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Subchronic Inhalation Toxicity of

[REDACTED]

Haskell Laboratory Report No. 182-85

[MR No. [REDACTED]]

E. I. du Pont de Nemours and Co., Inc.
Haskell Laboratory for Toxicology and Industrial Medicine
P. O. Box 50, Elkton Road
Newark, Delaware 19714

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Subchronic Inhalation Toxicity of

Summary

Three groups of 20 male Crl:CD®(SD)BR rats were exposed 6 hours/day, 5 days/week for 2 weeks to 7.6, 58 or 480 mg/m³ of [REDACTED] in air. A control group was exposed simultaneously to air only. After the exposure period, rats were observed for up to 12 weeks of recovery. Blood and urine samples were collected for clinical analysis from 10 rats/group at the end of the exposure period and on the 14th and 41st days of recovery, and from 5 rats per group on the 84th day of recovery. Five rats per group were killed for pathologic examination after the 10th exposure and on the 14th, 41st and 84th days of recovery. In addition, at each sacrifice, blood samples were collected from each rat to be analyzed for fluorine concentration.

Mean body weights for rats exposed to 480 mg/m³ of [REDACTED] were significantly lower than controls from the 2nd exposure through the 17th day of recovery. No other significant adverse clinical signs were observed in any rats throughout the test.

Clinical analyses after 10 exposures revealed several hematologic and clinical chemical changes in rats exposed to 480 mg/m³ of [REDACTED]. Hematologic changes included elevated erythrocyte count, hemoglobin concentration and hematocrit, and depressed mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration. Clinical chemical changes included elevated alkaline phosphatase activity, urea nitrogen concentration, urine volume and urine pH, and depressed serum cholesterol concentration and urine osmolality. These changes were absent after 14 days of recovery. No adverse clinical chemical or hematologic changes were observed in rats exposed to 7.6 or 58 mg/m³.

Pathologic examination showed compound-related changes in the livers and kidneys of rats exposed to 480 mg/m³. The liver effects included elevated liver weights after the 10th exposure and after 14 days of recovery, and minimal to moderate fatty change in the centrilobular hepatocytes at all 4 sacrifices. Microscopic examination of the kidneys showed minimal to mild nephrosis of tubular epithelium of the cortex after 10 exposures. This change was absent after 14 days of recovery. No adverse gross or microscopic effects were observed in rats exposed to 7.6 or 58 mg/m³.

Blood fluorine analyses indicated that 99%-100% of the total fluorine in the blood of test rats was present as organic fluorine. Total blood fluorine concentrations in rats killed after the 10th exposure ranged from 10 ppm to 150 ppm. Blood clearance of total fluorine during the recovery period appeared to be biphasic, with a rapid decline in blood fluorine concentrations over the first 2 weeks of recovery (approximate half-life of 9 days), followed by a gradual decline over the remaining 10 weeks (approximate half-life of 25 days). After 84 days of recovery, blood fluorine

concentrations for rats exposed to 7.6 mg/m³ were indistinguishable from controls. However, fluoigine concentrations for rats exposed to 58 mg/m³ and rats exposed to 480 mg/m³ were still significantly elevated.

No significant adverse effects were observed in rats exposed to 7.6 or 58 mg/m³ of [REDACTED]. The 58 mg/m³ level is considered the "no-effect" exposure concentration under the conditions of this test.

Work by: Thomas A. Keegelman 5/3/85
Thomas A. Keegelman
Technician

Robert T. Turner 5/3/85
Robert T. Turner
Technician

Supervised by: Laura A. Kinney 5/3/85
Laura A. Kinney
Chemist

Study Director: Nancy C. Chromey 5/3/85
Nancy C. Chromey, Ph.D.
Section Supervisor
Acute Investigations

Approved by: David F. Krahn 5/8/85
David F. Krahn
Manager, Toxicology

Acknowledgements: Bruce A. Burgess also participated in the conduct of this study.

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Material Tested:

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Sponsor:

Polymer Products Department
E. I. du Pont de Nemours and Co., Inc.
Wilmington, Delaware

Material Submitted by:

[REDACTED]

Polymer Products Department
E. I. du Pont de Nemours and Co., Inc.
Wilmington, Delaware

Test Facility:

Haskell Laboratory for Toxicology and
Industrial Medicine
E. I. du Pont de Nemours and Co., Inc.
Elkton Road, P. O. Box 50
Newark, Delaware 19714

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INTRODUCTION

[REDACTED] has very low toxicity on an acute³ inhalation basis. The 4-hour ALC for [REDACTED] was greater than 2100 mg/m³. The purpose of this study was to determine the toxic effects of repeated inhalation of sublethal concentrations of [REDACTED].

MATERIALS AND METHODS

A. Animals

Young adult male Cr1:CD®(SD)BR rats were received from Charles River Breeding Laboratories, Kingston, New York. Each rat was assigned a unique 6-digit identification number which was recorded on a card affixed to the cage. Rats were quarantined for one week prior to testing, and were weighed and observed twice during the quarantine period. During the test, rats were housed in pairs in 8" x 14" x 8" suspended, steel-mesh cages in rooms maintained at 23-60% relative humidity and 21-26°C on a timer-controlled 12 hour/12 hour light/dark cycle. The rat assigned the lower number in each cage was identified by a slash in the right ear. Rats' tails and cage cards were color-coded with water-insoluble markers so that individual rats could be identified after exposure. Except during exposure, Purina Certified Rodent Chow® #5002 and water were available ad libitum.

B. Exposure Protocol

Four groups of 20 rats, 8 weeks old and weighing between 210 and 265 grams, were restrained in perforated, stainless steel cylinders with conical nose pieces. Rats were grouped by computer randomization such that the groups' initial mean body weights were similar ($p > 0.99$).³ Three groups were exposed to design concentrations of 5, 50 or 500 mg/m³ of [REDACTED] in air. A control group was exposed to air only. Exposure was nose-only, 6 hour/day, 5 days/week for 2 weeks. Five rats per group were randomly selected and killed after the 10th exposure, and after 14, 41 and 84 days of recovery. Rats were weighed and observed daily throughout the exposure period and for 14 days post exposure (weekends excluded), then were weighed and observed weekly and on the morning prior to sacrifice for 17 to 84 days post exposure.

C. Test Material

Physical Form:
Purity:

[REDACTED]

Composition:

Synonyms:

Stability:

[REDACTED]

The test material was assumed to be stable throughout the exposure phase of the study. The test material is hygroscopic, and readily absorbs water when exposed to moist air. Therefore, the amount of contact of the test material with room air was minimized throughout the test.

D. Atmosphere Generation

Dust atmospheres of [REDACTED] in air were generated with a 2-stage, vertical glass generator. A round flask served as a dust reservoir. A cyclone-shaped flask, inserted above the reservoir, served as an elutriator. A motorized stirring rod with plastic paddles agitated dust in the generator. Air introduced at the reservoir blew dust particles upward to the elutriator. Air introduced at the elutriator swept dust particles into the exposure chamber. The concentration of [REDACTED] in the atmosphere was controlled by varying the 2 airflows.

E. Analytical

The atmospheric concentrations of [REDACTED] were determined daily at approximately 30-minute intervals for each exposure chamber by drawing calibrated volumes of chamber atmosphere through preweighed glass fiber filters. Filters were weighed on a Cahn model 26 Automatic Electrobalance®. The atmospheric concentration of particulate was determined from the filter weight differential before and after sampling.

Particle size distributions (mass median aerodynamic diameter and percent respirable) were determined with a Sierra model 210 cascade impactor¹. Particle size samples were collected 2 times per week per exposure chamber. During most exposures, chamber temperatures were monitored with mercury thermometers, relative humidities were measured with a Bendix model 566 psychrometer, and chamber oxygen contents were monitored with a BioMarine model 225 oxygen analyzer.

F. Pathology

Five rats per group were randomly selected and killed by chloroform asphyxiation after the 10th exposure and on the 14th, 41st and 84th days of recovery for gross and histopathologic examinations. Organs and tissues examined were the heart, lungs, nasal cavities, mesenteric lymph nodes, trachea, liver, pancreas, esophagus, stomach, duodenum, jejunum, ileum, cecum, colon, rectum, kidneys, urinary bladder, bone marrow

(sternal), spleen, thymus, thyroid, testes, epididymides, adrenal glands, brain and eyes.

G. Organ and Body Weight Analyses

Mean body weights for test rats were compared to controls during the exposure and recovery periods. In addition, at each sacrifice, mean organ weights and organ-to-body weight ratios were calculated for the lungs, liver, spleen, kidneys, testes and thymus. Data were statistically analyzed by a one-way analysis of variance. Test rats were compared with controls by least significant difference and Dunnett's tests when the ratio of variance (F) indicated a significant among-to-within group variation. Significance was judged at the 0.05 probability level.

H. Clinical Pathology

Urine samples were collected overnight from 10 rats per group after the 9th exposure and on the 13th and 40th days of recovery, and from 5 rats per group on the 83rd day of recovery. The 10 rats were selected such that the 5 rats per group designated to be killed the next day and the 5 rats per group designated to be killed at the next sacrifice were sampled. Samples were analyzed for volume, osmolality, pH, blood, sugar, protein, bilirubin, urobilinogen and ketone. Each specimen was noted for color and transparency, and the sediment from each sample was examined microscopically.

Blood samples were collected from the tails of 10 rats per group (same rats as above) after the 10th exposure and on the 14th and 41st days of recovery, and from 5 rats per group on the 84th day of recovery. Samples were analyzed for erythrocyte count, hemoglobin concentration, mean corpuscular volume, platelet count, leukocyte count, and relative numbers of neutrophils, band neutrophils, lymphocytes, atypical lymphocytes, eosinophils, monocytes and basophils. Hematocrit, mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration were calculated from the erythrocyte data. In addition, serum activities of alkaline phosphatase, alanine aminotransferase and aspartate aminotransferase, and serum concentrations of urea nitrogen, creatinine, total protein and cholesterol were also measured.

I. Blood Fluorine Analysis

At each sacrifice, vena cava blood samples were collected from 5 rats per group in lithium-heparinized tubes. Samples were lyophilized by S. R. Laas, Polymer Products Department, Experimental Section, and were analyzed by E. Kissa, Chemicals and Pigments Department, Jackson Laboratory. Four control samples (1 collected after the 10th exposure and 3 collected after 14 days recovery) and 4 high group samples (3 collected after the 10th exposure and 1 collected after 14 days recovery)

were analyzed for both total fluorine and ionic fluorine. Organic fluorine was calculated from the difference between the total and ionic fluorine values. Remaining samples were analyzed for total fluorine only.

J. Records Retention

All raw data (including tissue slides and paraffin blocks) and final reports will be stored in the archives of Haskell Laboratory for Toxicology and Industrial Medicine, Newark, Delaware, or in the DuPont Hall of Records, E. I. du Pont de Nemours and Co., Wilmington, Delaware.

RESULTS AND DISCUSSION

A. Exposure Conditions

Chamber temperatures ranged between 25-31°C, relative humidities ranged from 55-66%, and chamber oxygen contents were maintained at 21%. Particles size analyses indicated that atmospheres ranged between 80-89% respirable with mass median aerodynamic diameters between 4.7-6.3 μm for the design concentration of 5 mg/m^3 , and between 51-72% respirable with mass median aerodynamic diameters of 6.5-9.8 μm for the design concentrations of 50 and 500 mg/m^3 . Overall mean atmospheric concentrations are presented in Table I. Daily atmospheric characterization data are presented in Appendix I.

Table I

Mean Atmospheric Concentrations of [REDACTED]

<u>Design Concentration</u>	<u>Analyzed Concentration (mg/m^3)</u>		
	<u>Mean</u>	<u>S. D.</u>	<u>Range</u>
5 mg/m^3	7.6	8.1	0 - 50
50 mg/m^3	58	38	0 - 230
500 mg/m^3	480	210	20 - 1200

^a Represents mean, standard deviation and range of all samples from all exposures.

The large variations in atmospheric concentrations, and the relatively low respirability and large mass median aerodynamic diameters, were due to the hygroscopicity of the test material. The test material was "sticky" and tended to agglomerate in the generator and the chamber,

causing the particles to be large and the atmospheres to be difficult to control.

B. Clinical Observations

Mean body weights for rats exposed to 7.6 or 58 mg/m³ were indistinguishable from controls throughout the test. Rats exposed to 480 mg/m³ had significantly depressed body weights compared to controls throughout the exposure period and for the first 17 days of recovery. A growth curve is attached as Figure I. Mean body weights are presented in Appendix II.

During exposures, rats in all groups (including controls) exhibited red nasal and ocular discharges, effects common in rats under restraint. During the recovery period, 1 control rat had a red ocular discharge on the 14th day of recovery, and 1 control rat had brown-stained fur from the 46th to 59th days of recovery. One rat exposed to 480 mg/m³ had hair loss from the hip from the 11th to 31st days of recovery. No other adverse clinical signs were observed in any rats throughout the test.

C. Pathology

No adverse gross or microscopic effects were observed at any sacrifice in rats exposed to 7.6 or 58 mg/m³ of [REDACTED].

Rats exposed to 480 mg/m³ had compound-related changes in the liver and kidneys. Liver changes included elevated liver weights and/or liver-to-body weight ratios after the 10th exposure and after 14 days of recovery, and fatty change in centrilobular hepatocytes which persisted for 84 days of recovery. After 10 exposures, the fatty change was of minimal severity, and affected hepatocytes contained small numbers of fine lipid vacuoles. However, after 14 days of recovery, the fatty change was mild to moderate, and hepatocytes were moderately distended with numerous lipid vacuoles. After 41 and 84 days of recovery, the fatty change was mostly minimal, although affected hepatocytes appeared similar to those at 14 days recovery.

Rats exposed to 480 mg/m³ had minimal to mild nephrosis in the kidneys after the 10th exposure. This lesion was characterized by foci of cholesterol-like clefts, regenerative tubular epithelial cells and occasional necrotic epithelial cells in the cortex. This lesion was absent after 14 days recovery.

In addition to the liver and kidney changes, rats exposed to 480 mg/m³ had depressed spleen weights and spleen-to-body weight ratios, and elevated testis weights after 10 exposures. These changes were absent after 14 days recovery.

Several statistically-significant organ weight changes were observed that were not considered compound related. Rats exposed to 7.6 mg/m³ had

elevated thymus weights on the 14th day of recovery and depressed lung-to-body weight ratios on the 84th day of recovery. Rats exposed to 58 mg/m³ and rats exposed to 480 mg/m³ had elevated spleen-to-body weight ratios on the 84th day of recovery. These changes were believed to be unrelated to treatment.

Mean organ weights and organ-to-body weight ratios are presented in Appendices III and IV. The Pathology report is attached as Appendix V.

C. Clinical Pathology

No treatment-related clinical chemical or hematologic effects were observed in rats exposed to 7.6 or 58 mg/m³ throughout the test.

After the 10th exposure, rats exposed to 480 mg/m³ had several significantly altered hematologic and clinical chemical parameters. Hematologic changes included elevated red blood cell count, hemoglobin concentration and hematocrit, and depressed mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration. Clinical chemical changes included elevated alkaline phosphatase activity, urea nitrogen concentration, urine volume and urine pH, and depressed urine osmolality and serum cholesterol concentration.

Several of the clinical changes were consistent with the microscopic pathologic findings. The elevated alkaline phosphatase activity, and the elevated urea nitrogen concentration and urine volume could indicate changes in the liver and the kidneys, respectively. The mild polycythemic effect, indicated by the elevated red blood cell parameters, may have been the result of dehydration.

After 14 days of recovery, all of the above changes were absent. No other treatment-related changes were observed at any sacrifice. The Clinical Pathology report is attached as Appendix VI.

E. Blood Fluorine Analysis

A comparison of total fluorine with ionic fluorine indicated that, for control rats, organic fluorine was greater than 96% of total fluorine, and for rats exposed to 480 mg/m³, organic fluorine was greater than 99.9% of total fluorine. Mean total fluorine concentrations for each sampling interval are presented in Table II. Reported values are averages of 5 samples.

Table II
Total Fluorine Concentration (ppm)^a
Mean (S.D.)

<u>Exposure Concentration</u>	<u>After 10 Exposures</u>	<u>After 14 Days Recovery</u>	<u>After 41 Days Recovery</u>	<u>After 84 Days Recovery</u>
Controls ₃	2.0 (1.5)	0.92 (0.20)	0.86 (0.30)	0.40 (0.17)
7.6 mg/m ₃	10 (1.4)	4.0 (0.58)	1.8 (0.29)	0.61 (0.084)
58 mg/m ₃	42 (7.9)	13 (2.0)	7.2 (1.3)	2.2 (1.2)
480 mg/m ₃	150 (26)	40 (8.6)	17 (3.2)	4.4 (1.1)

^a ug total fluorine per g blood

Mean total fluorine concentrations after the 10th exposure increased with increasing exposure concentration. However, the increase in fluorine was not directly proportional to exposure concentration: a 10-fold increase in exposure concentration did not result in a 10-fold increase in blood fluorine concentration.

Elimination of fluorine from the blood appeared to be biphasic, with a rapid decline in blood fluorine over the first 14 days of recovery, followed by a gradual decline over the remaining 10 weeks. During the first phase of elimination, the average half-life of total fluorine in blood was approximately 9 days. The clearance rate during the first phase appeared to be dose-dependent: the higher the initial blood concentration, the faster the test material was cleared. The half-life for rats exposed to 480 mg/m₃ was 7.5 days, while the half-life for rats exposed to 7.6 mg/m₃ was 10.4 days.

During the second phase of elimination, the clearance rate appeared to be similar for all exposure concentrations. The average half-life of fluorine in blood during the second clearance phase was approximately 25 days.

A statistical comparison of the test groups with controls indicated that rats exposed to [REDACTED] had significantly elevated total fluorine concentrations at the first 3 sampling intervals. After 84 days of recovery, blood values for rats exposed to 7.6 mg/m₃ were indistinguishable from controls. However, blood fluorine concentrations for rats exposed to 58 or 480 mg/m₃ were still significantly elevated.

All reported half-lives were determined graphically. A blood fluorine elimination curve is attached as Figure II. Fluorine concentrations for individual rats and mathematical expressions of the observed fluorine eliminations are presented in Appendix VII. The statistical comparisons of total fluorine concentrations at each sampling interval are presented in Appendix VIII.

CONCLUSION

No significant adverse effects were³ observed in rats exposed to 7.6 or 58 mg/m³ throughout the test. The 58 mg/m³ level is considered the "no effect" concentration under the conditions of this test.

Rats exposed to 480 mg/m³ of [REDACTED] had significant adverse effects in the liver and the kidneys. The liver changes persisted for 84 days of recovery. The kidney changes were absent after 14 days of recovery.

Blood fluorine concentrations for rats exposed to [REDACTED] were dose-dependent and significantly elevated compared to controls for the first 6 weeks of recovery. Fluorine concentrations returned to normal after 12 weeks of recovery for rats exposed to 7.6 mg/m³ only. Elimination of blood fluorine was biphasic, with a rapid decline in blood fluorine over the first 2 weeks of recovery followed by a gradual decline over the remaining 10 weeks.

¹ Calculation described in Sierra Instruments, Inc., Manual 7-79-210IM, Instruction Manual: Series 210 Cascade Impactors and Ambient Preseparators.

Figure I

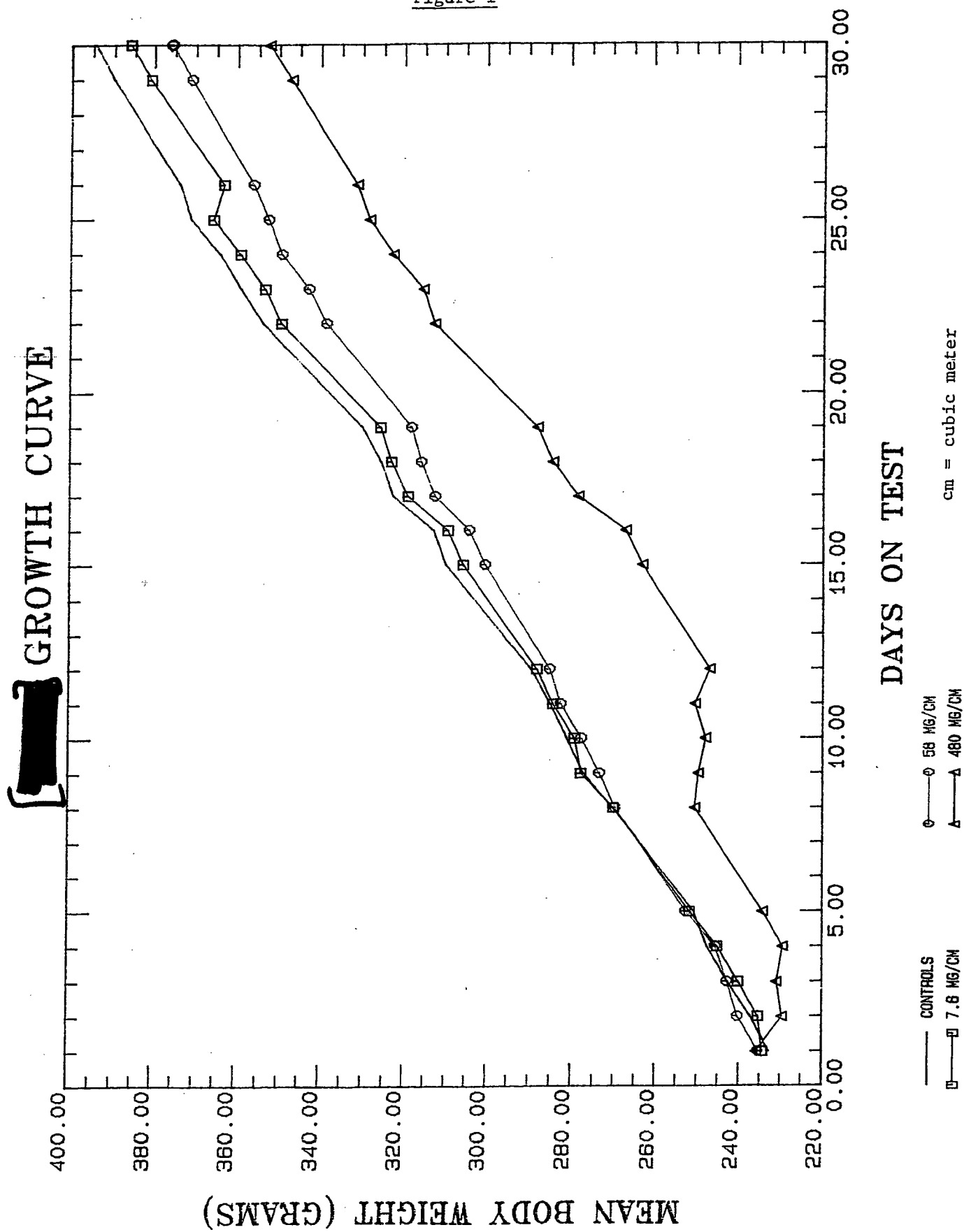
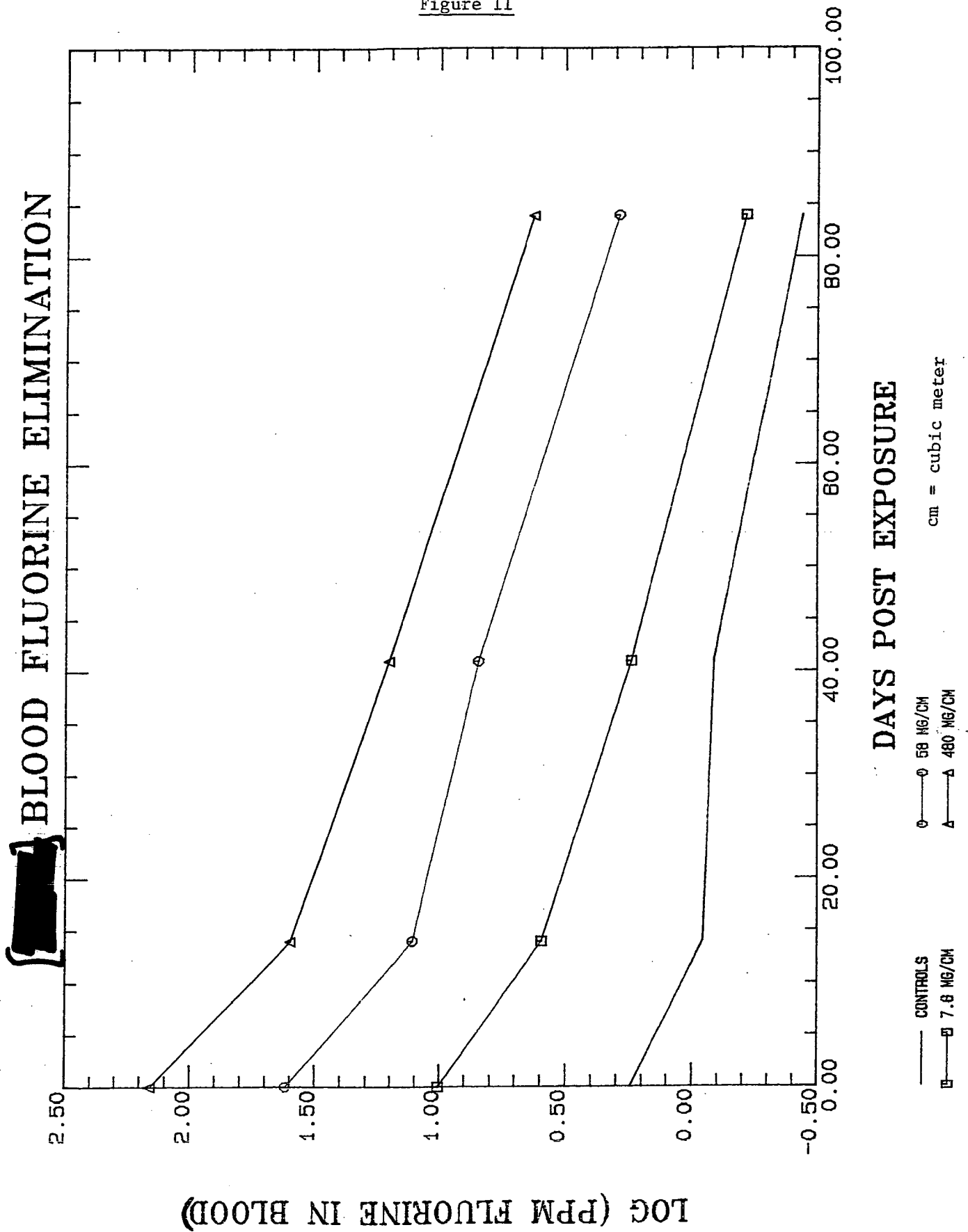


Figure II



APPENDIX I

DAILY ATMOSPHERE CHARACTERIZATION OF [REDACTED]

Exposure No.	Concentration (mg/m ³)			% Respirable	MMD (um) ^a
	Mean	S.D.	Range		
A. <u>Design Concentration of 5 mg/m³</u>					
1	6.9	7.0	2 - 26	-	-
2	16	17	0 - 50	-	-
3	8.2	7.2	0 - 25	80	6.3
4	8.3	6.5	0 - 20	-	-
5	8.1	8.8	0 - 32	83	4.7
6	5.3	4.6	0 - 13	-	-
7	5.4	3.7	2 - 11	84	5.3
8	6.5	4.3	2 - 14	-	-
9	5.5	2.9	1 - 10	89	4.7
10	5.2	3.0	0 - 10	-	-
B. <u>Design Concentration of 50 mg/m³</u>					
1	63	27	24 - 120	60	8.5
2	55	46	16 - 180	-	-
3	78	57	8 - 230	-	-
4	64	34	0 - 120	55	8.9
5	47	21	12 - 100	-	-
6	61	54	0 - 150	51	9.8
7	58	25	20 - 110	-	-
8	60	35	8 - 120	72	6.5
9	45	10	28 - 62	-	-
10	48	43	17 - 170	-	-
C. <u>Design Concentration of 500 mg/m³</u>					
1	520	290	20 - 920	70	6.9
2	400	95	180 - 570	-	-
3	420	98	190 - 550	-	-
4	430	220	150 - 730	64	7.8
5	450	150	180 - 620	-	-
6	470	110	310 - 690	61	7.9
7	480	200	240 - 870	-	-
8	400	240	80 - 870	60	8.0
9	580	240	280 - 960	-	-
10	650	250	200 - 1200	-	-

^a Mass median aerodynamic diameter.

APPENDIX II
MEAN BODY WEIGHTS

[REDACTED] MEAN BODY WEIGHTS (GRAMS)
H# 15,388 - EXPOSURE PERIOD

GROUP	INTERVALS IN TEST DAYS				
	1.	2.	3.	4.	5.
CONTROL	232.7	237.1	242.6	247.4	250.8
7.6 MG/CM	234.4	235.4	240.1	245.1	251.8
58 MG/CM	235.4	240.2	242.8	245.6	252.6
480 MG/CM	235.8	229.6+	231.0#	229.5#	234.3#
ANOVA(1)	0.778	0.028*	0.011*	0.001*	0.001*
TREND(2)	0.316	0.116	0.012*	0.001*	0.001*
LSD(3)	6.4858	6.9935	7.8406	8.0042	8.4181
DUNNETT(4)	7.8220	8.4344	9.4560	9.6533	10.1525
BARTLETT(5)	0.177	0.356	0.277	0.313	0.403

GROUP	INTERVALS IN TEST DAYS				
	8.	9.	10.	11.	12.
CONTROL	270.1	277.0	280.9	284.9	289.4
7.6 MG/CM	270.0	277.6	279.0	284.3	288.1
58 MG/CM	269.5	273.1	277.5	282.4	285.0
480 MG/CM	250.5#	249.6#	247.8#	250.3#	246.7#
ANOVA(1)	0.001*	0.001*	0.001*	0.001*	0.001*
TREND(2)	0.001*	0.001*	0.001*	0.001*	0.001*
LSD(3)	9.4285	9.9104	10.3550	10.6629	11.3864
DUNNETT(4)	11.3711	11.9522	12.4884	12.8598	13.7324
BARTLETT(5)	0.336	0.543	0.532	0.258	0.125

(1) P VALUE of F-TEST from ONE-FACTOR ANALYSIS OF VARIANCE.

(* indicates P value less than 0.05)

(2) P VALUE OF TEST FOR LINEAR TREND OVER GROUPS.

(* indicates P value less than 0.05)

(3) LEAST SIGNIFICANT DIFFERENCE - given a significant (alpha=0.05) F RATIO, any two means differing by more than the LSD are significantly different with a false positive (alpha) error rate of 0.05.

(4) DUNNETT TEST - any treatment mean differing from the control mean by more than the DUNNETT statistic is significantly different from the control mean with a variable-wise false positive (alpha) error rate of 0.05.

(5) BARTLETTS TEST FOR EQUAL VARIANCE P VALUE.

+ SIGNIFICANTLY DIFFERENT (P<0.05) from CONTROL GROUP by LSD.

SIGNIFICANTLY DIFFERENT (P<0.05) from CONTROL GROUP by DUNNETT TEST and LSD.

cm = cubic meter

[REDACTED] MEAN BODY WEIGHTS (GRAMS)
H# 15,388 - 0 TO 2 WEEKS POST EXPOSURE

GROUP	INTERVALS IN TEST DAYS				
	15.	16.	17.	18.	19.
CONTROL	309.9	312.9	323.0	325.9	330.3
7.6 MG/CM	305.8	309.5	319.2	323.3	326.1
58 MG/CM	300.5	304.3	312.5	315.9	318.3
480 MG/CM	263.0#	266.9#	278.3#	284.2#	287.9#
ANOVA(1)	0.001*	0.001*	0.001*	0.001*	0.001*
TREND(2)	0.001*	0.001*	0.001*	0.001*	0.001*
LSD(3)	14.3258	14.7224	15.0779	15.6897	15.7935
DUNNETT(4)	17.4059	17.8877	18.3197	19.0630	19.1891
BARTLETT(5)	0.533	0.466	0.602	0.536	0.516

GROUP	INTERVALS IN TEST DAYS				
	22.	23.	24.	25.	26.
CONTROL	354.1	359.3	364.2	371.1	373.8
7.6 MG/CM	349.6	353.6	359.4	365.9	363.3
58 MG/CM	339.0	343.2	349.5	352.7	356.3
480 MG/CM	312.7#	315.5#	322.9#	328.7#	331.6#
ANOVA(1)	0.001*	0.001*	0.001*	0.001*	0.001*
TREND(2)	0.001*	0.001*	0.001*	0.001*	0.001*
LSD(3)	17.8518	18.0962	19.0094	19.6318	18.8130
DUNNETT(4)	21.6900	21.9869	23.0965	23.8526	22.8578
BARTLETT(5)	0.440	0.428	0.440	0.373	0.220

(1) P VALUE of F-TEST from ONE-FACTOR ANALYSIS OF VARIANCE.

