	Chronic nephritis	8	1.0
	Testes	Testicular degeneration	2	1.0
		Periarteritis	2	1.0
	Prostate	Inflammation	1	1.0
	Adrenal Gland	Telangiectasis	1	1.0
		Nodular hyperplasia	1	1.0
		Focal fatty change	1	1.0
	Brain	Focal encephalitis	1	1.0
	Eye	Inflammation	2	1.0

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TABLE XLIII continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Final Sacrifice

Group: Control

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
14 Females	Heart	Chronic focal myocarditis	7	2.0
	Trachea	Tracheitis	3	1.0
	Lung	Chronic respiratory disease	13	1.0
	Liver	Focal lymphoid infiltration	3	1.0
		Ductile hyperplasia	2	1.0
		Focal hepatitis	1	1.0
		Non-lipid vacuolar change	2	0.5
	Stomach	Chronic gastritis	3	1.0
		Acanthosis - squamous epithelium	5	1.0
	Colon	Parasites	1	1.0
	Spleen	Hemosiderosis	4	1.0
	Uterus	Metritis	3	2.0
	Kidney	Chronic nephritis	6	1.0
		Focal lymphoid infiltration	1	1.0
	Ovary	Cyst	1	1.0

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LEXOLDMON002667

TABLE XLIII continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Final Sacrifice

Group: Control

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
4 Females	Adrenal Gland	Telangiectasis	9	1.0
		Nodular hyperplasia	4	1.0
		Pheochromocytoma	1	1.0
	Salivary Gland	Chronic fibrosis and atrophy	1	1.0

All other tissues and organs were normal histologically.

Grading System

0.5 = minimal
1.0 = slight
2.0 = mild
3.0 = moderate
4.0 = severe
5.0 = extreme

GBRN002331

LEXOLDMON02668

TABLE XLIV

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Final Sacrifice

Group: 1 ppm

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
11 Males	Heart	Chronic focal myocarditis	5	1.0
	Trachea	Tracheitis	6	1.0
	Lung	Chronic respiratory disease	9	1.0
		Congestion	1	1.0
	Liver	Ductile hyperplasia	1	0.5
		Vacuolar change (fatty)	1	1.0
		Necrosis	1	3.0
	Pancreas	Chronic focal pancreatitis	2	1.0
		Periarteritis	1	2.0
	Stomach	Chronic gastritis	2	1.0
		Acanthosis	2	1.0
		Ulcer	1	1.0
	Spleen	Hemosiderosis	5	2.0
	Kidney	Chronic nephritis	8	2.0
	Testes	Testicular degeneration	2	1.0

GBRN002332

LEXOLDMON002669

TABLE XLIV continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Final Sacrifice

Group: 1 ppm

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
11 Males	Testes (continued)	Periarteritis	2	1.0
		Focal calcification	2	2.0
	Prostate	Inflammation	6	2.0
	Seminal Vesicle	Inflammation	2	2.0
	Pituitary	Congestion	1	1.0
	Adrenal Gland	Nodular hyperplasia	1	1.0
	Parathyroid Gland	Hyperplasia	1	1.0
22 Females	Heart	Chronic focal myocarditis	12	1.0
	Trachea	Tracheitis	16	1.0
	Lung	Chronic respiratory disease	17	2.0
	Liver	Focal lymphoid infiltration	3	1.0

GBRN002333

LEXOLDMON002670

TABLE XLIV continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Final Sacrifice

Group: 1 ppm

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
22 Females	Liver (continued)	Ductile hyperplasia	2	1.0
		Vacuolar change (fatty)	3	2.0
		Congestion	1	1.0
		Necrosis	1	1.0
	Stomach	Focal inflammation and acanthosis	4	2.0
	Colon	Parasites	2	1.0
	Spleen	Hemosiderosis	8	2.0
	Lymph Node	Abscesses	1	1.0
	Kidney	Chronic nephritis	8	1.0
		Focal calcification	3	1.0
	Uterus	Metritis	6	1.0
	Pituitary	Hyperplasia	4	1.0
	Adrenal Gland	Telangiectasis	17	1.0
		Nodular hyperplasia	1	1.0
		Congestion	1	1.0
		Focal fatty change	3	1.0

All other tissues and organs were normal histologically.

