Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values

TRL Study #032-006

Day of Test 40

Group III 125 mg/kg/day

FEMALES

Animal Number	151	152	153	154	155	156	157	158	159	160
Specific Gravity	1.006	1.004	1.016	1.005	1.014	1.015	1.005	1.007	1.022	1.010
pH	8.0	8.0	8.5	8.5	8.5	9.0	8.5	8.0	9.0	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	trace	0	0	0	0
Nitrite	0	0	positive	0	positive	positive	0	0	0	0
Casts/LPF	--	--	0	--	0	0	--	--	--	--
Epith. Cells/LPF	--	--	5	--	0	0	--	--	--	--
Phos. Cryst./LPF	--	--	5	--	0	0	--	--	--	--
Other Cryst./LPF	--	--	0	--	0	0	--	--	--	--
RBC/HPF	--	--	0	--	0	0	--	--	--	--
WBC/HPF	--	--	0	--	0	0	--	--	--	--
Yeast/HPF	--	--	0	--	0	0	--	--	--	--
Bacteria	--	--	1+	--	1+	1+	--	--	--	--

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values

TRL Study #032-006

Day of Test 40

Group IV 500 mg/kg/day

FEMALES

Animal Number	211	212	213	214	215	216	217	218	219	220
Specific Gravity	1.012	1.011	1.008	1.005	1.015	1.007	1.010	1.009	1.011	1.012
pH	9.0	8.0	9.0	7.5	9.0	8.5	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	0	0	0	0	0
Leukocytes	0	0	0	0	0	0	0	0	0	0
Nitrite	0	positive	0	positive	0	0	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 - Final Sacrifice

TRL Study #032-006

Day of Test 88

Group I 0 mg/kg/day

MALES

Animal Number	011	012	013	014	015	016	017	018	019	020
Specific Gravity	1.024	1.008	1.025	1.022	1.014	1.023	1.014	1.010	1.025	1.029
pH	8.0	8.5	8.0	7.5	9.0	7.5	8.5	9.0	8.5	8.5
Protein: Chemstrip	2+	0	1+	0	0	trace	0	trace	1+	0
Supernatant	2+	--	1+	--	--	1+	--	trace	1+	--
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	10	0	10	10	0	10	0
Leukocytes	2+	0	1+	1+	trace	1+	trace	trace	1+	trace
Nitrite	0	0	0	0	positive	0	0	0	0	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	30	--	25	0	0	0	0	0	20	10
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	--	0	1+	0	0	0	0	0	0

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values - Final Sacrifice

TRL Study #032-006

Day of Test 88

Group II 30 mg/kg/day

MALES

Animal Number	071	072	073	074	075	076	077	078	079	080
Specific Gravity	1.012	1.028	1.016	1.011	1.020	1.006	1.010	1.012	1.010	1.020
pH	8.5	8.0	8.0	8.5	8.5	8.0	7.5	8.5	9.0	8.5
Protein: Chemstrip	0	0	trace	0	0	0	1+	0	0	0
Supernatant	--	--	1+	--	--	--	1+	--	--	--
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	10	0	10	10	0	0	10	10	0	10
Leukocytes	trace	trace	trace	trace	0	trace	1+	0	0	0
Nitrite	0	0	positive	0	0	positive	positive	positive	0	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	30	0	0	--	0	0	0	--	10
Other Cryst./LPF	0	0	0	0	--	0	0	0	--	0
RBC/HPF	0	0	0	0	--	0	0	0	--	0
WBC/HPF	0	0	0	0	--	0	0	0	--	0
Yeast/HPF	0	0	0	0	--	0	0	0	--	0
Bacteria	0	0	0	0	--	0	1+	1+	--	0

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values - Final Sacrifice

TRL Study #032-006

Day of Test 88

Group III 125 mg/kg/day

MALES

Animal Number	131	132	134	135	136	137	138	139	140	141
Specific Gravity	1.026	1.006	1.027	1.021	1.032	1.016	1.006	1.016	1.023	1.011
pH	9.0	8.5	9.0	9.0	8.0	8.5	8.0	9.0	9.0	8.5
Protein: Chemstrip	1+	0	1+	trace	0	0	1+	trace	1+	--
Supernatant	1+	--	2+	trace	--	--	trace	1+	trace	--
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	10	10	10	10	0	0	0	10	10	0
Leukocytes	trace	0	2+	1+	trace	0	0	trace	2+	0
Nitrite	0	positive	0	0	0	0	positive	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	15	0	0	0	0	--	0	6	0	--
Other Cryst./LPF	0	0	0	0	0	--	0	0	0	--
RBC/HPF	0	0	0	0	0	--	0	0	0	--
WBC/HPF	0	0	0	0	0	--	0	0	0	--
Yeast/HPF	0	0	0	0	0	--	0	0	0	--
Bacteria	0	1+	1+	0	0	--	0	0	0	--

Animal # 133 was found dead; no urinalysis values are available.

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values - Final Sacrifice

Day of Test 88

TRL Study #032-006

Group IV 500 mg/kg/day

MALES

Animal Number	191	192	193	194	195	196	197	198	199	200
Specific Gravity	1.026	1.023	1.007	1.006	1.006	1.007	1.009	1.022	1.021	1.040
pH	8.0	9.0	9.0	8.5	8.5	7.5	8.5	8.0	7.5	9.0
Protein: Chemstrip	0	1+	1+	0	0	1+	0	0	0	1+
Supernatant	--	1+	1+	--	--	1+	--	--	--	1+
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	10	0	0	10	0	10	0	10	10	50
Leukocytes	trace	2+	trace	0	0	trace	trace	trace	1+	1+
Nitrite	0	0	positive	0	0	positive	0	0	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	10	0	0	0	--	0	0	10	50	10
Other Cryst./LPF	0	0	0	0	--	0	0	0	0	0
RBC/HPF	0	0	0	0	--	0	0	0	0	2
WBC/HPF	0	0	0	0	--	0	0	0	0	0
Yeast/HPF	0	0	0	0	--	0	0	0	0	0
Bacteria	0	0	1+	0	--	1+	0	1+	1+	1+

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values - Final Sacrifice

TRL Study #032-006

Day of Test 88

Group I 0 mg/kg/day

FEMALES

Animal Number	041	042	043	044	045	046	047	048	049	050
Specific Gravity	1.004	1.010	1.012	1.005	1.004	1.006	1.004	1.005	1.005	1.008
pH	7.0	7.0	7.5	7.0	8.0	6.5	6.0	7.0	6.5	6.5
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	10	0	10	10	0	10	250	0	0
Leukocytes	0	0	0	0	0	0	trace	0	trace	0
Nitrite	0	0	0	0	positive	0	0	0	0	positive
Casts/LPF	--	0	--	0	0	--	0	0	0	0
Epith. Cells/LPF	--	0	--	0	0	--	0	0	0	0
Phos. Cryst./LPF	--	0	--	0	0	--	0	0	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	--	1+	--	0	0	--	0	0	0	0

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values - Final Sacrifice

TRL Study #032-006

Day of Test 88

Group II 30 mg/kg/day

FEMALES

Animal Number	101	102	103	104	105	106	107	108	109	110
Specific Gravity	1.006	1.006	1.008	1.007	1.006	1.008	1.005	1.007	1.005	1.006
pH	7.0	8.0	7.0	7.5	7.5	8.0	7.5	8.0	8.0	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	10	0	0	0	0	0	0	0	0	0
Leukocytes	trace	0	0	0	0	0	0	0	0	0
Nitrite	positive	0	0	0	0	0	0	0	0	positive
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 - Final Sacrifice

TRL Study #032-006

Day of Test 88

Group III 125 mg/kg/day

FEMALES

Animal Number	161	162	163	164	165	166	167	168	169	170
Specific Gravity	1.010	1.008	1.005	1.005	1.005	1.004	1.007	1.023	1.018	1.008
pH	9.0	9.0	7.5	7.5	7.5	7.0	8.0	5.5	5.5	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	50	0	0	0	50	10	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	--	--	0	--	--	--	0	0	--	--
Epith. Cells/LPF	--	--	0	--	--	--	0	0	--	--
Phos. Cryst./LPF	--	--	0	--	--	--	0	0	--	--
Other Cryst./LPF	--	--	0	--	--	--	0	0	--	--
RBC/HPF	--	--	0	--	--	--	0	0	--	--
WBC/HPF	--	--	0	--	--	--	0	0	--	--
Yeast/HPF	--	--	0	--	--	--	0	0	--	--
Bacteria	--	--	0	--	--	--	0	0	--	--

Table 7

Rat Oral Subchronic Toxicity Study of Normal Butanol
Urinalysis Values - Final Sacrifice

TRL Study #032-006

Day of Test 88

Group IV 500 mg/kg/day

FEMALES

Animal Number	221	222	223	225	226	227	228	229	230	231
Specific Gravity	1.006	1.013	1.006	1.008	1.006	1.008	1.013	1.005	1.010	1.004
pH	8.0	5.5	8.0	8.0	7.5	8.0	9.0	7.5	7.5	6.5
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	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	--	--	--	--	--	--	--	--	--	--

Animal # 224 was found dead; no urinalysis values are available.

Table 8

Rat Oral Subchronic Toxicity Study of Normal Butanol
Gross Observations at Necropsy - Interim Sacrifice[a]

TRL Study #032-006

	MALE				FEMALE			
Group	I	II	III	IV	I	II	III	IV
Dose (mg/kg/day)	0	30	125	500	0	30	125	500
TISSUE								
Lungs								
Left lobe red	--	--	1/11	--	--	--	--	--
Cranial and middle lobes shriveled	--	--	1/11	--	--	--	--	--
Kidney								
Dilated pelvis, one or both	--	--	--	--	1/10	--	--	1/11
Uterine Horns								
Enlarged bilaterally	--	--	--	--	1/10	2/10	1/10	1/11
Epididymis								
Tan raised area	--	1/10	--	--	--	--	--	--

[a] Includes animals found dead before day 43

Table 8

Rat Oral Subchronic Toxicity Study of Normal Butanol
Gross Observations at Necropsy - Final Sacrifice[a]

TRL Study #032-006

	MALE				FEMALE			
Group	I	II	III	IV	I	II	III	IV
Dose (mg/kg/day)	0	30	125	500	0	30	125	500
TISSUE								
LUNGS								
Dark area, caudal lobe	1	1	--	--	--	--	--	--
Dark area, middle lobe	--	--	--	--	--	--	--	1
White areas on edges, all lobes	--	1	--	--	--	--	--	--
STOMACH-FUNDIC								
Dark area, glandular mucosa	--	--	--	1	--	--	--	--
JEJUNUM								
Pouch	--	--	--	1	--	--	--	--
LIVER								
Small extra lobe attached to right lobe	--	--	--	--	--	--	1	--
Right lobe adhered to right kidney	--	--	--	1	--	--	--	--
UTERINE HORNS								
Enlarged bilaterally	--	--	--	--	2	3	4	7
MANDIBULAR LYMPH NODE								
Left enlarged	--	2	2	2	--	--	--	--
Enlarged bilaterally	--	1	--	2	--	--	--	--
Red bilaterally	1	--	--	--	--	--	--	--
MESENTERY								
Red and congested	--	--	--	--	--	1	--	--

[a] Includes animal # 202, sacrificed in extremis on day 46.

Table 9

Rat Oral Subchronic Toxicity Study of Normal Butanol
Group Mean Absolute Organ Weights (grams) - Final Sacrifice

TRL Study #032-006

Dose Level (mg/kg/day)	Sex	Terminal body wt.(g)[a]	Heart	Liver	Spleen	Kidney	Brain	Gonad	Thyroid[b]	Adrenal
0	M	499	1.555	18.583	0.740	3.611	2.008	4.931	0.021	0.061
30	M	514	1.551	19.768	0.790	3.829	2.043	5.104	0.024	0.056
125	M	515	1.629	18.529	0.765	3.813	2.052	4.827	0.024	0.060
500	M	484	1.548	17.577	0.760	3.647	2.002	4.789	0.024*	0.059
0	F	292	1.077	10.941	0.519	2.222	1.898	0.080	0.020	0.080
30	F	298	1.077	11.606	0.539	2.353	1.945	0.087	0.018	0.078
125	F	293	1.026	10.503	0.504	2.217	1.890	0.087	0.018	0.076
500	F	287	1.073	10.277	0.505	2.244	1.913	0.088	0.019	0.080

*$p \leq 0.05$

[a] Terminal body weight taken on the day of necropsy.

[b] Including parathyroids

Table 9

Rat Oral Subchronic Toxicity Study of Normal Butanol
Group Mean Relative Weights (% of body weight) - Final Sacrifice

TRL Study #032-006

Dose Level (mg/kg/day)	Sex	Terminal body wt.(g)[a]	Heart	Liver	Spleen	Kidney	Brain	Gonad	Thyroid[b,c]	Adrenal[c]
0	M	499	0.313	3.727	0.149	0.725	0.406	0.993	4.256	12.218
30	M	514	3.303	3.846	0.154	0.746	0.400	1.003	4.658	10.922
125	M	515	0.317	3.601	0.148	0.741	0.400	0.939	4.645	11.633
500	M	484	0.321	3.630	0.158	0.756	0.418	0.997	5.060**	12.216
0	F	292	0.370	3.754	0.178	0.765	0.658	0.027	6.871	27.482
30	F	298	0.362	3.879	0.181	0.792	0.657	0.029	6.188	26.333
125	F	293	0.353	3.582	0.173	0.761	0.650	0.030	6.219	26.034
500	F	287	0.376	3.578	0.177	0.788	0.674	0.031	6.792	27.965

**$p \leq 0.01$

a Terminal body weight taken on the day of necropsy.

b Including parathyroids

c $X\ 10^3$

Table 10

Rat Oral Subchronic Toxicity Study of Normal Butanol
Incidence of Histologic Lesions - Final Sacrifice[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
HEART # Examined	20	20	20	20	20	20	20	20
Myelitis, subacute, focal	0	0	1	0	0	0	0	0
Pericarditis, acute, diffuse	0	0	1	0	0	0	0	0
Necrosis, focal	0	0	0	1	0	0	0	0
AORTA # Examined	20	--	1	20	20	--	--	20
No lesion found								
THYMUS # Examined	20	--	1	20	20	--	--	20
Lymphocytolysis	0	--	1	1	0	--	--	0
Agonal hemorrhage	0	--	0	0	0	--	--	1
LUNG W/BRONCHI # Examined	20	2	1	20	20	--	--	20
Agonal hemorrhage	1	1	0	0	1	--	--	1
Pleuritis, acute, focal	0	0	1	0	0	--	--	0
Pleuritis, chronic, focal	0	0	0	1	0	--	--	0
Edema	0	0	1	0	0	--	--	0
Collapse	0	0	1	0	0	--	--	0
TRACHEA # Examined	20	--	1	20	20	--	--	20
No lesion found								
ESOPHAGUS # Examined	20	--	1	20	20	--	--	20
Perforation	0	--	1	0	0	--	--	0
Inflammation, acute, focal	0	--	1	0	0	--	--	0
Myositis, subacute, focal	0	--	0	1	0	--	--	0
STOMACH - FORESTOMACH # Examined	20	--	1	20	20	--	--	20
No lesion found								

