

ブチル 2,3-エポキシプロピル エーテルのラット
を用いた吸入によるがん原性試験報告書

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TABLES

TABLES

TABLE 1	CONCENTRATION OF BUTYL 2,3-EPOXYPROPYL ETHER IN THE INHALATION CHAMBER OF THE 2-YEAR INHALATION STUDY
TABLE 2	SURVIVAL ANIMAL NUMBERS AND BODY WEIGHT CHANGES OF MALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
TABLE 3	SURVIVAL ANIMAL NUMBERS AND BODY WEIGHT CHANGES OF FEMALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
TABLE 4	FOOD CONSUMPTION CHANGES OF MALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
TABLE 5	FOOD CONSUMPTION CHANGES OF FEMALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
TABLE 6	HEMATOLOGY OF MALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
TABLE 7	BIOCHEMISTRY OF MALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
TABLE 8	BIOCHEMISTRY OF FEMALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
TABLE 9	URINALYSIS OF MALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
TABLE 10	URINALYSIS OF FEMALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
TABLE 11	ORGAN WEIGHTS OF MALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
TABLE 12	ORGAN WEIGHTS OF FEMALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

TABLES (CONTINUED)

- TABLE 13 INCIDENCES OF SELECTED NEOPLASTIC LESIONS OF MALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
- TABLE 14 INCIDENCES OF SELECTED NEOPLASTIC LESIONS OF FEMALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
- TABLE 15 INCIDENCES OF SELECTED NON-NEOPLASTIC LESIONS OF MALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
- TABLE 16 INCIDENCES OF SELECTED NON-NEOPLASTIC LESIONS OF FEMALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
- TABLE 17 HISTORICAL CONTROL DATA OF SELECTED NEOPLASTIC LESIONS IN JAPAN BIOASSAY RESEARCH CENTER : F344/DuCrj MALE RATS
- TABLE 18 HISTORICAL CONTROL DATA OF SELECTED NEOPLASTIC LESIONS IN JAPAN BIOASSAY RESEARCH CENTER : F344/DuCrj FEMALE RATS
- TABLE 19 CAUSE OF DEATH OF RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

TABLE 1 CONCENTRATION OF BUTYL 2,3-EPOXYPROPYL ETHER IN THE INHALATION CHAMBER OF THE 2-YEAR INHALATION STUDY

Group Name	Concentration(ppm) Mean \pm S.D.
Control	0.0 \pm 0.0
10 ppm	10.1 \pm 0.1
30 ppm	30.1 \pm 0.2
90 ppm	90.1 \pm 0.6

TABLE 2 SURVIVAL ANIMAL NUMBERS AND BODY WEIGHT CHANGES OF MALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Week on Study	Control		10 ppm			30 ppm			90 ppm		
	Av. Wt. <50>	No. of Surviv.	Av. Wt.	% of cont. <50>	No. of Surviv.	Av. Wt.	% of cont. <50>	No. of Surviv.	Av. Wt.	% of cont. <50>	No. of Surviv.
0	127 (50)	50 / 50	127 (50)	100	50 / 50	127 (50)	100	50 / 50	127 (50)	100	50 / 50
1	159 (50)	50 / 50	156 (50)	98	50 / 50	155 (50)	97	50 / 50	145 (50)	91	50 / 50
2	189 (50)	50 / 50	187 (50)	99	50 / 50	183 (50)	97	50 / 50	168 (50)	89	50 / 50
3	215 (50)	50 / 50	211 (50)	98	50 / 50	208 (50)	97	50 / 50	191 (49)	89	49 / 50
4	235 (50)	50 / 50	231 (50)	98	50 / 50	227 (50)	97	50 / 50	207 (49)	88	49 / 50
5	251 (50)	50 / 50	248 (50)	99	50 / 50	243 (50)	97	50 / 50	220 (49)	88	49 / 50
6	266 (50)	50 / 50	262 (50)	98	50 / 50	258 (50)	97	50 / 50	230 (49)	86	49 / 50
7	280 (50)	50 / 50	275 (50)	98	50 / 50	270 (50)	96	50 / 50	240 (49)	86	49 / 50
8	293 (50)	50 / 50	288 (50)	98	50 / 50	282 (50)	96	50 / 50	247 (49)	84	49 / 50
9	304 (50)	50 / 50	297 (50)	98	50 / 50	292 (50)	96	50 / 50	254 (49)	84	49 / 50
10	313 (50)	50 / 50	305 (50)	97	50 / 50	300 (50)	96	50 / 50	259 (49)	83	49 / 50
11	321 (50)	50 / 50	314 (50)	98	50 / 50	308 (50)	96	50 / 50	266 (49)	83	49 / 50
12	328 (50)	50 / 50	319 (50)	97	50 / 50	317 (50)	97	50 / 50	283 (49)	86	49 / 50
13	334 (50)	50 / 50	327 (50)	98	50 / 50	323 (50)	97	50 / 50	280 (49)	84	49 / 50
14	339 (50)	50 / 50	332 (50)	98	50 / 50	330 (50)	97	50 / 50	280 (49)	83	49 / 50
18	357 (50)	50 / 50	351 (50)	98	50 / 50	348 (50)	97	50 / 50	294 (49)	82	49 / 50
22	372 (50)	50 / 50	367 (50)	99	50 / 50	363 (50)	98	50 / 50	304 (49)	82	49 / 50
26	384 (50)	50 / 50	379 (50)	99	50 / 50	375 (50)	98	50 / 50	314 (49)	82	49 / 50
30	393 (50)	50 / 50	388 (50)	99	50 / 50	385 (50)	98	50 / 50	320 (49)	81	49 / 50
34	404 (50)	50 / 50	399 (50)	99	50 / 50	394 (50)	98	50 / 50	326 (49)	81	49 / 50
38	412 (50)	50 / 50	408 (50)	99	50 / 50	402 (50)	98	50 / 50	332 (49)	81	49 / 50
42	422 (50)	50 / 50	418 (50)	99	50 / 50	413 (50)	98	50 / 50	343 (49)	81	49 / 50
46	429 (50)	50 / 50	424 (50)	99	50 / 50	419 (50)	98	50 / 50	342 (49)	80	49 / 50
50	435 (50)	50 / 50	431 (50)	99	50 / 50	424 (50)	97	50 / 50	348 (49)	80	49 / 50
54	439 (50)	50 / 50	433 (50)	99	50 / 50	424 (49)	97	49 / 50	351 (49)	80	49 / 50
58	442 (50)	50 / 50	436 (49)	99	49 / 50	431 (49)	98	49 / 50	349 (49)	79	49 / 50
62	444 (50)	50 / 50	437 (49)	98	49 / 50	429 (49)	97	49 / 50	348 (48)	78	48 / 50
66	448 (50)	50 / 50	440 (49)	98	49 / 50	434 (48)	97	48 / 50	354 (47)	79	47 / 50
70	451 (50)	50 / 50	443 (49)	98	49 / 50	436 (47)	97	47 / 50	352 (47)	78	47 / 50
74	454 (50)	50 / 50	447 (48)	98	48 / 50	437 (47)	96	47 / 50	347 (46)	76	46 / 50
78	454 (50)	50 / 50	449 (48)	99	48 / 50	438 (46)	96	46 / 50	338 (43)	74	43 / 50
82	452 (50)	50 / 50	451 (47)	100	47 / 50	439 (45)	97	45 / 50	337 (36)	75	36 / 50
86	447 (49)	49 / 50	449 (47)	100	47 / 50	435 (45)	97	45 / 50	322 (32)	72	32 / 50
90	441 (49)	49 / 50	447 (47)	101	47 / 50	436 (42)	99	42 / 50	334 (24)	76	24 / 50
94	434 (43)	43 / 50	440 (47)	101	47 / 50	431 (42)	99	42 / 50	311 (23)	72	23 / 50
98	432 (40)	40 / 50	434 (42)	100	42 / 50	423 (40)	98	40 / 50	319 (15)	74	15 / 50
102	431 (39)	39 / 50	428 (39)	99	39 / 50	421 (38)	98	38 / 50	310 (12)	72	12 / 50
104	422 (38)	38 / 50	423 (38)	100	38 / 50	418 (38)	99	38 / 50	294 (11)	70	11 / 50