(* indicates P value less than 0.05)

(2) P VALUE OF TEST FOR LINEAR TREND OVER GROUPS.

(* indicates P value less than 0.05)

(3) LEAST SIGNIFICANT DIFFERENCE - given a significant (alpha=0.05) F RATIO, any two means differing by more than the LSD are significantly different with a false positive (alpha) error rate of 0.05.

(4) DUNNETT TEST - any treatment mean differing from the control mean by more than the DUNNETT statistic is significantly different from the control mean with a variable-wise false positive (alpha) error rate of 0.05.

(5) BARTLETTS TEST FOR EQUAL VARIANCE P VALUE.

+ SIGNIFICANTLY DIFFERENT (P<0.05) from CONTROL GROUP by LSD.

SIGNIFICANTLY DIFFERENT (P<0.05) from CONTROL GROUP by DUNNETT TEST and LSD.

cm = cubic meter

[REDACTED] MEAN BODY WEIGHTS (GRAMS)
 [REDACTED] H# 15,388 - 2 TO 12 WEEKS POST EXPOSURE

GROUP	INTERVALS IN TEST DAYS				
	29.	36.	43.	50.	53.
CONTROL	389.9	421.6	447.4	472.1	481.6
7.6 MG/CM	381.0	415.3	445.5	472.4	475.4
58 MG/CM	371.1	404.2	432.1	459.7	464.8
480 MG/CM	347.2#	384.4+	411.8+	438.6	444.6
ANOVA(1)	0.022*	0.125	0.161	0.258	0.254
TREND(2)	0.003*	0.022*	0.034*	0.067	0.054
LSD(3)	27.7810	32.7937	34.9541	38.4790	39.1459
DUNNETT(4)	33.8025	39.9017	42.5303	46.8193	47.6307
BARTLETT(5)	0.606	0.468	0.352	0.352	0.210

GROUP	INTERVALS IN TEST DAYS				
	58.	64.	71.	78.	85.
CONTROL	505.4	521.2	545.2	561.8	572.2
7.6 MG/CM	499.4	514.4	538.0	555.4	570.2
58 MG/CM	488.8	503.2	524.2	543.8	556.8
480 MG/CM	457.2	477.0	493.2	514.2	529.2
ANOVA(1)	0.494	0.642	0.559	0.677	0.742
TREND(2)	0.159	0.229	0.183	0.257	0.314
LSD(3)	70.4257	77.1268	81.7306	87.9705	91.8318
DUNNETT(4)	87.3718	95.6854	101.3970	109.1384	113.9288
BARTLETT(5)	0.590	0.389	0.496	0.359	0.237

GROUP	INTERVALS IN TEST DAYS	
	92.	96.
CONTROL	583.6	586.2
7.6 MG/CM	582.6	575.4
58 MG/CM	577.0	567.6
480 MG/CM	539.8	532.6
ANOVA(1)	0.742	0.627
TREND(2)	0.355	0.228
LSD(3)	96.5097	90.1122
DUNNETT(4)	119.7323	111.7954
BARTLETT(5)	0.270	0.424

.cm = cubic meter

(1) P VALUE of F-TEST from ONE-FACTOR ANALYSIS OF VARIANCE.
(* indicates P value less than 0.05)

(2) P VALUE OF TEST FOR LINEAR TREND OVER GROUPS.
(* indicates P value less than 0.05)

(3) LEAST SIGNIFICANT DIFFERENCE - given a significant ($\alpha=0.05$) F RATIO, any two means differing by more than the LSD are significantly different with a false positive (α) error rate of 0.05.

(4) DUNNETT TEST - any treatment mean differing from the control mean by more than the DUNNETT statistic is significantly different from the control mean with a variable-wise false positive (α) error rate of 0.05.

(5) BARTLETTS TEST FOR EQUAL VARIANCE P VALUE.

+ SIGNIFICANTLY DIFFERENT ($P<0.05$) from CONTROL GROUP by LSD.

SIGNIFICANTLY DIFFERENT ($P<0.05$) from CONTROL GROUP by DUNNETT TEST and LSD.

cm = cubic meter

APPENDIX III
MEAN ORGAN WEIGHTS

[REDACTED] MEAN ORGAN WEIGHTS (GRAMS)
 [REDACTED] H# 15,388 - RATS SACRIFICED AFTER 10 EXPOSURES

GROUP	CONC.	FINAL WT.		LUNGS		LIVER	
CONTROL		290.4(	0.000)	1.329(	0.000)	10.086(	0.000)
7.6 MG/CM		289.6(	0.936)	1.260(	0.373)	10.258(	0.770)
58 MG/CM		285.4(	0.617)	1.302(	0.723)	10.801(	0.233)
480 MG/CM		248.0(	0.001)#	1.148(	0.029)	11.312(	0.050)
TEST - HOMOGENEITY		0.001		0.123		0.178	
TEST - TREND		0.001		0.051		0.034	
BARTLETT'S TEST		0.369		0.159		0.375	

GROUP	CONC.	SPLEEN		KIDNEY		TESTIS	
CONTROL		0.598(	0.000)	2.216(	0.000)	2.849(	0.000)
7.6 MG/CM		0.542(	0.335)	2.329(	0.395)	2.807(	0.731)
58 MG/CM		0.541(	0.322)	2.364(	0.268)	2.727(	0.324)
480 MG/CM		0.360(	0.001)#	2.145(	0.587)	2.742(	0.386)
TEST - HOMOGENEITY		0.003		0.330		0.720	
TEST - TREND		0.001		0.666		0.306	
BARTLETT'S TEST		0.767		0.920		0.630	

GROUP	CONC.	THYMUS	
-------	-------	--------	--

CONTROL		0.547(	0.000)
7.6 MG/CM		0.638(	0.285)
58 MG/CM		0.547(	0.998)
480 MG/CM		0.442(	0.221)

TEST - HOMOGENEITY	0.171
TEST - TREND	0.138
BARTLETT'S TEST	0.636

=====

Values in parentheses - P VALUE OF STUDENT T TEST COMPARISON
 OF TREATMENT MEAN TO CONTROL MEAN.
 + - SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD
 # - SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD AND
 DUNNETT'S TEST

HOMOGENEITY - P VALUE OF F TEST OF WHETHER GROUP MEANS ARE EQUAL.
 TREND - P VALUE OF F TEST OF WHETHER THERE IS DOSE-RELATED
 CHANGE IN GROUP MEANS.
 BARTLETT'S TEST - P VALUE OF TEST OF HOMOGENEITY OF VARIANCE

cm = cubic meter

[REDACTED] MEAN ORGAN WEIGHTS (GRAMS)
 [REDACTED] H# 15,388 - RATS SACRIFICED AFTER 14 DAYS RECOVERY

GROUP	CONC.	FINAL WT.		LUNGS		LIVER	
CONTROL		376.0	(0.000)	1.635	(0.000)	13.924	(0.000)
7.6 MG/CM		361.0	(0.367)	1.566	(0.399)	12.423	(0.464)
58 MG/CM		350.6	(0.135)	1.486	(0.081)	12.917	(0.622)
480 MG/CM		337.0	(0.028)	1.459	(0.042)	18.836	(0.026)+
TEST - HOMOGENEITY		0.143		0.154		0.021	
TEST - TREND		0.024		0.028		0.028	
BARTLETT'S TEST		0.267		0.480		0.002	

GROUP	CONC.	SPLEEN		KIDNEY		TESTIS	
CONTROL		0.804	(0.000)	2.808	(0.000)	3.228	(0.000)
7.6 MG/CM		0.718	(0.283)	2.822	(0.933)	2.918	(0.133)
58 MG/CM		0.629	(0.038)	2.693	(0.494)	3.060	(0.404)
480 MG/CM		0.698	(0.190)	2.660	(0.379)	3.050	(0.376)
TEST - HOMOGENEITY		0.200		0.692		0.491	
TEST - TREND		0.116		0.285		0.534	
BARTLETT'S TEST		0.943		0.351		0.123	

GROUP	CONC.	THYMUS	
CONTROL		0.619	(0.000)
7.6 MG/CM		0.761	(0.033)+
58 MG/CM		0.591	(0.648)
480 MG/CM		0.587	(0.600)
TEST - HOMOGENEITY		0.034	
TEST - TREND		0.182	
BARTLETT'S TEST		0.554	

=====

Values in parentheses - P VALUE OF STUDENT T TEST COMPARISON
 OF TREATMENT MEAN TO CONTROL MEAN.

+ - SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD

- SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD AND
 DUNNETT'S TEST

HOMOGENEITY - P VALUE OF F TEST OF WHETHER GROUP MEANS ARE EQUAL.

TREND - P VALUE OF F TEST OF WHETHER THERE IS DOSE-RELATED
 CHANGE IN GROUP MEANS.

BARTLETT'S TEST - P VALUE OF TEST OF HOMOGENEITY OF VARIANCE

cm = cubic meter

[REDACTED] MEAN ORGAN WEIGHTS (GRAMS)
H# 15,388 - RATS SACRIFICED AFTER 41 DAYS RECOVERY

GROUP	CONC.	FINAL WT.		LUNGS		LIVER	
CONTROL		470.2	(0.000)	1.815	(0.000)	18.641	(0.000)
7.6 MG/CM		465.0	(0.840)	1.671	(0.193)	17.815	(0.694)
58 MG/CM		454.0	(0.531)	1.684	(0.235)	17.603	(0.622)
480 MG/CM		442.8	(0.295)	1.724	(0.403)	18.262	(0.857)
TEST - HOMOGENEITY		0.712		0.537		0.958	
TEST - TREND		0.262		0.450		0.839	
BARTLETT'S TEST		0.208		0.228		0.586	

GROUP	CONC.	SPLEEN		KIDNEY		TESTIS	
CONTROL		0.773	(0.000)	3.517	(0.000)	3.246	(0.000)
7.6 MG/CM		0.723	(0.507)	3.344	(0.551)	3.126	(0.514)
58 MG/CM		0.728	(0.551)	3.336	(0.532)	3.176	(0.701)
480 MG/CM		0.743	(0.688)	3.187	(0.261)	3.191	(0.762)
TEST - HOMOGENEITY		0.904		0.719		0.928	
TEST - TREND		0.719		0.282		0.840	
BARTLETT'S TEST		0.234		0.651		0.808	

GROUP	CONC.	THYMUS	
CONTROL		0.633	(0.000)
7.6 MG/CM		0.708	(0.280)
58 MG/CM		0.579	(0.436)
480 MG/CM		0.596	(0.591)
TEST - HOMOGENEITY		0.265	
TEST - TREND		0.277	
BARTLETT'S TEST		0.108	

=====

Values in parentheses - P VALUE OF STUDENT T TEST COMPARISON
OF TREATMENT MEAN TO CONTROL MEAN.

+ - SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD

- SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD AND
DUNNETT'S TEST

HOMOGENEITY - P VALUE OF F TEST OF WHETHER GROUP MEANS ARE EQUAL.

TREND - P VALUE OF F TEST OF WHETHER THERE IS DOSE-RELATED
CHANGE IN GROUP MEANS.

BARTLETT'S TEST - P VALUE OF TEST OF HOMOGENEITY OF VARIANCE

cm = cubic meter

[REDACTED] - MEAN ORGAN WEIGHTS (GRAMS)
H# 15,388 - RATS SACRIFICED AFTER 84 DAYS RECOVERY

GROUP	CONC.	FINAL WT.		LUNGS		LIVER	
CONTROL		586.2	(0.000)	2.008	(0.000)	21.936	(0.000)
7.6 MG/CM		575.4	(0.803)	1.582	(0.031)	21.614	(0.889)
58 MG/CM		567.6	(0.668)	1.953	(0.766)	20.026	(0.415)
480 MG/CM		532.6	(0.225)	1.942	(0.719)	20.215	(0.461)

TEST - HOMOGENEITY	0.627	0.112	0.783
TEST - TREND	0.228	0.765	0.363
BARTLETT'S TEST	0.424	0.235	0.484

GROUP	CONC.	SPLEEN		KIDNEY		TESTIS	
CONTROL		0.749	(0.000)	3.952	(0.000)	3.210	(0.000)
7.6 MG/CM		0.802	(0.647)	3.730	(0.539)	3.454	(0.129)
58 MG/CM		0.944	(0.106)	3.521	(0.241)	3.355	(0.357)
480 MG/CM		0.875	(0.287)	3.690	(0.469)	3.204	(0.970)

TEST - HOMOGENEITY	0.373	0.685	0.322
TEST - TREND	0.170	0.386	0.812
BARTLETT'S TEST	0.015	0.491	0.092

GROUP	CONC.	THYMUS	
CONTROL		0.709	(0.000)
7.6 MG/CM		0.681	(0.816)
58 MG/CM		0.676	(0.789)
480 MG/CM		0.540	(0.181)
TEST - HOMOGENEITY	0.519		
TEST - TREND	0.199		
BARTLETT'S TEST	0.927		

=====

Values in parentheses - P VALUE OF STUDENT T TEST COMPARISON
OF TREATMENT MEAN TO CONTROL MEAN.
+ - SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD
- SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD AND
DUNNETT'S TEST

HOMOGENEITY - P VALUE OF F TEST OF WHETHER GROUP MEANS ARE EQUAL.
TREND - P VALUE OF F TEST OF WHETHER THERE IS DOSE-RELATED
CHANGE IN GROUP MEANS.
BARTLETT'S TEST - P VALUE OF TEST OF HOMOGENEITY OF VARIANCE

cm = cubic meter

APPENDIX IV

MEAN ORGAN-TO-BODY WEIGHT RATIOS

[REDACTED] MEAN ORGAN-TO-BODY WEIGHT RATIOS
 H# 15,388 - RATS SACRIFICED AFTER 10 EXPOSURES

GROUP	CONC.	LUNGS		LIVER		SPLEEN	
CONTROL		0.458(	0.000)	3.472(	0.000)	0.206(	0.000)
7.6 MG/CM		0.436(	0.330)	3.534(	0.686)	0.187(	0.289)
58 MG/CM		0.456(	0.925)	3.782(	0.055)	0.189(	0.327)
480 MG/CM		0.464(	0.800)	4.573(	0.000)#	0.144(	0.002)#
TEST - HOMOGENEITY		0.620		0.000		0.012	
TEST - TREND		0.601		0.000		0.003	
BARTLETT'S TEST		0.369		0.034		0.341	

GROUP	CONC.	KIDNEY		TESTIS		THYMUS	
CONTROL		0.763(	0.000)	0.982(	0.000)	0.188(	0.000)
7.6 MG/CM		0.803(	0.292)	0.973(	0.851)	0.222(	0.249)
58 MG/CM		0.827(	0.097)	0.957(	0.577)	0.190(	0.947)
480 MG/CM		0.868(	0.011)	1.106(	0.012)#	0.176(	0.674)
TEST - HOMOGENEITY		0.068		0.014		0.435	
TEST - TREND		0.010		0.021		0.457	
BARTLETT'S TEST		0.556		0.482		0.049	

=====

Values in parentheses - P VALUE OF STUDENT T TEST COMPARISON
 OF TREATMENT MEAN TO CONTROL MEAN.
 + - SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD
 # - SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD AND
 DUNNETT'S TEST

HOMOGENEITY - P VALUE OF F TEST OF WHETHER GROUP MEANS ARE EQUAL.
 TREND - P VALUE OF F TEST OF WHETHER THERE IS DOSE-RELATED
 CHANGE IN GROUP MEANS.
 BARTLETT'S TEST - P VALUE OF TEST OF HOMOGENEITY OF VARIANCE

cm = cubic meter

MEAN ORGAN-TO-BODY WEIGHT RATIOS
H# 15,388 - RATS SACRIFICED AFTER 14 DAYS RECOVERY

GROUP	CONC.	LUNGS		LIVER		SPLEEN	
CONTROL		0.435(	0.000)	3.697(	0.000)	0.213(	0.000)
7.6 MG/CM		0.434(	0.941)	3.437(	0.484)	0.199(	0.407)
58 MG/CM		0.424(	0.510)	3.685(	0.975)	0.179(	0.061)
480 MG/CM		0.434(	0.943)	5.502(	0.000)#	0.206(	0.667)
TEST - HOMOGENEITY		0.897		0.000		0.251	
TEST - TREND		0.800		0.000		0.444	
BARTLETT'S TEST		0.267		0.233		0.002	

GROUP	CONC.	KIDNEY		TESTIS		THYMUS	
CONTROL		0.747(	0.000)	0.858(	0.000)	0.165(	0.000)
7.6 MG/CM		0.781(	0.301)	0.807(	0.410)	0.212(	0.015)
58 MG/CM		0.768(	0.517)	0.876(	0.763)	0.168(	0.833)
480 MG/CM		0.790(	0.190)	0.914(	0.357)	0.175(	0.566)
TEST - HOMOGENEITY		0.564		0.374		0.055	
TEST - TREND		0.259		0.225		0.815	
BARTLETT'S TEST		0.923		0.238		0.565	

=====

Values in parentheses - P VALUE OF STUDENT T TEST COMPARISON
OF TREATMENT MEAN TO CONTROL MEAN.
+ - SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD
- SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD AND
DUNNETT'S TEST

HOMOGENEITY - P VALUE OF F TEST OF WHETHER GROUP MEANS ARE EQUAL.
TREND - P VALUE OF F TEST OF WHETHER THERE IS DOSE-RELATED
CHANGE IN GROUP MEANS.
BARTLETT'S TEST - P VALUE OF TEST OF HOMOGENEITY OF VARIANCE

cm = cubic meter

MEAN ORGAN-TO-BODY WEIGHT RATIOS
H# 15,388 - RATS SACRIFICED AFTER 41 DAYS RECOVERY

GROUP	CONC.	LUNGS		LIVER		SPLEEN	
CONTROL		0.387(	0.000)	3.975(	0.000)	0.165(	0.000)
7.6 MG/CM		0.360(	0.202)	3.797(	0.601)	0.156(	0.576)
58 MG/CM		0.371(	0.452)	3.858(	0.730)	0.159(	0.679)
480 MG/CM		0.390(	0.870)	4.126(	0.656)	0.169(	0.815)
TEST - HOMOGENEITY		0.430		0.770		0.840	
TEST - TREND		0.742		0.632		0.788	
BARTLETT'S TEST		0.208		0.259		0.995	

GROUP	CONC.	KIDNEY		TESTIS		THYMUS	
CONTROL		0.749(	0.000)	0.692(	0.000)	0.134(	0.000)
7.6 MG/CM		0.720(	0.555)	0.676(	0.656)	0.153(	0.129)
58 MG/CM		0.735(	0.784)	0.700(	0.829)	0.127(	0.516)
480 MG/CM		0.718(	0.517)	0.722(	0.432)	0.135(	0.980)
TEST - HOMOGENEITY		0.902		0.657		0.180	
TEST - TREND		0.606		0.343		0.499	
BARTLETT'S TEST		0.759		0.719		0.274	

=====

Values in parentheses - P VALUE OF STUDENT T TEST COMPARISON
OF TREATMENT MEAN TO CONTROL MEAN.

+ - SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD

- SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD AND
DUNNETT'S TEST

HOMOGENEITY - P VALUE OF F TEST OF WHETHER GROUP MEANS ARE EQUAL.

TREND - P VALUE OF F TEST OF WHETHER THERE IS DOSE-RELATED
CHANGE IN GROUP MEANS.

BARTLETT'S TEST - P VALUE OF TEST OF HOMOGENEITY OF VARIANCE

cm = cubic meter

MEAN ORGAN-TO-BODY WEIGHT RATIOS
H# 15,388 - RATS SACRIFICED AFTER 84 DAYS RECOVERY

GROUP	CONC.	LUNGS		LIVER		SPLEEN	
CONTROL		0.344(	0.000)	3.739(	0.000)	0.128(	0.000)
7.6 MG/CM		0.273(	0.010)#	3.755(	0.948)	0.139(	0.342)
58 MG/CM		0.345(	0.963)	3.506(	0.354)	0.165(	0.004)#
480 MG/CM		0.368(	0.336)	3.788(	0.843)	0.161(	0.010)#
TEST - HOMOGENEITY		0.008		0.649		0.012	
TEST - TREND		0.079		0.897		0.003	
BARTLETT'S TEST		0.424		0.088		0.152	

GROUP	CONC.	KIDNEY		TESTIS		THYMUS	
CONTROL		0.676(	0.000)	0.550(	0.000)	0.120(	0.000)
7.6 MG/CM		0.649(	0.522)	0.602(	0.124)	0.120(	0.995)
58 MG/CM		0.620(	0.196)	0.595(	0.180)	0.118(	0.916)
480 MG/CM		0.694(	0.687)	0.611(	0.073)	0.099(	0.271)
TEST - HOMOGENEITY		0.345		0.266		0.617	
TEST - TREND		0.867		0.099		0.282	
BARTLETT'S TEST		0.003		0.376		0.438	

=====

Values in parentheses - P VALUE OF STUDENT T TEST COMPARISON
OF TREATMENT MEAN TO CONTROL MEAN.

+ - SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD

- SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD AND
DUNNETT'S TEST

HOMOGENEITY - P VALUE OF F TEST OF WHETHER GROUP MEANS ARE EQUAL.

TREND - P VALUE OF F TEST OF WHETHER THERE IS DOSE-RELATED
CHANGE IN GROUP MEANS.

BARTLETT'S TEST - P VALUE OF TEST OF HOMOGENEITY OF VARIANCE

cm = cubic meter

APPENDIX V

PATHOLOGY REPORT NO. 18-85



E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED

HASKELL LABORATORY FOR TOXICOLOGY
AND INDUSTRIAL MEDICINE
P.O. BOX 50, ELKTON ROAD
NEWARK, DELAWARE 19711

CENTRAL RESEARCH AND DEVELOPMENT DEPARTMENT

PATHOLOGY REPORT NO. 19-85

[REDACTED]

[REDACTED]

H-15388, [REDACTED] POLYMER PRODUCTS DEPARTMENT

SUBCHRONIC INHALATION STUDY IN MALE Cr1:CD®(SD)BR RATS

APRIL 4, 1985

Summary

Cr1:CD®(SD)BR male rats exposed to [REDACTED] via inhalation for 10 days were examined grossly and selected tissues were weighed and/or examined microscopically. Compound-related lesions consisting of fatty change in centrilobular hepatocytes of the liver and nephrosis of tubular epithelial cells of the cortex of the kidneys occurred in high dose animals. The fatty change was most severe in animals killed 14 days following the last exposure. A slight degree of fatty change was still present in the liver of 2 of 5 animals killed after 84 days of recovery. The kidney lesion was only noted in the animals killed on the last day of exposure. The no-effect-level for histopathology was the design concentration of 0.05 mg/L.

Introduction

This report will summarize the results of inhalation exposure of male Cr1:CD®(SD)BR rats to [REDACTED] for 10 days. Treatment groups were as follows:

<u>Group</u>	<u>Design Chamber Concentration of</u> <u>[REDACTED] (mg/L)</u>
I	0 (Control)
II	0.005 (Low Dose)
III	0.05 (Intermediate Dose)
IV	0.5 (High Dose)

Animals were exposed "nose only" to the compound 6 hours/day, 5 days/week for 2 weeks. Five animals from each group were killed and examined at each of 4 different time periods - on the last day of exposure and 14, 41 and 84 days following the last exposure. Organ weights were determined for lungs, liver, spleen, kidneys, testes and thymus. Selected tissues were processed and examined for histopathology¹.

Results

Table I contains the gross observations made at necropsy. Tables II, III, IV and V summarize the microscopic observations for rats with 0, 14, 41 and 84 days recovery, respectively. Table VI contains microscopic observations for individual animals.

Compound-related lesions occurred in the liver and kidneys of high dose animals. Fatty change occurred in centrilobular hepatocytes of the liver in 4 of 5 rats killed on the last day of exposure, 5 of 5 rats killed on days 14 and 41 post-exposure and 2 of 5 rats killed on day 84 post-exposure. Diffuse fatty change of minimal severity occurred in the animals killed on the last day of exposure. Affected hepatocytes contained small numbers of fine lipid vacuoles without being appreciably enlarged. At 14 days recovery, the fatty change was moderate in one animal and mild in the other four. Affected hepatocytes were moderately distended by numerous lipid vacuoles. At 41 days recovery, the lesion was mild in one animal, minimal in three and only present in a few scattered hepatocytes in one animal. Eighty-four days following the last exposure, the lesion was minimal in one animal and only present in a few scattered hepatocytes in one animal. Affected hepatocytes at 41 and 84 days post-exposure were similar in appearance to those at 14 days post-exposure.

Minimal to mild nephrosis occurred in the kidneys of all five high dose animals killed on the last day of exposure. The lesion was characterized by foci of cholesterol-like clefts, regenerative tubular epithelial cells and

¹ Liver, kidneys, lungs, heart, spleen, thymus, pancreas, adrenal glands, thyroid gland, trachea, esophagus, brain, stomach, duodenum, jejunum, ileum, cecum, colon, rectum, mesenteric lymph node, testes, epididymides, urinary bladder, sternum, bone marrow, eyes, nose and all gross lesions.

occasional necrotic epithelial cells in the cortex of the kidneys. The lesion was not present after 14 days of recovery.

Conclusion

Compound-related lesions consisting of fatty change in the liver and nephrosis in the kidneys occurred in animals exposed to a design concentration of 0.5 mg/L of [REDACTED] for 10 days. A slight degree of fatty change was still present in the liver of 2 of 5 animals after 84 days of recovery. The kidney lesion was not evident after 14 days of recovery. The no-effect-level for histopathology was the design concentration of 0.05 mg/L.

Acknowledgement

Pathology supervisory personnel associated with this study were Joan A. Wolfe (Histology) and Bobby L. Moore (Necropsy).

Report by:

Theodore W. Slone Jr.

Theodore W. Slone, Jr. D.V.M.

Diplomate A.C.V.P.

Staff Pathologist

Approved by:

William C. Krauss

William C. Krauss, D.V.M.

Manager, Pathology Division

TWS/WCK/wfd
TWS 1.6

KEY TO TABLES

Mode of Death

SD = Sacrificed by design

Tissue Accounting Code

N = No change observed

L = Change observed

O = No tissue present

I = Insufficient tissue present for evaluation

Lesion Grades

P = Change present, severity not graded

1 = Minimal degree of change present

2 = Mild degree of change present

3 = Moderate degree of change present

4 = Marked degree of change present

- = Lesion not present

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TABLE I

GROSS PATHOLOGY

INHALATION SUBCHRONIC - MALE RATS

<u>Animal Number</u>	<u>Days on Test</u>	<u>Recovery Days</u>	<u>Mode of Death</u>	<u>Observation</u>
<u>Group I - Control</u>				
376825	12	0	SD	No abnormalities detected
376839	12	0	SD	No abnormalities detected
376840	12	0	SD	No abnormalities detected
376870	12	0	SD	No abnormalities detected
376873	12	0	SD	Mandibular Lymph Nodes - large, slight
376835	26	14	SD	No abnormalities detected
376841	26	14	SD	Lungs - discoloration, red, gray, patchy areas
376849	26	14	SD	No abnormalities detected
376863	26	14	SD	Urinary Bladder - dilatation, (1.0 cc)
376872	26	14	SD	Mediastinal Lymph Node - discoloration, red
376801	53	41	SD	No abnormalities detected
376836	53	41	SD	Liver - large Lungs - discoloration, white patchy areas
376837	53	41	SD	No abnormalities detected
376847	53	41	SD	No abnormalities detected
376878	53	41	SD	No abnormalities detected
376807	96	84	SD	No abnormalities detected
376829	96	84	SD	No abnormalities detected
376834	96	84	SD	No abnormalities detected

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TABLE I

Part 2

GROSS PATHOLOGY
INHALATION SUBCHRONIC - MALE RATS

Animal Number	Days on Test	Recovery Days	Mode of Death	Observation
376861	96	84	SD	No abnormalities detected
376869	96	84	SD	Lungs - discoloration, dark red foci, (< 2 mm in diameter), scattered
<u>Group II - Low Dose</u>				
376804	12	0	SD	No abnormalities detected
376806	12	0	SD	No abnormalities detected
376818	12	0	SD	No abnormalities detected
376823	12	0	SD	Lungs - foci, red, (< 2 mm), several
376844	12	0	SD	Renal Pelvis - dilatation, right, slight
376810	26	14	SD	Lungs - foci, red, (< 2 mm in diameter), few
376822	26	14	SD	Lungs - discoloration, pale
376852	26	14	SD	No abnormalities detected
376876	26	14	SD	Lungs - focus, brown, (1 mm in diameter) Testes - small, left, (wt. = 0.688 grams)
376881	26	14	SD	No abnormalities detected
376800	53	41	SD	Thymus - discoloration, red patchy areas, slight
376848	53	41	SD	Lungs - foci, red, few, (< 2 mm in diameter)
376856	53	41	SD	Liver - discoloration, pale

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TABLE I

Part 3

GROSS PATHOLOGY
INHALATION SUBCHRONIC - MALE RATS

Animal Number	Days on Test	Recovery Days	Mode of Death	Observation
376866	53	41	SD	Lungs - foci, dark red, lower right lobe, (< 2 mm in diameter), few Thymus - foci, dark red, (1 mm in diameter), several
376871	53	41	SD	No abnormalities detected
376827	96	84	SD	No abnormalities detected
376831	96	84	SD	Lungs - foci, black, (2 mm in diameter), caudal lobe
376862	96	84	SD	No abnormalities detected
376877	96	84	SD	No abnormalities detected
376882	96	84	SD	No abnormalities detected
<u>Group III - Intermediate Dose</u>				
376805	12	0	SD	No abnormalities detected
376821	12	0	SD	No abnormalities detected
376838	12	0	SD	Renal Pelvis - dilatation, right, moderate
376851	12	0	SD	No abnormalities detected
376867	12	0	SD	Periocular - chromodacryorrhea, right, slight Thymus - discoloration, red patchy areas
376812	26	14	SD	Lungs - focus, dark red, (< 1 mm in diameter), postcaval lobe
376813	26	14	SD	No abnormalities detected
376830	26	14	SD	No abnormalities detected

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TABLE I

Part 4

GROSS PATHOLOGY
INHALATION SUBCHRONIC - MALE RATS

Animal Number	Days on Test	Recovery Days	Mode of Death	Observation
376857	26	14	SD	Lungs - foci, red, right lower lobe, two, (< 1 mm in diameter)
376874	26	14	SD	No abnormalities detected
376803	53	41	SD	No abnormalities detected
376808	53	41	SD	Liver - large Lungs - foci, red, few, (< 1 mm in diameter)
376811	53	41	SD	Lungs - foci, dark red, diffuse, (< 2 mm in diameter)
376843	53	41	SD	Lungs - focus, dark, (2 mm in diameter), lower right lobe
376860	53	41	SD	Thymus - discoloration, red patchy areas
376817	96	84	SD	No abnormalities detected
376846	96	84	SD	No abnormalities detected
376855	96	84	SD	No abnormalities detected
376864	96	84	SD	No abnormalities detected
376875	96	84	SD	No abnormalities detected
<u>Group IV - High Dose</u>				
376820	12	0	SD	No abnormalities detected
376828	12	0	SD	No abnormalities detected
376854	12	0	SD	No abnormalities detected
376859	12	0	SD	Lungs - discoloration, white patchy areas, scattered