Table 10

Rat Oral Subchronic Toxicity Study of Normal Butanol
Incidence of Histologic Lesions - Final Sacrifice

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
STOMACH - CARDIAC	# Examined	20	--	1	20	20	--	--	20
No lesion found									
STOMACH - FUNDIC	# Examined	20	--	1	20	20	--	--	20
Necrosis, focal		0	--	0	1	0	--	--	0
STOMACH - PYLORIC	# Examined	20	--	1	20	20	--	--	20
No lesion found									
SALIVARY GLAND-SUBLINGUAL	# Examined	20	--	1	20	20	--	--	20
No lesion found									
SALIVARY GLAND-MANDIBULAR	# Examined	20	--	1	20	20	--	--	20
No lesion found									
DUODENUM	# Examined	20	--	1	20	20	--	--	20
Autolysis		0	--	1	0	0	--	--	0
JEJUNUM	# Examined	20	--	1	20	20	--	--	20
No lesion found									
ILEUM	# Examined	20	--	1	20	20	--	--	20
No lesion found									
COLON	# Examined	20	--	1	20	20	--	--	20
No lesion found									

Table 10

Rat Oral Subchronic Toxicity Study of Normal Butanol
Incidence of Histologic Lesions - Final Sacrifice

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
LIVER # Examined	20	20	20	20	20	20	20	20
Hepatitis, subacute, focal, minimal	2	1	1	2	1	1	0	0
Hepatitis, subacute, focal, slight	0	0	0	0	2	1	0	1
Hepatitis, chronic, focal, slight	0	0	0	0	0	1	0	0
Cytoplasmic vacuolization, centrilobular, slight	1	0	0	0	0	0	0	0
PANCREAS # Examined	20	--	1	20	20	--	--	20
No lesion found								
SPLEEN # Examined	20	--	1	20	20	--	--	20
No lesion found								
MESENTERIC LYMPH NODE # Examined	20	--	1	20	20	--	--	20
Lymphadenitis, chronic, diffuse	0	--	1	0	0	--	--	0
KIDNEYS # Examined	20	20	20	20	20	20	20	20
Nephritis, subacute, focal, minimal	0	0	0	0	0	1	0	0
Nephritis, chronic, focal, unilateral, slight	1	0	0	0	0	0	0	0
Nephritis, chronic, focal, minimal	0	1	1	0	0	1	0	0
Nephritis, chronic, focal, slight	1	0	1	1	0	1	0	0
Mineralization - renal pelvis, focal	0	0	0	0	1	0	0	0
URINARY BLADDER # Examined	20	--	1	20	20	--	--	20
Cystitis, chronic, diffuse, slight	0	--	0	1	0	--	--	0

Table 10

Rat Oral Subchronic Toxicity Study of Normal Butanol
Incidence of Histologic Lesions - Final Sacrifice

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
ADRENALS	# Examined	20	--	1	20	20	--	--	20
No lesion found									
PITUITARY	# Examined	20	--	1	19	20	--	--	20
Hypophyseal cleft - contains excess colloid		0	--	--	1	0	--	--	2
EYES	# Examined	20	--	1	20	20	--	--	20
Synechia, posterior		17	--	0	17	13	--	--	16
Autolysis		0	--	1	0	0	--	--	0
OPTIC NERVES	# Examined	20	--	1	20	20	--	--	20
No lesion found									
THYROIDS	# Examined	20	--	1	20	20	--	--	20
No lesion found									
PARATHYROIDS	# Examined	20	--	1	20	19	--	--	20
No lesion found									
SPINAL CORD-THORACIC	# Examined	20	--	--	20	20	--	--	20
No lesion found									
SPINAL CORD-LUMBAR	# Examined	20	--	--	20	20	--	--	20
No lesion found									

Table 10

Rat Oral Subchronic Toxicity Study of Normal Butanol
Incidence of Histologic Lesions - Final Sacrifice

TRL Study 032-006

Group		MALES				FEMALES			
		I	II	III	IV	I	II	III	IV
Dose Level (mg/kg/day)		0	30	125	500	0	30	125	500
BRAIN - FORE	# Examined	20	--	1	20	20	--	--	20
No lesion found									
BRAIN - MID	# Examined	20	--	1	20	20	--	--	20
No lesion found									
BRAIN - HIND	# Examined	20	--	1	20	20	--	--	20
No lesion found									
FEMUR	# Examined	20	--	1	20	20	--	--	20
No lesion found									
TESTES	# Examined	20	--	1	20	--	--	--	--
No lesion found									
EPIDIDYMIDES	# Examined	20	--	1	20	--	--	--	--
Proteinaceous material in tubules		1	--	0	0	--	--	--	--
OVARIES	# Examined	--	--	--	--	20	--	--	20
No lesion found									
UTERINE HORNS	# Examined	--	--	--	--	20	3	4	20
Hydrometra, bilateral		--	--	--	--	4	3	4	7
CERVIX	# Examined	--	--	--	--	20	--	--	20
No lesion found									
SKIN	# Examined	20	--	1	20	20	--	--	20
No lesion found									

Table 10

Rat Oral Subchronic Toxicity Study of Normal Butanol
Incidence of Histologic Lesions - Final Sacrifice

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
MAMMARY GLAND # Examined	19	--	1	19	20	--	--	20
No lesion found								
MUSCLE # Examined	20	--	1	20	20	--	--	20
Myositis, subacute, focal	0	--	0	0	1	--	--	0
Degeneration, focal	0	--	0	1	0	--	--	0
NERVE # Examined	20	--	1	20	20	--	--	20
Section inadequate for diagnosis	1	--	0	0	0	--	--	0
MANDIBULAR LYMPH NODE # Examined	1	3	2	4	--	--	--	--
Lymphadenitis, subacute, diffuse	1	3	2	4	--	--	--	--
MESENTERY # Examined	--	--	--	--	--	1	--	--
Thrombus	--	--	--	--	--	1	--	--

TOXICITY RESEARCH LABORATORIES, LTD.

TRL Study #032-006

Rat Oral Subchronic Toxicity Study

Compound:

Normal Butanol

APPENDIX A

Compound Assay Results

The Muskegon County Wastewater Treatment Facility

The Muskegon County Wastewater Treatment Facility is a fully instrumented and staffed, non-profit, governmental facility. All analyses are performed according to the accepted U.S. Environmental Protection Agency methodologies and conform to rigid EPA certified quality control. The laboratory performs a full range of organic and inorganic analyses using modern instrumentation.

I. Methodology for Methanol/Butanol/Isobutyl Alcohol

A. Materials and Reagents
1) Distilled Water - Burdick and Jackson
2) Methanol/Butanol/Isobutyl Alcohol - same lot # as sample group

B. Apparatus

1) A GC system consisting of a Varian 2100 GC using a Varian flame ionization detector connected to a Spectra Physics Model 4100 recording integrator set at a chart speed of 0.5 cm/minute
2) A glass 1/8" X 8' column consisting of 1% SP 1000 on 60/80 Carbopack
3) Class A pipettes
4) Class A volumetric glassware

C. Standards Preparation

A series of standards is prepared, ranging from 0-16 mg/ml as follows:

Alcohol/Distilled Water	Approximate Concentration (mg/ml)
1 ml/500 ml	1.6
1 ml/200 ml	4.0
1 ml/100 ml	8.0
3 ml/200 ml	12.0
1 ml/50 ml	16.0

Linear response is established by injection of at least three of these standards and an initial standard curve prepared.

D. Chromotography

Prior to each analysis, at least one standard (usually 3) is prepared and injected into the GC to determine the response factor and calibrate the instrument. The samples are injected at a volume of 2 ul. The results are printed out on the integrator. Samples with concentrations above this level are diluted to a concentration within the linear range.

E. Results

The concentration of each sample is calculated by the integrator as:

$$\text{CONCENTRATION} = \frac{\text{PEAK AREA OR PEAK HEIGHT}}{\text{RESPONSE FACTOR}}$$

F. Instrument Settings

	Methanol	Butanol	Isobutyl Alcohol
injector temp.	75°C	150°C	160°C
column temp.	60°C Isothermal	140°C Isothermal	140°C Isothermal
carrier flow	25 ml/min N_2	25 ml/min N_2	25 ml/min N_2
attenuation	$2X10^{-11}X64$	$2X10^{-11}X64$	$2X10^{-11}X64$
injection volume	2 ul	2 ul	2 ul

II. Standard Operating Procedure for Varian Model 2100 Gas Chromatograph with Varian flame ionization detector connected to a Spectra Physics Model 4100 recording integrator

A. Analysis

1) Choose and check the oven temperature program.

2) Install appropriate column

3) Check column for gas leaks.

4) Check the detector function.

5) Run standards of concentrations comparable to the samples if known (typically 2-3 standards). It is assumed that a 5 point standard curve has been established.

6) Run the sample(s).

7) Calculate sample concentrations, using the nearest standard.

B. Maintenance/Calibration

1) After each run, the column is baked at high temperature.

2) Run a blank for each batch of 10 samples.

3) If signs of column deterioration are noticed, such as change in peak shape:

a) bake the column for extended period

b) either repack the column partially or completely

4) Compare the standard run with the initial standard curve.

5) In case the instrument is not functioning as per manufacturer's specifications, run diagnostic procedure for that instrument, record any corrective measures taken or service calls placed.

III. Sample Handling Procedure

1) Incoming samples are logged in by laboratory personnel, assigned control number (WWCN), and presented to the chemist.

2) Samples are stored according to specified stability. If stability is not specified samples are stored under refrigeration at approximately 4-8°C.

3) Prior to analysis, samples are equilibrated to room temperature.

4) Analyses of samples are conducted according to specific methodologies and specific instrument standard operating procedures.

5) After analyzing the samples, they are returned to the submitter.

ERCO
205 Alewife Brook Parkway, Cambridge, Massachusetts 02138 (617) 661-3111 Telex 650-256-7697 (MCI)
A DIVISION OF
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INCORPORATED

1. Application.

This method covers the determination of compounds by direct aqueous injection. The following compounds can be detected using column A and temperature program A: acetone, methyl isobutyl ketone (MIBK), isobutyl alcohol, methyl alcohol, ethyl acetate, n-butyl alcohol and crotonaldehyde. The following compounds can be detected using system B and temperature program B: p-, m-, and o-cresol.

2. Summary.

A portion of a sample is injected directly onto a gas chromatograph capillary column. The gas chromatograph is temperature programmed to separate the constituents which are then detected by a flame ionization detector.

3. Instrumentation and Apparatus.

3.1. Gas chromatograph -- Hewlett-Packard 5880 with auto-sampler and integrator. Oven temperature profile A programmed as hold 8 min at 50°C, then to 220°C at 8°C/min and hold 5 min. Program B: hold 5 min at 50°C then to 250°C at 10°C/min and hold 15 min.

3.2. Column A -- 60 m x 0.32 mm ID, 0.25 µm film SUPEL-COWAX 10 fused silica capillary column. Set linear velocity to 25 cm/sec, He, at 100°C (flow rate = 1.2 ml/min).

Column B -- 30 m x 0.318 mm ID, 0.25 µm film SE - 54 fused silica capillary column. Set linear velocity

to 25 cm/sec, He, at 100°C (flow rate = 1.2 ml/min).

3.3. Injector -- configure for sample splitting and adjust ratio to 100:1. Set heater temperature to 200°C.

3.4. Detector -- Hewlett-Packard flame ionization detector. Hydrogen flow set at 40 ml/min. Air flow set at 400 ml/min. Set sensitivity at 2+2 and adjust if necessary. Set heater temperature to 250°C.

3.5. Syringes -- 1 ml, 100 µl, and 10 µl gas-tight glass for diluting and for sample transfer.

4. Reagents.

4.1. Reagent Water -- prepare with Corning Mega-Pure distillation system and filter through activated charcoal prior to use.

4.2. Methylene Chloride -- J. T. Baker "Resi-analyzed" or equivalent.

4.3. Standard Solution -- prepare by adding pure material to water. Pure material should be assayed reference liquid such as Chem Serve reagents. If not immediately available, supplied compound may be used.

4.3.1. Place about 9 ml of solvent into a stoppered 10 ml flask. Weigh the flask. Add one or two drops of pure material to the flask and reweigh. Dilute to

volume, mix well, and store in a teflon-sealed screw-cap vial at 4°C.

5. Calibration.

5.1. External Standard Calibration -- Prepare working standards to bracket the concentration range, of the samples of interest. Working standards are prepared by diluting the standard solution with water or methylene chloride if the samples are corn oil based. Analyze according to procedure section then calculate response factors using this equation:

$$RF = \frac{\text{concentration of standard}}{\text{area of standard}}$$

If the response factors are constant over the working range (10% Relative Percent Difference), an average response factor may be used for calculations.

6. Quality Control.

6.1. Interference -- a water blank must be run with each test to check for system contamination. A blank should also be run between samples of high concentration.

6.2 Purity -- reagents used in the procedure should also be analyzed with each test to determine their purity.

6.3 Spikes -- sample matrixes should be spiked with the compounds of interest and a percent recovery calculated to access matrix effects and method accuracy.

6.4. Duplicates -- Some samples should be analyzed in duplicate and a relative percent difference calculated to access method precision.

7. Procedure.

7.1. Calibration as in section 5.

7.2. Sample Preparation -- allow samples to come to room temperature before handling. Dilute if necessary to bring concentrations within system working range by adding portion of sample to water or to methylene chloride if corn oil based.

7.3. Analysis -- introduce sample by direct injection of 1 - 2 µl into the GC injection port and begin the temperature program.

7.4 Identification -- as the compounds are analyzed individually, there should be no coelution interferences. Retention time should still be checked against the standard.