< > : No. of effective animals, () : No. of measured animals, Av. Wt. : Averaged body weight (Unit : g).

TABLE 3 SURVIVAL ANIMAL NUMBERS AND BODY WEIGHT CHANGES OF FEMALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Week on Study	Control		10 ppm			30 ppm			90 ppm		
	Av. Wt. <50>	No. of Surviv.	Av. Wt.	% of cont. <50>	No. of Surviv.	Av. Wt.	% of cont. <50>	No. of Surviv.	Av. Wt.	% of cont. <50>	No. of Surviv.
0	95 (50)	50 / 50	95 (50)	100	50 / 50	95 (50)	100	50 / 50	95 (50)	100	50 / 50
1	110 (50)	50 / 50	108 (50)	98	50 / 50	108 (50)	98	50 / 50	102 (50)	93	50 / 50
2	123 (50)	50 / 50	121 (50)	98	50 / 50	119 (50)	97	50 / 50	113 (50)	92	50 / 50
3	133 (50)	50 / 50	131 (50)	98	50 / 50	130 (50)	98	50 / 50	124 (50)	93	50 / 50
4	141 (50)	50 / 50	139 (50)	99	50 / 50	136 (50)	96	50 / 50	131 (50)	93	50 / 50
5	149 (50)	50 / 50	147 (50)	99	50 / 50	145 (50)	97	50 / 50	140 (50)	94	50 / 50
6	154 (50)	50 / 50	152 (50)	99	50 / 50	149 (50)	97	50 / 50	143 (50)	93	50 / 50
7	159 (50)	50 / 50	158 (50)	99	50 / 50	153 (50)	96	50 / 50	148 (50)	93	50 / 50
8	162 (50)	50 / 50	160 (50)	99	50 / 50	156 (50)	96	50 / 50	151 (50)	93	50 / 50
9	168 (50)	50 / 50	165 (50)	98	50 / 50	161 (50)	96	50 / 50	155 (50)	92	50 / 50
10	171 (50)	50 / 50	168 (50)	98	50 / 50	165 (50)	96	50 / 50	157 (50)	92	50 / 50
11	176 (50)	50 / 50	172 (50)	98	50 / 50	169 (50)	96	50 / 50	162 (50)	92	50 / 50
12	178 (50)	50 / 50	176 (50)	99	50 / 50	173 (50)	97	50 / 50	168 (50)	94	50 / 50
13	180 (50)	50 / 50	178 (50)	99	50 / 50	174 (50)	97	50 / 50	166 (50)	92	50 / 50
14	181 (50)	50 / 50	180 (50)	99	50 / 50	175 (50)	97	50 / 50	165 (50)	91	50 / 50
18	188 (50)	50 / 50	187 (50)	99	50 / 50	183 (50)	97	50 / 50	170 (50)	90	50 / 50
22	195 (50)	50 / 50	194 (50)	99	50 / 50	189 (50)	97	50 / 50	175 (50)	90	50 / 50
26	199 (50)	50 / 50	197 (50)	99	50 / 50	194 (50)	97	50 / 50	179 (50)	90	50 / 50
30	203 (50)	50 / 50	202 (50)	100	50 / 50	200 (50)	99	50 / 50	182 (50)	90	50 / 50
34	207 (50)	50 / 50	207 (50)	100	50 / 50	205 (50)	99	50 / 50	185 (50)	89	50 / 50
38	210 (50)	50 / 50	210 (50)	100	50 / 50	209 (50)	100	50 / 50	188 (50)	90	50 / 50
42	217 (50)	50 / 50	216 (50)	100	50 / 50	216 (50)	100	50 / 50	195 (50)	90	50 / 50
46	222 (50)	50 / 50	220 (50)	99	50 / 50	218 (50)	98	50 / 50	195 (50)	88	50 / 50
50	226 (50)	50 / 50	228 (50)	101	50 / 50	227 (50)	100	50 / 50	201 (50)	89	50 / 50
54	229 (50)	50 / 50	229 (50)	100	50 / 50	229 (50)	100	50 / 50	201 (50)	88	50 / 50
58	233 (50)	50 / 50	232 (50)	100	50 / 50	233 (50)	100	50 / 50	201 (50)	86	50 / 50
62	234 (50)	50 / 50	236 (50)	101	50 / 50	235 (50)	100	50 / 50	203 (50)	87	50 / 50
66	239 (50)	50 / 50	242 (50)	101	50 / 50	241 (50)	101	50 / 50	210 (49)	88	49 / 50
70	242 (49)	49 / 50	248 (50)	102	50 / 50	245 (49)	101	49 / 50	212 (48)	88	48 / 50
74	249 (49)	49 / 50	255 (50)	102	50 / 50	251 (49)	101	49 / 50	212 (48)	85	48 / 50
78	255 (47)	47 / 50	260 (50)	102	50 / 50	256 (47)	100	47 / 50	211 (45)	83	45 / 50
82	258 (47)	47 / 50	262 (50)	102	50 / 50	260 (46)	101	46 / 50	213 (42)	83	42 / 50
86	261 (47)	47 / 50	267 (49)	102	49 / 50	263 (45)	101	45 / 50	214 (37)	82	37 / 50
90	267 (44)	44 / 50	271 (48)	101	48 / 50	266 (44)	100	44 / 50	210 (36)	79	36 / 50
94	269 (44)	44 / 50	272 (48)	101	48 / 50	271 (43)	101	43 / 50	211 (30)	78	30 / 50
98	271 (42)	42 / 50	274 (48)	101	48 / 50	274 (42)	101	42 / 50	206 (25)	76	25 / 50
102	271 (40)	40 / 50	274 (46)	101	46 / 50	274 (42)	101	42 / 50	207 (18)	76	18 / 50
104	269 (40)	40 / 50	272 (45)	101	45 / 50	270 (41)	100	41 / 50	206 (15)	77	15 / 50