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TABLE I

Part 5

GROSS PATHOLOGY
INHALATION SUBCHRONIC - MALE RATS

Animal Number	Days on Test	Recovery Days	Mode of Death	Observation
376879	12	0	SD	Oral Cavity - discharge, clear Perineum - stain, brown Whole Body - thin
376819	26	14	SD	Liver - discoloration, lobular patterns prominent Lungs - discoloration, pale
376824	26	14	SD	Liver - foci, (< 1 mm in diameter), diffuse, dark Lungs - foci, red, scattered, (< 1 mm in diameter) Thymus - foci, red, multiple, (< 2 mm in diameter)
376833	26	14	SD	No abnormalities detected
376858	26	14	SD	No abnormalities detected
376880	26	14	SD	Liver - discoloration, lobular patterns prominent Lungs - foci, red, (< 2 mm in diameter), few
376814	53	41	SD	No abnormalities detected
376815	53	41	SD	Liver - large Thymus - discoloration, dull red, left lobe
376832	53	41	SD	Lungs - discoloration, dark red foci, (< 2 mm), scattered
376850	53	41	SD	No abnormalities detected
376853	53	41	SD	No abnormalities detected
376816	96	84	SD	No abnormalities detected
376826	96	84	SD	Lungs - foci, red, brown, (1 mm in diameter), scattered

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TABLE I

Part 6

GROSS PATHOLOGY

INHALATION SUBCHRONIC - MALE RATS

<u>Animal Number</u>	<u>Days on Test</u>	<u>Recovery Days</u>	<u>Mode of Death</u>	<u>Observation</u>
376842	96	84	SD	Lungs - foci, red, (1 mm in diameter), scattered
376845	96	84	SD	Liver - hernia, through diaphragm
376868	96	84	SD	No abnormalities detected

TABLE II
SUMMARY TABLE

SPECIES: RAT
INCIDENCES OF NON-NEOPLASTIC LESIONS
COMPOUND: [REDACTED]
SUBCHRONIC INHALATION STUDY

TISSUE/LESION:	LESION GRADES: (P.1,2,3,4)	GROUP DESIGNATION: DOSE (MG/L): NUMBER IN GROUP:	(days-on-test from 1 to 12)			
			I	II	III	IV
			0.00	0.005	0.05	0.50
			5	5	5	5
=====						
LIVER						
FATTY CHANGE, DIFFUSE, CENTRILOBULAR		5	5	5	5	5
FATTY CHANGE, FOCAL, MEDIAN LOBE		-	-	-	-	-
FATTY CHANGE, INDIVIDUAL HEPATOCYTES, SCATTERED, CENTRILOBULAR		-	-	-	-	5
INFLAMMATION, SUBACUTE, MULTIFOCAL		-	-	-	-	4 (-,4,-,-,-)
NECROSIS, ACUTE, INDIVIDUAL HEPATOCYTES, CENTRILOBULAR		1 (-,-,1,-,-)	2 (-,2,-,-,-)	2 (-,2,-,-,-)	-	-
NECROSIS, COAGULATIVE, ACUTE, FOCAL/MULTIFOCAL		1 (-,1,-,-,-)	1 (-,1,-,-,-)	-	-	1 (-,1,-,-,-)
NECROSIS, COAGULATIVE, SUBACUTE, MULTIFOCAL		-	-	-	-	-
KIDNEYS						
CHOLESTEROL CLEFTS/REGENERATIVE TUBULES/INDIV. CELL NECROSIS		5	5	5	5	5
CVST, FOCAL		-	-	-	-	-
GLOMERULONEPHROPATHY, CHRONIC		-	-	-	-	-
HYDRONEPHROSIS, UNILATERAL		1 (-,1,-,-,-)	-	-	-	5 (-,2,3,-,-)
PROTEIN DROPLETS, PROXIMAL TUBULES		-	-	-	-	-
LUNGS						
HEMORRHAGE, SUBACUTE, FOCAL/MULTIFOCAL		5	5	5	5	5
HISTIOCYTOSIS, FOCAL/MULTIFOCAL		-	-	-	-	-
INFLAMMATION, SUBACUTE, FOCAL/MULTIFOCAL		-	-	-	-	-
LYMPHOCYTIC INFILTRATE, MULTIFOCAL, PERIVASCULAR		-	1 (-,1,-,-,-)	2 (-,2,-,-,-)	2 (-,2,-,-,-)	1 (-,1,-,-,-)
POLYMORPHONUCLEAR INFILTRATE, MULTIFOCAL, PERIVASCULAR		-	1 (-,1,-,-,-)	-	-	-
HEART		-	-	-	-	-
MYODEGENERATION, FOCAL/MULTIFOCAL, MYOCARDIUM		5	5	5	5	5
PANCREAS		-	-	-	-	-
ATROPHY, FOCAL, LOBULE		5	5	5	5	5
INFLAMMATION, CHRONIC, INTERSTITIAL, WITH PIGMENTED MACROPHAGES		-	-	-	-	-
THYMUS		-	-	-	-	-
HEMORRHAGE, ACUTE, MULTIFOCAL		5	5	5	5	5
SPLEEN		-	-	-	-	-
ADRENAL GLANDS		5	5	5	5	5
DEGENERATIVE FOCUS		4	5	5	5	5
THYROID GLAND		5	5	5	5	5
CYST		-	-	-	-	-
ULTIMOBRANCHIAL CYST		4	4	3	3	3
		-	1 (1,-,-,-,-)	-	-	-

TABLE II
SUMMARY TABLE

SPECIES: RAT
INCIDENCES OF NON-NEOPLASTIC LESIONS
COMPOUND: XXXXXXXXXX
SUBCHRONIC INHALATION STUDY

TISSUE/LESION:	LESION GRADES: (P,1,2,3,4)	MALES (days-on-test from 1 to 12)				
		GROUP DESIGNATION: DOSE (MG/L): NUMBER IN GROUP:	I 0.00 5	II 0.005 5	III 0.05 5	IV 0.50 5
TRACHEA			5	5	5	5
ESOPHAGUS			5	5	5	5
BRAIN			5	5	5	5
STOMACH			5	5	5	5
DUODENUM			5	5	5	5
JEJUNUM			5	5	5	5
ILEUM			5	5	5	5
CECUM			5	5	5	5
COLON			5	5	5	5
NEMATODE, LUMEN			5	5	5	5
RECTUM			5	5	5	5
NEMATODE, LUMEN			5	5	5	5
MESENTERIC LYMPH NODE			5	5	5	5
URINARY BLADDER			5	5	5	5
TESTES			5	5	5	5
ATROPHY, SEMINIFEROUS TUBULES, BILATERAL			5	5	5	5
ATROPHY, SEMINIFEROUS TUBULES, UNILATERAL			5	5	5	5
EPIDIDYMIDES			1 (-,1,-,-,-)	-	-	-
SPERM GRANULOMA			5	5	5	5
EYES			5	5	5	5
STERNUM			5	5	5	5
BONE MARROW			5	2	3	5
NOSE			5	2	3	5
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, RESPIRATORY EPITH.			5	5	5	4

TABLE II
SUMMARY TABLE

SPECIES: RAT
INCIDENCES OF NON-NEOPLASTIC LESIONS
COMPOUND: [REDACTED]
SUBCHRONIC INHALATION STUDY

TISSUE/LESION:	LESION GRADES: (P,1,2,3,4)	MALES			
		GROUP DESIGNATION:	DOSE (MG/L):	(days-on-test from 1 to 12)	
		NUMBER IN GROUP:			
NOSE (cont'd)					
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, VENTRAL MEATUS		I	0.00	III	IV
INFLAMMATION, FOCAL, SUBACUTE, MAXILLOTURBINATE		5	0.005	5	0.05
INFLAMMATION, SUBACUTE, MULTIFOCAL, RESPIRATORY TURBINATES		5	5	5	5
SQUAMOUS METAPLASIA, FOCAL, RESPIRATORY EPITHELIUM		1 (-,1,-,-,-)			4
SQUAMOUS METAPLASIA, RESPIRATORY EPITHELIUM		1 (-,1,-,-,-)			-
OTHER					-
MANDIBULAR LYMPH NODE: HYPERPLASIA, LYMPHOID		1		0	0
		1 (-,1,-,-,-)			-

NOTES:

- o THE NUMBER OF ORGANS EXAMINED FOR EACH GROUP IS UNDERLINED.
o LESION GRADES CORRESPOND BY POSITION WITH THE NUMBERS IN PARENTHESES, WHICH INDICATE HOW OFTEN EACH GRADE WAS OBSERVED.

TABLE III
SUMMARY TABLE

SPECIES: RAT
INCIDENCES OF NON-NEOPLASTIC LESIONS
COMPOUND: SUBCHRONIC INHALATION STUDY

TISSUE/LESION: (P,1,2,3,4)	MALES (days-on-test from 13 to 26)				
	GROUP DESIGNATION: DOSE (MG/L): NUMBER IN GROUP:	I 0.00 5	II 0.005 5	III 0.05 5	IV 0.50 5
LIVER					
FATTY CHANGE, DIFFUSE, CENTRILOBULAR		5	5	5	5
FATTY CHANGE, FOCAL, MEDIAN LOBE		1 (-,1,-,-,-)	-	-	5 (-,-,4,1,-)
INFLAMMATION, INDIVIDUAL HEPATOCYTES, SCATTERED, CENTRILOBULAR		-	-	-	-
NECROSIS, ACUTE, SUBACUTE, MULTIFOCAL		1 (-,1,-,-,-)	1 (-,1,-,-,-)	-	-
NECROSIS, ACUTE, INDIVIDUAL HEPATOCYTES, CENTRILOBULAR		-	-	-	-
NECROSIS, COAGULATIVE, ACUTE, FOCAL/MULTIFOCAL		-	-	-	-
NECROSIS, COAGULATIVE, SUBACUTE, MULTIFOCAL		-	-	-	1 (-,-,1,-,-)
KIDNEYS					
CHOLESTEROL CLEFTS/REGENERATIVE TUBULES/INDIV. CELL NECROSIS		5	5	5	5
CYST, FOCAL		-	-	-	-
GLOMERULONEPHROPATHY, CHRONIC		-	-	-	-
HYDRONEPHROSIS, UNILATERAL		-	-	-	2 (-,2,-,-,-)
PROTEIN DROPLETS, PROXIMAL TUBULES		-	-	-	-
LUNGS					
HEMORRHAGE, SUBACUTE, FOCAL/MULTIFOCAL		5	5	5	5
HISTIOCYTOSIS, FOCAL/MULTIFOCAL		-	-	-	-
INFLAMMATION, SUBACUTE, FOCAL/MULTIFOCAL		1 (-,1,-,-,-)	1 (-,1,-,-,-)	-	-
LYMPHOCYTIC INFILTRATE, MULTIFOCAL, PERIVASCULAR		1 (-,1,-,-,-)	1 (-,1,-,-,-)	-	-
POLYMORPHONUCLEAR INFILTRATE, MULTIFOCAL, PERIVASCULAR		1 (-,1,-,-,-)	-	1 (-,1,-,-,-)	2 (-,2,-,-,-)
HEART					
MYODEGENERATION, FOCAL/MULTIFOCAL, MYOCARDIUM		5	5	5	5
PANCREAS		5	5	5	5
ATROPHY, FOCAL, LOBULE		1 (-,1,-,-,-)	1 (-,1,-,-,-)	-	-
INFLAMMATION, CHRONIC, INTERSTITIAL, WITH PIGMENTED MACROPHAGES		5	5	5	5
THYMUS		-	-	-	-
HEMORRHAGE, ACUTE, MULTIFOCAL		5	5	5	5
SPLEEN		5	5	5	5
ADRENAL GLANDS		5	5	5	5
DEGENERATIVE FOCUS		5	5	5	5
THYROID GLAND		5	5	5	5
CYST		-	-	-	-
ULTIMOBRANCHIAL CYST		2 (2,-,-,-,-)	2 (2,-,-,-,-)	1 (1,-,-,-,-)	1 (1,-,-,-,-)

TABLE III

SUMMARY TABLE

SPECIES: RAT
INCIDENCES OF NON-NEOPLASTIC LESIONS
COMPOUND: [REDACTED]
SUBCHRONIC INHALATION STUDY

TISSUE/LESION:	MALES				
	(days-on-test from 13 to 26)				
LESION GRADES: (P, 1, 2, 3, 4)	GROUP DESIGNATION:				
	I	II	III	IV	
DOSE (MG/L):	0.00				
NUMBER IN GROUP:	5				
TRACHEA	5	5	5	5	0.50
ESOPHAGUS	5	5	5	5	5
BRAIN	5	5	5	5	5
STOMACH	5	5	5	5	5
DUODENUM	5	5	5	5	5
JEJUNUM	5	5	5	5	5
ILEUM	4	5	5	5	4
CECUM	5	5	5	5	5
COLON	5	5	5	5	5
NEMATODE, LUMEN	5	5	5	5	5
RECTUM	5	5	5	5	5
NEMATODE, LUMEN	5	5	5	5	5
MESENTERIC LYMPH NODE	5	5	5	5	5
URINARY BLADDER	4	4	5	5	5
TESTES	3	5	5	5	5
ATROPHY, SEMINIFEROUS TUBULES, BILATERAL	5	5	5	5	5
ATROPHY, SEMINIFEROUS TUBULES, UNILATERAL	-	1 (-, -, -, 1, -)	-	-	-
EPIDIDYMITIS	5	5	5	5	5
SPERM GRANULOMA	5	5	5	5	5
EYES	5	5	5	5	5
STERNUM	5	5	5	5	5
BONE MARROW	5	5	5	5	5
NOSE	5	5	5	5	4
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, RESPIRATORY EPITH.	5	5	5	5	5

TABLE III
SUMMARY TABLE

SPECIES: RAT
INCIDENCES OF NON-NEOPLASTIC LESIONS
COMPOUND: [REDACTED]
SUBCHRONIC INHALATION STUDY

PART: 3

TISSUE/LESION:	LESION GRADES: (P.1,2,3,4)	MALES				
		(days-on-test from 13 to 26)				
		GROUP DESIGNATION:	DOSE (MG/L):	NUMBER IN GROUP:		
		I	0.00	5	II	0.005
					III	0.05
					IV	0.50
NOSE						
(cont'd)						
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, VENTRAL MEATUS		5			5	
INFLAMMATION, FOCAL, SUBACUTE, MAXILLATORYBINATE		1 (-,1,-,-,-)			5	
INFLAMMATION, SUBACUTE, MULTIFOCAL, RESPIRATORY TURBINATES		1 (-,1,-,-,-)			-	
SQUAMOUS METAPLASIA, FOCAL, RESPIRATORY TURBINATES		1 (-,1,-,-,-)			-	
SQUAMOUS METAPLASIA, RESPIRATORY EPITHELIUM		1 (-,1,-,-,-)			-	
OTHER						
MANDIBULAR LYMPH NODE: HYPERPLASIA, LYMPHOID		0			0	

NOTES:
o THE NUMBER OF ORGANS EXAMINED FOR EACH GROUP IS UNDERLINED.
o LESION GRADES CORRESPOND BY POSITION WITH THE NUMBERS IN PARENTHESES, WHICH INDICATE HOW OFTEN EACH GRADE WAS OBSERVED.

INCIDENCES OF NON-NEOPLASTIC LESIONS
SPECIES: RAT
COMPOUND: 1
SUBCHRONIC INHALATION STUDY

SUMMARY TABLE

PART: 1

TABLE IV

TISSUE/LESION:	LESION GRADES: (P,1,2,3,4)	GROUP DESIGNATION:				(days-on-test from 27 to 53)			
		DOSE (MG/L):	NUMBER IN GROUP:	I	II	III	IV		
				0.00	0.005	0.05	0.50		
LIVER				5	5	5	5		
FATTY CHANGE, DIFFUSE, CENTRILOBULAR				5	5	5	5		
FATTY CHANGE, FOCAL, MEDIAN LOBE				-	-	-	4 (-,3,1,-,-)		
FATTY CHANGE, INDIVIDUAL HEPATOCYTES, SCATTERED, CENTRILOBULAR				-	-	-	-		
INFLAMMATION, SUBACUTE, MULTIFOCAL				1 (-,1,-,-,-)	-	-	-		
NECROSIS, ACUTE, INDIVIDUAL HEPATOCYTES, CENTRILOBULAR				-	-	2 (-,2,-,-,-)	1 (-,1,-,-,-)		
NECROSIS, COAGULATIVE, ACUTE, FOCAL/MULTIFOCAL				-	1 (-,1,-,-,-)	-	-		
NECROSIS, COAGULATIVE, SUBACUTE, MULTIFOCAL				-	-	-	-		
KIDNEYS				5	5	5	5		
CHOLESTEROL CLEFTS/REGENERATIVE TUBULES/INDIV. CELL NECROSIS				-	-	-	-		
CYST, FOCAL				-	-	-	-		
GLOMERULONEPHROPATHY, CHRONIC				-	-	-	-		
HYDRONEPHROSIS, UNILATERAL				-	-	-	-		
PROTEIN DROPLETS, PROXIMAL TUBULES				2 (-,2,-,-,-)	1 (-,1,-,-,-)	-	-		
LUNGS				5	5	5	5		
HEMORRHAGE, SUBACUTE, FOCAL/MULTIFOCAL				-	-	-	5 (-,1,-,-,-)	5 (-,1,-,-,-)	
HISTIOCYTOSIS, FOCAL/MULTIFOCAL				-	-	-	2 (-,2,-,-,-)	2 (-,2,-,-,-)	
INFLAMMATION, SUBACUTE, FOCAL/MULTIFOCAL				1 (-,-,1,-,-)	-	-	1 (-,1,-,-,-)	1 (-,1,-,-,-)	
LYMPHOCYTIC INFILTRATE, MULTIFOCAL, PERIVASCULAR				-	-	-	-	-	
POLYMORPHONUCLEAR INFILTRATE, MULTIFOCAL, PERIVASCULAR				1 (-,1,-,-,-)	1 (-,1,-,-,-)	2 (-,2,-,-,-)	1 (-,1,-,-,-)		
HEART				5	5	5	5		
MYODEGENERATION, FOCAL/MULTIFOCAL, MYOCARDIUM				-	-	-	-		
PANCREAS				5	5	5	5		
ATROPHY, FOCAL, LOBULE				-	-	-	-		
INFLAMMATION, CHRONIC, INTERSTITIAL, WITH PIGMENTED MACROPHAGES				-	-	-	1 (-,1,-,-,-)	5	
THYMUS				5	5	5	5		
HEMORRHAGE, ACUTE, MULTIFOCAL				-	5	5	5		
SPLEEN				5	5	5	5		
ADRENAL GLANDS				5	5	5	5		
DEGENERATIVE FOCUS				-	-	-	-		
THYROID GLAND				5	5	5	5		
CYST				-	-	-	-		
ULTIMOBRANCHIAL CYST				-	-	-	4	4	2 (2,-,-,-,-)

TABLE IV

SUMMARY TABLE

SPECIES: RAT
INCIDENCES OF NON-NEOPLASTIC LESIONS
COMPOUND: [REDACTED]
SUBCHRONIC INHALATION STUDY

PART: 2

TISSUE/LESION:	LESION GRADES: (P,1,2,3,4)	GROUP DESIGNATION:			
		DOSE (MG/L):	NUMBER IN GROUP:	MALES	(days-on-test from 27 to 53)
TRACHEA		0.00	5	II	0.005
ESOPHAGUS			5	III	0.05
BRAIN			5	IV	0.50
STOMACH			5		
DUODENUM			5		
JEJUNUM			5		
ILEUM			5		
CECUM			5		
COLON			5		
U7 NEMATODE, LUMEN			5		
RECTUM			5		
NEMATODE, LUMEN			5		
MESENTERIC LYMPH NODE			5		
URINARY BLADDER			5		
TESTES			5		
ATROPHY, SEMINIFEROUS TUBULES, BILATERAL			5		
ATROPHY, SEMINIFEROUS TUBULES, UNILATERAL			5		
EPIDIDYMIDES			5		
SPERM GRANULOMA			5		
EYES			5		
STERNUM			5		
BONE MARROW			5		
NOSE			5		
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, RESPIRATORY EPITH.			5		

TABLE IV
SUMMARY TABLE
INCIDENCES OF NON-NEOPLASTIC LESIONS
SPECIES: RAT
COMPOUND: [REDACTED]
SUBCHRONIC INHALATION STUDY

PART: 3

TISSUE/LESION:	LESION GRADES: (P,1,2,3,4)	GROUP DESIGNATION:				DOSE (MG/L): NUMBER IN GROUP:	MALES (days-on-test from 27 to 53)			
		I	II	III	IV		I	II	III	IV
		0.00	0.005	0.05	0.50					
=====										
NOSE (cont'd)										
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, VENTRAL MEATUS		5	5	5	5					
INFLAMMATION, FOCAL, SUBACUTE, MAXILLATORYBILATE		2 (-,2,-,-,-)	1 (-,-,1,-,-)	-	1 (-,1,-,-,-)					
INFLAMMATION, SUBACUTE, MULTIFOCAL, RESPIRATORY TURBINATES		2 (-,2,-,-,-)	1 (-,-,1,-,-)	-	1 (-,1,-,-,-)					
SQUAMOUS METAPLASIA, FOCAL, RESPIRATORY EPITHELIUM		2 (-,2,-,-,-)	1 (-,-,1,-,-)	-	1 (-,1,-,-,-)					
SQUAMOUS METAPLASIA, RESPIRATORY EPITHELIUM		-	-	3 (-,1,1,1,-)	2 (-,2,-,-,-)					
OTHER										
MANDIBULAR LYMPH NODE: HYPERPLASIA, LYMPHOID		0	0	0	0					

NOTES:

- o THE NUMBER OF ORGANS EXAMINED FOR EACH GROUP IS UNDERLINED.
- o LESION GRADES CORRESPOND BY POSITION WITH THE NUMBERS IN PARENTHESES, WHICH INDICATE HOW OFTEN EACH GRADE WAS OBSERVED.

TABLE V
SUMMARY TABLE
INCIDENCES OF NON-NEOPLASTIC LESIONS
SPECIES: RAT
COMPOUND: [REDACTED]
SUBCHRONIC INHALATION STUDY

PART: 2

TISSUE/LESION:	LESION GRADES: (P,1,2,3,4)	GROUP DESIGNATION:				MALES (days-on-test from 54 to 96)			
		DOSE (MG/L):		NUMBER IN GROUP:		I 0.00		II 0.005	
TRACHEA				5		5		5	
ESOPHAGUS				5		5		5	
BRAIN				5		5		5	
STOMACH				5		5		5	
DUODENUM				5		5		5	
JEJUNUM				5		5		5	
ILEUM				5		5		5	
CECUM				5		5		5	
COLON				5		5		5	
RECTUM				5		5		5	
NEMATODE, LUMEN				5		5		5	
MESENTERIC LYMPH NODE				5		5		5	
URINARY BLADDER				5		5		5	
TESTES				5		5		5	
ATROPHY, SEMINIFEROUS TUBULES, BILATERAL				5		5		5	
ATROPHY, SEMINIFEROUS TUBULES, UNILATERAL				5		5		5	
EPIIDIDYMIDES				5		5		5	
SPERM GRANULOMA				5		5		5	
EYES				5		5		5	
STERNUM				5		5		5	
BONE MARROW				5		5		5	
NOSE				5		5		5	
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, RESPIRATORY EPITH.				5		5		5	

TABLE V
SUMMARY TABLE
INCIDENCES OF NON-NEOPLASTIC LESIONS
SPECIES: RAT
COMPOUND: [REDACTED]
SUBCHRONIC INHALATION STUDY

PART: 3

TISSUE/LESION:	LESION GRADES: (P,1,2,3,4)	GROUP DESIGNATION:				DOSE (MG/L):				NUMBER IN GROUP:			
		MALES				(days-on-test from 54 to 96)							
		I	II	III	IV	I	II	III	IV	I	II	III	IV
		0.00	0.005	0.05	0.50	5	5	5	5	5	5	5	5
=====													
NOSE (cont'd)		5	5	5	5	5	5	5	5	5	5	5	5
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, VENTRAL MEATUS		-	-	-	-	-	-	-	-	-	-	-	-
INFLAMMATION, FOCAL, SUBACUTE, MAXILLOTURBINATE		-	-	-	-	-	-	-	-	-	-	-	-
INFLAMMATION, SUBACUTE, MULTIFOCAL, RESPIRATORY TURBINATES		-	-	-	-	-	-	-	-	-	-	-	-
SQUAMOUS METAPLASIA, FOCAL, RESPIRATORY EPITHELIUM		-	-	-	-	-	-	-	-	-	-	-	-
SQUAMOUS METAPLASIA, RESPIRATORY EPITHELIUM		-	-	-	-	-	-	-	-	-	-	-	-
OTHER		-	-	-	-	-	-	-	-	-	-	-	-
MANDIBULAR LYMPH NODE: HYPERPLASIA, LYMPHOID		0	0	0	0	0	0	0	0	0	0	0	0

NOTES:

- o THE NUMBER OF ORGANS EXAMINED FOR EACH GROUP IS UNDERLINED.
- o LESION GRADES CORRESPOND BY POSITION WITH THE NUMBERS IN PARENTHESES, WHICH INDICATE HOW OFTEN EACH GRADE WAS OBSERVED.

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SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

PART: 1

TABLE VI

TISSUES/OBSERVATIONS	SEX: MALE		GROUP: I		DOSE: CONTROL															
	ANIMAL NUMBER:		MODE OF DEATH:		DAYS ON TEST:		DAYS ON RECOVERY:		0		12		26		53		87		141	
LIVER																				
FATTY CHANGE, DIFFUSE, CENTRILOBULAR																				
FATTY CHANGE, FOCAL, MEDIAN LOBE																				
FATTY CHANGE, INDIVIDUAL HEPATOCYTES, SCATTERED, CENTRILOBULAR																				
INFLAMMATION, SUBACUTE, MULTIFOCAL																				
NECROSIS, ACUTE, INDIVIDUAL HEPATOCYTES, CENTRILOBULAR																				
NECROSIS, COAGULATIVE, ACUTE, FOCAL/MULTIFOCAL																				
KIDNEYS																				
CHOLESTEROL CLEFTS/REGENERATIVE TUBULES/INDIV. CELL NECROSIS																				
CYST, FOCAL																				
GLOMERULONEPHROPATHY, CHRONIC																				
HYDRONEPHROSIS, UNILATERAL																				
PROTEIN DROPLETS, PROXIMAL TUBULES																				
LUNGS																				
HEMORRHAGE, SUBACUTE, FOCAL/MULTIFOCAL																				
HISTIOCYTOSIS, FOCAL/MULTIFOCAL																				
INFLAMMATION, SUBACUTE, FOCAL/MULTIFOCAL																				
LYMPHOCYTIC INFILTRATE, MULTIFOCAL, PERIVASCULAR																				
POLYMORPHONUCLEAR INFILTRATE, MULTIFOCAL, PERIVASCULAR																				
HEART																				
MYODEGENERATION, FOCAL/MULTIFOCAL, MYOCARDIUM																				
PANCREAS																				
ATROPHY, FOCAL, LOBULE																				
INFLAMMATION, CHRONIC, INTERSTITIAL, WITH PIGMENTED MACROPHAGES																				
THYMUS																				
HEMORRHAGE, ACUTE, MULTIFOCAL																				
SPLEEN																				
ADRENAL GLANDS																				
DEGENERATIVE FOCUS																				

[REDACTED]

POLYMER PRODUCTS DEPARTMENT

PART:

TABLE VI

SEX: MALE GROUP: I

DOSE: CONTROL

ANIMAL NUMBER:

TISSUES/OBSERVATIONS

MODE OF DEATH:
DAYS ON TEST:
DAYS ON RECOVER:

DAYS ON RECOVERY:

THYROID GLAND

ULTIMOBRANCHIAL CYST

TRACHEA

ESOPHAGUS

BRAIN

STOMACH

DUODENUM

JEJUNUM

ILEUM

CECUM

COLON

NEMATODE, LUMEN

RECTUM

NEMATODE. LUMEN

MESENTERIC LYMPH NODE

URINARY BLADDER

TESTES

ATROPHY. SEMINIFEROUS TUBULES, BILATERAL
ATROPHY, SEMINIFEROUS TUBULES, UNILATERAL

EPIDIDYMITIS

SPERM GRANULOMA

EYES

[illegible][illegible]



PART: 3

DOSE: CONTROL

TISSUES/OBSERVATIONS

STERNUM

BONE MARROW

NOSE

INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, RESPIRATORY EPITH.
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, VENTRAL MEATUS
INFLAMMATION, FOCAL, SUBACUTE, MAXILLOTURBinate
INFLAMMATION, SUBACUTE, MULTIFOCAL, RESPIRATORY TURBINATES
SQUAMOUS METAPLASIA, FOCAL, RESPIRATORY EPITHELIUM
SQUAMOUS METAPLASIA, RESPIRATORY EPITHELIUM

MANDIBULAR LYMPH NODE: HYPERPLASIA, LYMPHOID

[illegible]

[REDACTED]

POLYMER PRODUCTS DEPARTMENT
SACCHARINIC INHALATION STUDY

4

TABLE VI

SEX: MALE
GROUP: I

DOSE: CONTROL

ANIMAL NUMBER:

TISSUES/OBSERVATIONS

Days on Recovery:	84	84	84	84	84	84
84	84	84	84	84	84	84

LIVER

FATTY CHANGE, DIFFUSE, CENTRILOBULAR
FATTY CHANGE, FOCAL, MEDIAN LOBE
FATTY CHANGE, INDIVIDUAL HEPATOCYTES, SCATTERED, CENTRILOBULAR
INFLAMMATION, SUBCUTE, MULTIFOCAL
NECROSIS, ACUTE, INDIVIDUAL HEPATOCYTES, CENTRILOBULAR
NECROSIS, COAGULATIVE, ACUTE, FOCAL/MULTIFOCAL
NECROSIS, COAGULATIVE, SUBCUTE, MULTIFOCAL

KIDNEYS

CELL NECROSIS
CYST, FOCAL
CLEFTS/REGENERATIVE TUBULES/INDIV.
GLOMERULONEPHROPATHY, CHRONIC
HYDRONEPHROSIS, UNILATERAL
PROTEIN DROPLETS, PROXIMAL TUBULES

- LUNGS

HEART
POLYMORPHONUCLEAR INFILTRATE, MULTIFOCAL, PERIVASCULAR
LYMPHOCYTIC INFILTRATE, MULTIFOCAL, PERIVASCULAR
INFLAMMATION, SUBACUTE, FOCAL/MULTIFOCAL
HISTIOCYTOSIS, FOCAL/MULTIFOCAL
HEMORRHAGE, SUBACUTE, FOCAL/MULTIFOCAL

HEART

... LOCAL/MULTIFOCAL, MYOCARDIUM

PANCREAS

ATROPHY, FOCAL, LOBULE
INFLAMMATION, CHRONIC, INTERSTITIAL, WITH PIGMENTED MACROPHAGES

THYMUS

...; ACUTE, MULTIFOCAL

SPLEEN

ADRENAL GLANDS
DEGENERATIVE FOCUS

DEG

[illegible]

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TABLE VI
SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

PART:

SEX: MALE GROUP: I

DOSE: CONTROL

TISSUES/OBSERVATIONS	ANIMAL NUMBER:				DOSE: CONTROL			
	376	376	376	376	376	376	376	376
THYROID GLAND	807	829	834	861	869			
CYST	SD	SD	SD	SD	SD			
ULTIMOBANCHIAL CYST	96	96	96	96	96			
TRACHEA	84	84	84	84	84			
ESOPHAGUS	N	0	I	N	N			
BRAIN	N	N	N	N	N			
STOMACH	N	N	N	N	N			
DUODENUM	N	N	N	N	N			
JEJUNUM	N	N	N	N	N			
ILEUM	N	N	N	N	N			
CECUM	N	N	N	N	N			
COLON	N	N	N	N	N			
NEMATODE, LUMEN	N	L	N	N	N			
RECTUM	N	P	N	N	N			
NEMATODE, LUMEN	N	N	N	N	N			
MESENTERIC LYMPH NODE	N	N	N	P	N			
URINARY BLADDER	N	N	N	N	N			
TESTES	N	N	N	N	N			
ATROPHY, SEMINIFEROUS TUBULES, BILATERAL	N	N	N	N	N			
ATROPHY, SEMINIFEROUS TUBULES, UNILATERAL	N	N	N	N	N			
EPIDIDYMIDES	N	N	N	N	N			
SPERM GRANULOMA	N	N	N	N	N			
EYES	N	N	N	N	N			

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TABLE VI
SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

PART: 6

	SEX: MALE	GROUP: I	DOSE: CONTROL									
TISSUES/OBSERVATIONS	ANIMAL NUMBER:		376	376	376	376	376	376				
	MODE OF DEATH:		807	829	834	861	869					
	DAYS ON TEST:		SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
	DAYS ON RECOVERY:		96	96	96	96	96	96	96	96	96	96
			84	84	84	84	84	84	84	84	84	84
STERNUM			N	N	N	N	N	N				
BONE MARROW			N	N	N	N	N	N				
NOSE			N	N	N	N	N	N				
INFLAMMATION, ACUTE.			N	N	N	N	N	N				
INFLAMMATION, ACUTE.			-	-	-	-	-	-				
MUCOSA/SUBMUCOSA, VENTRAL MEATUS			-	-	-	-	-	-				
INFLAMMATION, FOCAL, SUBACUTE, MAXILLOTURBINATE			-	-	-	-	-	-				
INFLAMMATION, SUBACUTE, MULTIFOCAL, RESPIRATORY TURBINATES			-	-	-	-	-	-				
SQUAMOUS METAPLASIA, FOCAL, RESPIRATORY EPITHELIUM			-	-	-	-	-	-				
SQUAMOUS METAPLASIA, RESPIRATORY EPITHELIUM			-	-	-	-	-	-				
OTHER			-	-	-	-	-	-				
MANDIBULAR LYMPH NODE: HYPERPLASIA, LYMPHOID			0	0	0	0	0	0				
*** END OF GROUP I												

SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

1

DOSE: LOW

376 376 376 376 376 376 376

	MODE OF DEATH:	804	SD	806	SD	818	SD	823	SD	844	SD	810	SD	822	SD	852	SD	876	SD	881	SD	900	SD	918	SD	936	SD	956	SD	971	SD
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TABLE VI

SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

PART: 2

SEX: MALE

GROUP: II

DOSE: LOW

TISSUES/OBSERVATIONS	ANIMAL NUMBER:											
	376	376	376	376	376	376	376	376	376	376	376	376
THYROID GLAND	804	806	818	823	844	810	822	852	876	881	800	848
MODE OF DEATH:	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
DAYS ON TEST:	12	12	12	12	12	12	26	26	26	26	41	41
DAYS ON RECOVERY:	0	0	0	0	0	14	14	14	14	14	41	41
ULTIMOBRANCHIAL CYST	0	L	N	N	N	0	L	N	L	N	N	N
TRACHEA		P	-	-	-	-	P	-	P	-	-	-
ESOPHAGUS	N	N	N	N	N	N	N	N	N	N	N	N
BRAIN	N	N	N	N	N	N	N	N	N	N	N	N
STOMACH	N	N	N	N	N	N	N	N	N	N	N	N
DUODENUM	N	N	N	N	N	N	N	N	N	N	N	N
JEJUNUM	N	N	N	N	N	N	N	N	N	N	N	N
ILEUM	N	N	N	N	N	N	N	N	N	N	N	N
CECUM	N	N	N	N	N	N	N	N	N	N	N	N
COLON	N	N	N	N	N	N	N	N	N	N	N	N
NEMATODE, LUMEN	N	N	N	N	N	N	N	N	N	N	N	N
RECTUM	N	N	N	N	N	N	N	N	N	N	N	N
NEMATODE, LUMEN	N	N	N	N	N	N	N	N	N	N	N	N
MESENTERIC LYMPH NODE	N	N	N	N	N	N	N	N	N	N	N	N
URINARY BLADDER	N	N	N	N	N	0	N	N	N	N	N	N
TESTES	N	N	N	N	N	N	N	N	N	N	N	N
ATROPHY, SEMINIFEROUS TUBULES, BILATERAL	N	N	N	N	N	N	N	N	N	N	N	N
ATROPHY, SEMINIFEROUS TUBULES, UNILATERAL	N	N	N	N	N	N	N	N	N	N	N	N
EPIDIDYMIDES	N	N	N	N	N	N	N	N	N	N	N	N
SPERM GRANULOMA	N	N	N	N	N	N	N	N	N	N	N	N
EYES	N	N	N	N	N	N	N	N	N	N	N	N



SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

SPECIES: RAT

DOSE: LOW

376 376

MODE OF DEATH;
DAYS ON TEST.