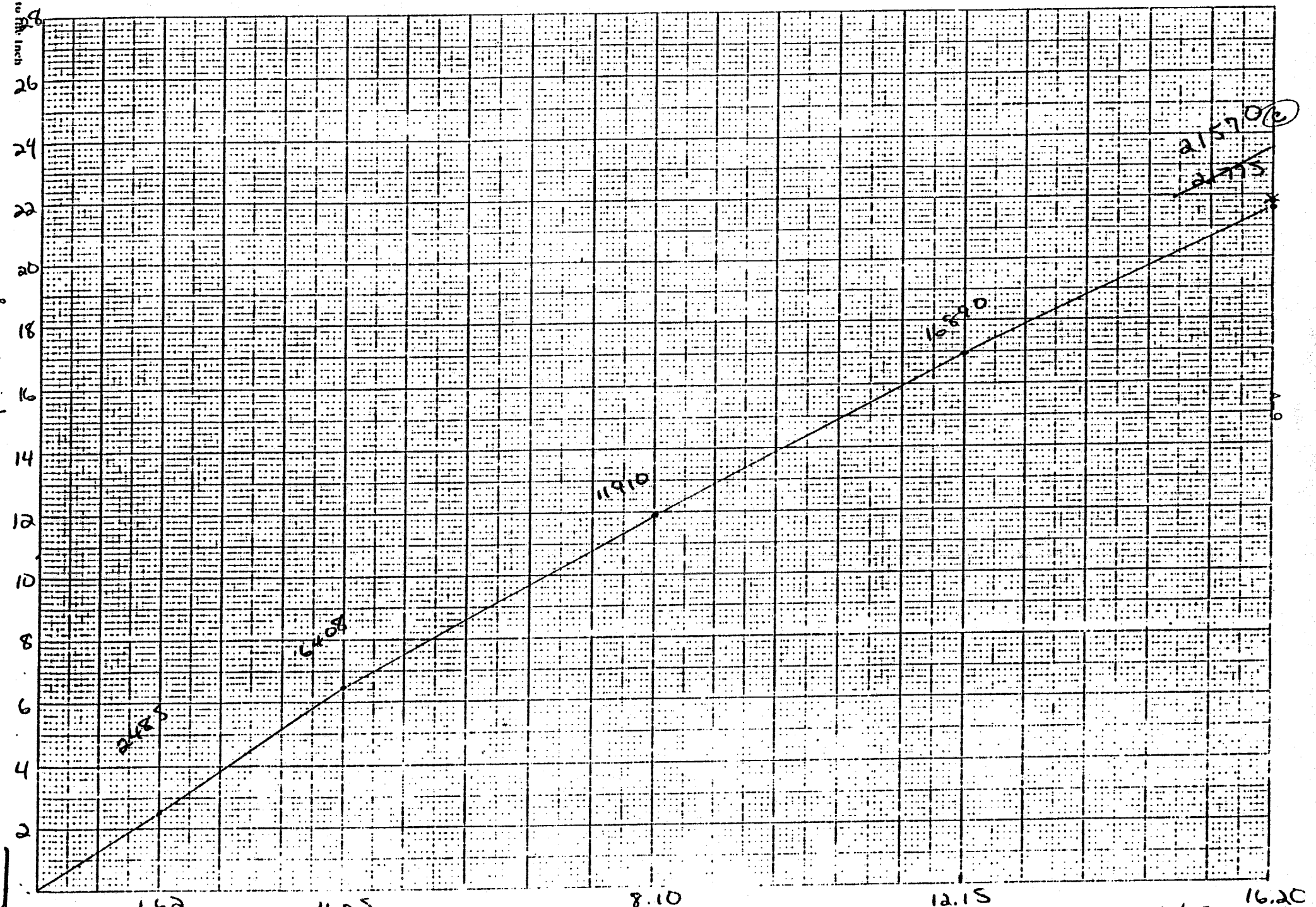
8. Calculation.

8.1. Concentration -- calculate using peak area and RF determined in section 5.1.

8.2. Dilution -- take into account any dilution performed on the sample or the standard.

8.3 Report results in mg/ml without correction for recovery percentage.

Butanol 10/85



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WASTEWATER MANAGEMENT SYSTEM
8301 WHITE ROAD, MUSKEGON, MICHIGAN 49442
PHONE 616-853-2291

September 4, 1985

Y.A. Demirjian, Ph.D.
Manager-Director

LABORATORY ANALYSES

COMPANY: Toxicity Research Laboratories, Study #032-006, Lot #3597 KVVE

Date: August 27, 1985

Week #1

WWCN	Sample Designation	Normal Butanol (mg/ml)
0885135	8/26/85, Deionized Water, Group I, 0 mg/ml	0.0
0885136	Normal Butanol Standard	Standard
0885137	8/26/85, Normal Butanol, Group II, 3.0 mg/ml	2.99
0885138	8/26/85, Normal Butanol, Group III, 12.5 mg/ml	12.16
0885139	8/26/85, Normal Butanol, Group IV, 50 mg/ml	51.57

Samples taken week 1 day 1; analyzed for concentration

CLIENT: Toxicity Research Laboratories, Inc.

ERCO/A DIVISION OF ENSECO, INC.

SAMPLE RECEIVED: 8/29/85

ANALYSIS COMPLETED: 9/11/85

RESULTS IN: mg/ml

SOLVENT ANALYSIS

- Data Report -

Client ID	ERCO ID	N-Butyl Alcohol	Theoretical Concentration
Group I, Week 1	20299	ND	0.0
Group II, Week 1	20295	3.8	3.0
Group III, Week 1	20296	12.0	12.5
Group IV, Week 1	20297	51.6	50.0
N-Butyl Alcohol, Lot #3597-KVVE	20298	6.5[a] (21 unknowns)	

Lot is approximately 99.4% pure.

ND = Not detected above the minimum reporting limit of 1.0 mg/ml.

[a]Approximate total concentration of unknowns using response factor of n-butyl alcohol.

Reported by: wtr

Checked by: JD

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September 25, 1985

Y.A. Demirjian, Ph.D.
Manager-Director

LABORATORY ANALYSES

COMPANY: Toxicity Research Laboratories, Study #032-006, Lot #3597 KVVE, Week 4

Date: September 16, 1985

WWCN	Sample Designation	n-Butanol mg/ml
0985125	Pure Butanol	-----
0985126	Group I, Deionized Water	0.0
0985127	Group II, 3.0 mg/ml	3.07
0985128	Group III, 12.5 mg/ml	12.27
0985129	Group IV, 50 mg/ml	49.78

CLIENT: Toxicity Research Laboratories, Ltd.

ERCO / A DIVISION OF ENSECO INC.

SAMPLE RECEIVED: 9/19/85

ANALYSIS COMPLETED: 10/1/85

RESULTS IN: mg/ml

SOLVENT ANALYSIS

- Data Report -

Client ID	ERCO ID	n-butyl alcohol	Theoretical Concentration
Group I Week 4	20986	ND	0.0
Group II Week 4	20987	3.0	3.0
Group III Week 4	20988	14.3	12.5
Group IV Week 5	20989	46.1	50.0
n-butyl alcohol Lot #3597 KVVE	20990	2.0[a] (5 unknowns) Lot is approximately 99.8% pure.	

ND = Not detected above the minimum reporting limit of 1 mg/ml.

Reported by: [illegible]
Checked by: [illegible]

[a]Total approximate concentration of unknowns using the n-butyl alcohol response factor.

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8301 WHITE ROAD, MUSKEGON, MICHIGAN 49442
PHONE 616-853-2291

Y.A. Demirjian, Ph.D.
Manager-Director

December 12, 1985

COMPANY: TRL, Study #032-006, Lot #3597 KVVE, Week #6

Date: September 30, 1985

WWCN	Sample Designation	Butanol mg/ml
0985185	Pure Butanol	
0985186	Group I, Deionized water, 0.0 mg/ml	0.00
0985187	Group II, 3.0 mg/ml	2.94
0985188	Group III, 12.5 mg/ml	12.73
0985189	Group IV, 50.0 mg/ml	50.92

DEC 20 1985

CLIENT: Toxicity Research Laboratories, Inc.

SAMPLE RECEIVED: 10/5/85

ANALYSIS COMPLETED: 10/10/85

RESULTS IN: mg/ml

ERCO/A DIVISION OF ENSECO, INC.

SOLVENT ANALYSIS

- Data Report -

Client ID	ERCO ID	N-Butyl Alcohol	Theoretical Concentration
Group I, Week 6	21468	ND	0.0
Group II, Week 6	21469	2.8	3.0
Group III, Week 6	21470	12.1	12.5
Group IV, Week 6	21471	49.6	50.0
N-Butyl Alcohol, Lot #3597	21472	4.8[a] (16 unknowns)	

Lot is approximately 99.5% pure.

ND = Not detected above the minimum reporting limit of 1.0 mg/ml.

[a]Approximate total concentration of unknowns using response factor of n-butyl alcohol.

Reported by: [illegible]
Checked by: [illegible]

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Y.A. Demirjian, Ph.D.
Manager-Director

LABORATORY ANALYSES

COMPANY: TRL

Date October 31, 1985

WWCN	Sample Designation	Butanol mg/ml
1085-149	032-006 Week #10, 10/28/85 Lot 3597 KVVE Pure Butanol	
1085-150	032-006 Week #10, 10/28/85 Lot 3597 KVVE Group I, 0.0 mg/ml	0.0
1085-151	032-006 Week #10, 10/28/85 Lot 3597 KVVE Group II, 3.0 ml/ml	2.85
1085-152	032-006 Week #10, 10/28/85 Lot 3597 KVVE Group III, 12.5 mg/ml	12.20
1085-153	032-006 Week #10, 10/28/85 Lot 3597 KVVE Group IV, 50 mg/ml	49.42

CLIENT: Toxicity Research Laboratories, Ltd.
SAMPLE RECEIVED: 11/6/85
ANALYSIS COMPLETED: 11/14/85
RESULTS IN: mg/ml

ENSECO INCORPORATED

SOLVENT ANALYSIS

- Data Report -

Client ID	ENSECO ID	Normal butanol	Theoretical Concentrations
Group I, Week 10	23108	ND	0.0
Group II, Week 10	23109	2.8	3.0
Group III, Week 10	23110	14.0	12.5
Group IV, Week 10	23111	59.1	50.0
Normal butanol, Lot #3597 KVVE	23112	9.4[a] (13 unknowns) Lot is approximately 99.1% pure.	

ND = Not detected above the minimum reporting limit of 1.0 mg/ml.

[a]Approximate total concentration of unknowns using response factor of normal butanol.

Reported by: [illegible]
Checked by: [illegible]

County of Muskegon

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PHONE 616-853-2291

December 23, 1985

Y.A. Demirjian, Ph.D.
Manager-Director

LABORATORY ANALYSES

COMPANY: Toxicity Research Laboratories, Study #032-006, Lot #3597 KVVE, Week #13

Date: November 18, 1985

WWCN	Sample Designation	Butanol (mg/ml)
1185210	Group I, 0.0 mg/ml	0.0
1185211	Group II, 3.0 mg/ml	2.99
1185212	Group III, 12.5 mg/ml	12.37
1185213	Group IV, 50.0 mg/ml	49.40

CLIENT: Toxicity Research Laboratories, Ltd.

SAMPLE RECEIVED: 11/21/85

ANALYSIS COMPLETED: 12/2/85

RESULTS IN: mg/ml

ENSECO INCORPORATED

SOLVENT ANALYSIS

- Data Report -

Client ID	ENSECO ID	Normal butanol	Theoretical Concentrations
Group I, Week 13	23702	ND	0.0
Group II, Week 13	23703	2.4	3.0
Group III, Week 13	23704	11.8	12.5
Group IV, Week 13	23705	47.9	50.0
Normal butanol, Lot #3597 KVVE	23706	0.7[a] (3 unknowns) Lot is approximately 99.9% pure.	

ND = Not detected above the minimum reporting limit of 1.0 mg/ml.

[a]Approximate total concentration of unknowns using response factor of normal butanol.

Reported by:

Checked by: JTS

County of Muskegon

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PHONE 616-853-2291

December 23, 1985

Y.A. Demirjian, Ph.D.
Manager-Director

LABORATORY ANALYSES

COMPANY: Toxicity Research Laboratories, Study #032-006, Lot #3597 KVVE, Week #13, Day 8

Date: November 25, 1985

WWCN	Sample Designation	Butanol (mg/ml)
1195236	Group I, 0.0 mg/ml	0.0
		0.0
		0.0
1185237	Group II, 3.0 mg/ml	3.19
		3.18
		3.10
1185238	Group III, 12.5 mg/ml	12.93
		13.02
		12.34
1185239	Group IV, 50.0 mg/ml	51.88
		51.02
		51.53

TOXICITY RESEARCH LABORATORIES, LTD.

TRL Study #032-006

Rat Oral Subchronic Toxicity Study

Compound:

Normal Butanol

APPENDIX B

Individual Body Weights

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 MALES

ANIMAL NUMBER	INITIAL Grams	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams
Group I	0 mg/kg/day				
1	83	132	184	234	287
2	95	148	208	266	324
3	105	161	220	275	332
4	92	144	192	238	284
5	89	129	162	209	252
6	96	155	205	261	312
7	84	132	175	225	272
8	95	152	207	263	319
9	91	149	211	260	307
10	89	139	180	226	284
11	89	139	184	227	257
12	98	156	192	251	291
13	105	167	221	279	317
14	75	124	168	209	251
15	82	131	180	233	282
16	84	142	191	251	300
17	94	146	198	255	306
18	84	138	189	242	293
19	106	161	217	273	338
20	89	142	200	253	305
21	92	148	196	248	294
22	96	153	205	263	316
23	88	139	191	246	292
24	90	142	193	249	299
25	82	126	174	219	259
26	84	139	178	247	307
27	85	136	184	231	277
28	90	146	193	239	286
29	86	143	190	242	293
30	93	156	188	243	298
Mean	90.4	143.8	192.5	245.2	294.5
S.D.	7.23	10.74	14.78	18.19	22.26

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 MALES

ANIMAL NUMBER	INITIAL Grams	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams
Group II	30 mg/kg/day				
61	105	165	225	280	332
62	82	139	188	245	289
63	92	150	206	262	314
64	90	146	194	247	290
65	82	136	195	236	288
66	88	140	200	253	306
67	97	160	215	270	328
68	93	140	192	242	297
69	81	138	196	245	289
70	96	151	204	259	308
71	94	149	198	248	295
72	88	143	193	246	295
73	96	154	196	248	294
74	97	148	176	241	301
75	88	142	198	243	289
76	85	137	186	234	286
77	95	153	212	270	317
78	91	146	204	266	322
79	81	136	187	234	286
80	88	139	192	240	279
81	89	144	194	253	312
82	93	151	191	244	297
83	97	155	213	266	310
84	104	163	219	281	335
85	91	149	207	259	313
86	95	158	214	265	315
87	83	133	195	259	323
88	94	144	194	255	299
89	88	145	200	261	314
90	91	146	193	253	306
Mean	91.1	146.7	199.2	253.5	304.3
S.D.	6.14	8.26	10.84	12.75	14.96

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 MALES

ANIMAL NUMBER	INITIAL Grams	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams
Group III	125 mg/kg/day				
121	92	149	206	257	308
122	80	133	187	243	293
123	92	151	193	255	306
124	89	147	209	264	330
125	84	138	197	246	307
126	82	128	168	216	263
127	92	151	206	263	318
128	99	158	220	272	330
129	90	140	191	245	296
130	91	149	199	252	298
131	95	147	199	250	294
132	94	156	202	259	312
133	100	149	X		
134	92	147	201	266	324
135	84	132	173	228	284
136	85	131	173	221	266
137	89	145	193	245	287
138	94	160	222	283	339
139	83	133	187	234	283
140	96	159	220	276	333
141	87	148	196	247	298
142	87	146	203	254	306
143	86	137	189	244	288
144	96	152	214	274	326
145	98	152	204	260	306
146	103	164	205	270	324
147	98	161	216	267	318
148	90	144	196	249	306
149	84	132	184	247	300
150	88	141	195	245	296
Mean	90.7	146.0	198.2	252.8	304.8
S.D.	5.86	9.83	13.75	15.94	19.02

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 MALES

ANIMAL NUMBER	INITIAL Grams	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams
Group IV	500 mg/kg/day				
181	88	140	185	238	280
182	88	139	190	246	308
183	89	133	176	224	272
184	84	134	181	238	284
185	98	158	215	268	316
186	94	152	208	260	319
187	84	135	184	230	280
188	85	122	162	210	258
189	88	149	204	256	301
190	88	142	191	246	299
191	84	128	172	218	264
192	94	144	181	217	260
193	85	131	183	237	286
194	92	145	191	236	276
195	97	153	198	237	300
196	94	149	196	237	280
197	83	133	181	222	266
198	81	124	169	211	256
199	97	143	179	239	292
200	97	163	216	279	336
201	98	159	218	283	344
202	92	155	207	255	314
203	80	137	183	232	270
204	96	147	196	241	289
205	95	146	195	239	286
206	93	153	194	229	293
207	95	154	202	266	318
208	90	133	172	208	249
209	99	148	203	251	303
210	102	157	205	260	305
Mean	91.0	143.5	191.2	240.4	290.1
S.D.	5.95	10.86	14.57	19.47	23.67