< > : No. of effective animals, () : No. of measured animals, Av. Wt. : Averaged body weight (Unit : g).

TABLE 4 FOOD CONSUMPTION CHANGES OF MALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Week on Study	Control		10 ppm			30 ppm			90 ppm		
	Av. FC. <50>	No. of Surviv.	Av. FC.	% of cont. <50>	No. of Surviv.	Av. FC.	% of cont. <50>	No. of Surviv.	Av. FC.	% of cont. <50>	No. of Surviv.
1	15.6 (50)	50 / 50	15.4 (50)	99	50 / 50	14.9 (50)	96	50 / 50	12.3 (50)	79	50 / 50
2	16.4 (50)	50 / 50	16.1 (50)	98	50 / 50	15.7 (50)	96	50 / 50	13.7 (50)	84	50 / 50
3	17.4 (50)	50 / 50	16.8 (50)	97	50 / 50	16.5 (50)	95	50 / 50	14.6 (49)	84	49 / 50
4	17.4 (50)	50 / 50	17.2 (50)	99	50 / 50	16.6 (50)	95	50 / 50	14.9 (49)	86	49 / 50
5	17.3 (50)	50 / 50	16.6 (50)	96	50 / 50	16.4 (50)	95	50 / 50	14.7 (49)	85	49 / 50
6	17.1 (50)	50 / 50	16.6 (50)	97	50 / 50	16.4 (50)	96	50 / 50	14.6 (49)	85	49 / 50
7	17.0 (50)	50 / 50	16.6 (50)	98	50 / 50	16.4 (50)	96	50 / 50	14.9 (49)	88	49 / 50
8	16.9 (50)	50 / 50	16.4 (50)	97	50 / 50	16.0 (50)	95	50 / 50	14.0 (49)	83	49 / 50
9	17.1 (50)	50 / 50	16.4 (50)	96	50 / 50	16.3 (50)	95	50 / 50	14.0 (49)	82	49 / 50
10	16.7 (50)	50 / 50	16.4 (50)	98	50 / 50	16.1 (50)	96	50 / 50	14.1 (49)	84	49 / 50
11	16.2 (50)	50 / 50	15.8 (50)	98	50 / 50	16.0 (50)	99	50 / 50	14.5 (49)	90	49 / 50
12	16.7 (50)	50 / 50	16.2 (50)	97	50 / 50	16.5 (50)	99	50 / 50	16.1 (49)	96	49 / 50
13	16.3 (50)	50 / 50	15.6 (50)	96	50 / 50	16.0 (50)	98	50 / 50	14.3 (49)	88	49 / 50
14	16.5 (50)	50 / 50	16.0 (50)	97	50 / 50	15.8 (50)	96	50 / 50	13.7 (49)	83	49 / 50
18	16.4 (50)	50 / 50	16.1 (50)	98	50 / 50	15.9 (50)	97	50 / 50	14.5 (49)	88	49 / 50
22	16.6 (50)	50 / 50	16.2 (50)	98	50 / 50	16.1 (50)	97	50 / 50	14.4 (49)	87	49 / 50
26	16.8 (50)	50 / 50	16.3 (50)	97	50 / 50	15.9 (50)	95	50 / 50	14.7 (49)	88	49 / 50
30	16.5 (50)	50 / 50	16.5 (50)	100	50 / 50	16.2 (50)	98	50 / 50	15.3 (49)	93	49 / 50
34	16.9 (50)	50 / 50	16.7 (50)	99	50 / 50	16.5 (50)	98	50 / 50	15.2 (49)	90	49 / 50
38	17.0 (50)	50 / 50	16.9 (50)	99	50 / 50	16.6 (50)	98	50 / 50	15.5 (49)	91	49 / 50
42	17.2 (50)	50 / 50	17.0 (50)	99	50 / 50	16.8 (50)	98	50 / 50	15.9 (49)	92	49 / 50
46	16.9 (50)	50 / 50	16.8 (50)	99	50 / 50	16.6 (50)	98	50 / 50	15.3 (49)	91	49 / 50
50	17.0 (50)	50 / 50	16.9 (50)	99	50 / 50	16.7 (50)	98	50 / 50	15.9 (49)	94	49 / 50
54	16.7 (50)	50 / 50	16.7 (50)	100	50 / 50	16.4 (49)	98	49 / 50	15.4 (49)	92	49 / 50
58	16.9 (50)	50 / 50	16.9 (49)	100	49 / 50	16.7 (49)	99	49 / 50	15.5 (49)	92	49 / 50
62	17.0 (50)	50 / 50	16.9 (49)	99	49 / 50	16.5 (49)	97	49 / 50	15.4 (48)	91	48 / 50
66	17.2 (50)	50 / 50	17.3 (49)	101	49 / 50	16.8 (48)	98	48 / 50	15.4 (47)	90	47 / 50
70	17.5 (50)	50 / 50	17.5 (49)	100	49 / 50	17.2 (47)	98	47 / 50	16.0 (47)	91	47 / 50
74	17.2 (50)	50 / 50	17.4 (48)	101	48 / 50	16.6 (46)	97	47 / 50	14.8 (46)	86	46 / 50
78	16.8 (50)	50 / 50	17.6 (48)	105	48 / 50	16.7 (46)	99	46 / 50	14.7 (43)	88	43 / 50
82	17.0 (50)	50 / 50	17.6 (47)	104	47 / 50	16.9 (45)	99	45 / 50	14.8 (36)	87	36 / 50
86	16.6 (49)	49 / 50	16.9 (47)	102	47 / 50	15.9 (45)	96	45 / 50	13.9 (32)	84	32 / 50
90	16.0 (49)	49 / 50	16.6 (47)	104	47 / 50	16.6 (42)	104	42 / 50	14.9 (24)	93	24 / 50
94	15.6 (43)	43 / 50	16.7 (47)	107	47 / 50	16.4 (42)	105	42 / 50	13.9 (23)	89	23 / 50
98	16.6 (39)	40 / 50	16.5 (42)	99	42 / 50	16.4 (40)	99	40 / 50	15.0 (15)	90	15 / 50
102	17.1 (39)	39 / 50	16.8 (39)	98	39 / 50	16.6 (38)	97	38 / 50	15.0 (12)	88	12 / 50
104	16.3 (38)	38 / 50	16.6 (38)	102	38 / 50	16.7 (38)	102	38 / 50	13.6 (11)	83	11 / 50