DAYS ON RECOVERY:

•

•

1

•

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TABLE VI
SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

PART: 5

TISSUES/OBSERVATIONS	SEX: MALE		GROUP: II		DOSE: LOW	
	ANIMAL NUMBER:	376	376	376	376	376
THYROID GLAND CYST ULTIMOBRANCHIAL CYST	MODE OF DEATH:	827	831	862	877	882
	DAYS ON TEST:	SD	SD	SD	SD	SD
	DAYS ON RECOVERY:	96	96	96	96	96
TRACHEA		84	84	84	84	84
ESOPHAGUS		N	O	N	N	O
BRAIN		-	-	-	-	-
STOMACH		N	N	N	N	N
DUODENUM		N	N	N	N	N
JEJUNUM		N	N	N	N	N
ILEUM		N	N	N	N	N
CECUM		N	N	N	N	N
COLON		N	N	N	N	N
NEMATODE, LUMEN		N	N	N	N	N
RECTUM		N	N	N	N	N
NEMATODE, LUMEN		N	N	N	N	N
MESENTERIC LYMPH NODE		N	N	N	N	N
URINARY BLADDER		N	N	N	N	N
TESTES		N	N	N	N	N
ATROPHY, SEMINIFEROUS TUBULES, BILATERAL		N	N	N	N	N
ATROPHY, SEMINIFEROUS TUBULES, UNILATERAL		N	N	N	N	N
EPIIDIDYMIDES		N	N	N	N	N
SPERM GRANULOMA		N	N	N	N	N
EYES		N	N	N	N	N

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TABLE VI.
SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

PART:

SEX: MALE GROUP: II DOSE: LOW

ANIMAL NUMBER:

376 376 376 376 376 376
827 831 862 877 882
MODE OF DEATH: SD SD SD SD SD
DAYS ON TEST: 96 96 96 96 96
DAYS ON RECOVERY: 84 84 84 84 84

TISSUES/OBSERVATIONS

STERNUM

BONE MARROW

NOSE

INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, RESPIRATORY EPITH.
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, VENTRAL MEATUS
INFLAMMATION, FOCAL, SUBACUTE, MAXILLOTURBINATE
INFLAMMATION, SUBACUTE, MULTIFOCAL, RESPIRATORY TURBINATES
SQUAMOUS METAPLASIA, FOCAL, RESPIRATORY EPITHELIUM
SQUAMOUS METAPLASIA, RESPIRATORY EPITHELIUM

OTHER

MANDIBULAR LYMPH NODE: HYPERPLASIA, LYMPHOID

*** END OF GROUP II

N N N N N N
N N N N N
N L N N N N
- - - - -
- 1 - - -
- - - - -
- - - - -
- - - - -
- - - - -
0 0 0 0 0 0

TABLE VI
HC INHALAT

SEX: MALE GROUP: III

DOSE: INTERMEDIATE

ANIMAL NUMBER:

ISSUES/OBSERVATIONS

LIVER

FATTY CHANGE.	DIFFUSE.	CENTRILOBULAR
FATTY CHANGE.	FOCAL.	MEDIAN LOBE
FATTY CHANGE.	INDIVIDUAL	HEPATOCTYTES.
INFLAMMATION.	SCATTERED.	CENTRILLOBULAR
NECROSIS.	SUBACUTE.	MULTIFOCAL
NECROSIS.	ACUTE.	INDIVIDUAL
NECROSIS.	COAGULATIVE.	HEPATOCTYTES.
NECROSIS.	ACUTE.	FOCAL/MULTIFOCAL
NECROSIS.	COAGULATIVE.	SUBACUTE.
		MULTIFOCAL

KIDNEYS

CHOLESTEROL CLEFTS/REGENERATIVE TUBULES/INDIV. CELL NECROSIS
CYST, FOCAL
GLOMERULONEPHROPATHY, CHRONIC
HYDRONEPHROSIS, UNILATERAL
PROTEIN DROPLETS, PROXIMAL TUBULES

LUNGS

HEMORRHAGE, SUBACUTE, FOCAL/MULTIFOCAL
HISTIOCYTOSIS, FOCAL/MULTIFOCAL
INFLAMMATION, SUBACUTE, FOCAL/MULTIFOCAL
LYMPHOCYTIC INFILTRATE, MULTIFOCAL, PERIVASCULAR
POLYMORPHONUCLEAR INFILTRATE, MULTIFOCAL, PERIVASCULAR
HEART

PANCREAS

ATROPHY, FOCAL, LOBULE
INFLAMMATION, CHRONIC, INTERSTITIAL, WITH PIGMENTED MACROPHAGES

SPLEEN

ADRENAL GLANDS
DEGENERATIVE FOCUS[illegible]

SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

SEX: MALE

GROUP: III

DOSE: INTERMEDIATE

ANIMAL NUMBER:

TISSUES/OBSERVATIONS

HYBRID CLANS

ULIIMBRANCHIAL CYST

TRACHEA

ESOPHAGUS

BRAIN

STOMACH

DUODENUM

JEJUNUM

LEUM

SECUM

NOTES:

NEMATODE, LUMEN

ELECTUM

NEIMA IODE, LUMEN

ESSENIERIC LYMPH NODE

PRIMARY BLADDER

TESTES

ATROPHY, SEMINIFEROUS TUBULES, BILATERAL

... ON LEA I ERAL

SPERM GRANULOMA

53

[illegible]

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TABLE VI

SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

PART: 3

SEX: MALE GROUP: III

DOSE: INTERMEDIATE

TISSUES/OBSERVATIONS	ANIMAL NUMBER:		MODE OF DEATH:		DAYS ON TEST:		DAYS ON RECOVERY:															
	376	805	821	838	851	867	812	813	830	857	874	803	808	811	843	860						
STERNUM	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD						
BONE MARROW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
NOSE	0	N	N	I	N	N	N	N	N	N	N	N	N	N	N	N						
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, RESPIRATORY EPITH.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N						
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, VENTRAL MEATUS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
INFLAMMATION, FOCAL, SUBACUTE, MAXILLOTURBINATE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
INFLAMMATION, SUBACUTE, MULTIFOCAL, RESPIRATORY TURBINATES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
SQUAMOUS METAPLASIA, FOCAL, RESPIRATORY EPITHELIUM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
SQUAMOUS METAPLASIA, RESPIRATORY EPITHELIUM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
OTHER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
MANDIBULAR LYMPH NODE: HYPERPLASIA, LYMPHOID	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						

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TABLE VI
SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

PART:

SEX: MALE GROUP: III

DOSE: INTERMEDIATE

TISSUES/OBSERVATIONS

ANIMAL NUMBER:

MODE OF DEATH: 376 376 376 376 376
DAYS ON TEST: 817 846 855 864 875
DAYS ON RECOVERY: 96 96 96 96 96
84 84 84 84 84

LIVER

FATTY CHANGE, DIFFUSE, CENTRILOBULAR
FATTY CHANGE, FOCAL, MEDIAN LOBE
FATTY CHANGE, INDIVIDUAL HEPATOCYTES, SCATTERED, CENTRILOBULAR
INFLAMMATION, SUBACUTE, MULTIFOCAL
NECROSIS, ACUTE, INDIVIDUAL HEPATOCYTES, CENTRILLOBULAR
NECROSIS, COAGULATIVE, ACUTE, FOCAL/MULTIFOCAL
NECROSIS, COAGULATIVE, SUBACUTE, MULTIFOCAL

KIDNEYS

CHOLESTEROL CLEFTS/REGENERATIVE TUBULES/INDIV. CELL NECROSIS
CYST, FOCAL
GLOMERULONEPHROPATHY, CHRONIC
HYDRONEPHROSIS, UNILATERAL
PROTEIN DROPLETS, PROXIMAL TUBULES

LUNGS

HEMORRHAGE, SUBACUTE, FOCAL/MULTIFOCAL
HISTIOCYTOSIS, FOCAL/MULTIFOCAL
INFLAMMATION, SUBACUTE, FOCAL/MULTIFOCAL
LYMPHOCYTIC INFILTRATE, MULTIFOCAL, PERIVASCULAR
POLYMORPHONUCLEAR INFILTRATE, MULTIFOCAL, PERIVASCULAR

HEART

MYODEGENERATION, FOCAL/MULTIFOCAL, MYOCARDIUM

PANCREAS

ATROPHY, FOCAL, LOBULE
INFLAMMATION, CHRONIC, INTERSTITIAL, WITH PIGMENTED MACROPHAGES

THYMUS

HEMORRHAGE, ACUTE, MULTIFOCAL

SPLEEN

ADRENAL GLANDS
DEGENERATIVE FOCUS

TISSUES/OBSERVATIONS	376	376	376	376	376
LIVER	N	L	N	N	N
KIDNEYS	N	N	N	N	N
LUNGS	L	L	L	N	N
HEART	-	-	-	-	-
PANCREAS	-	-	-	-	-
THYMUS	L	N	N	L	N
SPLEEN	-	-	-	-	-
ADRENAL GLANDS	N	N	N	N	N
DEGENERATIVE FOCUS	N	N	N	N	N

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SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

PART:

TABLE VI

TISSUES/OBSERVATIONS	SEX: MALE		GROUP: III		DOSE: INTERMEDIATE							
	ANIMAL NUMBER:	MODE OF DEATH:	DAYS ON TEST:	DAYS ON RECOVERY:	376	376	376	376	376	376	376	376
THYROID GLAND		817	846	855	864	875						
CYST		SD	SD	SD	SD	SD						
ULTIMOBRANCHIAL CYST		96	96	96	96	96						
TRACHEA		84	84	84	84	84						
ESOPHAGUS		N	0	I	0	N						
BRAIN		-	-	-	-	-						
STOMACH		N	N	N	N	N						
DUODENUM		N	N	N	N	N						
JEJUNUM		N	N	N	N	N						
ILEUM		N	N	N	N	N						
CECUM		N	N	N	N	N						
COLON		N	N	N	N	N						
NEMATODE, LUMEN		N	N	N	N	N						
RECTUM		N	N	N	N	N						
NEMATODE, LUMEN		N	N	N	N	N						
MESENTERIC LYMPH NODE		N	N	N	N	N						
URINARY BLADDER		N	I	N	I	I						
TESTES		N	N	N	N	N						
ATROPHY, SEMINIFEROUS TUBULES, BILATERAL		N	N	N	N	N						
ATROPHY, SEMINIFEROUS TUBULES, UNILATERAL		N	N	N	N	N						
EPIDIDYMIDES		-	-	-	-	-						
SPERM GRANULOMA		N	N	N	N	N						
EYES		N	N	N	N	N						

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SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

PART: 6

TABLE VI

SEX: MALE		GROUP: III		DOSE: INTERMEDIATE									
ANIMAL NUMBER:				376		376		376		376		376	
MODE OF DEATH:				817		846		855		864		875	
DAYS ON TEST:				SD		SD		SD		SD		SD	
DAYS ON RECOVERY:				96		96		96		96		96	
				84		84		84		84		84	
TISSUES/OBSERVATIONS				N		N		N		N		N	
STERNUM				N		N		N		N		N	
BONE MARROW				N		N		N		N		N	
NOSE				N		N		N		N		N	
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, RESPIRATORY EPITH.				-		-		-		-		-	
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, VENTRAL MEATUS				-		-		-		-		-	
INFLAMMATION, FOCAL, SUBACUTE, MAXILLOTURBINATE				-		-		-		-		-	
INFLAMMATION, SUBACUTE, MULTIFOCAL, RESPIRATORY TURBINATES				-		-		-		-		-	
SQUAMOUS METAPLASIA, FOCAL, RESPIRATORY EPITHELIUM				-		-		-		-		-	
SQUAMOUS METAPLASIA, RESPIRATORY EPITHELIUM				-		-		-		-		-	
OTHER				-		-		-		-		-	
MANDIBULAR LYMPH NODE: HYPERPLASIA, LYMPHOID				0		0		0		0		0	
*** END OF GROUP III													

TABLE VI

[illegible]

[REDACTED]

SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT

PART: 2

TABLE VI

SEX: MALE GROUP: IV

DOSE: HIGH

ANIMAL NUMBER:

MODE OF DEATH:
DAYS ON TEST:
DAYS ON RECOVERY:

TISSUES/OBSERVATIONS
THYROID GLAND
CYST

ULTIMOBRANCHIAL CYST

TRACHEA

ESOPHAGUS

BRAIN

STOMACH

DUODENUM

JEJUNUM

ILEUM

CECUM

COLON

NEMATODE, LUMEN

RECTUM
NEWCASTLE

NEMATODE, LUMEN

MESENTERIC LYMPH NODE

PRIMARY BLADDER

TESTES

ATROPHY. SEMINIFEROUS TUBULES. BILATERAL
ATROPHY. SEMINIFEROUS TUBULES. UNILATERAL

PIDIDYMIDES

YES

[illegible]

Z	I Z	I I Z	Z Z	I Z	I Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	I I Z
Z	I Z	I I Z	Z Z	I Z	I Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	I I Z
Z	I Z	I I Z	Z Z	I Z	I Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	I I Z
Z	I Z	I I Z	Z Z	I Z	I Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	O
Z	I Z	I I Z	Z Z	I Z	I Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	I
Z	I Z	I I Z	Z Z	I Z	I Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	I I Z
Z	I Z	I I Z	Z Z	I Z	I Z	Z Z	O Z	Z Z	Z Z	Z Z	Z Z	I I Z
Z	I Z	I I Z	Z Z	I Z	I Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	I I Z
Z	I Z	I I Z	Z Z	I Z	I Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	V I L
Z	I Z	I I Z	Z Z	I Z	I Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	I I Z
Z	I Z	I I Z	Z Z	I Z	I Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	V I L
Z	I Z	I - I	Z Z	I Z	I Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	I I Z
Z	N I	I I Z	Z Z	I Z	I Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	I
Z	I Z	I I Z	Z Z	I Z	I Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	I I Z
Z	I Z	I I Z	Z Z	I Z	I Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	V I L

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SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

PART:

TABLE VI

	SEX: MALE		GROUP: IV		DOSE: HIGH															
	ANIMAL NUMBER:				376		376		376		376		376		376		376		376	
TISSUES/OBSERVATIONS	MODE OF DEATH:		820		828		854		859		879		819		824		833		858	
	SD		SD		SD		SD		SD		SD		SD		SD		SD		SD	
STERNUM	DAYS ON TEST:		12		12		12		12		12		26		26		26		26	
	DAYS ON RECOVERY:		0		0		0		0		0		14		14		14		14	
BONE MARROW	N		N		N		N		N		N		N		N		N		N	
NOSE	N		N		N		N		N		N		I		N		N		N	
INFLAMMATION, ACUTE	N		N		N		N		N		N		N		N		N		N	
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, RESPIRATORY EPITH.	N		N		N		N		N		N		N		N		N		N	
INFLAMMATION, FOCAL, SUBACUTE, MAXILLOTURBINATE	N		N		N		N		N		N		N		N		N		N	
INFLAMMATION, SUBACUTE, MULTIFOCAL, RESPIRATORY TURBINATES	N		N		N		N		N		N		N		N		N		N	
SQUAMOUS METAPLASIA, FOCAL, RESPIRATORY EPITHELIUM	N		N		N		N		N		N		N		N		N		N	
OTHER	N		N		N		N		N		N		N		N		N		N	
MANDIBULAR LYMPH NODE: HYPERPLASIA, LYMPHOID	0		0		0		0		0		0		0		0		0		0	

I

SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

△

DOSE: HIGH

376 376 376 376 376

SD	SD	SD	SD	SD
842	845	868		

84 84 84 84 84

KIDNEYS

LUNGS

HEART

PANCREAS

HYMUS

SPL EEN

[illegible]

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SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

PART:

5

TABLE VI

	SEX: MALE	GROUP: IV	DOSE: HIGH											
			ANIMAL NUMBER:				MODE OF DEATH:				DAYS ON TEST:			
			376	376	376	376	376	376	376	376	84	84	84	84
			SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
			96	96	96	96	96	96	96	96	96	96	96	96
			84	84	84	84	84	84	84	84	84	84	84	84
TISSUES/OBSERVATIONS			L	O	O	O	O	L	P					
THYROID GLAND														
ULTIMOBRANCHIAL CYST														
TRACHEA														
ESOPHAGUS														
BRAIN														
STOMACH														
DUODENUM														
JEJUNUM														
ILEUM														
CECUM														
COLON														
NEMATODE, LUMEN														
RECTUM														
NEMATODE, LUMEN														
MESENTERIC LYMPH NODE														
URINARY BLADDER														
TESTES														
ATROPHY, SEMINIFEROUS TUBULES, BILATERAL														
ATROPHY, SEMINIFEROUS TUBULES, UNILATERAL														
EPIDIDYIMIDES														
SPERM GRANULOMA														
EYES														

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TABLE VI
SUBCHRONIC INHALATION STUDY
POLYMER PRODUCTS DEPARTMENT
SPECIES: RAT

PART:

SEX: MALE	GROUP: IV	DOSE: HIGH
ANIMAL NUMBER:	376 376 376 376 376	376 376
MODE OF DEATH:	816 826 842 845 868	868
DAYS ON TEST:	SD SD SD SD SD	SD
DAYS ON RECOVERY:	96 96 96 96 96	96
	84 84 84 84 84	84
TISSUES/OBSERVATIONS		
STERNUM	I N N N N	N
BONE MARROW	N N N N N	N
NOSE	N N N N N	N
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, RESPIRATORY EPITH.	N N N N N	N
INFLAMMATION, ACUTE, MUCOSA/SUBMUCOSA, VENTRAL MEATUS	N N N N N	N
INFLAMMATION, FOCAL, SUBACUTE, MAXILLOTURBinate	N N N N N	N
INFLAMMATION, SUBACUTE, MULTIFOCAL, RESPIRATORY TURBINATES	N N N N N	N
SQUAMOUS METAPLASIA, FOCAL, RESPIRATORY EPITHELIUM	N N N N N	N
SQUAMOUS METAPLASIA, RESPIRATORY EPITHELIUM	N N N N N	N
OTHER	N N N N N	N
MANDIBULAR LYMPH NODE: HYPERPLASIA, LYMPHOID	0 0 0 0 0	0
*** END OF GROUP IV		

APPENDIX VI

CLINICAL PATHOLOGY REPORT NO. 24-84



E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED

HASKELL LABORATORY FOR TOXICOLOGY
AND INDUSTRIAL MEDICINE
P.O. BOX 50, ELKTON ROAD
NEWARK, DELAWARE 19711

CENTRAL RESEARCH AND DEVELOPMENT DEPARTMENT

CLINICAL PATHOLOGY REPORT NO. 24-84

SUBCHRONIC INHALATION TOXICITY OF [REDACTED]

MEDICAL RESEARCH PROJECT NO. [REDACTED]

HASKELL LABORATORY NO. 15388

FEBRUARY 28, 1985

Summary.

Male Crl:CD®(SD)BR rats were exposed, by inhalation, to [REDACTED] at concentrations of 0 (control), 0.0076, 0.058 and 0.48 mg/L.

Compound-related effects observed in high-dose (0.48 mg/L) males at the 0-day recovery period included alterations in several hematologic and clinical chemical parameters. The hematologic changes included an increase in red blood cell count, hemoglobin and hematocrit and a decrease in mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration. The clinical chemical changes included an increase in alkaline phosphatase, urea nitrogen, urine volume and pH and a decrease in urine osmolality and serum cholesterol. These effects were not present at any of the subsequent recovery periods.

The 0.058 mg/L exposure concentration was interpreted to be a no-effect dose level for the hematologic and clinical chemical parameters measured under the conditions of this study.

Procedure

Four groups of 20 male Crl:CD®(SD)BR rats were exposed, by inhalation, for six hours per day for 10 days to Telomer B sulfonic acid at concentrations of 0 (control), 0.0076, 0.058 and 0.48 mg/L.

After the ninth exposure, an overnight (approximately 16-hour) urine specimen was collected from ten rats per group to measure volume (VOL), osmolality (OSMOL), pH and urobilinogen (UROBL); and to determine the presence of blood, sugar (glucose), protein, bilirubin and ketone (acetoacetic acid). The appearance (color and transparency) was recorded and the sediment from each specimen was microscopically examined.

After the tenth exposure (0-Day Rec), and at the 14-day recovery period (14-Day Rec) and 41-day recovery period (41-Day Rec), blood was taken from the tail of ten rats per group for measurement of erythrocytes (RBC), hemoglobin (Hb), mean corpuscular volume (MCV), platelets (PLAT), leukocytes (WBC) and relative numbers of neutrophils (Neut), band neutrophils (Band), lymphocytes (Lymph), atypical lymphocytes (Alym), monocytes (Mono), eosinophils (Eosin) and basophils (Baso). Absolute numbers of various types of leukocytes were calculated from the leukocytic data. Hematocrit (Ht), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC) were calculated from the erythrocytic data. Serum activities of alkaline phosphatase (ALP), alanine aminotransferase (ALT) and aspartate aminotransferase (AST) and concentrations of urea nitrogen (BUN), creatinine (CREAT), total protein (TPROT) and cholesterol (CHLOS) were also measured. After each sampling time, five rats from each group were then killed for pathologic evaluation.

Following an 84-day recovery period (84-Day Rec), the hematologic and clinical chemical (serum and urine) measurements were repeated on the five remaining rats in each group.

Statistics

Hematologic and clinical chemical data were statistically analyzed using a one-way analysis of variance for each sampling time. When the F-test was significant, least significant difference (LSD) and Dunnett tests were used to compare the control group and the groups exposed to Telomer B sulfonic acid. Significance was judged at the 5% probability level using Dunnett criteria.

Results

Results of hematologic and clinical chemical measurements are summarized in Tables I, II and III, statistical analyses in Tables IV and V. Data for individual animals are listed in the computer printouts attached to this report. A legend, preceding the computer printouts, defines terms and criteria used for urinalyses.

At the 0-day recovery sampling time, rats in the high-dose (0.48 mg/L) group had an increased erythrocyte count, hemoglobin and hematocrit. Mean corpuscular hemoglobin concentration was increased for the intermediate-dose (0.058 mg/L) rats and decreased for the high-dose rats. Decreased mean corpuscular hemoglobin and platelet count were observed for rats in the high-dose group. Serum alkaline phosphatase and serum aspartate aminotransferase activities and serum urea nitrogen concentration were increased for the high-dose rats. Rats in the high-dose group had decreased serum cholesterol concentration. Urine volume and pH were increased for rats in the high-dose group. Decreased urine osmolality was observed for the high-dose rats.

At the 14-day recovery sampling time, rats in the high-dose group had decreased hemoglobin, mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration. Urine pH was decreased for the intermediate- and high-dose rats.

At the 41-day recovery sampling time, rats in the high-dose group had a decreased erythrocyte count. The platelet count was increased for the high-dose rats. Decreased serum alanine aminotransferase activity was observed for rats in the low-(0.0076 mg/L) and high-dose groups.

At the 84-day recovery sampling time, rats in the intermediate- and high-dose groups had increased leukocyte counts and absolute numbers of lymphocytes. The absolute number of neutrophils was increased for the high-dose rats. Serum urea nitrogen concentration was decreased for rats in the high-dose group.

Discussion and Conclusions

There was a statistically significant increase in red blood cell count, hemoglobin, hematocrit, alkaline phosphatase, urea nitrogen, urine volume and pH in the high-dose animals at the 0-day recovery sampling time. At this time period, there was also a statistically significant decrease in mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, urine osmolality and serum cholesterol in the high-dose animals.

The other hematologic and clinical chemical parameters shown to be statistically significantly changed were within the range of expected biological variation and were not related to the administration of the compound.

The 0.058 mg/L exposure concentration was interpreted to be a no-effect dose level for the hematologic and clinical chemical parameters measured under the conditions of this study.

Report by:

Donna R. Holt

Donna R. Holt
Technician

Approved by:

Charlotte M. Keenan

Charlotte M. Keenan
Acting Coordinator
Clinical Pathology Section

DRH:bl
CP 3
2/28/85

TABLE I
SUMMARY OF HEMATOLOGIC FINDINGS FOR MALE RATS
EXPOSED BY INHALATION TO [REDACTED] FOR 10 DAYS
GROUP MEANS AND STANDARD DEVIATIONS(SD)

TESTS	DOSE (mg/L)	SAMPLING TIME			
		0-DAY REC	14-DAY REC	41-DAY REC	84-DAY REC
RBC x 10 ⁶ /uL	0.0000	7.41(0.57)	7.12(0.56)	7.92(0.45)	8.15(0.46)
	0.0076	7.28(0.54)	7.09(0.44)	7.56(0.44)	7.71(0.79)
	0.0580	7.26(0.47)	7.48(0.33)	7.59(0.52)	8.49(0.96)
	0.4800	8.55(0.24)	7.17(0.55)	7.29(0.48)	7.84(0.33)
Hb g/dL	0.0000	15.6(0.9)	15.8(0.5)	15.5(0.4)	16.0(0.3)
	0.0076	15.3(0.5)	15.9(0.5)	15.5(0.7)	15.5(0.6)
	0.0580	15.8(0.7)	16.0(0.5)	15.5(0.5)	15.8(0.8)
	0.4800	16.5(0.7)	14.8(0.6)	15.0(0.7)	15.1(0.8)
Ht %	0.0000	43.(3.)	41.(2.)	43.(2.)	41.(1.)
	0.0076	42.(3.)	40.(2.)	41.(2.)	39.(4.)
	0.0580	42.(2.)	42.(1.)	41.(3.)	43.(4.)
	0.4800	49.(2.)	40.(3.)	40.(2.)	40.(3.)
MCV fL	0.0000	57.(1.)	57.(2.)	53.(2.)	49.(1.)
	0.0076	57.(1.)	57.(2.)	54.(1.)	51.(2.)
	0.0580	57.(1.)	56.(1.)	54.(2.)	51.(2.)
	0.4800	57.(2.)	55.(2.)	54.(2.)	51.(2.)
MCH pg	0.0000	21.(1.)	22.(2.)	20.(1.)	20.(1.)
	0.0076	21.(1.)	22.(1.)	21.(1.)	20.(2.)
	0.0580	22.(1.)	21.(1.)	21.(1.)	19.(1.)
	0.4800	19.(1.)	21.(1.)	21.(1.)	19.(1.)

TABLE I(continued)
SUMMARY OF HEMATOLOGIC FINDINGS FOR MALE RATS
EXPOSED BY INHALATION TO [REDACTED] FOR 10 DAYS
GROUP MEANS AND STANDARD DEVIATIONS(SD)

TESTS	DOSE (mg/L)	SAMPLING TIME			
		0-DAY REC	14-DAY REC	41-DAY REC	84-DAY REC
MCHC g/dL	0.0000	37.(1.)	39.(2.)	37.(1.)	39.(1.)
	0.0076	37.(2.)	39.(2.)	38.(1.)	40.(3.)
	0.0580	38.(1.)	38.(1.)	38.(2.)	37.(2.)
	0.4800	33.(1.)	37.(2.)	38.(1.)	37.(2.)
PLAT x103/uL	0.0000	929.(121.)	1081.(163.)	950.(129.)	1208.(108.)
	0.0076	843.(110.)	1064.(125.)	1074.(121.)	1221.(267.)
	0.0580	821.(137.)	1069.(162.)	1099.(151.)	1141.(121.)
	0.4800	729.(111.)	1080.(96.)	1166.(159.)	1035.(146.)