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 FEMALES

ANIMAL NUMBER	INITIAL Grams	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams
Group I	0 mg/kg/day				
31	90	136	157	174	190
32	85	120	135	150	173
33	89	132	151	177	197
34	76	116	143	163	171
35	81	121	132	151	169
36	80	123	147	163	193
37	86	126	154	171	190
38	89	132	164	192	212
39	82	120	145	170	185
40	95	142	166	195	214
41	85	131	155	181	205
42	89	125	148	157	184
43	88	125	144	150	162
44	78	123	158	165	204
45	84	129	151	164	184
46	83	121	146	172	187
47	86	129	165	202	228
48	86	126	147	171	190
49	87	128	148	165	197
50	87	132	162	175	215
51	76	121	154	181	203
52	78	119	152	179	198
53	89	136	166	188	210
54	98	139	163	183	194
55	85	124	155	169	196
56	83	111	121	143	158
57	99	149	181	191	213
58	89	136	161	183	203
59	99	141	177	193	224
60	83	134	160	176	210
Mean	86.2	128.2	153.6	173.1	195.3
S.D.	6.07	8.50	12.47	14.59	17.38

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 FEMALES

ANIMAL NUMBER	INITIAL Grams	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams
Group II	30 mg/kg/day				
91	85	128	156	185	213
92	85	139	174	197	211
93	89	130	144	172	200
94	87	130	153	178	199
95	92	133	141	160	174
96	84	130	163	193	218
97	89	130	156	185	211
98	85	129	167	192	211
99	84	124	152	174	189
100	88	137	168	175	211
101	83	125	154	178	202
102	71	113	151	170	201
103	95	138	163	185	205
104	90	137	168	189	213
105	83	131	154	180	198
106	87	130	167	187	217
107	94	133	163	186	213
108	74	112	141	164	188
109	91	136	165	187	207
110	83	127	153	173	193
111	80	110	133	154	171
112	90	124	144	165	185
113	90	139	170	192	220
114	87	128	161	178	200
115	78	118	143	171	202
116	89	129	168	208	240
117	97	138	160	192	210
118	88	136	161	174	191
119	81	121	150	170	197
120	87	137	167	190	201
Mean	86.2	129.1	157.0	180.1	203.0
S.D.	5.71	8.00	10.37	11.92	13.97

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 FEMALES

ANIMAL NUMBER	INITIAL Grams	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams
Group III	125 mg/kg/day				
151	95	140	156	178	198
152	85	121	143	164	183
153	88	137	167	192	219
154	88	129	155	178	193
155	86	130	154	174	188
156	73	115	133	160	169
157	88	136	171	192	217
158	87	125	138	144	160
159	80	126	152	175	191
160	79	122	158	177	209
161	95	134	166	184	220
162	79	119	145	166	171
163	93	139	171	193	210
164	79	128	165	187	216
165	83	130	164	177	195
166	91	126	140	154	181
167	94	139	161	186	212
168	86	126	138	160	174
169	81	127	159	188	201
170	82	122	161	170	208
171	88	129	154	177	199
172	94	132	157	173	180
173	73	115	137	158	179
174	77	118	143	151	173
175	91	132	153	180	204
176	87	122	144	166	184
177	89	133	161	179	193
178	82	123	149	171	205
179	81	121	152	169	182
180	91	133	154	174	199
Mean	85.5	127.6	153.4	173.2	193.8
S.D.	6.24	7.01	10.50	12.43	16.40

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 FEMALES

ANIMAL NUMBER	INITIAL Grams	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams
Group IV	500 mg/kg/day				
211	74	113	135	149	169
212	85	128	148	169	192
213	88	129	158	183	206
214	83	121	142	159	173
215	93	139	158	184	208
216	86	132	155	179	200
217	95	140	167	187	206
218	89	126	145	167	177
219	80	124	154	181	198
220	94	133	157	187	208
221	90	136	150	177	193
222	82	131	160	180	206
223	84	120	153	173	196
224	81	125	152	176	198
225	85	132	165	188	214
226	95	136	157	181	208
227	83	123	153	180	201
228	76	121	145	168	191
229	74	118	135	163	187
230	79	134	167	189	208
231	87	118	138	158	182
232	87	121	130	148	162
233	81	118	142	159	184
234	87	125	149	169	193
235	80	121	140	166	185
236	82	112	137	166	177
237	89	129	153	185	211
238	86	127	150	179	196
239	73	131	149	175	182
240	91	131	143	171	202
Mean	84.6	126.5	149.6	173.2	193.8
S.D.	6.07	7.31	9.63	11.26	13.51

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 4 Grams	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams
Group I	0 mg/kg/day				
1	330	356	372	X	
2	367	387	410	X	
3	382	424	451	X	
4	323	352	377	X	
5	283	313	323	X	
6	352	381	409	X	
7	310	345	362	X	
8	362	384	415	X	
9	359	388	416	X	
10	327	361	398	X	
11	297	332	353	370	384
12	316	333	350	365	376
13	360	390	419	441	462
14	285	316	336	343	358
15	324	355	374	395	419
16	337	362	392	420	443
17	356	395	419	443	468
18	333	371	387	411	438
19	391	426	464	492	519
20	345	374	399	419	443
21	341	366	378	403	413
22	367	403	428	454	477
23	326	359	381	400	423
24	340	365	386	401	419
25	308	342	370	393	411
26	358	395	425	442	471
27	315	343	374	397	412
28	321	345	373	390	408
29	337	376	406	434	448
30	349	377	403	430	455
Mean	336.7	367.2	391.7	412.1	432.4
S.D.	26.43	27.78	31.73	34.20	38.03

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 4 Grams	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams
Group II	30 mg/kg/day				
61	373	410	440	X	
62	332	363	377	X	
63	357	393	421	X	
64	324	347	372	X	
65	317	354	378	X	
66	351	386	421	X	
67	365	397	419	X	
68	338	371	404	X	
69	327	362	391	X	
70	348	382	407	X	
71	327	356	370	389	397
72	326	361	381	398	414
73	323	352	375	392	402
74	350	400	431	455	483
75	326	357	379	400	409
76	321	348	368	385	398
77	355	392	418	439	463
78	372	413	435	463	470
79	326	352	380	403	418
80	303	337	366	391	400
81	368	404	437	460	487
82	340	372	416	452	486
83	353	388	416	444	469
84	371	410	433	460	485
85	357	396	413	430	450
86	347	379	407	428	449
87	380	426	461	494	520
88	339	365	385	404	424
89	361	396	425	449	469
90	344	377	405	432	452
Mean	344.0	378.2	404.4	428.4	447.3
S.D.	19.61	23.32	25.87	31.36	37.00

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 4 Grams	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams
Group III	125 mg/kg/day				
121	350	387	414	X	
122	328	375	403	X	
123	360	396	418	X	
124	368	409	429	X	
125	348	382	407	X	
126	286	306	324	X	
127	359	393	422	X	
128	377	400	412	X	
129	334	366	392	X	
130	340	367	392	X	
131	334	372	399	422	447
132	359	392	420	447	461
133	X				
134	377	410	438	463	489
135	316	349	378	370	401
136	297	328	346	359	379
137	323	355	382	401	413
138	391	429	452	470	497
139	321	357	390	409	429
140	379	404	431	462	489
141	336	366	386	409	439
142	351	385	419	440	468
143	336	361	391	419	435
144	370	412	442	468	493
145	345	380	390	407	414
146	376	426	439	462	473
147	352	388	410	423	444
148	354	388	420	445	461
149	350	389	421	442	463
150	330	366	390	412	433
Mean	346.4	380.6	405.4	427.9	448.8
S.D.	24.53	27.13	27.71	31.89	32.97

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 4 Grams	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams
Group IV	500 mg/kg/day				
181	311	326	343	X	
182	344	379	403	X	
183	312	330	344	X	
184	325	358	379	X	
185	365	395	425	X	
186	365	405	440	X	
187	316	347	375	X	
188	289	310	318	X	
189	336	363	388	X	
190	343	373	404	X	
191	294	320	341	352	366
192	305	337	363	392	416
193	326	349	379	401	427
194	310	333	356	373	325
195	339	373	400	416	434
196	323	353	382	403	418
197	297	319	342	361	375
198	286	318	335	350	363
199	335	361	379	403	423
200	380	417	444	470	496
201	390	424	445	468	488
202	348	373	397	X	
203	308	335	312	341	363
204	332	353	375	391	406
205	320	348	371	391	407
206	335	376	404	430	448
207	352	379	400	416	441
208	284	317	335	357	370
209	339	376	395	420	444
210	338	371	392	415	440
Mean	328.2	357.3	378.9	397.4	413.2
S.D.	26.68	30.01	35.36	36.56	44.29

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 4 Grams	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams
Group I	0 mg/kg/day				
31	212	220	230	X	
32	187	202	204	X	
33	211	233	239	X	
34	192	203	210	X	
35	178	199	201	X	
36	205	228	239	X	
37	211	224	227	X	
38	240	255	265	X	
39	202	217	232	X	
40	233	247	252	X	
41	220	236	253	265	276
42	202	215	215	240	253
43	173	190	195	204	219
44	208	217	235	243	243
45	192	204	219	226	232
46	210	219	227	233	242
47	265	285	307	319	342
48	202	219	226	231	243
49	217	232	238	252	254
50	230	230	250	264	273
51	228	233	255	259	269
52	224	237	258	267	287
53	235	248	256	270	277
54	208	215	231	240	258
55	200	213	227	235	236
56	170	176	186	195	197
57	235	252	261	274	284
58	227	235	244	247	256
59	242	257	265	277	297
60	230	252	270	276	276
Mean	213.0	226.4	237.2	250.9	260.7
S.D.	21.75	22.62	25.45	27.88	31.17

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 4 Grams	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams
Group II	30 mg/kg/day				
91	232	242	252	X	
92	245	262	277	X	
93	211	239	245	X	
94	212	218	239	X	
95	195	209	213	X	
96	234	257	256	X	
97	222	235	248	X	
98	232	244	254	X	
99	214	213	231	X	
100	228	237	258	X	
101	221	240	250	260	270
102	204	228	241	242	259
103	226	243	249	261	277
104	224	238	260	271	280
105	216	223	232	242	250
106	233	250	260	272	287
107	223	233	239	250	262
108	200	215	228	239	239
109	229	241	254	256	264
110	203	225	224	237	256
111	187	200	211	216	230
112	203	211	225	231	239
113	237	256	276	290	305
114	213	220	242	247	257
115	218	225	247	253	259
116	265	293	310	319	329
117	234	252	261	273	290
118	200	209	221	220	242
119	209	238	246	268	288
120	227	244	245	248	264
Mean	219.9	234.7	246.5	254.8	267.4
S.D.	16.37	19.34	20.13	23.84	24.25

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 4 Grams	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams
Group III	125 mg/kg/day				
151	213	220	234	X	
152	190	206	213	X	
153	240	252	275	X	
154	204	217	216	X	
155	200	214	224	X	
156	188	205	220	X	
157	231	252	274	X	
158	167	178	181	X	
159	214	227	237	X	
160	238	253	256	X	
161	241	258	262	278	291
162	197	219	225	230	246
163	232	253	277	292	301
164	235	263	279	285	298
165	210	219	225	249	251
166	198	204	222	228	232
167	228	249	264	274	284
168	184	191	203	212	225
169	233	246	258	275	270
170	231	253	250	287	306
171	215	224	242	252	261
172	202	220	230	229	242
173	189	211	222	232	232
174	198	209	224	232	237
175	225	239	254	268	276
176	206	222	238	256	263
177	217	235	241	253	261
178	220	225	237	243	246
179	206	225	230	237	252
180	214	224	242	257	265
Mean	212.2	227.1	238.5	253.5	262.0
S.D.	18.87	21.06	23.17	23.13	24.36

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 4 Grams	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams
Group IV	500 mg/kg/day				
211	185	199	201	X	
212	210	225	237	X	
213	231	252	267	X	
214	190	205	212	X	
215	230	245	260	X	
216	213	223	245	X	
217	230	242	251	X	
218	193	203	207	X	
219	221	232	237	X	
220	222	234	250	X	
221	200	216	228	238	235
222	224	244	261	265	278
223	204	227	240	246	268
224	X				
225	231	241	254	254	261
226	227	244	259	268	285
227	224	243	253	265	276
228	203	226	231	230	239
229	207	229	237	242	253
230	241	256	266	276	282
231	206	214	220	226	241
232	171	174	188	194	199
233	199	213	224	245	264
234	207	216	233	238	250
235	203	212	220	236	247
236	195	214	219	226	225
237	225	239	255	273	277
238	214	228	238	243	256
239	212	222	238	242	253
240	217	224	247	258	258
Mean	211.6	225.6	237.2	245.5	255.1
S.D.	16.11	17.85	19.97	19.82	21.56

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 9 Grams	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group I	0 mg/kg/day				
1	X				
2	X				
3	X				
4	X				
5	X				
6	X				
7	X				
8	X				
9	X				
10	X				
11	400	410	423	447	446
12	383	395	403	431	434
13	475	495	506	525	530
14	369	385	396	418	417
15	433	445	458	479	480
16	458	486	504	528	541
17	480	488	494	505	502
18	459	480	496	523	523
19	529	552	570	587	593
20	461	482	496	519	536
21	430	450	460	474	481
22	496	512	528	547	557
23	437	445	452	474	475
24	431	441	441	464	464
25	425	440	454	472	472
26	488	513	529	547	552
27	421	439	450	465	474
28	420	439	450	467	474
29	467	485	463	503	515
30	472	495	502	519	520
Mean	446.7	463.9	473.8	494.7	499.3
S.D.	39.26	42.08	43.92	42.67	45.08

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 9 Grams	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group II	30 mg/kg/day				
61	X				
62	X				
63	X				
64	X				
65	X				
66	X				
67	X				
68	X				
69	X				
70	X				
71	411	425	438	460	473
72	421	438	432	454	464
73	416	431	438	453	454
74	502	529	534	560	566
75	423	433	440	460	467
76	416	420	424	436	439
77	474	498	505	526	537
78	482	498	513	536	544
79	431	447	459	478	486
80	411	420	428	450	453
81	472	460	493	528	543
82	505	537	553	568	573
83	487	501	514	535	540
84	494	509	512	538	542
85	465	486	490	510	519
86	442	455	471	491	504
87	534	555	572	596	606
88	435	439	442	464	471
89	481	502	518	536	546
90	480	508	522	539	550
Mean	459.1	474.5	484.9	505.9	513.8
S.D.	37.12	42.49	45.21	46.49	47.46

