Final Report

Rat Oral Subchronic Toxicity Study of Normal Butanol

TRL Study #032-006

SUMMARY

The purpose of the study was to evaluate the toxicity of normal butanol in a rat subchronic toxicity study.

Four groups of male and female rats (30/sex/group) were dosed orally once daily with 0, 30, 125, or 500 mg/kg/day of compound for 6 weeks until the day of the interim necropsy. After the interim sacrifice, all surviving rats were dosed daily until the final sacrifice. Body weights and food consumption were recorded weekly and the rats were observed at least twice daily for mortality and overt signs of toxicity. Ophthalmologic examinations were done during the pretreatment period and again during week 13. Blood and urine for clinicopathologic evaluation were collected from a fifth group of 10 rats/sex prior to initiation of dosing, from all surviving rats scheduled for the interim sacrifice, and from the first 10 rats/sex/group at the final sacrifice. The first 10 male and 10 female rats from each group were scheduled for necropsy on day 43 or 44 and all remaining rats on day 92 or 93. Gross postmortem examinations were done on all rats. Organ weights were taken from rats sacrificed on day 92 or 93. After the final sacrifice, a complete histopathologic examination was done on all rats in the control and high-dose groups, on livers, kidneys, and hearts from the low- and mid-dose groups, and on all gross lesions. In addition, a histopathologic examination was done on any rat found dead or sacrificed in extremis.

The only unequivocal effects produced by normal butanol were ataxia and

hypoactivity at the 500 mg/kg/day dose level. Ataxia and hypoactivity were not seen as treatment-related signs until the final six weeks of the study with maximum weekly incidences of 32% and 29%, respectively. No treatment-related clinical signs were seen at the 30 or the 125 mg/kg/day dose level.

Body weight and food consumption values were similar for control and all treated groups. No treatment-related effect was observed at the ophthalmoscopic examinations or in gross or microscopic evaluation of the tissues.

Three rats were found dead or sacrificed in extremis, but these deaths could not be attributed to the test article, normal butanol.

At the interim clinical pathologic evaluation, red blood cell count (RBC), packed cell volume (PCV), and hemoglobin (HGB) averages of the 500 mg/kg/day dose group females were 5% below control averages. Although these differences were statistically significant, they were small and no differences between the parameters were observed in the males of the interim evaluation or between control and treated groups of either sex at the final evaluation. Therefore, even if the lower red blood cell parameters in the 500 mg/kg/day females were an actual treatment-related effect, it was small and transitory.

CONCLUSION

Oral administration of normal butanol at 500 mg/kg/day produced ataxia

and hypoactivity at a maximum weekly incidence rate of 32 and 29%, respectively. A slightly (5%) lower (compared to controls) red blood cell count (RBC), packed cell volume (PCV), and hemoglobin (HGB) concentration present only in the 500 mg/kg/day dose group females at the interim evaluation may have been treatment-related.

No treatment-related effect was observed at the 30 mg/kg/day or 125 mg/kg/day dose levels.

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I Introduction

The purpose of this study was to evaluate the toxicity of normal butanol in a rat subchronic toxicity study. In order to assess the toxicologic potential after both 6 weeks and 13 weeks of dosing, an interim sacrifice at the 7 week interval was included.[a] The oral route of administration was used because this is the probable route of human exposure.

This study was conducted in accordance with the protocol (Appendix I), the Standard Operating Procedures of Toxicity Research Laboratories (TRL) and in compliance with Good Laboratory Practice Regulations for Nonclinical Laboratory Studies.[b] Procedures pertinent to this study are described herein.

II Methods

A. Test Material

Normal butanol (lot # 3597 KVVE) was purchased from American Scientific Products, Romulus, Michigan. Samples of each dose concentration were saved during weeks 1, 4, 6, 10, and 13 and taken to the Muskegon County Wastewater Treatment Facility for chemical analysis under the direction of Dr. Avi Joshi, Physical Chemist. Duplicate samples were sent to Mr. John Maney, ERCO, a division of Enseco, Inc., 185 Alewife Brook Parkway, Cambridge, Massachusetts for referee analysis.

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a Protocol Change #4, effective 9/10/85.

b Federal Register, Vol. 43, No. 247, Part II, December 22, 1978, pp. 59986-60020.

B. Animals and Husbandry

The rat was chosen as a test system because of its established usefulness in toxicologic studies and as a pharmacologic model. One hundred-fifty three male and one hundred-forty seven female rats[a] (45-55 grams) aged 22-23 days arrived on August 12, 1985 and were housed individually in wire-bottom cages[b]. Filtered municipal water[c] and Purina Certified Rodent Laboratory Chow #5002 (pellet) [d] were available *ad libitum*. This feed has been tested by the manufacturer for contaminants, none of which were present at levels that would be expected to affect the outcome of the study. An acclimation period of 7 days prior to the pretreatment week was allowed. During the acclimation period, the rats were observed with respect to general health and any rat with evidence of disease or physical abnormality was discarded. A clean/dirty corridor system was in effect. Room air was filtered and humidity (average 47.6% ± 9.2) and temperature (average 70.2°F ± 2.2) controlled. The temperature value was calculated using the daily high and low value, ±1 standard deviation. One value per day was used to calculate the humidity average. A 12 hour light:12 hour dark cycle was controlled automatically.

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a Charles River Breeding Laboratories, Inc., Portage, Michigan, Crl: CD^{R}(SD)BR.

b Rats were housed in accordance with recommendations contained in DHEW Publication No. 78-23 (NIH): Revised 1978, "Guide for the Care and Use of Laboratory Animals." During the acclimation period the rats were housed 3/cage.

c Water used at TRL analyzed periodically for the presence of contaminants as defined by the Environmental Protection Agency "National Interim Primary Drinking Water Regulations" *Code of Federal Regulation*, Title 40-Protection of Environment Part 141.11 (b) and 141.12. Records retained at TRL.

d Lot #s May02-85-3E, Aug01-85-2E, Aug07-85-1B, Aug10-85-2D, Aug21-85-2D. Checkerboard Square, St.Louis, MO 63164.

The first day of the pretreatment week was August 19, 1985. At the initiation of the pretreatment week the rats were assigned randomly to groups (30 rats/sex/group and a fifth group of 10/sex) using a computer printout.[a] The rats were individually identified by toe clipping.

C. Compound Administration

Administration of the test material began on August 26, 1985. The rats scheduled for the interim sacrifice were dosed daily for 42 or 43 days and the rats scheduled for the final sacrifice were dosed daily for 91 or 92 days.

Group	Normal Butanol (mg/kg/day)	Animal Numbers			
		Male		Female	
		Interim	Final	Interim	Final
I	0	001-010	011-030	031-040	041-060
II	30	061-070	071-090	091-100	101-120
III	125	121-130	131-150	151-160	161-180
IV	500	181-190	191-210	211-220	221-240
V	Baseline	241-250		251-260	

The amounts administered were based on the most recent individual weekly body weight values. Fresh solutions of the compound (in deionized water) were prepared weekly and dosed orally at a volume of 10 ml/kg. Controls received deionized water at the same volume. A plastic syringe and an 18 gauge ball-tipped metal dosing cannula ensheathed in a number 8 French catheter were used to administer the solution.

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[a] Randomization printout programmed by Dr. John Quiring, Associate Professor of Mathematics and Computer Science, Department of Mathematics and Computer Science, Grand Valley State Colleges, Allendale, Michigan.

D. Clinical Observations

Body weights and food consumptions were recorded weekly and the rats were observed at least twice daily for mortality and clinical effects.

E. Ophthalmology

All rats received an ophthalmoscopic examination during the pretreatment period and week 13 by a veterinary ophthalmologist.[a] Ophthalmologic examinations were conducted on all rats in a darkened room with an indirect ophthalmoscope. Seven rats that had an eye lesion during the pretreatment period were not included in the study.

F. Clinical Pathology

1. Sampling

Blood and urine samples were collected from the 10 male and 10 female rats in group V prior to initiation of dosing. Blood was obtained at the time of necropsy from all surviving rats scheduled for the interim sacrifice and from the first ten rats/sex/group at the final sacrifice. Urine was collected over a period of up to 4 hours in metabolism cages 3-5 days prior to the scheduled sacrifices. The rats were anesthetized with CO_2, the thoracic cavity was opened and blood was collected by cardiac puncture. A necropsy was then done on each of these rats (except those in group V) and the tissues preserved.

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[a] Exams performed by W. F. Keller, D.V.M., M.S. and associates, Diplomates, American College of Veterinary Ophthalmologists, Michigan State University, East Lansing, Michigan.

2. Tests Performed

The following tests[a] were performed:

Hematology: hemoglobin (HGB), hematocrit (PCV), erythrocyte count (RBC), mean cell volume (MCV), mean cell hemoglobin (MCH), mean cell hemoglobin concentration (MCHC), total and differential leucocyte counts (WBC), estimated platelet count (PLT).

Serum Chemistry: alkaline phosphatase (Alk phos), blood urea nitrogen (BUN), glutamate pyruvate transaminase (SGPT), glutamate oxalacetate transaminase (SGOT), glucose (Gluc), total protein (TP), albumin (Alb), A/G ratio (calculated), globulin (calculated), total bilirubin (Tot. bili.), sodium (Na), potassium (K), chloride (Cl), calcium (Ca),[b] inorganic phosphate (Phos),[b] carbon dioxide (TCO_2), total serum cholesterol (Chol), creatinine.[c]

Urinalysis: pH, specific gravity, glucose, protein, ketones, bilirubin, urobilinogen, microscopy of sediment.

G. Necropsy

A necropsy was performed on all surviving rats of the first 10 males and 10 females from each dose group on day 43 or 44 of the study. On days 92 or 93 the remaining rats were necropsied. Rats found dead were also necropsied. Interim and final sacrifice rats were anesthetized with CO_2 and exsanguinated by cardiac puncture. The cranial, thoracic and peritoneal cavities were opened and the contents examined macroscopically. The organs and tissues listed in section H were removed from each animal and preserved. Lungs were inflated with formalin via the trachea. Eyes with attached optic nerve from all

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a See Appendix E for clinical pathology methodology.

b Protocol Change #1, effective 8/15/85; Protocol Change #2, effective 8/13/85.

c Protocol Change #4, effective 9/10/85.

rats killed at the interim and final sacrifices were preserved in a modified Zenker's fixative. The testes with attached epididymides from all male rats were preserved in Bouin's fixative. All other tissues were preserved in 10% neutral-buffered formalin. Feet were preserved with the tissues for positive identification of the rat.

Prior to fixation at the final sacrifice only,[a] the following organs were weighed: brain, heart, liver, spleen, kidneys, testes with epididymides, and ovaries. After fixation, the adrenals and thyroids with parathyroids were weighed.[a] For paired organs, the organ weight was the combined weight of right and left members of the pair. Organ/body weight ratios were determined for each tissue. No organ weights were taken on rats found dead.

H. Histology

The full tissue microscopic examination listed below was done on the control and high-dose rats, on one rat sacrificed in extremis, and on those found dead. Also, livers, hearts, and kidneys of low- and mid-dose rats, and all gross lesions seen at necropsy were examined microscopically.

As tissues were trimmed, the presence or absence of tissues and lesions was noted. The tissues were placed in Tissue Tek®[b] cassettes that were labeled with study number, rat number and the cassette

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a Protocol Change #4, effective 9/10/85.

b Lab Tek Division, Miles Laboratories, Inc., Naperville, IL 60540.

number. They were then processed on a Fisher Scientific Histomatic®[a] or an AO TP/8000®[b] After processing, the tissues were embedded in paraffin using a Tissue Tek® embedding system. They were sectioned at 5-6 microns, mounted on numbered slides and stained with hematoxylin and eosin.

The following tissues were placed on sequentially numbered slides as follows:

Slide Number	Tissue
1	heart and attached aorta (a longitudinal section)
1	thymus
2	lung (sections from the caudal and left lobes)
2	trachea (a cross-section)
2	esophagus (a cross-section)
3	stomach (a section from the nonglandular esophageal area through the area of the cardiac glands into the area of the fundic glands and another section from the duodenum through the pyloric sphincter into the area of the pyloric glands)
3	salivary glands (sections of the sublingual and mandibular glands)
4	small intestines (a separate cross-section of the duodenum, jejunum and ileum)
4	colon (a cross-section)
5	liver (sections from the left and right lobes)
5	pancreas (a separate section in addition to sections commonly attached to the viscera)
5	spleen (a cross-section)
5	mesenteric lymph node
6	kidney (a cross-section of the right kidney)
6	urinary bladder (an entire cross-section)
7	adrenal (a section through the cortex and medulla of one adrenal)
7	pituitary
8	eye (with attached optic nerve)
9	thyroids and parathyroids
9	thoracic spinal cord (a cross-section)[c]
10	lumbar spinal cord (a cross-section)[c]

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a Fisher Scientific Products, 34401 Industrial Road, Livonia, MI 48150.

b American Optical Scientific Instruments Division, Buffalo, NY 14215.

c Protocol Change #4, effective 9/10/85.

Slide Number	Tissue
10	brain (three sections including frontal cortex and basal ganglia, parietal cortex and thalamus and cerebellum and pons)
11	bone with marrow-femur
12	testis and epididymis (a cross-section of each)
12	ovary
12	uterus (a cross-section of one uterine horn)
12	cervix (a longitudinal section with uterine horns)
13	skin[a]
13	mammary gland[a]
13	skeletal muscle (thigh)[a]
13	sciatic nerve[a]
14, etc.	tissue masses and all other gross lesions

At the histologic examination, some lesions were graded, when necessary, using the following system: 1 = minimal, 2 = slight, 3 = moderate, 4 = severe, and 5 = extreme.

I. Statistics

The body weight, food consumption, clinicopathologic, and organ weight data were tested for homogeneity of variance by Bartlett's method (Steel and Torrie, 1980). If the data were found to be homogeneous, differences between control and treatment means were tested for statistical significance by the method of Dunnett (Dunnett, 1964). If the data were found not to be homogeneous, the method of Gill (modified Dunnett's) was employed (Gill, 1977).

J. Data Retention

All data including specimens and a copy of this report will be retained at Toxicity Research Laboratories, Ltd., 510 W. Hackley Avenue, Muskegon, Michigan 49444 for at least 5 years. Before any raw data is discarded, the sponsor will be notified to obtain permission.

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[a] Protocol Change #1, effective 8/15/85.

III. Results

A. Test Material

The results of the analysis of samples analyzed by the Wastewater Treatment Facility and by ERCO are given in Appendix A. Stability and concentration were found to be acceptable.

B. Clinical Signs

The incidence of clinical effects is given in Table 1.

Treatment-related ataxia first appeared in the high-dose group during week 8. Ataxia and hypoactivity occurred infrequently during weeks 9 and 10. These signs increased to a weekly incidence of 32% and 29% for ataxia and hypoactivity, respectively, at week 11 and continued at approximately the same frequency during weeks 12 and 13. Onset of ataxia and hypoactivity was about 2-3 minutes after dosing and duration was less than one hour.

Other clinical signs observed did not appear to be directly related to treatment. Three rats died during the study. Two of these deaths were the result of the rubber catheter slipping off the metal dosing cannula. During week 4, a catheter lodged in the esophagus of a high-dose female and the rat died of apparent asphyxiation before the catheter could be removed. During week 7, a high-dose male swallowed a catheter. It was sacrificed two days later when it became apparant that the situation was adversely affecting the health of the rat. These accidents and the occurrence of hypoactivity, salivation, labored respiration, and/or retching over a 3 day period in another

high-dose rat account for the majority of significant clinical effects observed in the high-dose group throughout the study. A mid-dose male died during week 1. It began exhibiting hypoactivity, emaciation, and labored respiration on day 4 and was found dead on day 6. Histopathologic evaluation of this rat will be discussed later in the report.

Dark urine and rales occurred in a high-dose male during week 8 following a cage related accident. This rat was normal in appearance within three days. During week 7, a 2 cm diameter tissue mass appeared in the left axillary area of one low-dose female and a 3 cm diameter mass appeared in the right axillary area of another low-dose female. Neither mass increased in size and both disappeared before study termination.

C. Body Weight, Weight Change and Food Consumption

The body weight, weight change and food consumption values are given in Table 2.

No treatment-related effect was present on body weight, weight gain, or food consumption. Statistically significant differences between control and treated group mean weight change and food consumption would occur sporadically, but no trend was observed and total body weight averages for control and treated groups were similar throughout the study.

D. Ophthalmology

The results of the ophthalmologic evaluations are given in Appendix D.

An ophthalmoscopic examination was performed prior to initation of dosing and all animals with ocular abnormalities were identified and discarded. Another ophthalmoscopic examination was performed during week 13. Lesions were seen at incidences according to the following table (numbers indicate eyes with lesions):

	Control	Low-dose	Mid-dose	High-dose
Chorioretinal hypoplasia	1	1	3	3
Total lesions	1	2	4	5

Chorioretinal hypoplasia is commonly seen in rats of this age, and other abnormalities seen were considered to be within normal limits for rats of this age, sex, and strain.

E. Clinical Pathology

Results of the clinicopathologic evaluation are given in Tables 3 through 7. Normal hematology and serum chemistry ranges for rats at TRL can be found in Appendix F.

Only one alteration in clinical pathologic parameters occurred that was suggestive of a treatment-related effect. At the interim sacrifice, RBC ($p \leq 0.05$), PCV ($p \leq 0.01$), and HGB ($p \leq 0.01$) averages in the high-dose females were 5% less than the corresponding control averages. The RBC and PCV ($p \leq 0.05$) averages for the middle-dose females were also slightly (4% and 3%, respectively) below those of the controls. However, RBC, PCV, and HGB averages were similar for control and treated groups of males at the interim evaluation and for control and treated groups of both sexes at the final evaluation.

Other statistically significant differences between control and treated group averages occurred but they were small, occurred in one sex and at one evaluation only, and there was no dose response relationship. Thus, they were not considered to be treatment-related. They were: a lower ($p \leqslant 0.05$) cholesterol average in the high-dose males at the interim evaluation, a higher ($p \leqslant 0.05$) absolute neutrophil count in the middle-dose males at the interim evaluation, a higher ($p \leqslant 0.05$) relative segmented neutrophil count and a lower ($p \leqslant 0.05$) relative lymphocyte count in the low-dose females at the final evaluation, and higher ($p \leqslant 0.05$) urine pH values in the low-dose males at the interim and low-dose females at the final evaluations.

At the final evaluation, the percentage of segmented neutrophils in the mid-dose males was higher than controls (not statistically significant). However, it appears that the increase was due mainly to animal #134, found to have lymphadenitis upon microscopic examination of the mandibular lymph node, and therefore not related to treatment. Also at the final evaluation, a high-dose female (#226) had increased SGPT and SGOT levels. No related lesion was found histologically, and other rats in that group did not show similar tendencies. Therefore, it was not considered to be treatment-related.

F. Observations at Necropsy

Observations made at necropsy are given in Table 8 and Appendix G.

No treatment-related lesion was observed in gross necropsy at the

interim or final sacrifices or of the rats found dead or sacrificed in extremis. The lesions present were those commonly observed in laboratory rats and they were present in control and treated groups at similar frequency or were one time occurrences. The enlarged uterine horns are related to the stage of the estrus cycle.

Three rats died during the study. No gross lesions were seen in rat # 224. Rat # 202 (which had a catheter in its stomach) had dark areas on the glandular mucosa of the stomach. In rat # 133 (middle-dose), the left lobe of the lung was red and the cranial and middle lobes were shriveled.

G. Organ Weights

Relative and absolute group mean organ weight values are given in Table 9.

There was no apparent treatment-related effect on organ weight values. The only statistically significant difference between control and treated group averages was a slightly ($p \leqslant 0.05$) higher thyroid weight average in the high-dose males. No dose response relationship was present, as the absolute thyroid weights were similar for all three treated groups of males. Moreover, they were only 14% above the control average. Thyroid weight averages of the treated females were not above those of the controls. Thus, this difference appears to be a chance occurrence rather than a treatment-related effect.

H. Histopathology

The results of the histopathologic examination are given in Table 10 and Appendix G. The histoaccountability report is given in Appendix H.

No treatment-related lesion was observed at the histopathologic evaluation. The lesions that were observed were one time occurrences or were present in the control and treated groups at a similar frequency. The diffuse subacute lymphadenitis of the mandibular lymph node was visable grossly as red or enlarged lymph nodes. This is a commonly observed lesion in laboratory rats. The cause of death of the mid-dose rat (#133) that died during the study was determined to be a gavaging accident since a perforated esophagus was found at the histopathologic examination.

IV Discussion

At the interim evaluation, RBC, PCV, and HGB averages in the high-dose females were 5% below control averages. The differences were statistically significant but the biological significance is questionable. All three parameters are closely related, so a decrease in the RBC count would be expected to result in a decrease in PCV and HGB values also. Moreover, the observed differences were small and no difference between these parameters was seen in males at the interim evaluation or between control and treated groups of either sex at the final evaluation. Thus, even if the decrease in RBC count (and hence, PCV and HGB) was a true treatment-related effect, it was small and transitory.