TABLE I(continued)
SUMMARY OF HEMATOLOGIC FINDINGS FOR MALE RATS
EXPOSED BY INHALATION TO [REDACTED] FOR 10 DAYS
GROUP MEANS AND STANDARD DEVIATIONS(SD)

TESTS	DOSE (mg/L)	SAMPLING TIME			
		0-DAY REC	14-DAY REC	41-DAY REC	84-DAY REC
WBC x103/uL	0.0000	12.5(3.3)	13.1(1.9)	12.1(1.6)	11.6(1.0)
	0.0076	11.7(2.1)	13.7(3.0)	14.3(2.7)	13.0(1.9)
	0.0580	11.3(2.4)	14.7(5.5)	15.3(5.6)	17.1(3.3)
	0.4800	12.4(3.1)	14.9(2.9)	14.8(4.5)	20.1(3.3)
Neut WBCx%	0.0000	2223.(920.)	2578.(1078.)	2091.(839.)	1728.(311.)
	0.0076	2638.(1108.)	2719.(1456.)	2921.(913.)	2120.(773.)
	0.0580	1929.(583.)	2989.(1428.)	3137.(1762.)	2922.(592.)
	0.4800	2429.(579.)	2873.(677.)	3480.(2311.)	5270.(1722.)
Band WBCx%	0.0000	0.(0.)	0.(0.)	0.(0.)	0.(0.)
	0.0076	13.(42.)	0.(0.)	0.(0.)	0.(0.)
	0.0580	0.(0.)	0.(0.)	0.(0.)	43.(96.)
	0.4800	0.(0.)	0.(0.)	15.(47.)	0.(0.)
Lymph WBCx%	0.0000	9492.(3033.)	10468.(1744.)	9775.(1128.)	9374.(1259.)
	0.0076	8284.(1637.)	10672.(3099.)	11053.(2056.)	10417.(1467.)
	0.0580	8559.(1953.)	11487.(4450.)	11557.(4068.)	13069.(2127.)
	0.4800	9173.(2833.)	11803.(2548.)	10782.(2058.)	13634.(2210.)
Al ym WBCx%	0.0000	167.(112.)	14.(44.)	45.(59.)	167.(180.)
	0.0076	240.(180.)	45.(72.)	68.(72.)	188.(145.)
	0.0580	208.(139.)	91.(91.)	171.(228.)	275.(452.)
	0.4800	142.(68.)	104.(128.)	141.(140.)	378.(197.)

TABLE I(continued)
SUMMARY OF HEMATOLOGIC FINDINGS FOR MALE RATS
EXPOSED BY INHALATION TO [REDACTED] FOR 10 DAYS
GROUP MEANS AND STANDARD DEVIATIONS(SD)

TESTS	DOSE (mg/L)	SAMPLING TIME			
		0-DAY REC	14-DAY REC	41-DAY REC	84-DAY REC
Mono WBCx%	0.0000	541.(170.)	16.(49.)	90.(96.)	211.(285.)
	0.0076	475.(260.)	142.(155.)	193.(216.)	242.(125.)
	0.0580	554.(196.)	126.(118.)	233.(246.)	526.(677.)
	0.4800	656.(301.)	131.(140.)	208.(209.)	525.(519.)
Eosin WBCx%	0.0000	48.(67.)	25.(54.)	90.(81.)	160.(120.)
	0.0076	69.(86.)	83.(77.)	61.(80.)	74.(69.)
	0.0580	50.(65.)	48.(84.)	140.(105.)	226.(209.)
	0.4800	0.(0.)	0.(0.)	174.(243.)	253.(303.)
Baso WBCx%	0.0000	0.(0.)	0.(0.)	0.(0.)	0.(0.)
	0.0076	0.(0.)	0.(0.)	13.(42.)	0.(0.)
	0.0580	0.(0.)	0.(0.)	22.(70.)	0.(0.)
	0.4800	0.(0.)	0.(0.)	0.(0.)	0.(0.)

TABLE II
SUMMARY OF CLINICAL CHEMICAL FINDINGS FOR MALE RATS
EXPOSED BY INHALATION TO [REDACTED] FOR 10 DAYS
GROUP MEANS AND STANDARD DEVIATIONS(SD)

TESTS	DOSE (mg/L)	SAMPLING TIME			
		0-DAY REC	14-DAY REC	41-DAY REC	84-DAY REC
ALP U/L	0.0000	191.(62.)	171.(58.)	131.(30.)	97.(37.)
	0.0076	199.(52.)	179.(56.)	151.(40.)	134.(41.)
	0.0580	206.(49.)	196.(38.)	157.(42.)	126.(56.)
	0.4800	325.(48.)	215.(59.)	152.(55.)	120.(73.)
ALT U/L	0.0000	37.(5.)	35.(4.)	40.(7.)	34.(5.)
	0.0076	39.(7.)	34.(7.)	32.(4.)	29.(5.)
	0.0580	44.(11.)	36.(5.)	37.(4.)	43.(25.)
	0.4800	44.(8.)	36.(5.)	33.(6.)	35.(11.)
AST U/L	0.0000	87.(14.)	76.(11.)	76.(12.)	66.(11.)
	0.0076	83.(12.)	75.(10.)	73.(12.)	60.(6.)
	0.0580	91.(15.)	79.(15.)	76.(14.)	83.(35.)
	0.4800	108.(17.)	70.(11.)	77.(11.)	71.(17.)
BUN mg/dL	0.0000	16.(3.)	17.(3.)	17.(2.)	20.(4.)
	0.0076	17.(2.)	17.(2.)	17.(1.)	19.(1.)
	0.0580	16.(3.)	17.(3.)	17.(2.)	19.(3.)
	0.4800	29.(4.)	19.(4.)	17.(2.)	15.(2.)

TABLE II(continued)
SUMMARY OF CLINICAL CHEMICAL FINDINGS FOR MALE RATS
EXPOSED BY INHALATION TO [REDACTED] FOR 10 DAYS
GROUP MEANS AND STANDARD DEVIATIONS(SD)

TESTS	DOSE (mg/L)	SAMPLING TIME		
		0-DAY REC	14-DAY REC	41-DAY REC 84-DAY REC
CREAT mg/dL	0.0000	0.54(0.07)	0.59(0.06)	0.65(0.04) 0.63(0.05)
	0.0076	0.59(0.05)	0.59(0.06)	0.68(0.06) 0.69(0.06)
	0.0580	0.63(0.06)	0.58(0.04)	0.67(0.06) 0.67(0.04)
	0.4800	0.64(0.14)	0.60(0.07)	0.65(0.07) 0.64(0.06)
TPROT g/dL	0.0000	5.9(0.2)	6.2(0.7)	6.3(0.5) 6.5(1.1)
	0.0076	6.0(0.3)	6.1(0.4)	6.4(0.5) 7.0(0.4)
	0.0580	6.1(0.3)	6.1(0.8)	6.2(0.6) 7.1(0.3)
	0.4800	6.2(0.5)	6.6(0.5)	6.1(0.4) 6.9(0.3)
CHLOS mg/dL	0.0000	57.(13.)	71.(13.)	67.(13.) 117.(53.)
	0.0076	49.(11.)	62.(11.)	69.(19.) 92.(17.)
	0.0580	50.(5.)	63.(11.)	71.(19.) 94.(20.)
	0.4800	19.(6.)	59.(9.)	63.(12.) 75.(16.)

TABLE III
SUMMARY OF CLINICAL URINE ANALYSIS FINDINGS FOR MALE
RATS EXPOSED BY INHALATION TO [REDACTED] FOR 10 DAYS
GROUP MEANS AND STANDARD DEVIATIONS(SD)

TESTS	DOSE (mg/L)	SAMPLING TIME		
		0-DAY REC	14-DAY REC	41-DAY REC 84-DAY REC
VOL mL	0.0000	7.2(3.7)	13.2(4.3)	13.5(4.9) 13.5(6.4)
	0.0076	5.2(1.6)	12.4(4.5)	13.8(5.0) 17.4(13.7)
	0.0580	7.5(3.3)	12.5(4.5)	13.3(4.6) 16.3(5.4)
	0.4800	11.9(2.5)	12.0(1.8)	13.5(7.0) 17.0(9.0)
OSMOL mOs	0.0000	1714.(296.)	1447.(406.)	1895.(370.) 1784.(756.)
	0.0076	1795.(350.)	1316.(411.)	1633.(373.) 1602.(663.)
	0.0580	1610.(389.)	1566.(335.)	1821.(523.) 1364.(361.)
	0.4800	850.(171.)	1538.(312.)	1626.(467.) 1446.(551.)
pH	0.0000	7.3(0.7)	8.1(0.7)	7.2(0.4) 7.4(0.5)
	0.0076	6.8(0.6)	7.6(0.5)	7.3(0.5) 7.0(0.0)
	0.0580	7.0(0.7)	7.1(0.6)	7.0(0.5) 7.4(0.5)
	0.4800	8.3(0.7)	7.2(0.4)	7.0(0.5) 7.2(0.4)
UROBL mg/dL	0.0000	0.9(0.3)	1.0(0.0)	1.0(0.0) 0.3(0.4)
	0.0076	0.9(0.3)	0.8(0.4)	1.0(0.0) 0.6(0.5)
	0.0580	1.0(0.0)	1.0(0.0)	1.0(0.0) 0.6(0.5)
	0.4800	0.6(0.5)	1.0(0.0)	1.0(0.0) 0.5(0.5)

TABLE III (continued)
SUMMARY OF CLINICAL URINE ANALYSIS FINDINGS FOR MALE RATS EXPOSED
BY INHALATION TO [REDACTED] FOR 10 DAYS

Sampling Time	0-Day Recovery				14-Day Recovery			
Dose (mg/L)	0	.0076	.058	.48	0	.0076	.058	.48
<u>Measurement</u>								
Blood	1/10*	3/10	1/10	0/10	0/10	0/10	1/10	0/10
Number Positive								
Sugar (Glucose)	2/10	3/10	1/10	3/10	0/10	1/10	2/10	0/10
Number Positive								
Protein	0/10	0/10	0/10	0/10	1/10	0/10	1/10	0/10
Number Abnormal								
≥ + 3								
Bilirubin	6/10	3/10	2/10	3/10	4/10	2/10	7/10	6/10
Number Positive								
Ketone	9/10	8/10	10/10	0/10	9/10	8/10	9/10	8/10
Number Positive								
Appearance (Color and Transparency)	0/10	0/10	0/10	0/10	0/10	0/10	0/10	0/10
Microscopic	4/10	1/10	1/10	0/10	6/10	1/10	4/10	3/10
Number Abnormal								

* Number of abnormal or positive findings/number of individual specimens examined

TABLE III (continued)
SUMMARY OF CLINICAL URINE ANALYSIS FINDINGS FOR MALE RATS EXPOSED
BY INHALATION TO [REDACTED] FOR 10 DAYS

<u>Sampling Time</u>	<u>41-Day Recovery</u>				<u>84-Day Recovery</u>			
<u>Dose (mg/L)</u>	0	.0076	.058	.48	0	.0076	.058	.48
<u>Measurement</u>								
Blood Number Positive	0/10	1/10	0/10	1/10	3/5	4/5	3/5	5/5
Sugar (Glucose) Number Positive	1/10	2/10	1/10	2/10	3/5	3/5	3/5	5/5
Protein Number Abnormal ≥ + 3	1/10	1/10	0/10	2/10	2/5	0/5	0/5	0/5
Bilirubin Number Positive	2/10	2/10	6/10	6/10	2/5	2/5	1/5	0/5
Ketone Number Positive	10/10	10/10	10/10	9/10	4/5	3/5	3/5	4/5
Appearance (Color and Transparency)	0/10	0/10	0/10	0/10	0/5	0/5	0/5	0/5
Microscopic Number Abnormal	1/10	1/10	2/10	0/10	0/5	2/5	0/5	1/5

TABLE IV
SUMMARY OF STATISTICAL ANALYSES OF HEMATOLOGIC AND CLINICAL
CHEMICAL FINDINGS FOR MALE RATS EXPOSED BY INHALATION TO
[REDACTED] FOR 10 DAYS

Sampling Time	0-Day Recovery		14-Day Recovery	
Statistic	p*	Dunnett	p	Dunnett
<u>Measurement</u>				
<u>Hematology</u>				
RBC	0.000	**	0.270	
Hb	0.003	**	0.000	**
Ht	0.000	**	0.353	
MCV	0.755		0.323	
MCH	0.000	**	0.015	**
MCHC	0.000	**	0.021	**
PLAT	0.007	**	0.991	
WBC	0.748		0.627	
Neut	0.280		0.880	
Band	0.404		1.000	
Lymph	0.673		0.740	
Alym	0.358		0.106	
Mono	0.407		0.092	
Eosin	0.112		0.038	
Baso	1.000		1.000	
<u>Clinical Chemistry (Serum)</u>				
ALP	0.000	**	0.283	
ALT	0.135		0.903	
AST	0.003	**	0.398	
BUN	0.000	**	0.426	
CREAT	0.057		0.891	
TPROT	0.120		0.445	
CHLOS	0.000	**	0.094	
<u>Clinical Chemistry (Urine)</u>				
VOL	0.000	**	0.911	
OSMOL	0.000	**	0.432	
pH	0.000	**	0.002	**
UROBL	0.069		0.099	

* = Value of p for F-statistic

** = Significantly different from controls at 5% level by Dunnett criteria

TABLE IV (continued)
SUMMARY OF STATISTICAL ANALYSES OF HEMATOLOGIC AND CLINICAL
CHEMICAL FINDINGS FOR MALE RATS EXPOSED BY INHALATION TO
[REDACTED] FOR 10 DAYS

Sampling Time	41-Day Recovery		84-Day Recovery	
Statistic	p	Dunnett	p	Dunnett
<u>Measurement</u>				
<u>Hematology</u>				
RBC	0.045	**	0.313	
Hb	0.170		0.165	
Ht	0.053		0.207	
MCV	0.789		0.375	
MCH	0.100		0.302	
MCHC	0.179		0.050	
PLAT	0.014	**	0.335	
WBC	0.289		0.000	**
Neut	0.259		0.000	**
Band	0.404		0.418	
Lymph	0.472		0.005	**
Alym	0.168		0.611	
Mono	0.412		0.552	
Eosin	0.316		0.500	
Baso	0.554		1.000	
<u>Clinical Chemistry (Serum)</u>				
ALP	0.532		0.727	
ALT	0.008	**	0.487	
AST	0.933		0.355	
BUN	0.980		0.048	**
CREAT	0.496		0.299	
TPROT	0.511		0.412	
CHLOS	0.686		0.227	
<u>Clinical Chemistry (Urine)</u>				
VOL	0.998		0.904	
OSMOL	0.425		0.704	
pH	0.382		0.455	
UROBL	1.000		0.585	

TABLE V
SUMMARY OF STATISTICALLY SIGNIFICANT HEMATOLOGIC AND CLINICAL
CHEMICAL FINDINGS FOR MALE RATS EXPOSED BY INHALATION TO [REDACTED]
[REDACTED] FOR 10 DAYS
[REDACTED]

<u>Sampling Time</u>	<u>0-Day Rec</u>	<u>14-Day Rec</u>	<u>41-Day Rec</u>	<u>84-Day Rec</u>
<u>Measurement</u>				
<u>Hematology</u>				
RBC	↑ IV		↑ IV	
Hb	↑ IV	↓ IV		
Ht	↑ IV			
MCH	↓ IV	↓ IV		
MCHC	↑ III, IV	↓ IV		
PLAT	↓ IV		↑ IV	
WBC				↑ III, IV
Neut				↑ IV
Lymph				↑ III, IV
<u>Clinical Chemistry (Serum)</u>				
ALP	↑ IV			
ALT			↓ II, IV	
AST	↑ IV			
BUN	↓ IV			↓ IV
CHLOS	IV			
<u>Clinical Chemistry (Urine)</u>				
VOL	↑ IV			
OSMOL	↓ IV			
pH	↑ IV	↓ III, IV		

↑ = Significantly higher than controls by Dunnett criteria
↓ = Significantly lower than controls by Dunnett criteria

Group Designation and Dose Concentration (mg/L)

II = Low Dose (0.0076)
III = Intermediate Dose (0.058)
IV = High Dose (0.48)

LEGEND

TERMS AND CRITERIA USED IN URINALYSES

Abbreviations for Descriptive Terms Normally Used for Gross Evaluation of Urine (other Abbreviations and Descriptive Terms may be used if they are more applicable).

Y = Yellow
LY = Light Yellow
DY = Dark Yellow
A = Amber
DA = Dark Amber
G = Green
BL = Bloody
R = Red
C = Clear
CL = Cloudy
PPT = Precipitate
F = Feed
FEC = Feces

Abbreviations for Descriptive Terms Used for Microscopic Evaluation of Urine

Epith = Epithelial Cells
hpf = high power field
lpf = low power field
RBC = Red Blood Cells
WBC = White Blood Cells
TNTC (99-99) = Too Numerous to Count

Definition of "Normal" and "Abnormal" Designations Used for Gross and Microscopic Appearance of Urine

<u>Appearance</u>	<u>Normal</u>	<u>Abnormal</u>
Color	Light to dark yellow or amber	Color other than yellow or amber
<u>Microscopic</u>		
Red Blood Cells	Average of 0 to 4 red blood cells per high power field	Average of more than 4 red blood cells per high power field
Casts	None observed	Average of more than 0 per low power field
Epithelial Cells	Average of 0 to 9 per high power field	Average of more than 9 per high power field
White Blood Cells	Average of 0 to 9 per high power field	Average of more than 9 per high power field

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 0-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC x10 ⁶ /uL	Hb g/dL	Ht %	MCV fL	MCH pg	MCHC g/dL	PLAT x10 ³ /uL
376825	7.31	15.2	42.	57.	21.	36.	1068.
376835	6.73	15.1	40.	58.	23.	38.	952.
376839	7.61	15.9	43.	56.	21.	37.	984.
376840	7.63	15.5	45.	58.	20.	35.	716.
376841	6.41	14.0	37.	58.	22.	38.	1030.
376849	7.06	15.0	41.	57.	21.	37.	1008.
376863	7.59	15.6	44.	58.	21.	35.	842.
376870	7.73	16.1	44.	57.	21.	37.	876.
376872	8.45	17.5	50.	58.	21.	35.	1044.
376873	7.57	15.7	42.	55.	21.	37.	774.
AVG.	7.409	15.56	42.7	57.2	21.0	36.5	929.4
S. D.	0.570	0.90	3.3	1.0	0.7	1.1	121.2
S. E.	0.180	0.28	1.0	0.3	0.2	0.3	38.3

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC x10 ⁶ /uL	Hb g/dL	Ht %	MCV fL	MCH pg	MCHC g/dL	PLAT x10 ³ /uL
376804	7.37	15.4	42.	57.	21.	37.	814.
376806	7.32	16.5	42.	56.	23.	40.	1032.
376810	6.75	14.8	40.	59.	22.	37.	758.
376818	6.26	14.6	36.	58.	23.	40.	802.
376822	6.81	15.2	41.	59.	22.	38.	984.
376823	7.35	15.5	42.	57.	21.	37.	936.
376844	7.61	15.1	43.	56.	20.	35.	728.
376852	7.33	15.0	43.	58.	21.	35.	876.
376876	7.90	15.4	44.	55.	20.	35.	776.
376881	8.05	15.7	47.	57.	20.	34.	720.
AVG.	7.275	15.32	42.0	57.2	21.1	36.6	842.6
S. D.	0.542	0.53	2.7	1.3	1.3	2.0	109.5
S. E.	0.171	0.17	0.8	0.4	0.4	0.6	34.6

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 0-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC x10 ⁶ /uL	Hb g/dL	Ht %	MCV fL	MCH pg	MCHC g/dL	PLAT x10 ³ /uL
376805	8.00	16.8	46.	56.	21.	37.	722.
376812	7.04	15.5	41.	58.	22.	37.	692.
376813	7.27	16.2	43.	58.	22.	38.	724.
376821	6.70	15.8	39.	57.	24.	41.	1164.
376830	7.30	16.0	42.	57.	22.	38.	806.
376838	6.95	15.3	41.	58.	22.	38.	836.
376851	7.25	15.6	40.	55.	22.	39.	890.
376857	7.90	16.6	44.	56.	21.	38.	804.
376867	6.60	14.5	38.	57.	22.	38.	852.
376874	7.61	15.7	43.	56.	21.	37.	722.
AVG.	7.262	15.80	41.6	56.8	21.8	38.0	821.2
S. D.	0.468	0.66	2.4	1.0	0.8	1.2	137.3
S. E.	0.148	0.21	0.7	0.3	0.3	0.4	43.4

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC x10 ⁶ /uL	Hb g/dL	Ht %	MCV fL	MCH pg	MCHC g/dL	PLAT x10 ³ /uL
376819	8.67	16.6	49.	56.	19.	34.	690.
376820	8.65	16.1	50.	57.	19.	32.	590.
376824	8.18	16.1	48.	58.	20.	34.	808.
376828	8.90	17.4	51.	57.	20.	34.	524.
376833	8.21	15.8	48.	58.	19.	33.	670.
376854	8.67	17.9	53.	61.	21.	34.	864.
376858	8.58	16.6	49.	57.	19.	34.	766.
376859	8.30	16.3	48.	58.	20.	34.	806.
376879	8.74	17.0	51.	57.	20.	34.	846.
376880	8.63	15.6	48.	55.	18.	33.	722.
AVG.	8.553	16.54	49.4	57.4	19.4	33.5	728.6
S. D.	0.240	0.72	1.8	1.6	0.7	0.6	111.5
S. E.	0.076	0.23	0.6	0.5	0.2	0.2	35.3

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 0-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x10 ³ /uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376825	13.6	2992.	0.	9792.	408.	408.	0.	0.
376835	14.8	3700.	0.	10508.	148.	444.	0.	0.
376839	8.9	2136.	0.	6141.	89.	534.	0.	0.
376840	10.5	1785.	0.	7875.	210.	525.	105.	0.
376841	13.3	1330.	0.	11172.	266.	532.	0.	0.
376849	16.0	3520.	0.	11680.	160.	640.	0.	0.
376863	10.5	2100.	0.	7560.	105.	735.	0.	0.
376870	9.1	1092.	0.	7735.	0.	182.	91.	0.
376872	18.5	1295.	0.	16095.	185.	740.	185.	0.
376873	9.5	2280.	0.	6365.	95.	665.	95.	0.
AVG.	12.47	2223.0	0.0	9492.3	166.6	540.5	47.6	0.0
S. D.	3.28	919.6	0.0	3032.7	112.3	169.6	66.6	0.0
S. E.	1.04	290.8	0.0	959.0	35.5	53.6	21.1	0.0

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x10 ³ /uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376804	9.5	2185.	0.	6270.	285.	665.	95.	0.
376806	11.1	4107.	0.	6327.	222.	444.	0.	0.
376810	13.0	2730.	0.	8580.	390.	1040.	260.	0.
376818	13.6	1904.	0.	11288.	136.	272.	0.	0.
376822	13.2	3300.	132.	9372.	132.	132.	132.	0.
376823	10.1	1717.	0.	7373.	404.	505.	101.	0.
376844	13.0	3770.	0.	8710.	130.	390.	0.	0.
376852	10.4	1456.	0.	8528.	104.	208.	104.	0.
376876	15.0	4050.	0.	9750.	600.	600.	0.	0.
376881	8.3	1162.	0.	6640.	0.	498.	0.	0.
AVG.	11.72	2638.1	13.2	8283.8	240.3	475.4	69.2	0.0
S. D.	2.14	1107.9	41.7	1636.5	180.1	260.5	86.4	0.0
S. E.	0.68	350.4	13.2	517.5	57.0	82.4	27.3	0.0

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 0-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x10 ³ /uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376805	6.6	1122.	0.	4884.	66.	528.	0.	0.
376812	14.4	2160.	0.	11376.	144.	720.	0.	0.
376813	14.4	1872.	0.	11376.	432.	576.	144.	0.
376821	11.7	2106.	0.	9009.	117.	468.	0.	0.
376830	10.4	1768.	0.	7280.	416.	832.	104.	0.
376838	9.4	1598.	0.	7332.	94.	376.	0.	0.
376851	12.7	3302.	0.	8636.	254.	381.	127.	0.
376857	12.5	2000.	0.	9500.	125.	750.	125.	0.
376867	11.0	1980.	0.	8470.	330.	220.	0.	0.
376874	9.9	1386.	0.	7722.	99.	693.	0.	0.
AVG.	11.30	1929.4	0.0	8558.5	207.7	554.4	50.0	0.0
S. D.	2.39	583.3	0.0	1952.8	139.3	195.6	65.2	0.0
S. E.	0.76	184.5	0.0	617.5	44.1	61.9	20.6	0.0

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x10 ³ /uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376819	10.9	2180.	0.	7739.	218.	763.	0.	0.
376820	8.5	1700.	0.	6545.	85.	170.	0.	0.
376824	16.7	2338.	0.	13360.	167.	835.	0.	0.
376828	9.8	1862.	0.	7546.	98.	294.	0.	0.
376833	13.5	2160.	0.	10800.	0.	540.	0.	0.
376854	11.1	3663.	0.	6105.	222.	1110.	0.	0.
376858	12.7	2667.	0.	9144.	127.	762.	0.	0.
376859	14.0	2800.	0.	10220.	140.	840.	0.	0.
376879	9.0	2070.	0.	6390.	180.	360.	0.	0.
376880	17.8	2848.	0.	13884.	178.	890.	0.	0.
AVG.	12.40	2428.8	0.0	9173.3	141.5	656.4	0.0	0.0
S. D.	3.14	579.0	0.0	2833.1	67.6	301.4	0.0	0.0
S. E.	0.99	183.1	0.0	895.9	21.4	95.3	0.0	0.0

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
PERIOD: 0-DAY REC REPORT DATE: 17-OCT-84
SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	ALP U/L	ALT U/L	AST U/L	BUN mg/dL	CREAT mg/dL	TPROT g/dL	CHLOS mg/dL
376825	130.	35.	75.	16.	0.54	5.9	62.
376835	339.	44.	96.	16.	0.59	6.0	60.
376839	237.	42.	71.	13.	0.53	6.2	64.
376840	137.	46.	91.	15.	0.56	6.0	60.
376841	161.	33.	73.	14.	0.56	5.6	62.
376849	184.	31.	68.	14.	0.55	5.8	81.
376863	183.	32.	93.	23.	0.41	5.9	40.
376870	211.	37.	98.	19.	0.46	6.0	54.
376872	140.	37.	95.	16.	0.56	5.5	40.
376873	185.	32.	109.	15.	0.66	5.9	45.
AVG.	190.7	36.9	86.9	16.0	0.542	5.88	56.7
S. D.	62.1	5.4	14.0	2.9	0.068	0.20	12.8
S. E.	19.6	1.7	4.4	0.9	0.021	0.06	4.0

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	ALP U/L	ALT U/L	AST U/L	BUN mg/dL	CREAT mg/dL	TPROT g/dL	CHLOS mg/dL
376804	98.	35.	69.	17.	0.58	6.3	62.
376806	166.	46.	90.	20.	0.52	6.0	47.
376810	177.	43.	72.	18.	0.59	6.0	53.
376818	265.	41.	82.	16.	0.59	6.5	69.
376822	262.	41.	77.	17.	0.59	6.0	52.
376823	242.	54.	106.	16.	0.65	5.8	50.
376844	153.	33.	70.	12.	0.66	6.1	45.
376852	211.	28.	92.	20.	0.67	5.8	34.
376876	206.	35.	93.	14.	0.54	6.1	41.
376881	207.	37.	77.	18.	0.56	5.3	34.
AVG.	198.7	39.3	82.8	16.9	0.595	5.99	48.6
S. D.	52.0	7.4	12.1	2.4	0.051	0.32	11.0
S. E.	16.4	2.3	3.8	0.7	0.016	0.10	3.5

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 0-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	ALP U/L	ALT U/L	AST U/L	BUN mg/dL	CREAT mg/dL	TPROT g/dL	CHLOS mg/dL
376805	299.	71.	116.	15.	0.67	6.3	47.
376812	127.	43.	72.	13.	0.53	6.1	61.
376813	229.	43.	83.	15.	0.70	6.2	53.
376821	228.	40.	78.	16.	0.68	6.4	50.
376830	210.	35.	102.	19.	0.55	5.9	48.
376838	240.	40.	105.	14.	0.72	6.4	49.
376851	204.	50.	96.	14.	0.61	6.7	50.
376857	187.	46.	99.	24.	0.63	5.8	42.
376867	141.	39.	79.	12.	0.61	5.6	49.
376874	199.	33.	76.	17.	0.59	6.0	52.
AVG.	206.4	44.0	90.6	15.8	0.629	6.14	49.9
S. D.	49.1	10.7	14.9	3.4	0.063	0.33	4.8
S. E.	15.5	3.4	4.7	1.1	0.020	0.10	1.5

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	ALP U/L	ALT U/L	AST U/L	BUN mg/dL	CREAT mg/dL	TPROT g/dL	CHLOS mg/dL
376819	372.	47.	124.	27.	0.70	6.1	32.
376820	287.	45.	123.	25.	0.62	5.9	18.
376824	324.	41.	93.	34.	0.71	6.4	19.
376828	322.	62.	137.	29.	0.29	6.1	19.
376833	351.	50.	91.	31.	0.74	5.4	20.
376854	334.	50.	94.	23.	0.76	6.3	16.
376858	263.	38.	99.	28.	0.71	6.2	18.
376859	254.	35.	94.	25.	0.60	6.0	9.
376879	328.	38.	101.	36.	0.62	7.1	18.
376880	411.	37.	124.	32.	0.68	6.9	16.
AVG.	324.6	44.3	108.0	28.9	0.643	6.24	18.6
S. D.	48.0	8.3	17.0	4.2	0.135	0.49	5.5
S. E.	15.2	2.6	5.4	1.3	0.043	0.15	1.7

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 0-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376825	5.8	1862.	-	-	+1	7.0	-	1.0	+1
376835	6.1	1641.	-	-	+2	7.0	+1	1.0	+1
376839	5.4	2028.	-	-	+1	7.0	+1	1.0	+1
376840	5.5	1739.	-	-	+1	8.0	-	1.0	+
376841	7.9	1552.	-	+	+1	8.0	-	1.0	+
376849	6.7	1901.	-	-	+1	8.0	+1	1.0	+1
376863	3.5	1593.	-	-	+2	6.0	+1	1.0	+
376870	17.0	1002.	+	+	+	8.0	-	0.1	-
376872	7.8	1879.	-	-	+1	7.0	+1	1.0	+
376873	6.3	1944.	-	-	+1	7.0	+1	1.0	+1
AVG.	7.20	1714.1				7.30		0.91	
S. D.	3.67	296.2				0.67		0.28	
S. E.	1.16	93.7				0.21		0.09	

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376804	4.6	1966.	-	-	+2	6.0	+1	1.0	+
376806	5.1	1607.	-	-	+1	8.0	+1	1.0	+
376810	7.4	1641.	-	-	+1	7.0	-	1.0	+1
376818	4.6	1926.	+	+	+1	7.0	-	1.0	+
376822	5.0	1666.	-	-	+1	7.0	-	1.0	+1
376823	4.2	2130.	+	+	+1	6.0	-	1.0	-
376844	7.7	1664.	-	-	+1	7.0	+1	1.0	+1
376852	2.2	1868.	+	+	+1	7.0	-	0.1	-
376876	6.5	1090.	-	-	+1	7.0	-	1.0	+
376881	4.4	2388.	-	-	+1	6.0	-	1.0	+1
AVG.	5.17	1794.6				6.80		0.91	
S. D.	1.64	350.5				0.63		0.28	
S. E.	0.52	110.8				0.20		0.09	

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 0-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376805	5.0	2062.	-	-	+2	7.0	-	1.0	+1
376812	7.3	1534.	-	-	+1	8.0	-	1.0	+
376813	6.2	1763.	-	-	+1	7.0	-	1.0	+
376821	8.3	1398.	-	-	+1	7.0	+1	1.0	+
376830	6.7	1471.	-	-	+1	8.0	-	1.0	+
376838	5.0	1976.	-	-	+1	6.0	-	1.0	+1
376851	9.0	1322.	-	-	+1	7.0	+1	1.0	+
376857	7.1	1669.	-	-	+1	7.0	-	1.0	+1
376867	4.6	2080.	+	+	+1	6.0	-	1.0	+
376874	16.0	821.	-	-	+	7.0	-	1.0	+
AVG.	7.52	1609.6				7.00		1.00	
S. D.	3.31	389.0				0.67		0.00	
S. E.	1.05	123.0				0.21		0.00	