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 9 Grams	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group III	125 mg/kg/day				
121	X				
122	X				
123	X				
124	X				
125	X				
126	X				
127	X				
128	X				
129	X				
130	X				
131	467	489	503	519	509
132	488	493	506	529	517
133	X				
134	500	524	542	555	558
135	411	440	453	445	448
136	387	399	416	442	446
137	421	444	443	463	461
138	520	545	554	579	586
139	448	466	472	487	496
140	510	536	537	561	570
141	459	470	478	497	505
142	492	515	518	545	564
143	447	466	477	498	493
144	513	535	549	560	570
145	423	439	440	459	467
146	485	503	514	531	537
147	458	471	481	491	485
148	479	498	505	520	529
149	477	499	503	507	530
150	457	423	458	483	491
Mean	465.4	481.8	492.1	509.0	513.8
S.D.	36.55	40.76	39.36	40.60	42.91

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 9 Grams	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group IV	500 mg/kg/day				
181	X				
182	X				
183	X				
184	X				
185	X				
186	X				
187	X				
188	X				
189	X				
190	X				
191	384	389	407	414	424
192	435	455	464	484	489
193	446	464	472	495	507
194	351	371	386	402	412
195	453	474	479	516	516
196	429	450	467	478	480
197	385	406	420	425	431
198	385	397	401	422	430
199	448	464	474	487	493
200	499	517	542	573	571
201	510	535	547	554	566
202	X				
203	381	398	405	413	416
204	426	439	455	478	478
205	425	442	458	478	482
206	474	490	487	518	538
207	457	477	488	497	507
208	382	394	395	411	416
209	469	481	492	514	530
210	456	474	487	499	508
Mean	431.3	448.3	459.3	476.7	483.9
S.D.	43.64	45.49	46.52	49.92	50.50

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 9 Grams	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group I	0 mg/kg/day				
31	X				
32	X				
33	X				
34	X				
35	X				
36	X				
37	X				
38	X				
39	X				
40	X				
41	281	292	299	311	305
42	257	259	264	282	275
43	225	228	228	233	238
44	261	246	273	270	284
45	244	253	264	264	267
46	254	256	262	276	281
47	354	362	377	388	389
48	251	260	273	280	274
49	270	273	270	286	278
50	279	297	301	310	306
51	277	277	294	300	304
52	291	307	324	320	320
53	279	293	296	312	301
54	270	276	278	286	295
55	251	259	260	269	278
56	198	208	210	217	219
57	294	296	310	317	317
58	269	268	273	288	294
59	300	302	309	333	325
60	297	306	307	314	321
Mean	270.1	275.9	283.6	292.8	293.5
S.D.	31.75	33.23	35.47	36.58	35.07

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 9 Grams	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group II	30 mg/kg/day				
91	X				
92	X				
93	X				
94	X				
95	X				
96	X				
97	X				
98	X				
99	X				
100	X				
101	277	281	283	305	309
102	268	273	283	286	292
103	280	288	290	301	301
104	292	300	302	312	313
105	248	257	266	270	272
106	293	291	313	317	315
107	264	271	275	288	293
108	252	262	266	264	274
109	283	287	282	297	303
110	264	273	273	285	294
111	239	241	241	254	263
112	247	245	247	267	272
113	312	325	326	334	340
114	266	276	283	293	294
115	266	280	284	286	294
116	331	346	364	364	366
117	300	310	312	323	336
118	255	273	273	278	289
119	304	318	332	346	365
120	267	276	279	289	296
Mean	275.4	283.6	288.7	298.0	304.0
S.D.	23.98	26.11	29.23	28.19	28.66

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 9 Grams	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group III	125 mg/kg/day				
151	X				
152	X				
153	X				
154	X				
155	X				
156	X				
157	X				
158	X				
159	X				
160	X				
161	288	287	301	303	321
162	257	259	258	272	274
163	311	316	324	345	345
164	315	343	350	354	349
165	257	269	272	294	319
166	234	255	252	254	268
167	294	300	306	309	313
168	227	233	238	246	246
169	267	285	288	298	299
170	317	321	334	348	346
171	264	278	291	303	302
172	247	253	253	264	275
173	243	253	252	257	268
174	239	247	250	251	251
175	274	291	301	308	302
176	263	273	285	291	291
177	267	256	253	271	279
178	239	243	248	265	265
179	260	267	271	280	284
180	267	264	272	281	283
Mean	266.5	274.6	280.0	289.7	294.0
S.D.	26.62	28.41	31.56	32.12	30.57

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Body Weights

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 9 Grams	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group IV	500 mg/kg/day				
211	X				
212	X				
213	X				
214	X				
215	X				
216	X				
217	X				
218	X				
219	X				
220	X				
221	247	255	258	257	267
222	286	296	306	311	310
223	265	288	289	300	307
224	X				
225	274	283	280	297	301
226	295	318	332	349	358
227	285	291	301	318	310
228	242	252	253	267	265
229	262	273	274	281	280
230	289	296	306	322	328
231	250	253	257	270	274
232	198	204	208	210	211
233	267	284	292	298	304
234	260	257	261	279	275
235	261	255	264	266	278
236	230	237	239	250	245
237	284	299	303	314	314
238	265	267	267	277	276
239	258	263	257	274	276
240	259	272	282	283	273
Mean	261.9	270.7	275.2	285.4	286.9
S.D.	22.99	26.21	28.65	31.08	32.23

X Animal dead

TOXICITY RESEARCH LABORATORIES, LTD.

TRL Study #032-006

Rat Oral Subchronic Toxicity Study

Compound:

Normal Butanol

APPENDIX C

Individual Food Consumption

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 MALES

ANIMAL NUMBER	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams	WEEK 4 Grams
Group I	0 mg/kg/day				
1	114	152	174	191	210
2	94	185	208	221	233
3	134	176	193	218	237
4	128	155	177	176	192
5	121	126	156	168	175
6	132	162	181	198	198
7	115	136	163	173	185
8	137	164	192	206	217
9	135	178	190	202	229
10	126	145	160	186	198
11	127	152	170	173	176
12	144	155	186		200
13	145	173	193	198	212
14	116	140	160	160	172
15	146	165	166	178	198
16	139	176	193	196	206
17	122	152	180	199	218
18	123	152	178	198	212
19	149	173	193	221	245
20	115	190	185	202	219
21	137	160	171	185	208
22	136	154	179	197	215
23	132	163	193	189	201
24	138	166	167	186	202
25	121	144	167	172	192
26	132	140	183	212	226
27	134	151	177	181	199
28	132	156	175	193	206
29	130	156	172	206	210
30	131	156	185	197	221
Mean	129.5	158.4	178.9	192.5	207.1
S.D.	11.58	14.62	12.40	15.80	17.74

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 MALES

ANIMAL NUMBER	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams	WEEK 4 Grams
Group II	30 mg/kg/day				
61	154	181	207	219	244
62	136	158	186	194	211
63	143	163	176	197	
64	141	156	172	188	193
65	134	159	168	184	187
66	138	161	185	199	216
67	144	163	179	206	211
68	170	162	182	205	225
69	134	167	182	187	196
70	141	161	183	193	203
71	134	150	167	188	200
72	130	150	169	180	198
73	145	154	173	182	189
74	143	120	182	208	235
75	140	166	174	183	204
76	138	149	169	186	201
77	153	191	189	205	210
78	133	161	190	202	224
79	135	163	161	182	187
80	133	162	173	182	189
81	136	159	177	206	237
82	143	148	181	197	207
83	147	173	198	212	221
84	141	167	191	215	231
85	145	175	195	221	238
86	147	175	195	198	207
87	126	152	182	207	225
88	135	159	183	191	206
89	143	165	190	209	232
90	138	153	180	192	204
Mean	140.7**	160.8	181.3	197.3	211.4
S.D.	8.41	12.37	10.32	11.88	16.77

** P less than or equal to 0.01

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 MALES

ANIMAL NUMBER	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams	WEEK 4 Grams
Group III	125 mg/kg/day				
121	147	171	177	198	207
122	128	153	175	187	198
123	140	152	185	196	217
124	147	188	186	213	221
125	135	162	175	204	204
126	134	141	162	180	174
127	145	171	188	202	211
128	149	170	184	210	225
129	132	155	173	182	196
130	164	169	196	231	203
131	137	157	173	188	203
132	141	149	173	199	212
133	138	X			
134	145	156	184	206	221
135	129	143	167	188	199
136	133	143	164	177	189
137	139	155	170	187	196
138	161	193	211	237	243
139	138	164	178	199	206
140	156	190	208	231	238
141	162	172	185	207	209
142	135	165	177	194	213
143	135	148	162	179	200
144	137	175	194	207	218
145	146	162	186	195	205
146	164	158	194	214	234
147	146	167	192	201	214
148	135	160	175	198	215
149	142	165	183	196	215
150	143	169	194	202	196
Mean	142.8**	162.9	181.8	200.3	209.7
S.D.	10.10	13.27	12.37	15.04	14.62

** P less than or equal to 0.01

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 MALES

ANIMAL NUMBER	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams	WEEK 4 Grams
Group IV	500 mg/kg/day				
181	134	152	178	184	193
182	131	154	166	189	197
183	132	147	168	185	195
184	136	160	177	213	209
185	157	184	192	209	224
186	154	174	183	196	219
187	133	151	165	174	188
188	130	136	155	172	187
189	143	166	181	187	191
190	131	166	179	206	219
191	124	140	154	174	188
192	136	160	156	179	208
193	119	155	176	185	204
194	137	151	168	184	193
195	134	161	153	198	210
196	150	160	154	164	188
197	125	148	155	180	181
198	146	141	174	176	170
199	129	143	172	196	210
200	173	197	198	220	234
201	145	183	207	230	243
202	143	170	180	199	202
203	126	154	173	175	207
204	156	169	178	182	211
205	139	164	161	183	193
206	141	161	167	196	197
207	135	161	191	204	205
208	120	139	146	161	173
209	133	165	171	195	203
210	136	171	183	191	198
Mean	137.6*	159.4	172.0	189.6	201.3
S.D.	11.83	14.12	14.38	15.93	16.28

* P less than or equal to 0.05

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 FEMALES

ANIMAL NUMBER	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams	WEEK 4 Grams
Group I	0 mg/kg/day				
31	126	122	127	128	134
32	108	110	119	126	126
33	129	127	133	141	153
34	115	123	129	126	136
35	122	106	125	124	125
36	113	119	125	138	141
37	120	119	131	148	137
38	137	139	150	154	168
39	114	119	130	130	138
40	144	142	154	153	168
41	128	132	143	141	146
42	114	116	119	131	128
43	127	118	117	125	121
44	131	136	130	157	139
45	131	136	129	142	137
46	122	120	133	128	141
47	135	148	176	178	225
48	120	122	136	132	128
49	121	121	132	148	161
50	127	131	130	169	149
51	117	132	136	137	146
52	120	130	144	142	150
53	126	130	138	138	148
54	142	132	132	130	141
55	120	123	125	151	134
56	114	104	116	110	117
57	133	149	140	144	155
58	135	139	144	151	163
59	146	159	167	175	181
60	141	133	144	161	165
Mean	125.9	127.9	135.1	141.9	146.7
S.D.	10.05	12.55	13.62	15.88	21.29

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 FEMALES

ANIMAL NUMBER	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams	WEEK 4 Grams
Group II	30 mg/kg/day				
91	128	132	138	147	156
92	140	157	148	157	181
93	153	135	128	153	155
94	158	150	151	162	163
95	121	106	119	124	145
96	123	128	134	146	158
97	120	123	139	147	153
98	121	133	138	155	146
99	120	127	138	139	156
100	131	138	129	156	160
101	132	156	136	142	155
102	114	125	131	144	145
103	136	129	155	173	162
104	134	139	141	150	161
105	135	132	144	142	151
106	122	130	136	144	151
107	140	148	148	157	145
108	119	138	152	152	155
109	137	135	138	144	155
110	126	126	131		146
111	121	110	116	119	135
112	118	115	127	135	145
113	140	150	150	159	176
114	128	135	138	142	145
115	117	121	133	142	158
116	128	155	186	195	209
117	136	127	139	152	155
118	132	132	137	146	148
119	124	135	136	143	154
120	127	142	139	134	150
Mean	129.4	133.6	139.2	148.3	155.8
S.D.	10.32	12.63	12.61	14.11	13.62

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 FEMALES

ANIMAL NUMBER	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams	WEEK 4 Grams
Group III	125 mg/kg/day				
151	135	125	139	136	138
152	124	120	130	129	135
153	145	151	164	178	173
154	133	140	146	142	139
155	146	141	156	151	142
156	111	114	120	118	126
157	137	143	142	158	153
158	118	109	106	119	119
159	132	135	138	147	161
160	125	136	142	154	158
161	122	129	140	152	156
162	125	124	126	137	149
163	149	148	142	146	153
164	128	143	144	153	156
165	148	161	135	127	136
166	114	111	111	130	128
167	133	129	130	147	152
168	122	112	122	117	121
169	125	136	148	142	162
170	130	141	139	154	158
171	131	136	141	140	143
172	128	123	125	141	149
173	121	115	127	130	142
174	113	118	113	124	135
175	146	134	140	136	148
176	121	114	128	133	145
177	141	137	142	141	163
178	119	125	137	149	160
179	120	125	124	124	139
180	134	132	142	149	152
Mean	129.2	130.2	134.6	140.1	146.4
S.D.	10.69	12.97	12.85	13.70	13.12

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 FEMALES

ANIMAL NUMBER	PRE-TEST Grams	WEEK 1 Grams	WEEK 2 Grams	WEEK 3 Grams	WEEK 4 Grams
Group IV	500 mg/kg/day				
211	130	145	128	163	122
212	117	121	126	134	142
213	124	139	141	145	158
214	113	124	122	123	138
215	130	137	148	145	163
216	123	134	139		144
217	133	139	150	146	155
218	117	118	124	121	130
219	114	133	138	143	151
220	126	135	149	142	150
221	130	129	134	132	132
222	127	138	139	142	154
223	118	138	138	157	162
224	122	129	142	138	X
225	129	147	145	156	169
226	127	135	140	146	157
227	123	134	138	147	149
228	125	132	135	135	155
229	111	121	130	134	142
230	131	144	153	158	171
231	106	113	117	126	139
232	122	117	116	116	117
233	115	125	122	138	147
234	122	125	128	138	138
235	117	125	142	139	145
236	119	120	133	125	144
237	126	128	141	141	150
238	116	126	143	133	146
239	124	123	133	129	145
240	119	121	148	159	161
Mean	121.9	129.8	136.1	139.7	147.4
S.D.	6.59	8.85	9.87	11.86	12.69

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams	WEEK 9 Grams
Group I	0 mg/kg/day				
1	198	198	X		
2	206	204	X		
3	230	244	X		
4	192	210	X		
5	177	178	X		
6	196	205	X		
7	189	188	X		
8	210	225	X		
9	219	227	X		
10	200	222	X		
11	185	190	185	187	182
12	182	199	195	195	193
13	208	209	217	202	192
14	174	173	166	166	161
15	198	193	191	195	189
16	196	210	200	214	202
17	206	202	201	210	194
18	209	211	210	205	216
19	234	243	245	243	218
20	207	212	210	215	213
21	190	190	188	186	180
22	205	221	212	212	208
23	197	202	193	200	193
24	184	194	191	190	188
25	200	214	207	200	193
26	219	237	217	235	221
27	188	225	216	193	185
28	198	214	198	206	201
29	208	218	209	202	198
30	208	223	223	227	221
Mean	200.4	209.4	203.7	204.2	197.4
S.D.	14.12	17.53	16.79	17.64	15.48