One mid-dose and two high-dose rats died during the study, but none of these deaths was due to administration of normal butanol. The two high-dose rats died because the rubber catheter slipped off of the dosing cannula during dosing. In one case (rat # 224), the catheter lodged in the throat and esophagus, thus cutting off air flow into the lungs. The rat died of apparent asphyxiation before the cannula could be removed. No gross or histologic lesion relating to the death of this rat was observed. The second rat (# 202) swallowed the catheter. It was sacrificed two days later, as the health of the rat was adversely affected by the presence of the catheter in its stomach. Gross necropsy revealed dark areas on the glandular mucosa of the stomach. This was seen histologically as focal necrosis.

Shriveled and red lungs were observed at gross necropsy of the middle-dose rat (# 133) that died. Histologic evaluation revealed pleuritis and edema in the lung and a perforated esophagus. Thus, death was the result of esophageal damage at dosing.

V Conclusion

Oral administration of normal butanol at 500 mg/kg/day produced ataxia and hypoactivity at a maximum weekly incidence rate of 32% and 29%, respectively. A slightly (5%) lower (compared to controls) red blood cell count (RBC), packed cell volume (PCV), and hemoglobin (HGB) concentration present in the 500 mg/kg/day dose group females at the interim evaluation only may have been treatment-related.

No treatment-related effect was observed at the 30 mg/kg/day or 125 mg/kg/day dose levels.

VI References

Dunnett, C.W. (1964). Biometrics 20,482-491.

Gill, J.L. (1977). Journal of Dairy Science 60,444-449.

Steel, R., and Torrie, J.H. (1980). Principles and Procedures of Statistics, A Biometrical Approach 2nd ed., pp. 471-472. McGraw-Hill, New York.

Table 1

Rat Oral Subchronic Toxicity Study of Normal Butanol
Incidence of Clinical Signs[a]

TRL Study #032-006

	MALES				FEMALES			
Group	I	II	III	IV	I	II	III	IV
Dose Level (mg/kg/day)	0	30	125	500	0	30	125	500
Pretreatment								
No signs observed								
Week 1								
Lacrimation	--	--	1/30	--	--	--	--	--
Labored respiration	--	--	1/30	--	--	--	--	--
Hypoactivity	--	--	1/30	--	--	--	--	--
Emaciation	--	--	1/30	--	--	--	--	--
Found dead	--	--	1/30	--	--	--	--	--
Week 2								
No signs observed								
Week 3								
No signs observed								
Week 4								
Found dead	--	--	--	--	--	--	--	1/30
Week 5								
No signs observed								
Week 6								
Salivation	--	--	--	1/30	--	--	--	--
Retching	--	--	--	1/30	--	--	--	--
Labored respiration	--	--	--	1/30	--	--	--	--

[a] Data presented as animals with sign/live animals.

-- Indicates sign not present in given group.

Table 1 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol
Incidence of Clinical Signs[a]

TRL Study #032-006

	MALES				FEMALES			
Group	I	II	III	IV	I	II	III	IV
Dose Level (mg/kg/day)	0	30	125	500	0	30	125	500
Week 7[b]								
Tissue mass	--	--	--	--	--	2/25	--	--
Salivation	--	--	--	1/25	--	--	--	--
Rales	--	--	--	1/25	--	--	--	--
Labored respiration	--	--	--	2/25	--	--	--	--
Hypoactivity	--	--	--	2/25	--	--	--	--
Moribund sacrifice	--	--	--	1/25	--	--	--	--
Week 8[c]								
Tissue mass	--	--	--	--	--	2/20	--	--
Lacrimation	--	--	--	--	--	--	1/20	--
Rales	--	--	--	1/19	--	--	--	--
Dark urine	--	--	--	1/19	--	--	--	--
Ataxia	--	--	--	1/19	--	--	--	--
Week 9								
Tissue mass	--	--	--	--	--	2/20	--	--
Salivation	--	--	--	1/19	--	--	--	--
Hypoactivity	--	--	--	1/19	--	--	--	--
Ataxia	--	--	--	2/19	--	--	--	--

[a] Data presented as animals with sign/live animals.

[b] Five animals/sex/group sacrificed at interim evaluation on day 1 not included in week 7 tabluation.

[c] Decrease in number of live animals reflects rats sacrificed at interim evaluation on day 2 of week 7.

-- Indicates sign not present in given group.

Table 1 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol
Incidence of Clinical Signs[a]

TRL Study #032-006

	MALES				FEMALES			
Group	I	II	III	IV	I	II	III	IV
Dose Level (mg/kg/day)	0	30	125	500	0	30	125	500
Week 10								
Tissue mass	--	--	--	--	--	2/20	--	--
Salivation	--	--	--	1/19	--	--	--	1/19
Hypoactivity	--	--	--	--	--	--	--	1/19
Ataxia	--	--	--	--	--	--	--	1/19
Week 11								
Tissue mass	--	--	--	--	--	2/20	--	--
Hypoactivity	--	--	--	5/19	--	--	--	5/19
Ataxia	--	--	--	4/19	--	--	--	8/19
Week 12								
Tissue mass	--	--	--	--	--	2/20	--	--
Hypoactivity	--	--	--	4/19	--	--	--	1/19
Ataxia	--	--	--	2/19	--	--	--	2/19
Week 13								
Tissue mass	--	--	--	--	--	1/20	--	--
Hypoactivity	--	--	--	4/19	--	--	--	1/19
Ataxia	--	--	--	7/19	--	--	--	8/19
Week 14[b]								
Ataxia	--	--	--	--	--	--	--	2/9

[a] Data presented as animals with sign/live animals.

[b] Includes only signs seen in animals dosed on day 1 (scheduled for sacrifice on day 2).

-- Indicates sign not present in given group.

Table 2

Rat Oral Subchronic Toxicity Study with Normal Butanol
Group Mean Body Weight, Weight Change, and Food Consumption

TRL Study #032-006

	MALES				FEMALES			
Group	I	II	III	IV	I	II	III	IV
Dose Level (mg/kg/day)	0	30	125	500	0	30	125	500
Initial								
Body Weight (g)	90	91	91	91	86	86	86	85
Pretreatment								
Body Weight	144	147	146	144	128	129	128	126
Weight Change (g)	53	56	55	53	42	43	42	42
Food Consumption (g)	130	141**	143**	138*	126	129	129	122
Week 1								
Body Weight	193	199	198	191	154	157	153	150
Weight Change	49	53	52	48	25	28	26	23
Food Consumption	158	161	163	159	128	134	130	130
Week 2								
Body Weight	245	254	253	240	173	180	173	173
Weight Change	53	54	55	49	20	23	20	24*
Food Consumption	179	181	182	172	135	139	135	136
Week 3								
Body Weight	294	304	305	290	195	203	194	194
Weight Change	49	51	52	50	22	23	21	21
Food Consumption	192	197	200	190	142	148	140	140
Week 4								
Body Weight	337	344	346	328	213	220	212	212
Weight Change	42	40	42	38	18	17	18	18
Food Consumption	207	211	210	201	147	156	146	147
Week 5								
Body Weight	367	378	381	357	226	235	227	226
Weight Change	31	34	34	29	13	15	15	14
Food Consumption	200	208	211*	195	145	153	147	149
Week 6								
Body Weight	392	404	405	379	237	246	239	237
Weight Change	24	26	25	22	11	12	11	12
Food Consumption	209	214	218	201	149	160	160*	160

* $p \leq 0.05$

** $p \leq 0.01$

Table 2
(cont'd.)

Rat Oral Subchronic Toxicity Study with Normal Butanol
Group Mean Body Weight, Weight Change, and Food Consumption

TRL Study #032-006

	MALES				FEMALES			
Group	I	II	III	IV	I	II	III	IV
Dose Level (mg/kg/day)	0	30	125	500	0	30	125	500
Week 7								
Body Weight (g)	412	428	428	397	251	255	253	246
Weight Change (g)	21	23	20	21	10	9	12	8
Food Consumption (g)	204	207	208	195	147	151	153	150
Week 8								
Body Weight	432	447	449	413	261	267	262	255
Weight Change	20	19	21	16	10	13	9	10
Food Consumption	204	212	220	202	153	167	164	161
Week 9								
Body Weight	447	459	465	431	270	275	267	262
Weight Change	14	12	17	18	9	8	5*	7
Food Consumption	197	198	208	196	152	156	152	153
Week 10								
Body Weight	464	475	482	448	276	284	275	271
Weight Change	17	15	16	17	6	8	8	9
Food Consumption	215	212	222	214	159	173	167	164
Week 11								
Body Weight	474	485	492	459	284	289	280	275
Weight Change	10	10	10	11	8	5	5	5
Food Consumption	200	200	202	196	154	159	149	147
Week 12								
Body Weight	495	506	509	477	293	298	290	285
Weight Change	21	21	17	17	9	9	10	10
Food Consumption	229	231	219	219	174	165	168	171
Week 13								
Body Weight	499	514	514	484	294	304	294	287
Weight Change	5	8	5	7	1	6*	4	2
Food Consumption	196	200	195	194	143	154	151	147

* $p \leq 0.05$

** $p \leq 0.01$

Table 3

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Summary

TRL Study #032-006 MALES Day of Test -3

	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group V							
Mean	5.56	38.7	12.8	19.1	69.3	23.1	33.2
S.D.	0.35	2.07	0.65	2.64	1.9	0.72	0.46

FEMALES

	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group V							
Mean	5.24	34.8	11.9	11.7	67.1	22.8	34.4
S.D.	0.29	1.74	0.63	2.85	1.7	0.76	1.68

Table 3 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Summary - Differential

TRL Study #032-006 MALES Day of Test -3

	WBC $x10^3/ul$	ABS. NEUT. $x10^3/ul$	ABS. LYMPH. $x10^3/ul$	ABS. MONO. $x10^3/ul$	ABS. EO. $x10^3/ul$	ABS. BASO. $x10^3/ul$	PLT $x10^3/ul$
Group V							
Mean	19.1	2.0	15.8	1.3	0.1	0.0	adequate
S.D.	2.64	0.98	1.97	0.72	0.13	0.00	

FEMALES

	WBC $x10^3/ul$	ABS. NEUT. $x10^3/ul$	ABS. LYMPH. $x10^3/ul$	ABS. MONO. $x10^3/ul$	ABS. EO. $x10^3/ul$	ABS. BASO. $x10^3/ul$	PLT $x10^3/ul$
Group V							
Mean	11.7	1.6	9.5	0.6	0.1	0.0	adequate
S.D.	2.85	0.67	2.50	0.31	0.08	0.00	

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Summary - Differential

TRL Study #032-006 MALES Day of Test -3

	WBC $x10^3/ul$	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %
Group V							
Mean	19.1	0.0	9.9	83.1	6.7	0.3	0.0
S.D.	2.64	0.00	4.01	4.91	4.06	0.67	0.00

FEMALES

	WBC $x10^3/ul$	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %
Group V							
Mean	11.7	0.0	13.5	80.5	5.4	0.6	0.0
S.D.	2.85	0.00	4.14	5.23	3.20	0.70	0.00

Table 3 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Summary

TRL Study #032-006 MALES Day of Test 43

	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group I							
Mean	7.92	46.6	15.8	11.9	58.6	19.9	33.8
S.D.	0.29	2.13	0.59	2.64	1.8	0.56	0.89
Group II							
Mean	7.48	44.2	15.2	12.2	59.1	20.3	34.3
S.D.	0.36	2.24	0.72	2.13	1.6	0.70	0.64
Group III							
Mean	7.92	46.1	15.7	14.1	59.0	19.9	34.1
S.D.	0.59	2.77	0.93	4.15	1.2	0.94	0.39
Group IV							
Mean	7.85	45.5	15.5	11.0	58.0	19.7	33.9
S.D.	0.45	1.20	0.51	3.02	2.1	0.90	0.48

FEMALES

	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group I							
Mean	7.73	44.8	15.7	8.8	58.0	20.4	35.1
S.D.	0.22	0.94	0.31	2.09	1.3	0.73	0.82
Group II							
Mean	7.76	44.9	15.6	8.9	57.9	20.2	34.8
S.D.	0.41	1.49	0.58	2.36	1.6	0.67	0.56
Group III							
Mean	7.41	43.3*	15.2	8.5	58.4	20.5	35.1
S.D.	0.17	1.04	0.48	2.42	1.2	0.61	0.61
Group IV							
Mean	7.33*	42.7**	14.9**	8.8	57.9	20.3	34.8
S.D.	0.35	1.57	0.70	3.07	1.3	0.38	0.73

* P less than or equal to 0.05
** P less than or equal to 0.01

Table 3 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Summary - Differential

TRL Study #032-006 MALES Day of Test 43

	WBC x10^3/ul	ABS. NEUT. x10^3/ul	ABS. LYMPH. x10^3/ul	ABS. MONO. x10^3/ul	ABS. EO. x10^3/ul	ABS. BASO. x10^3/ul	PLT x10^3/ul
Group I							
Mean	11.9	0.9	10.1	0.8	0.1	0.0	737.2
S.D.	2.64	0.30	2.30	0.45	0.10	0.00	132.67
Group II							
Mean	12.2	1.1	10.3	0.8	0.1	0.0	821.3
S.D.	2.13	0.50	1.85	0.47	0.09	0.00	157.24
Group III							
Mean	14.1	1.3*	11.9	0.8	0.1	0.0	908.5
S.D.	4.15	0.45	4.14	0.41	0.07	0.00	204.79
Group IV							
Mean	11.0	0.8	9.5	0.6	0.1	0.0	814.5
S.D.	3.02	0.33	2.69	0.59	0.11	0.00	141.45

FEMALES

	WBC x10^3/ul	ABS. NEUT. x10^3/ul	ABS. LYMPH. x10^3/ul	ABS. MONO. x10^3/ul	ABS. EO. x10^3/ul	ABS. BASO. x10^3/ul	PLT x10^3/ul
Group I							
Mean	8.8	0.6	7.6	0.5	0.1	0.0	969.6
S.D.	2.09	0.25	1.79	0.36	0.11	0.00	224.35
Group II							
Mean	8.9	0.7	7.7	0.4	0.1	0.0	863.9
S.D.	2.36	0.25	2.19	0.12	0.15	0.00	118.36
Group III							
Mean	8.5	0.9	7.2	0.4	0.1	0.0	863.6
S.D.	2.42	0.43	2.14	0.26	0.05	0.00	227.27
Group IV							
Mean	8.8	0.8	7.5	0.5	0.1	0.0	854.2
S.D.	3.07	0.33	2.93	0.20	0.10	0.00	129.58

* P less than or equal to 0.05

Table 3 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Summary - Differential

TRL Study #032-006 MALES Day of Test 43

	WBC $x10^3/ul$	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %
Group I							
Mean	11.9	0.0	7.6	84.8	7.0	0.6	0.0
S.D.	2.64	0.00	2.55	3.33	3.33	0.70	0.00
Group II							
Mean	12.2	0.0	8.5	84.4	5.9	1.2	0.0
S.D.	2.13	0.00	3.54	5.08	3.54	0.92	0.00
Group III							
Mean	14.1	0.0	10.1	83.3	6.1	0.5	0.0
S.D.	4.15	0.00	3.81	4.69	2.64	0.53	0.00
Group IV							
Mean	11.0	0.0	7.6	86.7	5.1	0.6	0.0
S.D.	3.02	0.00	3.13	2.67	3.84	0.84	0.00

FEMALES

	WBC $x10^3/ul$	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %
Group I							
Mean	8.8	0.0	7.3	86.3	5.1	1.2	0.0
S.D.	2.09	0.00	2.55	3.28	3.59	1.48	0.00
Group II							
Mean	8.9	0.0	8.4	85.9	4.6	1.1	0.0
S.D.	2.36	0.00	3.24	3.59	1.67	1.45	0.00
Group III							
Mean	8.5	0.0	10.3	84.9	4.3	0.5	0.0
S.D.	2.42	0.00	4.76	5.82	2.45	0.53	0.00
Group IV							
Mean	8.8	0.0	9.1	84.1	5.7	1.1	0.0
S.D.	3.07	0.00	4.04	6.98	2.11	1.79	0.00

Table 3 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Summary

TRL Study #032-006 MALES Day of Test 92

	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group I							
Mean	7.93	44.8	14.9	9.6	56.5	18.9	33.3
S.D.	0.56	2.73	0.69	2.69	2.3	0.95	0.70
Group II							
Mean	7.89	43.5	14.7	11.5	55.1	18.6	33.7
S.D.	0.30	1.67	0.63	3.08	1.9	0.82	0.80
Group III							
Mean	7.84	44.0	14.6	11.0	55.8	18.7	33.3
S.D.	0.66	3.61	1.10	1.91	0.8	0.47	0.65
Group IV							
Mean	7.74	43.3	14.4	9.5	55.8	18.7	33.4
S.D.	0.43	2.27	0.60	2.64	1.2	0.72	0.90

FEMALES

	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group I							
Mean	7.68	44.2	15.0	7.9	57.4	19.6	34.0
S.D.	0.51	2.91	0.91	2.09	1.9	0.74	0.66
Group II							
Mean	7.70	43.4	14.8	7.9	56.3	19.3	34.1
S.D.	0.58	2.88	0.89	3.52	1.2	0.51	0.40
Group III							
Mean	7.48	42.5	14.6	6.4	56.8	19.5	34.3
S.D.	0.35	2.00	0.69	1.04	1.2	0.41	0.49
Group IV							
Mean	7.75	43.8	14.9	7.3	56.4	19.2	34.0
S.D.	0.43	2.26	0.52	1.83	2.0	0.76	0.77

Table 3 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Summary - Differential

TRL Study #032-006 MALES Day of Test 92

	WBC $x10^3/ul$	ABS. NEUT. $x10^3/ul$	ABS. LYMPH. $x10^3/ul$	ABS. MONO. $x10^3/ul$	ABS. EO. $x10^3/ul$	ABS. BASO. $x10^3/ul$	PLT $x10^3/ul$
Group I							
Mean	9.6	0.8	8.3	0.4	0.1	0.0	720.8
S.D.	2.69	0.33	2.60	0.29	0.05	0.00	145.04
Group II							
Mean	11.5	1.2	9.6	0.7	0.1	0.0	772.6
S.D.	3.08	0.82	2.57	0.34	0.11	0.00	141.56
Group III							
Mean	11.0	1.6	8.6	0.6	0.1	0.0	805.6
S.D.	1.91	1.34	1.71	0.16	0.16	0.00	192.95
Group IV							
Mean	9.5	1.1	7.9	0.5	0.1	0.0	720.0
S.D.	2.64	0.47	2.69	0.30	0.10	0.00	103.33

FEMALES

	WBC $x10^3/ul$	ABS. NEUT. $x10^3/ul$	ABS. LYMPH. $x10^3/ul$	ABS. MONO. $x10^3/ul$	ABS. EO. $x10^3/ul$	ABS. BASO. $x10^3/ul$	PLT $x10^3/ul$
Group I							
Mean	7.9	0.4	7.0	0.4	0.0	0.0	734.9
S.D.	2.09	0.24	1.96	0.21	0.05	0.00	134.02
Group II							
Mean	7.9	0.9	6.4	0.5	0.1	0.0	787.8
S.D.	3.52	0.72	2.50	0.48	0.05	0.00	156.04
Group III							
Mean	6.4	0.6	5.6	0.3	0.1	0.0	716.2
S.D.	1.04	0.32	0.92	0.13	0.07	0.00	141.09
Group IV							
Mean	7.3	0.6	6.4	0.3	0.0	0.0	749.4
S.D.	1.83	0.38	1.88	0.18	0.05	0.00	150.96

Table 3 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Summary - Differential

TRL Study #032-006 MALES Day of Test 92

	WBC $x10^3/ul$	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %
Group I							
Mean	9.6	0.0	8.6	86.1	4.8	0.5	0.0
S.D.	2.69	0.00	3.66	5.09	3.33	0.53	0.00
Group II							
Mean	11.5	0.0	9.6	83.7	5.7	1.0	0.0
S.D.	3.08	0.00	5.30	6.70	2.63	1.05	0.00
Group III							
Mean	11.0	0.0	14.6	79.2	5.3	0.9	0.0
S.D.	1.91	0.00	9.79	9.99	1.95	1.29	0.00
Group IV							
Mean	9.5	0.0	11.9	81.7	5.6	0.8	0.0
S.D.	2.64	0.00	5.32	8.19	4.20	0.92	0.00

FEMALES

	WBC $x10^3/ul$	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %
Group I							
Mean	7.9	0.0	5.6	89.3	4.6	0.5	0.0
S.D.	2.09	0.00	4.20	5.76	2.27	0.71	0.00
Group II							
Mean	7.9	0.0	11.2*	81.7*	6.4	0.7	0.0
S.D.	3.52	0.00	4.85	6.43	3.66	0.67	0.00
Group III							
Mean	6.4	0.0	8.5	86.8	3.8	0.9	0.0
S.D.	1.04	0.00	4.17	5.43	2.04	0.88	0.00
Group IV							
Mean	7.3	0.0	7.6	87.1	4.9	0.4	0.0
S.D.	1.83	0.00	4.40	5.99	3.28	0.70	0.00

* P less than or equal to 0.05

Table 4

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Summary

TRL Study #032-006 MALES Day of Test -3

	GLUC mg/dl	BUN mg/dl	ALK PHOS U/l	TP g/dl	ALB g/dl	GLOB g/dl	A/G
Group V							
Mean	227.10	18.41	334.62	5.52	3.26	2.26	1.45
S.D.	35.41	2.39	46.36	0.21	0.12	0.13	0.09