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376819	11.0	1039.	-	+	+1	8.0	-	0.1	-
376820	9.1	955.	-	+	+1	9.0	-	0.1	-
376824	12.0	944.	-	-	+1	8.0	+1	1.0	-
376828	16.0	886.	-	+	+	7.0	-	0.1	-
376833	15.0	730.	-	-	+1	8.0	-	1.0	-
376854	11.0	1099.	-	-	+1	9.0	+1	1.0	-
376858	10.0	537.	-	-	+	8.0	-	0.1	-
376859	8.7	861.	-	-	+1	9.0	+1	1.0	-
376879	14.0	725.	-	-	+1	9.0	-	1.0	-
376880	12.0	723.	-	-	+	8.0	-	1.0	-
AVG.	11.88	849.9				8.30		0.64	
S. D.	2.45	171.0				0.67		0.46	
S. E.	0.78	54.1				0.21		0.15	

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
PERIOD: 0-DAY REC REPORT DATE: 17-OCT-84
SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC /hpf	WBC /hpf	Epith /hpf	Cast /lpf	APPEARANCE
376825	0-0	4-8	0-3	0-0	Y CL PPT FEED
376835	0-0	5-10	0-2	0-0	DY CL PPT FEED
376839	0-0	0-2	1-2	0-0	Y CL PPT FEED
376840	0-0	5-8	0-3	0-0	LY CL PPT FEED
376841	0-0	8-10	2-4	0-0	DY CL PPT FEED
376849	0-0	0-4	0-2	0-0	DY CL PPT FEED
376863	0-0	0-1	0-1	0-0	DY C PPT
376870	0-2	10-20	1-3	0-0	Y CL PPT FEED
376872	0-0	1-3	0-1	0-0	Y C PPT FEED
376873	0-0	5-10	0-2	0-0	DY CL PPT FEED

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC /hpf	WBC /hpf	Epith /hpf	Cast /lpf	APPEARANCE
376804	0-0	1-4	0-1	0-0	DY CL PPT FEED
376806	0-0	1-3	0-1	0-0	Y CL PPT FEED
376810	0-0	20-30	3-6	0-0	DY CL PPT FEED
376818	0-0	0-2	0-1	0-0	DY C PPT
376822	0-0	2-4	0-1	0-0	LY C PPT
376823	0-2	5-8	0-2	0-0	Y C PPT
376844	0-0	1-2	0-0	0-0	Y C PPT FEED
376852	0-1	0-2	0-2	0-0	DY C PPT
376876	0-0	0-1	0-0	0-0	LY CL PPT
376881	0-0	0-2	0-1	0-0	Y C PPT

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
PERIOD: 0-DAY REC REPORT DATE: 17-OCT-84
SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC /hpf	WBC /hpf	Epith /hpf	Cast /lpf	APPEARANCE
376805	0-0	5-10	1-4	0-0	Y CL PPT FEED
376812	0-0	3-6	0-2	0-0	Y CL PPT FEED
376813	0-1	1-3	1-2	0-0	Y C PPT
376821	0-0	4-6	0-1	0-0	Y CL PPT FEED
376830	0-0	1-4	0-3	0-0	Y C PPT FEED
376838	0-0	0-3	0-1	0-0	DY CL PPT FEED
376851	0-0	0-2	1-2	0-0	Y C PPT FEED
376857	0-0	0-2	0-1	0-0	Y C PPT FEED
376867	0-3	2-4	0-2	0-0	DY CL PPT FEED
376874	0-0	0-3	0-1	0-0	LY CL PPT FEED

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
SAMPLE DATE: 07/20/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC /hpf	WBC /hpf	Epith /hpf	Cast /lpf	APPEARANCE
376819	0-0	1-3	1-2	0-0	DY CL PPT
376820	0-0	0-4	0-2	0-0	Y CL PPT FEED
376824	0-0	0-1	0-1	0-0	Y CL PPT FEED
376828	0-1	0-2	0-1	0-0	LY CL PPT FEED
376833	0-0	1-4	1-2	0-0	Y CL PPT FEED
376854	0-0	1-3	0-2	0-0	DY CL PPT
376858	0-0	0-1	0-2	0-0	LY CL PPT
376859	0-0	2-4	2-4	0-0	A CL PPT
376879	0-0	0-2	0-1	0-0	Y CL PPT
376880	0-0	1-3	2-4	0-0	LY CL PPT

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 14-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

	RBC	Hb	Ht	MCV	MCH	MCHC	PLAT
ANIMAL#:	x10 ⁶ /uL	g/dL	%	fL	pg	g/dL	x10 ³ /uL
376801	6.73	15.2	39.	57.	23.	39.	940.
376835	6.49	16.4	39.	59.	25.	43.	1262.
376836	7.63	16.0	43.	56.	21.	37.	1138.
376837	7.75	16.0	43.	54.	21.	38.	944.
376841	6.39	14.8	38.	59.	23.	39.	1190.
376847	7.93	15.8	42.	52.	20.	38.	1158.
376849	7.27	15.8	42.	58.	22.	38.	954.
376863	7.28	15.9	41.	56.	22.	39.	998.
376872	7.26	16.4	42.	57.	23.	39.	864.
376878	6.51	16.0	38.	58.	25.	42.	1360.
AVG.	7.124	15.83	40.6	56.6	22.4	39.2	1080.8
S. D.	0.561	0.49	2.0	2.2	1.7	1.8	163.4
S. E.	0.177	0.16	0.6	0.7	0.5	0.6	51.7

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

	RBC	Hb	Ht	MCV	MCH	MCHC	PLAT
ANIMAL#:	x10 ⁶ /uL	g/dL	%	fL	pg	g/dL	x10 ³ /uL
376800	7.25	16.2	41.	56.	22.	40.	1118.
376810	6.68	15.0	40.	59.	23.	38.	888.
376822	6.23	16.1	37.	58.	26.	44.	1330.
376848	6.74	15.5	38.	57.	23.	40.	1042.
376852	7.49	16.4	44.	58.	22.	38.	1078.
376856	7.72	16.3	43.	55.	21.	38.	936.
376866	7.03	16.3	40.	56.	23.	41.	1162.
376871	7.43	15.8	42.	55.	21.	38.	972.
376876	7.20	15.1	39.	54.	21.	39.	1048.
376881	7.18	16.3	41.	57.	23.	40.	1066.
AVG.	7.095	15.90	40.5	56.5	22.5	39.4	1064.0
S. D.	0.441	0.52	2.1	1.6	1.4	2.0	124.7
S. E.	0.140	0.17	0.7	0.5	0.5	0.6	39.4

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 14-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC x10 ⁶ /uL	Hb g/dL	Ht %	MCV fL	MCH pg	MCHC g/dL	PLAT x10 ³ /uL
376803	7.54	16.1	41.	54.	21.	39.	1064.
376808	7.66	16.3	42.	55.	21.	39.	1126.
376811	7.99	16.2	44.	54.	20.	37.	768.
376812	7.16	16.6	42.	58.	23.	40.	1300.
376813	7.07	15.7	41.	57.	22.	39.	878.
376830	7.57	16.2	43.	57.	21.	38.	1060.
376843	7.29	15.3	40.	54.	21.	38.	1026.
376857	7.90	16.6	44.	55.	21.	38.	1134.
376860	7.05	15.3	40.	56.	22.	38.	1282.
376874	7.54	15.8	42.	55.	21.	38.	1050.
AVG.	7.477	16.01	41.8	55.5	21.4	38.3	1068.8
S. D.	0.329	0.47	1.5	1.4	0.8	0.8	161.8
S. E.	0.104	0.15	0.5	0.5	0.2	0.2	51.2

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC x10 ⁶ /uL	Hb g/dL	Ht %	MCV fL	MCH pg	MCHC g/dL	PLAT x10 ³ /uL
376814	7.52	15.2	41.	54.	20.	37.	1052.
376815	7.32	14.7	40.	54.	20.	37.	1140.
376819	6.83	14.5	38.	56.	21.	38.	900.
376824	6.18	14.0	35.	56.	23.	40.	1146.
376832	6.76	14.9	37.	55.	22.	40.	1078.
376833	7.25	15.3	44.	60.	21.	35.	1256.
376850	7.71	15.6	43.	55.	20.	36.	1036.
376853	8.01	15.4	43.	53.	19.	36.	1120.
376858	7.40	15.2	43.	57.	21.	35.	1074.
376880	6.70	13.6	37.	54.	20.	37.	998.
AVG.	7.168	14.84	40.0	55.4	20.8	37.2	1080.0
S. D.	0.546	0.64	3.1	2.0	1.0	1.7	95.7
S. E.	0.173	0.20	1.0	0.6	0.3	0.6	30.3

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 14-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	ALP U/L	ALT U/L	AST U/L	BUN mg/dL	CREAT mg/dL	TPROT g/dL	CHLOS mg/dL
376801	166.	39.	71.	22.	0.63	6.2	63.
376835	307.	39.	103.	16.	0.68	6.4	67.
376836	151.	32.	70.	15.	0.60	6.5	63.
376837	101.	38.	77.	12.	0.55	7.4	76.
376841	168.	35.	78.	19.	0.58	7.5	72.
376847	201.	29.	75.	18.	0.49	5.4	64.
376849	207.	37.	59.	16.	0.64	5.7	101.
376863	128.	28.	71.	21.	0.60	5.7	61.
376872	139.	37.	83.	18.	0.54	5.8	61.
376878	139.	35.	77.	16.	0.56	5.8	87.
AVG.	170.7	34.9	76.4	17.2	0.587	6.24	71.5
S. D.	57.7	4.0	11.3	3.0	0.055	0.72	13.2
S. E.	18.2	1.3	3.6	1.0	0.017	0.23	4.2

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	ALP U/L	ALT U/L	AST U/L	BUN mg/dL	CREAT mg/dL	TPROT g/dL	CHLOS mg/dL
376800	219.	39.	72.	16.	0.53	6.0	50.
376810	127.	32.	70.	15.	0.60	6.3	64.
376822	261.	46.	70.	20.	0.69	6.6	64.
376848	87.	24.	98.	17.	0.57	6.1	65.
376852	137.	30.	81.	15.	0.59	6.2	66.
376856	145.	31.	76.	16.	0.56	6.2	55.
376866	176.	28.	59.	17.	0.61	6.8	86.
376871	180.	36.	67.	16.	0.61	6.3	50.
376876	242.	39.	79.	19.	0.63	5.7	51.
376881	219.	39.	75.	15.	0.49	5.2	65.
AVG.	179.3	34.4	74.7	16.6	0.588	6.14	61.7
S. D.	55.8	6.6	10.3	1.6	0.055	0.45	10.8
S. E.	17.6	2.1	3.3	0.5	0.017	0.14	3.4

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 14-DAY REC REPORT DATE: 16-OCT-84
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x10 ³ /uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376801	9.9	1287.	0.	8514.	0.	0.	99.	0.
376835	12.4	3720.	0.	8680.	0.	0.	0.	0.
376836	14.4	3168.	0.	11232.	0.	0.	0.	0.
376837	13.8	4002.	0.	9798.	0.	0.	0.	0.
376841	14.1	2961.	0.	11139.	0.	0.	0.	0.
376847	15.5	1860.	0.	13485.	0.	155.	0.	0.
376849	14.9	3725.	0.	11026.	0.	0.	149.	0.
376863	10.6	2332.	0.	8268.	0.	0.	0.	0.
376872	11.6	1624.	0.	9976.	0.	0.	0.	0.
376878	13.8	1104.	0.	12558.	138.	0.	0.	0.
AVG.	13.10	2578.3	0.0	10467.6	13.8	15.5	24.8	0.0
S. D.	1.88	1078.5	0.0	1743.6	43.6	49.0	53.6	0.0
S. E.	0.60	341.0	0.0	551.4	13.8	15.5	16.9	0.0

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x10 ³ /uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376800	14.7	5292.	0.	9261.	147.	0.	0.	0.
376810	13.1	2882.	0.	9563.	131.	524.	0.	0.
376822	13.8	3174.	0.	10488.	0.	138.	0.	0.
376848	16.7	1169.	0.	15030.	167.	167.	167.	0.
376852	10.4	1560.	0.	8528.	0.	208.	104.	0.
376856	16.4	2460.	0.	13612.	0.	164.	164.	0.
376866	12.0	1680.	0.	10320.	0.	0.	0.	0.
376871	18.0	2160.	0.	15660.	0.	0.	180.	0.
376876	13.2	5148.	0.	7788.	0.	132.	132.	0.
376881	8.3	1660.	0.	6474.	0.	83.	83.	0.
AVG.	13.66	2718.5	0.0	10672.4	44.5	141.6	83.0	0.0
S. D.	2.97	1456.0	0.0	3099.0	72.2	154.7	77.0	0.0
S. E.	0.94	460.4	0.0	980.0	22.8	48.9	24.4	0.0

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 14-DAY REC REPORT DATE: 16-OCT-84
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x10 ³ /uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376803	11.3	2260.	0.	8588.	113.	226.	113.	0.
376808	24.4	4148.	0.	19764.	0.	244.	244.	0.
376811	10.6	2014.	0.	8480.	106.	0.	0.	0.
376812	21.2	3392.	0.	17808.	0.	0.	0.	0.
376813	10.7	1712.	0.	8881.	107.	0.	0.	0.
376830	12.2	1586.	0.	10126.	122.	244.	122.	0.
376843	15.2	4104.	0.	11096.	0.	0.	0.	0.
376857	12.4	3100.	0.	8804.	248.	248.	0.	0.
376860	21.2	5936.	0.	14840.	212.	212.	0.	0.
376874	8.2	1640.	0.	6478.	0.	82.	0.	0.
AVG.	14.74	2989.2	0.0	11486.5	90.8	125.6	47.9	0.0
S. D.	5.55	1427.8	0.0	4450.2	90.9	118.1	84.5	0.0
S. E.	1.75	451.5	0.0	1407.3	28.7	37.4	26.7	0.0

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x10 ³ /uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376814	16.7	2672.	0.	13861.	0.	167.	0.	0.
376815	17.3	2422.	0.	14705.	173.	0.	0.	0.
376819	11.6	2552.	0.	9048.	0.	0.	0.	0.
376824	16.7	4008.	0.	12358.	0.	334.	0.	0.
376832	11.5	2300.	0.	9085.	0.	115.	0.	0.
376833	12.2	2684.	0.	9272.	122.	122.	0.	0.
376850	19.0	4180.	0.	14440.	190.	190.	0.	0.
376853	13.8	3036.	0.	10764.	0.	0.	0.	0.
376858	12.6	2394.	0.	9450.	378.	378.	0.	0.
376880	17.7	2478.	0.	15045.	177.	0.	0.	0.
AVG.	14.91	2872.6	0.0	11802.8	104.0	130.6	0.0	0.0
S. D.	2.85	676.5	0.0	2548.0	127.8	139.8	0.0	0.0
S. E.	0.90	213.9	0.0	805.7	40.4	44.2	0.0	0.0

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
PERIOD: 14-DAY REC REPORT DATE: 17-OCT-84
SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	ALP U/L	ALT U/L	AST U/L	BUN mg/dL	CREAT mg/dL	TPROT g/dL	CHLOS mg/dL
376803	185.	40.	104.	22.	0.56	6.5	52.
376808	236.	36.	72.	17.	0.53	6.9	84.
376811	171.	36.	81.	17.	0.66	6.5	68.
376812	116.	42.	69.	15.	0.59	6.6	70.
376813	252.	37.	74.	18.	0.63	6.3	54.
376830	200.	27.	79.	19.	0.57	5.5	48.
376843	209.	36.	56.	14.	0.62	4.0	56.
376857	178.	43.	107.	21.	0.53	6.3	57.
376860	213.	31.	73.	15.	0.57	6.4	71.
376874	196.	32.	79.	13.	0.54	6.4	67.
AVG.	195.6	36.0	79.4	17.1	0.580	6.14	62.7
S. D.	37.5	5.0	15.5	2.8	0.044	0.83	11.2
S. E.	11.9	1.6	4.9	0.9	0.014	0.26	3.6

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	ALP U/L	ALT U/L	AST U/L	BUN mg/dL	CREAT mg/dL	TPROT g/dL	CHLOS mg/dL
376814	210.	46.	64.	16.	0.60	6.4	73.
376815	277.	31.	61.	16.	0.64	6.8	63.
376819	234.	38.	88.	19.	0.49	6.9	63.
376824	233.	41.	68.	27.	0.72	7.5	58.
376832	139.	38.	90.	16.	0.58	6.5	55.
376833	239.	35.	65.	18.	0.69	6.9	65.
376850	122.	33.	60.	16.	0.58	6.4	44.
376853	247.	32.	63.	22.	0.58	6.3	46.
376858	150.	27.	77.	19.	0.62	5.9	66.
376880	294.	36.	65.	17.	0.50	5.9	60.
AVG.	214.5	35.7	70.1	18.7	0.600	6.55	59.2
S. D.	58.7	5.4	11.0	3.7	0.073	0.49	8.8
S. E.	18.6	1.7	3.5	1.2	0.023	0.16	2.8

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 14-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376801	5.4	2496.	-	-	+2	7.0	+1	1.0	+
376835	13.8	1371.	-	-	+2	8.0	-	1.0	+
376836	10.2	1608.	-	-	+2	8.0	-	1.0	-
376837	17.6	1061.	-	-	+1	9.0	-	1.0	+
376841	14.3	1300.	-	-	+1	8.0	-	1.0	+
376847	11.8	1573.	-	-	+3	9.0	+1	1.0	+1
376849	18.6	1367.	-	-	+1	8.0	+1	1.0	+
376863	8.9	1344.	-	-	+2	9.0	+1	1.0	+
376872	17.9	1147.	-	-	+1	7.0	-	1.0	+
376878	13.9	1201.	-	-	+1	8.0	-	1.0	+
AVG.	13.24	1446.8				8.10		1.00	
S. D.	4.25	406.4				0.74		0.00	
S. E.	1.35	128.5				0.23		0.00	

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376800	12.9	1603.	-	-	+2	7.0	-	1.0	+1
376810	22.8	642.	-	-	+1	8.0	-	1.0	+
376822	11.0	1455.	-	+	+1	8.0	-	0.1	+
376848	8.1	932.	-	-	+1	8.0	-	0.1	-
376852	10.0	834.	-	-	+	7.0	-	1.0	+
376856	8.2	1874.	-	-	+2	8.0	-	1.0	+1
376866	15.4	1151.	-	-	+1	8.0	-	1.0	-
376871	8.0	1694.	-	-	+1	7.0	+1	1.0	+1
376876	13.9	1332.	-	-	+1	8.0	-	1.0	+
376881	14.0	1640.	-	-	+1	7.0	+1	1.0	+1
AVG.	12.43	1315.7				7.60		0.82	
S. D.	4.54	411.3				0.52		0.38	
S. E.	1.44	130.1				0.16		0.12	

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 14-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376803	7.0	1998.	-	-	+1	7.0	-	1.0	+
376808	9.9	1894.	-	-	+1	6.0	+1	1.0	+1
376811	12.2	1473.	-	-	+3	8.0	+1	1.0	+
376812	19.0	1063.	-	-	+2	7.0	-	1.0	-
376813	9.0	1707.	-	-	+2	7.0	+1	1.0	+
376830	12.2	1573.	+	+	+2	7.0	+1	1.0	+
376843	11.0	1682.	-	-	+2	7.0	+1	1.0	+
376857	12.8	1532.	-	-	+2	8.0	+1	1.0	+1
376860	10.0	1785.	-	-	+1	7.0	+1	1.0	+1
376874	21.7	957.	-	+	+2	7.0	-	1.0	+
AVG.	12.48	1566.4				7.10		1.00	
S. D.	4.53	334.9				0.57		0.00	
S. E.	1.43	105.9				0.18		0.00	

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376814	10.0	1570.	-	-	+1	7.0	+1	1.0	+
376815	10.2	1754.	-	-	+1	7.0	+1	1.0	+
376819	10.5	1775.	-	-	+1	7.0	-	1.0	+
376824	15.0	1303.	-	-	+2	7.0	+1	1.0	+
376832	14.1	1413.	-	-	+1	7.0	-	1.0	+
376833	13.0	1272.	-	-	+1	8.0	-	1.0	-
376850	12.7	1705.	-	-	+2	7.0	+1	1.0	+
376853	10.0	1957.	-	-	+2	7.0	+1	1.0	+
376858	11.9	912.	-	-	+1	8.0	-	1.0	-
376880	12.3	1722.	-	-	+1	7.0	+1	1.0	+
AVG.	11.97	1538.3				7.20		1.00	
S. D.	1.78	311.7				0.42		0.00	
S. E.	0.56	98.6				0.13		0.00	

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
PERIOD: 14-DAY REC REPORT DATE: 17-OCT-84
SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC /hpf	WBC /hpf	Epith /hpf	Cast /lpf	APPEARANCE
376801	0-0	3-5	0-1	0-0	Y C
376835	0-0	10-20	0-2	0-0	Y CL PPT FEED
376836	0-0	10-15	1-2	0-0	Y CL PPT FEED
376837	0-0	10-20	1-3	0-0	Y CL PPT FEED
376841	0-0	10-20	2-4	0-0	Y CL PPT FEED
376847	0-0	10-20	2-4	0-0	DY CL PPT FECES
376849	0-0	4-6	0-1	0-0	Y CL PPT
376863	0-0	4-8	4-6	0-0	DA CL PPT FECES
376872	0-0	10-20	0-2	0-0	Y CL PPT FEED
376878	0-0	5-8	0-2	0-0	Y CL PPT

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC /hpf	WBC /hpf	Epith /hpf	Cast /lpf	APPEARANCE
376800	0-0	4-6	2-3	0-0	DY CL PPT FEED
376810	0-0	3-5	0-2	0-0	Y CL PPT FEED
376822	0-0	3-6	0-3	0-0	DY CL PPT FEED
376848	0-0	0-1	0-2	0-0	Y CL PPT
376852	0-0	0-0	0-0	0-0	Y CL
376856	0-0	1-5	0-0	0-0	DY CL PPT FEED
376866	0-0	4-8	1-4	0-0	Y CL PPT
376871	0-0	0-2	0-1	0-0	Y CL
376876	0-0	3-6	1-2	0-0	Y CL PPT
376881	0-0	8-12	1-3	0-0	DY CL PPT FECES

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
PERIOD: 14-DAY REC REPORT DATE: 17-OCT-84
SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC /hpf	WBC /hpf	Epith /hpf	Cast /lpf	APPEARANCE
376803	0-0	10-15	0-3	0-0	Y CL PPT
376808	0-0	2-4	0-2	0-0	DY CL PPT FEED
376811	0-0	1-3	0-1	0-0	DY CL PPT FEED
376812	0-0	3-6	0-2	0-0	DY CL PPT FEED
376813	0-0	4-6	0-2	0-0	Y CL PPT
376830	0-1	5-10	1-3	0-0	DY CL PPT FEED
376843	0-0	4-8	0-1	0-0	Y CL PPT
376857	0-0	10-15	1-2	0-0	Y CL PPT FEED
376860	0-0	3-5	0-2	0-0	Y CL PPT FEED
376874	0-0	5-10	2-4	0-0	DY CL PPT FEED FECES

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
SAMPLE DATE: 08/03/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC /hpf	WBC /hpf	Epith /hpf	Cast /lpf	APPEARANCE
376814	0-0	4-8	1-3	0-0	Y CL PPT
376815	0-0	10-20	0-3	0-0	Y CL PPT FEED
376819	0-0	3-5	0-2	0-0	Y CL PPT FEED
376824	0-0	1-3	0-1	0-0	Y CL PPT FEED
376832	0-0	0-2	0-1	0-0	Y CL PPT FEED
376833	0-0	4-8	0-2	0-0	Y CL PPT FEED
376850	0-0	5-10	1-2	0-0	DY CL PPT FEED
376853	0-0	5-10	1-3	0-0	DY CL PPT FECES
376858	0-0	0-1	0-1	0-0	Y CL PPT
376880	0-0	0-3	0-2	0-0	Y CL PPT FEED

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 41-DAY REC REPORT DATE: 27-FEB-85
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC x10 ⁶ /uL	Hb g/dL	Ht %	MCV fL	MCH pg	MCHC g/dL	PLAT x10 ³ /uL
376801	7.55	15.4	43.	57.	20.	36.	1008.
376807	7.25	15.1	39.	53.	21.	39.	1020.
376829	8.34	16.0	44.	52.	19.	37.	694.
376834	7.50	15.1	40.	53.	20.	38.	1000.
376836	7.78	15.1	41.	53.	19.	37.	974.
376837	8.09	15.5	43.	53.	19.	36.	968.
376847	8.70	15.8	46.	52.	18.	35.	882.
376861	8.28	15.8	43.	52.	19.	37.	1054.
376869	7.62	15.4	42.	54.	20.	37.	1122.
376878	8.06	16.1	45.	55.	20.	36.	782.
AVG.	7.917	15.53	42.5	53.4	19.6	36.6	950.4
S. D.	0.451	0.38	2.1	1.6	0.8	1.1	129.3
S. E.	0.143	0.12	0.7	0.5	0.3	0.4	40.9

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC x10 ⁶ /uL	Hb g/dL	Ht %	MCV fL	MCH pg	MCHC g/dL	PLAT x10 ³ /uL
376800	7.36	15.4	41.	55.	21.	38.	1158.
376827	6.90	15.9	39.	56.	23.	41.	1236.
376831	7.26	15.1	40.	54.	21.	38.	1266.
376848	7.14	15.3	40.	55.	21.	39.	1094.
376856	8.00	15.6	43.	53.	20.	37.	904.
376862	7.77	15.6	42.	54.	20.	37.	1086.
376866	7.68	15.6	42.	54.	20.	37.	994.
376871	7.53	14.6	41.	53.	19.	36.	1046.
376877	7.55	15.1	39.	51.	20.	39.	920.
376882	8.44	17.2	46.	55.	20.	37.	1038.
AVG.	7.563	15.54	41.2	54.0	20.6	37.8	1074.2
S. D.	0.443	0.69	2.3	1.4	1.0	1.3	121.0
S. E.	0.140	0.22	0.7	0.4	0.3	0.4	38.3

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 41-DAY REC REPORT DATE: 27-FEB-85
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC x10 ⁶ /uL	Hb g/dL	Ht %	MCV fL	MCH pg	MCHC g/dL	PLAT x10 ³ /uL
376803	8.45	16.4	45.	53.	20.	37.	1142.
376808	7.51	15.4	41.	53.	21.	38.	1108.
376811	7.33	15.7	39.	53.	22.	40.	1004.
376817	7.96	15.3	42.	52.	19.	37.	1244.
376843	7.75	15.3	42.	53.	20.	37.	1064.
376846	7.96	16.0	44.	55.	20.	36.	852.
376855	7.83	15.8	41.	52.	20.	38.	1144.
376860	7.44	14.8	44.	59.	20.	34.	1398.
376864	6.59	15.1	37.	56.	23.	41.	1066.
376875	7.10	15.5	39.	55.	22.	40.	964.
AVG.	7.592	15.53	41.4	54.1	20.5	37.7	1098.6
S. D.	0.520	0.46	2.5	2.2	1.2	2.1	150.9
S. E.	0.164	0.15	0.8	0.7	0.4	0.7	47.7

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC x10 ⁶ /uL	Hb g/dL	Ht %	MCV fL	MCH pg	MCHC g/dL	PLAT x10 ³ /uL
376814	7.00	15.3	39.	55.	22.	39.	1134.
376815	8.06	16.1	43.	53.	20.	37.	1544.
376816	7.26	14.4	38.	52.	20.	38.	1294.
376826	7.52	15.1	41.	53.	20.	37.	986.
376832	7.47	15.1	40.	53.	20.	38.	1060.
376842	7.38	14.9	41.	55.	20.	36.	1080.
376845	6.32	13.4	36.	56.	21.	38.	1168.
376850	7.07	15.8	39.	55.	22.	41.	1224.
376853	7.77	15.2	41.	52.	20.	37.	1088.
376868	7.00	15.1	39.	56.	21.	38.	1080.
AVG.	7.285	15.04	39.6	54.0	20.7	37.9	1165.8
S. D.	0.480	0.74	2.0	1.6	0.9	1.2	159.2
S. E.	0.152	0.23	0.6	0.5	0.3	0.4	50.4

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 41-DAY REC REPORT DATE: 27-FEB-85
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x10 ³ /uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376801	11.8	1416.	0.	10384.	0.	0.	0.	0.
376807	9.1	1274.	0.	7462.	91.	91.	182.	0.
376829	12.3	1968.	0.	10086.	0.	123.	123.	0.
376834	12.9	2064.	0.	10836.	0.	0.	0.	0.
376836	11.5	1380.	0.	10005.	0.	115.	0.	0.
376837	13.9	3892.	0.	10008.	0.	0.	0.	0.
376847	12.2	1952.	0.	10004.	122.	0.	122.	0.
376861	10.1	1414.	0.	8080.	101.	303.	202.	0.
376869	13.2	2904.	0.	9900.	132.	132.	132.	0.
376878	13.9	2641.	0.	10981.	0.	139.	139.	0.
AVG.	12.09	2090.5	0.0	9774.6	44.6	90.3	90.0	0.0
S. D.	1.56	838.6	0.0	1127.7	58.6	96.4	81.4	0.0
S. E.	0.49	265.2	0.0	356.6	18.5	30.5	25.8	0.0

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x10 ³ /uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376800	15.7	3768.	0.	11618.	157.	157.	0.	0.
376827	19.3	4632.	0.	14282.	0.	193.	193.	0.
376831	13.2	2772.	0.	10164.	132.	0.	0.	132.
376848	15.4	2464.	0.	12782.	0.	0.	154.	0.
376856	14.0	2800.	0.	10500.	140.	420.	140.	0.
376862	13.4	3350.	0.	9916.	134.	0.	0.	0.
376866	10.0	1400.	0.	8500.	0.	100.	0.	0.
376871	13.3	3458.	0.	9576.	0.	266.	0.	0.
376877	11.8	2360.	0.	9086.	118.	118.	118.	0.
376882	17.0	2210.	0.	14110.	0.	680.	0.	0.
AVG.	14.31	2921.4	0.0	11053.4	68.1	193.4	60.5	13.2
S. D.	2.65	912.7	0.0	2055.8	72.4	216.4	80.2	41.7
S. E.	0.84	288.6	0.0	650.1	22.9	68.4	25.4	13.2

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 41-DAY REC REPORT DATE: 27-FEB-85
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x103/uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376803	9.4	1316.	0.	7990.	0.	0.	94.	0.
376808	22.2	4662.	0.	17094.	0.	0.	222.	222.
376811	7.8	1482.	0.	6084.	78.	0.	156.	0.
376817	18.9	3402.	0.	14742.	378.	189.	189.	0.
376843	12.4	4712.	0.	7440.	0.	124.	124.	0.
376846	9.7	1552.	0.	7857.	0.	194.	97.	0.
376855	17.8	2492.	0.	13884.	712.	356.	356.	0.
376860	24.2	6776.	0.	16940.	242.	242.	0.	0.
376864	15.8	2528.	0.	12166.	158.	790.	158.	0.
376875	14.4	2448.	0.	11376.	144.	432.	0.	0.
AVG.	15.26	3137.0	0.0	11557.3	171.2	232.7	139.6	22.2
S. D.	5.56	1762.2	0.0	4067.7	227.8	245.7	105.3	70.2
S. E.	1.76	557.3	0.0	1286.3	72.0	77.7	33.3	22.2

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x103/uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376814	11.1	1776.	0.	9213.	0.	111.	0.	0.
376815	12.5	1500.	0.	10625.	250.	125.	0.	0.
376816	22.0	6600.	0.	14740.	0.	0.	660.	0.
376826	15.0	2700.	150.	11250.	300.	450.	150.	0.
376832	9.5	1045.	0.	8265.	190.	0.	0.	0.
376842	16.6	4316.	0.	11786.	0.	332.	166.	0.
376845	20.8	7280.	0.	12688.	208.	416.	208.	0.
376850	18.4	5704.	0.	11224.	368.	552.	552.	0.
376853	9.8	1666.	0.	7938.	98.	98.	0.	0.
376868	12.3	2214.	0.	10086.	0.	0.	0.	0.
AVG.	14.80	3480.1	15.0	10781.5	141.4	208.4	173.6	0.0
S. D.	4.50	2311.2	47.4	2057.9	140.2	209.2	243.2	0.0
S. E.	1.42	730.9	15.0	650.8	44.3	66.1	76.9	0.0

