

STUDY NO. 03-6141

LIQUIFIED PETROLEUM GAS:

A 13-WEEK WHOLE-BODY INHALATION TOXICITY STUDY IN THE RATS

WITH NEUROTOXICITY ASSESSMENTS AND *IN VIVO*

GENOTOXICITY ASSESSMENTS

Final Report

Volume III of IV

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Date: 23 April 2010

Page 586 of 1375

TABLE OF CONTENTS**VOLUME III**

COVER PAGE.....	586
TABLE OF CONTENTS.....	587
N. Individual Sperm Evaluations	588
O. Individual Animal Gross and Microscopic Observations	597
P. Equipment List	872
Q. Miran Calibration	874
R. Chamber Distribution Results	877
S. Chamber and Exposure Room Environmental Monitoring.....	878
T. Animal Termination History	879
U. Analytical Report	897
V. ChevronTexaco Analytical Report.....	914
W. Neurobehavioral Positive Control Data	929
X. Neuropathology Historical Control Data	1022

	Individual Sperm Evaluations Preface	Appendix N
--	---	------------

Table of Contents:

Sperm Motility and Counts	589
Sperm Morphology	593

Group 1 - 0 ppm	Individual Sperm Evaluations Sperm Motility and Counts	Appendix N
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Animal Number	Left Vas Deferens			Left Cauda Epididymis		Left Testis	
	Motile sperm (%)	Progressively motile sperm (%)	Number of Sperm Analyzed	Weight (g)	Sperm count (millions/g)	Weight (g)	Sperm count (millions/g)
1311	89	62	406	0.3987	689.2	1.8470	107.9
1312	95	71	249	0.3619	451.8	1.6279	38.9
1313	96	72	212	0.2955	644.4	1.6766	115.7
1314	91	51	217	0.3608	553.6	1.8005	47.4
1315	96	42	308	0.3628	380.8	1.8351	101.5
1316	96	62	269	0.3287	607.7	2.0464	83.4
1317	95	59	264	0.3581	708.1	1.7014	104.9
1318	95	68	267	0.3463	551.4	1.8666	115
1319	97	60	263	0.3045	701.9	1.8864	88.5
1320	94	58	238	0.3784	396.6	1.7859	88.4
Mean	94	61		0.3496	569	1.8074	89
SD	3	9		0.0319	124	0.1203	27
N	10	10		10	10	10	10

Group 2 - 1000 ppm	Individual Sperm Evaluations Sperm Motility and Counts	Appendix N
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Animal number	Left vas deferens			Left Cauda epididymis		Left Testis	
	Motile sperm (%)	Progressively motile sperm (%)	Number of Sperm Analyzed	Weight (g)	Sperm count (millions/g)	Weight (g)	Sperm count (millions/g)
2311	95	58	311	0.3259	482.7	1.7088	78
2312	94	62	296	0.3593	617.9	1.8226	81.6
2313	97	57	287	0.2943	789.5	1.8811	63.3
2314	95	64	302	0.3061	622.1	1.6846	115.2
2315	95	52	333	0.3326	560.1	1.7315	75.5
2316	95	89	296	0.3107	669.5	1.7477	22.2
2317	84	51	360	0.3772	500.7	1.5699	135.1
2318	93	81	234	0.3311	668.9	1.8213	22.7
2319	94	50	309	0.3302	593.9	1.6162	87.2
2320	95	48	291	0.2950	389.4	1.6025	67.8
Mean	94	61		0.3262	589	1.7186	75
SD	4	14		0.0267	113	0.1033	35
N	10	10		10	10	10	10

Group 3 - 5000 ppm	Individual Sperm Evaluations Sperm Motility and Counts	Appendix N
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Animal number	Left vas deferens			Left Cauda epididymis		Left Testis	
	Motile sperm (%)	Progressively motile sperm (%)	Number of Sperm Analyzed	Weight (g)	Sperm count (millions/g)	Weight (g)	Sperm count (millions/g)
3311	98	52	313	0.3584	586.2	1.9116	127.2
3312	98	72	283	0.3285	754.5	1.6754	49.4
3313	92	54	349	0.3264	501.0	1.7387	81.8
3314	96	63	310	0.3496	615.8	1.6880	70.5
3315	95	36	225	0.3765	614.4	1.5325	97.9
3316	97	61	219	0.2651	753.5	1.6153	88.9
3317	96	49	284	0.2697	596.7	1.7521	51.7
3318	97	66	211	0.3155	511.7	1.8625	107.7
3319	96	66	364	0.2811	331.4	1.4479	46.5
3320	93	46	204	0.2833	646.6	1.6629	96.5
Mean	96	57		0.3154	591	1.6887	82
SD	2	11		0.0393	124	0.1395	27
N	10	10		10	10	10	10

Group 4 - 10000 ppm	Individual Sperm Evaluations Sperm Motility and Counts	Appendix N
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Animal Number	Left Vas Deferens			Left Cauda Epididymis		Left Testis	
	Motile sperm (%)	Progressively motile sperm (%)	Number of Sperm Analyzed	Weight (g)	Sperm count (millions/g)	Weight (g)	Sperm count (millions/g)
4311	93	83	220	0.3543	937.7	1.6380	52.9
4312	95	67	439	0.3284	365.6	1.8439	92.6
4313	68	48	261	0.3462	464.9	1.6035	90.4
4314	90	76	236	0.3170	558.3	1.6914	65.8
4315	95	76	299	0.3415	733.4	2.0136	68.1
4316	94	58	274	0.3244	386.0	1.6473	80.1
4317	94	57	313	0.3173	696.4	1.7340	122.4
4318	92	72	269	0.2897	362.6	1.4720	74.7
4319	92	73	344	0.3398	703.6	1.9948	63.6
4320	96	61	244	0.3034	656.6	1.7487	45.9
Mean	91	67		0.3262	587	1.7387	76
SD	8	11		0.0201	192	0.1708	22
N	10	10		10	10	10	10

Group 1 - 0 ppm	Individual Sperm Evaluations Sperm Morphology	Appendix N
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Animal Number	Number of sperm examined	Total per Animal	Normal			Decapitate			Head abnormal			Neck abnormal			Tail abnormal			Mid tail blob		
			# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal
1311	200	200	197	197	98.5	3	3	1.5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
1312	200	200	197	197	98.5	2	2	1.0	1	1	0.5	0	0	0.0	0	0	0.0	0	0	0.0
1313	200	200	197	197	98.5	0	0	0.0	0	0	0.0	0	0	0.0	1	1	0.5	2	2	1.0
1314	200	200	198	198	99.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	2	2	1.0
1315	200	200	196	196	98.0	1	1	0.5	0	0	0.0	1	1	0.5	2	2	1.0	0	0	0.0
1316	200	200	198	198	99.0	1	1	0.5	0	0	0.0	0	0	0.0	1	1	0.5	0	0	0.0
1317	200	200	195	195	97.5	3	3	1.5	1	1	0.5	0	0	0.0	0	0	0.0	1	1	0.5
1318	200	200	195	195	97.5	1	1	0.5	3	3	1.5	0	0	0.0	2	2	1.0	0	0	0.0
1319	200	200	200	200	100.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
1320	200	200	199	199	99.5	1	1	0.5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Mean			197.2	197.2	98.6	1.2	1.2	0.6	0.5	0.5	0.3	0.1	0.1	0.1	0.6	0.6	0.3	0.5	0.5	0.3
SD			1.6	1.6	0.8	1.1	1.1	0.6	1.0	1.0	0.5	0.3	0.3	0.2	0.8	0.8	0.4	0.8	0.8	0.4

Group 2 - 1000 ppm	Individual Sperm Evaluations Sperm Morphology	Appendix N
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Animal Number	Number of sperm examined	Total per Animal	Normal			Decapitate			Head abnormal			Neck abnormal			Tail abnormal			Mid tail blob		
			# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal
2311	200	200	190	190	95.0	6	6	3.0	2	2	1.0	0	0	0.0	0	0	0.0	2	2	1.0
2312	200	200	196	196	98.0	1	1	0.5	0	0	0.0	0	0	0.0	2	2	1.0	1	1	0.5
2313	200	200	197	197	98.5	2	2	1.0	1	1	0.5	0	0	0.0	0	0	0.0	0	0	0.0
2314	200	200	194	194	97.0	3	3	1.5	1	1	0.5	0	0	0.0	0	0	0.0	2	2	1.0
2315	202	202	198	198	98.0	2	2	1.0	1	1	0.5	0	0	0.0	1	1	0.5	0	0	0.0
2316	200	200	199	199	99.5	1	1	0.5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
2317	200	200	188	188	94.0	4	4	2.0	1	1	0.5	2	2	1.0	1	1	0.5	5	5	2.5
2318	200	200	197	197	98.5	1	1	0.5	0	0	0.0	0	0	0.0	0	0	0.0	2	2	1.0
2319	200	200	196	196	98.0	3	3	1.5	1	1	0.5	0	0	0.0	0	0	0.0	0	0	0.0
2320	200	200	197	197	98.5	1	1	0.5	1	1	0.5	1	1	0.5	1	1	0.5	0	0	0.0
Mean			195.2	195.2	97.5	2.4	2.4	1.2	0.8	0.8	0.4	0.3	0.3	0.2	0.5	0.5	0.2	1.2	1.2	0.6
SD			3.6	3.6	1.7	1.6	1.6	0.8	0.6	0.6	0.3	0.7	0.7	0.3	0.7	0.7	0.4	1.6	1.6	0.8

Group 3 - 5000 ppm	Individual Sperm Evaluations Sperm Morphology	Appendix N
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Animal Number	Number of sperm examined	Total per Animal	Normal			Decapitate			Head abnormal			Neck abnormal			Tail abnormal			Mid tail blob		
			# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal
3311	200	200	194	194	97.0	3	3	1.5	1	1	0.5	0	0	0.0	0	0	0.0	2	2	1.0
3312	200	200	198	198	99.0	0	0	0.0	1	1	0.5	1	1	0.5	0	0	0.0	1	1	0.5
3313	200	200	197	197	98.5	3	3	1.5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
3314	200	200	197	197	98.5	3	3	1.5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
3315	200	200	198	198	99.0	2	2	1.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
3316	200	200	195	195	97.5	2	2	1.0	0	0	0.0	0	0	0.0	3	3	1.5	0	0	0.0
3317	200	200	196	196	98.0	0	0	0.0	1	1	0.5	0	0	0.0	0	0	0.0	3	3	1.5
3318	200	200	196	196	98.0	1	1	0.5	1	1	0.5	0	0	0.0	2	2	1.0	0	0	0.0
3319	200	200	195	195	97.5	2	2	1.0	3	3	1.5	0	0	0.0	0	0	0.0	0	0	0.0
3320	200	200	197	197	98.5	1	1	0.5	2	2	1.0	0	0	0.0	0	0	0.0	0	0	0.0
Mean			196.3	196.3	98.2	1.7	1.7	0.9	0.9	0.9	0.5	0.1	0.1	0.1	0.5	0.5	0.3	0.6	0.6	0.3
SD			1.3	1.3	0.7	1.2	1.2	0.6	1.0	1.0	0.5	0.3	0.3	0.2	1.1	1.1	0.5	1.1	1.1	0.5

Group 4 - 10000 ppm	Individual Sperm Evaluations Sperm Morphology	Appendix N
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Animal Number	Number of sperm examined	Total per Animal	Normal			Decapitate			Head abnormal			Neck abnormal			Tail abnormal			Mid tail blob		
			# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal	# per Slide	# per Animal	% per Animal
4311	200	200	172	172	86.0	1	1	0.5	2	2	1.0	0	0	0.0	1	1	0.5	24	24	12.0
4312	200	200	183	183	91.5	0	0	0.0	1	1	0.5	1	1	0.5	1	1	0.5	14	14	7.0
4313	200	200	197	197	98.5	0	0	0.0	3	3	1.5	0	0	0.0	0	0	0.0	0	0	0.0
4314	200	200	188	188	94.0	3	3	1.5	1	1	0.5	1	1	0.5	0	0	0.0	8	8	4.0
4315	200	200	188	188	94.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	12	12	6.0
4316	200	200	194	194	97.0	4	4	2.0	1	1	0.5	0	0	0.0	0	0	0.0	1	1	0.5
4317	200	200	196	196	98.0	0	0	0.0	4	4	2.0	0	0	0.0	0	0	0.0	0	0	0.0
4318	200	200	195	195	97.5	1	1	0.5	2	2	1.0	1	1	0.5	1	1	0.5	1	1	0.5
4319	200	200	195	195	97.5	2	2	1.0	0	0	0.0	1	1	0.5	1	1	0.5	1	1	0.5
4320	200	200	198	198	99.0	1	1	0.5	0	0	0.0	0	0	0.0	1	1	0.5	0	0	0.0
Mean			190.6	190.6	95.3	1.2	1.2	0.6	1.4	1.4	0.7	0.4	0.4	0.2	0.5	0.5	0.3	6.1	6.1	3.1
SD			8.1	8.1	4.1	1.4	1.4	0.7	1.3	1.3	0.7	0.5	0.5	0.3	0.5	0.5	0.3	8.2	8.2	4.1

	Individual Animal Gross and Microscopic Observations Preface	Appendix O
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Table of Contents

Main Study Animals	598
Neurotoxicity Animals	820

Key to Abbreviations

Gang	=	ganglia
Fibr	=	Fiber
LN	=	Lymph Node
N/	=	Nerve
Nose/Turb Sec 1	=	Nose/Turbinates Section 1
Nose/Turb Sec 2	=	Nose/Turbinates Section 2
Nose/Turb Sec 3	=	Nose/Turbinates Section 3
Nose/Turb Sec 4	=	Nose/Turbinates Section 4
Oviducts/Fallop	=	Oviducts/Fallopian
SC	=	Spinal Cord
Submandib/Max	=	Submandibular/Submaxillary
TB+PL	=	Toluidine blue in plastic
Ventr	=	Ventrol
V-DVTC	=	Ventral Diverticulum
V-SM-G	=	Ventral Seromucous Glands
w/joint	=	with joint

Notes

1. Unless otherwise specified in a histopathology note, the organ/tissue examined was the required (routine) section.
2. The one testis and one epididymis were retained for use in sperm evaluations and therefore these tissues are noted as one of pair missing in the following table.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1311
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASICULATA-VACUOLATED, BILATERAL, Minimal.	
		CORTEX: ZONA FASICULATA-HYPERPLASIA, BILATERAL, Slight.	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Cecum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Duodenum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Epididymides	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Heart	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Kidneys	No gross observations on tissue.	CORTEX: SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 1311
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Liver No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
FOCUS/FOCI, Minimal.

Mesenteric LN No gross observations on tissue.

Tissue is unremarkable (with comment).

- PROCESSING ARTIFACTS PRESENT

Mediastinal LN No gross observations on tissue.

FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS,
Slight.

- PROCESSING ARTIFACTS PRESENT

Submandib/Max LN No gross observations on tissue.

PROMINENT PLASMA CELLS, Slight.

Lungs No gross observations on tissue.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH MACROPHAGES, Minimal.

Larynx No gross observations on tissue.

MUCOSA: MIXED INFLAMMATORY CELL
INFILTRATE, Minimal.

- FINDINGS FROM SLIDE #27.1 (VENTRAL
SEROMUCINOUS GLANDS).

Larynx: V-DVTC No gross observations on tissue.

MUCOSA: MIXED INFLAMMATORY CELL
INFILTRATE, Minimal.

Larynx: V-SM-G No gross observations on tissue.

Tissue is inadequate and unreadable.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 1311
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Larynx: V-SM-G

- VENTRAL SEROMUCINOUS GLANDS/VENTRAL
LARYNGEAL EPITHELIUM NOT PRESENT/NOT
EVALUATED. RECUT, NO IMPROVEMENT.

Nose/Turb Sec 1 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
EPITHELIUM- GOBLET CELL
HYPERTROPHY/HYPERPLASIA, Multifocal,
Slight.

Nose/Turb Sec 2 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY/VESTIBULAR
JUNCTION): MIXED INFLAMMATORY CELLS WITH
OR WITHOUT LYMPHOID AGGREGATES, BILATERAL,
Slight.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Multifocal, Slight.

NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID AGGREGATES,
BILATERAL, Slight.

Nose/Turb Sec 3 No gross observations on tissue.

PHARYNGEAL DUCT: PROMINENT NASAL
ASSOCIATED LYMPHOID TISSUE, BILATERAL,
Slight.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Minimal.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1311
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight.	
Prostate	No gross observations on tissue.	ATROPHY, Slight.	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Minimal.	
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Thymus	Discolored, Red, Foci, <= 0.1 cm, Slight	Examined; 1 correlation found: HEMORRHAGE(S), Slight. INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Aorta	Sternal Marrow	Brain	Sternum	Colon
Esophagus	Ileum	Sciatic Nerve	Pancreas	Parathyroid
Rectum/Low Colon	Cervical SC	Thoracic SC	Lumbar SC	Salivary glands

19-Feb-10; 19:11
Huntingdon Life Sciences, Inc. 036141

Page: 602

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 1311
GROUP: 1

Tissue

Gross Observations/Comments

Microscopic Observations/Comments

Stomach
Urinary bladder

Seminal vesicles Testis Staging

Thyroid

Trachea

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1312
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-VACUOLATED, BILATERAL, Minimal.	
		CORTEX: ZONA FASCICULATA-HYPERPLASIA, BILATERAL, Minimal.	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Sternum	No gross observations on tissue.	DECREASED TRABECULAR BONE, Focal, Slight.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Colon	No gross observations on tissue.	LUMEN: NEMATODE(S), Minimal.	
Epididymides	No gross observations on tissue.	One-of-pair missing. SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Focal, Slight.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Mesenteric LN	No gross observations on tissue.	LYMPHOID ATROPHY, Slight.	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	
		PROMINENT PLASMA CELLS, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1312
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Submandib/Max LN . . .	No gross observations on tissue.	Tissue is missing.	
		- TISSUE EXHAUSTED AT TIME OF TRIM. RECUT, NO IMPROVEMENT.	
Lungs	Discolored, Left lobe(s), Red, Foci, </= 0.1 cm, Slight	Examined; 1 correlation found: HEMORRHAGE(S), Minimal.	
		ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Multifocal, Minimal.	
		ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.	
Larynx	No gross observations on tissue.	MUCOSA: GRANULOMATOUS INFLAMMATION (ASSOCIATED WITH CARTILAGE), Moderate.	
		- FINDINGS FROM SLIDE #27.1 (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: GLANDULAR DIVERTICULUM WITH OR WITHOUT LUMINAL DEBRIS AND MINERALIZATION, Minimal.	
		MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		GLANDULAR DILATATION, Slight.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 1312
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Larynx: V-SM-G

- VENTRAL SEROMUCINOUS GLANDS AND VENTRAL
LARYNGEAL EPITHELIUM marginally present or
not present/not evaluated. Recut, no
improvement.

Nose/Turb Sec 1 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
EPITHELIUM- GOBLET CELL
HYPERTROPHY/HYPERPLASIA, Multifocal,
Slight.

ODONTOPATHY, BILATERAL, Moderate.

VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, BILATERAL, Slight.

Nose/Turb Sec 2 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY/VESTIBULAR
JUNCTION): MIXED INFLAMMATORY CELLS WITH
OR WITHOUT LYMPHOID AGGREGATES,
UNILATERAL, Slight.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Multifocal, Moderate.

ODONTOPATHY, UNILATERAL, Moderate.

NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID AGGREGATES,
BILATERAL, Moderate.

Nose/Turb Sec 3 No gross observations on tissue.

NASAL SINUS: PROMINENT NASAL ASSOCIATED
LYMPHOID TISSUE, BILATERAL, Moderate.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1312
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 3		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Moderate.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal.	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal.	
Pancreas	No gross observations on tissue.	SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Minimal.	
Prostate	No gross observations on tissue.	ATROPHY, Minimal.	
		SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Multifocal, Slight.	
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Minimal.	
		INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	

Page: 607

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 1312
PHASE DAY OF DEATH: 91	PHASE: Dosing phase	GROUP: 1

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Aorta	Sternal Marrow	Brain	Cecum	Duodenum
Esophagus	Heart	Ileum	Kidneys	Liver
Sciatic Nerve	Parathyroid	Rectum/Low Colon	Cervical SC	Thoracic SC
Lumbar SC	Salivary glands	Spleen	Stomach	Seminal vesicles
Testis Staging	Thyroid	Trachea	Urinary bladder	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 1313
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Adrenal Glands No gross observations on tissue.

CORTEX: ZONA FASCICULATA-HYPERPLASIA,
BILATERAL, Slight.

Sternal Marrow No gross observations on tissue.

INCREASED FATTY MARROW/DECREASED
HEMATOPOIETIC CELLS, Minimal.