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams	WEEK 9 Grams
Group II	30 mg/kg/day				
61	230	248	X		
62	206	203	X		
63	207	201	X		
64	185	202	X		
65	190	194	X		
66	209	229	X		
67	198	206	X		
68	225	220	X		
69	198	207	X		
70	202	208	X		
71	192	193	178	180	175
72	189	191	187	190	175
73	186	197	186	189	178
74	234	243	233	240	226
75	194	203	193	198	188
76	189	206	189	194	189
77	226	213	208	218	204
78	228	227	204	197	186
79	180	199	182	188	178
80	194	201	193	190	182
81	221	236	223	227	190
82	201	238	242	262	242
83	222	228	224	223	220
84	225	228	228	239	219
85	242	226	220	218	213
86	196	209	193	205	166
87	228	229	227	228	216
88	188	205	191	208	193
89	239	227	219	223	192
90	203	213	212	223	226
Mean	207.6	214.3	206.6	212.0	197.9
S.D.	18.28	15.91	19.34	21.57	21.28

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006

MALES

ANIMAL NUMBER	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams	WEEK 9 Grams
Group III	125 mg/kg/day				
121	200	209	X		
122	210	207	X		
123	217	224	X		
124	226	230	X		
125	205	212	X		
126	169	185	X		
127	210	215	X		
128	217	205	X		
129	200	208	X		
130	197	209	X		
131	214	233	214	248	211
132	213	226	220	221	211
133	X				
134	223	227	213	227	201
135	201	220	190	174	187
136	189	192	184	190	188
137	205	209	199	209	189
138	246	257	228	250	252
139	211	218	206	217	207
140	232	240	235	253	245
141	213	223	210	230	223
142	206	222	200	231	211
143	186	206	189	206	196
144	226	234	223	234	233
145	198	196	175	192	170
146	246	225	210	206	203
147	211	221	203	218	195
148	216	226	215	229	207
149	221	223	215	220	204
150	206	218	222	228	220
Mean	210.8*	217.9	207.9	220.2	208.1
S.D.	16.26	14.73	15.61	20.70	20.24

* P less than or equal to 0.05

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams	WEEK 9 Grams
Group IV	500 mg/kg/day				
181	174	191	X		
182	202	202	X		
183	182	181	X		
184	200	197	X		
185	215	239	X		
186	223	218	X		
187	192	206	X		
188	181	169	X		
189	183	198	X		
190	206	223	X		
191	183	191	180	187	174
192	204	213	213	228	223
193	195	205	199	218	209
194	190	196	188	125	176
195	203	206	190	194	198
196	195	213	196	200	188
197	173	188	173	174	173
198	168	178	172	182	165
199	202	202	202	219	208
200	227	233	226	245	197
201	226	228	223	238	224
202	186	202	X		
203	188	153	153	176	191
204	189	192	185	193	193
205	182	190	194	192	185
206	209	210	211	222	217
207	203	217	205	214	217
208	176	181	180	182	174
209	203	213	206	220	216
210	200	206	208	220	201
Mean	195.3	201.4	194.9	201.5	196.3
S.D.	15.47	18.67	18.53	28.10	18.58

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams	WEEK 9 Grams
Group I	0 mg/kg/day				
31	130	140	X		
32	128	142	X		
33	150	151	X		
34	135	139	X		
35	141	134	X		
36	142	146	X		
37	140	140	X		
38	156	170	X		
39	133	149	X		
40	159	157	X		
41	151	164	153	158	151
42	125	139	136	138	152
43	125	130	127	128	126
44	155	159	146	159	140
45	145	142	137	152	149
46	135	141	131	140	137
47	202	202	179	198	205
48	135	132	127	136	135
49	161	165	171	170	178
50	132	152	151	151	167
51	136	152	136	141	141
52	152	163	163	162	151
53	155	148	136	141	137
54	134	157	141	166	165
55	137	144	141	147	149
56	115	115	109	108	95
57	157	177	154	159	163
58	147	151	151	153	148
59	173	77	176	184	179
60	176	178	169	178	179
Mean	145.4	148.5	146.7	153.5	152.4
S.D.	17.78	21.63	18.26	20.40	23.42

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams	WEEK 9 Grams
Group II	30 mg/kg/day				
91	136	158	X		
92	167	185	X		
93	162	164	X		
94	156	176	X		
95	143	144	X		
96	159	147	X		
97	157	160	X		
98	144	160	X		
99	147	172	X		
100	157	175	X		
101	153	152	157	165	143
102	147	163	152	152	159
103	169	168	152	180	178
104	166	172	169	196	176
105	141	158	151	151	138
106	150	152	150	161	148
107	143	143	143	147	140
108	161	159	158	161	161
109	150	106	146	158	156
110	154	205	142	164	154
111	129	132	132	158	135
112	136	161	155	152	155
113	160	175	167	202	176
114	147	152	152	158	155
115	150	157	143	164	156
116	196	195	160	171	158
117	164	156	156	183	160
118	146	147	138	171	171
119	162	148	164	193	181
120	144	145	136	158	113
Mean	153.2	159.6	151.2	167.3*	155.7
S.D.	12.85	18.69	10.13	15.76	16.69

* P less than or equal to 0.05

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams	WEEK 9 Grams
Group III	125 mg/kg/day				
151	138	158	X		
152	135	132	X		
153	180	207	X		
154	142	139	X		
155	157	142	X		
156	135	139	X		
157	158	183	X		
158	117	130	X		
159	154	168	X		
160	160	160	X		
161	151	178	143	153	135
162	147	155	145	165	149
163	164	173	176	175	160
164	178	179	154	209	196
165	138	148	151	157	141
166	124	151	143	130	137
167	158	171	154	179	177
168	126	137	118	148	142
169	162	173	166	167	136
170	172	179	186	198	187
171	137	156	145	158	148
172	157	144	133	153	137
173	146	148	143	157	147
174	69	154	141	140	128
175	150	173	147	159	156
176	154	166	160	172	156
177	154	181	190	176	154
178	156	170	151	165	145
179	138	141	139	159	153
180	149	173	174	169	147
Mean	146.9	160.3*	153.0	164.5	151.6
S.D.	20.90	18.29	17.90	18.04	17.47

* P less than or equal to 0.05

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 5 Grams	WEEK 6 Grams	WEEK 7 Grams	WEEK 8 Grams	WEEK 9 Grams
Group IV	500 mg/kg/day				
211	126	140	X		
212	140	161	X		
213	156	162	X		
214	148	143	X		
215	165	187	X		
216	141	177	X		
217	147	160	X		
218	127	131	X		
219	155	155	X		
220	163	182	X		
221	143	153	139	142	149
222	172	170	148	176	162
223	168	169	172	182	151
224	X				
225	149	161	137	151	156
226	146	170	154	183	168
227	157	170	160	170	154
228	171	167	146	163	144
229	156	168	147	165	145
230	168	177	162	172	153
231	131	131	123	131	143
232	115	139	125	123	125
233	150	163	164	192	192
234	137	148	138	151	148
235	143	162	164	157	174
236	142	135	136	151	137
237	158	158	159	159	156
238	148	152	149	164	150
239	143	165	150	158	135
240	156	191	171	165	158
Mean	149.0	160.2	149.7	160.8	152.6
S.D.	13.98	15.82	14.28	17.31	14.86

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group I	0 mg/kg/day			
1	X			
2	X			
3	X			
4	X			
5	X			
6	X			
7	X			
8	X			
9	X			
10	X			
11	192	186	216	169
12	211	204	242	201
13	210	196	227	197
14	175	176	196	157
15	200	196	216	185
16	226	226	252	217
17	190	182	209	178
18	229	213	257	200
19	246	232	244	206
20	228	209	243	226
21	205	194	208	179
22	223	206	242	203
23	203	179	216	175
24	206	178	213	183
25	208	204	219	192
26	254	229	251	226
27	212	191	221	202
28	223	200	228	195
29	218	160	226	212
30	244	230	247	209
Mean	215.2	199.6	228.7	195.6
S.D.	19.67	19.90	17.39	18.50

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group II	30 mg/kg/day			
61	X			
62	X			
63	X			
64	X			
65	X			
66	X			
67	X			
68	X			
69	X			
70	X			
71	189	177	219	191
72	199	177	211	184
73	198	183	207	174
74	261	232	263	230
75	194	184	216	188
76	188	171	195	177
77	232	206	246	203
78	206	188	233	199
79	189	178	201	181
80	194	184	202	173
81	107	219	263	219
82	275	241	245	217
83	237	222	246	204
84	235	209	255	216
85	235	201	242	213
86	181	176	217	197
87	244	238	254	218
88	207	179	226	197
89	221	204	230	204
90	245	230	247	223
Mean	211.9	200.0	230.9	200.4
S.D.	36.52	23.37	21.50	17.26

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group III	125 mg/kg/day			
121	X			
122	X			
123	X			
124	X			
125	X			
126	X			
127	X			
128	X			
129	X			
130	X			
131	248	219	235	180
132	222	208	243	200
133	X			
134	235	215	237	200
135	209	194	179	161
136	198	191	218	200
137	218	176	201	198
138	273	245	282	219
139	226	198	222	191
140	270	223	245	224
141	224	202	235	203
142	219	194	239	207
143	207	185	214	182
144	239	220	219	211
145	190	172	174	167
146	224	202	195	203
147	212	199	184	168
148	225	195	190	197
149	219	X		
150	158	201	234	206
Mean	221.9	202.2	219.2	195.4
S.D.	26.14	17.65	27.98	17.54

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 MALES

ANIMAL NUMBER	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group IV	500 mg/kg/day			
181	X			
182	X			
183	X			
184	X			
185	X			
186	X			
187	X			
188	X			
189	X			
190	X			
191	179	173	186	175
192	241	215	258	223
193	224	200	235	208
194	201	185	208	190
195	208	200	240	206
196	214	203	213	190
197	185	176	192	171
198	183	158	199	176
199	235	204	219	193
200	251	236	272	219
201	249	224	227	209
202	X			
203	174	167	183	159
204	205	199	222	191
205	205	197	217	187
206	233	195	229	214
207	231	213	221	199
208	191	168	187	167
209	221	206	230	208
210	238	212	232	210
Mean	214.1	196.4	219.5	194.5
S.D.	24.34	20.63	23.79	18.50

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group I	0 mg/kg/day			
31	X			
32	X			
33	X			
34	X			
35	X			
36	X			
37	X			
38	X			
39	X			
40	X			
41	164	148	168	137
42	139	127	155	120
43	129	118	137	115
44	142	147	175	153
45	162	143	179	151
46	145	149	170	136
47	201	184	214	171
48	140	139	157	128
49	179	169	200	166
50	174	155	174	149
51	141	144	169	148
52	171	184	169	130
53	159	146	168	126
54	173	143	183	158
55	152	140	180	158
56	112	200	132	110
57	170	158	173	142
58	158	147	180	146
59	186	178	208	158
60	177	168	192	167
Mean	158.7	154.4	174.2	143.5
S.D.	21.35	20.44	20.33	17.72

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group II	30 mg/kg/day			
91	X			
92	X			
93	X			
94	X			
95	X			
96	X			
97	X			
98	X			
99	X			
100	X			
101	162	165	180	148
102	162	149	167	143
103	207	168	184	166
104	192	172	187	163
105	163	148	162	154
106	164	158	171	142
107	157	140	168	141
108	180	166	164	153
109	160	144	171	137
110	172	144	170	159
111	140	139	157	136
112	143	142	169	157
113	195	159	155	161
114	165	163	149	145
115	171	147	136	148
116	183	193	155	141
117	186	168	166	161
118	193	172	154	173
119	212	196	199	220
120	153	149	144	126
Mean	173.0	159.1	165.4	153.7
S.D.	19.93	16.37	15.01	19.50

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group III	125 mg/kg/day			
151	X			
152	X			
153	X			
154	X			
155	X			
156	X			
157	X			
158	X			
159	X			
160	X			
161	148	136	146	144
162	164	137	163	132
163	176	151	180	165
164	220	197	199	151
165	162	148	184	194
166	166	132	132	138
167	166	149	152	146
168	146	126	128	130
169	175	165	153	153
170	209	183	205	171
171	124	201	178	153
172	206	85	183	153
173	152	140	158	147
174	143	131	134	125
175	170	149	178	155
176	176	155	167	150
177	144	148	192	152
178	164	147	193	183
179	158	150	166	145
180	164	154	169	135
Mean	166.7	149.2	168.0	151.1
S.D.	23.44	25.26	22.37	17.06

X Animal dead

Rat Oral Subchronic Toxicity Study of Normal Butanol

Individual Food Consumptions

TRL Study #032-006 FEMALES

ANIMAL NUMBER	WEEK 10 Grams	WEEK 11 Grams	WEEK 12 Grams	WEEK 13 Grams
Group IV	500 mg/kg/day			
211	X			
212	X			
213	X			
214	X			
215	X			
216	X			
217	X			
218	X			
219	X			
220	X			
221	147	131	167	148
222	162	156	178	150
223	182	161	170	159
224	X			
225	162	140	178	153
226	200	185	214	182
227	164	156	174	136
228	156	141	165	142
229	169	146	167	133
230	167	140	184	162
231	131	129	147	126
232	138	123	137	124
233	200	175	194	175
234	159	154	175	139
235	168	150	182	168
236	142	141	162	137
237	174	149	174	156
238	161	140	153	132
239	144	123	158	132
240	185	158	165	144
Mean	163.7	147.3	170.7	147.3
S.D.	19.08	16.19	17.01	16.46

X Animal dead

TOXICITY RESEARCH LABORATORIES, LTD.