FEMALES

	GLUC mg/dl	BUN mg/dl	ALK PHOS U/l	TP g/dl	ALB g/dl	GLOB g/dl	A/G
Group V							
Mean	198.66	16.03	244.01	5.84	3.38	2.46	1.38
S.D.	13.52	1.15	44.51	0.30	0.18	0.17	0.09

Table 4 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Summary

TRL Study #032-006 MALES Day of Test -3

	Na	K	Cl	TCO	CHOL	TOTL BILI	Ca	PHOS	SGOT	SGPT
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl	U/l	U/l
Group V										
Mean	144.7	7.19	102.6	31.8	82.4	0.33	12.54	11.91	65.5	42.0
S.D.	0.90	0.41	1.58	1.34	9.86	0.07	0.63	0.80	4.60	2.65

FEMALES

	Na	K	Cl	TCO	CHOL	TOTL BILI	Ca	PHOS	SGOT	SGPT
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl	U/l	U/l
Group V										
Mean	145.9	7.05	102.3	31.5	94.6	0.35	12.90	11.71	57.8	40.4
S.D.	1.74	0.38	1.70	1.13	12.77	0.07	0.85	0.70	5.69	5.08

Table 4 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Summary

TRL Study #032-006 MALES Day of Test 43

	GLUC mg/dl	BUN mg/dl	A/G	TP g/dl	ALB g/dl	ALK PHOS U/l	SGOT U/l	SGPT U/l	GLOB g/dl	CREAT mg/dl
Group I										
Mean	275.0	18.8	1.08	6.85	3.54	171.5	52.3	33.5	3.31	0.63
S.D.	50.27	2.11	0.10	0.45	0.18	44.57	8.20	7.29	0.34	0.05
Group II										
Mean	284.4	18.7	1.03	6.82	3.46	161.0	46.3	29.3	3.36	0.68
S.D.	49.09	2.70	0.06	0.34	0.17	35.88	4.65	5.41	0.22	0.08
Group III										
Mean	262.7	18.6	1.06	6.86	3.53	171.1	52.4	33.6	3.33	0.65
S.D.	42.43	2.28	0.06	0.22	0.07	41.73	6.86	3.82	0.20	0.05
Group IV										
Mean	262.4	18.8	1.08	6.58	3.41	134.4	49.0	33.1	3.17	0.66
S.D.	55.91	2.72	0.08	0.26	0.07	23.52	6.15	4.59	0.23	0.05

FEMALES

	GLUC mg/dl	BUN mg/dl	A/G	TP g/dl	ALB g/dl	ALK PHOS U/l	SGOT U/l	SGPT U/l	GLOB g/dl	CREAT mg/dl
Group I										
Mean	244.9	19.8	1.09	7.08	3.69	129.2	50.5	37.1	3.39	0.67
S.D.	70.00	3.12	0.07	0.48	0.19	32.90	4.61	8.68	0.32	0.07
Group II										
Mean	238.6	18.7	1.12	7.13	3.75	118.5	52.4	32.2	3.38	0.64
S.D.	34.82	3.19	0.05	0.42	0.18	30.26	8.23	4.33	0.26	0.05
Group III										
Mean	243.1	17.0	1.11	7.29	3.83	109.0	50.3	34.1	3.46	0.64
S.D.	47.44	3.91	0.06	0.46	0.24	29.80	9.71	5.06	0.26	0.05
Group IV										
Mean	243.0	19.6	1.13	7.12	3.77	119.2	52.6	34.5	3.35	0.69
S.D.	52.17	4.42	0.07	0.49	0.30	45.90	7.62	8.31	0.23	0.09

Table 4 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Summary

TRL Study #032-006 MALES Day of Test 43

	Na	K	Cl	TCO_2	Ca	PHOS	CHOL	TOTL BILI
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl
Group I								
Mean	148.1	8.03	100.8	35.4	13.65	10.56	82.9	0.32
S.D.	0.88	1.86	2.57	2.14	0.84	1.97	17.58	0.09
Group II								
Mean	147.4	7.58	100.8	34.9	13.47	9.80	77.6	0.29
S.D.	0.85	1.14	1.32	2.92	0.86	1.04	11.26	0.05
Group III								
Mean	148.5	7.29	101.1	35.9	13.40	9.66	75.3	0.29
S.D.	1.63	1.22	1.79	2.84	0.72	1.25	15.58	0.05
Group IV								
Mean	148.2	7.11	101.0	35.0	13.03	9.81	67.1*	0.25
S.D.	0.83	1.14	2.26	2.87	0.51	0.99	11.56	0.07

FEMALES

	Na	K	Cl	TCO_2	Ca	PHOS	CHOL	TOTL BILI
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl
Group I								
Mean	146.3	7.91	103.0	32.6	12.83	8.96	78.4	0.29
S.D.	1.86	1.46	1.15	2.34	0.67	1.98	10.34	0.09
Group II								
Mean	145.7	7.90	102.2	33.5	12.84	8.59	78.6	0.28
S.D.	1.07	0.67	1.99	1.91	0.48	1.40	15.66	0.07
Group III								
Mean	147.0	6.67	101.4	34.8	12.86	8.15	82.0	0.26
S.D.	1.49	1.25	2.17	2.73	0.35	1.33	13.29	0.07
Group IV								
Mean	146.9	7.11	102.8	33.8	12.88	8.88	75.8	0.26
S.D.	1.52	1.71	1.55	2.91	0.73	2.05	9.27	0.06

* P less than or equal to 0.05

Table 4 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Summary

TRL Study #032-006 MALES Day of Test 92

	GLUC mg/dl	BUN mg/dl	A/G	TP g/dl	ALB g/dl	ALK PHOS u/l	SGOT u/l	SGPT u/l	GLOB g/dl	CREAT mg/dl
Group I										
Mean	313.2	19.1	1.01	7.24	3.63	119.2	49.8	34.2	3.61	0.74
S.D.	38.78	2.31	0.06	0.28	0.14	42.99	7.32	4.74	0.20	0.08
Group II										
Mean	282.9	18.9	0.99	7.13	3.55	112.0	48.8	35.2	3.58	0.71
S.D.	60.05	2.11	0.05	0.29	0.11	28.37	11.07	11.40	0.22	0.06
Group III										
Mean	286.6	17.8	0.97	7.16	3.51	92.8	50.2	35.8	3.65	0.68
S.D.	56.84	1.92	0.11	0.43	0.21	31.73	6.91	7.18	0.37	0.06
Group IV										
Mean	290.0	18.8	1.01	7.12	3.56	116.0	53.0	39.0	3.55	0.70
S.D.	69.61	1.93	0.08	0.48	0.28	36.38	10.56	9.32	0.28	0.08

FEMALES

	GLUC mg/dl	BUN mg/dl	A/G	TP g/dl	ALB g/dl	ALK PHOS u/l	SGOT u/l	SGPT u/l	GLOB g/dl	CREAT mg/dl
Group I										
Mean	260.5	17.5	1.13	7.76	4.11	71.8	58.7	46.0	3.65	0.73
S.D.	87.72	3.84	0.08	0.65	0.34	34.25	19.81	22.77	0.36	0.09
Group II										
Mean	283.2	18.2	1.04	8.00	4.06	83.2	61.0	47.1	3.93	0.75
S.D.	50.66	3.55	0.12	0.46	0.30	23.31	25.76	28.34	0.37	0.14
Group III										
Mean	272.8	17.8	1.06	7.62	3.92	92.3	61.2	43.1	3.70	0.71
S.D.	29.20	2.98	0.05	0.24	0.18	27.24	11.54	11.57	0.13	0.07
Group IV										
Mean	270.6	17.3	1.10	7.77	4.06	72.9	78.6	44.9	3.72	0.74
S.D.	33.22	1.93	0.06	0.74	0.38	36.76	94.59	40.29	0.38	0.07

Table 4 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Summary

TRL Study #032-006 MALES Day of Test 92

	Na	K	Cl	TCO_2	Ca	PHOS	CHOL	TOTL BILI
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl
Group I								
Mean	147.4	7.97	100.4	35.3	13.27	8.74	96.1	0.25
S.D.	1.33	1.29	2.27	2.68	0.70	1.62	18.96	0.08
Group II								
Mean	147.3	7.90	99.5	37.3	13.33	9.36	89.4	0.23
S.D.	1.63	1.78	2.01	2.16	0.76	1.39	9.41	0.04
Group III								
Mean	147.6	7.47	100.0	35.6	13.02	8.19	92.1	0.20
S.D.	1.71	0.87	1.41	1.71	0.51	1.26	16.98	0.06
Group IV								
Mean	147.7	7.51	100.2	36.8	12.81	8.32	93.2	0.20
S.D.	0.86	1.02	1.32	2.00	0.67	1.29	18.95	0.06

FEMALES

	Na	K	Cl	TCO_2	Ca	PHOS	CHOL	TOTL BILI
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl
Group I								
Mean	145.9	8.20	100.1	32.3	13.41	8.87	104.6	0.21
S.D.	1.40	1.06	2.23	4.45	0.69	2.93	15.17	0.05
Group II								
Mean	146.1	7.52	100.0	34.2	13.19	7.28	98.8	0.19
S.D.	1.56	0.89	1.49	3.00	0.41	1.02	12.41	0.03
Group III								
Mean	146.5	7.40	101.2	33.3	13.06	7.44	100.0	0.19
S.D.	1.74	0.90	1.32	3.24	0.58	1.32	16.96	0.05
Group IV								
Mean	146.2	7.51	100.8	33.6	13.44	7.90	98.7	0.18
S.D.	0.92	1.06	2.15	3.16	0.78	1.88	24.95	0.05

Table 5

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values

TRL Study #032-006 MALES Day of Test -3

ANIMAL NUMBER	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group V	Baseline						
241	6.17	41.4	13.7	19.7	67	22.2	33.1
242	5.91	40.5	13.4	22.5	68	22.7	33.1
243	5.18	37.0	12.5	21.6	71	24.1	33.8
244	5.41	37.2	12.1	14.6	68	22.4	32.5
245	5.27	37.1	12.4	20.5	70	23.5	33.4
246	5.23	37.1	12.1	21.9	70	23.1	32.6
247	5.72	37.7	12.6	17.2	66	22.0	33.4
248	5.25	37.2	12.5	18.0	71	23.8	33.6
249	5.91	42.5	13.9	16.0	72	23.5	32.7
250	5.57	39.0	13.1	19.3	70	23.5	33.6
Mean	5.56	38.7	12.8	19.1	69.3	23.1	33.2
S.D.	0.35	2.07	0.65	2.64	1.9	0.72	0.46

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values

TRL Study #032-006 FEMALES Day of Test -3

ANIMAL NUMBER	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group V	Baseline						
251	5.26	33.7	11.4	10.6	63	21.7	33.8
252	5.21	35.0	11.7	8.8	67	22.5	33.4
253	5.16	34.9	11.7	12.2	67	22.7	33.5
254	5.77	38.8	12.9	10.6	67	22.4	33.2
255	5.00	34.4	11.8	16.3	69	23.6	34.3
256	5.36	35.3	11.8	8.9	66	22.0	33.4
257	5.14	35.8	12.5	11.2	69	24.3	34.9
258	5.13	34.3	11.7	9.8	67	22.8	34.1
259	5.58	33.2	12.9	11.7	68	23.1	38.9
260	4.74	32.4	11.0	17.1	68	23.2	34.0
Mean	5.24	34.8	11.9	11.7	67.1	22.8	34.4
S.D.	0.29	1.74	0.63	2.85	1.7	0.76	1.68

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 MALES Day of Test -3

ANIMAL NUMBER	WBC $x10^3/ul$	ABS. NEUT. $x10^3/ul$	ABS. LYMPH. $x10^3/ul$	ABS. MONO. $x10^3/ul$	ABS. EO. $x10^3/ul$	ABS. BASO. $x10^3/ul$	PLT $x10^3/ul$
Group V		Baseline					
241	19.7	2.2	16.7	0.8	0.0	0.0	adequate
242	22.5	3.4	18.0	1.1	0.0	0.0	adequate
243	21.6	2.2	18.6	0.4	0.4	0.0	adequate
244	14.6	0.7	13.4	0.4	0.0	0.0	adequate
245	20.5	2.7	16.2	1.6	0.0	0.0	adequate
246	21.9	3.3	16.9	1.5	0.2	0.0	adequate
247	17.2	1.0	13.8	2.4	0.0	0.0	adequate
248	18.0	1.4	14.2	2.3	0.0	0.0	adequate
249	16.0	1.9	13.4	0.6	0.0	0.0	adequate
250	19.3	0.8	17.2	1.4	0.0	0.0	adequate
Mean	19.1	2.0	15.8	1.3	0.1	0.0	
S.D.	2.64	0.98	1.97	0.72	0.13	0.00	

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 FEMALES Day of Test -3

ANIMAL NUMBER	WBC $x10^3/ul$	ABS. NEUT. $x10^3/ul$	ABS. LYMPH. $x10^3/ul$	ABS. MONO. $x10^3/ul$	ABS. EO. $x10^3/ul$	ABS. BASO. $x10^3/ul$	PLT $x10^3/ul$
Group V		Baseline					
251	10.6	1.6	8.7	0.1	0.2	0.0	adequate
252	8.8	0.8	7.3	0.6	0.1	0.0	adequate
253	12.2	1.5	9.9	0.9	0.0	0.0	adequate
254	10.6	0.8	9.1	0.5	0.1	0.0	adequate
255	16.3	1.6	13.7	0.8	0.2	0.0	adequate
256	8.9	1.9	6.0	1.1	0.0	0.0	adequate
257	11.2	1.5	9.3	0.4	0.0	0.0	adequate
258	9.8	1.4	7.9	0.5	0.0	0.0	adequate
259	11.7	1.6	9.1	0.8	0.1	0.0	adequate
260	17.1	3.2	13.7	0.2	0.0	0.0	adequate
Mean	11.7	1.6	9.5	0.6	0.1	0.0	
S.D.	2.85	0.67	2.50	0.31	0.08	0.00	

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 MALES Day of Test -3

ANIMAL NUMBER	WBC $x10^3/ul$	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %	COMMENT
Group V		Baseline						
241	19.7	0	11	85	4	0	0	Slight polychromasia, 2 NR
242	22.5	0	15	80	5	0	0	200 cell differential,[b]
243	21.6	0	10	86	2	2	0	200 cell differential
244	14.6	0	5	92	3	0	0	
245	20.5	0	13	79	8	0	0	200 cell differential,[b]
246	21.9	0	15	77	7	1	0	200 cell differential
247	17.2	0	6	80	14	0	0	
248	18.0	0	8	79	13	0	0	
249	16.0	0	12	84	4	0	0	
250	19.3	0	4	89	7	0	0	Rare Howell Jolly Body, 1 N
Mean	19.1	0.0	9.9	83.1	6.7	0.3	0.0	
S.D.	2.64	0.00	4.01	4.91	4.06	0.67	0.00	

[a] NRBC = Nucleated Red Blood Cell

[b] continued:
#242 - Rare Howell Jolly Body
#245 - Rare Howell Jolly Body, 1 NRBC

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 FEMALES Day of Test -3

ANIMAL NUMBER	WBC $x10^3/ul$	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %	COMMENT
Group V		Baseline						
251	10.6	0	15	82	1	2	0	Slight polychromasia,[a]
252	8.8	0	9	83	7	1	0	
253	12.2	0	12	81	7	0	0	
254	10.6	0	8	86	5	1	0	
255	16.3	0	10	84	5	1	0	2 NRBC[b]
256	8.9	0	21	67	12	0	0	
257	11.2	0	13	83	4	0	0	Rare Howell Jolly Body
258	9.8	0	14	81	5	0	0	Rare Howell Jolly Body, 1 N
259	11.7	0	14	78	7	1	0	Rare Howell Jolly Body
260	17.1	0	19	80	1	0	0	
Mean	11.7	0.0	13.5	80.5	5.4	0.6	0.0	
S.D.	2.85	0.00	4.14	5.23	3.20	0.70	0.00	

[a] continued:
#251 - slight hypochromia, occasional Howell Jolly Body

[b] NRBC = Nucleated Red Blood Cell

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values

TRL Study #032-006 MALES Day of Test 43

ANIMAL NUMBER	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group I	0 mg/kg/day						
1	8.05	45.4	15.6	8.0	56	19.4	34.4
2	8.03	45.1	15.5	14.9	56	19.3	34.4
3	8.31	49.5	15.9	15.4	59	19.1	32.1
4	7.50	45.2	15.2	11.1	60	20.3	33.6
5	7.77	45.0	15.4	9.5	58	19.8	34.2
6	7.89	46.4	16.3	15.7	59	20.7	35.1
7	8.39	51.0	17.2	10.5	61	20.5	33.7
8	7.95	47.3	15.5	12.5	59	19.5	32.8
9	7.76	44.6	15.4	10.4	57	19.8	34.5
10	7.59	46.2	15.5	10.9	61	20.4	33.5
Mean	7.92	46.6	15.8	11.9	58.6	19.9	33.8
S.D.	0.29	2.13	0.59	2.64	1.8	0.56	0.89
Group II	30 mg/kg/day						
61	7.29	43.0	14.8	13.8	59	20.3	34.4
62	7.10	41.8	14.4	10.3	59	20.3	34.4
63	7.44	43.8	15.6	12.4	59	21.0	35.6
64	7.18	43.0	14.7	10.9	60	20.5	34.2
65	8.16	48.5	16.3	15.1	59	20.0	33.6
66	7.61	43.6	14.9	15.1	57	19.6	34.2
67	7.74	46.2	15.4	8.5	60	19.9	33.3
68	6.94	42.3	14.6	10.7	61	21.0	34.5
69	7.66	42.8	14.6	12.4	56	19.1	34.1
70	7.66	47.0	16.4	12.7	61	21.4	34.9
Mean	7.48	44.2	15.2	12.2	59.1	20.3	34.3
S.D.	0.36	2.24	0.72	2.13	1.6	0.70	0.64

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values

TRL Study #032-006 MALES Day of Test 43

ANIMAL NUMBER	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group III 125 mg/kg/day							
121	7.19	43.3	14.8	14.2	60	20.6	34.2
122	7.44	44.7	15.3	24.2	60	20.6	34.2
123	7.21	43.0	14.3	13.4	60	19.8	33.3
124	8.24	48.7	16.5	13.3	59	20.0	33.9
125	8.86	44.9	15.4	14.7	57	17.4	34.3
126	8.00	46.3	15.9	10.3	58	19.9	34.3
127	7.50	43.8	15.2	14.6	58	20.3	34.7
128	7.92	45.8	15.8	9.7	58	19.9	34.5
129	8.71	51.2	17.3	16.3	59	19.9	33.8
130	8.14	49.3	16.8	10.5	61	20.6	34.1
Mean	7.92	46.1	15.7	14.1	59.0	19.9	34.1
S.D.	0.59	2.77	0.93	4.15	1.2	0.94	0.39
Group IV 500 mg/kg/day							
181	8.42	46.3	16.1	7.9	56	19.1	34.4
182	7.83	43.9	14.6	8.7	56	18.6	33.3
183	8.77	47.3	15.9	10.7	54	18.1	33.6
184	7.94	46.5	15.7	9.5	58	19.8	33.8
185	7.41	44.9	15.0	9.2	60	20.2	33.4
186	7.42	44.1	15.3	10.5	59	20.6	34.7
187	7.77	46.0	15.8	16.2	59	20.3	34.3
188	7.77	45.1	15.1	8.0	58	19.4	33.5
189	7.78	46.7	16.0	15.3	60	20.6	34.3
190	7.34	44.3	15.1	13.6	60	20.6	34.1
Mean	7.85	45.5	15.5	11.0	58.0	19.7	33.9
S.D.	0.45	1.20	0.51	3.02	2.1	0.90	0.48

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values

TRL Study #032-006 FEMALES Day of Test 43

ANIMAL NUMBER	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group I	0 mg/kg/day						
31	7.89	46.4	16.1	5.8	59	20.4	34.7
32	7.90	44.3	15.2	10.5	56	19.2	34.3
33	7.97	46.1	15.8	8.9	58	19.8	34.3
34[a]							
35	7.93	44.5	15.8	8.3	56	19.9	35.5
36	7.68	44.3	15.4	8.4	58	20.1	34.8
37	7.61	44.0	16.2	6.0	58	21.3	36.8
38	7.78	45.4	15.7	9.5	58	20.2	34.6
39	7.34	43.8	15.6	8.9	60	21.3	35.6
40	7.49	44.4	15.8	12.6	59	21.1	35.6
Mean	7.73	44.8	15.7	8.8	58.0	20.4	35.1
S.D.	0.22	0.94	0.31	2.09	1.3	0.73	0.82
Group II	30 mg/kg/day						
91	7.36	43.5	15.1	8.0	59	20.5	34.7
92	7.38	44.3	15.4	14.9	60	20.9	34.8
93	7.94	44.6	15.5	7.0	56	19.5	34.8
94	7.48	44.1	15.1	8.6	59	20.2	34.2
95	8.60	48.5	16.7	9.2	56	19.4	34.4
96	7.57	45.0	16.2	8.7	59	21.4	36.0
97	7.54	44.3	15.1	8.0	59	20.0	34.1
98	8.17	45.9	16.1	8.8	56	19.7	35.1
99[a]							
100	7.77	44.2	15.4	7.1	57	19.8	34.8
Mean	7.76	44.9	15.6	8.9	57.9	20.2	34.8
S.D.	0.41	1.49	0.58	2.36	1.6	0.67	0.56