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 41-DAY REC REPORT DATE: 27-FEB-85
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	ALP U/L	ALT U/L	AST U/L	BUN mg/dL	CREAT mg/dL	TPROT g/dL	CHLOS mg/dL
376801	131.	44.	96.	17.	0.68	6.0	53.
376807	121.	36.	67.	20.	0.66	6.6	71.
376829	125.	39.	80.	18.	0.70	6.8	62.
376834	91.	28.	75.	17.	0.65	5.4	63.
376836	166.	37.	81.	15.	0.60	5.6	62.
376837	100.	35.	56.	16.	0.62	6.9	71.
376847	172.	42.	68.	15.	0.65	6.3	58.
376861	173.	43.	78.	16.	0.57	6.5	56.
376869	125.	54.	68.	20.	0.68	6.7	93.
376878	104.	46.	91.	19.	0.67	6.1	85.
AVG.	130.8	40.4	76.0	17.1	0.648	6.29	67.3
S. D.	30.1	7.1	11.9	1.9	0.040	0.51	12.8
S. E.	9.5	2.2	3.8	0.6	0.013	0.16	4.0

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	ALP U/L	ALT U/L	AST U/L	BUN mg/dL	CREAT mg/dL	TPROT g/dL	CHLOS mg/dL
376800	197.	36.	101.	16.	0.66	6.0	47.
376827	134.	31.	77.	19.	0.64	6.4	55.
376831	174.	39.	65.	19.	0.61	6.6	70.
376848	99.	31.	68.	16.	0.63	6.1	60.
376856	102.	37.	66.	15.	0.64	5.3	52.
376862	219.	28.	78.	17.	0.75	6.9	95.
376866	156.	31.	63.	18.	0.72	7.3	102.
376871	139.	35.	71.	17.	0.69	6.5	58.
376877	120.	28.	61.	19.	0.66	6.3	64.
376882	173.	28.	84.	17.	0.81	6.7	89.
AVG.	151.3	32.4	73.4	17.3	0.681	6.41	69.2
S. D.	39.8	4.1	12.2	1.3	0.062	0.54	19.2
S. E.	12.6	1.3	3.8	0.4	0.020	0.17	6.1

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE [REDACTED]
COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
PERIOD: 41-DAY REC REPORT DATE: 27-FEB-85
SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

	ALP	ALT	AST	BUN	CREAT	TPROT	CHLOS
ANIMAL#:	U/L	U/L	U/L	mg/dL	mg/dL	g/dL	mg/dL
376803	117.	35.	100.	23.	0.78	5.8	41.
376808	224.	40.	87.	18.	0.62	5.8	75.
376811	138.	32.	75.	18.	0.64	5.3	55.
376817	127.	41.	73.	18.	0.59	5.6	64.
376843	182.	38.	65.	17.	0.59	5.8	48.
376846	147.	41.	83.	14.	0.74	6.4	88.
376855	155.	36.	95.	15.	0.69	6.7	88.
376860	144.	30.	60.	15.	0.68	6.5	81.
376864	230.	41.	62.	19.	0.71	7.2	102.
376875	106.	33.	64.	18.	0.67	6.4	70.
AVG.	157.0	36.7	76.4	17.5	0.671	6.15	71.2
S. D.	42.4	4.1	14.3	2.4	0.063	0.58	19.3
S. E.	13.4	1.3	4.5	0.8	0.020	0.18	6.1

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

	ALP	ALT	AST	BUN	CREAT	TPROT	CHLOS
ANIMAL#:	U/L	U/L	U/L	mg/dL	mg/dL	g/dL	mg/dL
376814	171.	38.	76.	20.	0.71	5.9	69.
376815	227.	22.	71.	16.	0.54	6.0	56.
376816	216.	43.	73.	14.	0.55	6.0	46.
376826	120.	32.	76.	17.	0.66	5.6	53.
376832	74.	26.	80.	17.	0.66	5.4	68.
376842	187.	37.	102.	23.	0.67	6.1	50.
376845	113.	38.	87.	16.	0.63	6.4	87.
376850	90.	31.	65.	15.	0.67	6.4	57.
376853	201.	30.	65.	19.	0.59	6.4	71.
376868	125.	31.	71.	17.	0.78	6.7	70.
AVG.	152.4	32.8	76.6	17.5	0.646	6.09	62.7
S. D.	54.7	6.3	11.1	2.5	0.073	0.40	12.4
S. E.	17.3	2.0	3.5	0.8	0.023	0.13	3.9

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 41-DAY REC REPORT DATE: 27-FEB-85
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376801	10.0	1961.	-	-	+1	7.0	+1	1.0	+1
376807	7.8	2420.	-	+	+3	7.0	+1	1.0	+1
376829	15.0	2280.	-	-	+2	7.0	-	1.0	+1
376834	8.0	1967.	-	-	+1	7.0	-	1.0	+
376836	13.0	1877.	-	-	+2	7.0	-	1.0	+
376837	24.0	1164.	-	-	+1	8.0	-	1.0	+
376847	12.4	2170.	-	-	+2	7.0	-	1.0	+1
376861	17.0	1537.	-	-	+2	8.0	-	1.0	+
376869	16.5	1915.	-	-	+2	7.0	-	1.0	+
376878	11.5	1655.	-	-	+2	7.0	-	1.0	+
AVG.	13.52	1894.6				7.20		1.00	
S. D.	4.88	369.7				0.42		0.00	
S. E.	1.54	116.9				0.13		0.00	

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376800	16.0	1608.	-	-	+2	7.0	-	1.0	+1
376827	15.0	1365.	-	+	+2	7.0	-	1.0	+
376831	10.5	1889.	-	-	+2	7.0	+1	1.0	+
376848	9.0	2126.	-	-	+2	7.0	-	1.0	+
376856	11.0	1761.	-	-	+1	7.0	-	1.0	+1
376862	9.0	2064.	+3	-	+3	7.0	+1	1.0	+
376866	22.5	1389.	-	+	+2	8.0	-	1.0	+
376871	11.5	1536.	-	-	+1	7.0	-	1.0	+1
376877	11.5	1726.	-	-	+2	8.0	-	1.0	+1
376882	22.0	865.	-	-	+1	8.0	-	1.0	+
AVG.	13.80	1632.9				7.30		1.00	
S. D.	5.00	372.8				0.48		0.00	
S. E.	1.58	117.9				0.15		0.00	

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 41-DAY REC REPORT DATE: 27-FEB-85
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376803	6.5	2420.	-	+	+2	7.0	+1	1.0	+
376808	11.0	2362.	-	-	+2	7.0	+1	1.0	+1
376811	12.0	1939.	-	-	+2	7.0	+1	1.0	+
376817	17.0	1534.	-	-	+1	7.0	-	1.0	+1
376843	10.0	2338.	-	-	+2	6.0	+1	1.0	+
376846	18.5	1258.	-	-	+1	8.0	-	1.0	+1
376855	19.5	981.	-	-	+1	7.0	-	1.0	+
376860	18.0	1344.	-	-	+1	7.0	-	1.0	+
376864	12.0	1773.	-	-	+2	7.0	+1	1.0	+
376875	8.5	2260.	-	-	+2	7.0	+1	1.0	+2
AVG.	13.30	1820.9				7.00		1.00	
S. D.	4.60	522.8				0.47		0.00	
S. E.	1.45	165.3				0.15		0.00	

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376814	12.0	1646.	-	-	+2	7.0	+1	1.0	+1
376815	11.5	1808.	-	+	+2	7.0	+1	1.0	+1
376816	15.0	1105.	+	+	+3	8.0	+2	1.0	+1
376826	15.0	1555.	-	-	+2	7.0	-	1.0	+1
376832	16.0	1232.	-	-	+1	7.0	-	1.0	+
376842	4.6	2292.	-	-	+2	6.0	+1	1.0	+
376845	30.5	956.	-	-	+1	7.0	-	1.0	+
376850	12.5	1883.	-	-	+1	7.0	+1	1.0	+1
376853	6.8	2336.	-	-	+3	7.0	+1	1.0	-
376868	11.0	1446.	-	-	+1	7.0	-	1.0	+1
AVG.	13.49	1625.9				7.00		1.00	
S. D.	6.97	466.7				0.47		0.00	
S. E.	2.20	147.6				0.15		0.00	

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 41-DAY REC REPORT DATE: 27-FEB-85
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC /hpf	WBC /hpf	Epith /hpf	Cast /lpf	APPEARANCE
376801	0-0	3-5	1-3	0-0	Y CL PPT FEED
376807	0-0	10-15	0-3	0-0	Y CL PPT FEED
376829	0-0	2-4	0-2	0-0	Y CL PPT FEED
376834	0-0	0-2	0-1	0-0	Y CL PPT FEED
376836	0-0	3-5	1-3	0-0	Y CL PPT FEED
376837	0-0	4-6	1-2	0-0	Y CL PPT FEED
376847	0-0	0-4	0-2	0-0	Y CL PPT FEED
376861	0-0	4-8	0-3	0-0	DY CL PPT FEED
376869	0-0	0-3	0-2	0-0	Y CL PPT FEED
376878	0-0	0-3	2-3	0-0	Y CL PPT

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC /hpf	WBC /hpf	Epith /hpf	Cast /lpf	APPEARANCE
376800	0-0	0-0	4-6	0-0	Y CL PPT FEED
376827	0-0	0-3	3-5	0-0	Y CL PPT FEED
376831	0-0	1-2	4-6	0-0	Y CL PPT FEED
376848	0-0	0-2	6-8	0-0	Y CL PPT FEED
376856	0-0	0-2	5-7	0-0	Y CL PPT FEED
376862	7-10	2-4	7-9	0-0	DY CL PPT FEED
376866	0-0	1-2	2-4	0-0	Y CL PPT FEED
376871	0-0	1-3	1-3	0-0	Y C PPT FEED
376877	0-0	2-3	1-2	0-0	Y CL PPT FEED
376882	0-0	0-1	2-4	0-0	Y CL PPT FEED

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 41-DAY REC REPORT DATE: 27-FEB-85
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC /hpf	WBC /hpf	Epith /hpf	Cast /lpf	APPEARANCE
376803	0-3	4-6	0-2	0-0	Y CL PPT FEED
376808	0-0	1-2	0-2	0-0	Y C PPT FEED
376811	0-0	3-5	1-2	0-0	Y CL PPT FEED
376817	0-0	1-2	0-1	0-0	Y CL PPT FEED
376843	0-0	0-2	0-1	0-0	Y C PPT FEED
376846	0-0	5-10	0-3	0-0	Y CL PPT FEED
376855	0-0	2-4	0-2	0-0	Y CL PPT FEED
376860	0-0	10-20	1-4	0-0	Y CL PPT FEED
376864	0-0	5-8	0-3	0-0	Y CL PPT FEED
376875	0-0	0-4	0-3	0-0	Y C PPT

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 08/30/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC /hpf	WBC /hpf	Epith /hpf	Cast /lpf	APPEARANCE
376814	0-0	1-2	4-6	0-0	Y CL PPT FEED
376815	0-0	0-2	1-2	0-0	Y CL PPT FEED
376816	0-1	1-2	1-3	0-0	DY CL PPT FEED FECES
376826	0-0	1-2	3-5	0-0	Y CL PPT FEED
376832	0-1	0-0	0-1	0-0	Y C PPT
376842	0-0	0-1	0-2	0-0	Y C PPT
376845	0-0	1-2	1-3	0-0	LY CL PPT FEED
376850	0-0	0-1	1-2	0-0	Y CL PPT FEED
376853	0-0	1-2	3-5	0-0	Y C PPT
376868	0-0	0-1	1-3	0-0	Y C PPT

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 84-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC x10 ⁶ /uL	Hb g/dL	Ht %	MCV fL	MCH pg	MCHC g/dL	PLAT x10 ³ /uL
376807	7.80	16.1	40.	50.	21.	40.	1120.
376829	8.60	16.1	42.	48.	19.	39.	1288.
376834	8.31	15.7	41.	49.	19.	38.	1154.
376861	8.51	16.5	41.	48.	19.	40.	1120.
376869	7.54	15.8	39.	51.	21.	41.	1356.
AVG.	8.152	16.04	40.7	49.2	19.7	39.4	1207.6
S. D.	0.462	0.31	1.2	1.3	1.0	1.1	108.1
S. E.	0.206	0.14	0.5	0.6	0.4	0.5	48.3

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC x10 ⁶ /uL	Hb g/dL	Ht %	MCV fL	MCH pg	MCHC g/dL	PLAT x10 ³ /uL
376827	7.08	15.4	38.	53.	22.	41.	1434.
376831	7.54	16.2	40.	53.	22.	41.	1324.
376862	6.91	14.8	35.	51.	22.	42.	1446.
376877	8.21	15.2	39.	47.	19.	39.	1074.
376882	8.81	16.0	45.	51.	18.	36.	826.
AVG.	7.710	15.52	39.5	51.0	20.3	39.6	1220.8
S. D.	0.795	0.58	3.6	2.4	1.8	2.5	266.6
S. E.	0.355	0.26	1.6	1.1	0.8	1.1	119.2

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 84-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC x10 ⁶ /uL	Hb g/dL	Ht %	MCV fL	MCH pg	MCHC g/dL	PLAT x10 ³ /uL
376817	9.52	15.9	47.	49.	17.	34.	1022.
376846	8.42	16.5	43.	51.	20.	38.	1162.
376855	9.26	16.5	46.	49.	18.	36.	1180.
376864	7.12	14.6	38.	52.	21.	39.	1312.
376875	8.12	15.6	43.	53.	19.	36.	1028.
AVG.	8.488	15.82	43.5	50.8	18.7	36.5	1140.8
S. D.	0.958	0.79	3.7	1.8	1.5	2.0	120.6
S. E.	0.429	0.35	1.6	0.8	0.7	0.9	53.9

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC x10 ⁶ /uL	Hb g/dL	Ht %	MCV fL	MCH pg	MCHC g/dL	PLAT x10 ³ /uL
376816	7.53	14.9	37.	49.	20.	40.	1208.
376826	7.90	14.7	39.	49.	19.	37.	1174.
376842	8.13	15.6	43.	52.	19.	37.	894.
376845	7.47	14.1	40.	53.	19.	36.	972.
376868	8.18	16.2	43.	53.	20.	38.	926.
AVG.	7.842	15.10	40.5	51.2	19.3	37.4	1034.8
S. D.	0.330	0.82	2.5	2.0	0.5	1.7	145.8
S. E.	0.148	0.36	1.1	0.9	0.2	0.7	65.2

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 84-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x10 ³ /uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376807	11.9	2142.	0.	8449.	476.	714.	119.	0.
376829	10.9	1744.	0.	8938.	109.	109.	0.	0.
376834	13.0	1560.	0.	11050.	130.	130.	130.	0.
376861	10.4	1872.	0.	8112.	0.	104.	312.	0.
376869	12.0	1320.	0.	10320.	120.	0.	240.	0.
AVG.	11.64	1727.6	0.0	9373.8	167.0	211.4	160.2	0.0
S. D.	1.02	311.1	0.0	1259.2	180.5	285.5	120.1	0.0
S. E.	0.45	139.1	0.0	563.1	80.7	127.7	53.7	0.0

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x10 ³ /uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376827	13.3	2926.	0.	9709.	133.	399.	133.	0.
376831	13.5	2700.	0.	10125.	270.	270.	135.	0.
376862	15.5	2325.	0.	12710.	155.	310.	0.	0.
376877	10.1	1111.	0.	8787.	0.	101.	101.	0.
376882	12.8	1536.	0.	10752.	384.	128.	0.	0.
AVG.	13.04	2119.6	0.0	10416.6	188.4	241.6	73.8	0.0
S. D.	1.94	772.5	0.0	1467.4	145.4	125.4	68.7	0.0
S. E.	0.87	345.5	0.0	656.3	65.0	56.1	30.7	0.0

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 84-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x10 ³ /uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376817	17.1	3420.	0.	12996.	0.	342.	342.	0.
376846	18.1	3620.	0.	13937.	181.	0.	362.	0.
376855	16.5	2805.	0.	13365.	0.	330.	0.	0.
376864	12.2	2196.	0.	9638.	122.	244.	0.	0.
376875	21.4	2568.	214.	15408.	1070.	1712.	428.	0.
AVG.	17.06	2921.8	42.8	13068.8	274.6	525.6	226.4	0.0
S. D.	3.31	591.9	95.7	2126.6	451.5	677.3	209.1	0.0
S. E.	1.48	264.7	42.8	951.0	201.9	302.9	93.5	0.0

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	WBC x10 ³ /uL	Neut WBCx%	Band WBCx%	Lymph WBCx%	Alym WBCx%	Mono WBCx%	Eosin WBCx%	Baso WBCx%
376816	24.2	7260.	0.	15972.	242.	0.	726.	0.
376826	17.9	3938.	0.	12351.	716.	537.	358.	0.
376842	23.1	5775.	0.	15708.	231.	1386.	0.	0.
376845	18.0	6300.	0.	10800.	360.	360.	180.	0.
376868	17.1	3078.	0.	13338.	342.	342.	0.	0.
AVG.	20.06	5270.2	0.0	13633.8	378.2	525.0	252.8	0.0
S. D.	3.32	1721.6	0.0	2209.8	197.5	519.1	303.4	0.0
S. E.	1.48	769.9	0.0	988.3	88.3	232.1	135.7	0.0

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
PERIOD: 84-DAY REC REPORT DATE: 17-OCT-84
SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	ALP U/L	ALT U/L	AST U/L	BUN mg/dL	CREAT mg/dL	TPROT g/dL	CHLOS mg/dL
376807	84.	35.	65.	21.	0.61	4.6	119.
376829	78.	40.	81.	16.	0.59	7.4	198.
376834	66.	29.	69.	17.	0.64	6.4	75.
376861	161.	37.	64.	21.	0.59	6.9	64.
376869	96.	27.	49.	24.	0.71	7.0	132.
AVG.	97.0	33.6	65.6	19.7	0.628	6.46	117.5
S. D.	37.4	5.5	11.5	3.5	0.050	1.10	53.3
S. E.	16.7	2.4	5.1	1.6	0.022	0.49	23.8

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	ALP U/L	ALT U/L	AST U/L	BUN mg/dL	CREAT mg/dL	TPROT g/dL	CHLOS mg/dL
376827	110.	30.	60.	21.	0.65	6.4	73.
376831	136.	35.	68.	19.	0.64	7.2	94.
376862	190.	32.	65.	19.	0.74	7.3	118.
376877	83.	26.	53.	20.	0.65	7.1	83.
376882	150.	23.	56.	18.	0.77	7.2	94.
AVG.	133.8	29.2	60.4	19.5	0.690	7.04	92.3
S. D.	40.5	4.8	6.2	1.0	0.060	0.36	16.9
S. E.	18.1	2.1	2.8	0.4	0.027	0.16	7.5

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 84-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	ALP U/L	ALT U/L	AST U/L	BUN mg/dL	CREAT mg/dL	TPROT g/dL	CHLOS mg/dL
376817	84.	33.	70.	23.	0.67	6.9	71.
376846	156.	87.	145.	16.	0.62	6.8	96.
376855	92.	26.	70.	19.	0.74	7.3	99.
376864	211.	40.	66.	19.	0.65	7.4	124.
376875	89.	30.	65.	18.	0.67	6.9	81.
AVG.	126.4	43.2	83.2	19.2	0.670	7.06	94.4
S. D.	55.7	25.0	34.6	2.7	0.044	0.27	20.1
S. E.	24.9	11.2	15.5	1.2	0.020	0.12	9.0

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	ALP U/L	ALT U/L	AST U/L	BUN mg/dL	CREAT mg/dL	TPROT g/dL	CHLOS mg/dL
376816	171.	49.	71.	14.	0.55	7.3	79.
376826	64.	25.	61.	16.	0.65	7.0	77.
376842	224.	43.	97.	19.	0.71	6.4	49.
376845	70.	36.	74.	15.	0.63	6.7	93.
376868	72.	23.	53.	14.	0.67	7.0	78.
AVG.	120.2	35.2	71.2	15.4	0.642	6.88	75.0
S. D.	73.1	11.2	16.6	2.1	0.059	0.34	16.1
S. E.	32.7	5.0	7.4	0.9	0.027	0.15	7.2

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 84-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
 SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376807	6.4	2636.	-	+	+3	7.0	+1	1.0	+1
376829	10.5	2348.	+	-	+2	7.0	+1	0.1	+1
376834	19.5	763.	+	+	+	8.0	-	0.1	-
376861	21.0	1337.	-	+	+2	8.0	-	0.1	+
376869	10.0	1836.	+	-	+3	7.0	-	0.1	+
AVG.	13.48	1784.0				7.40		0.28	
S. D.	6.40	756.5				0.55		0.40	
S. E.	2.86	338.3				0.24		0.18	

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
 SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376827	41.0	721.	+	+1	+1	7.0	-	0.1	-
376831	8.4	2070.	+1	-	+2	7.0	+1	1.0	+
376862	10.2	1849.	+1	+1	+2	7.0	+1	1.0	+
376877	9.4	2272.	-	-	+2	7.0	-	1.0	+1
376882	18.0	1100.	+	+	+1	7.0	-	0.1	-
AVG.	17.40	1602.4				7.00		0.64	
S. D.	13.73	662.8				0.00		0.49	
S. E.	6.14	296.4				0.00		0.22	

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
 COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
 PERIOD: 84-DAY REC REPORT DATE: 17-OCT-84
 SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
 SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376817	13.0	1448.	-	-	+2	8.0	-	1.0	+1
376846	14.0	1398.	+	+	+1	7.0	-	0.1	+
376855	25.0	778.	+	+	+1	7.0	-	0.1	-
376864	18.0	1421.	+	+	+1	7.0	-	1.0	-
376875	11.5	1773.	-	-	+2	8.0	+1	1.0	+1
AVG.	16.30	1363.6				7.40		0.64	
S. D.	5.43	361.3				0.55		0.49	
S. E.	2.43	161.6				0.24		0.22	

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
 SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	VOL mL	OSMOL mOs	BLOOD	SUGAR	PRO- TEIN	pH	BILI- RUBIN	UROBL mg/dL	Ke- tone
376816	18.5	1292.	+	+	+1	8.0	-	0.1	+
376826	18.5	1372.	+	+	+2	7.0	-	1.0	+1
376842	5.7	2348.	+	+1	+2	7.0	-	1.0	+
376845	30.0	839.	+1	+	+1	7.0	-	0.1	-
376868	12.5	1381.	+	+	+1	7.0	-	0.1	+
AVG.	17.04	1446.4				7.20		0.46	
S. D.	8.96	551.2				0.45		0.49	
S. E.	4.01	246.5				0.20		0.22	

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
PERIOD: 84-DAY REC REPORT DATE: 17-OCT-84
SEX: MALE

GROUP: 1CM DOSE: CONTROL SPECIES: RAT
SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

	RBC	WBC	Epith	Cast	APPEARANCE
ANIMAL#:	/hpf	/hpf	/hpf	/lpf	
376807	0-0	4-6	1-3	0-0	Y CL PPT
376829	0-1	1-3	0-2	0-0	Y CL PPT
376834	0-1	3-6	0-1	0-0	LY CL PPT
376861	0-0	5-8	1-2	0-0	Y CL PPT FEED FECES
376869	0-1	1-2	0-3	0-0	Y CL PPT

GROUP: 2M DOSE: .0076 mg/L SPECIES: RAT
SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

	RBC	WBC	Epith	Cast	APPEARANCE
ANIMAL#:	/hpf	/hpf	/hpf	/lpf	
376827	0-2	5-10	3-5	0-0	LY CL PPT FEED
376831	0-1	4-8	0-2	0-0	DY CL PPT FEED
376862	0-2	3-5	1-2	0-0	DY CL PPT FEED
376877	0-3	10-20	4-8	0-0	Y CL PPT FEED
376882	0-1	0-2	0-1	0-0	Y CL PPT FEED

MR: [REDACTED] HASKELL NUMBER: 15388 HASKELL CODE: [REDACTED]
COMPOUND: [REDACTED] DEPARTMENT: POLYMER PRODUCTS
PERIOD: 84-DAY REC REPORT DATE: 17-OCT-84
SEX: MALE

GROUP: 3M DOSE: .058 mg/L SPECIES: RAT
SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC /hpf	WBC /hpf	Epith /hpf	Cast /lpf	APPEARANCE
376817	0-0	0-3	0-2	0-0	Y CL PPT FEED
376846	0-1	5-8	3-5	0-0	Y CL PPT FEED
376855	0-2	3-4	0-2	0-0	Y CL PPT FEED
376864	0-0	2-4	3-6	0-0	Y CL PPT
376875	0-0	1-3	1-2	0-0	Y CL PPT

GROUP: 4M DOSE: .480 mg/L SPECIES: RAT
SAMPLE DATE: 10/12/84 BIRTH DATE: 05/14/84

ANIMAL#:	RBC /hpf	WBC /hpf	Epith /hpf	Cast /lpf	APPEARANCE
376816	1-2	0-3	1-3	0-0	Y CL PPT
376826	0-3	4-8	1-4	0-0	Y CL PPT FEED
376842	0-1	0-3	0-2	0-0	Y CL PPT
376845	0-3	10-15	3-6	0-0	Y CL PPT FEED FECES
376868	0-2	2-4	1-2	0-0	Y CL PPT

APPENDIX VII

BLOOD FLUORINE ANALYTICAL REPORTS



ESTABLISHED 1802

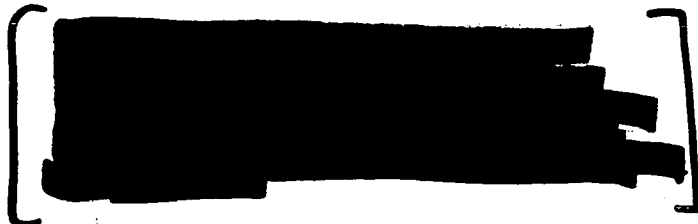
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WILMINGTON, DELAWARE 19898

CHEMICALS AND PIGMENTS DEPARTMENT

JACKSON LABORATORY



October 18, 1984

TO: L. A. Kinney
CR&D, Haskell Lab.

FROM: E. Kissa *E. Kissa*
C&P, Jackson Lab.

[REDACTED] -- FLUORINE IN BLOOD

We have analyzed rat blood samples of the inhalation subchronic study on [REDACTED] for fluorine. Sixty rat blood samples were analyzed for total fluorine by the oxyhydrogen torch method and four samples for ionic (inorganic) fluorine by our analyte addition method. The difference between total fluorine and ionic (inorganic) fluorine is organic fluorine. The ionic fluorine values were found to be so low that the difference between total and organic fluorine is insignificant in this study.

The amount of organic fluorine in blood, c_b , was found to increase exponentially with the increasing [REDACTED] concentration in air, c_a (Fig. 1), expressed as:

$$c_b = k c_a^n$$

The values of the coefficient, k , and to a lesser extent, the values of the exponent n , decreased with the increasing recovery time. (Table I).

FLUORINE IN BLOOD

TABLE I

ORGANIC FLUORINE IN RAT BLOOD

Exposure Conc. of (mg/m ³)	ppm Organic Fluorine in Blood*			k	n
	Initial	2-Weeks Recovery	6-Weeks Recovery		
0	2.0	0.9	0.9	-	-
7.6	10.2	4.0	1.8	2.87	0.64
58.0	42.0	13.0	7.2	1.31	0.56
480.0	147.0	40.5	16.6	0.67	0.54

*Average values for blood samples of five rats.

During the recovery period the logarithm of organic fluorine content of blood decreased with the square root of the recovery time (Fig. 2), suggesting that fluorine is eliminated by a diffusion controlled process:

$$\log (c_t/c_0) = k_r t^{0.5}$$

where c_t is the organic fluorine concentration at time t , c_0 the initial organic fluorine concentration, and k_r the recovery coefficient.

TABLE II

DESORPTION RATE OF FLUORINE FROM BLOOD

Exposure Conc. of (mg/m ³) in Air	k_r	Recovery time (weeks) Needed for the Fluorine Values to Return to Normal (1 ppm or less) Values
0		
7.6		
58	-0.31	11
480	-0.32	26
	-0.39	31

The value of the desorption coefficient k_r for human blood differs probably from that of rat blood, but the desorption mechanism may be similar.

The inorganic (ionic) fluorine in rat blood increased slightly, but perhaps significantly, as a result of exposure to (Table III). If the slight increase was significant, the ionic fluorine returned to normal values in a relatively short time.

OCTOBER 10, 1964

L. A. Kinney

FLUORINE IN BLOOD

TABLE III

INORGANIC (IONIC) FLUORINE IN RAT BLOOD

<u>Exposure</u> <u>[REDACTED] Conc.</u> <u>in Air</u> <u>(mg./m³)</u>	<u>Recovery</u> <u>Time</u> <u>(Weeks)</u>	<u>Organic</u> <u>Fluorine</u> <u>(ppm)</u>	<u>Inorganic</u> <u>Fluorine</u> <u>(ppm)</u>	<u>Rat No.</u>
0	0	1.4	0.016	376 840
0	2	0.7	0.025	376 849
0	2	1.1	0.019	376 835
0	2	0.7	0.007	376 841
480	0	140.0	0.055	376 854
480	0	112.0	0.034	376 828
480	0	168.0	0.063	376 879
480	2	41.2	0.020	376 858

The remaining 56 blood samples will be analyzed for ionic fluorine, if the significance of the apparent ionic fluorine elevation by [REDACTED] exposure has to be established.

The total fluorine values of the sixty blood samples analyzed are given in Table IV.