< > : No. of effective animals, () : No. of measured animals, Av. FC. : Averaged food consumption (Unit : g).

TABLE 5 FOOD CONSUMPTION CHANGES OF FEMALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Week on Study	Control		10 ppm			30 ppm			90 ppm		
	Av. FC. <50>	No. of Surviv.	Av. FC.	% of cont. <50>	No. of Surviv.	Av. FC.	% of cont. <50>	No. of Surviv.	Av. FC.	% of cont. <50>	No. of Surviv.
1	10.9 (50)	50 / 50	10.8 (50)	99	50 / 50	10.7 (50)	98	50 / 50	9.2 (50)	84	50 / 50
2	11.0 (50)	50 / 50	10.9 (50)	99	50 / 50	10.5 (50)	95	50 / 50	9.9 (50)	90	50 / 50
3	11.2 (50)	50 / 50	11.3 (50)	101	50 / 50	10.8 (50)	96	50 / 50	10.6 (50)	95	50 / 50
4	11.1 (50)	50 / 50	11.2 (50)	101	50 / 50	10.8 (50)	97	50 / 50	10.4 (50)	94	50 / 50
5	11.6 (50)	50 / 50	11.6 (50)	100	50 / 50	11.2 (50)	97	50 / 50	11.0 (50)	95	50 / 50
6	10.9 (49)	50 / 50	10.9 (50)	100	50 / 50	10.5 (50)	96	50 / 50	10.4 (50)	95	50 / 50
7	11.0 (50)	50 / 50	11.1 (50)	101	50 / 50	10.7 (50)	97	50 / 50	10.9 (50)	99	50 / 50
8	10.2 (50)	50 / 50	10.2 (50)	100	50 / 50	10.0 (50)	98	50 / 50	9.6 (50)	94	50 / 50
9	10.9 (50)	50 / 50	10.4 (50)	95	50 / 50	10.6 (50)	97	50 / 50	10.0 (50)	92	50 / 50
10	10.1 (50)	50 / 50	10.1 (50)	100	50 / 50	10.1 (50)	100	50 / 50	9.8 (50)	97	50 / 50
11	10.7 (50)	50 / 50	10.4 (50)	97	50 / 50	10.7 (50)	100	50 / 50	10.7 (50)	100	50 / 50
12	10.4 (50)	50 / 50	10.2 (50)	98	50 / 50	10.4 (50)	100	50 / 50	10.6 (50)	102	50 / 50
13	10.5 (50)	50 / 50	10.4 (50)	99	50 / 50	10.2 (50)	97	50 / 50	10.0 (50)	95	50 / 50
14	10.2 (50)	50 / 50	10.1 (50)	99	50 / 50	10.1 (50)	99	50 / 50	9.3 (50)	91	50 / 50
18	9.9 (50)	50 / 50	10.0 (50)	101	50 / 50	10.0 (50)	101	50 / 50	9.9 (50)	100	50 / 50
22	10.2 (50)	50 / 50	10.3 (50)	101	50 / 50	10.1 (50)	99	50 / 50	10.0 (50)	98	50 / 50
26	10.2 (50)	50 / 50	10.1 (50)	99	50 / 50	10.1 (50)	99	50 / 50	10.2 (50)	100	50 / 50
30	10.4 (50)	50 / 50	10.3 (50)	99	50 / 50	10.6 (50)	102	50 / 50	10.4 (50)	100	50 / 50
34	10.2 (50)	50 / 50	10.5 (50)	103	50 / 50	10.6 (50)	104	50 / 50	10.5 (50)	103	50 / 50
38	10.4 (50)	50 / 50	10.5 (50)	101	50 / 50	10.7 (50)	103	50 / 50	10.5 (50)	101	50 / 50
42	10.8 (50)	50 / 50	10.7 (50)	99	50 / 50	10.8 (50)	100	50 / 50	11.0 (50)	102	50 / 50
46	10.7 (50)	50 / 50	10.6 (50)	99	50 / 50	10.4 (50)	97	50 / 50	10.5 (50)	98	50 / 50
50	10.9 (50)	50 / 50	11.1 (50)	102	50 / 50	11.3 (50)	104	50 / 50	11.3 (50)	104	50 / 50
54	10.7 (50)	50 / 50	11.0 (50)	103	50 / 50	10.9 (50)	102	50 / 50	10.2 (50)	95	50 / 50
58	10.8 (50)	50 / 50	10.9 (50)	101	50 / 50	10.8 (50)	100	50 / 50	10.4 (50)	96	50 / 50
62	10.7 (50)	50 / 50	11.1 (50)	104	50 / 50	10.9 (50)	102	50 / 50	10.7 (50)	100	50 / 50
66	11.5 (50)	50 / 50	12.0 (50)	104	50 / 50	11.6 (50)	101	50 / 50	11.1 (49)	97	49 / 50
70	11.3 (49)	49 / 50	12.0 (50)	106	50 / 50	11.8 (49)	104	49 / 50	11.7 (48)	104	48 / 50
74	11.5 (49)	49 / 50	12.2 (50)	106	50 / 50	11.8 (49)	103	49 / 50	10.7 (48)	93	48 / 50
78	11.5 (47)	47 / 50	12.1 (50)	105	50 / 50	11.8 (47)	103	47 / 50	10.5 (45)	91	45 / 50
82	11.6 (47)	47 / 50	11.8 (50)	102	50 / 50	11.9 (46)	103	46 / 50	10.8 (42)	93	42 / 50
86	11.5 (47)	47 / 50	12.1 (49)	105	49 / 50	11.5 (45)	100	45 / 50	10.8 (37)	94	37 / 50
90	11.4 (44)	44 / 50	12.1 (48)	106	48 / 50	11.7 (44)	103	44 / 50	10.1 (36)	89	36 / 50
94	12.3 (43)	44 / 50	12.0 (48)	98	48 / 50	12.3 (43)	100	43 / 50	10.7 (30)	87	30 / 50
98	12.2 (42)	42 / 50	12.2 (48)	100	48 / 50	12.2 (42)	100	42 / 50	9.9 (25)	81	25 / 50
102	11.7 (39)	40 / 50	12.3 (46)	105	46 / 50	12.4 (42)	106	42 / 50	10.5 (18)	90	18 / 50
104	11.5 (40)	40 / 50	11.9 (45)	103	45 / 50	11.7 (41)	102	41 / 50	10.3 (15)	90	15 / 50