Grading System

0.5 = minimal
1.0 = slight
2.0 = mild
3.0 = moderate
4.0 = severe
5.0 = extreme

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TABLE XLV

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Final Sacrifice

Group: 10 ppm

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
12 Males	Heart	Chronic focal myocarditis	7	1.0
	Trachea	Tracheitis	9	2.0
	Lung	Chronic respiratory disease	11	1.0
		Pneumonia	1	1.0
	Liver	Vacuolar change (fatty)	3	1.0
		Ductile hyperplasia	1	1.0
		Hypertrophy	1	0.5
		Focal degeneration	1	0.5
	Pancreas	Chronic focal pancreatitis	1	3.0
	Stomach	Chronic gastritis and acanthosis	1	1.0
	Spleen	Hemosiderosis	2	1.0
	Kidney	Chronic nephritis	7	1.0
	Testes	Testicular degeneration	1	2.0

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LEXOLDMON002672

TABLE XLV continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Final Sacrifice

Group: 10 ppm

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
12 Males	Testes (continued)	Periarteritis	1	3.0
	Prostate	Inflammation	2	2.0
	Seminal Vesicle	Inflammation	2	1.0
	Adrenal Gland	Telangiectasis	2	1.0
		Focal fatty change	1	1.0
	Thyroid Gland	Focal hyperplasia	1	1.0
12 Females	Heart	Chronic focal myocarditis	3	1.0
	Trachea	Tracheitis	7	1.0
	Lung	Chronic respiratory disease	12	1.0
	Liver	Focal lymphoid infiltration	4	1.0
		Vacuolar change (fatty)	1	1.0
		Nodular hyperplasia	1	3.0

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LEXOLDMON002673

TABLE XLV continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Final Sacrifice

Group: 10 ppm

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
12 Females	Liver (continued)	Ductile hyperplasia	2	1.0
		Telangiectasis	1	1.0
		Hepatoma	1	1.0
	Colon	Parasites	1	1.0
	Spleen	Hemosiderosis	2	1.0
	Lymph Node	Congestion	1	1.0
	Kidney	Chronic nephritis	3	2.0
		Focal calcification	2	1.0
	Uterus	Metritis	1	1.0
	Pituitary	Adenoma	3	1.0
		Hyperplasia	1	1.0
	Adrenal Gland	Telangiectasis	9	1.0
	Parathyroid Gland	Hyperplasia	1	1.0
	Thymus	Abscess	1	1.0

GBRN002337

All other tissues and organs were normal histologically.

Grading System

0.5 = minimal
1.0 = slight
2.0 = mild
3.0 = moderate
4.0 = severe
5.0 = extreme

LEXOLDMON002674

TABLE XLVI

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Final Sacrifice

Group: 100 ppm

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
11 Males	Heart	Chronic focal myocarditis	3	2.0
	Trachea	Tracheitis	4	1.0
	Lung	Chronic respiratory disease	10	1.0
		Edema	3	2.0
	Liver	Focal degeneration	2	1.0
		Vacuolar change (fatty)	3	1.0
		Ductile hyperplasia	3	1.0
		Hypertrophy	3	2.0
		Focal lymphoid infiltration	1	1.0
		Portal fibrosis	1	2.0
	Small Intestine	Focal inflammation	1	1.0
	Spleen	Hemosiderosis	2	1.0
	Lymph Node	Congestion	1	1.0

GBRN002338

LEXOLDMON02675

TABLE XLVI continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Final Sacrifice

Group: 100 ppm

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
11 Males	Kidney	Chronic nephritis	8	1.0
	Testes	Periarteritis	1	1.0
	Prostate	Inflammation	5	2.0
	Adrenal Gland	Telangiectasis	2	1.0
		Congestion	1	1.0
	Thyroid Gland	Hyperplasia	1	1.0
15 Females	Heart	Chronic focal myocarditis	5	1.0
	Trachea	Tracheitis	6	1.0
	Lung	Chronic respiratory disease	13	2.0
		Edema	1	2.0
	Liver	Focal hypertrophy	1	1.0
		Hypertrophy	5	3.0
		Focal hyperplasia	1	1.0