[a] clotted specimen

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values

TRL Study #032-006 FEMALES Day of Test 43

ANIMAL NUMBER	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group III 125 mg/kg/day							
151	7.43	44.4	15.5	12.2	60	20.9	34.9
152	7.25	43.3	15.6	6.5	60	21.5	36.0
153	7.29	43.4	15.1	5.2	59	20.7	34.8
154	7.50	44.4	15.9	11.0	59	21.2	35.8
155	7.41	43.7	15.3	10.9	59	20.6	35.0
156	7.47	42.6	14.6	9.0	57	19.5	34.3
157	7.27	42.4	15.0	9.6	58	20.6	35.4
158	7.34	41.7	14.8	5.5	57	20.2	35.5
159	7.28	42.5	14.5	7.7	58	19.9	34.1
160	7.81	44.9	15.7	7.6	57	20.1	35.0
Mean	7.41	43.3*	15.2	8.5	58.4	20.5	35.1
S.D.	0.17	1.04	0.48	2.42	1.2	0.61	0.61
Group IV 500 mg/kg/day							
211	7.74	44.7	15.8	6.5	58	20.4	35.3
212	7.42	43.5	15.0	8.9	58	20.2	34.5
213	7.75	44.3	15.5	15.1	57	20.0	35.0
214	7.59	42.7	15.3	8.5	56	20.2	35.8
215	6.65	40.6	13.6	12.4	61	20.5	33.5
216	7.05	41.4	14.9	6.6	58	21.1	36.0
217	7.04	40.1	13.8	9.6	57	19.6	34.4
218	7.28	42.6	14.7	4.3	58	20.2	34.5
219	7.31	43.1	14.9	7.8	58	20.4	34.6
220	7.51	44.1	15.3	8.5	58	20.4	34.7
Mean	7.33*	42.7**	14.9**	8.8	57.9	20.3	34.8
S.D.	0.35	1.57	0.70	3.07	1.3	0.38	0.73

* P less than or equal to 0.05
** P less than or equal to 0.01

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 MALES Day of Test 43

ANIMAL NUMBER	WBC $x10^3/ul$	ABS. NEUT. $x10^3/ul$	ABS. LYMPH. $x10^3/ul$	ABS. MONO. $x10^3/ul$	ABS. EO. $x10^3/ul$	ABS. BASO. $x10^3/ul$	PLT $x10^3/ul$
Group I	0 mg/kg/day						
1	8.0	0.7	6.6	0.6	0.0	0.0	698
2	14.9	0.7	12.5	1.3	0.3	0.0	638
3	15.4	1.1	13.2	1.1	0.0	0.0	726
4	11.1	0.6	9.3	1.2	0.0	0.0	595
5	9.5	0.9	8.5	0.2	0.0	0.0	875
6	15.7	0.9	13.3	1.3	0.2	0.0	650
7	10.5	1.3	8.1	1.1	0.1	0.0	994
8	12.5	1.4	11.0	0.1	0.0	0.0	864
9	10.4	0.7	9.0	0.5	0.1	0.0	729
10	10.9	0.5	9.3	1.0	0.1	0.0	603
Mean	11.9	0.9	10.1	0.8	0.1	0.0	737.2
S.D.	2.64	0.30	2.30	0.45	0.10	0.00	132.67
Group II	30 mg/kg/day						
61	13.8	0.7	12.3	0.7	0.1	0.0	837
62	10.3	1.1	8.3	0.6	0.2	0.0	838
63	12.4	1.9	9.5	0.7	0.2	0.0	942
64	10.9	0.8	9.2	0.9	0.1	0.0	1081
65	15.1	0.8	13.0	1.4	0.0	0.0	626
66	15.1	1.8	12.7	0.5	0.2	0.0	648
67	8.5	0.6	7.7	0.1	0.1	0.0	997
68	10.7	0.4	9.7	0.2	0.3	0.0	673
69	12.4	1.1	9.5	1.6	0.1	0.0	695
70	12.7	1.3	10.7	0.8	0.0	0.0	876
Mean	12.2	1.1	10.3	0.8	0.1	0.0	821.3
S.D.	2.13	0.50	1.85	0.47	0.09	0.00	157.24

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 MALES Day of Test 43

ANIMAL NUMBER	WBC $x10^3/ul$	ABS. NEUT. $x10^3/ul$	ABS. LYMPH. $x10^3/ul$	ABS. MONO. $x10^3/ul$	ABS. EO. $x10^3/ul$	ABS. BASO. $x10^3/ul$	PLT $x10^3/ul$
Group III 125 mg/kg/day							
121	14.2	2.1	11.2	0.7	0.1	0.0	774
122	24.2	0.7	22.3	1.2	0.0	0.0	667
123	13.4	1.7	11.5	0.1	0.0	0.0	1151
124	13.3	1.2	11.3	0.7	0.1	0.0	1083
125	14.7	1.6	11.8	1.2	0.1	0.0	1106
126	10.3	0.7	8.8	0.8	0.0	0.0	726
127	14.6	1.6	11.4	1.6	0.0	0.0	877
128	9.7	1.4	7.6	0.7	0.1	0.0	1193
129	16.3	1.0	14.3	0.8	0.2	0.0	824
130	10.5	1.3	8.6	0.6	0.0	0.0	684
Mean	14.1	1.3*	11.9	0.8	0.1	0.0	908.5
S.D.	4.15	0.45	4.14	0.41	0.07	0.00	204.79
Group IV 500 mg/kg/day							
181	7.9	0.9	6.6	0.4	0.1	0.0	682
182	8.7	0.7	7.1	0.9	0.0	0.0	786
183	10.7	1.2	9.3	0.2	0.0	0.0	946
184	9.5	0.6	8.4	0.6	0.0	0.0	941
185	9.2	0.7	8.1	0.2	0.2	0.0	665
186	10.5	1.2	9.2	0.1	0.0	0.0	759
187	16.2	0.2	13.8	2.1	0.2	0.0	1073
188	8.0	0.6	7.0	0.4	0.0	0.0	902
189	15.3	1.2	13.3	0.8	0.0	0.0	686
190	13.6	0.7	12.4	0.3	0.3	0.0	705
Mean	11.0	0.8	9.5	0.6	0.1	0.0	814.5
S.D.	3.02	0.33	2.69	0.59	0.11	0.00	141.45

* P less than or equal to 0.05

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 FEMALES Day of Test 43

ANIMAL NUMBER	WBC $x10^3/ul$	ABS. NEUT. $x10^3/ul$	ABS. LYMPH. $x10^3/ul$	ABS. MONO. $x10^3/ul$	ABS. EO. $x10^3/ul$	ABS. BASO. $x10^3/ul$	PLT $x10^3/ul$
Group I 0 mg/kg/day							
31	5.8	0.6	5.0	0.0	0.2	0.0	1434
32	10.5	0.6	9.7	0.2	0.0	0.0	723
33	8.9	0.4	7.5	0.8	0.2	0.0	1145
34[a]							
35	8.3	0.8	6.8	0.7	0.0	0.0	679
36	8.4	0.3	7.4	0.7	0.0	0.0	891
37	6.0	0.5	5.4	0.0	0.1	0.0	981
38	9.5	0.4	8.3	0.6	0.3	0.0	918
39	8.9	0.8	7.6	0.4	0.1	0.0	947
40	12.6	1.1	10.5	1.0	0.0	0.0	1008
Mean	8.8	0.6	7.6	0.5	0.1	0.0	969.6
S.D.	2.09	0.25	1.79	0.36	0.11	0.00	224.35
Group II 30 mg/kg/day							
91	8.0	0.7	7.1	0.2	0.0	0.0	993
92	14.9	1.0	13.1	0.6	0.1	0.0	853
93	7.0	0.9	5.6	0.5	0.0	0.0	1008
94	8.6	1.0	7.1	0.4	0.1	0.0	759
95	9.2	0.6	8.0	0.3	0.3	0.0	725
96	8.7	0.6	7.7	0.4	0.0	0.0	875
97	8.0	0.8	6.7	0.5	0.0	0.0	1019
98	8.8	0.2	8.0	0.3	0.4	0.0	733
99[b]							
100	7.1	0.6	6.0	0.4	0.1	0.0	810
Mean	8.9	0.7	7.7	0.4	0.1	0.0	863.9
S.D.	2.36	0.25	2.19	0.12	0.15	0.00	118.36

[a] broken tube
[b] clotted specimen

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 FEMALES Day of Test 43

ANIMAL NUMBER	WBC $x10^3/ul$	ABS. NEUT. $x10^3/ul$	ABS. LYMPH. $x10^3/ul$	ABS. MONO. $x10^3/ul$	ABS. EO. $x10^3/ul$	ABS. BASO. $x10^3/ul$	PLT $x10^3/ul$
Group III 125 mg/kg/day							
151	12.2	1.3	10.1	0.6	0.1	0.0	711
152	6.5	0.9	5.4	0.1	0.1	0.0	868
153	5.2	0.3	4.7	0.2	0.0	0.0	735
154	11.0	0.4	9.9	0.7	0.0	0.0	635
155	10.9	1.4	8.7	0.7	0.1	0.0	714
156	9.0	1.1	7.8	0.1	0.0	0.0	1036
157	9.6	0.2	9.1	0.2	0.1	0.0	784
158	5.5	0.8	4.6	0.1	0.0	0.0	1037
159	7.7	1.2	5.9	0.6	0.1	0.0	735
160	7.6	1.0	6.1	0.5	0.0	0.0	1381
Mean	8.5	0.9	7.2	0.4	0.1	0.0	863.6
S.D.	2.42	0.43	2.14	0.26	0.05	0.00	227.27
Group IV 500 mg/kg/day							
211	6.5	0.5	5.8	0.3	0.0	0.0	825
212	8.9	1.0	7.3	0.5	0.1	0.0	753
213	15.1	1.5	12.7	0.8	0.2	0.0	770
214	8.5	0.5	7.5	0.5	0.0	0.0	901
215	12.4	0.4	11.9	0.1	0.0	0.0	653
216	6.6	0.8	5.3	0.5	0.1	0.0	1090
217	9.6	0.5	8.5	0.6	0.0	0.0	740
218	4.3	0.7	3.0	0.3	0.3	0.0	920
219	7.8	0.7	6.3	0.7	0.1	0.0	925
220	8.5	0.9	7.0	0.5	0.1	0.0	965
Mean	8.8	0.8	7.5	0.5	0.1	0.0	854.2
S.D.	3.07	0.33	2.93	0.20	0.10	0.00	129.58

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 MALES Day of Test 43

ANIMAL NUMBER	WBC $x10^3/ul$	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %	COMMENT
Group I	0 mg/kg/day							
1	8.0	0	9	83	8	0	0	
2	14.9	0	5	84	9	2	0	
3	15.4	0	7	86	7	0	0	
4	11.1	0	5	84	11	0	0	
5	9.5	0	9	89	2	0	0	
6	15.7	0	6	85	8	1	0	
7	10.5	0	12	77	10	1	0	
8	12.5	0	11	88	1	0	0	
9	10.4	0	7	87	5	1	0	
10	10.9	0	5	85	9	1	0	
Mean	11.9	0.0	7.6	84.8	7.0	0.6	0.0	
S.D.	2.64	0.00	2.55	3.33	3.33	0.70	0.00	
Group II	30 mg/kg/day							
61	13.8	0	5	89	5	1	0	
62	10.3	0	11	81	6	2	0	
63	12.4	0	15	77	6	2	0	
64	10.9	0	7	84	8	1	0	
65	15.1	0	5	86	9	0	0	
66	15.1	0	12	84	3	1	0	
67	8.5	0	7	91	1	1	0	
68	10.7	0	4	91	2	3	0	
69	12.4	0	9	77	13	1	0	
70	12.7	0	10	84	6	0	0	
Mean	12.2	0.0	8.5	84.4	5.9	1.2	0.0	
S.D.	2.13	0.00	3.54	5.08	3.54	0.92	0.00	

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 MALES Day of Test 43

ANIMAL NUMBER	WBC $x10^3/ul$	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %	COMMENT
Group III 125 mg/kg/day								
121	14.2	0	15	79	5	1	0	
122	24.2	0	3	92	5	0	0	200 cell differential
123	13.4	0	13	86	1	0	0	
124	13.3	0	9	85	5	1	0	
125	14.7	0	11	80	8	1	0	
126	10.3	0	7	85	8	0	0	
127	14.6	0	11	78	11	0	0	
128	9.7	0	14	78	7	1	0	
129	16.3	0	6	88	5	1	0	
130	10.5	0	12	82	6	0	0	
Mean	14.1	0.0	10.1	83.3	6.1	0.5	0.0	
S.D.	4.15	0.00	3.81	4.69	2.64	0.53	0.00	
Group IV 500 mg/kg/day								
181	7.9	0	11	83	5	1	0	
182	8.7	0	8	82	10	0	0	
183	10.7	0	11	87	2	0	0	
184	9.5	0	6	88	6	0	0	
185	9.2	0	8	88	2	2	0	
186	10.5	0	11	88	1	0	0	
187	16.2	0	1	85	13	1	0	
188	8.0	0	7	88	5	0	0	
189	15.3	0	8	87	5	0	0	
190	13.6	0	5	91	2	2	0	
Mean	11.0	0.0	7.6	86.7	5.1	0.6	0.0	
S.D.	3.02	0.00	3.13	2.67	3.84	0.84	0.00	

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 FEMALES Day of Test 43

ANIMAL NUMBER	WBC	NEUT NON SEG	NEUT SEG	LYMPH	MONO	EO	BASO	COMMENT
	x10^3/ul	%	%	%	%	%	%	
Group I	0 mg/kg/day							
31	5.8	0	10	86	0	4	0	
32	10.5	0	6	92	2	0	0	
33	8.9	0	5	84	9	2	0	
34[a]								
35	8.3	0	10	82	8	0	0	
36	8.4	0	4	88	8	0	0	
37	6.0	0	9	90	0	1	0	
38	9.5	0	4	87	6	3	0	
39	8.9	0	9	85	5	1	0	
40	12.6	0	9	83	8	0	0	
Mean	8.8	0.0	7.3	86.3	5.1	1.2	0.0	
S.D.	2.09	0.00	2.55	3.28	3.59	1.48	0.00	
Group II	30 mg/kg/day							
91	8.0	0	9	89	2	0	0	
92	14.9	0	7	88	4	1	0	
93	7.0	0	13	80	7	0	0	
94	8.6	0	12	82	5	1	0	
95	9.2	0	7	87	3	3	0	
96	8.7	0	7	88	5	0	0	
97	8.0	0	10	84	6	0	0	
98	8.8	0	2	91	3	4	0	
99[b]								
100	7.1	0	9	84	6	1	0	
Mean	8.9	0.0	8.4	85.9	4.6	1.1	0.0	
S.D.	2.36	0.00	3.24	3.59	1.67	1.45	0.00	

[a] broken tube
[b] clotted specimen

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 FEMALES Day of Test 43

ANIMAL NUMBER	WBC $x10^3/ul$	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %	COMMENT
Group III 125 mg/kg/day								
151	12.2	0	11	83	5	1	0	
152	6.5	0	14	83	2	1	0	
153	5.2	0	5	91	4	0	0	
154	11.0	0	4	90	6	0	0	
155	10.9	0	13	80	6	1	0	
156	9.0	0	12	87	1	0	0	
157	9.6	0	2	95	2	1	0	
158	5.5	0	14	84	2	0	0	
159	7.7	0	15	76	8	1	0	
160	7.6	0	13	80	7	0	0	
Mean	8.5	0.0	10.3	84.9	4.3	0.5	0.0	
S.D.	2.42	0.00	4.76	5.82	2.45	0.53	0.00	
Group IV 500 mg/kg/day								
211	6.5	0	7	89	4	0	0	
212	8.9	0	11	82	6	1	0	
213	15.1	0	10	84	5	1	0	
214	8.5	0	6	88	6	0	0	
215	12.4	0	3	96	1	0	0	
216	6.6	0	12	80	7	1	0	Rare HJB[a]
217	9.6	0	5	89	6	0	0	
218	4.3	0	17	70	7	6	0	
219	7.8	0	9	81	9	1	0	
220	8.5	0	11	82	6	1	0	
Mean	8.8	0.0	9.1	84.1	5.7	1.1	0.0	
S.D.	3.07	0.00	4.04	6.98	2.11	1.79	0.00	

[a] HJB = Howell Jolly Body

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values

TRL Study #032-006 MALES Day of Test 92

ANIMAL NUMBER	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group I	0 mg/kg/day						
11	8.45	46.2	15.3	8.4	55	18.1	33.1
12	8.78	48.4	16.0	8.7	55	18.2	33.1
13	7.57	42.8	14.3	14.6	56	18.9	33.4
14	8.36	50.1	16.1	7.3	60	19.3	32.1
15	8.16	44.6	15.0	12.1	55	18.4	33.6
16	7.87	43.8	14.8	12.8	56	18.8	33.8
17	7.97	43.5	14.3	9.2	54	17.9	32.9
18	7.30	41.8	14.2	7.5	57	19.5	34.0
19	7.98	44.5	14.6	6.2	56	18.3	32.8
20	6.88	41.9	14.5	9.2	61	21.1	34.6
Mean	7.93	44.8	14.9	9.6	56.5	18.9	33.3
S.D.	0.56	2.73	0.69	2.69	2.3	0.95	0.70
Group II	30 mg/kg/day						
71	8.22	45.1	14.7	9.8	55	17.9	32.6
72	8.19	44.9	15.5	9.1	55	18.9	34.5
73	7.79	41.5	13.8	8.0	53	17.7	33.3
74	7.46	40.4	13.9	8.5	54	18.6	34.4
75	7.84	44.4	15.2	11.6	56	19.4	34.2
76	7.45	43.8	14.6	12.3	59	19.6	33.3
77	8.29	45.7	15.3	16.5	55	18.5	33.5
78	8.06	43.0	14.2	14.4	53	17.6	33.0
79	7.68	43.5	15.3	15.5	57	19.9	35.2
80	7.87	42.5	14.2	9.2	54	18.0	33.4
Mean	7.89	43.5	14.7	11.5	55.1	18.6	33.7
S.D.	0.30	1.67	0.63	3.08	1.9	0.82	0.80

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values

TRL Study #032-006 MALES Day of Test 92

ANIMAL NUMBER	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group III 125 mg/kg/day							
131	8.09	45.4	15.3	9.4	56	18.9	33.7
132	6.70	36.8	12.5	8.6	55	18.7	34.0
134	6.69	38.6	13.2	13.1	57	19.7	34.2
135	7.89	44.6	15.0	11.8	56	19.0	33.6
136	8.85	48.6	16.3	11.2	55	18.4	33.5
137	8.06	44.8	15.0	9.0	55	18.6	33.5
138	8.08	45.7	15.1	11.4	56	18.7	33.0
139	7.86	43.6	14.1	13.7	55	17.9	32.3
140	7.97	44.6	14.7	8.7	56	18.4	33.0
141	8.17	47.0	15.2	12.6	57	18.6	32.3
Mean	7.84	44.0	14.6	11.0	55.8	18.7	33.3
S.D.	0.66	3.61	1.10	1.91	0.8	0.47	0.65
Group IV 500 mg/kg/day							
191	7.41	42.0	13.7	12.4	57	18.5	32.6
192	7.59	41.3	14.2	7.7	55	18.7	34.4
193	8.22	44.4	14.6	6.8	54	17.8	32.9
194	7.78	44.6	14.5	9.7	57	18.6	32.5
195	8.03	45.5	15.0	10.5	56	18.7	33.0
196	7.42	41.4	13.9	8.7	56	18.7	33.6
197	7.31	41.8	14.6	7.9	57	20.0	34.9
198	8.63	47.7	15.4	8.2	55	17.8	32.3
199	7.44	40.5	13.5	7.8	54	18.1	33.3
200	7.57	43.3	14.9	15.4	57	19.7	34.4
Mean	7.74	43.3	14.4	9.5	55.8	18.7	33.4
S.D.	0.43	2.27	0.60	2.64	1.2	0.72	0.90

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values

TRL Study #032-006 FEMALES Day of Test 92

ANIMAL NUMBER	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group I	0 mg/kg/day						
41	7.24	41.5	14.6	8.2	57	20.2	35.2
42	7.78	47.6	16.0	9.6	61	20.6	33.6
43	7.27	41.0	14.4	7.6	56	19.8	35.1
44	7.24	40.6	13.5	6.7	56	18.6	33.3
45	8.84	48.8	16.4	7.2	55	18.6	33.6
46	7.70	45.0	15.1	7.1	58	19.6	33.6
47	8.09	45.7	15.5	7.9	56	19.2	33.9
48	7.65	45.9	15.8	12.2	60	20.7	34.4
49	7.17	41.5	14.1	4.0	58	19.7	34.0
50	7.77	44.2	14.9	8.0	57	19.2	33.7
Mean	7.68	44.2	15.0	7.9	57.4	19.6	34.0
S.D.	0.51	2.91	0.91	2.09	1.9	0.74	0.66
Group II	30 mg/kg/day						
101	7.94	44.1	14.9	5.6	55	18.8	33.8
102	8.67	47.0	15.7	3.7	54	18.1	33.4
103	6.78	39.2	13.5	8.3	58	19.9	34.4
104	7.36	41.5	14.3	7.5	56	19.4	34.5
105	8.03	45.7	15.8	8.2	57	19.7	34.6
106	7.89	45.2	15.4	5.4	57	19.5	34.1
107	8.36	47.6	16.0	16.8	57	19.1	33.6
108	7.41	41.9	14.4	6.8	56	19.4	34.4
109	7.29	41.7	14.2	7.6	57	19.5	34.1
110	7.22	40.5	13.8	9.2	56	19.1	34.1
Mean	7.70	43.4	14.8	7.9	56.3	19.3	34.1
S.D.	0.58	2.88	0.89	3.52	1.2	0.51	0.40