Femoral Marrow No gross observations on tissue.

INCREASED FATTY MARROW/DECREASED
HEMATOPOIETIC CELLS, Slight.

Femur w/joint No gross observations on tissue.

PHYSIS OPEN, Present.

Duodenum No gross observations on tissue.

Tissue is autolytic and readable;
unremarkable.

Epididymides No gross observations on tissue.

One-of-pair missing.
SUBACUTE (CHRONIC ACTIVE)/CHRONIC
INFLAMMATION, Slight.

Heart No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
INFILTRATE, Minimal.

Ileum No gross observations on tissue.

Tissue is autolytic and readable;
unremarkable.

Jejunum No gross observations on tissue.

Tissue is autolytic and readable;
unremarkable.

Liver No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
FOCUS/FOCI, Minimal.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 1313
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Mesenteric LN No gross observations on tissue.

LYMPHOID ATROPHY, Slight.

PROMINENT MAST CELLS, Slight.

Mediastinal LN No gross observations on tissue.

FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS,
Slight.

PROMINENT PLASMA CELLS, Slight.

PROMINENT HISTIOCYTES, Slight.

PROMINENT MAST CELLS, Slight.

Submandib/Max LN No gross observations on tissue.

PROMINENT PLASMA CELLS, Moderate.

PROMINENT MAST CELLS, Slight.

Lungs No gross observations on tissue.

ALVEOLAR EPITHELIAL HYPERPLASIA, Minimal.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH MACROPHAGES, Minimal.

Larynx: V-DVTC No gross observations on tissue.

MUCOSA: GLANDULAR DIVERTICULUM WITH OR
WITHOUT LUMINAL DEBRIS AND MINERALIZATION,
Minimal.

MUCOSA: MIXED INFLAMMATORY CELL
INFILTRATE, Minimal.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 1313
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Larynx: V-SM-G No gross observations on tissue.

MUCOSA/SUBMUCOSA [VSMG]: MIXED
INFLAMMATORY CELLS WITH AND WITHOUT
LYMPHOID AGGREGATES, Minimal.

MUCOSA: LYMPHOID CELL AGGREGATE(S), Slight.

Nose/Turb Sec 1 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
EPITHELIUM- GOBLET CELL
HYPERTROPHY/HYPERPLASIA, Minimal.

Nose/Turb Sec 2 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID AGGREGATES,
BILATERAL, Minimal.

Nose/Turb Sec 3 No gross observations on tissue.

NASAL SINUS: PROMINENT NASAL ASSOCIATED
LYMPHOID TISSUE, BILATERAL, Slight.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Slight.

Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Minimal.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1313
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Pancreas	No gross observations on tissue.	SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Minimal.	
Prostate	No gross observations on tissue.	ATROPHY, Focal, Moderate. SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Slight.	
Salivary glands	No gross observations on tissue.	INTERSTITIAL AMPHOPHILIC MATERIAL, UNILATERAL, Slight.	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Minimal.	
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Slight. INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Aorta	Brain	Sternum	Cecum	Colon
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Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 1313
GROUP: 1

Tissue	Gross Observations/Comments			Microscopic Observations/Comments	
Esophagus	Kidneys	Larynx	Sciatic Nerve	Parathyroid	
Rectum/Low Colon	Cervical SC	Thoracic SC	Lumbar SC	Stomach	
Seminal vesicles	Testis Staging	Thyroid	Trachea	Urinary bladder	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1314
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-VACUOLATED, BILATERAL, Minimal.	
		CORTEX: ZONA FASCICULATA-HYPERPLASIA, BILATERAL, Slight.	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Duodenum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Epididymides	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Heart	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	
Ileum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Kidneys	No gross observations on tissue.	CORTEX: CONVOLUTED TUBULAR EPITHELIUM-BASOPHILIC, UNILATERAL, Minimal.	
		CORTEX: SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, BILATERAL, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 1314
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Liver No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
FOCUS/FOCI, Minimal.

Mesenteric LN No gross observations on tissue.

PROMINENT PLASMA CELLS, Minimal.
- PROCESSING ARTIFACTS PRESENT

Mediastinal LN No gross observations on tissue.

FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS,
Minimal.
PROMINENT PLASMA CELLS, Slight.
PROMINENT MAST CELLS, Slight.
- PROCESSING ARTIFACTS PRESENT

Submandib/Max LN No gross observations on tissue.

FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS,
Minimal.
PROMINENT MAST CELLS, Slight.
- PROCESSING ARTIFACTS PRESENT

Lungs No gross observations on tissue.

INTERSTITIUM: OSSBOUS METAPLASIA, Minimal.

Larynx No gross observations on tissue.

MUCOSA: MIXED INFLAMMATORY CELL
INFILTRATE, Slight.
MUCOSA: LYMPHOID CELL AGGREGATE(S), Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1314
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Larynx		MUCOSA: GRANULOMATOUS INFLAMMATION (ASSOCIATED WITH CARTILAGE), Slight. - FINDINGS FROM SLIDE #27.1 (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: GLANDULAR DIVERTICULUM WITH OR WITHOUT LUMINAL DEBRIS AND MINERALIZATION, Minimal. MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable. - VENTRAL SEROMUCINOUS GLANDS/VENTRAL LARYNGEAL EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY/VESTIBULAR JUNCTION): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, UNILATERAL, Slight. NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Multifocal, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight. PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 1314
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 3

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Slight.

Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Slight.

PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID
ASSOCIATED TISSUE, BILATERAL, Minimal.

Pancreas No gross observations on tissue.

ATROPHY, Focal, Slight.

Prostate No gross observations on tissue.

ATROPHY, Slight.

SUBACUTE (CHRONIC ACTIVE)/CHRONIC
INFLAMMATION, Minimal.

Spleen No gross observations on tissue.

GOLDEN-BROWN PIGMENT, Minimal.

Stomach No gross observations on tissue.

GLANDULAR DILATATION, Minimal.

Testes No gross observations on tissue.

Tissue is unremarkable; one-of-pair
missing.

Thymus No gross observations on tissue.

HEMORRHAGE(S), Minimal.

INVOLUTION/CORTICAL LYMPHOCYTOLYSIS,
Minimal.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1314
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Thymus		- PROCESSING ARTIFACTS PRESENT	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Aorta	Sternal Marrow	Brain	Sternum	Cecum
Colon	Esophagus	Sciatic Nerve	Nose/Turb Sec 1	Parathyroid
Rectum/Low Colon	Cervical SC	Thoracic SC	Lumbar SC	Salivary glands
Seminal vesicles	Testis Staging	Thyroid	Trachea	Urinary bladder

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 1315
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Femoral Marrow No gross observations on tissue.

INCREASED FATTY MARROW/DECREASED
HEMATOPOIETIC CELLS, Minimal.

Femur w/joint No gross observations on tissue.

PHYSIS OPEN, Present.

Colon No gross observations on tissue.

ECTOPIC ADIPOSE TISSUE, Moderate.

Epididymides No gross observations on tissue.

Tissue is unremarkable; one-of-pair
missing.

Heart No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
INFILTRATE, Slight.

Ileum No gross observations on tissue.

Tissue is autolytic and readable;
unremarkable.

Jejunum No gross observations on tissue.

Tissue is autolytic and readable;
unremarkable.

Kidneys No gross observations on tissue.

CORTEX: CONVOLUTED TUBULAR
EPITHELIUM-BASOPHILIC, UNILATERAL,
Minimal.

Mediastinal LN No gross observations on tissue.

FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS,
Slight.

PROMINENT PLASMA CELLS, Slight.

PROMINENT MAST CELLS, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1315
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Submandib/Max LN . . .	No gross observations on tissue.	PROMINENT PLASMA CELLS, Moderate.	
		PROMINENT MAST CELLS, Slight.	
Lungs	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Focal, Minimal.	
		ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.	
		PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		MUCOSA: GLANDULAR DILATATION, Minimal.	
		- FINDINGS FROM SLIDES #27 AND #27.1 (VENTRAL DIVERTICULUM AND VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL DIVERTICULUM/ EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS/VENTRAL	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 1315
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 1 No gross observations on tissue.

LARYNGEAL EPITHELIUM NOT PRESENT/NOT
EVALUATED. RECUT, NO IMPROVEMENT.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
EPITHELIUM- GOBLET CELL
HYPERTROPHY/HYPERPLASIA, Multifocal,
Slight.

Nose/Turb Sec 2 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY/VESTIBULAR
JUNCTION): MIXED INFLAMMATORY CELLS WITH
OR WITHOUT LYMPHOID AGGREGATES,
UNILATERAL, Slight.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Multifocal, Slight.

NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID AGGREGATES,
BILATERAL, Slight.

NASAL LACRIMAL DUCT (EPITHELIUM): SQUAMOUS
EPITHELIAL HYPERPLASIA, BILATERAL, Slight.

Nose/Turb Sec 3 No gross observations on tissue.

NASAL SINUS: PROMINENT NASAL ASSOCIATED
LYMPHOID TISSUE, Slight.

PHARYNGEAL DUCT: PROMINENT NASAL
ASSOCIATED LYMPHOID TISSUE, BILATERAL,
Slight.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1315
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight.	
Prostate	No gross observations on tissue.	SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Minimal.	
Parathyroid	No gross observations on tissue.	Tissue is unremarkable (with comment); one-of-pair missing. - RECUT, NO IMPROVEMENT.	
Stomach	No gross observations on tissue.	GLANDULAR DILATATION, Minimal.	
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Thyroid	No gross observations on tissue.	ULTIMOBANCHIAL REST(S), UNILATERAL, Slight.	
Thymus	No gross observations on tissue.	Tissue is missing.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
Adrenal Glands Aorta Sternal Marrow Brain Sternum

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 1315
PHASE DAY OF DEATH: 91	PHASE: Dosing phase	GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Cecum	Duodenum	Esophagus	Liver	Mesenteric LN
Sciatic Nerve	Pancreas	Rectum/Low Colon	Cervical SC	Thoracic SC
Lumbar SC	Salivary glands	Spleen	Seminal vesicles	Testis Staging
Trachea	Urinary bladder			

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 1316
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Adrenal Glands No gross observations on tissue.

CORTEX: ZONA FASCICULATA-VACUOLATED,
BILATERAL, Slight.

CORTEX: ZONA FASCICULATA-HYPERPLASIA,
Slight.

Femoral Marrow No gross observations on tissue.

INCREASED FATTY MARROW/DECREASED
HEMATOPOIETIC CELLS, Minimal.

Femur w/joint No gross observations on tissue.

PHYSIS OPEN, Present.

Epididymides No gross observations on tissue.

Tissue is unremarkable; one-of-pair
missing.

Heart No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
INFILTRATE, Slight.

Jejunum No gross observations on tissue.

Tissue is autolytic and readable;
unremarkable.

Liver No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
FOCUS/FOCI, Minimal.

Mediastinal LN No gross observations on tissue.

FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS,
Slight.

PROMINENT HISTIOCYTES, Slight.

PROMINENT MAST CELLS, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1316
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Submandib/Max LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal. PROMINENT PLASMA CELLS, Moderate. PROMINENT MAST CELLS, Slight.	
Lungs	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal. MUCOSA: LYMPHOID CELL AGGREGATE(S), Slight. - FINDINGS FROM SLIDES #27.1, #27.1-A, AND #27.1-B (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: GLANDULAR DIVERTICULUM WITH OR WITHOUT LUMINAL DEBRIS AND MINERALIZATION, Minimal. MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal. GLANDULAR DILATATION, Slight.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 1316
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Larynx: V-SM-G

- VENTRAL SEROMUCINOUS GLANDS AND VENTRAL
LARYNGEAL EPITHELIUM marginally present or
not present/not evaluated. Recut, no
improvement.

Nose/Turb Sec 1 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
EPITHELIUM- GOBLET CELL
HYPERTROPHY/HYPERPLASIA, Minimal.

Nose/Turb Sec 2 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY/VESTIBULAR
JUNCTION): MIXED INFLAMMATORY CELLS WITH
OR WITHOUT LYMPHOID AGGREGATES, BILATERAL,
Slight.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID AGGREGATES,
BILATERAL, Slight.

Nose/Turb Sec 3 No gross observations on tissue.

NASAL SINUS: PROMINENT NASAL ASSOCIATED
LYMPHOID TISSUE, BILATERAL, Slight.

PHARYNGEAL DUCT: PROMINENT NASAL
ASSOCIATED LYMPHOID TISSUE, BILATERAL,
Slight.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1316
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 4	No gross observations on tissue.	PERIODONTAL DISEASE, Slight.	
Prostate	No gross observations on tissue.	SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Slight.	
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Slight. INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Aorta	Sternal Marrow	Brain	Sternum	Cecum
Colon	Duodenum	Esophagus	Ileum	Kidneys
Mesenteric LN	Sciatic Nerve	Pancreas	Parathyroid	Rectum/Low Colon
Cervical SC	Thoracic SC	Lumbar SC	Salivary glands	Spleen
Stomach	Seminal vesicles	Testis Staging	Thyroid	Trachea
Urinary bladder				

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1317
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Sternal Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Femoral Marrow	No gross observations on tissue.	Tissue is missing.	
Sternum	No gross observations on tissue.	CHONDROMALACIA, Slight.	
		DECREASED TRABECULAR BONE, Multifocal, Moderate.	
Femur w/joint	No gross observations on tissue.	Tissue is missing.	
Epididymides	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Ileum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
Mesenteric LN	No gross observations on tissue.	LYMPHOID ATROPHY, Moderate.	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1317
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal.	
		ALVEOLAR EPITHELIAL HYPERPLASIA, Minimal.	
		INTERSTITIUM: OSSEOUS METAPLASIA, Minimal.	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx: V-SM-G	No gross observations on tissue.	MUCOSA (SEROMUCOUS GLANDS): EPITHELIAL-SQUAMOUS/SQUAMOID METAPLASIA, Focal, Minimal.	
		MUCOSA/SUBMUCOSA [VSMG]: MIXED INFLAMMATORY CELLS WITH AND WITHOUT LYMPHOID AGGREGATES, Minimal.	
Sciatic Nerve	No gross observations on tissue.	Tissue is missing.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Slight.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Multifocal, Slight.	
		NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1317
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 2		VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL LUMEN: AMPHOPHILIC CONCRETIONS, Focal, Slight.	
		NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight.	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Slight.	
Prostate	No gross observations on tissue.	ATROPHY, Minimal.	
Rectum/Low Colon . . .	No gross observations on tissue.	GLANDULAR DILATATION, Focal, Minimal.	
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	

Huntingdon Life Sciences, Inc. 036141

Page: 630

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation Toxicity Study in Rats with Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 1317
GROUP: 1

Tissue	Gross Observations/Comments
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Microscopic Observations/Comments

Thymus No gross observations on tissue.

HEMORRHAGE(S), Minimal.

INVOLUTION/CORTICAL LYMPHOCYTOLYSIS,
Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Adrenal Glands	Aorta	Brain	Cecum	Colon
Duodenum	Esophagus	Heart	Kidneys	Submandib/Max LN
Larynx	Pancreas	Parathyroid	Cervical SC	Thoracic SC
Lumbar SC	Salivary glands	Spleen	Stomach	Seminal vesicles
Testis Staging	Thyroid	Trachea	Urinary bladder	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1318
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Sternum	No gross observations on tissue.	CHONDROMALACIA, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Duodenum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Epididymides	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	
Submandib/Max LN . . .	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal.	
Lungs	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.	
		PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1318
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Larynx	No gross observations on tissue.	MUCOSA: EPITHELIUM-SQUAMOUS/SQUAMOID METAPLASIA, Focal, Minimal.	
		MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		MUCOSA: LYMPHOID CELL AGGREGATE(S), Slight.	
		- FINDINGS FROM SLIDE #27.1 (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS AND VENTRAL LARYNGEAL EPITHELIUM marginally present or not present/not evaluated. RECUT, NO IMPROVEMENT.	
Sciatic Nerve	No gross observations on tissue.	Tissue is missing.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Slight.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY/VESTIBULAR JUNCTION): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1318
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 2		NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	
		NASAL MUCOSA (OLFACTORY EPITHELIUM): MIXED INFLAMMATORY CELL INFILTRATE, UNILATERAL, Slight.	
		NASAL MUCOSA [NASOTURBINATE]: MIXED INFLAMMATORY CELL INFILTRATE WITH OR WITHOUT LYMPHOID CELL AGGREGATES, UNILATERAL, Slight.	
		NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight.	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1318
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Pancreas	No gross observations on tissue.	ATROPHY, Minimal.	
Prostate	No gross observations on tissue.	ATROPHY, Slight.	
Parathyroid	No gross observations on tissue.	Tissue is unremarkable (with comment); one-of-pair missing.	
		- RECUT, NO IMPROVEMENT.	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Minimal.	
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Thymus	No gross observations on tissue.	INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Adrenal Glands	Aorta	Sternal Marrow	Brain	Cecum
Colon	Esophagus	Heart	Ileum	Kidneys
Liver	Mesenteric LN	Rectum/Low Colon	Cervical SC	Thoracic SC

19-Feb-10; 19:11
Huntingdon Life Sciences, Inc. 036141

Page: 635

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 1318
GROUP: 1

Tissue

Gross Observations/Comments

Microscopic Observations/Comments

Lumbar SC
Thyroid

Salivary glands
Trachea

Stomach
Urinary bladder

Seminal vesicles Testis Staging

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 1319
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Adrenal Glands No gross observations on tissue.

CORTEX: ZONA FASCICULATA-HYPERPLASIA,
BILATERAL, Minimal.

Femoral Marrow No gross observations on tissue.

INCREASED FATTY MARROW/DECREASED
HEMATOPOIETIC CELLS, Minimal.

Femur w/joint No gross observations on tissue.

PHYSIS OPEN, Present.

Cecum No gross observations on tissue.

GLANDULAR DILATATION, Focal, Slight.

Duodenum No gross observations on tissue.

Tissue is autolytic and readable;
unremarkable.

Epididymides No gross observations on tissue.

Tissue is unremarkable; one-of-pair
missing.

Ileum No gross observations on tissue.

MUCOSAL DEGENERATIVE FOCUS, Focal, Slight.

Jejunum No gross observations on tissue.

Tissue is autolytic and readable;
unremarkable.

Kidneys
Discolored, Bilateral, Tan, Mottled,
Moderate

Examined; no correlation found

CORTEX: CONVOLUTED TUBULAR
EPITHELIUM-BASOPHILIC, UNILATERAL,
Minimal.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1319
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
Mesenteric LN	No gross observations on tissue.	LYMPHOID ATROPHY, Slight.	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	
Submandib/Max LN	No gross observations on tissue.	PROMINENT PLASMA CELLS, Slight.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal. MUCOSA: LYMPHOID CELL AGGREGATE(S), Slight. - FINDINGS FROM SLIDES #27.1 AND #27.1-A (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal. GLANDULAR DILATATION, Moderate.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable. - VENTRAL SEROMUCINOUS GLANDS AND VENTRAL LARYNGEAL EPITHELIUM marginally present or not present/not evaluated. RECUT, NO	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1319
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 1 No gross observations on tissue.		IMPROVEMENT.	
		NASAL MUCOSA (VESTIBULAR EPITHELIUM): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID CELL AGGREGATES, Slight.	
		NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Minimal.	
		VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Slight.	
Nose/Turb Sec 2 No gross observations on tissue.		NASAL MUCOSA (RESPIRATORY/VESTIBULAR JUNCTION): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, Minimal.	
		NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Focal, Slight.	
		NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Minimal.	
Nose/Turb Sec 3 No gross observations on tissue.		NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 1319
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Slight.

PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID
ASSOCIATED TISSUE, BILATERAL, Slight.

Prostate No gross observations on tissue.

ATROPHY, Slight.

SUBACUTE (CHRONIC ACTIVE)/CHRONIC
INFLAMMATION, Slight.

Parathyroid No gross observations on tissue.

Tissue is unremarkable (with comment);
one-of-pair missing.

- RECUT, NO IMPROVEMENT.

Testes No gross observations on tissue.

Tissue is unremarkable; one-of-pair
missing.

Thymus No gross observations on tissue.

HEMORRHAGE(S), Minimal.