< > : No. of effective animals, () : No. of measured animals, Av. FC. : Averaged food consumption (Unit : g).

TABLE 6 HEMATOLOGY OF MALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Group Name	Control	10 ppm	30 ppm	90 ppm	
No. of examined animals	38	37	38	8	
HEMOGLOBIN (g/dL)	14.5 ± 2.3	14.0 ± 2.7	13.7 ± 2.8	10.6 ± 3.0	**
HEMATOCRIT (%)	41.7 ± 5.6	40.2 ± 6.6	39.8 ± 6.5	33.2 ± 7.0	**
MCH (pg)	17.3 ± 1.5	17.0 ± 1.2	17.1 ± 1.9	15.8 ± 3.2	**
MCHC (g/dL)	34.7 ± 1.8	34.6 ± 2.0	34.1 ± 2.2	31.4 ± 2.7	**
Differential WBC (%)					
N-SEG	48 ± 8	45 ± 11	45 ± 9	37 ± 13	*

Mean ± S.D.

Significant difference: * : $p \leq 0.05$ ** : $p \leq 0.01$ Test of Dunnett

TABLE 7 BIOCHEMISTRY OF MALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Group Name	Control	10 ppm	30 ppm	90 ppm	
No. of examined animals	38	37	38	8	
ALBUMIN (g/dL)	2.9 ± 0.2	2.8 ± 0.2	2.8 ± 0.3	2.5 ± 0.3	**
T-CHOLESTEROL (mg/dL)	190 ± 84	194 ± 76	172 ± 54	94 ± 22	**
TRIGLYCERIDE (mg/dL)	154 ± 173	146 ± 107	112 ± 62	44 ± 41	**
PHOSPHOLIPID (mg/dL)	275 ± 130	280 ± 110	250 ± 63	164 ± 34	**
AST (IU/L)	103 ± 121	91 ± 55	87 ± 67	156 ± 111	**
ALP (IU/L)	205 ± 57	351 ± 849	237 ± 94	370 ± 144	**
CK (IU/L)	119 ± 146	109 ± 48	111 ± 73	169 ± 105	**
POTASSIUM (mEq/L)	3.8 ± 0.3	3.8 ± 0.3	3.9 ± 0.3	4.2 ± 0.4	*
CALCIUM (mg/dL)	10.4 ± 0.4	10.3 ± 0.4	10.2 ± 0.3	10.0 ± 0.2	*
INORGANIC PHOSPHORUS (mg/dL)	4.0 ± 0.8	4.2 ± 0.5	4.2 ± 0.7	4.9 ± 0.5	**

Mean ± S.D.
Significant difference: * : $p \leq 0.05$ ** : $p \leq 0.01$ Test of Dunnett

TABLE 8 BIOCHEMISTRY OF FEMALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Group Name	Control	10 ppm	30 ppm	90 ppm	
No. of examined animals	38	45	41	15	
TOTAL PROTEIN (g/dL)	6.7 ± 0.6	7.0 ± 0.4	** 7.0 ± 0.4	6.4 ± 0.7	
ALBUMIN (g/dL)	3.4 ± 0.4	3.5 ± 0.3	3.5 ± 0.4	3.1 ± 0.5	*
T-CHOLESTEROL (mg/dL)	126 ± 23	138 ± 28	* 150 ± 53	** 104 ± 38	
TRIGLYCERIDE (mg/dL)	62 ± 62	62 ± 30	81 ± 65	* 35 ± 20	
PHOSPHOLIPID (mg/dL)	226 ± 38	245 ± 43	267 ± 81	** 192 ± 62	
ALP (IU/L)	142 ± 59	140 ± 62	170 ± 150	236 ± 150	**
G-GTP (IU/L)	2 ± 1	3 ± 2	4 ± 4	4 ± 4	*
CK (IU/L)	95 ± 18	108 ± 62	117 ± 82	181 ± 188	**
SODIUM (mEq/L)	141 ± 2	140 ± 2	141 ± 1	140 ± 2	*
CALCIUM (mg/dL)	10.1 ± 0.3	10.3 ± 0.3	** 10.4 ± 0.4	** 10.0 ± 0.3	

Mean ± S.D.
Significant difference: * : $p \leq 0.05$ ** : $p \leq 0.01$ Test of Dunnett