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values

TRL Study #032-006 FEMALES Day of Test 92

ANIMAL NUMBER	RBC $x10^6$/ul	PCV %	HGB g/dl	WBC $x10^3$/ul	MCV fl	MCH pg	MCHC g/dl
Group III 125 mg/kg/day							
161	7.54	41.7	14.4	6.1	55	19.1	34.5
162	7.96	44.6	15.0	4.2	56	18.8	33.6
163	7.42	41.8	14.7	6.2	56	19.8	35.2
164	6.89	38.5	13.3	7.9	56	19.3	34.5
165	7.54	43.1	14.6	5.9	57	19.4	33.9
166	7.81	45.7	15.8	6.9	59	20.2	34.6
167	7.93	44.2	15.4	7.1	56	19.4	34.8
168	7.20	42.0	14.3	7.6	58	19.9	34.0
169	7.21	42.0	14.3	6.1	58	19.8	34.0
170	7.28	41.8	14.2	6.3	57	19.5	34.0
Mean	7.48	42.5	14.6	6.4	56.8	19.5	34.3
S.D.	0.35	2.00	0.69	1.04	1.2	0.41	0.49
Group IV 500 mg/kg/day							
221	7.33	41.3	14.5	9.8	56	19.8	35.1
222	7.64	42.9	14.8	7.6	56	19.4	34.5
223	8.18	44.0	14.6	6.8	54	17.8	33.2
225	7.26	41.9	14.3	8.3	57	19.7	34.1
226	7.19	42.2	14.3	5.4	59	19.9	33.9
227	8.36	45.1	15.3	6.7	54	18.3	33.9
228	7.67	43.2	14.9	6.5	56	19.4	34.5
229	8.20	44.9	15.1	5.0	55	18.4	33.6
230	7.56	43.2	15.0	6.2	57	19.8	34.7
231	8.12	49.2	16.0	10.7	60	19.7	32.5
Mean	7.75	43.8	14.9	7.3	56.4	19.2	34.0
S.D.	0.43	2.26	0.52	1.83	2.0	0.76	0.77

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 MALES Day of Test 92

ANIMAL NUMBER	WBC $x10^3/ul$	ABS. NEUT. $x10^3/ul$	ABS. LYMPH. $x10^3/ul$	ABS. MONO. $x10^3/ul$	ABS. EO. $x10^3/ul$	ABS. BASO. $x10^3/ul$	PLT $x10^3/ul$
Group I	0 mg/kg/day						
11	8.4	1.1	6.4	0.9	0.0	0.0	741
12	8.7	0.4	7.5	0.8	0.0	0.0	896
13	14.6	1.2	13.3	0.0	0.1	0.0	897
14	7.3	0.5	6.2	0.5	0.1	0.0	645
15	12.1	0.7	10.9	0.5	0.0	0.0	803
16	12.8	1.0	11.1	0.6	0.0	0.0	570
17	9.2	0.7	8.0	0.4	0.1	0.0	827
18	7.5	1.3	5.9	0.2	0.1	0.0	635
19	6.2	0.4	5.7	0.1	0.0	0.0	451
20	9.2	0.7	8.1	0.3	0.1	0.0	743
Mean	9.6	0.8	8.3	0.4	0.1	0.0	720.8
S.D.	2.69	0.33	2.60	0.29	0.05	0.00	145.04
Group II	30 mg/kg/day						
71	9.8	1.5	7.7	0.4	0.2	0.0	978
72	9.1	1.1	7.1	0.6	0.3	0.0	579
73	8.0	0.5	7.0	0.6	0.0	0.0	822
74	8.5	0.7	7.0	0.8	0.1	0.0	795
75	11.6	0.8	9.7	0.8	0.2	0.0	953
76	12.3	1.1	11.1	0.1	0.0	0.0	720
77	16.5	2.5	13.0	1.0	0.0	0.0	701
78	14.4	2.6	10.5	1.3	0.0	0.0	909
79	15.5	0.8	14.1	0.5	0.2	0.0	651
80	9.2	0.1	8.6	0.4	0.1	0.0	618
Mean	11.5	1.2	9.6	0.7	0.1	0.0	772.6
S.D.	3.08	0.82	2.57	0.34	0.11	0.00	141.56

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 MALES Day of Test 92

ANIMAL NUMBER	WBC $x10^3/ul$	ABS. NEUT. $x10^3/ul$	ABS. LYMPH. $x10^3/ul$	ABS. MONO. $x10^3/ul$	ABS. EO. $x10^3/ul$	ABS. BASO. $x10^3/ul$	PLT $x10^3/ul$
Group III 125 mg/kg/day							
131	9.4	0.8	8.1	0.5	0.0	0.0	754
132	8.6	0.9	7.2	0.5	0.0	0.0	557
134	13.1	5.2	7.2	0.5	0.1	0.0	1260
135	11.8	1.5	8.9	0.9	0.5	0.0	606
136	11.2	0.3	10.3	0.6	0.0	0.0	821
137	9.0	1.1	7.0	0.7	0.2	0.0	758
138	11.4	1.9	8.9	0.5	0.1	0.0	886
139	13.7	1.6	11.6	0.3	0.1	0.0	805
140	8.7	1.5	6.6	0.6	0.0	0.0	717
141	12.6	1.6	10.5	0.5	0.0	0.0	892
Mean	11.0	1.6	8.6	0.6	0.1	0.0	805.6
S.D.	1.91	1.34	1.71	0.16	0.16	0.00	192.95
Group IV 500 mg/kg/day							
191	12.4	0.4	11.8	0.2	0.0	0.0	889
192	7.7	1.0	6.5	0.2	0.1	0.0	869
193	6.8	0.6	5.8	0.3	0.1	0.0	611
194	9.7	1.1	7.9	0.6	0.2	0.0	711
195	10.5	0.8	9.2	0.3	0.1	0.0	725
196	8.7	1.0	7.0	0.7	0.0	0.0	707
197	7.9	1.8	5.1	1.0	0.0	0.0	663
198	8.2	1.4	6.4	0.4	0.0	0.0	608
199	7.8	0.9	5.9	0.9	0.0	0.0	801
200	15.4	1.8	13.1	0.2	0.3	0.0	616
Mean	9.5	1.1	7.9	0.5	0.1	0.0	720.0
S.D.	2.64	0.47	2.69	0.30	0.10	0.00	103.33

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 FEMALES Day of Test 92

ANIMAL NUMBER	WBC $x10^3/ul$	ABS. NEUT. $x10^3/ul$	ABS. LYMPH. $x10^3/ul$	ABS. MONO. $x10^3/ul$	ABS. EO. $x10^3/ul$	ABS. BASO. $x10^3/ul$	PLT $x10^3/ul$
Group I	0 mg/kg/day						
41	8.2	0.5	7.1	0.6	0.1	0.0	739
42	9.6	0.2	9.0	0.3	0.1	0.0	646
43	7.6	0.5	6.7	0.4	0.1	0.0	885
44	6.7	0.1	6.4	0.2	0.0	0.0	768
45	7.2	0.3	6.5	0.4	0.0	0.0	903
46	7.1	0.3	6.3	0.5	0.0	0.0	629
47	7.9	0.2	7.4	0.2	0.0	0.0	502
48	12.2	0.9	10.6	0.7	0.0	0.0	863
49	4.0	0.6	3.0	0.2	0.1	0.0	803
50	8.0	0.6	7.4	0.0	0.0	0.0	611
Mean	7.9	0.4	7.0	0.4	0.0	0.0	734.9
S.D.	2.09	0.24	1.96	0.21	0.05	0.00	134.02
Group II	30 mg/kg/day						
101	5.6	0.7	4.1	0.7	0.1	0.0	682
102	3.7	0.7	3.0	0.0	0.0	0.0	814
103	8.3	1.0	6.4	0.8	0.1	0.0	960
104	7.5	0.3	6.7	0.5	0.0	0.0	641
105	8.2	0.8	7.1	0.2	0.0	0.0	661
106	5.4	0.3	4.8	0.3	0.1	0.0	891
107	16.8	2.7	12.4	1.7	0.0	0.0	860
108	6.8	0.5	6.1	0.1	0.1	0.0	605
109	7.6	0.6	6.4	0.5	0.1	0.0	691
110	9.2	1.5	7.0	0.6	0.1	0.0	1073
Mean	7.9	0.9	6.4	0.5	0.1	0.0	787.8
S.D.	3.52	0.72	2.50	0.48	0.05	0.00	156.04

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 FEMALES Day of Test 92

ANIMAL NUMBER	WBC $x10^3/ul$	ABS. NEUT. $x10^3/ul$	ABS. LYMPH. $x10^3/ul$	ABS. MONO. $x10^3/ul$	ABS. EO. $x10^3/ul$	ABS. BASO. $x10^3/ul$	PLT $x10^3/ul$
Group III 125 mg/kg/day							
161	6.1	0.1	5.9	0.0	0.1	0.0	869
162	4.2	0.3	3.6	0.3	0.1	0.0	783
163	6.2	0.4	5.6	0.2	0.0	0.0	685
164	7.9	1.1	6.2	0.4	0.2	0.0	841
165	5.9	0.6	4.9	0.4	0.1	0.0	689
166	6.9	0.7	5.8	0.3	0.1	0.0	929
167	7.1	0.4	6.4	0.3	0.0	0.0	714
168	7.6	0.6	6.9	0.1	0.0	0.0	544
169	6.1	0.3	5.5	0.3	0.0	0.0	497
170	6.3	1.0	5.0	0.2	0.1	0.0	611
Mean	6.4	0.6	5.6	0.3	0.1	0.0	716.2
S.D.	1.04	0.32	0.92	0.13	0.07	0.00	141.09
Group IV 500 mg/kg/day							
221	9.8	1.4	8.1	0.2	0.1	0.0	839
222	7.6	0.3	7.1	0.2	0.0	0.0	443
223	6.8	0.9	5.3	0.6	0.0	0.0	793
225	8.3	0.3	7.7	0.2	0.0	0.0	803
226	5.4	0.3	4.6	0.5	0.1	0.0	832
227	6.7	0.8	5.5	0.4	0.0	0.0	752
228	6.5	0.5	5.5	0.4	0.1	0.0	932
229	5.0	0.5	4.5	0.1	0.0	0.0	627
230	6.2	0.4	5.3	0.6	0.0	0.0	590
231	10.7	0.1	10.4	0.2	0.0	0.0	883
Mean	7.3	0.6	6.4	0.3	0.0	0.0	749.4
S.D.	1.83	0.38	1.88	0.18	0.05	0.00	150.96

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 MALES Day of Test 92

ANIMAL NUMBER	WBC $x10^3/ul$	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %	COMMENT
Group I	0 mg/kg/day							
11	8.4	0	13	76	11	0	0	
12	8.7	0	5	86	9	0	0	
13	14.6	0	8	91	0	1	0	
14	7.3	0	7	85	7	1	0	
15	12.1	0	6	90	4	0	0	
16	12.8	0	8	87	5	0	0	
17	9.2	0	8	87	4	1	0	
18	7.5	0	17	79	3	1	0	Rare HJB[a]
19	6.2	0	6	92	2	0	0	
20	9.2	0	8	88	3	1	0	
Mean	9.6	0.0	8.6	86.1	4.8	0.5	0.0	
S.D.	2.69	0.00	3.66	5.09	3.33	0.53	0.00	
Group II	30 mg/kg/day							
71	9.8	0	15	79	4	2	0	
72	9.1	0	12	78	7	3	0	
73	8.0	0	6	87	7	0	0	
74	8.5	0	8	82	9	1	0	
75	11.6	0	7	84	7	2	0	
76	12.3	0	9	90	1	0	0	
77	16.5	0	15	79	6	0	0	
78	14.4	0	18	73	9	0	0	
79	15.5	0	5	91	3	1	0	
80	9.2	0	1	94	4	1	0	
Mean	11.5	0.0	9.6	83.7	5.7	1.0	0.0	
S.D.	3.08	0.00	5.30	6.70	2.63	1.05	0.00	

[a]HJB = Howell Jolly Body

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 MALES Day of Test 92

ANIMAL NUMBER	WBC $x10^3/ul$	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %	COMMENT
Group III 125 mg/kg/day								
131	9.4	0	9	86	5	0	0	
132	8.6	0	10	84	6	0	0	
134	13.1	0	40	55	4	1	0	
135	11.8	0	13	75	8	4	0	
136	11.2	0	3	92	5	0	0	
137	9.0	0	12	78	8	2	0	
138	11.4	0	17	78	4	1	0	
139	13.7	0	12	85	2	1	0	
140	8.7	0	17	76	7	0	0	
141	12.6	0	13	83	4	0	0	
Mean	11.0	0.0	14.6	79.2	5.3	0.9	0.0	
S.D.	1.91	0.00	9.79	9.99	1.95	1.29	0.00	
Group IV 500 mg/kg/day								
191	12.4	0	3	95	2	0	0	
192	7.7	0	13	84	2	1	0	
193	6.8	0	9	85	4	2	0	
194	9.7	0	11	81	6	2	0	
195	10.5	0	8	88	3	1	0	
196	8.7	0	11	81	8	0	0	
197	7.9	0	23	64	13	0	0	
198	8.2	0	17	78	5	0	0	1 NRBC[a]
199	7.8	0	12	76	12	0	0	
200	15.4	0	12	85	1	2	0	
Mean	9.5	0.0	11.9	81.7	5.6	0.8	0.0	
S.D.	2.64	0.00	5.32	8.19	4.20	0.92	0.00	

[a]NRBC = Nucleated Red Blood Cell

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 FEMALES Day of Test 92

ANIMAL NUMBER	WBC $x10^3$/ul	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %	COMMENT
Group I	0 mg/kg/day							
41	8.2	0	6	86	7	1	0	
42	9.6	0	2	94	3	1	0	
43	7.6	0	6	88	5	1	0	
44	6.7	0	1	96	3	0	0	
45	7.2	0	4	90	6	0	0	
46	7.1	0	4	89	7	0	0	
47	7.9	0	3	94	3	0	0	
48	12.2	0	7	87	6	0	0	
49	4.0	0	16	76	6	2	0	
50	8.0	0	7	93	0	0	0	
Mean	7.9	0.0	5.6	89.3	4.6	0.5	0.0	
S.D.	2.09	0.00	4.20	5.76	2.27	0.71	0.00	
Group II	30 mg/kg/day							
101	5.6	0	13	73	12	2	0	1 NRBC[a]
102	3.7	0	19	80	1	0	0	
103	8.3	0	12	77	10	1	0	
104	7.5	0	4	89	7	0	0	
105	8.2	0	10	87	3	0	0	
106	5.4	0	6	88	5	1	0	1 NRBC
107	16.8	0	16	74	10	0	0	
108	6.8	0	8	89	2	1	0	
109	7.6	0	8	84	7	1	0	
110	9.2	0	16	76	7	1	0	
Mean	7.9	0.0	11.2*	81.7*	6.4	0.7	0.0	
S.D.	3.52	0.00	4.85	6.43	3.66	0.67	0.00	

* P less than or equal to 0.05

[a]NRBC = Nucleated Red Blood Cell

Table 5 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Hematology Values - Differential

TRL Study #032-006 FEMALES Day of Test 92

ANIMAL NUMBER	WBC $x10^3/ul$	NEUT NON SEG %	NEUT SEG %	LYMPH %	MONO %	EO %	BASO %	COMMENT
Group III 125 mg/kg/day								
161	6.1	0	2	96	0	2	0	
162	4.2	0	7	85	6	2	0	
163	6.2	0	7	90	3	0	0	
164	7.9	0	14	79	5	2	0	
165	5.9	0	10	83	6	1	0	
166	6.9	0	10	84	5	1	0	
167	7.1	0	6	90	4	0	0	
168	7.6	0	8	91	1	0	0	
169	6.1	0	5	90	5	0	0	
170	6.3	0	16	80	3	1	0	
Mean	6.4	0.0	8.5	86.8	3.8	0.9	0.0	
S.D.	1.04	0.00	4.17	5.43	2.04	0.88	0.00	
Group IV 500 mg/kg/day								
221	9.8	0	14	83	2	1	0	
222	7.6	0	4	94	2	0	0	
223	6.8	0	13	78	9	0	0	
225	8.3	0	4	93	3	0	0	
226	5.4	0	5	85	9	1	0	
227	6.7	0	12	82	6	0	0	
228	6.5	0	7	85	6	2	0	
229	5.0	0	10	89	1	0	0	
230	6.2	0	6	85	9	0	0	
231	10.7	0	1	97	2	0	0	
Mean	7.3	0.0	7.6	87.1	4.9	0.4	0.0	
S.D.	1.83	0.00	4.40	5.99	3.28	0.70	0.00	

Table 6

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 MALES Day of Test -3

ANIMAL NUMBER	GLUC mg/dl	BUN mg/dl	ALK PHOS U/l	TP g/dl	ALB g/dl	GLOB g/dl	A/G
Group V	Baseline						
241	238.8	20.1	300.6	5.62	3.23	2.39	1.35
242	252.8	16.7	350.5	5.70	3.34	2.36	1.42
243	129.4	15.7	383.4	5.37	3.09	2.28	1.36
244	240.5	18.4	254.1	5.52	3.34	2.18	1.53
245	237.6	18.5	310.9	5.60	3.29	2.31	1.42
246	227.1	15.9	338.7	5.30	3.09	2.21	1.40
247	227.0	15.8	396.8	5.48	3.23	2.25	1.44
248	232.2	22.5	391.6	5.92	3.48	2.44	1.43
249	234.6	19.3	301.3	5.19	3.21	1.98	1.62
250	251.0	21.2	318.3	5.48	3.32	2.16	1.54
Mean	227.10	18.41	334.62	5.52	3.26	2.26	1.45
S.D.	35.41	2.39	46.36	0.21	0.12	0.13	0.09

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 FEMALES Day of Test -3

ANIMAL NUMBER	GLUC mg/dl	BUN mg/dl	ALK PHOS U/l	TP g/dl	ALB g/dl	GLOB g/dl	A/G
Group V	Baseline						
251	194.6	15.5	195.9	5.67	3.19	2.48	1.29
252	191.1	16.8	275.3	6.37	3.74	2.63	1.42
253	212.2	15.9	218.6	5.69	3.45	2.24	1.54
254	223.5	15.6	301.2	6.03	3.48	2.55	1.36
255	193.1	17.1	269.7	5.82	3.38	2.44	1.39
256	188.1	18.1	284.8	5.81	3.27	2.54	1.29
257	203.3	14.9	195.0	5.59	3.30	2.29	1.44
258	175.0	14.0	202.3	5.46	3.23	2.23	1.45
259	205.4	16.1	203.3	6.30	3.57	2.73	1.31
260	200.3	16.3	294.0	5.70	3.20	2.50	1.28
Mean	198.66	16.03	244.01	5.84	3.38	2.46	1.38
S.D.	13.52	1.15	44.51	0.30	0.18	0.17	0.09

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 MALES Day of Test -3

ANIMAL NUMBER	Na	K	Cl	TCO_2	CHOL	TOTL BILI	Ca	PHOS	SGOT	SGPT
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl	U/l	U/l
Group V		Baseline								
241	146.0	7.65	102.0	31.1	87.3	0.39	12.98	13.14	70.2	43.2
242	144.7	7.12	102.0	31.2	87.9	0.38	12.92	11.48	67.9	48.0
243	143.5	7.64	100.0	33.0	86.7	0.35	12.78	12.76	63.8	42.0
244	144.4	7.43	102.0	29.4	81.2	0.32	12.38	11.02	69.3	38.5
245	144.8	6.21	103.0	30.9	82.7	0.42	11.42	11.02	67.0	41.2
246	144.4	7.26	102.0	34.0	82.7	0.28	13.14	12.46	59.1	43.8
247	145.9	7.00	106.0	31.1	62.6	0.43	12.58	11.72	70.9	41.9
248	145.7	7.20	102.0	32.7	97.3	0.24	13.38	12.82	59.8	41.0
249	144.0	7.30	104.0	32.9	86.6	0.25	12.02	11.24	59.4	39.5
250	143.7	7.12	103.0	31.9	69.4	0.28	11.82	11.48	67.3	40.5
Mean	144.7	7.19	102.6	31.8	82.4	0.33	12.54	11.91	65.5	42.0
S.D.	0.90	0.41	1.58	1.34	9.86	0.07	0.63	0.80	4.60	2.65