INVOLUTION/CORTICAL LYMPHOCYTOLYSIS,
Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
Aorta Sternal Marrow Brain Sternum Colon

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 1319
PHASE DAY OF DEATH: 92	PHASE: Dosing phase	GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Esophagus	Heart	Lungs	Sciatic Nerve	Pancreas
Rectum/Low Colon	Cervical SC	Thoracic SC	Lumbar SC	Salivary glands
Spleen	Stomach	Seminal vesicles	Testis Staging	Thyroid
Trachea	Urinary bladder			

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1320
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASICULATA-HYPERPLASIA, BILATERAL, Slight.	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Sternum	No gross observations on tissue.	CHONDROMALACIA, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Epididymides	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Ileum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Kidneys	No gross observations on tissue.	CORTEX: CONVOLUTED TUBULAR EPITHELIUM-BASOPHILIC, BILATERAL, Slight.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	
		PROMINENT PLASMA CELLS, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1320
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Submandib/Max LN . . .	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal.	
		PROMINENT PLASMA CELLS, Slight.	
Lungs	Discolored, All lobes, Red, Foci, 0.2 - 0.5 cm	Examined; 1 correlation found: HEMORRHAGE(S), Minimal.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		MUCOSA: GLANDULAR DIVERTICULUM WITH LUMINAL DEBRIS AND MINERALIZATION, Minimal.	
		- FINDINGS FROM SLIDES #27 AND #27.1 (VENTRAL DIVERTICULUM AND VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- INSUFFICIENT TISSUE PRESENT/ DIVERTICULUM MUCOSA MISSING. RECUT, NO IMPROVEMENT.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS AND VENTRAL LARYNGEAL EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1320
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Moderate.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY/VESTIBULAR JUNCTION): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, UNILATERAL, Slight. NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Focal, Moderate. NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Minimal. VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight. PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight. PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight. NASAL MUCOSA [GLAND]: DUCTAL/ACINAR EPITHELIAL HYPERPLASIA WITH OR WITHOUT EPITHELIAL VACUOLATION, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 1320
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Slight.

PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID
ASSOCIATED TISSUE, BILATERAL, Slight.

Pancreas No gross observations on tissue.

ATROPHY, Minimal.

Prostate No gross observations on tissue.

SUBACUTE (CHRONIC ACTIVE)/CHRONIC
INFLAMMATION, Minimal.

Parathyroid No gross observations on tissue.

Tissue is unremarkable (with comment);
one-of-pair missing.

- RECUT, NO IMPROVEMENT.

Rectum/Low Colon . . . No gross observations on tissue.

LUMEN: NEMATODE(S), Minimal.

Spleen No gross observations on tissue.

GOLDEN-BROWN PIGMENT, Minimal.

Testes No gross observations on tissue.

Tissue is unremarkable; one-of-pair
missing.

Thymus No gross observations on tissue.

HEMORRHAGE(S), Slight.

INVOLUTION/CORTICAL LYMPHOCYTOLYSIS,
Minimal.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1320
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Aorta	Sternal Marrow	Brain	Cecum	Colon
Duodenum	Esophagus	Heart	Mesenteric LN	Sciatic Nerve
Cervical SC	Thoracic SC	Lumbar SC	Salivary glands	Stomach
Seminal vesicles	Testis Staging	Thyroid	Urinary bladder	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 2311
GROUP: 2

Tissue Gross Observations/Comments

Lungs No gross observations on tissue.

Microscopic Observations/Comments

ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY
CYTOPLASM, Focal, Minimal.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH MACROPHAGES, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
 No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 2312
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 2

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Focal, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 2313
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 2
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 2314
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 2
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. ALVEOLAR EPITHELIAL HYPERPLASIA, Focal, Minimal.	
Thymus	Discolored, Red, Foci, <= 0.1 cm, Moderate	Examined; 1 correlation found: HEMORRHAGE(S), Slight.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 2315
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 2
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Focal, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

19-Feb-10; 19:11
Huntingdon Life Sciences, Inc. 036141

Page: 651

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

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STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 2316
PHASE DAY OF DEATH: 92	PHASE: Dosing phase	GROUP: 2
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Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

19-Feb-10; 19:11
Huntingdon Life Sciences, Inc. 036141

Page: 652

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 2317
GROUP: 2

Tissue Gross Observations/Comments

Lungs No gross observations on tissue.

Microscopic Observations/Comments

HEMORRHAGE(S), Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
 No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 2318
GROUP: 2

Tissue Gross Observations/Comments
Lungs No gross observations on tissue.

Microscopic Observations/Comments
ALVEOLAR EPITHELIAL HYPERPLASIA, Focal,
Minimal.

PERIVASCULAR MIXED INFLAMMATORY CELL
INFILTRATE, Minimal.

INTERSTITIUM: OSSEOUS METAPLASIA, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
 No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 2319
PHASE DAY OF DEATH: 92	PHASE: Dosing phase	GROUP: 2

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 2320
PHASE DAY OF DEATH: 92	PHASE: Dosing phase	GROUP: 2

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Lungs No gross observations on tissue.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH MACROPHAGES, Minimal.

PERIVASCULAR MIXED INFLAMMATORY CELL
INFILTRATE, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 3311
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 3
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Slight.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 3312
GROUP: 3

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Lungs No gross observations on tissue.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH MACROPHAGES, Minimal.

PERIVASCULAR MIXED INFLAMMATORY CELL
INFILTRATE, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
 No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 3313
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 3
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	ALVEOLAR EPITHELIAL HYPERPLASIA, Focal, Minimal. PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

19-Feb-10; 19:11
Huntingdon Life Sciences, Inc. 036141

Page: 659

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 3314
GROUP: 3

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Lungs No gross observations on tissue.

PERIVASCULAR MIXED INFLAMMATORY CELL
INFILTRATE, Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
 No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 3315
PHASE DAY OF DEATH: 91	PHASE: Dosing phase	GROUP: 3

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Lungs No gross observations on tissue.

ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY
CYTOPLASM, Slight.

- TISSUE EVALUATED DESPITE SIGNIFICANT
ALVEOLAR COLLAPSE. RECUT, NO IMPROVEMENT.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

19-Feb-10; 19:11
Huntingdon Life Sciences, Inc. 036141

Page: 661

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 3316
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 3
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	ALVEOLAR EPITHELIAL HYPERPLASIA, Focal, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 3317
PHASE DAY OF DEATH: 92	PHASE: Dosing phase	GROUP: 3

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Lungs No gross observations on tissue.

ALVEOLAR EPITHELIAL HYPERPLASIA, Focal,
Minimal.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH MACROPHAGES, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 3318
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 3
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 3319
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 3
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lymph Node, other . . .	Enlarged, Submandibular, Slight	No micropathology observations on tissue. Examined; 1 correlation found: (Submandib/Max LN) PROMINENT PLASMA CELLS, Moderate.	
Submandib/Max LN . . .	No gross observations on tissue.	PROMINENT PLASMA CELLS, Moderate. PROMINENT MAST CELLS, Slight.	
Lungs	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Focal, Minimal. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal. PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Thymus	Discolored, Red, Foci, 0.2 - 0.5 cm, Slight	Examined; 1 correlation found: HEMORRHAGE(S), Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 3320
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 3
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Multifocal, Minimal. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal. PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4311
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-VACUOLATED, BILATERAL, Minimal.	
Sternal Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Epididymides	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Heart	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	
Kidneys	No gross observations on tissue.	CORTEX: CONVOLUTED TUBULAR EPITHELIUM-BASOPHILIC, UNILATERAL, Slight.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal. PROMINENT PLASMA CELLS, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4311
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Submandib/Max LN . . .	No gross observations on tissue.	PROMINENT PLASMA CELLS, Moderate.	
		PROMINENT MAST CELLS, Slight.	
Lungs	Discolored, All lobes, Red, Foci, <= 0.1 cm, Slight	Examined; 1 correlation found: HEMORRHAGE(S), Minimal.	
		ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.	
		PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		MUCOSA: GLANDULAR DILATATION, Moderate.	
		- FINDINGS FROM SLIDE #27.1 (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		GLANDULAR DILATATION, Moderate.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS AND VENTRAL LARYNGEAL EPITHELIUM NOT PRESENT/NOT	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 4311
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

EVALUATED. RECUT, NO IMPROVEMENT.

Nose/Turb Sec 1 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
EPITHELIUM- GOBLET CELL
HYPERTROPHY/HYPERPLASIA, Multifocal,
Slight.

Nose/Turb Sec 2 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

NASAL MUCOSA (RESPIRATORY/OLFACTORY
JUNCTION): SUBMUCOSAL GLANDULAR
EOSINOPHILIC SECRETORY MATERIAL,
UNILATERAL, Slight.

NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID AGGREGATES,
BILATERAL, Slight.

VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, BILATERAL, Minimal.

Nose/Turb Sec 3 No gross observations on tissue.

NASAL SINUS: PROMINENT NASAL ASSOCIATED
LYMPHOID TISSUE, BILATERAL, Slight.

PHARYNGEAL DUCT: PROMINENT NASAL
ASSOCIATED LYMPHOID TISSUE, BILATERAL,
Slight.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4311
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 3		NASAL MUCOSA [GLAND]: DUCTAL/ACINAR EPITHELIAL HYPERPLASIA WITH OR WITHOUT EPITHELIAL VACUOLATION, BILATERAL, Slight.	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal. PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Slight.	
Prostate	No gross observations on tissue.	SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Minimal.	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Minimal.	
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Minimal. INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	

Page: 670

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 4311
PHASE DAY OF DEATH: 91	PHASE: Dosing phase	GROUP: 4

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Aorta	Brain	Sternum	Cecum	Colon
Duodenum	Esophagus	Ileum	Jejunum	Mesenteric LN
Sciatic Nerve	Pancreas	Parathyroid	Rectum/Low Colon	Cervical SC
Thoracic SC	Lumbar SC	Salivary glands	Stomach	Seminal vesicles
Testis Staging	Thyroid	Urinary bladder		

19-Feb-10; 19:11

Huntingdon Life Sciences, Inc. 036141

Page: 671

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 4312
GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-VACUOLATED, BILATERAL, Minimal.
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.
Sternum	No gross observations on tissue.	CHONDROMALACIA, Slight.
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.
Epididymides	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.
Heart	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Slight.
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.
Mediastinal LN	No gross observations on tissue.	LYMPHOID ATROPHY, Moderate.
Submandib/Max LN . . .	No gross observations on tissue.	PROMINENT PLASMA CELLS, Moderate.
Lungs	Discolored, All lobes, Red, Foci, </= 0.1 cm, Slight	Examined; 1 correlation found: HEMORRHAGE(S), Minimal.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4312
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Larynx	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.	
		PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		- FINDINGS FROM SLIDE #27.1 (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS/VENTRAL LARYNGEAL EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Slight.	
		VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, UNILATERAL, Minimal.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 4312
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 2

NASAL MUCOSA (RESPIRATORY/OLFACTORY
JUNCTION): SUBMUCOSAL GLANDULAR
EOSINOPHILIC SECRETORY MATERIAL,
UNILATERAL, Slight.

NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID AGGREGATES,
BILATERAL, Slight.

VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, BILATERAL, Minimal.

Nose/Turb Sec 3 No gross observations on tissue.

NASAL SINUS: PROMINENT NASAL ASSOCIATED
LYMPHOID TISSUE, BILATERAL, Slight.

PHARYNGEAL DUCT: PROMINENT NASAL
ASSOCIATED LYMPHOID TISSUE, BILATERAL,
Slight.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

NASAL MUCOSA [GLAND]: DUCTAL/ACINAR
EPITHELIAL HYPERPLASIA WITH OR WITHOUT
EPITHELIAL VACUOLATION, BILATERAL, Slight.

SQUAMOUS EPITHELIAL HYPERPLASIA, Focal,
Slight.

Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4312
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 4		PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Slight.	
Pancreas	No gross observations on tissue.	SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Minimal.	
Prostate	No gross observations on tissue.	ATROPHY, Slight.	
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Thyroid	No gross observations on tissue.	ECTOPIC THYMIC TISSUE, UNILATERAL, Slight.	
Thymus	No gross observations on tissue.	INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Aorta	Sternal Marrow	Brain	Cecum	Colon
Duodenum	Esophagus	Ileum	Jejunum	Kidneys
Mesenteric LN	Sciatic Nerve	Parathyroid	Rectum/Low Colon	Cervical SC
Thoracic SC	Lumbar SC	Salivary glands	Spleen	Stomach

19-Feb-10; 19:11
Huntingdon Life Sciences, Inc. 036141

Page: 675

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

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STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4312
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
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Tissue	Gross Observations/Comments	Microscopic Observations/Comments	

Seminal vesicles	Testis Staging	Trachea	Urinary bladder

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4313
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-HYPERPLASIA, BILATERAL, Slight.	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Sternum	No gross observations on tissue.	CHONDROMALACIA, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Epididymides	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Heart	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	
Ileum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Kidneys	No gross observations on tissue.	PELVIS: DILATED, UNILATERAL, Slight.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4313
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Mesenteric LN	No gross observations on tissue.	RETICULOENDOTHELIAL CELLS: FOAMY CYTOPLASM, Slight.	
Submandib/Max LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal. PROMINENT PLASMA CELLS, Moderate. PROMINENT MAST CELLS, Slight.	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal. MUCOSA: GLANDULAR DILATATION, Slight. - FINDINGS FROM SLIDES #27 AND #27.1 (VENTRAL DIVERTICULUM AND VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	Tissue is inadequate and unreadable. - VENTRAL DIVERTICULUM/ EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4313
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS/VENTRAL LARYNGEAL EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Moderate.	
		NASAL MUCOSA (MAXILLOTURBINATE): MIXED INFLAMMATORY CELL INFILTRATE WITH OR WITHOUT LYMPHOID CELLULAR AGGREGATES, Slight.	
		VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Slight.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY/VESTIBULAR JUNCTION): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Minimal.	
		NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	
		NASAL MUCOSA (OLFACTORY EPITHELIUM): MIXED INFLAMMATORY CELL INFILTRATE, Slight.	
		NASAL MUCOSA (OLFACTORY EPITHELIUM): PROMINENT BOWMAN'S GLAND(S)/GLANDULAR EPITHELIAL HYPERPLASIA, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 4313
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 2

NASAL MUCOSA [NASOTURBINATE]: MIXED
INFLAMMATORY CELL INFILTRATE WITH OR
WITHOUT LYMPHOID CELL AGGREGATES,
UNILATERAL, Minimal.

NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID AGGREGATES,
UNILATERAL, Minimal.

Nose/Turb Sec 3 No gross observations on tissue.

NASAL SINUS: PROMINENT NASAL ASSOCIATED
LYMPHOID TISSUE, BILATERAL, Slight.

PHARYNGEAL DUCT: PROMINENT NASAL
ASSOCIATED LYMPHOID TISSUE, BILATERAL,
Moderate.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Moderate.

NASAL MUCOSA [GLAND]: DUCTAL/ACINAR
EPITHELIAL HYPERPLASIA WITH OR WITHOUT
EPITHELIAL VACUOLATION, BILATERAL, Slight.

Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Slight.

PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID
ASSOCIATED TISSUE, BILATERAL, Slight.

Prostate No gross observations on tissue.

ATROPHY, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 4313
GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Parathyroid	No gross observations on tissue.	Tissue is missing. - RECUT, NO IMPROVEMENT.
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Aorta	Sternal Marrow	Brain	Cecum	Colon
Duodenum	Esophagus	Mediastinal LN	Sciatic Nerve	Pancreas
Rectum/Low Colon	Cervical SC	Thoracic SC	Lumbar SC	Salivary glands
Spleen	Stomach	Seminal vesicles	Testis Staging	Thyroid
Trachea	Urinary bladder			

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4314
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-HYPERPLASIA, BILATERAL, Slight.	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Sternum	No gross observations on tissue.	CHONDROMALACIA, Slight.	
		DECREASED TRABECULAR BONE, Slight.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Epididymides	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Heart	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Slight.	
Kidneys	No gross observations on tissue.	CORTEX/CORTICO-MEDULLARY JUNCTION: MINERAL DEPOSIT(S), UNILATERAL, Minimal.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
Mediastinal LN	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Minimal.	
		FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 4314
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Submandib/Max LN . . . No gross observations on tissue.

PROMINENT PLASMA CELLS, Moderate.

Lungs No gross observations on tissue.

HEMORRHAGE(S), Minimal.

ALVEOLAR EPITHELIAL HYPERPLASIA, Minimal.

PERIVASCULAR MIXED INFLAMMATORY CELL
INFILTRATE, Slight.

Larynx: V-DVTC No gross observations on tissue.

Tissue is missing.

Larynx: V-SM-G No gross observations on tissue.

Tissue is missing.

Nose/Turb Sec 1 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
EPITHELIUM- GOBLET CELL
HYPERTROPHY/HYPERPLASIA, Multifocal,
Slight.

ODONTOPATHY, UNILATERAL, Moderate.

VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, BILATERAL, Slight.

Nose/Turb Sec 2 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID AGGREGATES,
BILATERAL, Slight.

VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, BILATERAL, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4314
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Minimal.	
		NASAL MUCOSA [GLAND]: DUCTAL/ACINAR EPITHELIAL HYPERPLASIA WITH OR WITHOUT EPITHELIAL VACUOLATION, UNILATERAL, Slight.	
		SQUAMOUS EPITHELIAL HYPERPLASIA, Focal, Minimal.	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal.	
		PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Slight.	
Spleen	No gross observations on tissue.	LYMPHOID DEPLETION, Multifocal, Slight.	
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4314
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Slight. INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Aorta	Sternal Marrow	Brain	Cecum	Colon
Duodenum	Esophagus	Ileum	Jejunum	Mesenteric LN
Larynx	Sciatic Nerve	Pancreas	Prostate	Parathyroid
Rectum/Low Colon	Cervical SC	Thoracic SC	Lumbar SC	Salivary glands
Stomach	Seminal vesicles	Testis Staging	Thyroid	Urinary bladder

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4315
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-HYPERPLASIA, BILATERAL, Slight.	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Duodenum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Epididymides	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Heart	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	
Ileum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Kidneys	No gross observations on tissue.	CORTEX: CONVOLUTED TUBULAR EPITHELIUM-BASOPHILIC, UNILATERAL, Minimal.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4315
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	
		PROMINENT HISTIOCYTES, Slight.	
		PROMINENT MAST CELLS, Slight.	
Submandib/Max LN . . .	No gross observations on tissue.	Tissue is missing.	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal.	
		ALVEOLAR EPITHELIAL HYPERPLASIA, Minimal.	
		ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Minimal.	
		ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		- FINDINGS FROM SLIDE #27.1 (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		GLANDULAR DILATATION, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4315
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS AND VENTRAL LARYNGEAL EPITHELIUM MARGINALLY PRESENT OR NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Minimal.	
		NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight.	
		VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	
		NASAL MUCOSA [GLAND]: DUCTAL/ACINAR EPITHELIAL HYPERPLASIA WITH OR WITHOUT EPITHELIAL VACUOLATION, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4315
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal.	
		PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Minimal.	
Prostate	No gross observations on tissue.	ATROPHY, Slight.	
Salivary glands	No gross observations on tissue.	Tissue is missing.	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Minimal.	
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Thymus	No gross observations on tissue.	INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
Aorta Sternal Marrow Brain Sternum Cecum

Huntingdon Life Sciences, Inc. 036141

Page: 689

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Male
PHASE: Dosing phase

ANIMAL: 4315
GROUP: 4

Tissue	Gross Observations/Comments		Microscopic Observations/Comments	
Colon	Esophagus	Mesenteric LN	Sciatic Nerve	Nose/Turb Sec 1
Pancreas	Parathyroid	Rectum/Low Colon	Cervical SC	Thoracic SC
Lumbar SC	Stomach	Seminal vesicles	Testis Staging	Thyroid
Trachea	Urinary bladder			

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4316
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Sternum	No gross observations on tissue.	CHONDROMALACIA, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Duodenum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Epididymides	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Ileum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
		- ARTIFACTS PRESENT	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	
		PROMINENT HISTIOCYTES, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4316
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Submandib/Max LN . . .	No gross observations on tissue.	PROMINENT PLASMA CELLS, Moderate.	
Lungs	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Minimal. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal. PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal. INTERSTITIUM: OSSEOUS METAPLASIA, Minimal.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Slight. - FINDINGS FROM SLIDES #27.1 AND #27.1A (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable. - VENTRAL SEROMUCINOUS GLANDS/VENTRAL LARYNGEAL EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 4316
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 1

VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, BILATERAL, Minimal.

Nose/Turb Sec 2 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY/VESTIBULAR
JUNCTION): MIXED INFLAMMATORY CELLS WITH
OR WITHOUT LYMPHOID AGGREGATES,
UNILATERAL, Slight.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID AGGREGATES,
BILATERAL, Slight.

VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, UNILATERAL, Minimal.

Nose/Turb Sec 3 No gross observations on tissue.

PHARYNGEAL DUCT: PROMINENT NASAL
ASSOCIATED LYMPHOID TISSUE, BILATERAL,
Slight.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

- DORSAL SINUS NOT PRESENT/NOT EVALUATED.

Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 4316
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 4

PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID
ASSOCIATED TISSUE, BILATERAL, Slight.

Parathyroid No gross observations on tissue.

Tissue is unremarkable (with comment);
one-of-pair missing.

- RECUT, NO IMPROVEMENT.