TABLE 9 URINALYSIS OF MALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Group Name		Control	10 ppm	30 ppm	90 ppm
No. of examined animals		38	38	38	11
pH	Grade				
	5.0	0	0	0	0
	6.0	0	2	0	0
	6.5	2	4	2	3
	7.0	7	7	1	1
	7.5	15	15	27	5
	8.0	14	10	8	2
	8.5	0	0	0	0
	Chi square test			*	
Ketone body	—	38	38	35	9
	±	0	0	3	2
	+	0	0	0	0
	2+	0	0	0	0
	3+	0	0	0	0
	4+	0	0	0	0
		Chi square test			
Occult blood	—	37	38	38	7
	±	1	0	0	4
	+	0	0	0	0
	2+	0	0	0	0
	3+	0	0	0	0
		Chi square test			

Significant difference: * : $p \leq 0.05$ ** : $p \leq 0.01$

TABLE 10 URINALYSIS OF FEMALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Group Name		Control	10 ppm	30 ppm	90 ppm
No. of examined animals		39	46	42	15
Protein	Grade				
	—	1	0	0	1
	±	5	4	4	5
	+	7	8	3	7
	2+	10	13	9	2
	3+	11	14	21	0
	4+	5	7	5	0
	Chi square test				*

Significant difference: * : $p \leq 0.05$ ** : $p \leq 0.01$

TABLE 11 ORGAN WEIGHTS OF MALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Group Name	Control	10 ppm	30 ppm	90 ppm	
No. of examined animals	38	38	38	11	
Body weight (g)	396 ± 33	395 ± 27	390 ± 32	275 ± 35	**
Heart (g)	1.176 ± 0.094	1.249 ± 0.116	1.214 ± 0.091	1.204 ± 0.162	
Heart (%)	0.298 ± 0.023	0.317 ± 0.038 *	0.312 ± 0.023 *	0.446 ± 0.097	**
Lungs (g)	1.476 ± 0.343	1.620 ± 0.470 *	1.498 ± 0.252	1.810 ± 0.498	**
Lungs (%)	0.376 ± 0.101	0.413 ± 0.134	0.384 ± 0.046	0.682 ± 0.270	**
Kidneys (g)	2.771 ± 0.217	2.819 ± 0.228	2.844 ± 0.278	2.470 ± 0.209	**
Kidneys (%)	0.705 ± 0.072	0.715 ± 0.071	0.732 ± 0.078	0.909 ± 0.129	**
Brain (g)	2.068 ± 0.051	2.083 ± 0.052	2.097 ± 0.063	2.036 ± 0.067	
Brain (%)	0.526 ± 0.045	0.529 ± 0.039	0.540 ± 0.042	0.752 ± 0.113	**

Mean ± S.D.
Significant difference: * : $p \leq 0.05$ ** : $p \leq 0.01$ Test of Dunnett

TABLE 12 ORGAN WEIGHTS OF FEMALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Group Name	Control	10 ppm	30 ppm	90 ppm	
No. of examined animals	40	45	41	15	
Body weight (g)	251 ± 35	254 ± 24	252 ± 27	195 ± 24	**
Adrenals (g)	0.082 ± 0.097	0.068 ± 0.010	0.065 ± 0.013	0.065 ± 0.009	
Adrenals (%)	0.034 ± 0.044	0.027 ± 0.006	0.026 ± 0.005	0.034 ± 0.007	**
Ovaries (g)	0.164 ± 0.332	0.116 ± 0.023	0.192 ± 0.490	0.106 ± 0.015	
Ovaries (%)	0.070 ± 0.159	0.046 ± 0.009	0.071 ± 0.159	0.055 ± 0.010	**
Heart (g)	0.858 ± 0.106	0.837 ± 0.052	0.862 ± 0.087	0.796 ± 0.048	*
Heart (%)	0.347 ± 0.056	0.332 ± 0.025	0.345 ± 0.050	0.415 ± 0.055	**
Lungs (g)	1.017 ± 0.123	1.039 ± 0.218	1.050 ± 0.234	1.043 ± 0.179	
Lungs (%)	0.413 ± 0.076	0.413 ± 0.096	0.425 ± 0.146	0.544 ± 0.115	**
Kidneys (g)	1.710 ± 0.136	1.754 ± 0.134	1.816 ± 0.309	1.610 ± 0.140	
Kidneys (%)	0.691 ± 0.088	0.697 ± 0.085	0.726 ± 0.120	0.836 ± 0.096	**
Brain (g)	1.864 ± 0.046	1.866 ± 0.046	1.872 ± 0.042	1.864 ± 0.033	
Brain (%)	0.757 ± 0.107	0.742 ± 0.072	0.751 ± 0.083	0.976 ± 0.163	**

Mean ± S.D.
Significant difference: * : $p \leq 0.05$ ** : $p \leq 0.01$ Test of Dunnett

TABLE 13 INCIDENCES OF SELECTED NEOPLASTIC LESIONS OF MALE RATS
IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Group Name	Control	10 ppm	30 ppm	90 ppm	Peto test	Cochran- Armitage test
Number of examined animals	50	50	50	50		
subcutis	<50>	<50>	<50>	<50>		
fibroma	8 (16 %)	4 (8 %)	6 (12 %)	0 (0 %)**		↓ ↓
nasal cavity	<50>	<50>	<50>	<50>		
squamous cell papilloma	0 (0 %)	0 (0 %)	0 (0 %)	1 (2 %)		
adenoma	0 (0 %)	0 (0 %)	5 (10 %)*	0 (0 %)		
squamous cell carcinoma	0 (0 %)	0 (0 %)	0 (0 %)	35 (70 %)**	↑ ↑	↑ ↑
ethesioneuroepithelioma	0 (0 %)	0 (0 %)	0 (0 %)	1 (2 %)		
spleen	<50>	<50>	<50>	<50>		
mononuclear cell leukemia	10 (20 %)	16 (32 %)	19 (38 %)*	7 (14 %)		
pituitary	<50>	<50>	<50>	<50>		
adenoma	8 (16 %)	14 (28 %)	7 (14 %)	2 (4 %)*		↓ ↓
testis	<50>	<50>	<50>	<50>		
interstitial cell tumor	47 (94 %)	38 (76 %)*	40 (80 %)*	24 (48 %)**		↓ ↓
Significant difference * : $p \leq 0.05$ ** : $p \leq 0.01$			Fisher's exact test			
↑(↓) : $p \leq 0.05$ ↑ ↑(↓ ↓) : $p \leq 0.01$			Peto or Cochran-Armitage test			
< > : Number of animals examined at the site						