TRL Study #032-006

Rat Oral Subchronic Toxicity Study

Compound:

Normal Butanol

APPENDIX D

Ophthalmologic Evaluation

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

TRL Study #032-006

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
001	M	0	N	__[a]
002	M	0	N	__[a]
003	M	0	N	__[a]
004	M	0	N	__[a]
005	M	0	N	__[a]
006	M	0	N	__[a]
007	M	0	N	__[a]
008	M	0	N	__[a]
009	M	0	N	__[a]
010	M	0	N	__[a]
011	M	0	N	N
012	M	0	N	N
013	M	0	N	N
014	M	0	N	N
015	M	0	N	N

N = Normal

NOP = No Other Ocular Pathology

OU = Both eyes

OD = Right eye

OS = Left eye

[a] Sacrificed at interim

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

TRL Study #032-006

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
016	M	0	N	N
017	M	0	N	N
018	M	0	N	N
019	M	0	N	N
020	M	0	N	OS-N; OD-Chorioretinal hypoplasia, NOP
021	M	0	N	N
022	M	0	N	N
023	M	0	N	N
024	M	0	N	N
025	M	0	N	N
026	M	0	N	N
027	M	0	N	N
028	M	0	N	N
029	M	0	N	N
030	M	0	N	N

N = Normal
NOP = No Other Ocular Pathology

OU = Both eyes
OD = Right eye
OS = Left eye

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

TRL Study #032-006

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
031	F	0	N	--[a]
032	F	0	N	--[a]
033	F	0	N	--[a]
034	F	0	N	--[a]
035	F	0	N	--[a]
036	F	0	N	--[a]
037	F	0	N	--[a]
038	F	0	N	--[a]
039	F	0	N	--[a]
040	F	0	N	--[a]
041	F	0	N	N
042	F	0	N	N
043	F	0	N	N
044	F	0	N	N
045	F	0	N	N

N = Normal
NOP = No Other Ocular Pathology

OU = Both eyes
OD = Right eye
OS = Left eye

[a] Sacrificed at interim

TRL Study #032-006

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
046	F	0	N	N
047	F	0	N	N
048	F	0	N	N
049	F	0	N	N
050	F	0	N	N
051	F	0	N	N
052	F	0	N	N
053	F	0	N	N
054	F	0	N	N
055	F	0	N	N
056	F	0	N	N
057	F	0	N	N
058	F	0	N	N
059	F	0	N	N
060	F	0	N	N

N = Normal

NOP = No Other Ocular Pathology

OU = Both eyes

OD = Right eye

OS = Left eye

TRL Study #032-006

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
061	M	30	N	--[a]
062	M	30	N	--[a]
063	M	30	N	--[a]
064	M	30	N	--[a]
065	M	30	N	--[a]
066	M	30	N	--[a]
067	M	30	N	--[a]
068	M	30	N	--[a]
069	M	30	N	--[a]
070	M	30	N	--[a]
071	M	30	N	N
072	M	30	N	N
073	M	30	N	N
074	M	30	N	N
075	M	30	N	N

N = Normal
NOP = No Other Ocular Pathology

OU = Both eyes
OD = Right eye
OS = Left eye

[a] Sacrificed at interim

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

TRL Study #032-006

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
076	M	30	N	N
077	M	30	N	N
078	M	30	N	N
079	M	30	N	N
080	M	30	N	N
081	M	30	N	N
082	M	30	N	N
083	M	30	N	N
084	M	30	N	N
085	M	30	N	N
086	M	30	N	N
087	M	30	N	OS-N; OD-Chorioretinal hypoplasia, NOP
088	M	30	N	N
089	M	30	N	N
090	M	30	N	N

N = Normal
NOP = No Other Ocular Pathology

OU = Both eyes
OD = Right eye
OS = Left eye

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

TRL Study #032-006

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
091	F	30	N	--[a]
092	F	30	N	--[a]
093	F	30	N	--[a]
094	F	30	N	--[a]
095	F	30	N	--[a]
096	F	30	N	--[a]
097	F	30	N	--[a]
098	F	30	N	--[a]
099	F	30	N	--[a]
100	F	30	N	--[a]
101	F	30	N	N
102	F	30	N	N
103	F	30	N	N
104	F	30	N	OS-N; OD-Retinal hyaloid, NOP
105	F	30	N	N

N = Normal
NOP = No Other Ocular Pathology

OU = Both eyes
OD = Right eye
OS = Left eye

[a] Sacrificed at interim

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

TRL Study #032-006

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
106	F	30	N	N
107	F	30	N	N
108	F	30	N	N
109	F	30	N	N
110	F	30	N	N
111	F	30	N	N
112	F	30	N	N
113	F	30	N	N
114	F	30	N	N
115	F	30	N	N
116	F	30	N	N
117	F	30	N	N
118	F	30	N	N
119	F	30	N	N
120	F	30	N	N

N = Normal
NOP = No Other Ocular Pathology

OU = Both eyes
OD = Right eye
OS = Left eye

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

TRL Study #032-006

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
121	M	125	N	--[a]
122	M	125	N	--[a]
123	M	125	N	--[a]
124	M	125	N	--[a]
125	M	125	N	--[a]
126	M	125	N	--[a]
127	M	125	N	--[a]
128	M	125	N	--[a]
129	M	125	N	--[a]
130	M	125	N	--[a]
131	M	125	N	N
132	M	125	N	N
133	M	125	N	--[b]
134	M	125	N	N
135	M	125	N	N

N = Normal
NOP = No Other Ocular Pathology

OU = Both eyes
OD = Right eye
OS = Left eye

a Sacrificed at interim
b Found dead

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

TRL Study #032-006

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
136	M	125	N	N
137	M	125	N	N
138	M	125	N	N
139	M	125	N	N
140	M	125	N	OS-N; OD-Chorioretinal hypoplasia, NOP
141	M	125	N	N
142	M	125	N	N
143	M	125	N	N
144	M	125	N	N
145	M	125	N	N
146	M	125	N	N
147	M	125	N	N
148	M	125	N	OS-N; OD-Chorioretinal hypoplasia, NOP
149	M	125	N	N
150	M	125	N	N

N = Normal
NOP = No Other Ocular Pathology

OU = Both eyes
OD = Right eye
OS = Left eye

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

TRL Study #032-006

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
151	F	125	N	--[a]
152	F	125	N	--[a]
153	F	125	N	--[a]
154	F	125	N	--[a]
155	F	125	N	--[a]
156	F	125	N	--[a]
157	F	125	N	--[a]
158	F	125	N	--[a]
159	F	125	N	--[a]
160	F	125	N	--[a]
161	F	125	N	N
162	F	125	N	N
163	F	125	N	N
164	F	125	N	N
165	F	125	N	OD-N; OS-Chorioretinal hypoplasia, NOP

N = Normal
NOP = No Other Ocular Pathology

OU = Both eyes
OD = Right eye
OS = Left eye

[a] Sacrificed at interim

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

TRL Study #032-006

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
166	F	125	N	N
167	F	125	N	OS-N; OD-Posterior capsular and cortical cataract, NOP
168	F	125	N	N
169	F	125	N	N
170	F	125	N	N
171	F	125	N	N
172	F	125	N	N
173	F	125	N	N
174	F	125	N	N
175	F	125	N	N
176	F	125	N	N
177	F	125	N	N
178	F	125	N	N
179	F	125	N	N
180	F	125	N	N

N = Normal
NOP = No Other Ocular Pathology

OU = Both eyes
OD = Right eye
OS = Left eye

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

TRL Study #032-006

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
181	M	500	N	--[a]
182	M	500	N	--[a]
183	M	500	N	--[a]
184	M	500	N	--[a]
185	M	500	N	--[a]
186	M	500	N	--[a]
187	M	500	N	--[a]
188	M	500	N	--[a]
189	M	500	N	--[a]
190	M	500	N	--[a]
191	M	500	N	N
192	M	500	N	N
193	M	500	N	N
194	M	500	N	N
195	M	500	N	N

N = Normal
NOP = No Other Ocular Pathology

OU = Both eyes
OD = Right eye
OS = Left eye

[a] Sacrificed at interim

TRL Study #032-006

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
196	M	500	N	N
197	M	500	N	N
198	M	500	N	N
199	M	500	N	N
200	M	500	N	N
201	M	500	N	N
202	M	500	N	--[a]
203	M	500	N	N
204	M	500	N	N
205	M	500	N	N
206	M	500	N	N
207	M	500	N	N
208	M	500	N	N
209	M	500	N	N
210	M	500	N	N

N = Normal
NOP = No Other Ocular Pathology

OU = Both eyes
OD = Right eye
OS = Left eye

[a] Moribund sacrifice

TRL Study #032-006

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
211	F	500	N	--[a]
212	F	500	N	--[a]
213	F	500	N	--[a]
214	F	500	N	--[a]
215	F	500	N	--[a]
216	F	500	N	--[a]
217	F	500	N	--[a]
218	F	500	N	--[a]
219	F	500	N	--[a]
220	F	500	N	--[a]
221	F	500	N	N
222	F	500	N	N
223	F	500	N	OD-N; OS-Chorioretinal hypoplasia, NOP
224[b]	F	500	N	OS-N; OD-Chorioretinal hypoplasia, NOP
225	F	500	N	

N = Normal
NOP = No Other Ocular Pathology

OU = Both eyes
OD = Right eye
OS = Left eye

a Sacrificed at interim
b Found dead

TRL Study #032-006

Rat Oral Subchronic Toxicity Study of Normal Butanol
Ophthalmologic Examination

Rat #	Sex	Dose Level (mg/kg/day)	Pretreatment	Week 13
226	F	500	N	N
227	F	500	N	OS-N; OD-Chorioretinal hypoplasia, NOP
228	F	500	N	N
229	F	500	N	N
230	F	500	N	N
231	F	500	N	N
232	F	500	N	N
233	F	500	N	N
234	F	500	N	OU-Keratitis, NOP
235	F	500	N	N
236	F	500	N	N
237	F	500	N	N
238	F	500	N	N
239	F	500	N	N
240	F	500	N	N

N = Normal
NOP = No Other Ocular Pathology

OU = Both eyes
OD = Right eye
OS = Left eye

TOXICITY RESEARCH LABORATORIES, LTD.

TRL Study #032-006

Rat Oral Subchronic Toxicity Study

Compound:

Normal Butanol

APPENDIX E

Clinical Pathology Methodology

1. Tests Performed

Hematology

	Units
Hematocrit value (PCV)	%
Hemoglobin concentration (HGB)	g/dl
Erythrocyte count (RBC)	($x10^6/\mu\ell$)
Mean corpuscular volume (MCV)	fl
Mean corpuscular hemoglobin (MCH)	pg
Mean corpuscular hemoglobin concentration (MCHC)	g/dl
Total leucocyte count (WBC)	($x10^3/\mu\ell$)
Absolute differential leucocyte count (Neut, Lymph, Mono, Eo, Baso)	($x10^3/\mu\ell$)
Percent differential leucocyte count (Neut, Lymph, Mono, Eo, Baso)	%
Platelet count (PLT)	($x10^3/\mu\ell$)

Blood Chemistry

Serum alkaline phosphatase (Alk Phos)	U/l
Serum glutamate pyruvate transaminase (SGPT)	U/l
Serum glutamate oxalacetate transaminase (SGOT)	U/l
Glucose (Gluc)	mg/dl
Urea nitrogen (BUN)	mg/dl
Total serum protein (TP)	g/dl
Serum albumin (Alb)	g/dl
Globulin	g/dl
Albumin/Globulin ratio (A/G)	--
Sodium (Na)	meq/l
Potassium (K)	meq/l
Chloride (Cl)	mmol/l
Calcium (Ca)	mg/dl
Creatinine	mg/dl
Inorganic phosphate (Phos.)	mg/dl
Total serum bilirubin (Tot. Bili.)	mg/dl
Total serum cholesterol (Chol)	mg/dl
Total carbon dioxide (TCO_2)	mmol/l

Urinalysis

pH		
Specific gravity		
Glucose		(1/20, 1/10, 1/4, 1/2, or 1 g/dl)
Protein	Chemstrip	(trace to 3+)
	Supernatant	(trace to 4+)
Ketones		(1+ to 3+)
Bilirubin		(1+ to 3+)
Microscopy of sediment		(#/HPF, #/LPF)
Bacteria		(1+ to 3+)
Urobilinogen		(1,4,8 or 12 mg/d

2. Instrumentation

a. A system of Coulter instruments was used to obtain hematology values. The system includes:

1) Coulter Counter Model Z_F which is used for RBC and WBC determinations.
2) Coulter MHR - MCV/Hct/RBC computer which is electrically attached to the Model Z_F for RBC corrected counts, MCV determinations and Hematocrit calculation.
3) Coulter Diluter II which is an automatic diluter used for the RBC and WBC dilutions.
4) Coulter Hemoglobinometer which is used for determining hemoglobin values from the WBC dilution.
5) Coulter Thrombocounter-C which is used for platelet counts.

b. Coagulation testing was done on the MLA (Medical Laboratory Automation, Inc.) Electra 750.

c. Chemistry determinations are performed on a system of three instruments.

1) The IL 443 Flame Photometer was used for the quantitative determination of sodium and potassium in serum.
2) The IL 446 Analyzer was used to measure chloride and TCO_2 in serum.
3) The IL Multistat III Micro Centrifugal Analyzer (MCA) was used for the following tests:

Test	MCA Reference Number	Sample size (μℓ)
Glucose	IL[a]35162-9-83	3
BUN (Urea Nitrogen)	IL35161-9-83	2
Total Protein	IL35173-12-84	5
Albumin	IL35174-4-85	3
Alk. Phosphatase	GD[b]4619-11-81	4
SGOT	IL35165-9-83	15
SGPT	IL35166-9-83	15
Cholesterol	BI[c]015-245444-6-83	2
Total Bilirubin	IL35182-9-83	20
Calcium	IL35170-8-84	4
Inorganic Phosphate	IL35172-9-83	3
Creatinine	IL35164-9-83	12

d. Urine pH, glucose, Ketones, proteins, urobilinogen, and bilirubin were determined with Bio-Dynamics Chemstrip 9. In addition, a confirmatory test for protein was done using a 20% sulfosalicylic acid precipitation test. Specific gravity was determined using an American Optical refractometer.

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a Instrumentation Laboratory Inc., 113 Hartwell Avenue, Lexington, MA 02173.

b Gilford Diagnostics, 16035 Industrial Parkway SW, Cleveland, OH 44135.

c Beckman Instruments, Inc., Fullerton, CA 92634.

TOXICITY RESEARCH LABORATORIES, LTD.

TRL Study #032-006

Rat Oral Subchronic Toxicity Study

Compound:

Normal Butanol

APPENDIX F

Normal Hematology and Serum Chemistry Ranges
for Rats at Toxicity Research Laboratories, Ltd.

Toxicity Research Laboratories, Ltd.
HEMATOLOGY NORMALS[a] - RAT (Sprague Dawley - CD)
Cardiac Blood
Age: 30-91 days old

TRL Study #032-006

	Unit	n	Mean	Range (± 2SD)	CV	Instrumentation
RBC	($x10^6$/ul)					
Male		70	6.84	5.62 - 8.05	8.91	Coulter[b]
Female		69	6.56	5.57 - 7.55	7.55	
PCV	%					
Male		70	42.25	36.83 - 47.66	6.41	Coulter
Female		69	39.75	35.44 - 44.06	5.42	
Hgb	g/dl					
Male		70	15.54	13.40 - 17.67	6.87	Coulter
Female		69	15.17	13.15 - 17.20	6.68	
WBC	($x10^3$/ul)					
Male		70	12.69	5.19 - 20.20	29.57	Coulter
Female		69	10.04	3.50 - 16.59	32.59	
MCV	fl					
Male		70	62.74	56.63 - 68.86	4.87	Coulter
Female		69	61.59	55.94 - 67.24	4.59	
MCH	pg					
Male		70	22.79	20.66 - 24.93	4.69	Calculation[c]
Female		69	23.17	21.13 - 25.20	4.39	
MCHC	g/dl					
Male		70	36.78	34.68 - 38.88	2.85	Calculation[d]
Female		69	38.17	35.30 - 41.04	3.76	
PLT	(10^3/ul)					
Male		44	1060.48	488.62 - 1632.34	26.96	Coulter Thrombo-counter-C
Female		45	1036.22	533.58 - 1538.86	24.25	

[a] Data collected May 1980 - July 1983.

[b] Coulter ZF with Model MHR MCV/Hct/RBC computer.