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 FEMALES Day of Test -3

ANIMAL NUMBER	Na	K	Cl	TCO_2	CHOL	TOTL BILI	Ca	PHOS	SGOT	SGPT
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl	U/l	U/l
Group V		Baseline								
251	144.0	7.43	101.0	33.0	97.9	0.30	12.50	12.04	51.1	33.8
252	144.9	7.27	100.0	31.5	102.6	0.48	11.90	11.94	59.8	41.8
253	146.4	6.73	102.0	31.5	76.2	0.31	12.58	11.82	56.9	40.3
254	145.1	7.50	102.0	30.1	101.3	0.29	13.06	10.68	59.9	37.9
255	147.3	6.71	104.0	31.8	91.8	0.36	15.00	13.14	65.3	43.0
256	146.6	6.80	103.0	32.1	90.5	0.35	12.88	11.50	65.9	39.6
257	146.1	7.59	104.0	32.1	85.0	0.43	12.06	11.70	61.4	52.4
258	146.1	6.51	100.0	32.8	99.9	0.28	12.96	11.72	53.3	41.1
259	149.5	7.00	105.0	29.5	120.3	0.41	13.20	11.88	55.7	35.5
260	143.4	6.95	102.0	30.6	80.3	0.29	12.90	10.66	49.0	38.3
Mean	145.9	7.05	102.3	31.5	94.6	0.35	12.90	11.71	57.8	40.4
S.D.	1.74	0.38	1.70	1.13	12.77	0.07	0.85	0.70	5.69	5.08

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 MALES Day of Test 43

ANIMAL NUMBER	GLUC mg/dl	BUN mg/dl	A/G	TP g/dl	ALB g/dl	ALK PHOS U/l	SGOT U/l	SGPT U/l	GLOB g/dl	CREAT mg/dl
Group I	0 mg/kg/day									
1	307.9	16.6	1.12	6.31	3.33	151.9	53.0	33.0	2.98	0.6
2	259.2	19.3	1.11	7.12	3.75	137.9	47.0	31.8	3.37	0.7
3	229.1	21.2	0.94	7.00	3.39	110.2	45.9	27.5	3.61	0.6
4	228.5	18.9	1.12	6.48	3.42	190.7	51.2	38.2	3.06	0.6
5	307.5	18.8	1.13	6.76	3.59	187.4	52.0	26.9	3.17	0.6
6	345.6	17.2	0.99	6.87	3.41	109.2	39.9	22.3	3.46	0.6
7	330.6	18.8	1.25	6.65	3.69	211.2	68.0	42.1	2.96	0.7
8	303.0	22.4	0.94	7.85	3.81	220.8	51.6	32.0	4.04	0.7
9	196.8	19.7	1.10	6.41	3.36	160.7	51.0	34.3	3.05	0.6
10	241.6	15.2	1.10	7.04	3.69	234.6	63.8	46.6	3.35	0.6
Mean	275.0	18.8	1.08	6.85	3.54	171.5	52.3	33.5	3.31	0.63
S.D.	50.27	2.11	0.10	0.45	0.18	44.57	8.20	7.29	0.34	0.05
Group II	30 mg/kg/day									
61	210.2	22.2	1.06	7.29	3.75	219.7	56.7	36.4	3.54	0.7
62	246.9	17.7	1.06	6.38	3.28	164.8	45.6	28.3	3.10	0.6
63	324.3	21.8	1.00	6.87	3.43	117.4	48.6	26.8	3.44	0.8
64	303.2	21.1	0.93	7.11	3.42	178.6	44.9	28.5	3.69	0.6
65	276.3	14.7	1.01	6.73	3.39	160.4	45.5	24.4	3.34	0.6
66	244.0	17.8	1.11	6.66	3.51	100.3	39.4	27.6	3.15	0.7
67	355.6	19.1	1.05	7.27	3.72	146.2	48.4	40.2	3.55	0.7
68	252.7	19.4	1.11	6.53	3.43	200.9	46.0	24.9	3.10	0.7
69	275.9	14.3	1.02	6.37	3.22	146.1	41.2	23.8	3.15	0.6
70	355.0	19.3	0.99	7.01	3.48	175.1	46.2	32.4	3.53	0.8
Mean	284.4	18.7	1.03	6.82	3.46	161.0	46.3	29.3	3.36	0.68
S.D.	49.09	2.70	0.06	0.34	0.17	35.88	4.65	5.41	0.22	0.08

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 MALES Day of Test 43

ANIMAL NUMBER	GLUC mg/dl	BUN mg/dl	A/G	TP g/dl	ALB g/dl	ALK PHOS U/l	SGOT U/l	SGPT U/l	GLOB g/dl	CREAT mg/dl
Group III 125 mg/kg/day										
121	261.0	20.0	1.10	6.59	3.45	225.8	53.8	30.4	3.14	0.7
122	213.5	17.9	1.20	6.44	3.51	189.2	47.6	29.2	2.93	0.6
123	282.0	19.5	1.00	7.07	3.54	130.7	45.2	27.3	3.53	0.7
124	276.9	21.5	1.07	6.79	3.51	126.4	47.7	37.0	3.28	0.7
125	355.1	17.9	1.08	6.93	3.60	210.8	68.3	38.7	3.33	0.6
126	265.7	17.0	0.97	7.00	3.44	207.8	51.1	34.9	3.56	0.6
127	243.2	19.8	1.06	6.97	3.59	164.5	51.6	31.0	3.38	0.7
128	288.4	20.7	1.08	6.67	3.47	108.3	59.1	35.3	3.20	0.6
129	216.1	13.5	1.07	7.01	3.63	143.9	52.2	37.1	3.38	0.7
130	224.7	18.5	1.01	7.09	3.57	203.9	47.5	34.6	3.52	0.6
Mean	262.7	18.6	1.06	6.86	3.53	171.1	52.4	33.6	3.33	0.65
S.D.	42.43	2.28	0.06	0.22	0.07	41.73	6.86	3.82	0.20	0.05
Group IV 500 mg/kg/day										
181	289.0	18.5	1.13	6.38	3.38	112.8	47.4	31.4	3.00	0.6
182	379.4	15.2	1.03	6.80	3.45	131.7	63.3	44.5	3.35	0.7
183	278.6	22.1	0.98	6.68	3.31	141.8	53.1	33.8	3.37	0.7
184	248.3	16.4	1.10	6.46	3.38	103.3	42.6	31.8	3.08	0.6
185	289.7	18.5	1.00	6.79	3.40	132.8	45.8	31.8	3.39	0.7
186	190.8	23.7	1.03	7.02	3.57	105.5	42.2	30.4	3.45	0.6
187	213.8	20.4	1.08	6.52	3.38	182.1	48.8	34.8	3.14	0.7
188	207.4	19.7	1.05	6.69	3.43	146.4	52.2	34.0	3.26	0.7
189	231.8	16.0	1.25	6.18	3.43	148.7	48.8	26.7	2.75	0.7
190	295.2	17.5	1.15	6.31	3.38	138.9	46.1	32.0	2.93	0.6
Mean	262.4	18.8	1.08	6.58	3.41	134.4	49.0	33.1	3.17	0.66
S.D.	55.91	2.72	0.08	0.26	0.07	23.52	6.15	4.59	0.23	0.05

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 FEMALES Day of Test 43

ANIMAL NUMBER	GLUC mg/dl	BUN mg/dl	A/G	TP g/dl	ALB g/dl	ALK PHOS U/l	SGOT U/l	SGPT U/l	GLOB g/dl	CREAT mg/dl
Group I	0 mg/kg/day									
31	300.1	22.0	1.04	7.30	3.72	140.3	51.1	37.6	3.58	0.8
32	190.1	17.0	1.17	6.87	3.71	102.4	45.8	31.3	3.16	0.6
33	255.8	16.4	1.13	6.51	3.46	170.5	49.6	37.6	3.05	0.6
34	222.2	21.5	1.04	7.55	3.85	166.0	57.6	45.1	3.70	0.7
35	205.6	15.5	1.07	6.88	3.56	117.4	53.7	37.4	3.32	0.6
36	220.0	20.0	1.01	6.95	3.50	146.4	56.1	40.7	3.45	0.7
37	235.0	20.3	1.17	6.56	3.53	59.2	50.8	25.4	3.03	0.6
38	210.1	17.2	1.08	7.18	3.72	112.0	45.5	33.2	3.46	0.7
39	189.2	22.6	1.20	6.89	3.76	142.6	43.4	27.4	3.13	0.7
40	420.5	25.0	1.02	8.10	4.09	134.8	50.9	55.0	4.01	0.7
Mean	244.9	19.8	1.09	7.08	3.69	129.2	50.5	37.1	3.39	0.67
S.D.	70.00	3.12	0.07	0.48	0.19	32.90	4.61	8.68	0.32	0.07
Group II	30 mg/kg/day									
91	222.9	24.4	1.13	7.35	3.90	134.4	58.1	32.3	3.45	0.7
92	211.6	16.1	1.17	6.94	3.74	118.6	47.1	26.9	3.20	0.7
93	241.0	20.8	1.12	6.98	3.69	100.7	64.2	40.2	3.29	0.6
94	277.5	18.7	1.18	6.66	3.61	174.2	50.7	34.7	3.05	0.6
95	215.1	17.3	1.12	6.71	3.55	87.4	66.4	37.4	3.16	0.6
96	208.5	18.9	1.15	7.09	3.79	154.2	45.1	30.7	3.30	0.7
97	197.1	16.3	1.03	7.07	3.58	121.0	40.9	31.2	3.49	0.6
98	271.6	23.1	1.05	8.15	4.17	101.3	53.6	28.6	3.98	0.6
99	237.7	14.6	1.11	7.02	3.70	120.0	50.3	33.3	3.32	0.6
100	303.0	16.7	1.09	7.32	3.81	73.5	48.0	27.1	3.51	0.7
Mean	238.6	18.7	1.12	7.13	3.75	118.5	52.4	32.2	3.38	0.64
S.D.	34.82	3.19	0.05	0.42	0.18	30.26	8.23	4.33	0.26	0.05

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 FEMALES Day of Test 43

ANIMAL NUMBER	GLUC mg/dl	BUN mg/dl	A/G	TP g/dl	ALB g/dl	ALK PHOS U/l	SGOT U/l	SGPT U/l	GLOB g/dl	CREAT mg/dl
Group III 125 mg/kg/day										
151	185.7	12.5	1.06	7.45	3.83	113.6	74.1	44.1	3.62	0.7
152	350.0	21.9	1.03	7.26	3.69	173.9	45.1	31.1	3.57	0.6
153	270.8	19.2	1.15	6.98	3.73	115.7	51.0	28.5	3.25	0.6
154	230.8	15.4	1.12	7.24	3.82	71.6	52.2	41.4	3.42	0.7
155	256.9	18.0	1.21	7.11	3.89	99.8	37.6	31.8	3.22	0.6
156	267.3	24.4	1.10	8.35	4.37	112.8	43.8	36.4	3.98	0.7
157	214.5	12.1	1.18	6.94	3.76	80.6	47.8	33.9	3.18	0.7
158	227.8	15.5	1.14	6.87	3.66	77.3	48.6	32.3	3.21	0.6
159	235.9	15.1	1.02	6.97	3.52	117.9	55.7	29.8	3.45	0.6
160	190.8	16.2	1.09	7.76	4.05	127.1	47.4	31.9	3.71	0.6
Mean	243.1	17.0	1.11	7.29	3.83	109.0	50.3	34.1	3.46	0.64
S.D.	47.44	3.91	0.06	0.46	0.24	29.80	9.71	5.06	0.26	0.05
Group IV 500 mg/kg/day										
211	192.5	19.8	1.14	6.67	3.55	156.2	60.9	51.9	3.12	0.6
212	241.0	17.8	1.17	6.96	3.75	57.0	39.8	26.3	3.21	0.6
213	255.3	19.4	1.10	6.88	3.61	120.6	47.9	32.4	3.27	0.6
214	260.1	20.7	1.23	8.20	4.52	55.4	64.4	46.7	3.68	0.8
215	232.3	31.2	1.24	6.69	3.71	117.7	60.8	31.3	2.98	0.8
216	366.8	17.5	1.06	7.23	3.72	162.1	51.3	29.0	3.51	0.8
217	219.0	14.5	1.08	6.91	3.58	73.0	51.9	27.9	3.33	0.7
218	193.1	19.4	1.08	7.71	4.01	160.9	45.0	30.7	3.70	0.7
219	197.0	17.7	1.09	6.76	3.52	181.0	51.8	34.4	3.24	0.7
220	272.5	17.9	1.08	7.19	3.74	108.4	52.1	34.0	3.45	0.6
Mean	243.0	19.6	1.13	7.12	3.77	119.2	52.6	34.5	3.35	0.69
S.D.	52.17	4.42	0.07	0.49	0.30	45.90	7.62	8.31	0.23	0.09

TRL STUDY #032-006

Conducted for:

RESEARCH TRIANGLE INSTITUTE
P.O. Box 12194
Research Triangle Park, North Carolina 27709

by:

TOXICITY RESEARCH LABORATORIES, LTD.
510 West Hackley Avenue
Muskegon, Michigan 49444

Rat Oral Subchronic Toxicity Study

Compound:

Normal Butanol

Start of Test (pretreatment):	August 19, 1985
Interim Necropsy:	October 7 and 8, 1985
Final Necropsy:	November 25 and 26, 1985

TRL Study #032-006

Study Director: E. Crosby Tompkins by [illegible] 28 Oct 1987

E. Crosby Tompkins, Ph.D.
Diplomate, American Board of Toxicology

Date

Toxicologist: Randall Reed by [illegible] 28 Oct 1987

Randall Reed, B.A.

Date

Director of Pathology: Bobby Joe Payne 28 Oct '87

Bobby Joe Payne, D.V.M., M.S., Ph.D.
Diplomate, American College of Veterinary Pathologists

Date

Head, Clinical Pathology Lab: Aileen K. Tejchma 28 Oct. 1987

Aileen K. Tejchma, B.S., M.T. (ASCP)

Date

Histologist: Dorothy Jensen 28 Oct. '87

Dorothy Jensen, B.S., H.T.L. (ASCP)

Date

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 MALES Day of Test 43

ANIMAL NUMBER	Na	K	Cl	TCO_2	Ca	PHOS	CHOL	TOTL BILI
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl
Group I	0 mg/kg/day							
1	147.4	7.71	102.0	34.0	12.47	8.64	70.8	0.34
2	147.7	7.05	95.0	38.5	13.42	10.99	93.5	0.33
3	148.7	6.41	99.0	37.0	13.56	9.29	111.0	0.31
4	147.5	7.66	103.0	36.4	12.58	8.50	69.1	0.36
5	148.1	8.56	102.0	34.7	14.51	10.94	63.3	0.25
6	147.8	9.10	103.0	33.4	14.17	10.95	62.6	0.37
7	149.7	9.56	103.0	31.9	14.56	15.16	86.3	0.22
8	146.8	11.85	102.0	35.1	14.85	11.86	87.1	0.52
9	148.1	7.33	100.0	35.0	13.08	10.06	76.1	0.20
10	149.2	5.11	99.0	38.4	13.29	9.23	108.8	0.26
Mean	148.1	8.03	100.8	35.4	13.65	10.56	82.9	0.32
S.D.	0.88	1.86	2.57	2.14	0.84	1.97	17.58	0.09
Group II	30 mg/kg/day							
61	146.7	8.51	99.0	38.0	13.37	10.37	76.9	0.38
62	147.8	8.43	102.0	39.1	11.96	9.19	55.2	0.25
63	146.7	7.42	101.0	31.5	13.61	8.75	90.8	0.34
64	146.7	7.15	101.0	34.3	13.87	9.38	72.8	0.29
65	147.3	7.31	100.0	33.4	14.67	9.14	85.1	0.23
66	149.0	6.99	99.0	38.3	13.43	11.48	93.9	0.31
67	148.1	8.36	101.0	32.1	14.18	11.29	79.3	0.29
68	147.0	6.50	103.0	35.1	12.39	8.87	68.0	0.28
69	148.4	5.57	102.0	36.4	12.88	8.95	80.5	0.24
70	146.6	9.52	100.0	31.2	14.31	10.61	73.5	0.30
Mean	147.4	7.58	100.8	34.9	13.47	9.80	77.6	0.29
S.D.	0.85	1.14	1.32	2.92	0.86	1.04	11.26	0.05

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 MALES Day of Test 43

ANIMAL NUMBER	Na	K	Cl	TCO_2	Ca	PHOS	CHOL	TOTL BILI
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl
Group III	125 mg/kg/day							
121	149.4	8.58	104.0	34.8	13.21	9.66	67.7	0.35
122	148.9	6.01	99.0	40.6	13.27	11.75	98.3	0.24
123	146.2	7.55	102.0	33.5	13.39	8.33	63.1	0.31
124	148.5	7.39	103.0	33.2	13.23	9.28	60.7	0.32
125	147.9	8.87	102.0	33.5	14.61	11.48	80.5	0.26
126	147.6	8.01	100.0	33.9	13.02	10.51	60.3	0.30
127	148.7	6.60	99.0	38.3	14.64	9.40	90.2	0.37
128	146.3	8.49	101.0	35.4	13.13	9.45	65.5	0.25
129	151.2	5.85	102.0	35.8	12.25	8.00	99.7	0.20
130	150.6	5.56	99.0	40.4	13.29	8.78	66.9	0.33
Mean	148.5	7.29	101.1	35.9	13.40	9.66	75.3	0.29
S.D.	1.63	1.22	1.79	2.84	0.72	1.25	15.58	0.05
Group IV	500 mg/kg/day							
181	147.2	7.66	102.0	33.1	12.83	9.18	64.0	0.26
182	148.9	8.31	104.0	32.8	13.78	11.04	84.4	0.19
183	148.2	7.88	102.0	32.7	13.42	10.81	61.0	0.25
184	146.7	7.24	99.0	35.9	12.95	10.12	72.0	0.21
185	147.3	6.93	100.0	32.5	13.58	8.84	56.8	0.26
186	149.0	6.51	104.0	35.0	13.30	8.65	86.2	0.41
187	148.1	7.64	102.0	35.6	13.12	11.20	56.5	0.28
188	148.4	8.38	101.0	33.7	12.73	9.82	52.0	0.23
189	149.1	5.74	97.0	41.9	12.48	9.91	71.7	0.25
190	148.6	4.84	99.0	36.9	12.13	8.53	66.3	0.14
Mean	148.2	7.11	101.0	35.0	13.03	9.81	67.1*	0.25
S.D.	0.83	1.14	2.26	2.87	0.51	0.99	11.56	0.07

* P less than or equal to 0.05

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 FEMALES Day of Test 43

ANIMAL NUMBER	Na	K	Cl	TCO_2	Ca	PHOS	CHOL	TOTL BILI
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl
Group I	0 mg/kg/day							
31	142.5	10.49	103.0	31.8	13.93	9.74	81.6	0.32
32	146.4	7.82	103.0	30.4	12.52	9.59	67.3	0.25
33	148.0	6.72	104.0	34.3	12.52	9.23	69.2	0.23
34	148.6	5.82	104.0	35.5	12.88	6.70	71.8	0.35
35	146.9	7.61	103.0	33.4	12.44	7.02	99.7	0.22
36	145.1	7.38	102.0	34.2	13.54	8.62	73.1	0.24
37	145.7	7.33	105.0	29.5	11.77	7.68	73.8	0.19
38	148.7	7.87	103.0	33.6	12.47	8.30	86.3	0.26
39	145.9	7.71	101.0	34.2	12.56	9.00	72.7	0.28
40	145.6	10.37	102.0	28.6	13.62	13.76	88.5	0.51
Mean	146.3	7.91	103.0	32.6	12.83	8.96	78.4	0.29
S.D.	1.86	1.46	1.15	2.34	0.67	1.98	10.34	0.09
Group II	30 mg/kg/day							
91	144.9	8.69	103.0	34.0	13.27	7.13	85.4	0.33
92	145.5	7.43	100.0	35.8	12.18	10.05	96.3	0.33
93	145.4	7.53	103.0	33.3	12.85	8.12	55.7	0.33
94	146.0	7.07	102.0	35.3	12.59	7.43	62.7	0.17
95	146.0	8.02	103.0	31.6	12.34	8.51	95.3	0.26
96	145.4	8.26	99.0	33.7	12.77	9.42	62.5	0.37
97	147.2	7.06	105.0	34.5	12.72	7.63	93.2	0.35
98	146.3	7.67	101.0	34.7	13.81	7.56	79.3	0.29
99	143.4	8.27	101.0	33.1	12.66	8.41	65.0	0.19
100	146.9	9.03	105.0	29.3	13.25	11.59	90.2	0.21
Mean	145.7	7.90	102.2	33.5	12.84	8.59	78.6	0.28
S.D.	1.07	0.67	1.99	1.91	0.48	1.40	15.66	0.07