TABLE 14 INCIDENCES OF SELECTED NEOPLASTIC LESIONS OF FEMALE RATS
IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Group Name	Control	10 ppm	30 ppm	90 ppm	Peto	Cochran-
Number of examined animals	50	50	50	50	test	Armitage
						test
nasal cavity	<50>	<50>	<50>	<50>		
adenoma	1 (2 %)	1 (2 %)	2 (4 %)	0 (0 %)		
squamous cell carcinoma	0 (0 %)	0 (0 %)	0 (0 %)	28 (56 %) **	↑ ↑	↑ ↑
sarcoma NOS	0 (0 %)	0 (0 %)	0 (0 %)	1 (2 %)		
adenosquamous carcinoma	0 (0 %)	0 (0 %)	0 (0 %)	1 (2 %)		
esthesioneuroepithelioma	0 (0 %)	0 (0 %)	0 (0 %)	2 (4 %)		
spleen	<50>	<50>	<49>	<50>		
mononuclear cell leukemia	7 (14 %)	8 (16 %)	5 (10 %)	13 (26 %)	↑ ↑	
pituitary	<50>	<50>	<50>	<50>		
adenoma	15 (30 %)	16 (32 %)	14 (28 %)	5 (10 %)*		↓ ↓
Significant difference	* : $p \leq 0.05$ ** : $p \leq 0.01$		Fisher's exact test			
	↑ (↓) : $p \leq 0.05$ ↑ ↑ (↓ ↓) : $p \leq 0.01$		Peto or Cochran-Armitage test			
< > : Number of animals examined at the site						

TABLE 15 INCIDENCES OF SELECTED NON-NEOPLASTIC LESIONS OF MALE RATS
IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Group Name	Control				10 ppm				30 ppm				90 ppm					
	50				50				50				50					
Grade of non-neoplastic lesion	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
nasal cavity	<50>				<50>				<50>				<50>					
squamous cell metaplasia :respiratory epithelium	0	0	0	0	1	1	0	0	4	6	0	0	**	4	38	0	0	**
squamous cell hyperplasia with atypia	0	0	0	0	0	0	0	0	1	0	0	0	1	30	1	0	0	**
inflammation:respiratory epithelium	0	0	0	0	1	1	0	0	0	2	0	0	4	17	1	0	0	**
hyperplasia:transitional epithelium	0	0	0	0	0	0	0	0	5	3	0	0	*	0	0	0	0	
hyperplasia with atypia :respiratory epithelium	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
atrophy:olfactory epithelium	0	0	0	0	0	1	0	0	7	2	0	0	**	10	14	0	0	**
respiratory metaplasia:olfactory epithelium	3	0	0	0	0	1	0	0	4	1	0	0	2	6	0	0	0	*
squamous cell metaplasia :olfactory epithelium	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	
hyperplasia:submucosal gland	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	
eosinophilic change:olfactory epithelium	18	23	1	0	20	20	1	0	11	22	1	0	9	6	0	0	0	**
inflammation:foreign body	7	17	0	0	8	15	0	0	6	23	0	0	2	7	0	0	0	**
lung	<50>				<50>				<50>				<50>					
inflammation:foreign body	0	0	0	0	0	0	0	0	0	0	0	0	1	8	0	0	0	**
metastasis:nasal tumor	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	
bone marrow	<50>				<50>				<50>				<50>					
increased hematopoiesis	4	0	0	0	5	0	0	0	5	0	0	0	14	0	0	0	0	*
lymph node	<50>				<50>				<50>				<50>					
metastasis:nasal tumor	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	
spleen	<50>				<50>				<50>				<50>					
congestion	0	6	0	0	1	3	0	0	1	3	0	0	0	0	0	0	0	*
heart	<50>				<50>				<50>				<50>					
myocardial fibrosis	14	36	0	0	15	31	0	0	22	27	0	0	24	21	0	0	0	**
stomach	<50>				<50>				<50>				<50>					
hyperplasia:forestomach	0	4	0	0	2	3	0	0	1	2	0	0	3	0	0	0	0	*
erosion:glandular stomach	7	1	0	0	1	0	0	0	*	3	0	0	0	8	1	0	0	
liver	<50>				<50>				<50>				<50>					
clear cell focus	7	4	0	0	5	8	0	0	3	5	0	0	1	1	0	0	0	*
kidney	<50>				<50>				<50>				<50>					
chronic nephropathy	16	26	2	0	12	31	2	0	14	25	2	0	18	1	0	0	0	**

TABLE 15 INCIDENCES OF SELECTED NON-NEOPLASTIC LESIONS OF MALE RATS
IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER
(CONTINUED)

Group Name	Control				10 ppm				30 ppm				90 ppm			
Number of examined animals	50				50				50				50			
Grade of non-neoplastic lesion	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
testis	<50>				<50>				<50>				<50>			
atrophy	0	3	44	0	0	1	47	0	2	2	43	0	10	6	24	0 **
interstitial cell hyperplasia	0	1	0	0	6	0	0	0 *	4	0	0	0	10	0	0	0 **
prostate	<50>				<50>				<50>				<50>			
hyperplasia	7	1	0	0	9	0	0	0	8	0	0	0	1	0	0	0 *
brain	<50>				<50>				<50>				<50>			
metastasis: nasal tumor	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
eye	<50>				<50>				<50>				<50>			
retinal atrophy	32	0	8	0	36	0	5	0	40	0	5	0	18	0	2	0 **
keratitis	3	0	0	0	3	0	0	0	0	0	0	0	10	13	3	0 **

Grade 1: Slight 2: Moderate 3: Marked 4: Severe
 < > : Number of animals examined at the site
 Significant difference ; * : $p \leq 0.05$ ** : $p \leq 0.01$ Test of Chi Square