Rectum/Low Colon . . . No gross observations on tissue.

LUMEN: NEMATODE(S), Minimal.

Spleen No gross observations on tissue.

Tissue is unremarkable (with comment).

- ARTIFACTS PRESENT

Testes No gross observations on tissue.

Tissue is unremarkable; one-of-pair
missing.

Thymus No gross observations on tissue.

INVOLUTION/CORTICAL LYMPHOCYTOLYSIS,
Minimal.

Trachea No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
INFILTRATE, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Adrenal Glands Aorta Sternal Marrow Brain Cecum

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 4316
PHASE DAY OF DEATH: 92	PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Colon	Esophagus	Heart	Kidneys	Mesenteric LN
Sciatic Nerve	Pancreas	Prostate	Cervical SC	Thoracic SC
Lumbar SC	Salivary glands	Stomach	Seminal vesicles	Testis Staging
Thyroid	Urinary bladder			

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4317
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASICULATA-HYPERPLASIA, BILATERAL, Slight.	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Slight.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Colon	No gross observations on tissue.	LUMEN: NEMATODE(S), Minimal.	
Epididymides	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Ileum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	
		PROMINENT HISTIOCYTES, Slight.	
Submandib/Max LN . . .	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4317
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Submandib/Max LN . . .		PROMINENT PLASMA CELLS, Moderate.	
Larynx: V-DVTC	No gross observations on tissue.	GLANDULAR DILATATION, Slight.	
Larynx: V-SM-G	No gross observations on tissue.	MUCOSA/SUBMUCOSA [VSMG]: MIXED INFLAMMATORY CELLS WITH AND WITHOUT LYMPHOID AGGREGATES, Minimal. MUCOSA: LYMPHOID CELL AGGREGATE(S), Slight. MUCOSA: GLANDULAR-DILATATION, Slight.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Moderate. VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight. NASAL MUCOSA (OLFACTORY EPITHELIUM): PROMINENT BOWMAN'S GLAND(S)/GLANDULAR EPITHELIAL HYPERPLASIA, BILATERAL, Slight. NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 4317
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 3 No gross observations on tissue.

NASAL SINUS: PROMINENT NASAL ASSOCIATED
LYMPHOID TISSUE, UNILATERAL, Minimal.

PHARYNGEAL DUCT: PROMINENT NASAL
ASSOCIATED LYMPHOID TISSUE, BILATERAL,
Slight.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Slight.

Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Minimal.

Prostate No gross observations on tissue.

ATROPHY, Slight.

Parathyroid No gross observations on tissue.

Tissue is unremarkable (with comment);
one-of-pair missing.

- RECUT, NO IMPROVEMENT.

Spleen No gross observations on tissue.

GOLDEN-BROWN PIGMENT, Multifocal, Moderate.

Testes No gross observations on tissue.

Tissue is unremarkable; one-of-pair
missing.

Thymus No gross observations on tissue.

HEMORRHAGE(S), Minimal.

INVOLUTION/CORTICAL LYMPHOCYTOLYSIS,
Minimal.

19-Feb-10; 19:11
Huntingdon Life Sciences, Inc. 036141

Page: 698

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 4317
GROUP: 4

Tissue

Gross Observations/Comments

Microscopic Observations/Comments

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Aorta	Sternal Marrow	Brain	Sternum	Cecum
Duodenum	Esophagus	Heart	Kidneys	Mesenteric LN
Lungs	Larynx	Sciatic Nerve	Pancreas	Rectum/Low Colon
Cervical SC	Thoracic SC	Lumbar SC	Salivary glands	Stomach
Seminal vesicles	Testis Staging	Thyroid	Trachea	Urinary bladder

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4318
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-VACUOLATED, BILATERAL, Minimal.	
		CORTEX: ZONA FASCICULATA-HYPERPLASIA, BILATERAL, Minimal.	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Epididymides	No gross observations on tissue.	One-of-pair missing. SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Minimal.	
Heart	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Kidneys	No gross observations on tissue.	MEDULLARY TUBULAR DILATATION, UNILATERAL, Slight.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4318
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Mediastinal LN		PROMINENT MAST CELLS, Moderate.	
Submandib/Max LN . . .	No gross observations on tissue.	PROMINENT PLASMA CELLS, Moderate.	
		PROMINENT MAST CELLS, Slight.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		MUCOSA: LYMPHOID CELL AGGREGATE(S), Slight.	
		MUCOSA: GRANULOMATOUS INFLAMMATION (ASSOCIATED WITH CARTILAGE), Slight.	
		- FINDINGS FROM SLIDE #27.1 (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		GLANDULAR DILATATION, Minimal.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS/VENTRAL LARYNGEAL EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4318
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 1		VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Slight.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	
		NASAL MUCOSA (OLFACTORY EPITHELIUM): PROMINENT BOWMAN'S GLAND(S)/GLANDULAR EPITHELIAL HYPERPLASIA, BILATERAL, Slight.	
		NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight.	
		VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal.	
		PALATE: ECTOPIC SEBACEOUS GLAND, Focal, Present.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4318
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments	

Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal.	
		PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Slight.	
Pancreas	No gross observations on tissue.	ATROPHY, Minimal.	
Prostate	No gross observations on tissue.	ATROPHY, Slight.	
		SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Slight.	
Rectum/Low Colon . . .	No gross observations on tissue.	LUMEN: NEMATODE(S), Minimal.	
Spleen	No gross observations on tissue.	LYMPHOID DEPLETION, Focal, Slight.	
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Minimal.	
		INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	
		- PROCESSING ARTIFACTS PRESENT	

Page: 703

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 4318
PHASE DAY OF DEATH: 92	PHASE: Dosing phase	GROUP: 4

Trachea No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Slight.

Aorta	Sternal Marrow	Brain	Sternum	Cecum
Colon	Duodenum	Esophagus	Ileum	Mesenteric LN
Lungs	Sciatic Nerve	Parathyroid	Cervical SC	Thoracic SC
Lumbar SC	Salivary glands	Stomach	Seminal vesicles	Testis Staging
Thyroid	Urinary bladder			

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4319
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-VACUOLATED, BILATERAL, Minimal.	
		CORTEX: ZONA FASCICULATA-HYPERPLASIA, BILATERAL, Slight.	
Femoral Marrow	No gross observations on tissue.	Tissue is missing.	
Sternum	No gross observations on tissue.	CHONDROMALACIA, Minimal.	
		DECREASED TRABECULAR BONE, Focal, Slight.	
Femur w/joint	No gross observations on tissue.	Tissue is missing.	
Duodenum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Epididymides	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Heart	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	
Ileum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
Mesenteric LN	No gross observations on tissue.	PROMINENT PLASMA CELLS, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4319
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Mediastinal LN	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Slight.	
		FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal.	
		PROMINENT PLASMA CELLS, Minimal.	
Submandib/Max LN . . .	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal.	
		PROMINENT PLASMA CELLS, Moderate.	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal.	
		ALVEOLAR EPITHELIAL HYPERPLASIA, Minimal.	
		ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		MUCOSA: GLANDULAR DILATATION, Moderate.	
		- FINDINGS FROM SLIDES #27 AND #27.1 (VENTRAL DIVERTICULUM AND VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	Tissue is inadequate and unreadable.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4319
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Larynx: V-DVTC		- VENTRAL DIVERTICULUM AND EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS/VENTRAL LARYNGEAL EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Slight.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY/VESTIBULAR JUNCTION): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight.	
		NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Minimal.	
		NASAL MUCOSA [NASOTURBINATE]: MIXED INFLAMMATORY CELL INFILTRATE WITH OR WITHOUT LYMPHOID CELL AGGREGATES, BILATERAL, Moderate.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4319
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 3		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Minimal.	
Prostate	No gross observations on tissue.	ATROPHY, Slight.	
		SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Slight.	
Parathyroid	No gross observations on tissue.	Tissue is missing.	
		- RECUT, NO IMPROVEMENT.	
Rectum/Low Colon . . .	No gross observations on tissue.	LUMEN: NEMATODE(S), Minimal.	
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Minimal.	
		INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	

19-Feb-10; 19:11
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Page: 708

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 4319
PHASE DAY OF DEATH: 92	PHASE: Dosing phase	GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Aorta	Sternal Marrow	Brain	Cecum	Colon
Esophagus	Jejunum	Kidneys	Sciatic Nerve	Pancreas
Cervical SC	Thoracic SC	Lumbar SC	Salivary glands	Spleen
Stomach	Seminal vesicles	Testis Staging	Thyroid	Trachea
Urinary bladder				

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 4320
GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Sternal Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Slight.
Sternum	No gross observations on tissue.	CHONDROMALACIA, Minimal. DECREASED TRABECULAR BONE, Slight.
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.
Duodenum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.
Epididymides	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.
Ileum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.
Mesenteric LN	No gross observations on tissue.	PROMINENT PLASMA CELLS, Minimal.
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4320
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Submandib/Max LN	. . . No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal.	
		PROMINENT PLASMA CELLS, Slight.	
		PROMINENT MAST CELLS, Slight.	
Lungs	 No gross observations on tissue.	HEMORRHAGE(S), Minimal.	
		ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.	
		PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx	 No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		MUCOSA: LYMPHOID CELL AGGREGATE(S), Slight.	
		- FINDINGS FROM SLIDE #27.1 (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	 No gross observations on tissue.	MUCOSA: GLANDULAR DIVERTICULUM WITH OR WITHOUT LUMINAL DEBRIS AND MINERALIZATION, Slight.	
		MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 92

SEX: Male
PHASE: Dosing phase

ANIMAL: 4320
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Larynx: V-SM-G No gross observations on tissue.

Tissue is inadequate and unreadable.

- RECUT, NO IMPROVEMENT.

Nose/Turb Sec 1 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
EPITHELIUM- GOBLET CELL
HYPERTROPHY/HYPERPLASIA, Multifocal,
Moderate.

VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, BILATERAL, Minimal.

Nose/Turb Sec 2 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY/VESTIBULAR
JUNCTION): MIXED INFLAMMATORY CELLS WITH
OR WITHOUT LYMPHOID AGGREGATES, BILATERAL,
Minimal.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Moderate.

NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID AGGREGATES,
BILATERAL, Slight.

VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, BILATERAL, Minimal.

Nose/Turb Sec 3 No gross observations on tissue.

PHARYNGEAL DUCT: PROMINENT NASAL
ASSOCIATED LYMPHOID TISSUE, BILATERAL,
Slight.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4320
PHASE DAY OF DEATH: 92		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Moderate. PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Slight.	
Prostate	No gross observations on tissue.	ATROPHY, Slight. SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Minimal.	
Parathyroid	No gross observations on tissue.	Tissue is unremarkable (with comment); one-of-pair missing. - TISSUE EXHAUSTED AT TIME OF TRIM. RECUT, NO IMPROVEMENT.	
Testes	No gross observations on tissue.	Tissue is unremarkable; one-of-pair missing.	
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Slight. INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
Adrenal Glands Aorta Brain Cecum Colon

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 4320
PHASE DAY OF DEATH: 92	PHASE: Dosing phase	GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Esophagus	Heart	Jejunum	Kidneys	Sciatic Nerve
Pancreas	Rectum/Low Colon	Cervical SC	Thoracic SC	Lumbar SC
Salivary glands	Spleen	Stomach	Seminal vesicles	Testis Staging
Thyroid	Trachea	Urinary bladder		

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1811
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-HYPERPLASIA, BILATERAL, Slight.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Duodenum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Heart	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
Mesenteric LN	No gross observations on tissue.	PROMINENT PLASMA CELLS, Minimal.	
Mediastinal LN	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Moderate. FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal. PROMINENT MAST CELLS, Slight.	
Submandib/Max LN	No gross observations on tissue.	PROMINENT PLASMA CELLS, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1811
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Focal, Minimal.	
		ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.	
		PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Focal, Minimal.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		- FINDINGS FROM SLIDE #27.1 (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: GLANDULAR DIVERTICULUM WITH OR WITHOUT LUMINAL DEBRIS AND MINERALIZATION, Minimal.	
		MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS/VENTRAL LARYNGEAL EPITHELIUM marginally present or not present/not evaluated. RECUT, NO IMPROVEMENT.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1811
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 1		VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, UNILATERAL, Minimal.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY/VESTIBULAR JUNCTION): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight.	
		NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	
		NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight.	
		VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, UNILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight.	
		NASAL MUCOSA [GLAND]: DUCTAL/ACINAR EPITHELIAL HYPERPLASIA WITH OR WITHOUT EPITHELIAL VACUOLATION, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1811
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight. PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Slight.	
Parathyroid	No gross observations on tissue.	Tissue is unremarkable (with comment); one-of-pair missing. - RECUT, NO IMPROVEMENT.	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Slight.	
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Minimal. INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Aorta	Sternal Marrow	Femoral Marrow	Brain	Sternum
Cecum	Colon	Esophagus	Ileum	Kidneys

Page: 718

STATUS: Final phase sacrifice			SEX: Female		ANIMAL: 1811
PHASE DAY OF DEATH: 91			PHASE: Dosing phase		GROUP: 1
Tissue	Gross Observations/Comments			Microscopic Observations/Comments	
Sciatic Nerve	Ovaries	Pancreas	Rectum/Low Colon	Cervical SC	
Thoracic SC	Lumbar SC	Salivary glands	Stomach	Thyroid	
Trachea	Urinary bladder	Uterus			

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1812
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-HYPERPLASIA, BILATERAL, Slight.	
Sternum	No gross observations on tissue.	CHONDROMALACIA, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Lungs	No gross observations on tissue.	PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx: V-SM-G	No gross observations on tissue.	MUCOSA/SUBMUCOSA [VSMG]: MIXED INFLAMMATORY CELLS WITH AND WITHOUT LYMPHOID AGGREGATES, Minimal.	
		MUCOSA: LYMPHOID CELL AGGREGATE(S), Minimal.	
		MUCOSA: GLANDULAR-DILATATION, Slight.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Female
PHASE: Dosing phase

ANIMAL: 1812
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 1

NASAL LACRIMAL DUCT: MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID CELLULAR
AGGREGATES, Minimal.

Nose/Turb Sec 2 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID AGGREGATES,
BILATERAL, Slight.

VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, UNILATERAL, Minimal.

Nose/Turb Sec 3 No gross observations on tissue.

NASAL SINUS: PROMINENT NASAL ASSOCIATED
LYMPHOID TISSUE, BILATERAL, Moderate.

PHARYNGEAL DUCT: PROMINENT NASAL
ASSOCIATED LYMPHOID TISSUE, BILATERAL,
Slight.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Minimal.

NASAL MUCOSA [GLAND]: DUCTAL/ACINAR
EPITHELIAL HYPERPLASIA WITH OR WITHOUT
EPITHELIAL VACUOLATION, BILATERAL, Slight.

Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Minimal.

Page: 721

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1812
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Minimal.	
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Minimal.	

Aorta	Sternal Marrow	Femoral Marrow	Brain	Cecum
Colon	Duodenum	Esophagus	Heart	Ileum
Kidneys	Liver	Mesenteric LN	Mediastinal LN	Submandib/Max LN
Larynx	Sciatic Nerve	Ovaries	Pancreas	Parathyroid
Rectum/Low Colon	Cervical SC	Thoracic SC	Lumbar SC	Salivary glands
Stomach	Thyroid	Trachea	Urinary bladder	Uterus

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Female
PHASE: Dosing phase

ANIMAL: 1813
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Adrenal Glands No gross observations on tissue.

CORTEX: ZONA FASCICULATA-HYPERPLASIA,
BILATERAL, Slight.

Brain No gross observations on tissue.

HEMORRHAGE(S), Minimal.

Femur w/joint No gross observations on tissue.

PHYSIS OPEN, Present.

Jejunum No gross observations on tissue.

Tissue is autolytic and readable;
unremarkable.

Kidneys No gross observations on tissue.

CORTEX/CORTICO-MEDULLARY JUNCTION: MINERAL
DEPOSIT(S), BILATERAL, Minimal.

Mediastinal LN No gross observations on tissue.

FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS,
Slight.

Submandib/Max LN . . . No gross observations on tissue.

FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS,
Minimal.

PROMINENT PLASMA CELLS, Moderate.

PROMINENT MAST CELLS, Slight.

Larynx: V-DVTC No gross observations on tissue.

MUCOSA: MIXED INFLAMMATORY CELL
INFILTRATE, Minimal.

Larynx: V-SM-G No gross observations on tissue.

MUCOSA/SUBMUCOSA [VSMG]: MIXED
INFLAMMATORY CELLS WITH AND WITHOUT
LYMPHOID AGGREGATES, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1813
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Larynx: V-SM-G		MUCOSA: LYMPHOID CELL AGGREGATE(S), Slight.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Minimal. VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY/VESTIBULAR JUNCTION): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight. NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Moderate. PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Moderate. PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight. NASAL MUCOSA [GLAND]: DUCTAL/ACINAR EPITHELIAL HYPERPLASIA WITH OR WITHOUT EPITHELIAL VACUOLATION, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 1813
PHASE DAY OF DEATH: 91	PHASE: Dosing phase	GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Minimal.

- ARTIFACTUAL PHARYNGEAL EPITHELIAL
EXFOLIATION.

Spleen No gross observations on tissue.

GOLDEN-BROWN PIGMENT, Minimal.

Trachea No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
INFILTRATE, Minimal.

Uterus No gross observations on tissue.

LUMEN: DILATED, Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Aorta	Sternal Marrow	Femoral Marrow	Sternum	Cecum
Colon	Duodenum	Esophagus	Heart	Ileum
Liver	Mesenteric LN	Lungs	Larynx	Sciatic Nerve
Ovaries	Pancreas	Parathyroid	Rectum/Low Colon	Cervical SC
Thoracic SC	Lumbar SC	Salivary glands	Stomach	Thyroid
Thymus	Urinary bladder			

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Female
PHASE: Dosing phase

ANIMAL: 1814
GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-HYPERPLASIA, BILATERAL, Slight.
Sternal Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.
Duodenum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.
Ileum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.
Kidneys	No gross observations on tissue.	CORTEX/CORTICO-MEDULLARY JUNCTION: MINERAL DEPOSIT(S), BILATERAL, Slight.
Mesenteric LN	No gross observations on tissue.	PROMINENT PLASMA CELLS, Slight.
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1814
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Submandib/Max LN . . .	No gross observations on tissue.	PROMINENT PLASMA CELLS, Slight.	
Lungs	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Minimal.	
		PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		- FINDINGS FROM SLIDE #27.1 (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS AND VENTRAL LARYNGEAL EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Minimal.	
		NASAL LACRIMAL DUCT: MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID CELLULAR AGGREGATES, BILATERAL, Minimal.	
		VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Female
PHASE: Dosing phase

ANIMAL: 1814
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 2 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY/VESTIBULAR
JUNCTION): MIXED INFLAMMATORY CELLS WITH
OR WITHOUT LYMPHOID AGGREGATES, BILATERAL,
Slight.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID AGGREGATES,
BILATERAL, Slight.

VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, BILATERAL, Minimal.

Nose/Turb Sec 3 No gross observations on tissue.

PHARYNGEAL DUCT: PROMINENT NASAL
ASSOCIATED LYMPHOID TISSUE, BILATERAL,
Moderate.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Moderate.

NASAL MUCOSA [GLAND]: DUCTAL/ACINAR
EPITHELIAL HYPERPLASIA WITH OR WITHOUT
EPITHELIAL VACUOLATION, BILATERAL,
Moderate.

- DORSAL SINUS NOT PRESENT/NOT EVALUATED.

Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Minimal.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1814
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 4		PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Slight.	
Oviducts/Fallop	Cyst, Right, Clear, Thin fluid, 0.2 - 0.5 cm	Examined; 1 correlation found: CYST(S), Moderate.	
Pancreas	No gross observations on tissue.	ATROPHY, Minimal.	
Parathyroid	No gross observations on tissue.	Tissue is unremarkable (with comment); one-of-pair missing. - RECUT, NO IMPROVEMENT.	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Slight.	
Stomach	Discolored, Mucosa, White, Mottled, Slight	Tissue is unremarkable. Examined; no correlation found	
Thyroid	No gross observations on tissue.	ULTIMOBANCHIAL REST(S), UNILATERAL, Minimal.	
Thymus	Discolored, Red, Foci, </= 0.1 cm, Slight	Examined; 1 correlation found: HEMORRHAGE(S), Minimal. INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	
Uterus	No gross observations on tissue.	LUMEN: DILATED, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 1814
PHASE DAY OF DEATH: 91	PHASE: Dosing phase	GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Aorta	Brain	Sternum	Cecum	Colon
Esophagus	Heart	Liver	Larynx: V-DVTC	Sciatic Nerve
Ovaries	Rectum/Low Colon	Cervical SC	Thoracic SC	Lumbar SC
Salivary glands	Trachea	Urinary bladder		

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1815
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-HYPERPLASIA, BILATERAL, Slight.	
Sternal Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Sternum	No gross observations on tissue.	CHONDROMALACIA, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Duodenum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Kidneys	No gross observations on tissue.	CORTEX/CORTICO-MEDULLARY JUNCTION: MINERAL DEPOSIT(S), BILATERAL, Minimal. UROTHELIUM: HYPERPLASIA, UNILATERAL, Slight.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1815
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Mesenteric LN	No gross observations on tissue.	PROMINENT MAST CELLS, Slight.	
Mediastinal LN	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Slight.	
		FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	
		PROMINENT PLASMA CELLS, Slight.	
Submandib/Max LN	No gross observations on tissue.	PROMINENT PLASMA CELLS, Moderate.	
		PROMINENT MAST CELLS, Slight.	
Lungs	Discolored, All lobes, Tan, Foci, 0.2 - 0.5 cm	Examined; 1 correlation found: ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Minimal.	
		PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		- FINDINGS FROM SLIDES #27.1 AND #27.1-A (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	GLANDULAR DILATATION, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1815
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS AND VENTRAL LARYNGEAL EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Slight. VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Slight.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Minimal. NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight. VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight. PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight. PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1815
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 3		NASAL MUCOSA [GLAND]: DUCTAL/ACINAR EPITHELIAL HYPERPLASIA WITH OR WITHOUT EPITHELIAL VACUOLATION, BILATERAL, Slight.	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal. PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Slight.	
Parathyroid	No gross observations on tissue.	Tissue is unremarkable (with comment); one-of-pair missing. - RECUT, NO IMPROVEMENT.	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Minimal.	
Stomach	Discolored, Mucosa, Red, Foci, 0.2 - 0.5 cm	Tissue is unremarkable. Examined; no correlation found	
Thyroid	No gross observations on tissue.	ULTIMOBANCHIAL REST(S), UNILATERAL, Slight.	
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Minimal.	

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Page: 734

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice SEX: Female ANIMAL: 1815
PHASE DAY OF DEATH: 91 PHASE: Dosing phase GROUP: 1

Tissue Gross Observations/Comments Microscopic Observations/Comments

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Aorta	Brain	Cecum	Colon	Esophagus
Heart	Ileum	Sciatic Nerve	Ovaries	Pancreas
Rectum/Low Colon	Cervical SC	Thoracic SC	Lumbar SC	Salivary glands
Trachea	Urinary bladder	Uterus		

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1816
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-HYPERPLASIA, BILATERAL, Slight.	
Sternal Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Sternum	No gross observations on tissue.	CHONDROMALACIA, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Kidneys	No gross observations on tissue.	CORTEX: CONVOLUTED TUBULAR EPITHELIUM-BASOPHILIC, UNILATERAL, Minimal.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Slight.	
Mesenteric LN	No gross observations on tissue.	PROMINENT PLASMA CELLS, Slight.	
		PROMINENT MAST CELLS, Slight.	
Mediastinal LN	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Multifocal, Slight.	
		FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1816
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Mediastinal LN		PROMINENT MAST CELLS, Slight.	
Submandib/Max LN . . .	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Multifocal, Slight.	
		PROMINENT PLASMA CELLS, Slight.	
		PROMINENT MAST CELLS, Slight.	
Lungs	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx: V-SM-G	No gross observations on tissue.	MUCOSA (SEROMUCOUS GLANDS): EPITHELIAL-SQUAMOUS/SQUAMOID METAPLASIA, Minimal.	
		MUCOSA/SUBMUCOSA [VSMG]: MIXED INFLAMMATORY CELLS WITH AND WITHOUT LYMPHOID AGGREGATES, Minimal.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Slight.	
		NASAL LACRIMAL DUCT: MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID CELLULAR AGGREGATES, UNILATERAL, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1816
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 1		VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Slight.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY/VESTIBULAR JUNCTION): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight.	
		NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	
		NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight.	
		VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Moderate.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Moderate.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Moderate.	
		NASAL MUCOSA [GLAND]: DUCTAL/ACINAR EPITHELIAL HYPERPLASIA WITH OR WITHOUT EPITHELIAL VACUOLATION, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 1816
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Slight.

PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID
ASSOCIATED TISSUE, BILATERAL, Slight.

PALATE: FOREIGN BODY MIXED INFLAMMATORY
CELL INFILTRATE, Focal, Slight.

Parathyroid No gross observations on tissue.

Tissue is unremarkable (with comment);
one-of-pair missing.

- RECUT, NO IMPROVEMENT.

Spleen No gross observations on tissue.

GOLDEN-BROWN PIGMENT, Minimal.

Thyroid No gross observations on tissue.

ULTIMOBANCHIAL REST(S), Minimal.

Thymus No gross observations on tissue.

HEMORRHAGE(S), Minimal.

Uterus
Distended, Bilateral horns, Slight

Examined; 1 correlation found:
LUMEN: DILATED, Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Aorta Femoral Marrow Brain Cecum Colon

Page: 739

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 1816
PHASE DAY OF DEATH: 93	PHASE: Dosing phase	GROUP: 1

Tissues without comment under Gross Observations were within normal limits at necropsy. The following tissues were unremarkable microscopically:

Duodenum	Esophagus	Heart	Ileum	Larynx
Sciatic Nerve	Ovaries	Pancreas	Rectum/Low Colon	Cervical SC
Thoracic SC	Lumbar SC	Salivary glands	Stomach	Trachea
Urinary bladder				

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1817
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-HYPERPLASIA, UNILATERAL, Slight.	
Sternum	No gross observations on tissue.	CHONDROMALACIA, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Ileum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal. PROMINENT HISTIOCYTES, Slight.	
Submandib/Max LN . . .	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal. PROMINENT PLASMA CELLS, Slight.	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. ALVEOLAR EPITHELIAL HYPERPLASIA, Minimal. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Focal, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

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STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 1817
PHASE DAY OF DEATH: 93	PHASE: Dosing phase	GROUP: 1
-----		-----
Tissue	Gross Observations/Comments	Microscopic Observations/Comments
-----		-----
Lungs		PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal. MUCOSA: GLANDULAR DILATATION, Moderate. - FINDINGS FROM SLIDE #27 (VENTRAL DIVERTICULUM).
Larynx: V-DVTC	No gross observations on tissue.	Tissue is inadequate and unreadable. - VENTRAL DIVERTICULUM AND EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.
Larynx: V-SM-G	No gross observations on tissue.	MUCOSA/SUBMUCOSA [VSMG]: MIXED INFLAMMATORY CELLS WITH AND WITHOUT LYMPHOID AGGREGATES, Minimal. - MARGINAL VENTRAL LARYNGEAL EPITHELIAL MUCOSA PRESENT/EVALUATED. RECUT, NO IMPROVEMENT.
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Minimal. NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIAL HYPERPLASIA, UNILATERAL, Focal, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1817
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 1		VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Multifocal, Slight.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Minimal. NASAL MUCOSA (OLFACTORY EPITHELIUM): PROMINENT BOWMAN'S GLAND(S)/GLANDULAR EPITHELIAL HYPERPLASIA, UNILATERAL, Slight. NASAL LACRIMAL DUCT (EPITHELIUM): SQUAMOUS EPITHELIAL HYPERPLASIA, BILATERAL, Minimal. VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight. PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight. PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight. NASAL MUCOSA [GLAND]: DUCTAL/ACINAR EPITHELIAL HYPERPLASIA WITH OR WITHOUT EPITHELIAL VACUOLATION, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 1817
PHASE DAY OF DEATH: 93	PHASE: Dosing phase	GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Minimal.

PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID
ASSOCIATED TISSUE, BILATERAL, Slight.

- ARTIFACTUAL PHARYNGEAL EPITHELIAL
EXFOLIATION.

Ovaries No gross observations on tissue.

LUTEAL CYST(S), UNILATERAL, Slight.

Parathyroid No gross observations on tissue.

Tissue is unremarkable (with comment).

- RECUT, NO IMPROVEMENT.

Spleen No gross observations on tissue.

GOLDEN-BROWN PIGMENT, Slight.

Trachea No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
INFILTRATE, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Aorta	Sternal Marrow	Femoral Marrow	Brain	Cecum
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19-Feb-10; 19:11
Huntingdon Life Sciences, Inc. 036141

Page: 744

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 1817
GROUP: 1

Tissue	Gross Observations/Comments			Microscopic Observations/Comments	
Colon	Duodenum	Esophagus	Heart	Kidneys	
Liver	Mesenteric LN	Sciatic Nerve	Pancreas	Rectum/Low Colon	
Cervical SC	Thoracic SC	Lumbar SC	Salivary glands	Stomach	
Thyroid	Thymus	Urinary bladder	Uterus		

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 1818
PHASE DAY OF DEATH: 93	PHASE: Dosing phase	GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Sternal Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.
Heart	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.
Kidneys	No gross observations on tissue.	MEDULLA: MINERAL DEPOSIT(S), UNILATERAL, Minimal.
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.
Mesenteric LN	No gross observations on tissue.	PARACORTICAL AREA: INCREASED [T-LYMPHOCYTES] SIZE/ CELLULARITY, Marked.
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1818
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Submandib/Max LN . . .	No gross observations on tissue.	PROMINENT PLASMA CELLS, Slight.	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Slight.	
		ALVEOLAR EPITHELIAL HYPERPLASIA, Minimal.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
		- FINDINGS FROM SLIDES #27 AND #27.1 (VENTRAL DIVERTICULUM AND VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL DIVERTICULUM/EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS AND VENTRAL LARYNGEAL EPITHELIUM marginally present or not present/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Sciatic Nerve	No gross observations on tissue.	Tissue is missing.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 1818
PHASE DAY OF DEATH: 93	PHASE: Dosing phase	GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Nose/Turb Sec 1		NASAL LACRIMAL DUCT: MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID CELLULAR AGGREGATES, UNILATERAL, Minimal.
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Minimal. NASAL MUCOSA (OLFACTORY EPITHELIUM): PROMINENT BOWMAN'S GLAND(S)/GLANDULAR EPITHELIAL HYPERPLASIA, BILATERAL, Slight. NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight.
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, UNILATERAL, Minimal. PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight. PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight.
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 1818
GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Slight.
Thyroid	No gross observations on tissue.	ULTIMOBRANCHIAL REST(S), BILATERAL, Slight. ECTOPIC THYMIC TISSUE, UNILATERAL, Focal, Slight.
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Slight. INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.
Uterus	No gross observations on tissue.	LUMEN: DILATED, UNILATERAL, Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Adrenal Glands	Aorta	Brain	Sternum	Cecum
Colon	Duodenum	Esophagus	Ileum	Ovaries
Pancreas	Parathyroid	Rectum/Low Colon	Cervical SC	Thoracic SC
Lumbar SC	Salivary glands	Stomach	Trachea	Urinary bladder

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1819
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Kidneys	Dilated Pelvis, Right, Slight	Examined; 3 correlations found: PELVIS: DILATED, UNILATERAL, Slight. PELVIS: LYMPHOCYTIC INFILTRATE WITH GERMINAL CENTER DEVELOPMENT, UNILATERAL, Moderate. UROTHELIUM: HYPERPLASIA, UNILATERAL, Slight.	
Mediastinal LN	No gross observations on tissue.	PROMINENT MAST CELLS, Slight. LYMPHOID ATROPHY, Moderate.	
Submandib/Max LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal. PROMINENT PLASMA CELLS, Slight. PROMINENT MAST CELLS, Slight.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal. MUCOSA: GLANDULAR DILATATION, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 1819
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Larynx

- FINDINGS FROM SLIDES #27 AND #27.1
(VENTRAL DIVERTICULUM AND VENTRAL
SEROMUCINOUS GLANDS).

Larynx: V-DVTC No gross observations on tissue.

Tissue is inadequate and unreadable.

- VENTRAL DIVERTICULUM AND EPITHELIUM NOT
PRESENT/NOT EVALUATED. RECUT, NO
IMPROVEMENT.

Larynx: V-SM-G No gross observations on tissue.

Tissue is inadequate and unreadable.

- VENTRAL SEROMUCINOUS GLANDS/VENTRAL
LARYNGEAL EPITHELIUM NOT PRESENT/NOT
EVALUATED. RECUT, NO IMPROVEMENT.

Nose/Turb Sec 1 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
EPITHELIUM- GOBLET CELL
HYPERTROPHY/HYPERPLASIA, Multifocal,
Moderate.

VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, BILATERAL, Minimal.

Nose/Turb Sec 2 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY/VESTIBULAR
JUNCTION): MIXED INFLAMMATORY CELLS WITH
OR WITHOUT LYMPHOID AGGREGATES,
UNILATERAL, Slight.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Minimal.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1819
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 2		NASAL MUCOSA (OLFACTORY EPITHELIUM): PROMINENT BOWMAN'S GLAND(S)/GLANDULAR EPITHELIAL HYPERPLASIA, UNILATERAL, Slight. NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Minimal. VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight. PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight. PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight. NASAL MUCOSA [GLAND]: DUCTAL/ACINAR EPITHELIAL HYPERPLASIA WITH OR WITHOUT EPITHELIAL VACUOLATION, UNILATERAL, Slight.	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1819
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Ovaries	No gross observations on tissue.	LUTEAL CYST(S), UNILATERAL, Minimal.
Parathyroid	No gross observations on tissue.	Tissue is unremarkable (with comment); one-of-pair missing. - RECUT, NO IMPROVEMENT.
Thymus	No gross observations on tissue.	INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Adrenal Glands	Aorta	Sternal Marrow	Femoral Marrow	Brain
Sternum	Cecum	Colon	Duodenum	Esophagus
Heart	Ileum	Liver	Mesenteric LN	Lungs
Sciatic Nerve	Pancreas	Rectum/Low Colon	Cervical SC	Thoracic SC
Lumbar SC	Salivary glands	Spleen	Stomach	Thyroid
Trachea	Urinary bladder	Uterus		

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 1820
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Femur w/joint No gross observations on tissue.

PHYSIS OPEN, Present.

Ileum No gross observations on tissue.

Tissue is autolytic and readable;
unremarkable.

Kidneys No gross observations on tissue.

CORTEX/CORTICO-MEDULLARY JUNCTION: MINERAL
DEPOSIT(S), BILATERAL, Minimal.

Mesenteric LN No gross observations on tissue.

PROMINENT PLASMA CELLS, Slight.

Mediastinal LN No gross observations on tissue.

FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS,
Slight.

PROMINENT MAST CELLS, Slight.

Submandib/Max LN No gross observations on tissue.

FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS,
Minimal.

PROMINENT PLASMA CELLS, Moderate.

PROMINENT MAST CELLS, Slight.

Larynx No gross observations on tissue.

MUCOSA: MIXED INFLAMMATORY CELL
INFILTRATE, Minimal.

MUCOSA: GLANDULAR DILATATION, Moderate.

- FINDINGS FROM SLIDE #27.1 (VENTRAL

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 1820
GROUP: 1

Tissue Gross Observations/Comments

Microscopic Observations/Comments

SEROMUCINOUS GLANDS).

Larynx: V-DVTC No gross observations on tissue.

MUCOSA: MIXED INFLAMMATORY CELL
INFILTRATE, Slight.

Larynx: V-SM-G No gross observations on tissue.

Tissue is inadequate and unreadable.

- VENTRAL SEROMUCINOUS GLANDS AND VENTRAL
LARYNGEAL EPITHELIUM NOT PRESENT/NOT
EVALUATED. RECUR, NO IMPROVEMENT.

Nose/Turb Sec 1 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
EPITHELIUM- GOBLET CELL
HYPERTROPHY/HYPERPLASIA, Multifocal,
Moderate.

NASAL MUCOSA (NASOTURBINATE): ACUTE
INFLAMMATORY CELL INFILTRATE, UNILATERAL,
Minimal.

VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, BILATERAL, Minimal.

Nose/Turb Sec 2 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY/VESTIBULAR
JUNCTION): MIXED INFLAMMATORY CELLS WITH
OR WITHOUT LYMPHOID AGGREGATES,
UNILATERAL, Minimal.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Moderate.

NASAL MUCOSA (OLFACTORY EPITHELIUM):
PROMINENT BOWMAN'S GLAND(S)/GLANDULAR
EPITHELIAL HYPERPLASIA, BILATERAL, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1820
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 2		NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Minimal.	
		VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	
		NASAL MUCOSA [GLAND]: DUCTAL/ACINAR EPITHELIAL HYPERPLASIA WITH OR WITHOUT EPITHELIAL VACUOLATION, BILATERAL, Slight.	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Slight.	
Thymus	No gross observations on tissue.	INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1820
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Adrenal Glands	Aorta	Sternal Marrow	Femoral Marrow	Brain
Sternum	Cecum	Colon	Duodenum	Esophagus
Heart	Jejunum	Liver	Lungs	Sciatic Nerve
Ovaries	Pancreas	Parathyroid	Rectum/Low Colon	Cervical SC
Thoracic SC	Lumbar SC	Salivary glands	Spleen	Stomach
Thyroid	Urinary bladder	Uterus		

19-Feb-10; 19:11

Huntingdon Life Sciences, Inc. 036141

Page: 757

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 2811
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 2
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Multifocal, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 2812
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 2

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.
Stomach	Discolored, Mucosa, Yellow, Mottled, Moderate	Examined; 1 correlation found: SUPERFICIAL MUCOUS/CELLULAR DEBRIS, Slight. GLANDULAR DILATATION, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 2813
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 2
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	Discolored, All lobes, Red, Foci, 0.2 - 0.5 cm	Examined; 1 correlation found: HEMORRHAGE(S), Slight. ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Slight. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Focal, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 2814
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 2
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Focal, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 2815
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 2
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Focal, Minimal. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Focal, Minimal.	
Stomach	Discolored, Mucosa, Yellow, Mottled, Moderate	Examined; 1 correlation found: SUPERFICIAL MUCOUS/CELLULAR DEBRIS, Slight.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

19-Feb-10; 19:11
Huntingdon Life Sciences, Inc. 036141

Page: 762

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 2816
GROUP: 2

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Lungs No gross observations on tissue.

HEMORRHAGE(S), Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
 No tissues examined.

19-Feb-10; 19:11
Huntingdon Life Sciences, Inc. 036141

Page: 763

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 2817
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 2
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Slight. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Focal, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 2818
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 2
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal.	
		MICROGRANULOMA, Slight.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 2819
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 2
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Slight.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

19-Feb-10; 19:11
Huntingdon Life Sciences, Inc. 036141

Page: 766

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 2820
PHASE DAY OF DEATH: 93	PHASE: Dosing phase	GROUP: 2

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
Lungs

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 3811
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 3
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Eyes	Trauma, Right, Slight	Examined; 1 correlation found: RETROBULBAR/SUBSCLERAL TISSUE: HEMORRHAGE WITH MIXED INFLAMMATORY CELL INFILTRATE, Moderate.	
Lungs	No gross observations on tissue.	ALVEOLAR EPITHELIAL HYPERPLASIA, Focal, Minimal. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.	
Stomach	Discolored, Mucosa, Yellow, Mottled, Slight	No micropathology observations on tissue. Examined; no correlation found	
Uterus	Distended, Bilateral horns, Slight	Examined; 1 correlation found: LUMEN: DILATED, BILATERAL, Moderate.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 3812
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 3
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. ALVEOLAR EPITHELIAL HYPERPLASIA, Focal, Minimal. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal. PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal. INTERSTITIUM: OSSEOUS METAPLASIA, Minimal.	
Skin (other)	Hair Thin/Absent, Hindlegs, Severe/ right	Examined; 1 correlation found: SEBACEOUS GLAND HYPERTROPHY/HYPERPLASIA, Slight.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 3813
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 3

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 3814
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 3

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	ALVEOLAR EPITHELIAL HYPERPLASIA, Focal, Minimal. ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Focal, Minimal.
Stomach	Discolored, Mucosa, Yellow, Mottled, Moderate	Tissue is unremarkable. Examined; no correlation found
Thymus	Discolored, Red, Foci, 0.2 - 0.5 cm, Slight	Examined; 1 correlation found: HEMORRHAGE(S), Slight. INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.
Uterus	Distended, Bilateral horns, Slight	Examined; 1 correlation found: LUMEN: DILATED, BILATERAL, Moderate.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 3815
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 3
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	Tissue is unremarkable (with comment). - TISSUE EVALUATED DESPITE SIGNIFICANT ALVEOLAR COLLAPSE. RECUT, NO IMPROVEMENT.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

19-Feb-10; 19:11
Huntingdon Life Sciences, Inc. 036141

Page: 772

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 3816
GROUP: 3

Tissue

Gross Observations/Comments

Microscopic Observations/Comments

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
Lungs

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 3817
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 3
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Slight.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 3818
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 3
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	Discolored, All lobes, Tan, Foci, 0.2 - 0.5 cm	Examined; 1 correlation found: ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Multifocal, Minimal. HEMORRHAGE(S), Minimal. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal. PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 3819
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 3
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	Discolored, All lobes, Red, Foci, $\leq$ 0.1 cm, Slight	Tissue is unremarkable. Examined; no correlation found	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 3820
GROUP: 3

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Lungs No gross observations on tissue.