EKissa/jve
0524J

October 18, 1984

L. A. Kinney

FLUORINE IN BLOOD

TABLE IV

TOTAL FLUORINE IN RAT BLOOD
OF THE INHALATION SUBCHRONIC STUDY ON
TOTAL FLUORINE (PPM)

Group	Conc. in Air	Initial		2-Weeks Recovery			6-Weeks Recovery		
		Rat Number	ppm F		Rat Number	ppm F		Rat Number	ppm F
I - Control	0 mg/m ³	376839	1.5		376872	1.0		376801	0.8
		376870	1.7	Avg.	376849	0.7	Avg.	376836	1.3
		376840	1.4	2.0	376835	1.1	0.9	376837	0.5
		376873	4.6		376841	0.7		376878	0.7
		376825	1.0		376863	1.1		376847	1.0
II - Low	7.6 mg/m ³	376804	10.8		376810	3.4		376871	1.6
		376844	7.6	Avg.	376876	4.4	Avg.	376800	1.4
		376806	10.5	10.2	376852	3.4	4.0	376848	2.0
		376823	10.8		376822	4.0		376866	2.1
		376818	11.1		376881	4.7		376856	1.7
III - Inter.	58 mg/m ³	376805	44.3		376874	15.1		376808	8.2
		376838	46.0	Avg.	376812	12.9	Avg.	376811	8.6
		376851	44.4	42.0	376813	10.3	13.0	376803	5.3
		376821	47.4		376857	11.8		376843	6.9
		376867	28.0		376830	14.9		376860	7.0
IV - High	480 mg/m ³	376854	140.0		376858	41.2		376815	16.8
		376879	168.0	Avg.	376824	34.7	Avg.	376814	11.1
		376828	112.0	147	376880	33.6	40.5	376853	17.7
		376820	176.0		376833	37.9		376850	18.7
		376859	138.0		376819	55.0		376832	18.8

:jve
24J

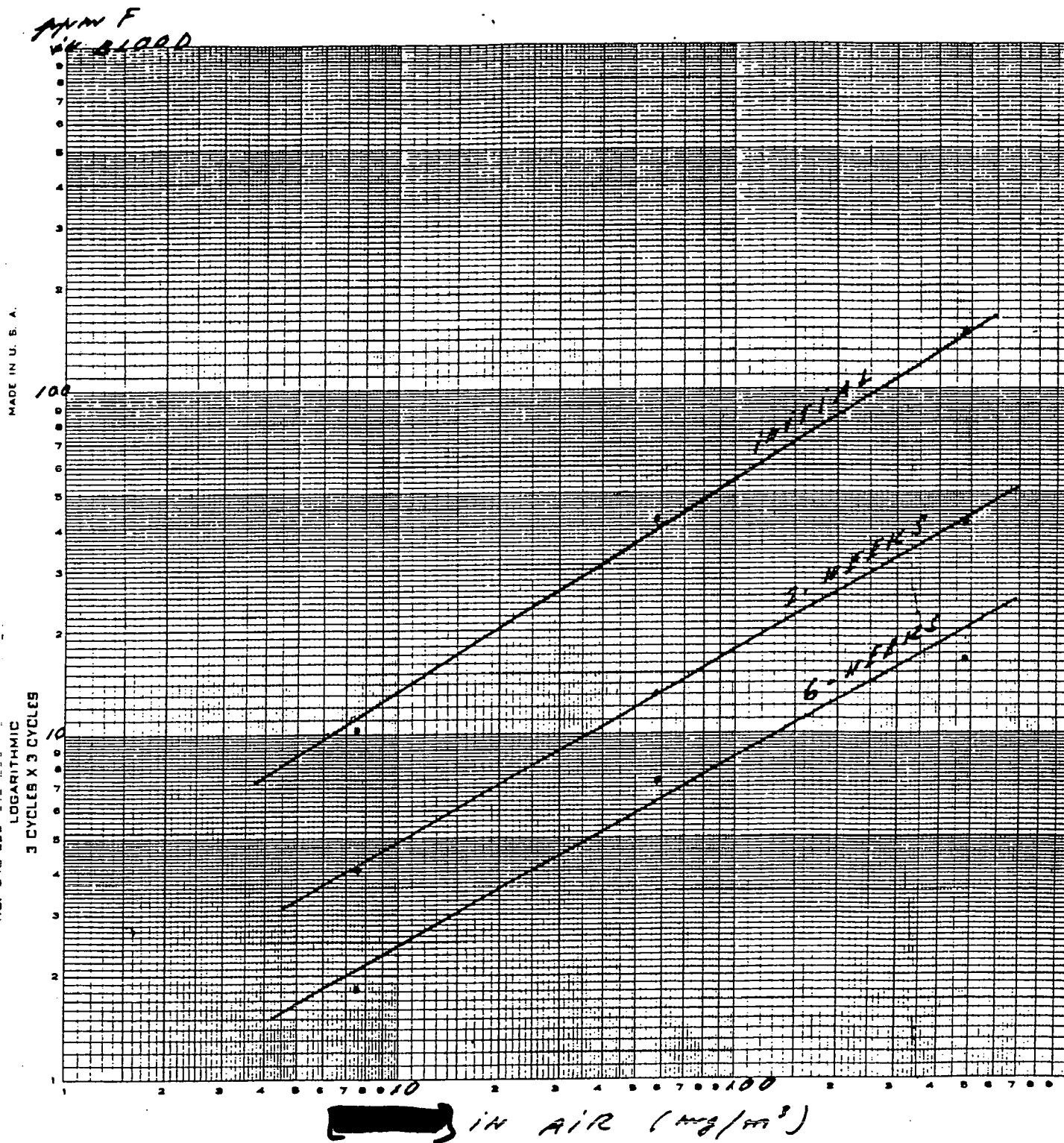
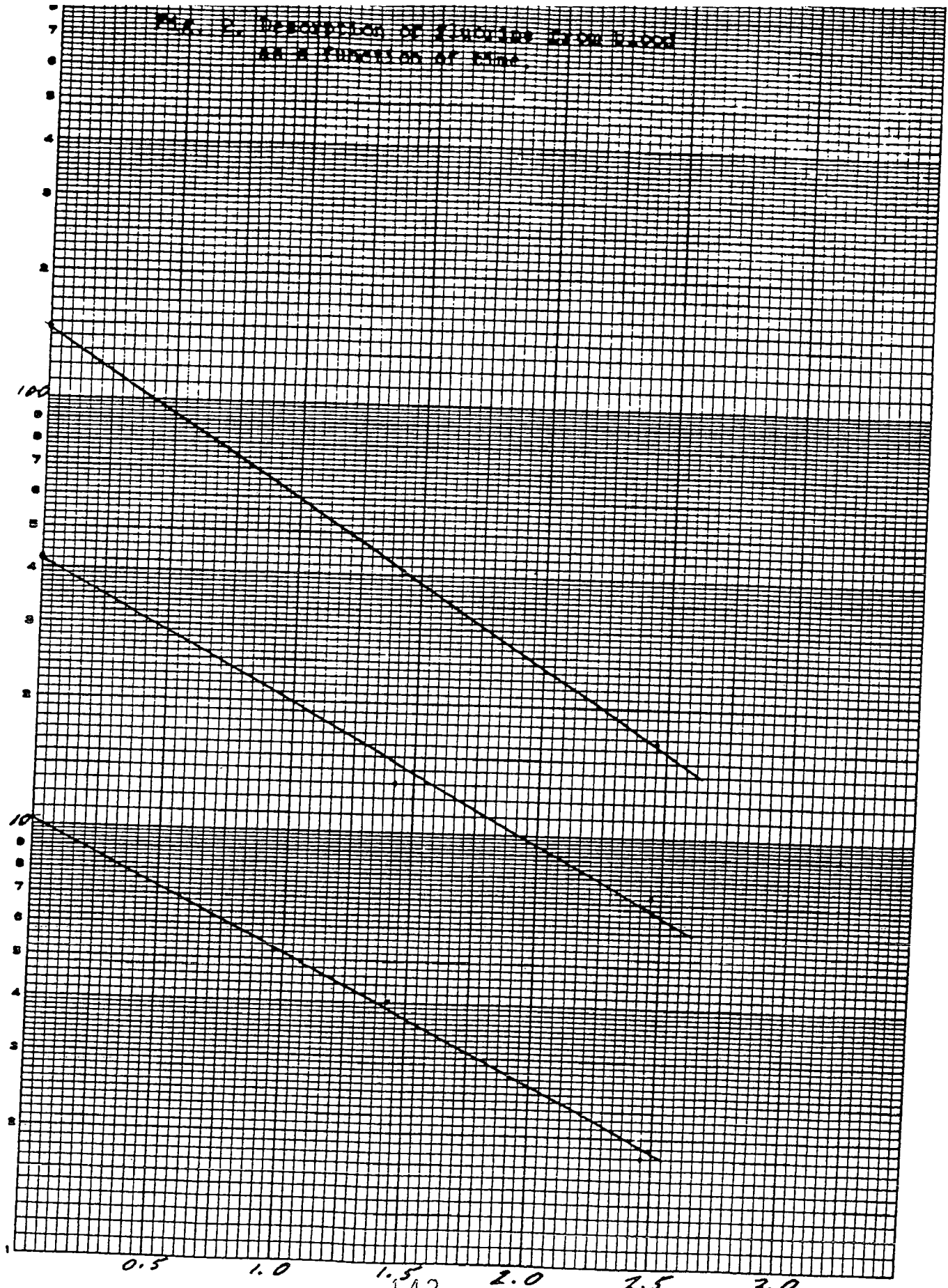


Fig. 1. Concentration of organic fluorine in blood as a function of [redacted] concentration in air.

FIG. 2. DECONTAMINATION OF FIBROUS FROM BLOOD
AS A FUNCTION OF TIME



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CHEMICALS AND PIGMENTS DEPARTMENT
JACKSON LABORATORY

[REDACTED]

December 19, 1984

TO: L. A. Kinney
CR&D, Haskell Lab.

FROM: E. Kissa *E. Kissa*
C&P, Jackson Lab.

[REDACTED] -- FLUORINE IN BLOOD

The rat blood samples of the twelve-weeks recovery period have been analyzed for fluorine (Table I). This completes the fluorine data of the inhalation subchronic study on [REDACTED]

To compare the recovery rate of [REDACTED] related fluorine in blood to that of perfluorooctanoic acid the data have to be fitted to a kinetic expression that permits the calculation of rate constants or rate coefficients. This is, however, not straightforward, because the elimination of fluorine from blood does not obey simple kinetics. The decrease of the organic fluorine concentration in blood during the recovery period of the recent inhalation subchronic study on TBSA can be represented as a reasonable approximation with the equation

$$\log (c_t/c_0) = k_r t^{0.5}, \quad (1)$$

where c_t is the organic fluorine concentration in blood at time t , c_0 the initial organic fluorine concentration in blood, and k_r the recovery coefficient. (Fig. 2 in Kissa to Kinney, October 18, 1984.)

December 19, 1984

L. A. Kinney

FLUORINE IN BLOOD

The average fluorine values of the 12-weeks recovery period are slightly lower than these calculated by this equation from the recovery data of the first six weeks.

Initial Fluorine Conc. in Blood ppm	Fluorine Conc. after 12-weeks Recovery ppm	
	Predicted	Found
10.2	0.90	0.40
42.0	3.2	2.2
147.0	6.6	4.4

The recovery coefficients are slightly higher for the 0 to 12 weeks recovery period than those calculated for the 0 to 6-weeks recovery period, but the correlation with equation (1) is still reasonable:

Exposure Conc. of [redacted] in Air (mg./m ³)	Linear Correlation Coefficient (for log c vs. t ^{0.5})		Recovery Coefficient k _r	
	0-6 weeks	0-12 weeks	0-6 weeks	0-12 weeks
7.6	0.9991	0.993	-0.31	-0.35
58	0.995	0.992	-0.32	-0.36
480	0.9998	0.995	-0.39	-0.43

I reported in [redacted] that the decay of fluorine during recovery period of a perfluorooctanoic acid feeding study approximates first-order kinetics.

$$\log c_t/c_0 = k_r t \quad (2)$$

The log c vs. time plot (Fig. 1) shows considerable curvature indicating that the removal of fluorine from blood is more rapid at the beginning of the recovery time than predicted by equation (2). The first-order plot of [redacted] data also shows curvature (Fig. 2). Conceivably the rate at which a fluorocompound is eliminated from blood is not the same for different [redacted] telomers. Their diffusion rates are likely to vary with their chain length. It is also possible that the adsorptive bond of the fluorochemical in blood may vary. The less strongly bonded molecules may be eliminated at a faster rate and leave the more strongly held fluorochemical molecules back. Since perfluorooctanoic acid is homogeneous, this type of a mechanism is needed to explain its decreasing coefficient of the elimination rate. Perhaps perfluorooctanoic acid dissolved in blood is eliminated from blood at a fast rate, but perfluorooctanoic acid bound to protein in blood at a slower rate, perhaps together with the protein on which it is adsorbed. Whatever the true mechanism, the expected result is a decrease of the recovery rate (fluorine elimination rate) coefficient with increasing time.

The average fluorine removal rate coefficient k_t during a time interval Δt can be calculated from the equation

$$\frac{\Delta c}{\Delta t} = k_t c_a^z \quad (3)$$

where Δc is the average fluorine concentration decrease and c_a the average fluorine concentration during time interval Δt . It follows that

$$\log \left(\frac{\Delta c}{\Delta t} \right) = \log k_t + z \log c_a \quad (4)$$

A plot of [redacted] recovery data according to the equation (4) yields straight lines with the average z value of one. However, the $\log k_t$, and consequently, the k_t , values are not constant, but decrease with the increasing recovery time (Table II), in accord with my explanation of curvature in first order plots (Fig. 3 and 4).

Hence

$$\log (c_t/c_0) = k_t t \quad (5)$$

where k_t is the time dependent rate coefficient at time t .

The question remains, why does the [redacted] data fit equation (5) and also, as a reasonable approximation, equation (1). Since the left side of the equations is the same, the right side has to be the same function of time. This is the case when

$$k_t = k_r/t^y, \quad (6)$$

where y is an exponent. If $y = 0.5$

$$k_t = k_r/t^{0.5}, \quad (7)$$

and the equation (5) becomes equation (1)

$$\log (c_t/c_0) = \frac{k_r t}{t^{0.5}} = k_r t^{0.5}, \quad (8)$$

Although the time intervals of [redacted] recovery data are not suited for redefining the time dependence of the rate coefficients, the k_t values seem to vary approximately with the square root of time. (Table III).

December 19, 1984

L. A. Kinney

[REDACTED] -- FLUORINE IN BLOOD

In summary, the elimination of organic fluorine from blood can be described by a time dependent rate coefficient k_t and an exponent z , that is approximately equal to one. A logarithmic plot

$$\log (\Delta c / \Delta t) = \log k_t + z \log c_a \quad (9)$$

or regression analysis using a pocket calculator, yields k_t .

A comparison of [REDACTED] and perfluorooctanoic acid decay in blood suggests that k_t values of anionic fluorosurfactants in blood may not be largely different. However, [REDACTED] is much less volatile than perfluorooctanoic acid and poses therefore a lesser environmental problem.

EK:jve
Attach.
0564J

TABLE I

FLUORINE IN BLOOD AFTER A 12-WEEK RECOVERY PERIOD

<u>Exposure</u>	<u>Rat Number</u>	<u>Fluorine ppm</u>	<u>Average Fluorine ppm</u>
Control: (0 mg/m ³)	376869	0.54	0.40
	834	0.54	
	829	0.17	
	807	0.49	
	861	0.26	
Low: (7.6 mg/m ³)	376877	0.53	0.61
	862	0.72	
	882	0.64	
	831	0.64	
	827	0.52	
Intermediate: (58 mg/m ³)	376875	1.37	2.16
	864	1.91	
	817	1.18	
	855	2.13	
	846	4.23	
High: (480 mg/m ³)	376826	5.89	4.38
	845	3.22	
	868	4.12	
	816	5.21	
	842	3.47	

TABLE II
KINETICS OF FLUORINE ELIMINATION FROM RAT BLOOD

<u>Recovery Period</u> <u>(weeks)</u>	<u>Fluorochemical</u>	<u>Rate</u> <u>Coefficient</u> <u>k_t</u>	<u>Exponent</u> <u>z</u>
0-2	[REDACTED] (inhalation)	0.36	1.10
2-6		0.17	1.03
6-12		0.16	1.07
		Average	1.07
0-2	Perfluorooctanoic Acid (feeding)	0.73	0.92
2-6		0.33	1.03
		Average	0.98

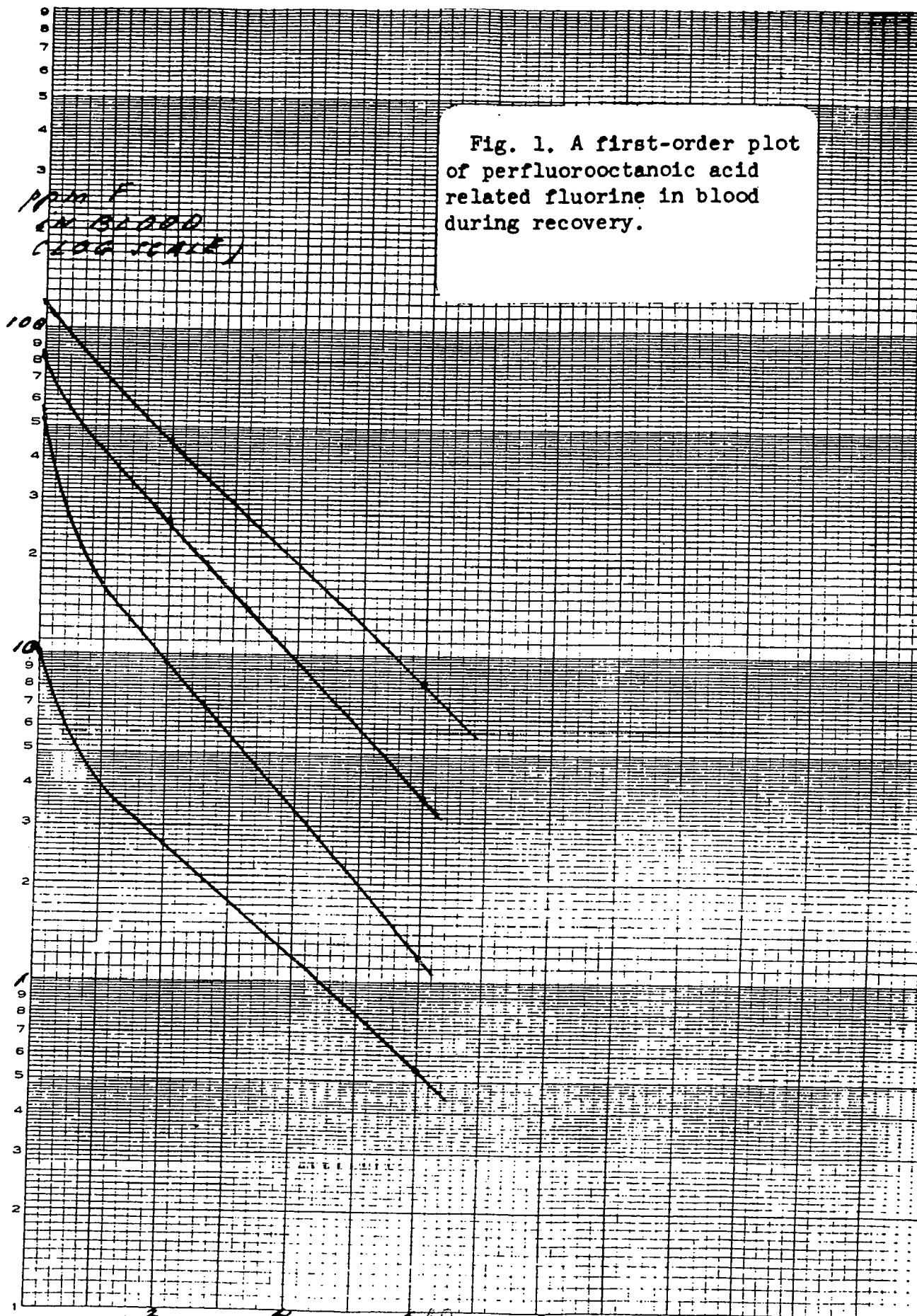
TABLE III
RATE COEFFICIENTS AS A FUNCTION OF TIME

<u>Recovery</u> <u>Period</u> <u>(weeks)</u>	<u>Average</u> <u>Recovery</u> <u>Time</u> <u>(weeks)</u>	<u>Square Root</u> <u>of Average</u> <u>Recovery</u> <u>Time</u>	<u>Rate Coefficients</u>			
			[REDACTED]		Perfluorooctanoic Acid	
			<u>Found</u>	<u>Calc.*</u>	<u>Found</u>	<u>Calc.*</u>
0-2	1	1	0.36	-	0.73	-
2-6	4	2	0.17	0.18	0.33	0.37
6-12	9	3	0.16	0.12		

* Calculated by the equation (7).

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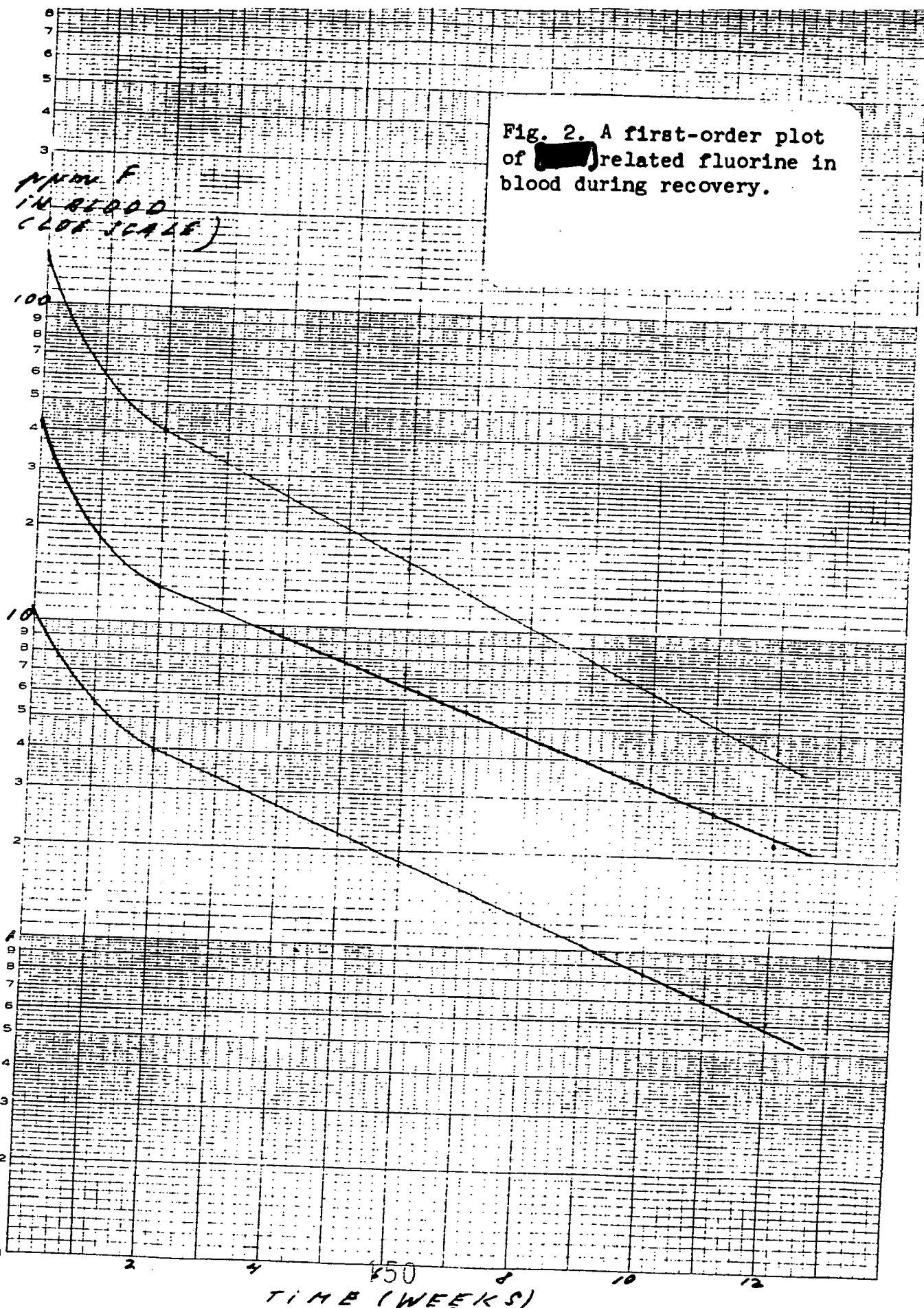
Fig. 1. A first-order plot of perfluorooctanoic acid related fluorine in blood during recovery.



MADE IN U.S.A.

SEMI-LOGARITHMIC
4 CYCLES X 10 DIVISIONS PER INCH

Fig. 2. A first-order plot of [redacted] related fluorine in blood during recovery.

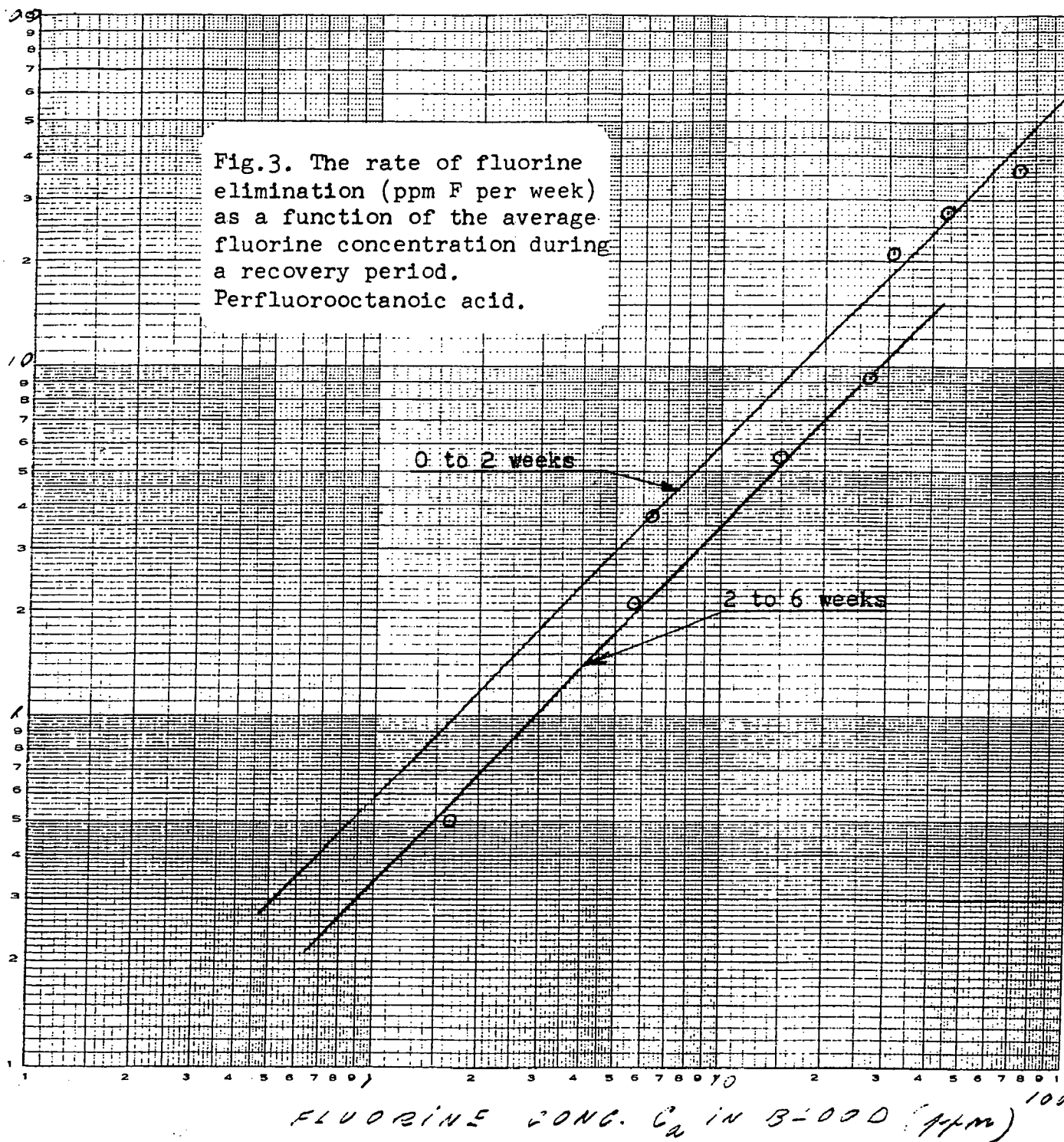


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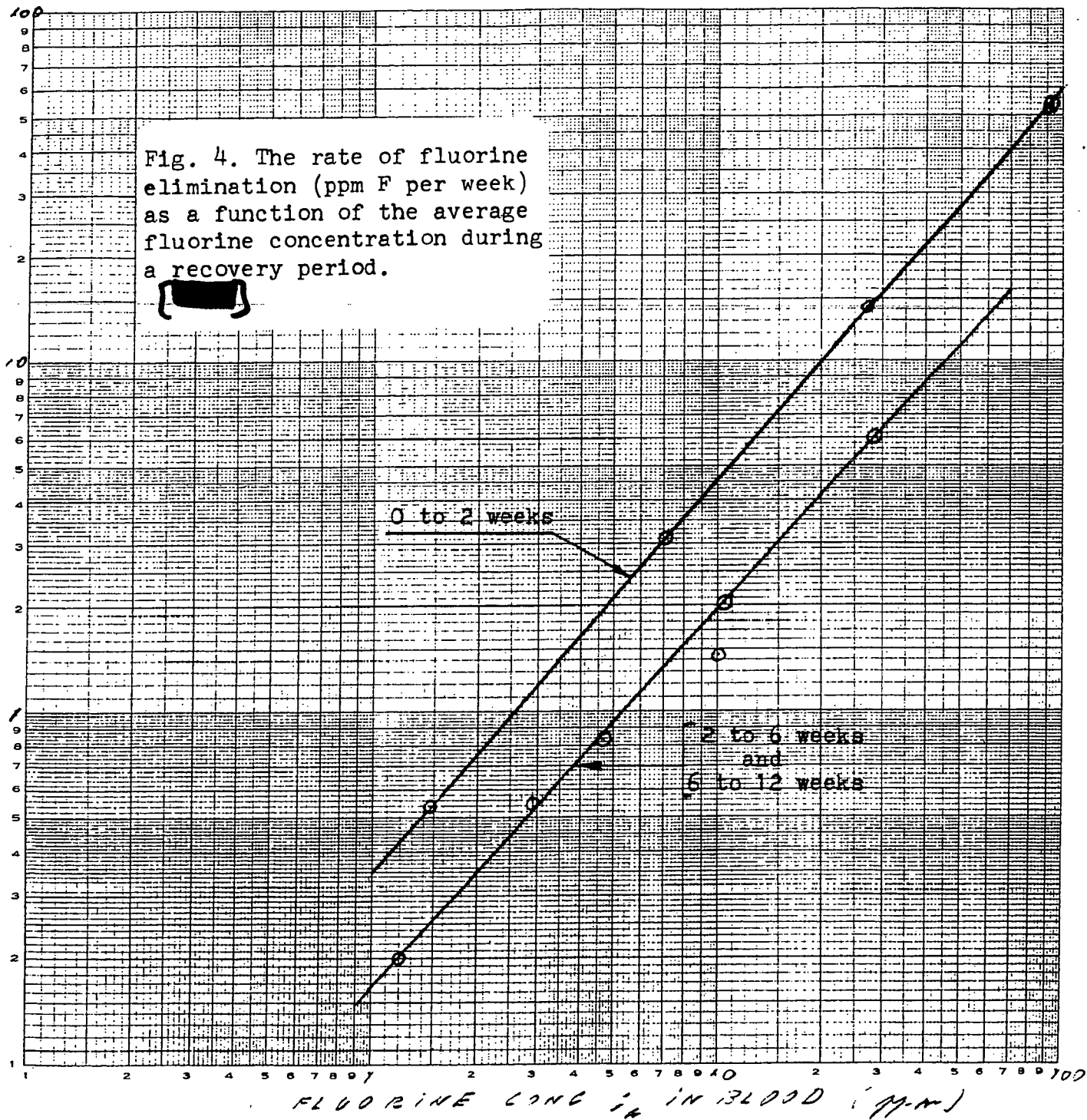
4 CYCLES X 10 DIVISIONS PER INCH

TIME (WEEKS)

$\Delta C / \Delta t$



$\Delta C / \Delta t$



APPENDIX VIII
BLOOD FLUORINE STATISTICS

[REDACTED] MEAN BLOOD FLOURINE CONCENTRATIONS
 (Values in Log(ppm) + 1)
 [REDACTED] H# 14,930

GROUP	0 DAYS POST EXPOSURE	14 DAYS POST EXPOSURE	41 DAYS POST EXPOSURE
CONTROL	1.2431(0.000)	0.9546(0.000)	0.9122(0.000)
7.6 MG/CM	2.0028(0.000)#	1.5961(0.000)#	1.2408(0.000)#
58 MG/CM	2.6159(0.000)#	2.1095(0.000)#	1.8513(0.000)#
480 MG/CM	3.1612(0.000)#	2.6001(0.000)#	2.2129(0.000)#
TEST - HOMOGENEITY	0.000	0.000	0.000
TEST - TREND	0.000	0.000	0.000
BARTLETT'S TEST	0.034	0.818	0.425

GROUP	84 DAYS POST EXPOSURE
CONTROL	0.5601(0.000)
7.6 MG/CM	0.7820(0.054)
58 MG/CM	1.2889(0.000)#
480 MG/CM	1.6300(0.000)#
TEST - HOMOGENEITY	0.000
TEST - TREND	0.000
BARTLETT'S TEST	0.088

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Values in parentheses - P VALUE OF STUDENT'S T TEST COMPARISON
 OF TREATMENT MEAN TO CONTROL MEAN.
 + - SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD
 # - SIGNIFICANTLY DIFFERENT (P<0.05) FROM CONTROL GROUP BY LSD AND
 DUNNETT'S TEST

HOMOGENEITY - P VALUE OF F TEST OF WHETHER GROUP MEANS ARE EQUAL.
 TREND - P VALUE OF F TEST OF WHETHER THERE IS DOSE-RELATED
 CHANGE IN GROUP MEANS.
 BARTLETT'S TEST - P VALUE OF TEST OF HOMOGENEITY OF VARIANCE