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LEXOLDMON002676

TABLE XLVI continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes

Final Sacrifice

Group: 100 ppm

Number of Animals	Organ Examined	Findings	Incidence	Average Grade
15 Females	Liver (continued)	Ductile hyperplasia	2	1.0
		Vacuolar change (fatty)	10	1.0
		Nodular hyperplasia	1	1.0
		Hepatoma	1	1.0
	Stomach	Chronic gastritis	2	1.0
		Acanthosis	4	1.0
		Inflammation	1	1.0
	Spleen	Hemosiderosis	5	1.0
	Kidney	Chronic nephritis	5	1.0
		Focal calcification	1	1.0
	Uterus	Metritis	3	1.0
	Pituitary	Hyperplasia	4	1.0
	Pituit	Nodular hyperplasia	1	1.0
	Adrenal Gland	Telangiectasis	3	1.0
		Nodular hyperplasia	1	1.0
		Congestion	1	1.0

All other tissues and organs were normal histologically.

Grading System

0.5 = minimal
1.0 = slight
2.0 = mild
3.0 = moderate
4.0 = severe
5.0 = extreme

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TABLE XLVII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Histopathologic Changes of the Urinary Bladder

Final Sacrifice

Group	Sex	Number Examined	Findings*	Incidence	Average Grade
:	M	11	Proteinaceous plug (34)	1	-
	F	14	Focal epithelial hyperplasia (62)	1	1
:-I	M	10	Proteinaceous plug (326)	1	-
1 ppm)	F	19	Diffuse epithelial hyperplasia associated with diffuse cystitis (377)	1	3
:-II	M	13	Diffuse epithelial hyperplasia and papilloma associated with focal cystitis (417)	1	4
10 ppm)			Diffuse epithelial hyperplasia associated with diffuse cystitis (419)	1	2
	F	13	None	-	-
:-III	M	10	Focal epithelial hyperplasia associated with focal cystitis (497)	1	2
100 ppm)			Focal epithelial hyperplasia (5)	1	1
	F	17	None	-	-

Individual animal numbers are shown in parenthesis.

Grading System

.0 = minimal or trace
.0 = mild
.0 = moderate
4.0 = severe
5.0 = extreme

LEXOLDMON002678

G. Detailed Description of Tumor Findings

Tumor data for individual animals including location, weight and pathologic classification are presented in Table XLVIII through LI.

None of these tumors could be related to the ingestion of Aroclor 1254 and are considered normal for a random population of rats this age.

LEXOLDMON002679

TABLE XLVIII

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Description of Tumor Findings

Group: Control

imal mber l Sex	Location	Weight (grams)	Size (cm)	Classification	Months on Test
M	Abdomen	-	-	Mammary fibroadenoma	24
M	Pancreas	11.76	-	Adenocarcinoma	24
F	Abdomen	64.98 35.09	8 x 1 x 2 5 x 2 x 2	Mammary fibroadenoma Mammary fibroadenoma	24
F	Lymph node	-	-	Reticulum cell sarcoma	24
F	Abdomen	-	2 x 2 x 1	Mammary fibroadenoma	24
F	Abdomen	-	2 x 2 x 3	Mammary fibroadenoma	7
F	Abdomen	-	-	Mammary fibroadenoma	24
F	Abdomen Adrenal gland	- -	- -	Mammary fibroadenoma Pheochromocytoma	24
F	Abdomen	88.92	13 x 11 x 4	Fibroadenoma	24
F	Abdomen	230.00	13 x 11 x 4	Mammary adenoma	24

GBRN002343

LEXOLDMON002680

TABLE XLIX continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Description of Tumor Findings

Group: 1 ppm

Animal Number and Sex	Location	Weight (grams)	Size (cm)	Classification	Months on Test
1-F *	Abdomen	-	-	Mammary adenocarcinoma	24
2-F ***	Abdomen	-	-	Mammary fibroadenoma	24
3-F **	Abdomen	-	-	Lipoma	24