HEMORRHAGE(S), Minimal.

ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY
CYTOPLASM, Slight.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH MACROPHAGES, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4811
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-VACUOLATED, UNILATERAL, Focal, Slight.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Heart	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	
Ileum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Kidneys	No gross observations on tissue.	MEDULLA: MINERAL DEPOSIT(S), UNILATERAL, Minimal.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	
Submandib/Max LN . . .	No gross observations on tissue.	PROMINENT PLASMA CELLS, Slight.	
		PROMINENT MAST CELLS, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Female
PHASE: Dosing phase

ANIMAL: 4811
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Lungs No gross observations on tissue.

ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY
CYTOPLASM, Minimal.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH MACROPHAGES, Minimal.

PERIVASCULAR MIXED INFLAMMATORY CELL
INFILTRATE, Minimal.

Larynx No gross observations on tissue.

MUCOSA: MIXED INFLAMMATORY CELL
INFILTRATE, Minimal.

MUCOSA: GLANDULAR DILATATION, Slight.

- FINDINGS FROM SLIDES # 27 (VENTRAL
DIVERTICULUM AND VENTRAL SEROMUCINOUS
GLANDS).

Larynx: V-DVTC No gross observations on tissue.

Tissue is inadequate and unreadable.

- VENTRAL DIVERTICULUM NOT PRESENT/NOT
EVALUATED. RECUT, NO IMPROVEMENT.

Larynx: V-SM-G No gross observations on tissue.

Tissue is inadequate and unreadable.

- VENTRAL SEROMUCINOUS GLANDS AND VENTRAL
LARYNGEAL EPITHELIUM NOT PRESENT/NOT
EVALUATED. RECUT, NO IMPROVEMENT.

Nose/Turb Sec 1 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
EPITHELIUM- GOBLET CELL
HYPERTROPHY/HYPERPLASIA, Multifocal,
Moderate.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4811
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 1		VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY/VESTIBULAR JUNCTION): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Minimal.	
		NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	
		NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight.	
		VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, UNILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Moderate.	
		NASAL MUCOSA [GLAND]: DUCTAL/ACINAR EPITHELIAL HYPERPLASIA WITH OR WITHOUT EPITHELIAL VACUOLATION, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4811
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal.	
Ovaries	No gross observations on tissue.	LUTEAL CYST(S), UNILATERAL, Slight.	
Parathyroid	No gross observations on tissue.	Tissue is unremarkable (with comment); one-of-pair missing. - RECUT, NO IMPROVEMENT.	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Minimal.	
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Slight. INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Aorta	Sternal Marrow	Femoral Marrow	Brain	Sternum
Cecum	Colon	Duodenum	Esophagus	Mesenteric LN

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female		ANIMAL: 4811
PHASE DAY OF DEATH: 91		PHASE: Dosing phase		GROUP: 4
Tissue	Gross Observations/Comments		Microscopic Observations/Comments	
Sciatic Nerve	Pancreas	Rectum/Low Colon	Cervical SC	Thoracic SC
Lumbar SC	Salivary glands	Stomach	Thyroid	Trachea
Urinary bladder	Uterus			

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Moribund Sacrifice	SEX: Female	ANIMAL: 4812
PHASE DAY OF DEATH: 83	PHASE: Dosing phase	GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Brain	No gross observations on tissue.	HEMORRHAGE(S), Minimal.
Bone	Mass, Red, Hard, 0.2 - 0.5 cm/ Ventral. Skull. Anterior to pituitary.	Examined; 1 correlation found: PRESUMPTIVE FRACTURE WITH HEMATOMA AND REPARATIVE CHONDRO-OSSEOUS CALLUS, Moderate.
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.
Prob Cause Death	No gross observations on tissue.	PROBABLE TRAUMATIC FRACTURE, Present.
Heart	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.
Kidneys	No gross observations on tissue.	CORTEX/CORTICO-MEDULLARY JUNCTION: MINERAL DEPOSIT(S), BILATERAL, Minimal.
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight. PROMINENT PLASMA CELLS, Slight. PROMINENT MAST CELLS, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Moribund Sacrifice		SEX: Female	ANIMAL: 4812
PHASE DAY OF DEATH: 83		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	ALVEOLAR EPITHELIAL HYPERPLASIA, Minimal.	
Larynx: V-SM-G	No gross observations on tissue.	MUCOSA/SUBMUCOSA [VSMG]: MIXED INFLAMMATORY CELLS WITH AND WITHOUT LYMPHOID AGGREGATES, Minimal.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Minimal. NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIAL HYPERPLASIA, UNILATERAL, Minimal. VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Minimal. NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, UNILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight. PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Moribund Sacrifice		SEX: Female	ANIMAL: 4812
PHASE DAY OF DEATH: 83		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal. PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, UNILATERAL, Minimal.	
Parathyroid	No gross observations on tissue.	Tissue is missing. - RECUT, NO IMPROVEMENT.	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Slight.	
Thyroid	No gross observations on tissue.	Tissue is inadequate and unreadable. - INSUFFICIENT TISSUE PRESENT: RECUT, NO IMPROVEMENT.	
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Minimal. INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	
Uterus	No gross observations on tissue.	LUMEN: DILATED, BILATERAL, Moderate.	

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Adrenal Glands Aorta Sternal Marrow Femoral Marrow Sternum

Page: 785

STATUS: Moribund Sacrifice	SEX: Female	ANIMAL: 4812
PHASE DAY OF DEATH: 83	PHASE: Dosing phase	GROUP: 4

Cecum	Colon	Duodenum	Esophagus	Ileum
Liver	Mesenteric LN	Submandib/Max LN	Larynx	Larynx: V-DVTC
Sciatic Nerve	Ovaries	Pancreas	Rectum/Low Colon	Cervical SC
Thoracic SC	Lumbar SC	Salivary glands	Stomach	Trachea
Urinary bladder				

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Female
PHASE: Dosing phase

ANIMAL: 4813
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Adrenal Glands No gross observations on tissue.

CORTEX: ZONA FASCICULATA-VACUOLATED,
UNILATERAL, Focal, Slight.

Sternal Marrow No gross observations on tissue.

INCREASED FATTY MARROW/DECREASED
HEMATOPOIETIC CELLS, Minimal.

Femoral Marrow No gross observations on tissue.

INCREASED FATTY MARROW/DECREASED
HEMATOPOIETIC CELLS, Minimal.

Femur w/joint No gross observations on tissue.

PHYSIS OPEN, Present.

Jejunum No gross observations on tissue.

Tissue is autolytic and readable;
unremarkable.

Kidneys No gross observations on tissue.

CORTEX: CONVOLUTED TUBULAR
EPITHELIUM-BASOPHILIC, UNILATERAL, Slight.

Mediastinal LN No gross observations on tissue.

Tissue is inadequate and unreadable.

- INSUFFICIENT TISSUE PRESENT: RECUR, NO
IMPROVEMENT.

Submandib/Max LN . . . No gross observations on tissue.

FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS,
Minimal.

PROMINENT PLASMA CELLS, Slight.

LYMPHOID ATROPHY, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4813
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	ALVEOLAR EPITHELIAL HYPERPLASIA, Minimal. PERIVASCULAR MIXED INFLAMMATORY CELL INFILTRATE, Slight.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal. - FINDINGS FROM SLIDES #27-A, AND #27.1 (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable. - VENTRAL SEROMUCINOUS GLANDS AND VENTRAL LARYNGEAL EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUR, NO IMPROVEMENT.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Slight. VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Slight.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY/VESTIBULAR JUNCTION): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, UNILATERAL, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 91

SEX: Female
PHASE: Dosing phase

ANIMAL: 4813
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 2

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, BILATERAL, Minimal.

Nose/Turb Sec 3 No gross observations on tissue.

NASAL SINUS: PROMINENT NASAL ASSOCIATED
LYMPHOID TISSUE, BILATERAL, Slight.

PHARYNGEAL DUCT: PROMINENT NASAL
ASSOCIATED LYMPHOID TISSUE, BILATERAL,
Slight.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

NASAL MUCOSA [GLAND]: DUCTAL/ACINAR
EPITHELIAL HYPERPLASIA WITH OR WITHOUT
EPITHELIAL VACUOLATION, BILATERAL, Slight.

Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Slight.

PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID
ASSOCIATED TISSUE, BILATERAL, Slight.

Spleen No gross observations on tissue.

GOLDEN-BROWN PIGMENT, Slight.

Page: 789

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4813
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Thymus	No gross observations on tissue.	INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	
Uterus	No gross observations on tissue.	LUMEN: DILATED, UNILATERAL, Slight.	

The following tissues were unremarkable microscopically:

Aorta	Brain	Sternum	Cecum	Colon
Duodenum	Esophagus	Heart	Ileum	Liver
Mesenteric LN	Sciatic Nerve	Ovaries	Pancreas	Parathyroid
Rectum/Low Colon	Cervical SC	Thoracic SC	Lumbar SC	Salivary glands
Stomach	Thyroid	Trachea	Urinary bladder	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4814
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Cecum	No gross observations on tissue.	LUMEN: NEMATODE(S), Minimal.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Kidneys	No gross observations on tissue.	CORTEX/CORTICO-MEDULLARY JUNCTION: MINERAL DEPOSIT(S), BILATERAL, Minimal.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	
Submandib/Max LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal.	
		PROMINENT PLASMA CELLS, Slight.	
		PROMINENT MAST CELLS, Minimal.	
Lungs	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Minimal.	
		ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 4814
PHASE DAY OF DEATH: 91	PHASE: Dosing phase	GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Slight.
Larynx: V-SM-G	No gross observations on tissue.	MUCOSA/SUBMUCOSA [VSMG]: MIXED INFLAMMATORY CELLS WITH AND WITHOUT LYMPHOID AGGREGATES, Slight. MUCOSA: LYMPHOID CELL AGGREGATE(S), Slight. MUCOSA: GRANULOMATOUS INFLAMMATION (ASSOCIATED WITH CARTILAGE), Moderate.
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (VESTIBULAR EPITHELIUM): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID CELL AGGREGATES, Minimal. NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Moderate. NASAL LACRIMAL DUCT: MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID CELLULAR AGGREGATES, UNILATERAL, Minimal. VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Slight.
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY/VESTIBULAR JUNCTION): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4814
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 2		NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	
		NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, UNILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Moderate.	
		NASAL MUCOSA [GLAND]: DUCTAL/ACINAR EPITHELIAL HYPERPLASIA WITH OR WITHOUT EPITHELIAL VACUOLATION, BILATERAL, Slight.	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Slight.	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Minimal.	

Page: 793

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4814
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Thyroid	No gross observations on tissue.	ULTIMOBANCHIAL REST(S), BILATERAL, Slight.	
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Slight.	
Uterus	No gross observations on tissue.	LUMEN: DILATED, BILATERAL, Moderate.	

The following tissues were unremarkable microscopically:

Adrenal Glands	Aorta	Sternal Marrow	Femoral Marrow	Brain
Sternum	Colon	Duodenum	Esophagus	Heart
Ileum	Mesenteric LN	Larynx	Sciatic Nerve	Ovaries
Pancreas	Parathyroid	Rectum/Low Colon	Cervical SC	Thoracic SC
Lumbar SC	Salivary glands	Stomach	Trachea	Urinary bladder

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4815
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Sternal Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Sternum	No gross observations on tissue.	FIBROUS OSTEOPROGENITOR CELL FOCUS/FOCI, Focal, Slight.	
		CHONDROMALACIA, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Cecum	No gross observations on tissue.	LUMEN: NEMATODE(S), Minimal.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal.	
		LYMPHOID ATROPHY, Slight.	
Submandib/Max LN . . .	No gross observations on tissue.	PROMINENT PLASMA CELLS, Moderate.	
Lungs	No gross observations on tissue.	ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4815
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs		ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH MACROPHAGES, Minimal.	
Larynx	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Slight. - FINDINGS FROM SLIDE #27.1 (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable. - VENTRAL LARYNGEAL EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Moderate. NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIAL HYPERPLASIA, Slight. VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4815
PHASE DAY OF DEATH: 91		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 2		NASAL LACRIMAL DUCT (EPITHELIUM): SQUAMOUS EPITHELIAL HYPERPLASIA, BILATERAL, Slight.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight.	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal.	
		PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Slight.	
Ovaries	No gross observations on tissue.	MINERAL DEPOSIT(S), UNILATERAL, Minimal.	
Parathyroid	No gross observations on tissue.	Tissue is unremarkable (with comment); one-of-pair missing.	
		- RECUT, NO IMPROVEMENT.	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Minimal.	

Huntingdon Life Sciences, Inc. 036141

Page: 797

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 4815
PHASE DAY OF DEATH: 91	PHASE: Dosing phase	GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Tissues without comment under Gross Observations were within normal limits at necropsy. The following tissues were unremarkable microscopically:

Adrenal Glands	Aorta	Brain	Colon	Duodenum
Esophagus	Heart	Ileum	Kidneys	Liver
Mesenteric LN	Sciatic Nerve	Pancreas	Rectum/Low Colon	Cervical SC
Thoracic SC	Lumbar SC	Salivary glands	Stomach	Thyroid
Thymus	Trachea	Urinary bladder	Uterus	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4816
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Femoral Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Kidneys	No gross observations on tissue.	CORTEX/CORTICO-MEDULLARY JUNCTION: MINERAL DEPOSIT(S), BILATERAL, Minimal. MEDULLA: MINERAL DEPOSIT(S), UNILATERAL, Minimal.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	
Submandib/Max LN	No gross observations on tissue.	PARACORTICAL AREA: INCREASED [T-LYMPHOCYTES] SIZE/CELLULARITY, Moderate. PROMINENT MAST CELLS, Slight.	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 4816
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Larynx: V-SM-G No gross observations on tissue.

MUCOSA/SUBMUCOSA [VSMG]: MIXED
INFLAMMATORY CELLS WITH AND WITHOUT
LYMPHOID AGGREGATES, Slight.

MUCOSA: LYMPHOID CELL AGGREGATE(S), Slight.

MUCOSA: GRANULOMATOUS INFLAMMATION
(ASSOCIATED WITH CARTILAGE), Moderate.

Nose/Turb Sec 1 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
EPITHELIUM- GOBLET CELL
HYPERTROPHY/HYPERPLASIA, Multifocal,
Slight.

VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, BILATERAL, Minimal.

Nose/Turb Sec 2 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY/VESTIBULAR
JUNCTION): MIXED INFLAMMATORY CELLS WITH
OR WITHOUT LYMPHOID AGGREGATES, BILATERAL,
Slight.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Minimal.

NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY
CELLS WITH OR WITHOUT LYMPHOID AGGREGATES,
BILATERAL, Slight.

VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL
INFILTRATE, UNILATERAL, Minimal.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 4816
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 3 No gross observations on tissue.

NASAL SINUS: PROMINENT NASAL ASSOCIATED
LYMPHOID TISSUE, BILATERAL, Slight.

PHARYNGEAL DUCT: PROMINENT NASAL
ASSOCIATED LYMPHOID TISSUE, BILATERAL,
Slight.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
BILATERAL, Slight.

Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Minimal.

- ARTIFACTUAL PHARYNGEAL EPITHELIAL
EXFOLIATION.

Ovaries No gross observations on tissue.

LUTEAL CYST(S), UNILATERAL, Minimal.

Pancreas No gross observations on tissue.

SUBACUTE (CHRONIC ACTIVE)/CHRONIC
INFLAMMATION, Slight.

Parathyroid No gross observations on tissue.

Tissue is unremarkable (with comment);
one-of-pair missing.

- RECUT, NO IMPROVEMENT.

Spleen No gross observations on tissue.

GOLDEN-BROWN PIGMENT, Minimal.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4816
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Thyroid	No gross observations on tissue.	ULTIMOBANCHIAL REST(S), UNILATERAL, Slight.	
Thymus	No gross observations on tissue.	HEMORRHAGE(S), Minimal.	
		INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Adrenal Glands	Aorta	Sternal Marrow	Brain	Sternum
Cecum	Colon	Duodenum	Esophagus	Heart
Ileum	Mesenteric LN	Lungs	Larynx	Sciatic Nerve
Rectum/Low Colon	Cervical SC	Thoracic SC	Lumbar SC	Salivary glands
Stomach	Trachea	Urinary bladder	Uterus	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4817
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-VACUOLATED, UNILATERAL, Focal, Slight.	
Sternal Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Kidneys	No gross observations on tissue.	CORTEX/CORTICO-MEDULLARY JUNCTION: TUBULAR LUMENS- EOSINOPHILIC MATERIAL, UNILATERAL, Minimal.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
Mesenteric LN	No gross observations on tissue.	PROMINENT PLASMA CELLS, Slight.	
Mediastinal LN	No gross observations on tissue.	PROMINENT MAST CELLS, Slight.	
Submandib/Max LN	No gross observations on tissue.	PROMINENT PLASMA CELLS, Slight.	
Larynx	No gross observations on tissue.	MUCOSA: EPITHELIUM-EROSION(S)/SINGLE CELL REGENERATION, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4817
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Larynx		MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Slight.	
		MUCOSA: LYMPHOID CELL AGGREGATE(S), Slight.	
		- FINDINGS FROM SLIDES #27.1 (VENTRAL SEROMUCINOUS GLANDS).	
Larynx: V-DVTC	No gross observations on tissue.	MUCOSA: MIXED INFLAMMATORY CELL INFILTRATE, Slight.	
		VENTRAL MUCOSA: FOREIGN BODY MICROGRANULOMA, Focal, Slight.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS AND VENTRAL LARYNGEAL EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Minimal.	
		VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	
		NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4817
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal.	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal.	
		- ARTIFACTUAL PHARYNGEAL EPITHELIAL EXFOLIATION.	
Ovaries	No gross observations on tissue.	LUTEAL CYST(S), UNILATERAL, Slight.	
Pancreas	No gross observations on tissue.	SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Minimal.	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4817
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Aorta	Femoral Marrow	Brain	Sternum	Cecum
Colon	Duodenum	Esophagus	Heart	Ileum
Lungs	Sciatic Nerve	Parathyroid	Rectum/Low Colon	Cervical SC
Thoracic SC	Lumbar SC	Salivary glands	Stomach	Thyroid
Thymus	Trachea	Urinary bladder	Uterus	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 4818
GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-HYPERPLASIA, BILATERAL, Slight.
Sternal Marrow	No gross observations on tissue.	INCREASED FATTY MARROW/DECREASED HEMATOPOIETIC CELLS, Minimal.
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.
Duodenum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.
Kidneys	No gross observations on tissue.	CORTEX/CORTICO-MEDULLARY JUNCTION: MINERAL DEPOSIT(S), BILATERAL, Minimal. UROTHELIUM: HYPERPLASIA, UNILATERAL, Minimal.
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Slight.
Mesenteric LN	No gross observations on tissue.	PROMINENT PLASMA CELLS, Slight. RETICULOENDOTHELIAL CELLS: FOAMY CYTOPLASM, Minimal. PROMINENT MAST CELLS, Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 4818
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Mediastinal LN No gross observations on tissue.

GOLDEN-BROWN PIGMENT, Minimal.

FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS,
Minimal.

PROMINENT PLASMA CELLS, Slight.

PROMINENT HISTIOCYTES, Slight.

PROMINENT MAST CELLS, Slight.

Submandib/Max LN . . . No gross observations on tissue.

PROMINENT MAST CELLS, Slight.

Lungs No gross observations on tissue.

ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY
CYTOPLASM, Minimal.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH MACROPHAGES, Minimal.

Larynx No gross observations on tissue.

MUCOSA: MIXED INFLAMMATORY CELL
INFILTRATE, Minimal.

MUCOSA: GLANDULAR DILATATION, Slight.

- FINDINGS FROM SLIDES #27 AND #27.1
(VENTRAL DIVERTICULUM AND VENTRAL
SEROMUCINOUS GLANDS).

Larynx: V-DVTC No gross observations on tissue.