[c] $MCH = \frac{Hgb \times 10}{RBC}$

[d] $MCHC = \frac{Hgb \times 100}{PCV}$

Toxicity Research Laboratories, Ltd.
SERUM CHEMISTRY NORMALS[a] - RAT (Sprague Dawley - CD)
Cardiac Blood
Age: 30-91 days old

TRL Study #032-006

	Unit	n	Mean	Range (± 2SD)	CV	Instrumentation
Glucose	mg/dl					MCA[b]
Male		70	268.20	92.92 - 443.49	32.68	
Female		69	237.89	82.39 - 393.38	32.68	
BUN	mg/dl					MCA
Male		70	16.31	10.35 - 22.27	18.27	
Female		69	17.54	9.25 - 25.83	23.64	
Total Protein	g/dl					MCA
Male		70	6.30	5.44 - 7.16	6.80	
Female		69	6.37	5.36 - 7.38	7.93	
Albumin	g/dl					MCA
Male		70	4.32	3.77 - 4.86	6.30	
Female		69	4.41	3.90 - 4.92	5.74	
Alk. Phos.	U/l					MCA
Male		70	201.34	60.42 - 342.25	34.99	
Female		69	144.48	35.76 - 253.21	37.62	
SGOT	U/l					MCA
Male		70	55.89	34.79 - 76.99	18.88	
Female		69	52.90	36.26 - 69.55	15.73	
SGPT	U/l					MCA
Male		70	26.49	11.61 - 41.36	28.09	
Female		69	23.69	9.49 - 37.90	29.97	
Na	meq/l					IL 443[c]
Male		64	146.96	143.65 - 150.27	1.13	
Female		62	145.89	139.82 - 151.96	2.08	
K	meq/l					IL 443
Male		64	7.26	4.73 - 9.79	17.41	
Female		62	7.37	5.60 - 9.13	11.98	

[a] Data collected May 1980 - July 1983.

[b] MCA = IL MCA Multistat

[c] IL 443 = Flame Photometer

Toxicity Research Laboratories, Ltd.
SERUM CHEMISTRY NORMALS - RAT (Sprague Dawley - CD)
Cardiac Blood
Age: 30-91 days old

TRL Study #032-006

	Unit	n	Mean	Range (± 2SD)	CV	Instrumentation
Cl	mmol/l					IL 446[a]
Male		45	98.84	93.43 - 104.25	2.74	
Female		41	100.61	95.03 - 106.19	2.77	
TCO_2	mmol/l					IL 446
Male		45	33.53	27.38 - 39.69	9.18	
Female		41	29.80	24.35 - 35.26	9.15	
Calcium	mg/dl					MCA
Male		65	12.07	10.95 - 13.19	4.63	
Female		64	11.85	10.89 - 12.81	4.05	
Phos.	mg/dl					MCA
Male		50	10.09	7.08 - 13.11	14.94	
Female		50	9.07	6.42 - 11.71	14.60	
Tot. Bili.	mg/dl					MCA
Male		70	0.15	0 - 0.39	82.17	
Female		69	0.13	0 - 0.34	82.72	

[a] IL 446 - Chloride/Total CO_2 Analyzer

TOXICITY RESEARCH LABORATORIES, LTD.

TRL Study #032-006

Rat Oral Subchronic Toxicity Study

Compound:

Normal Butanol

APPENDIX G

Individual Rat Reports
(Gross and Histopathologic)

TOXICITY RESEARCH LABORATORIES, LTD.
RAT ORAL SUBCHRONIC TOXICITY STUDY
TRL Study #032-006

Test Material Normal Butanol Dose Level 0 mg/kg/day Group I Male
Rat # 011 No. days on study 93 Found dead ___ Moribund ___ Interim ___ Final X
Necropsy Date 11/26/85 Prosector L. Brantman

TISSUE	GROSS OBSERVATION	HISTOLOGIC DESCRIPTION
Heart	Normal	Normal
Aorta	Normal	Normal
Thymus	Normal	Normal
Lung w/bronchi	Normal	Normal
Trachea	Normal	Normal
Esophagus	Normal	Normal
Stomach-forestomach	Normal	Normal
Stomach-cardiac	Normal	Normal
Stomach-fundic	Normal	Normal
Stomach-pyloric	Normal	Normal
Salivary Gland-sublingual	Normal	Normal
Salivary Gland-mandibular	Normal	Normal
Duodenum	Normal	Normal
Jejunum	Normal	Normal
Ileum	Normal	Normal
Colon	Normal	Normal
Liver	Normal	Normal
Pancreas	Normal	Normal
Spleen	Normal	Normal
Mesenteric Lymph Node	Normal	Normal
Kidney	Left: pit in cortex (observed at trim)	Nephritis, chronic, focal, unilateral, slight
Urinary Bladder	Normal	Normal
Adrenal	Normal	Normal
Pituitary	Normal	Normal
Eye	Normal	Normal
Optic Nerve	Normal	Normal
Thyroid	Normal	Normal
Parathyroid	Normal	Normal
Spinal Cord-thoracic	Normal	Normal
Spinal Cord-lumbar	Normal	Normal
Brain-fore	Normal	Normal
Brain-mid	Normal	Normal
Brain-hind	Normal	Normal
Femur with marrow	Normal	Normal
Testis	Normal	Normal
Epididymis	Normal	Normal
Skin	Normal	Normal
Mammary Gland	Normal	Normal
Skeletal Muscle	Normal	Normal
Sciatic Nerve	Normal	Normal

TOXICITY RESEARCH LABORATORIES, LTD.
RAT ORAL SUBCHRONIC TOXICITY STUDY
TRL Study #032-006

Test Material Normal Butanol Dose Level 0 mg/kg/day Group I Male
Rat # 012 No. days on study 93 Found dead ___ Moribund ___ Interim ___ Final X
Necropsy Date 11/26/85 Prosector A. Surge

TISSUE	GROSS OBSERVATION	HISTOLOGIC DESCRIPTION
Heart	Normal	Normal
Aorta	Normal	Normal
Thymus	Normal	Normal
Lung w/bronchi	Normal	Normal
Trachea	Normal	Normal
Esophagus	Normal	Normal
Stomach-forestomach	Normal	Normal
Stomach-cardiac	Normal	Normal
Stomach-fundic	Normal	Normal
Stomach-pyloric	Normal	Normal
Salivary Gland-sublingual	Normal	Normal
Salivary Gland-mandibular	Normal	Normal
Duodenum	Normal	Normal
Jejunum	Normal	Normal
Ileum	Normal	Normal
Colon	Normal	Normal
Liver	Normal	Normal
Pancreas	Normal	Normal
Spleen	Normal	Normal
Mesenteric Lymph Node	Normal	Normal
Kidney	Normal	Normal
Urinary Bladder	Normal	Normal
Adrenal	Normal	Normal
Pituitary	Normal	Normal
Eye	Normal	Synechia, posterior
Optic Nerve	Normal	Normal
Thyroid	Normal	Normal
Parathyroid	Normal	Normal
Spinal Cord-thoracic	Normal	Normal
Spinal Cord-lumbar	Normal	Normal
Brain-fore	Normal	Normal
Brain-mid	Normal	Normal
Brain-hind	Normal	Normal
Femur with marrow	Normal	Normal
Testis	Normal	Normal
Epididymis	Normal	Normal
Skin	Normal	Normal
Mammary Gland	Normal	Normal
Skeletal Muscle	Normal	Normal
Sciatic Nerve	Normal	Normal

TOXICITY RESEARCH LABORATORIES, LTD.
RAT ORAL SUBCHRONIC TOXICITY STUDY
TRL Study #032-006

Test Material Normal Butanol Dose Level 0 mg/kg/day Group I Male
Rat # 013 No. days on study 93 Found dead ___ Moribund ___ Interim ___ Final X
Necropsy Date 11/26/85 Prosector J. Bozeman

TISSUE	GROSS OBSERVATION	HISTOLOGIC DESCRIPTION
Heart	Normal	Normal
Aorta	Normal	Normal
Thymus	Normal	Normal
Lung w/bronchi	Normal	Normal
Trachea	Normal	Normal
Esophagus	Normal	Normal
Stomach-forestomach	Normal	Normal
Stomach-cardiac	Normal	Normal
Stomach-fundic	Normal	Normal
Stomach-pyloric	Normal	Normal
Salivary Gland-sublingual	Normal	Normal
Salivary Gland-mandibular	Normal	Normal
Duodenum	Normal	Normal
Jejunum	Normal	Normal
Ileum	Normal	Normal
Colon	Normal	Normal
Liver	Normal	Normal
Pancreas	Normal	Normal
Spleen	Normal	Normal
Mesenteric Lymph Node	Normal	Normal
Kidney	Normal	Normal
Urinary Bladder	Normal	Normal
Adrenal	Normal	Normal
Pituitary	Normal	Normal
Eye	Normal	Synechia, posterior
Optic Nerve	Normal	Normal
Thyroid	Normal	Normal
Parathyroid	Normal	Normal
Spinal Cord-thoracic	Normal	Normal
Spinal Cord-lumbar	Normal	Normal
Brain-fore	Normal	Normal
Brain-mid	Normal	Normal
Brain-hind	Normal	Normal
Femur with marrow	Normal	Normal
Testis	Normal	Normal
Epididymis	Normal	Normal
Skin	Normal	Normal
Mammary Gland	Normal	Normal
Skeletal Muscle	Normal	Normal
Sciatic Nerve	Normal	Normal

TOXICITY RESEARCH LABORATORIES, LTD.
RAT ORAL SUBCHRONIC TOXICITY STUDY
TRL Study #032-006

Test Material Normal Butanol Dose Level 0 mg/kg/day Group I Male
Rat # 014 No. days on study 92 Found dead ___ Moribund ___ Interim ___ Final X
Necropsy Date 11/25/85 Prosector A. Surge

TISSUE	GROSS OBSERVATION	HISTOLOGIC DESCRIPTION
Heart	Normal	Normal
Aorta	Normal	Normal
Thymus	Normal	Normal
Lung w/bronchi	Normal	Normal
Trachea	Normal	Normal
Esophagus	Normal	Normal
Stomach-forestomach	Normal	Normal
Stomach-cardiac	Normal	Normal
Stomach-fundic	Normal	Normal
Stomach-pyloric	Normal	Normal
Salivary Gland-sublingual	Normal	Normal
Salivary Gland-mandibular	Normal	Normal
Duodenum	Normal	Normal
Jejunum	Normal	Normal
Ileum	Normal	Normal
Colon	Normal	Normal
Liver	Normal	Hepatitis, subacute, focal, minimal
Pancreas	Normal	Normal
Spleen	Normal	Normal
Mesenteric Lymph Node	Normal	Normal
Kidney	Normal	Normal
Urinary Bladder	Normal	Normal
Adrenal	Normal	Normal
Pituitary	Normal	Normal
Eye	Normal	Synechia, posterior
Optic Nerve	Normal	Normal
Thyroid	Normal	Normal
Parathyroid	Normal	Normal
Spinal Cord-thoracic	Normal	Normal
Spinal Cord-lumbar	Normal	Normal
Brain-fore	Normal	Normal
Brain-mid	Normal	Normal
Brain-hind	Normal	Normal
Femur with marrow	Normal	Normal
Testis	Normal	Normal
Epididymis	Normal	Normal
Skin	Normal	Normal
Mammary Gland	Normal	Normal
Skeletal Muscle	Normal	Normal
Sciatic Nerve	Normal	Normal

TOXICITY RESEARCH LABORATORIES, LTD.
RAT ORAL SUBCHRONIC TOXICITY STUDY
TRL Study #032-006

Test Material Normal Butanol Dose Level 0 mg/kg/day Group I Male
Rat # 015 No. days on study 92 Found dead ___ Moribund ___ Interim ___ Final X
Necropsy Date 11/25/85 Prosector A. Surge

TISSUE	GROSS OBSERVATION	HISTOLOGIC DESCRIPTION
Heart	Normal	Normal
Aorta	Normal	Normal
Thymus	Normal	Normal
Lung w/bronchi	Normal	Normal
Trachea	Normal	Normal
Esophagus	Normal	Normal
Stomach-forestomach	Normal	Normal
Stomach-cardiac	Normal	Normal
Stomach-fundic	Normal	Normal
Stomach-pyloric	Normal	Normal
Salivary Gland-sublingual	Normal	Normal
Salivary Gland-mandibular	Normal	Normal
Duodenum	Normal	Normal
Jejunum	Normal	Normal
Ileum	Normal	Normal
Colon	Normal	Normal
Liver	Normal	Cytoplasmic vacuolization, centrilobular, slight
Pancreas	Normal	Normal
Spleen	Normal	Normal
Mesenteric Lymph Node	Normal	Normal
Kidney	Normal	Normal
Urinary Bladder	Normal	Normal
Adrenal	Normal	Normal
Pituitary	Normal	Normal
Eye	Normal	Synechia, posterior
Optic Nerve	Normal	Normal
Thyroid	Normal	Normal
Parathyroid	Normal	Normal
Spinal Cord-thoracic	Normal	Normal
Spinal Cord-lumbar	Normal	Normal
Brain-fore	Normal	Normal
Brain-mid	Normal	Normal
Brain-hind	Normal	Normal
Femur with marrow	Normal	Normal
Testis	Normal	Normal
Epididymis	Normal	Proteinaceous material in tubules
Skin	Normal	Normal
Mammary Gland	Normal	Normal
Skeletal Muscle	Normal	Normal
Sciatic Nerve	Normal	Normal

TOXICITY RESEARCH LABORATORIES, LTD.
RAT ORAL SUBCHRONIC TOXICITY STUDY
TRL Study #032-006

Test Material Normal Butanol Dose Level 0 mg/kg/day Group I Male
Rat # 016 No. days on study 92 Found dead ___ Moribund ___ Interim ___ Final X
Necropsy Date 11/25/85 Prosector A. Surge

TISSUE	GROSS OBSERVATION	HISTOLOGIC DESCRIPTION
Heart	Normal	Normal
Aorta	Normal	Normal
Thymus	Normal	Normal
Lung w/bronchi	Normal	Normal
Trachea	Normal	Normal
Esophagus	Normal	Normal
Stomach-forestomach	Normal	Normal
Stomach-cardiac	Normal	Normal
Stomach-fundic	Normal	Normal
Stomach-pyloric	Normal	Normal
Salivary Gland-sublingual	Normal	Normal
Salivary Gland-mandibular	Normal	Normal
Duodenum	Normal	Normal
Jejunum	Normal	Normal
Ileum	Normal	Normal
Colon	Normal	Normal
Liver	Normal	Normal
Pancreas	Normal	Normal
Spleen	Normal	Normal
Mesenteric Lymph Node	Normal	Normal
Kidney	Normal	Normal
Urinary Bladder	Normal	Normal
Adrenal	Normal	Normal
Pituitary	Normal	Normal
Eye	Normal	Synechia, posterior
Optic Nerve	Normal	Normal
Thyroid	Normal	Normal
Parathyroid	Normal	Normal
Spinal Cord-thoracic	Normal	Normal
Spinal Cord-lumbar	Normal	Normal
Brain-fore	Normal	Normal
Brain-mid	Normal	Normal
Brain-hind	Normal	Normal
Femur with marrow	Normal	Normal
Testis	Normal	Normal
Epididymis	Normal	Normal
Skin	Normal	Normal
Mammary Gland	Normal	Normal
Skeletal Muscle	Normal	Normal
Sciatic Nerve	Normal	Normal