* No 374 in raw data histo
*** No 405 in raw data histo
** maybe No 388 in raw data histo

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GBRN002344

LEXOLDMON002681

TABLE XLIX

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Description of Tumor Findings

Group: 1 ppm

Animal Number and Sex	Location	Weight (grams)	Size (cm)	Classification	Months on Test
1-M	Parathyroid gland	-	-	Adenoma	24
2-M	Pituitary	-	-	Chromophobe adenoma	23
3-F	Abdomen	-	-	Mammary fibroadenoma	24
4-F	Abdomen	-	-	Mammary fibroadenoma	24
5-F	Abdomen	8.97	2 x 2 x 2	Mammary adenoma	24
	Parathyroid gland	-	-	Adenoma	
6-F	Abdomen	8.86	3 x 2 x 2	Mammary fibroadenoma	24
7-F	Abdomen	65.0		Mammary fibroadenoma	24
	Dorsal cervical region	209	13 x 8 x 2	Fibroadenoma	
8-F	Pituitary	-	-	Chromophobe adenoma	24
	Abdomen	-	-	Mammary fibroadenoma	
9-F	Abdomen	-	-	Mammary fibroadenoma	24
0-F	Abdomen	-	-	Mammary fibroadenoma	24

GBRN002345

LEXOLDMON002682

TABLE L

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Description of Tumor Findings

Group: 10 ppm

nal ber Sex	Location	Weight (grams)	Size (cm)	Classification	Months on Test
M	Pancreas	-	-	Adenoma	24
M	Parathyroid gland	-	-	Adenoma	24
F	Abdomen	-	-	Mammary fibroadenoma	24
F	Thyroid	-	-	Adenoma	24
	Abdomen	-	-	Mammary fibroadenoma	
F	Abdomen	-	-	Mammary fibroadenoma	24
F	Abdomen	86	7 x 8 x 3	Fibroadenoma	24
	Abdomen	29	5 x 5 x 2	Fibroadenoma	
F	Pituitary	-	-	Chromophobe adenoma	24
F	Abdomen	28	6 x 5 x 3	Fibroadenoma	24
F	Pituitary	-	-	Chromophobe adenoma	22
F	Adrenal gland	7.8	-	Telangioma	24
F	Abdomen	23	4 x 7 x 1	Fibroadenoma	24

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LEXOLDMON002683

TABLE LI

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Description of Tumor Findings

Group: 100 ppm

imal mber l Sex	Location	Weight (grams)	Size (cm)	Classification	Months on Test
-F	Abdomen	48.12	5 x 4 x 3	Fibroma	24
-F	Abdomen	-	-	Mammary fibroadenoma	24
-F	Abdomen	-	18 x 4 x 3	Mammary fibroadenoma	24
-M	Pancreas	-	-	Adenoma	24
-M	Abdomen	-	1 x 2 x 1	Fibroadenoma	24
-F	Abdomen	-	-	Mammary fibroadenoma	24
-M	Lymph node	-	-	Reticulum cell sarcoma	13
-F	Pancreas	13.0	3 x 3 x 3	Adenocarcinoma	24
-F	Lymph node	-	-	Lymphosarcoma	24
-F	Abdomen	52.0	8 x 5 x 2	Fibroadenoma	24

GBRN002347

LEXOLDMON02684

TABLE LI continued

TEST MATERIAL: Aroclor 1254

Two-Year Chronic Oral Toxicity Study - Albino Rats

Description of Tumor Findings

Group: 100 ppm

mal nber Sex	Location	Weight (grams)	Size (cm)	Classification	Months on Test
-F	Abdomen	141.9	8 x 8 x 2	Mammary fibroadenoma	24
-F	Abdomen	42	6 x 4 x 2	Mammary fibroadenoma	24
-F	Abdomen	-	-	Fibroadenoma	24
-F	Abdomen	209.0	10 x 9 x 3	Mammary fibroadenoma	24
-F	Abdomen	14.63	-	Fibroadenoma	24

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LEXOLDMON002685