TABLE 16 INCIDENCES OF SELECTED NON-NEOPLASTIC LESIONS OF FEMALE RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Group Name	Control				10 ppm				30 ppm				90 ppm			
	50				50				50				50			
Grade of non-neoplastic lesion	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
nasal cavity	<50>				<50>				<50>				<50>			
squamous cell metaplasia :respiratory epithelium	0	0	0	0	1	0	0	0	6	0	0	0*	2	41	0	0**
squamous cell hyperplasia with atypia	0	0	0	0	0	0	0	0	0	0	0	0	9	30	0	0**
inflammation:respiratory epithelium	0	0	0	0	0	0	0	0	2	0	0	0	8	23	1	0**
hyperplasia:transitional epithelium	0	0	0	0	0	0	0	0	6	0	0	0*	0	0	0	0
atrophy:olfactory epithelium	0	0	0	0	0	0	0	0	1	0	0	0	21	8	0	0**
respiratory metaplasia:olfactory epithelium	0	0	0	0	0	0	0	0	1	0	0	0	5	0	0	0
squamous cell metaplasia :olfactory epithelium	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0**
eosinophilic change:respiratory epithelium	22	5	0	0	20	6	0	0	11	2	0	0*	1	0	0	0**
eosinophilic change:olfactory epithelium	1	35	13	0	2	46	2	0*	3	46	1	0**	10	25	0	0**
lung	<50>				<50>				<50>				<50>			
inflammation:foreign body	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0
liver	<50>				<50>				<50>				<50>			
granulation	12	7	2	0	14	8	6	0	13	8	3	0	4	1	1	0**
basophilic cell focus	14	8	0	0	7	9	0	0	4	7	0	0*	3	2	0	0**
kidney	<50>				<50>				<50>				<50>			
chronic nephropathy	9	4	0	0	18	3	1	0	16	4	2	0	1	0	0	0**
brain	<50>				<50>				<50>				<50>			
metastasis:nasal tumor	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
eye	<50>				<50>				<50>				<50>			
keratitis	1	1	0	0	0	0	0	0	1	0	0	0	10	12	1	2**
Harderian gland	<50>				<50>				<50>				<50>			
metastasis:nasal tumor	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Grade 1: Slight 2: Moderate 3: Marked 4: Severe

< >: Number of animals examined at the site

Significant difference; *: $p \leq 0.05$ **: $p \leq 0.01$ Test of Chi Square

TABLE 17 HISTORICAL CONTROL DATA OF SELECTED NEOPLASTIC LESIONS
IN JAPAN BIOASSAY RESEARCH CENTER : F344/DuCrj MALE RATS

Organs Tumors	No. of animals examined	No. of animals bearing tumor	Incidence (%)	Min. - Max. (%)
Nasal cavity	1849			
Squamous cell papilloma		0	0	0 - 0
Adenoma		2	0.1	0 - 2
Squamous cell carcinoma		0	0	0 - 0
Ethesioneuroepithelioma		0	0	0 - 0

37 carcinogenicity studies examined in Japan Bioassay Research Center were used.

Study No. : 0043, 0059, 0061, 0063, 0065, 0067, 0095, 0104, 0115, 0130, 0141, 0158, 0162, 0189, 0205, 0210, 0224, 0242, 0267, 0269, 0278, 0284, 0288, 0294, 0296, 0318, 0328, 0342, 0347, 0365, 0371, 0396, 0399, 0401, 0407, 0417, 0421

TABLE 18 HISTORICAL CONTROL DATA OF SELECTED NEOPLASTIC LESIONS
IN JAPAN BIOASSAY RESEARCH CENTER : F344/DuCrj FEMALE RATS

Organs Tumors	No. of animals examined	No. of animals bearing tumor	Incidence (%)	Min. - Max. (%)
Nasal cavity	1697			
Adenoma		0	0	0 - 0
Squamous cell carcinoma		0	0	0 - 0
Sarcoma NOS		0	0	0 - 0
Adenosquamous carcinoma		0	0	0 - 0
Ethesioneuroepithelioma		0	0	0 - 0
Spleen	1697			
Mononuclear cell leukemia		222	13.1	2 - 26

34 carcinogenicity studies examined in Japan Bioassay Research Center were used.

Study No. : 0043, 0059, 0061, 0063, 0065, 0067, 0095, 0104, 0115, 0130, 0141, 0158, 0162, 0189, 0205, 0210, 0224, 0242, 0267, 0269, 0278, 0284, 0296, 0303, 0318, 0328, 0342, 0347, 0365, 0371, 0399, 0401, 0417, 0421

TABLE 19 CAUSE OF DEATH OF RATS IN THE 2-YEAR INHALATION STUDY OF BUTYL 2,3-EPOXYPROPYL ETHER

Group name	Male				Female			
	Control	10 ppm	30 ppm	90 ppm	Control	10 ppm	30 ppm	90 ppm
Number of dead or moribund animals	12	12	12	39	10	5	9	35
No microscopical confirmation	3	0	1	1	2	0	0	1
Respiratory system lesion	0	0	0	1	0	0	0	4
Cardiovascular lesion	1	0	0	0	0	0	0	0
Central nervous system lesion	0	0	1	0	0	0	0	0
Urinary retention	0	0	1	0	0	0	0	0
Tumor death : leukemia	3	4	3	4	2	1	1	3
subcutis	2	1	1	0	0	0	0	0
skin/appendage	0	0	0	0	1	0	0	0
nasal cavity	0	0	0	28	0	0	0	24
spleen	0	1	0	0	0	0	0	0
large intestine	0	0	0	0	0	0	1	0
pituitary gland	1	3	1	1	3	2	4	0
thyroid	1	0	0	1	0	0	0	0
adrenal gland	1	1	0	1	0	0	0	0
uterus	—	—	—	—	0	1	2	3
mammary gland	0	0	0	0	0	1	0	0
preputial/clitoral gland	0	0	0	1	0	0	0	0
brain	0	1	1	0	0	0	0	0
spinal cord	0	0	0	0	1	0	0	0
peripheral nerves	0	0	2	0	0	0	0	0
Zymbal gland	0	1	0	0	0	0	1	0
vertebra	0	0	0	0	1	0	0	0
mediastinum	0	0	0	1	0	0	0	0
retroperitoneum	0	0	1	0	0	0	0	0