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 FEMALES Day of Test 43

ANIMAL NUMBER	Na	K	Cl	TCO_2	Ca	PHOS	CHOL	TOTL BILI
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl
Group III	125 mg/kg/day							
151	148.5	5.78	102.0	37.6	12.47	7.41	87.2	0.27
152	144.8	6.01	102.0	30.9	12.59	7.00	67.7	0.27
153	145.8	7.95	103.0	35.9	12.44	8.38	64.9	0.38
154	148.5	8.85	102.0	30.3	12.79	10.58	73.3	0.19
155	147.4	5.94	98.0	38.7	13.11	9.39	78.4	0.32
156	147.9	5.47	98.0	34.6	13.32	7.65	93.9	0.33
157	145.3	7.53	100.0	36.4	12.53	9.22	75.8	0.26
158	147.0	7.85	104.0	33.3	12.99	8.18	81.3	0.18
159	145.8	6.01	104.0	34.1	13.01	7.80	87.8	0.19
160	149.0	5.30	101.0	36.3	13.37	5.88	109.6	0.22
Mean	147.0	6.67	101.4	34.8	12.86	8.15	82.0	0.26
S.D.	1.49	1.25	2.17	2.73	0.35	1.33	13.29	0.07
Group IV	500 mg/kg/day							
211	146.2	6.24	103.0	36.1	11.59	6.80	63.3	0.25
212	145.8	7.20	102.0	33.4	12.37	8.36	82.0	0.18
213	148.3	7.65	103.0	34.5	14.03	10.64	79.3	0.36
214	148.9	6.14	102.0	28.4	12.96	8.98	83.1	0.27
215	146.2	8.37	100.0	38.3	12.76	11.51	79.6	0.34
216	143.7	10.33	103.0	30.2	13.93	11.82	88.2	0.24
217	148.3	4.65	103.0	35.1	12.30	6.95	80.0	0.20
218	146.7	5.12	102.0	35.8	12.71	5.63	73.9	0.32
219	147.5	8.61	106.0	33.4	13.09	9.35	59.0	0.21
220	147.2	6.74	104.0	32.3	13.03	8.79	69.3	0.25
Mean	146.9	7.11	102.8	33.8	12.88	8.88	75.8	0.26
S.D.	1.52	1.71	1.55	2.91	0.73	2.05	9.27	0.06

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 MALES Day of Test 92

ANIMAL NUMBER	GLUC mg/dl	BUN mg/dl	A/G	TP g/dl	ALB g/dl	ALK PHOS U/l	SGOT U/l	SGPT U/l	GLOB g/dl	CREAT mg/dl
Group I	0 mg/kg/day									
11	331.7	18.7	1.11	7.11	3.74	113.7	47.1	32.4	3.37	0.9
12	367.6	20.0	1.08	7.23	3.76	190.1	63.1	35.9	3.47	0.8
13	312.7	16.3	0.93	7.36	3.54	91.5	42.9	37.4	3.82	0.7
14	318.9	19.0	0.98	7.48	3.71	97.7	51.8	35.9	3.77	0.7
15	349.7	23.4	1.02	7.28	3.68	133.9	56.0	32.3	3.60	0.8
16	248.6	16.5	0.96	7.83	3.84	87.3	47.0	30.1	3.99	0.8
17	268.8	19.8	0.98	7.14	3.53	63.0	42.6	27.3	3.61	0.7
18	277.2	17.3	0.97	6.83	3.37	177.5	58.3	44.7	3.46	0.7
19	306.7	18.2	0.98	7.19	3.56	82.8	41.5	32.0	3.63	0.6
20	350.4	22.2	1.04	6.92	3.52	154.3	47.2	34.1	3.40	0.7
Mean	313.2	19.1	1.01	7.24	3.63	119.2	49.8	34.2	3.61	0.74
S.D.	38.78	2.31	0.06	0.28	0.14	42.99	7.32	4.74	0.20	0.08
Group II	30 mg/kg/day									
71	264.9	19.6	1.04	7.37	3.75	98.6	42.1	30.8	3.62	0.7
72	326.0	18.9	1.00	6.97	3.48	114.6	38.8	26.2	3.49	0.7
73	176.4	18.1	0.96	7.32	3.58	128.4	43.7	28.2	3.74	0.8
74	281.9	15.8	1.01	6.68	3.36	89.5	56.1	44.1	3.32	0.7
75	413.2	18.0	0.97	7.46	3.67	154.5	46.0	32.1	3.79	0.7
76	283.7	23.7	0.95	7.11	3.46	124.8	50.1	36.4	3.65	0.8
77	283.5	18.5	0.90	7.51	3.55	80.3	40.4	25.1	3.96	0.7
78	285.6	17.0	1.01	6.86	3.45	63.0	47.2	36.9	3.41	0.6
79	239.8	19.5	1.01	7.16	3.59	135.1	46.3	28.8	3.57	0.7
80	273.5	20.1	1.09	6.84	3.57	131.3	76.9	63.2	3.27	0.7
Mean	282.9	18.9	0.99	7.13	3.55	112.0	48.8	35.2	3.58	0.71
S.D.	60.05	2.11	0.05	0.29	0.11	28.37	11.07	11.40	0.22	0.06

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 MALES Day of Test 92

ANIMAL NUMBER	GLUC mg/dl	BUN mg/dl	A/G	TP g/dl	ALB g/dl	ALK PHOS U/l	SGOT U/l	SGPT U/l	GLOB g/dl	CREAT mg/dl
Group III 125 mg/kg/day										
131	335.8	14.1	1.00	7.29	3.64	76.2	40.7	34.2	3.65	0.6
132	334.1	19.0	0.94	6.63	3.22	75.9	47.9	28.4	3.41	0.7
134	337.9	19.7	0.83	7.91	3.58	68.0	59.8	41.1	4.33	0.7
135	186.9	17.7	0.85	6.80	3.12	141.1	53.5	43.3	3.68	0.6
136	215.1	16.4	1.18	7.10	3.85	99.9	59.2	43.3	3.25	0.7
137	288.2	18.1	1.09	6.91	3.60	75.5	43.4	26.7	3.31	0.6
138	277.3	17.2	1.00	7.09	3.54	76.2	53.4	37.8	3.55	0.8
139	341.2	19.3	0.85	7.89	3.62	159.3	55.2	45.2	4.27	0.7
140	233.9	20.3	0.95	7.10	3.46	72.8	43.1	28.6	3.64	0.7
141	316.0	15.9	1.01	6.89	3.46	82.7	46.0	29.6	3.43	0.7
Mean	286.6	17.8	0.97	7.16	3.51	92.8	50.2	35.8	3.65	0.68
S.D.	56.84	1.92	0.11	0.43	0.21	31.73	6.91	7.18	0.37	0.06
Group IV 500 mg/kg/day										
191	275.0	18.4	1.00	6.93	3.46	125.1	80.2	63.1	3.47	0.7
192	200.6	17.8	1.08	7.76	4.03	115.8	51.0	32.0	3.73	0.6
193	408.5	18.4	1.10	7.05	3.69	78.4	50.0	37.2	3.36	0.8
194	257.2	20.7	0.96	6.75	3.31	70.4	48.1	30.5	3.44	0.7
195	346.7	21.2	1.06	7.20	3.71	174.4	50.1	42.5	3.49	0.7
196	263.0	17.7	1.06	6.81	3.51	121.3	48.0	36.3	3.30	0.8
197	288.8	18.3	0.88	6.76	3.16	139.0	41.0	35.4	3.60	0.6
198	239.5	17.4	1.02	7.53	3.81	164.3	52.5	38.6	3.72	0.7
199	229.8	16.0	1.01	6.45	3.24	95.4	50.1	41.7	3.21	0.6
200	390.8	22.2	0.89	7.92	3.72	75.9	59.4	32.9	4.20	0.8
Mean	290.0	18.8	1.01	7.12	3.56	116.0	53.0	39.0	3.55	0.70
S.D.	69.61	1.93	0.08	0.48	0.28	36.38	10.56	9.32	0.28	0.08

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 FEMALES Day of Test 92

ANIMAL NUMBER	GLUC mg/dl	BUN mg/dl	A/G	TP g/dl	ALB g/dl	ALK PHOS U/l	SGOT U/l	SGPT U/l	GLOB g/dl	CREAT mg/dl
Group I	0 mg/kg/day									
41	217.4	15.6	1.26	7.60	4.24	76.7	53.2	38.6	3.36	0.7
42	251.5	12.7	1.21	7.64	4.19	46.4	39.5	25.7	3.45	0.6
43	263.9	18.6	1.18	7.60	4.11	73.2	46.9	30.4	3.49	0.8
44	262.3	23.8	1.11	8.66	4.56	59.2	47.1	36.4	4.10	0.8
45	496.1	18.4	1.12	8.10	4.28	79.4	51.6	31.9	3.82	0.9
46	183.9	24.1	1.18	7.20	3.89	160.1	55.3	41.2	3.31	0.7
47	264.5	16.9	0.99	7.61	3.79	65.1	93.8	76.6	3.82	0.7
48	246.2	14.7	1.05	7.53	3.85	37.8	42.1	32.8	3.68	0.7
49	194.1	15.9	1.07	8.94	4.63	46.0	94.3	96.1	4.31	0.6
50	224.6	14.3	1.11	6.75	3.55	73.7	63.4	50.6	3.20	0.8
Mean	260.5	17.5	1.13	7.76	4.11	71.8	58.7	46.0	3.65	0.73
S.D.	87.72	3.84	0.08	0.65	0.34	34.25	19.81	22.77	0.36	0.09
Group II	30 mg/kg/day									
101	248.9	15.9	1.03	8.67	4.39	58.1	42.5	42.5	4.28	0.6
102	380.0	25.3	1.03	8.04	4.07	82.0	50.5	30.6	3.97	1.1
103	246.0	18.7	1.16	8.57	4.60	55.5	129.4	124.5	3.97	0.7
104	301.1	14.6	1.22	7.28	4.00	54.6	51.0	30.1	3.28	0.8
105	298.6	15.6	1.14	7.37	3.92	108.2	49.6	32.4	3.45	0.7
106	281.4	22.8	1.02	8.30	4.20	97.4	52.1	36.2	4.10	0.8
107	341.3	18.8	0.78	8.02	3.51	63.5	45.1	32.9	4.51	0.7
108	287.8	14.3	1.08	7.62	3.95	100.4	73.6	44.6	3.67	0.7
109	231.3	18.2	1.04	8.04	4.10	114.0	51.0	41.1	3.94	0.7
110	216.0	17.3	0.94	8.06	3.90	97.8	65.6	55.7	4.16	0.7
Mean	283.2	18.2	1.04	8.00	4.06	83.2	61.0	47.1	3.93	0.75
S.D.	50.66	3.55	0.12	0.46	0.30	23.31	25.76	28.34	0.37	0.14

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 FEMALES Day of Test 92

ANIMAL NUMBER	GLUC mg/dl	BUN mg/dl	A/G	TP g/dl	ALB g/dl	ALK PHOS U/l	SGOT U/l	SGPT U/l	GLOB g/dl	CREAT mg/dl
Group III 125 mg/kg/day										
161	300.2	13.8	1.09	7.78	4.05	42.0	72.9	49.2	3.73	0.8
162	272.3	14.5	1.15	7.95	4.25	78.3	78.3	44.6	3.70	0.8
163	276.8	18.9	1.04	7.43	3.79	117.6	45.4	33.9	3.64	0.7
164	296.8	16.2	1.11	7.96	4.19	72.6	62.6	32.2	3.77	0.7
165	241.9	18.6	1.06	7.32	3.76	91.1	54.7	40.6	3.56	0.6
166	212.5	13.9	1.10	7.45	3.90	97.9	47.7	34.1	3.55	0.7
167	252.8	20.9	0.96	7.82	3.83	78.1	57.5	58.4	3.99	0.7
168	279.5	20.3	1.03	7.44	3.77	88.1	63.6	36.7	3.67	0.6
169	291.6	21.6	1.06	7.43	3.83	133.3	75.8	66.1	3.60	0.7
170	303.5	19.6	1.03	7.60	3.86	123.8	53.4	34.7	3.74	0.8
Mean	272.8	17.8	1.06	7.62	3.92	92.3	61.2	43.1	3.70	0.71
S.D.	29.20	2.98	0.05	0.24	0.18	27.24	11.54	11.57	0.13	0.07
Group IV 500 mg/kg/day										
221	220.6	19.3	1.03	7.47	3.79	42.5	53.2	28.6	3.68	0.8
222	283.6	19.1	1.04	7.50	3.83	128.4	43.4	26.1	3.67	0.7
223	265.9	13.0	1.09	7.06	3.68	43.8	56.2	30.5	3.38	0.7
225	323.4	17.8	1.13	7.15	3.79	40.3	55.7	34.1	3.36	0.8
226	240.0	15.6	1.06	9.48	4.87	81.3	347.2	158.7	4.61	0.7
227	274.2	16.1	1.06	7.62	3.92	38.7	54.9	38.0	3.70	0.7
228	288.7	17.8	1.03	7.80	3.96	96.9	48.4	41.7	3.84	0.7
229	314.4	18.1	1.11	8.13	4.27	37.8	42.1	27.6	3.86	0.9
230	258.3	17.8	1.21	7.14	3.91	93.2	40.4	28.6	3.23	0.7
231	237.3	18.7	1.19	8.37	4.54	125.7	44.0	35.4	3.83	0.7
Mean	270.6	17.3	1.10	7.77	4.06	72.9	78.6	44.9	3.72	0.74
S.D.	33.22	1.93	0.06	0.74	0.38	36.76	94.59	40.29	0.38	0.07

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 MALES Day of Test 92

ANIMAL NUMBER	Na	K	Cl	TCO_2	Ca	PHOS	CHOL	TOTL BILI
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl
Group I	0 mg/kg/day							
11	148.9	8.27	103.0	34.0	14.40	9.39	97.8	0.24
12	149.7	8.86	104.0	28.8	13.93	11.76	67.9	0.24
13	146.3	9.13	98.0	38.1	12.96	9.35	99.7	0.22
14	146.8	8.27	100.0	35.5	13.47	8.21	80.5	0.19
15	145.6	9.00	99.0	36.7	13.78	10.09	92.2	0.31
16	146.7	8.16	97.0	36.3	13.36	8.92	131.6	0.34
17	147.2	7.41	102.0	34.7	13.12	7.98	121.9	0.38
18	148.9	4.77	100.0	38.2	12.00	5.69	82.8	0.10
19	146.8	7.16	99.0	35.8	12.50	7.50	88.3	0.23
20	146.8	8.62	102.0	34.5	13.17	8.48	97.8	0.24
Mean	147.4	7.97	100.4	35.3	13.27	8.74	96.1	0.25
S.D.	1.33	1.29	2.27	2.68	0.70	1.62	18.96	0.08
Group II	30 mg/kg/day							
71	147.7	7.71	101.0	34.6	13.89	9.33	96.8	0.25
72	147.5	8.49	102.0	36.7	13.74	9.44	85.0	0.23
73	147.7	7.83	98.0	37.3	13.30	10.91	84.5	0.20
74	149.9	5.51	101.0	36.7	12.39	7.90	95.0	0.22
75	146.0	10.51	100.0	36.4	14.78	11.94	80.9	0.28
76	146.1	7.70	101.0	38.4	13.09	8.17	80.4	0.22
77	145.6	8.20	97.0	36.8	13.68	9.43	108.1	0.31
78	148.8	6.94	97.0	41.9	13.48	10.12	94.7	0.21
79	149.1	5.35	97.0	39.6	12.50	7.37	90.6	0.20
80	145.0	10.73	101.0	35.0	12.44	8.98	77.8	0.21
Mean	147.3	7.90	99.5	37.3	13.33	9.36	89.4	0.23
S.D.	1.63	1.78	2.01	2.16	0.76	1.39	9.41	0.04

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 MALES Day of Test 92

ANIMAL NUMBER	Na	K	Cl	TCO_2	Ca	PHOS	CHOL	TOTL BILI
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl
Group III 125 mg/kg/day								
131	146.5	6.85	98.0	35.4	12.61	7.66	82.4	0.18
132	145.9	8.13	102.0	37.4	12.88	7.56	97.1	0.14
134	146.0	7.84	99.0	32.8	13.16	7.66	112.5	0.18
135	149.0	5.99	100.0	37.7	12.47	8.63	92.0	0.17
136	149.5	7.37	99.0	36.2	13.66	10.87	98.9	0.30
137	149.9	8.17	101.0	37.5	13.56	9.96	97.0	0.22
138	149.8	6.91	102.0	33.6	12.46	7.79	75.9	0.16
139	146.3	6.56	99.0	34.1	13.84	7.55	119.7	0.26
140	146.1	8.13	99.0	36.3	12.64	7.33	82.6	0.23
141	147.3	8.72	101.0	35.2	12.90	6.92	62.5	0.11
Mean	147.6	7.47	100.0	35.6	13.02	8.19	92.1	0.20
S.D.	1.71	0.87	1.41	1.71	0.51	1.26	16.98	0.06
Group IV 500 mg/kg/day								
191	148.1	7.46	102.0	34.9	13.20	8.43	80.0	0.19
192					12.30	6.61	110.1	0.26
193	147.5	8.02	101.0	34.2	13.49	6.80	102.4	0.17
194	148.7	7.67	100.0	38.5	12.61	9.93	98.6	0.13
195	148.2	8.97	100.0	35.2	13.21	9.14	83.4	0.29
196	148.1	6.81	98.0	39.0	12.29	8.05	92.1	0.14
197	146.3	7.99	101.0	37.6	11.48	7.73	86.3	0.14
198	147.3	8.04	100.0	35.2	13.40	10.54	101.7	0.23
199	148.8	6.30	102.0	39.9	12.59	8.67	54.0	0.19
200	146.8	5.52	99.0	35.4	13.54	7.31	123.3	0.27
207[a]	146.7	8.29	99.0	37.6				
Mean	147.7	7.51	100.2	36.8	12.81	8.32	93.2	0.20
S.D.	0.86	1.02	1.32	2.00	0.67	1.29	18.95	0.06

[a] substituted #207 for #192

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 FEMALES Day of Test 92

ANIMAL NUMBER	Na	K	Cl	TCO_2	Ca	PHOS	CHOL	TOTL BILI
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl
Group I	0 mg/kg/day							
41	144.1	8.35	99.0	34.5	13.12	9.38	98.6	0.21
42	145.2	7.88	101.0	30.3	12.89	9.52	101.1	0.17
43	146.0	8.10	98.0	33.4	12.77	7.01	98.9	0.20
44	143.1	8.44	98.0	33.4	14.21	7.53	107.6	0.23
45	146.0	10.59	98.0	20.8	14.86	16.84	93.6	0.24
46	147.5	8.16	105.0	36.5	13.66	7.95	87.9	0.25
47	146.1	8.69	100.0	31.1	13.10	7.85	112.3	0.31
48	147.2	7.42	101.0	32.8	13.28	8.00	111.7	0.17
49	146.9	6.40	99.0	35.6	13.58	7.66	141.3	0.20
50	146.8	7.95	102.0	34.4	12.63	6.99	93.4	0.14
Mean	145.9	8.20	100.1	32.3	13.41	8.87	104.6	0.21
S.D.	1.40	1.06	2.23	4.45	0.69	2.93	15.17	0.05
Group II	30 mg/kg/day							
101	146.8	6.70	101.0	38.0	13.52	5.44	80.9	0.23
102	147.7	7.75	102.0	28.6	13.89	7.01	104.8	0.20
103	148.4	5.68	99.0	36.4	12.91	6.08	123.5	0.18
104	147.0	7.33	99.0	36.3	13.26	7.51	85.0	0.16
105	145.8	7.28	100.0	35.9	12.97	7.36	90.0	0.18
106	144.6	8.90	100.0	33.0	13.75	8.58	96.8	0.13
107	144.8	7.93	98.0	34.2	12.78	7.97	108.9	0.19
108	147.1	8.37	102.0	30.4	12.74	8.59	99.9	0.19
109	144.0	7.78	98.0	36.6	13.10	6.61	103.7	0.24
110	144.3	7.45	101.0	33.0	12.93	7.60	94.4	0.17
Mean	146.1	7.52	100.0	34.2	13.19	7.28	98.8	0.19
S.D.	1.56	0.89	1.49	3.00	0.41	1.02	12.41	0.03

Table 6 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Serum Chemistry Values

TRL Study #032-006 FEMALES Day of Test 92

ANIMAL NUMBER	Na	K	Cl	TCO_2	Ca	PHOS	CHOL	TOTL BILI
	meq/l	meq/l	mmol/l	mmol/l	mg/dl	mg/dl	mg/dl	mg/dl
Group III	125 mg/kg/day							
161	146.4	8.31	102.0	33.6	13.02	7.42	89.0	0.26
162	148.4	6.84	103.0	32.3	13.83	7.78	112.0	0.13
163	147.8	6.91	102.0	33.4	12.94	5.86	80.5	0.18
164	146.7	8.00	99.0	28.0	13.47	9.86	102.5	0.19
165	145.7	8.15	100.0	32.7	13.52	9.47	117.6	0.17
166	149.6	5.48	100.0	38.1	12.00	7.03	76.3	0.17
167	144.4	7.90	101.0	32.5	12.82	6.45	91.5	0.12
168	144.0	8.14	101.0	29.1	12.26	7.13	95.0	0.20
169	145.5	7.59	101.0	37.8	13.50	7.32	104.3	0.22
170	146.1	6.67	103.0	35.1	13.20	6.09	130.8	0.27
Mean	146.5	7.40	101.2	33.3	13.06	7.44	100.0	0.19
S.D.	1.74	0.90	1.32	3.24	0.58	1.32	16.96	0.05
Group IV	500 mg/kg/day							
221	145.2	7.55	103.0	31.8	12.29	7.24	72.8	0.14
222	145.0	6.55	100.0	39.4	13.24	6.96	84.4	0.21
223	145.7	8.32	100.0	36.3	12.95	8.39	88.6	0.22
225	146.0	8.11	102.0	33.2	13.06	7.96	95.4	0.11
226	145.2	6.90	97.0	34.4	14.32	6.58	141.7	0.26
227	147.4	8.72	103.0	34.0	13.82	7.84	89.4	0.15
228	147.2	5.38	98.0	34.7	12.62	4.53	102.6	0.16
229	146.3	8.83	102.0	27.2	14.17	11.10	118.9	0.12
230	147.3	7.27	103.0	33.1	13.24	7.81	62.9	0.23
231	146.6	7.45	100.0	32.1	14.69	10.55	129.9	0.22
Mean	146.2	7.51	100.8	33.6	13.44	7.90	98.7	0.18
S.D.	0.92	1.06	2.15	3.16	0.78	1.88	24.95	0.05