Tissue is inadequate and unreadable.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4818
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Larynx: V-DVTC		- VENTRAL DIIVERTICULUM/EPITHELIUM NOT PRESENT/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable. - VENTRAL LARYNGEAL EPITHELIUM NOT PRESENT/NOT EVALUATED. TISSUE FRAGMENTED. RECUT, NO IMPROVEMENT.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Minimal. NASAL LACRIMAL DUCT: MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID CELLULAR AGGREGATES, UNILATERAL, Slight. ODONTOPATHY, UNILATERAL, Slight. PERIODONTAL (AMEOLOBLAST EPITHELIUM): ACUTE INFLAMMATION, UNILATERAL, Slight. VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY/VESTIBULAR JUNCTION): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight. NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4818
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 2		ODONTOPATHY, UNILATERAL, Moderate.	
		NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, UNILATERAL, Minimal.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, UNILATERAL, Slight.	
		PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight.	
		PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal.	
		PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, UNILATERAL, Slight.	
		- ARTIFACTUAL PHARYNGEAL EPITHELIAL EXFOLIATION.	
Ovaries	No gross observations on tissue.	MINERAL DEPOSIT(S), BILATERAL, Minimal.	
Pancreas	No gross observations on tissue.	SUBACUTE (CHRONIC ACTIVE)/CHRONIC INFLAMMATION, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4818
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Pancreas		ATROPHY, Minimal.	
Spleen	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Minimal.	
Thymus	Discolored, Right lobe, Red, Areas, 0.2 - 0.5 cm, Moderate	Examined; 1 correlation found: HEMORRHAGE(S), Slight.	
		INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	
Uterus	No gross observations on tissue.	LUMEN: DILATED, BILATERAL, Moderate.	

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Aorta	Femoral Marrow	Brain	Sternum	Cecum
Colon	Esophagus	Heart	Ileum	Sciatic Nerve
Parathyroid	Rectum/Low Colon	Cervical SC	Thoracic SC	Lumbar SC
Salivary glands	Stomach	Thyroid	Trachea	Urinary bladder

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 4819
PHASE DAY OF DEATH: 93	PHASE: Dosing phase	GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.
Kidneys	No gross observations on tissue.	CORTEX/CORTICO-MEDULLARY JUNCTION: MINERAL DEPOSIT(S), UNILATERAL, Minimal. MEDULLA: MINERAL DEPOSIT(S), UNILATERAL, Minimal.
Mediastinal LN	No gross observations on tissue.	GOLDEN-BROWN PIGMENT, Minimal. FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.
Submandib/Max LN	No gross observations on tissue.	PROMINENT PLASMA CELLS, Moderate.
Larynx	No gross observations on tissue.	MUCOSA: LYMPHOID CELL AGGREGATE(S), Slight. MUCOSA: GLANDULAR DIVERTICULUM WITH LUMINAL DEBRIS AND MINERALIZATION, Focal, Slight. - FINDINGS FROM SLIDES #27 AND #27.1 (VENTRAL DIVERTICULUM AND VENTRAL SEROMUCINOUS GLANDS).
Larynx: V-DVTC	No gross observations on tissue.	Tissue is inadequate and unreadable.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4819
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Larynx: V-DVTC		- MARGINAL VENTRAL DIVERTICULAR EPITHELIUM PRESENT/EVALUATED. RECUT, NO IMPROVEMENT.	
Larynx: V-SM-G	No gross observations on tissue.	Tissue is inadequate and unreadable.	
		- VENTRAL SEROMUCINOUS GLANDS NOT PRESENT/NOT EVALUATED. VENTRAL LARYNGEAL EPITHELIUM FRAGMENTED/NOT EVALUATED. RECUT, NO IMPROVEMENT.	
Nose/Turb Sec 1	No gross observations on tissue.	NASAL MUCOSA (VESTIBULE, LAMINA PROPRIA AND BONE): FIBROUS OSTEOGENITOR CELLS WITH WOVEN BONE FORMATION, UNILATERAL, Slight.	
		NASAL MUCOSA (RESPIRATORY EPITHELIUM): EPITHELIUM- GOBLET CELL HYPERTROPHY/HYPERPLASIA, Multifocal, Moderate.	
		NASAL LACRIMAL DUCT: MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID CELLULAR AGGREGATES, BILATERAL, Slight.	
		ODONTOPATHY, BILATERAL, Moderate.	
		PERIODONTAL (AMEOLOBLAST EPITHELIUM): ACUTE INFLAMMATION, UNILATERAL, Slight.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4819
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 2		NASAL MUCOSA (OLFACTORY EPITHELIUM): PROMINENT BOWMAN'S GLAND(S)/GLANDULAR EPITHELIAL HYPERPLASIA, UNILATERAL, Slight. ODONTOPATHY, BILATERAL, Moderate. NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight. VOMERNASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Slight.	
Nose/Turb Sec 3	No gross observations on tissue.	NASAL SINUS: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight. PHARYNGEAL DUCT: PROMINENT NASAL ASSOCIATED LYMPHOID TISSUE, BILATERAL, Slight. PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Slight. NASAL MUCOSA [GLAND]: DUCTAL/ACINAR EPITHELIAL HYPERPLASIA WITH OR WITHOUT EPITHELIAL VACUOLATION, UNILATERAL, Slight.	
Nose/Turb Sec 4	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, Minimal.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4819
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 4		PHARYNGEAL DUCT: PROMINENT NASAL LYMPHOID ASSOCIATED TISSUE, BILATERAL, Minimal.	
		PALATE-TOOTH JUNCTION: MIXED INFLAMMATORY CELL INFILTRATE, Focal, Slight.	
Parathyroid	No gross observations on tissue.	Tissue is unremarkable (with comment); one-of-pair missing.	
		- RECUT, NO IMPROVEMENT.	
Thymus	No gross observations on tissue.	INVOLUTION/CORTICAL LYMPHOCYTOLYSIS, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Adrenal Glands	Aorta	Sternal Marrow	Femoral Marrow	Brain
Sternum	Cecum	Colon	Duodenum	Esophagus
Heart	Ileum	Liver	Mesenteric LN	Lungs
Sciatic Nerve	Ovaries	Pancreas	Rectum/Low Colon	Cervical SC
Thoracic SC	Lumbar SC	Salivary glands	Spleen	Stomach
Thyroid	Trachea	Urinary bladder	Uterus	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4820
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Adrenal Glands	No gross observations on tissue.	CORTEX: ZONA FASCICULATA-HYPERPLASIA, BILATERAL, Slight.	
Brain	No gross observations on tissue.	HEMORRHAGE(S), Minimal.	
Sternum	No gross observations on tissue.	FIBROUS OSTEOPROGENITOR CELL FOCUS/FOCI, Focal, Slight.	
Femur w/joint	No gross observations on tissue.	PHYSIS OPEN, Present.	
Duodenum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Jejunum	No gross observations on tissue.	Tissue is autolytic and readable; unremarkable.	
Liver	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL FOCUS/FOCI, Minimal.	
Mesenteric LN	No gross observations on tissue.	PROMINENT PLASMA CELLS, Slight.	
Mediastinal LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Minimal.	
Submandib/Max LN	No gross observations on tissue.	FREE ERYTHROCYTES/ERYTHROPHAGOCYTOSIS, Slight.	
		PROMINENT PLASMA CELLS, Moderate.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 4820
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Submandib/Max LN

PROMINENT MAST CELLS, Slight.

Lungs No gross observations on tissue.

ALVEOLAR EPITHELIAL HYPERPLASIA, Slight.

Larynx No gross observations on tissue.

MUCOSA: MIXED INFLAMMATORY CELL
INFILTRATE, Minimal.

MUCOSA: GLANDULAR DILATATION, Moderate.

- FINDINGS FROM SLIDES #27 AND #27.1
(VENTRAL DIVERTICULUM AND VENTRAL
SEROMUCINOUS GLANDS).

Larynx: V-DVTC No gross observations on tissue.

Tissue is inadequate and unreadable.

- VENTRAL DIVERTICULUM/EPITHELIUM NOT
PRESENT/NOT EVALUATED. RECUT, NO
IMPROVEMENT.

Larynx: V-SM-G No gross observations on tissue.

Tissue is inadequate and unreadable.

- VENTRAL SEROMUCINOUS GLANDS AND VENTRAL
LARYNGEAL EPITHELIUM marginally present or
not present/NOT EVALUATED. RECUT, NO
IMPROVEMENT.

Nose/Turb Sec 1 No gross observations on tissue.

NASAL MUCOSA (VESTIBULAR EPITHELIUM):
MIXED INFLAMMATORY CELLS WITH OR WITHOUT
LYMPHOID CELL AGGREGATES, Slight.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
EPITHELIUM- GOBLET CELL
HYPERTROPHY/HYPERPLASIA, Multifocal,
Slight.

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4820
PHASE DAY OF DEATH: 93		PHASE: Dosing phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Nose/Turb Sec 1		NASOTURBINATE: FUSION [LATERAL WALL], UNILATERAL, Multifocal, Slight.	
		NASAL MUCOSA (MAXILLOTURBINATE): MIXED INFLAMMATORY CELL INFILTRATE WITH OR WITHOUT LYMPHOID CELLULAR AGGREGATES, UNILATERAL, Minimal.	
		NASAL LACRIMAL DUCT: MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID CELLULAR AGGREGATES, BILATERAL, Slight.	
		ODONTOPATHY, UNILATERAL, Moderate.	
		VOMERONASAL ORGAN: MIXED INFLAMMATORY CELL INFILTRATE, BILATERAL, Minimal.	
		BONE: REMODELING WITH WOVEN BONE FORMATION, UNILATERAL, Multifocal, Slight.	
Nose/Turb Sec 2	No gross observations on tissue.	NASAL MUCOSA (RESPIRATORY/VESTIBULAR JUNCTION): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, UNILATERAL, Slight.	
		NASAL MUCOSA (RESPIRATORY EPITHELIUM): GOBLET CELL HYPERPLASIA/HYPERTROPHY, BILATERAL, Slight.	
		NASOTURBINATE: FUSION (LATERAL WALL), UNILATERAL, Minimal.	
		ODONTOPATHY, BILATERAL, Slight.	
		NASOLACRIMAL DUCT(S): MIXED INFLAMMATORY CELLS WITH OR WITHOUT LYMPHOID AGGREGATES, BILATERAL, Slight.	

Liquified Petroleum Gas: A 13-Week Whole-Body Inhalation
Toxicity Study in Rats with Neurotoxicity Assessments
and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 93

SEX: Female
PHASE: Dosing phase

ANIMAL: 4820
GROUP: 4

Tissue Gross Observations/Comments

Microscopic Observations/Comments

Nose/Turb Sec 3 No gross observations on tissue.

NASAL SINUS: PROMINENT NASAL ASSOCIATED
LYMPHOID TISSUE, BILATERAL, Slight.

PHARYNGEAL DUCT: PROMINENT NASAL
ASSOCIATED LYMPHOID TISSUE, BILATERAL,
Slight.

PHARYNGEAL DUCT (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Moderate.

Nose/Turb Sec 4 No gross observations on tissue.

NASAL MUCOSA (RESPIRATORY EPITHELIUM):
GOBLET CELL HYPERPLASIA/HYPERTROPHY,
Slight.

Ovaries No gross observations on tissue.

LUTEAL CYST(S), UNILATERAL, Minimal.

Parathyroid No gross observations on tissue.

Tissue is unremarkable (with comment);
one-of-pair missing.

- RECUT, NO IMPROVEMENT.

Spleen No gross observations on tissue.

GOLDEN-BROWN PIGMENT, Minimal.

Thymus No gross observations on tissue.

HEMORRHAGE(S), Slight.

INVOLUTION/CORTICAL LYMPHOCYTOLYSIS,
Minimal.

Page: 819

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 4820
PHASE DAY OF DEATH: 93	PHASE: Dosing phase	GROUP: 4

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Aorta	Femoral Marrow	Cecum	Colon	Esophagus
Heart	Ileum	Kidneys	Sciatic Nerve	Pancreas
Rectum/Low Colon	Cervical SC	Thoracic SC	Lumbar SC	Salivary glands
Stomach	Thyroid	Trachea	Urinary bladder	Uterus

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1321
PHASE DAY OF DEATH: 97		PHASE: Neurotox phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	CONGESTION, Slight. ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Focal, Slight. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Focal, Slight.	
Sural Nerve	No gross observations on tissue.	Tissue is unremarkable (with comment). - MARGINAL TISSUE PRESENT/EVALUATED. BEST MICROSLIDE.	
Dorsal Root Fibr	No gross observations on tissue.	AXONAL SWELLING/DEGENERATION, Minimal.	
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Brain	Eyes	Sciatic N/TB+PL	Tibial N/TB+PL	Sural N/TB+PL
Sciatic Nerve	Tibial Nerve	Trigeminal Gang	Dorsal Root Gang	Ventr1 Root Fibr

19-Feb-10; 19:12
Huntingdon Life Sciences, Inc. 036141N

Page: 821

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1321
PHASE DAY OF DEATH: 97		PHASE: Neurotox phase	GROUP: 1
Tissue	Gross Observations/Comments		Microscopic Observations/Comments
Optic nerve	Cervical SC	Thoracic SC	Lumbar SC

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1322
PHASE DAY OF DEATH: 97		PHASE: Neurotox phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	CONGESTION, Minimal.	
		ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Slight.	
Sciatic N/TB+PL	No gross observations on tissue.	Tissue is missing.	
Tibial N/TB+PL	No gross observations on tissue.	Tissue is missing.	
Sural N/TB+PL	No gross observations on tissue.	Tissue is missing.	
		- NO MICROSLIDE/TISSUE MISIDENTIFIED.	
Tibial Nerve	No gross observations on tissue.	Tissue is missing.	
Sural Nerve	No gross observations on tissue.	Tissue is missing.	
		- TISSUE MISIDENTIFIED. RECUT, NO IMPROVEMENT.	
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
Brain Eyes Sciatic Nerve Trigeminal Gang Dorsal Root Gang

19-Feb-10; 19:12
Huntingdon Life Sciences, Inc. 036141N

Page: 823

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 97

SEX: Male
PHASE: Neurotox phase

ANIMAL: 1322
GROUP: 1

Tissue

Gross Observations/Comments

Microscopic Observations/Comments

Dorsal Root Fibr Ventrl Root Fibr Optic nerve
Lumbar SC

Cervical SC

Thoracic SC

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1323
PHASE DAY OF DEATH: 97		PHASE: Neurotox phase	GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	CONGESTION, Slight. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal.
Dorsal Root Fibr . . .	No gross observations on tissue.	AXONAL SWELLING/DEGENERATION, Minimal.
Lumbar SC	No gross observations on tissue.	BASOPHILIC/MINERAL FOCUS/FOCI, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Brain	Eyes	Sciatic N/TB+PL	Tibial N/TB+PL	Sural N/TB+PL
Sciatic Nerve	Tibial Nerve	Sural Nerve	Trigeminal Gang	Dorsal Root Gang
Ventr l Root Fibr	Optic nerve	Cervical SC	Thoracic SC	Trachea

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1324
PHASE DAY OF DEATH: 98		PHASE: Neurotox phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	CONGESTION, Slight. ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Minimal. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Slight.	
Sural Nerve	No gross observations on tissue.	Tissue is unremarkable (with comment). - MARGINAL TISSUE PRESENT/EVALUATED. TISSUE EXHAUSTED AT TIME OF TRIM.	
Trigeminal Gang	No gross observations on tissue.	MONONUCLEAR CELL AGGREGATES, Slight.	
Dorsal Root Fibr	No gross observations on tissue.	MIXED INFLAMMATORY CELL INFILTRATE, Minimal.	
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal. SUBMUCOSAL GLANDULAR [DUCT] DILATATION, Slight.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Brain Eyes Sciatic N/TB+PL Tibial N/TB+PL Sural N/TB+PL

19-Feb-10; 19:12
Huntingdon Life Sciences, Inc. 036141N

Page: 826

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 1324
PHASE DAY OF DEATH: 98	PHASE: Neurotox phase	GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
Sciatic Nerve Tibial Nerve Dorsal Root Gang Ventrl Root Fibr Optic nerve
Cervical SC Thoracic SC Lumbar SC

Page: 827

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 1325
PHASE DAY OF DEATH: 98		PHASE: Neurotox phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	CONGESTION, Multifocal, Slight.	
		ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal.	
Trigeminal Gang	No gross observations on tissue.	AXONAL SWELLING/DEGENERATION, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy. The following tissues were unremarkable microscopically:

Brain	Eyes	Sciatic N/TB+PL	Tibial N/TB+PL	Sural N/TB+PL
Sciatic Nerve	Tibial Nerve	Sural Nerve	Dorsal Root Gang	Dorsal Root Fibr
Ventr1 Root Fibr	Optic nerve	Cervical SC	Thoracic SC	Lumbar SC
Trachea				

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 2321
PHASE DAY OF DEATH: 97	PHASE: Neurotox phase	GROUP: 2

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Lungs No gross observations on tissue.

CONGESTION, Multifocal, Slight.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH ALVEOLAR MACROPHAGES,
Multifocal, Slight.

Trachea No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
INFILTRATE, Slight.

SUBMUCOSAL GLANDULAR [DUCT] DILATATION,
Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 2322
PHASE DAY OF DEATH: 97	PHASE: Neurotox phase	GROUP: 2

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	CONGESTION, Slight. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal. PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID TISSUE, Slight.
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal. SUBMUCOSAL GLANDULAR [DUCT] DILATATION, Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 2323
PHASE DAY OF DEATH: 98	PHASE: Neurotox phase	GROUP: 2

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. CONGESTION, Multifocal, Slight. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal.
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 2324
PHASE DAY OF DEATH: 98		PHASE: Neurotox phase	GROUP: 2
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Multifocal, Slight.	
		CONGESTION, Focal, Slight.	
		ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal.	
		INTRABRONCHIOLAR EOSINOPHILIC MATERIAL, Minimal.	
		PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID TISSUE, Multifocal, Slight.	
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Slight.	
		SUBMUCOSAL GLANDULAR [DUCT] DILATATION, Slight.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 2325
PHASE DAY OF DEATH: 98	PHASE: Neurotox phase	GROUP: 2

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Lungs No gross observations on tissue.

HEMORRHAGE(S), Minimal.

CONGESTION, Focal, Slight.

ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY
CYTOPLASM, Multifocal, Minimal.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH ALVEOLAR MACROPHAGES,
Minimal.

PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID
TISSUE, Minimal.

Trachea No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
INFILTRATE, Minimal.

SUBMUCOSAL GLANDULAR [DUCT] DILATATION,
Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 3321
PHASE DAY OF DEATH: 97	PHASE: Neurotox phase	GROUP: 3

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. CONGESTION, Slight. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal. ALVEOLAR/BRONCHIOLAR EPITHELIAL HYPERPLASIA, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
Trachea

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 3322
PHASE DAY OF DEATH: 97	PHASE: Neurotox phase	GROUP: 3

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. CONGESTION, Slight. ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Minimal. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal.
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 97

SEX: Male
PHASE: Neurotox phase

ANIMAL: 3323
GROUP: 3

Tissue Gross Observations/Comments
Lungs No gross observations on tissue.

Microscopic Observations/Comments
HEMORRHAGE(S), Minimal.
CONGESTION, Slight.
ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH ALVEOLAR MACROPHAGES,
Minimal.
PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID
TISSUE, Slight.

Trachea No gross observations on tissue.

SUBMUCOSAL GLANDULAR [DUCT] DILATATION,
Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 3324
PHASE DAY OF DEATH: 98	PHASE: Neurotox phase	GROUP: 3

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	CONGESTION, Slight. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal.
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal. SUBMUCOSAL GLANDULAR [DUCT] DILATATION, Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 3325
PHASE DAY OF DEATH: 98	PHASE: Neurotox phase	GROUP: 3

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Lungs No gross observations on tissue.

HEMORRHAGE(S), Minimal.

CONGESTION, Multifocal, Slight.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH ALVEOLAR MACROPHAGES,
Minimal.

Trachea No gross observations on tissue.

SUBMUCOSAL GLANDULAR [DUCT] DILATATION,
Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 4321
PHASE DAY OF DEATH: 97	PHASE: Neurotox phase	GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Eyes No gross observations on tissue.

IRIS: SUBACUTE/CHRONIC INFLAMMATORY CELL
INFILTRATE, BILATERAL, Slight.

Lungs No gross observations on tissue.

HEMORRHAGE(S), Minimal.
CONGESTION, Multifocal, Slight.
ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH ALVEOLAR MACROPHAGES,
Minimal.
ALVEOLAR/BRONCHIOLAR EPITHELIAL
HYPERPLASIA, Minimal.

Dorsal Root Fibr . . . No gross observations on tissue.

MIXED INFLAMMATORY CELL INFILTRATE,
Minimal.

Lumbar SC No gross observations on tissue.

BASOPHILIC/MINERAL FOCUS/FOCI, Minimal.