Table 7 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Urinalysis Values

TRL Study #032-006 MALES Day of Test -4

ANIMAL NUMBER	SPECIFIC GRAVITY	pH
Group V	Baseline	
241	1.014	7.0
242	1.016	6.5
243	1.009	7.0
244	1.018	6.0
245	1.010	7.0
246	1.007	6.5
247	1.005	7.0
248	1.007	7.0
249	1.010	7.0
250	1.010	7.5
Mean	1.011	6.9
S.D.	0.004	0.41

Table 7 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Urinalysis Values

TRL Study #032-006 FEMALES Day of Test -4

ANIMAL NUMBER	SPECIFIC GRAVITY	pH
Group V	Baseline	
251	1.008	7.0
252	1.005	7.5
253	1.009	7.5
254	1.010	7.0
255	1.007	7.5
256	1.010	7.0
257	1.007	7.0
258	1.007	8.0
259	1.005	7.0
260	1.014	8.0
Mean	1.008	7.4
S.D.	0.003	0.41

Table 7 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Urinalysis Values

TRL Study #032-006 MALES Day of Test 39

ANIMAL NUMBER	SPECIFIC GRAVITY	pH
Group I	0 mg/kg/day	
1	1.019	9.0
2	1.012	8.0
3	1.010	8.0
4	1.022	8.0
5	1.007	8.5
6	1.027	8.5
7	1.011	8.0
8	1.009	8.0
9	1.014	9.0
10	1.007	8.0
Mean	1.014	8.3
S.D.	0.007	0.42
Group II	30 mg/kg/day	
61	1.011	9.0
62	1.019	8.5
63	1.029	8.5
64	1.030	8.5
65	1.023	8.5
66	1.012	9.0
67	1.009	9.0
68	1.010	9.0
69	1.014	9.0
70	1.008	8.5
Mean	1.017	8.8*
S.D.	0.008	0.26

* P less than or equal to 0.05

Table 7 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Urinalysis Values

TRL Study #032-006 MALES Day of Test 39

ANIMAL NUMBER	SPECIFIC GRAVITY	pH
Group III	125 mg/kg/day	
121	1.015	8.0
122	1.009	8.5
123	1.011	8.5
124	1.042	8.0
125	1.012	9.0
126	1.011	8.0
127	1.027	8.5
128	1.017	9.0
129	1.009	9.0
130	1.011	8.5
Mean	1.016	8.5
S.D.	0.010	0.41
Group IV	500 mg/kg/day	
181	1.005	8.0
182	1.009	8.5
183	1.006	8.0
184	1.011	9.0
185	1.023	9.0
186	1.017	9.0
187	1.016	8.5
188	1.008	8.0
189	1.010	8.5
190	1.010	9.0
Mean	1.012	8.6
S.D.	0.006	0.44

Table 7 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Urinalysis Values

TRL Study #032-006 FEMALES Day of Test 39

ANIMAL NUMBER	SPECIFIC GRAVITY	pH
Group I	0 mg/kg/day	
31	1.005	8.5
32	1.007	8.5
33	1.010	8.0
34	1.006	8.5
35	1.013	9.0
36	1.011	8.0
37	1.005	9.0
38	1.014	9.0
39	1.007	8.5
40	1.012	8.5
Mean	1.009	8.6
S.D.	0.003	0.37
Group II	30 mg/kg/day	
91	1.010	9.0
92	1.011	9.0
93	1.010	9.0
94	1.014	9.0
95	1.012	9.0
96	1.010	9.0
97	1.013	8.0
98	1.010	9.0
99	1.009	8.5
100	1.006	9.0
Mean	1.011	8.9
S.D.	0.002	0.34

Table 7 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Urinalysis Values

TRL Study #032-006 FEMALES Day of Test 39

ANIMAL NUMBER	SPECIFIC GRAVITY	pH
Group III	125 mg/kg/day	
151	1.006	8.0
152	1.004	8.0
153	1.016	8.5
154	1.005	8.5
155	1.014	8.5
156	1.015	9.0
157	1.005	8.5
158	1.007	8.0
159	1.022	9.0
160	1.010	9.0
Mean	1.010	8.5
S.D.	0.006	0.41
Group IV	500 mg/kg/day	
211	1.012	9.0
212	1.011	8.0
213	1.008	9.0
214	1.005	7.5
215	1.015	9.0
216	1.007	8.5
217	1.010	9.0
218	1.009	9.0
219	1.011	8.5
220	1.012	8.5
Mean	1.010	8.6
S.D.	0.003	0.52

Table 7 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Urinalysis Values

TRL Study #032-006 FEMALES Day of Test 88

ANIMAL NUMBER	SPECIFIC GRAVITY	pH
Group III	125 mg/kg/day	
161	1.010	9.0
162	1.008	9.0
163	1.005	7.5
164	1.005	7.5
165	1.005	7.5
166	1.004	7.0
167	1.007	8.0
168	1.023	5.5
169	1.018	5.5
170	1.008	8.5
Mean	1.009	7.5
S.D.	0.006	1.25
Group IV	500 mg/kg/day	
221	1.006	8.0
222	1.013	5.5
223	1.006	8.0
225	1.008	8.0
226	1.006	7.5
227	1.008	8.0
228	1.013	9.0
229	1.005	7.5
230	1.010	7.5
231	1.004	6.5
Mean	1.008	7.6
S.D.	0.003	0.96

Table 7 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Urinalysis Values

TRL Study #032-006 FEMALES Day of Test 88

ANIMAL NUMBER	SPECIFIC GRAVITY	pH
Group I	0 mg/kg/day	
41	1.004	7.0
42	1.010	7.0
43	1.012	7.5
44	1.005	7.0
45	1.004	8.0
46	1.006	6.5
47	1.004	6.0
48	1.005	7.0
49	1.005	6.5
50	1.008	6.5
Mean	1.006	6.9
S.D.	0.003	0.57
Group II	30 mg/kg/day	
101	1.006	7.0
102	1.006	8.0
103	1.008	7.0
104	1.007	7.5
105	1.006	7.5
106	1.008	8.0
107	1.005	7.5
108	1.007	8.0
109	1.005	8.0
110	1.006	8.0
Mean	1.006	7.7*
S.D.	0.001	0.41

* P less than or equal to 0.05

Table 7 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Urinalysis Values

TRL Study #032-006 MALES Day of Test 88

ANIMAL NUMBER	SPECIFIC GRAVITY	pH
Group III	125 mg/kg/day	
131	1.026	9.0
132	1.006	8.5
134	1.027	9.0
135	1.021	9.0
136	1.032	8.0
137	1.016	8.5
138	1.006	8.0
139	1.016	9.0
140	1.023	9.0
141	1.011	8.5
Mean	1.018	8.7
S.D.	0.009	0.41
Group IV	500 mg/kg/day	
191	1.026	8.0
192	1.023	9.0
193	1.007	9.0
194	1.006	8.5
195	1.006	8.5
196	1.007	7.5
197	1.009	8.5
198	1.022	8.0
199	1.021	7.5
200	1.040	9.0
Mean	1.017	8.4
S.D.	0.012	0.58

Table 7 (cont'd.)

Rat Oral Subchronic Toxicity Study of Normal Butanol

Urinalysis Values

TRL Study #032-006 MALES Day of Test 88

ANIMAL NUMBER	SPECIFIC GRAVITY	pH
Group I	0 mg/kg/day	
11	1.024	8.0
12	1.008	8.5
13	1.025	8.0
14	1.022	7.5
15	1.014	9.0
16	1.023	7.5
17	1.014	8.5
18	1.010	9.0
19	1.025	8.5
20	1.029	8.5
Mean	1.019	8.3
S.D.	0.007	0.54
Group II	30 mg/kg/day	
71	1.012	8.5
72	1.028	8.0
73	1.016	8.0
74	1.011	8.5
75	1.020	8.5
76	1.006	8.0
77	1.010	7.5
78	1.012	8.5
79	1.010	9.0
80	1.020	8.5
Mean	1.015	8.3
S.D.	0.007	0.42

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values

TRL Study #032-006

Day of Test -4

Group V 0 mg/kg/day (baseline)

MALES

Animal Number	241	242	243	244	245	246	247	248	249	250
Specific Gravity	1.014	1.016	1.009	1.018	1.010	1.007	1.005	1.007	1.010	1.010
pH	7.0	6.5	7.0	6.0	7.0	6.5	7.0	7.0	7.0	7.5
Protein: Chemstrip	0	0	0	0	0	0	0	0	0	0
Supernatant	--	--	--	--	--	--	--	--	--	--
Glucose	0	0	0	0	0	0	0	0	0	0
Ketones	0	0	0	0	0	0	0	0	0	0
Bilirubin	0	0	0	0	0	0	0	0	0	0
Urobilinogen	0	0	0	0	0	0	0	0	0	0
Occult Blood	0	0	0	50	0	0	0	0	0	0
Leukocytes	0	0	0	trace	0	0	0	0	0	0
Nitrite	0	0	0	positive	0	positive	0	0	0	0
Casts/LPF	--	--	--	0	--	0	--	--	--	--
Epith. Cells/LPF	--	--	--	0	--	0	--	--	--	--
Phos. Cryst./LPF	--	--	--	0	--	0	--	--	--	--
Other Cryst./LPF	--	--	--	0	--	0	--	--	--	--
RBC/HPF	--	--	--	0	--	0	--	--	--	--
WBC/HPF	--	--	--	0	--	0	--	--	--	--
Yeast/HPF	--	--	--	0	--	0	--	--	--	--
Bacteria	--	--	--	0	--	0	--	--	--	--

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values

TRL Study #032-006

Day of Test -4

Group V 0 mg/kg/day (baseline)

FEMALES

Animal Number	251	252	253	254	255	256	257	258	259	260
Specific Gravity	1.008	1.005	1.009	1.010	1.007	1.010	1.007	1.007	1.005	1.014
pH	7.0	7.5	7.5	7.0	7.5	7.0	7.0	8.0	7.0	8.0
Protein: Chemstrip	0	0	0	0	0	0	0	0	0	0
Supernatant	--	--	--	--	--	--	--	--	--	--
Glucose	0	0	0	0	0	0	0	0	0	0
Ketones	0	0	0	0	0	0	0	0	0	0
Bilirubin	0	0	0	0	0	0	0	0	0	0
Urobilinogen	0	0	0	0	0	0	0	0	0	0
Occult Blood	0	0	0	0	0	0	0	0	0	0
Leukocytes	0	0	0	0	0	0	0	0	0	0
Nitrite	0	0	0	0	0	0	0	0	0	0
Casts/LPF	--	--	--	--	--	--	--	--	--	--
Epith. Cells/LPF	--	--	--	--	--	--	--	--	--	--
Phos. Cryst./LPF	--	--	--	--	--	--	--	--	--	--
Other Cryst./LPF	--	--	--	--	--	--	--	--	--	--
RBC/HPF	--	--	--	--	--	--	--	--	--	--
WBC/HPF	--	--	--	--	--	--	--	--	--	--
Yeast/HPF	--	--	--	--	--	--	--	--	--	--
Bacteria	--	--	--	--	--	--	--	--	--	--

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values

TRL Study #032-006

Day of Test 39

Group I 0 mg/kg/day

MALES

Animal Number	001	002	003	004	005	006	007	008	009	010
Specific Gravity	1.019	1.012	1.010	1.022	1.007	1.027	1.011	1.009	1.014	1.007
pH	9.0	8.0	8.0	8.0	8.5	8.5	8.0	8.0	9.0	8.0
Protein: Chemstrip	trace	0	0	trace	0	trace	0	0	0	0
Supernatant	trace	--	--	trace	--	trace	--	--	--	--
Glucose	0	0	0	0	0	0	0	0	0	0
Ketones	0	0	0	1+	0	1+	0	0	0	0
Bilirubin	0	0	0	0	0	0	0	0	0	0
Urobilinogen	0	0	0	0	0	0	0	0	0	0
Occult Blood	10	0	10	0	0	0	0	10	10	0
Leukocytes	1+	trace	1+	trace	0	trace	0	trace	0	0
Nitrite	0	0	0	0	0	0	0	0	0	0
Casts/LPF	0	0	0	0	--	0	--	0	0	--
Epith. Cells/LPF	0	0	0	0	--	0	--	0	0	--
Phos. Cryst./LPF	5	0	0	8	--	130	--	0	0	--
Other Cryst./LPF	0	0	0	0	--	0	--	0	0	--
RBC/HPF	0	0	0	0	--	0	--	0	0	--
WBC/HPF	0	0	0	0	--	0	--	0	0	--
Yeast/HPF	0	0	0	0	--	0	--	0	0	--
Bacteria	0	0	0	1+	--	0	--	0	1+	--

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values

TRL Study #032-006

Day of Test 39

Group II 30 mg/kg/day

MALES

Animal Number	061	062	063	064	065	066	067	068	069	070
Specific Gravity	1.011	1.019	1.029	1.030	1.023	1.012	1.009	1.010	1.014	1.008
pH	9.0	8.5	8.5	8.5	8.5	9.0	9.0	9.0	9.0	8.5
Protein: Chemstrip	0	trace	0	1+	0	1+	0	0	trace	0
Supernatant	--	trace	--	1+	--	trace	--	--	trace	--
Glucose	0	0	0	0	0	0	0	0	0	0
Ketones	0	0	1+	1+	1+	0	0	0	0	0
Bilirubin	0	0	0	0	0	0	0	0	0	0
Urobilinogen	0	0	0	0	0	0	0	0	0	0
Occult Blood	10	10	0	0	10	50	0	0	0	0
Leukocytes	trace	trace	trace	trace	trace	1+	0	0	0	0
Nitrite	0	positive	0	0	0	0	0	positive	positive	0
Casts/LPF	0	0	0	0	0	0	--	0	0	--
Epith. Cells/LPF	0	0	0	0	0	0	--	0	0	--
Phos. Cryst./LPF	0	300	35	8	10	0	--	0	70	--
Other Cryst./LPF	0	0	0	0	0	0	--	0	0	--
RBC/HPF	0	0	0	0	0	0	--	0	0	--
WBC/HPF	0	2	0	0	0	0	--	0	0	--
Yeast/HPF	0	0	0	0	0	0	--	0	0	--
Bacteria	0	1+	0	0	0	0	--	1+	0	--

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values

TRL Study #032-006

Day of Test 39

Group III 125 mg/kg/day

MALES

Animal Number	121	122	123	124	125	126	127	128	129	130
Specific Gravity	1.015	1.009	1.011	1.042	1.012	1.011	1.027	1.017	1.009	1.011
pH	8.0	8.5	8.5	8.0	9.0	8.0	8.5	9.0	9.0	8.5
Protein: Chemstrip	0	0	0	trace	0	0	0	1+	trace	0
Supernatant	--	--	--	1+	--	--	--	trace	0	--
Glucose	0	0	0	0	0	0	0	0	0	0
Ketones	0	0	0	1+	0	0	1+	1+	0	0
Bilirubin	0	0	0	0	0	0	0	0	0	0
Urobilinogen	0	0	0	0	0	0	0	0	0	0
Occult Blood	0	0	0	10	0	0	0	10	0	0
Leukocytes	trace	0	0	1+	0	trace	trace	trace	0	0
Nitrite	positive	0	0	0	0	0	positive	positive	positive	0
Casts/LPF	0	--	--	0	--	0	0	0	0	--
Epith. Cells/LPF	0	--	--	0	--	0	0	0	0	--
Phos. Cryst./LPF	0	--	--	120	--	0	350	80	0	--
Other Cryst./LPF	0	--	--	0	--	0	0	0	0	--
RBC/HPF	0	--	--	0	--	0	0	0	0	--
WBC/HPF	0	--	--	0	--	0	0	0	0	--
Yeast/HPF	0	--	--	0	--	0	0	0	0	--
Bacteria	1+	--	--	0	--	0	0	0	1+	--

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values

TRL Study #032-006

Day of Test 39

Group IV 500 mg/kg/day

MALES

Animal Number	181	182	183	184	185	186	187	188	189	190
Specific Gravity	1.005	1.009	1.006	1.011	1.023	1.017	1.016	1.008	1.010	1.010
pH	8.0	8.5	8.0	9.0	9.0	9.0	8.5	8.0	8.5	9.0
Protein: Chemstrip	0	0	0	0	trace	0	0	0	0	1+
Supernatant	--	--	--	--	0	--	--	--	--	0
Glucose	0	0	0	0	0	0	0	0	0	0
Ketones	0	0	0	0	1+	0	0	0	0	0
Bilirubin	0	0	0	0	0	0	0	0	0	0
Urobilinogen	0	0	0	0	0	0	0	0	0	0
Occult Blood	0	0	10	0	10	0	0	10	0	0
Leukocytes	0	0	trace	0	trace	trace	trace	trace	0	0
Nitrite	0	0	0	positive	0	0	0	0	0	positive
Casts/LPF	--	--	0	0	0	0	0	0	--	0
Epith. Cells/LPF	--	--	5	0	0	0	0	0	--	0
Phos. Cryst./LPF	--	--	0	10	10	15	5	0	--	0
Other Cryst./LPF	--	--	0	0	0	0	0	0	--	0
RBC/HPF	--	--	0	0	0	0	0	2	--	0
WBC/HPF	--	--	2	0	0	0	0	2	--	0
Yeast/HPF	--	--	0	0	0	0	0	0	--	0
Bacteria	--	--	1+	1+	0	0	0	0	--	1+

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values

TRL Study #032-006

Day of Test 40

Group I 0 mg/kg/day

FEMALES

Animal Number	031	032	033	034	035	036	037	038	039	040
Specific Gravity	1.005	1.007	1.010	1.006	1.013	1.011	1.005	1.014	1.007	1.012
pH	8.5	8.5	8.0	8.5	9.0	8.0	9.0	9.0	8.5	8.5
Protein: Chemstrip	0	0	0	0	0	0	0	0	0	0
Supernatant	--	--	--	--	--	--	--	--	--	--
Glucose	0	0	0	0	0	0	0	0	0	0
Ketones	0	0	0	0	0	0	0	0	0	0
Bilirubin	0	0	0	0	0	0	0	0	0	0
Urobilinogen	0	0	0	0	0	0	0	0	0	0
Occult Blood	0	0	0	0	0	10	0	0	0	0
Leukocytes	0	0	0	0	0	0	0	0	0	0
Nitrite	positive	positive	positive	positive	positive	0	positive	positive	positive	0
Casts/LPF	0	0	0	0	0	0	0	0	0	--
Epith. Cells/LPF	0	0	0	0	0	0	0	0	0	--
Phos. Cryst./LPF	0	0	0	0	0	0	0	15	0	--
Other Cryst./LPF	0	0	0	0	0	0	0	0	0	--
RBC/HPF	0	0	0	0	0	0	0	0	0	--
WBC/HPF	0	0	0	0	0	0	0	0	0	--
Yeast/HPF	0	0	0	0	0	0	0	0	0	--
Bacteria	0	1+	0	1+	1+	0	0	0	1+	--

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values

TRL Study #032-006

Day of Test 40

Group II 30 mg/kg/day

FEMALES

Animal Number	091	092	093	094	095	096	097	098	099	100
Specific Gravity	1.010	1.011	1.010	1.014	1.012	1.010	1.013	1.010	1.009	1.006
pH	9.0	9.0	9.0	9.0	9.0	9.0	8.0	9.0	8.5	9.0
Protein: Chemstrip	0	0	0	0	0	0	0	0	0	0
Supernatant	--	--	--	--	--	--	--	--	--	--
Glucose	0	0	0	0	0	0	0	0	0	0
Ketones	0	0	0	0	0	0	0	0	0	0
Bilirubin	0	0	0	0	0	0	0	0	0	0
Urobilinogen	0	0	0	0	0	0	0	0	0	0
Occult Blood	0	0	0	0	0	0	0	0	0	0
Leukocytes	0	0	0	0	0	0	0	0	0	0
Nitrite	0	positive	0	0	0	positive	0	0	0	0
Casts/LPF	--	0	--	--	--	0	--	--	--	--
Epith. Cells/LPF	--	5	--	--	--	0	--	--	--	--
Phos. Cryst./LPF	--	0	--	--	--	0	--	--	--	--
Other Cryst./LPF	--	0	--	--	--	0	--	--	--	--
RBC/HPF	--	0	--	--	--	0	--	--	--	--
WBC/HPF	--	0	--	--	--	0	--	--	--	--
Yeast/HPF	--	0	--	--	--	0	--	--	--	--
Bacteria	--	1+	--	--	--	0	--	--	--	--