Trachea No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
INFILTRATE, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Brain	Sciatic N/TB+PL	Tibial N/TB+PL	Sural N/TB+PL	Sciatic Nerve
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Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4321
PHASE DAY OF DEATH: 97		PHASE: Neurotox phase	GROUP: 4

Tissue	Gross Observations/Comments		Microscopic Observations/Comments	
Tibial Nerve	Sural Nerve	Trigeminal Gang	Dorsal Root Gang	Ventr1 Root Fibr
Optic nerve	Cervical SC	Thoracic SC		

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4322
PHASE DAY OF DEATH: 97		PHASE: Neurotox phase	GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. CONGESTION, Slight. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal.
Trigeminal Gang	No gross observations on tissue.	MIXED INFLAMMATORY CELL INFILTRATE, Slight.
Dorsal Root Fibr	No gross observations on tissue.	AXONAL SWELLING/DEGENERATION, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Brain	Eyes	Sciatic N/TB+PL	Tibial N/TB+PL	Sural N/TB+PL
Sciatic Nerve	Tibial Nerve	Sural Nerve	Dorsal Root Gang	Ventr1 Root Fibr
Optic nerve	Cervical SC	Thoracic SC	Lumbar SC	Trachea

Page: 841

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4323
PHASE DAY OF DEATH: 98		PHASE: Neurotox phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal.	
		CONGESTION, Multifocal, Slight.	
		ALVEOLAR/BRONCHIOLAR EPITHELIAL HYPERPLASIA, Minimal.	
Sural Nerve	No gross observations on tissue.	Tissue is unremarkable (with comment).	
		- MARGINAL TISSUE PRESENT/EVALUATED.	
Dorsal Root Fibr . . .	No gross observations on tissue.	MIXED INFLAMMATORY CELL INFILTRATE, Slight.	
Thoracic SC	No gross observations on tissue.	AXONAL SWELLING/DEGENERATION, Minimal.	
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	
		SUBMUCOSAL GLANDULAR [DUCT] DILATATION, Slight.	

The following tissues were unremarkable microscopically:

Brain	Eyes	Sciatic N/TB+PL	Tibial N/TB+PL	Sural N/TB+PL
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19-Feb-10; 19:12
Huntingdon Life Sciences, Inc. 036141N

Page: 842

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice SEX: Male ANIMAL: 4323
PHASE DAY OF DEATH: 98 PHASE: Neurotox phase GROUP: 4

Tissue	Gross Observations/Comments			Microscopic Observations/Comments		
Sciatic Nerve	Tibial Nerve	Trigeminal Gang	Dorsal Root Gang	Ventr1 Root Fibr		
Optic nerve	Cervical SC	Lumbar SC				

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Male	ANIMAL: 4324
PHASE DAY OF DEATH: 98		PHASE: Neurotox phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Eyes	No gross observations on tissue.	Tissue is unremarkable (with comment). - ONLY ONE LENS PRESENT/EVALUATED.	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. CONGESTION, Minimal. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal.	
Sural Nerve	No gross observations on tissue.	Tissue is unremarkable (with comment). - MARGINAL TISSUE PRESENT/EVALUATED.	
Dorsal Root Gang . . .	No gross observations on tissue.	Tissue is unremarkable (with comment). - MARGINAL TISSUE PRESENT/EVALUATED.	
Ventr1 Root Fibr . . .	No gross observations on tissue.	Tissue is unremarkable (with comment). - MARGINAL TISSUE PRESENT/EVALUATED.	

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Brain	Sciatic N/TB+PL	Tibial N/TB+PL	Sural N/TB+PL	Sciatic Nerve
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Page: 844

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 4324
PHASE DAY OF DEATH: 98	PHASE: Neurotox phase	GROUP: 4

Tissue	Gross Observations/Comments		Microscopic Observations/Comments	
Tibial Nerve	Trigeminal Gang	Dorsal Root Fibr	Optic nerve	Cervical SC
Thoracic SC	Lumbar SC	Trachea		

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Male	ANIMAL: 4325
PHASE DAY OF DEATH: 98	PHASE: Neurotox phase	GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	CONGESTION, Minimal. ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY CYTOPLASM, Minimal. PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID TISSUE, Slight. INTERSTITIUM: OSSEOUS METAPLASIA, Slight.
Thoracic SC	No gross observations on tissue.	AXONAL SWELLING/DEGENERATION, Minimal.
Lumbar SC	No gross observations on tissue.	MONONUCLEAR CELL AGGREGATES, Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Brain	Eyes	Sciatic N/TB+PL	Tibial N/TB+PL	Sural N/TB+PL
Sciatic Nerve	Tibial Nerve	Sural Nerve	Trigeminal Gang	Dorsal Root Gang
Dorsal Root Fibr	Ventr1 Root Fibr	Optic nerve	Cervical SC	Trachea

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 97

SEX: Female
PHASE: Neurotox phase

ANIMAL: 1821
GROUP: 1

Tissue Gross Observations/Comments
Lungs No gross observations on tissue.

Microscopic Observations/Comments
HEMORRHAGE(S), Minimal.
CONGESTION, Multifocal, Slight.
ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH ALVEOLAR MACROPHAGES,
Minimal.

Thoracic SC No gross observations on tissue.

AXONAL SWELLING/DEGENERATION, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Brain	Eyes	Sciatic N/TB+PL	Tibial N/TB+PL	Sural N/TB+PL
Sciatic Nerve	Tibial Nerve	Sural Nerve	Trigeminal Gang	Dorsal Root Gang
Dorsal Root Fibr	Ventr1 Root Fibr	Optic nerve	Cervical SC	Lumbar SC
Trachea				

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1822
PHASE DAY OF DEATH: 97		PHASE: Neurotox phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Slight. CONGESTION, Minimal. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal. ALVEOLAR/BRONCHIOLAR EPITHELIAL HYPERPLASIA, Minimal. PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID TISSUE, Slight.	
Sciatic Nerve	No gross observations on tissue.	Tissue is unremarkable (with comment). - BEST MICROSLIDE.	
Sural Nerve	No gross observations on tissue.	Tissue is unremarkable (with comment). - MARGINAL TISSUE PRESENT/EVALUATED. TISSUE EXHAUSTED AT TIME OF TRIM.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Brain Eyes Sciatic N/TB+PL Tibial N/TB+PL Sural N/TB+PL

19-Feb-10; 19:12

Huntingdon Life Sciences, Inc. 036141N

Page: 848

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 1822
PHASE DAY OF DEATH: 97	PHASE: Neurotox phase	GROUP: 1

Tissue	Gross Observations/Comments			Microscopic Observations/Comments	
Tibial Nerve	Trigeminal Gang	Dorsal Root Gang	Dorsal Root Fibr	Ventr1 Root Fibr	
Optic nerve	Cervical SC	Thoracic SC	Lumbar SC	Trachea	

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1823
PHASE DAY OF DEATH: 98		PHASE: Neurotox phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	CONGESTION, Slight. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal. ALVEOLAR/BRONCHIOLAR EPITHELIAL HYPERPLASIA, Focal, Slight. INTRABRONCHIOLAR EOSINOPHILIC MATERIAL, Minimal.	
Sural Nerve	No gross observations on tissue.	Tissue is missing. - TISSUE MISSING FROM SLIDE. RECUT: ORIGINAL SLIDE SUBMITTED/NO IMPROVEMENT.	
Trigeminal Gang	No gross observations on tissue.	AXONAL SWELLING/DEGENERATION, Minimal. MINERAL DEPOSIT, Minimal.	
Ventr1 Root Fibr	No gross observations on tissue.	AXONAL SWELLING/DEGENERATION, Minimal. MIXED INFLAMMATORY CELL INFILTRATE, Slight.	
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal. SUBMUCOSAL GLANDULAR [DUCT] DILATATION, Slight.	

19-Feb-10; 19:12
Huntingdon Life Sciences, Inc. 036141N

Page: 850

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 1823
PHASE DAY OF DEATH: 98	PHASE: Neurotox phase	GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Brain	Eyes	Sciatic N/TB+PL	Tibial N/TB+PL	Sural N/TB+PL
Sciatic Nerve	Tibial Nerve	Dorsal Root Gang	Dorsal Root Fibr	Optic nerve
Cervical SC	Thoracic SC	Lumbar SC		

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 1824
PHASE DAY OF DEATH: 98		PHASE: Neurotox phase	GROUP: 1
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Minimal. CONGESTION, Multifocal, Slight. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal. ALVEOLAR/BRONCHIOLAR EPITHELIAL HYPERPLASIA, Minimal. PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID TISSUE, Multifocal, Slight.	
Sural N/TB+PL	No gross observations on tissue.	Tissue is missing. - TISSUE EXHAUSTED AT TIME OF TRIM.	
Dorsal Root Fibr	No gross observations on tissue.	MIXED INFLAMMATORY CELL INFILTRATE, Slight.	
Ventrl Root Fibr	No gross observations on tissue.	Tissue is unremarkable (with comment). - MARGINAL TISSUE PRESENT/EVALUATED.	
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	

19-Feb-10; 19:12
Huntingdon Life Sciences, Inc. 036141N

Page: 852

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 98

SEX: Female
PHASE: Neurotox phase

ANIMAL: 1824
GROUP: 1

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Brain	Eyes	Sciatic N/TB+PL	Tibial N/TB+PL	Sciatic Nerve
Tibial Nerve	Sural Nerve	Trigeminal Gang	Dorsal Root Gang	Optic nerve
Cervical SC	Thoracic SC	Lumbar SC		

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 98

SEX: Female
PHASE: Neurotox phase

ANIMAL: 1825
GROUP: 1

Tissue Gross Observations/Comments
Lungs No gross observations on tissue.

Microscopic Observations/Comments

HEMORRHAGE(S), Focal, Slight.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH ALVEOLAR MACROPHAGES,
Minimal.

ALVEOLAR/BRONCHIOLAR EPITHELIAL
HYPERPLASIA, Slight.

PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID
TISSUE, Focal, Slight.

Sciatic Nerve No gross observations on tissue.

AXONAL SWELLING/DEGENERATION, Minimal.

Trigeminal Gang No gross observations on tissue.

MONONUCLEAR CELL AGGREGATES, Slight.

Dorsal Root Gang No gross observations on tissue.

MIXED INFLAMMATORY CELL INFILTRATE,
Minimal.

Dorsal Root Fibr No gross observations on tissue.

MIXED INFLAMMATORY CELL INFILTRATE,
Minimal.

Ventr1 Root Fibr No gross observations on tissue.

AXONAL SWELLING/DEGENERATION, Minimal.

Thoracic SC No gross observations on tissue.

AXONAL SWELLING/DEGENERATION, Focal,
Minimal.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice SEX: Female ANIMAL: 1825
PHASE DAY OF DEATH: 98 PHASE: Neurotox phase GROUP: 1

Tissue Gross Observations/Comments Microscopic Observations/Comments

Trachea No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
INFILTRATE, Minimal.

SUBMUCOSAL GLANDULAR [DUCT] DILATATION,
Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Brain	Eyes	Sciatic N/TB+PL	Tibial N/TB+PL	Sural N/TB+PL
Tibial Nerve	Sural Nerve	Optic nerve	Cervical SC	Lumbar SC

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 2821
PHASE DAY OF DEATH: 97		PHASE: Neurotox phase	GROUP: 2
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	CONGESTION, Moderate. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Slight.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
Trachea

Page: 856

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 2822
PHASE DAY OF DEATH: 97	PHASE: Neurotox phase	GROUP: 2

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 97

SEX: Female
PHASE: Neurotox phase

ANIMAL: 2823
GROUP: 2

Tissue Gross Observations/Comments
Lungs No gross observations on tissue.

Microscopic Observations/Comments
CONGESTION, Multifocal, Moderate.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH ALVEOLAR MACROPHAGES,
Minimal.

Trachea No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
INFILTRATE, Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
 No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice
PHASE DAY OF DEATH: 98

SEX: Female
PHASE: Neurotox phase

ANIMAL: 2824
GROUP: 2

Tissue Gross Observations/Comments
Lungs No gross observations on tissue.

Microscopic Observations/Comments
ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY
CYTOPLASM, Focal, Minimal.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH ALVEOLAR MACROPHAGES,
Minimal.

PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID
TISSUE, Slight.

Trachea No gross observations on tissue.

SUBMUCOSAL GLANDULAR [DUCT] DILATATION,
Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 2825
PHASE DAY OF DEATH: 98	PHASE: Neurotox phase	GROUP: 2

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	

CONGESTION, Slight.

ALVEOLAR/INTRAALVEOLAR MACROPHAGES: FOAMY
CYTOPLASM, Slight.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH ALVEOLAR MACROPHAGES,
Minimal.

PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID
TISSUE, Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
Trachea

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 3821
PHASE DAY OF DEATH: 97	PHASE: Neurotox phase	GROUP: 3

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Slight. CONGESTION, Multifocal, Slight. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal.
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 3822
PHASE DAY OF DEATH: 97		PHASE: Neurotox phase	GROUP: 3
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	CONGESTION, Moderate. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal. PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID TISSUE, Focal, Slight.	
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 3823
PHASE DAY OF DEATH: 98	PHASE: Neurotox phase	GROUP: 3

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Lungs No gross observations on tissue.

CONGESTION, Multifocal, Moderate.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH ALVEOLAR MACROPHAGES,
Minimal.

ALVEOLAR/BRONCHIOLAR EPITHELIAL
HYPERPLASIA, Minimal.

PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID
TISSUE, Minimal.

Trachea No gross observations on tissue.

SUBMUCOSAL GLANDULAR [DUCT] DILATATION,
Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 3824
PHASE DAY OF DEATH: 98		PHASE: Neurotox phase	GROUP: 3
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	HEMORRHAGE(S), Slight.	
		CONGESTION, Multifocal, Moderate.	
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 3825
PHASE DAY OF DEATH: 98	PHASE: Neurotox phase	GROUP: 3

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
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Lungs No gross observations on tissue.

ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL
INFILTRATE WITH ALVEOLAR MACROPHAGES,
Minimal.

Trachea No gross observations on tissue.

SUBACUTE/CHRONIC INFLAMMATORY CELL
INFILTRATE, Minimal.

SUBMUCOSAL GLANDULAR [DUCT] DILATATION,
Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:
No tissues examined.

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4821
PHASE DAY OF DEATH: 97		PHASE: Neurotox phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	CONGESTION, Minimal. ALVEOLAR/BRONCHIOLAR EPITHELIAL HYPERPLASIA, Minimal. PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID TISSUE, Slight. - TISSUE EVALUATED DESPITE SIGNIFICANT ATELECTASIS.	
Sural Nerve	No gross observations on tissue.	Tissue is unremarkable (with comment). - MARGINAL TISSUE PRESENT/EVALUATED. TISSUE EXHAUSTED AT TIME OF TRIM.	
Dorsal Root Fibr	No gross observations on tissue.	AXONAL SWELLING/DEGENERATION, Minimal.	
Stomach	Abnormal Contents, Yellow, Thick fluid, Moderate	Examined; 1 correlation found: SUPERFICIAL CELLULAR AND EOSINOPHILIC-GRANULAR DEBRIS, Slight.	
Urinary bladder	Distended, Slight/ Filled with clear, thin fluid.	Examined; 1 correlation found: LUMINAL DISTENSION, Marked.	

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Brain Eyes Sciatic N/TB+PL Tibial N/TB+PL Sural N/TB+PL

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice SEX: Female ANIMAL: 4821
PHASE DAY OF DEATH: 97 PHASE: Neurotox phase GROUP: 4

Tissue Gross Observations/Comments Microscopic Observations/Comments

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Sciatic Nerve	Tibial Nerve	Trigeminal Gang	Dorsal Root Gang	Ventr1 Root Fibr
Optic nerve	Cervical SC	Thoracic SC	Lumbar SC	Trachea

Page: 867

STATUS: Final phase sacrifice	SEX: Female	ANIMAL: 4822
PHASE DAY OF DEATH: 97	PHASE: Neurotox phase	GROUP: 4

Tissues without comment under Gross Observations were within normal limits at necropsy. The following tissues were unremarkable microscopically:

Brain	Eyes	Sciatic N/TB+PL	Tibial N/TB+PL	Sural N/TB+PL
Sciatic Nerve	Tibial Nerve	Sural Nerve	Trigeminal Gang	Dorsal Root Gang
Dorsal Root Fibr	Ventr l Root Fibr	Optic nerve	Cervical SC	Thoracic SC
Lumbar SC				

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4823
PHASE DAY OF DEATH: 97		PHASE: Neurotox phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	CONGESTION, Focal, Slight.	
		PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID TISSUE, Focal, Minimal.	
Sciatic Nerve	No gross observations on tissue.	AXONAL SWELLING/DEGENERATION, Minimal.	
Trigeminal Gang	No gross observations on tissue.	AXONAL SWELLING/DEGENERATION, Minimal.	
		MONONUCLEAR CELL AGGREGATES, Minimal.	
Dorsal Root Fibr	No gross observations on tissue.	MIXED INFLAMMATORY CELL INFILTRATE, Slight.	

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Brain	Eyes	Sciatic N/TB+PL	Tibial N/TB+PL	Sural N/TB+PL
Tibial Nerve	Sural Nerve	Dorsal Root Gang	Ventr Root Fibr	Optic nerve
Cervical SC	Thoracic SC	Lumbar SC	Trachea	

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice SEX: Female ANIMAL: 4824
PHASE DAY OF DEATH: 98 PHASE: Neurotox phase GROUP: 4

Tissue	Gross Observations/Comments	Microscopic Observations/Comments
Lungs	No gross observations on tissue.	CONGESTION, Multifocal, Slight. ALVEOLAR/INTRAALVEOLAR INFLAMMATORY CELL INFILTRATE WITH ALVEOLAR MACROPHAGES, Minimal. PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID TISSUE, Slight.
Dorsal Root Fibr	No gross observations on tissue.	MIXED INFLAMMATORY CELL INFILTRATE, Minimal.
Cervical SC	No gross observations on tissue.	BASOPHILIC/MINERAL FOCUS/FOCI, Minimal.
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal. SUBMUCOSAL GLANDULAR [DUCT] DILATATION, Slight.

Tissues without comment under Gross Observations were within normal limits at necropsy.

The following tissues were unremarkable microscopically:

Brain Eyes Sciatic N/TB+PL Tibial N/TB+PL Sural N/TB+PL

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Page: 870

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice SEX: Female ANIMAL: 4824
PHASE DAY OF DEATH: 98 PHASE: Neurotox phase GROUP: 4

Tissue	Gross Observations/Comments			Microscopic Observations/Comments	
Sciatic Nerve	Tibial Nerve	Sural Nerve	Trigeminal Gang	Dorsal Root Gang	
Ventr1 Root Fibr	Optic nerve	Thoracic SC	Lumbar SC		

Liquified Petroleum Gas
A 13-Week Whole-Body Inhalation Toxicity Study in Rats with
Neurotoxicity Assessments and In Vivo Genotoxicity Assessments
Individual Animal Gross and Microscopic Observations

STATUS: Final phase sacrifice		SEX: Female	ANIMAL: 4825
PHASE DAY OF DEATH: 98		PHASE: Neurotox phase	GROUP: 4
Tissue	Gross Observations/Comments	Microscopic Observations/Comments	
Lungs	No gross observations on tissue.	CONGESTION, Multifocal, Moderate. PROMINENT BRONCHIOLAR ASSOCIATED LYMPHOID TISSUE, Slight.	
Sural Nerve	No gross observations on tissue.	Tissue is missing. - TISSUE MISSING FROM SLIDE. RECUT, NO IMPROVEMENT.	
Trachea	No gross observations on tissue.	SUBACUTE/CHRONIC INFLAMMATORY CELL INFILTRATE, Minimal. SUBMUCOSAL GLANDULAR [DUCT] DILATATION, Slight.	

Tissues without comment under Gross Observations were within normal limits at necropsy.
The following tissues were unremarkable microscopically:

Brain	Eyes	Sciatic N/TB+PL	Tibial N/TB+PL	Sural N/TB+PL
Sciatic Nerve	Tibial Nerve	Trigeminal Gang	Dorsal Root Gang	Dorsal Root Fibr
Ventr1 Root Fibr	Optic nerve	Cervical SC	Thoracic SC	Lumbar SC

	Equipment List	Appendix P
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Exposure Chamber

1000-Liter glass and stainless steel chamber (Wahmann)

Compound Generator

Liquified Petroleum Gas Cylinder (Chevron)

Flowmeters

Top Trak™ Mass Flow Meter, sizes 0-100 sccm, 0 – 1 and 0 – 20 Lpm,
Model 821-1 (Sierra Instruments); Model 822-13-0V1-PV1-VI and 821-1 (Sierra
Instruments)

Flowmeter, size 0 – 20 and 0 - 40 Lpm (Dwyer®)

Pressure/Vacuum Gauges

U.S. Gauge backpressure gauge; Model NA

Union Carbide vacuum gauge, Model SG-6310

Matheson® backpressure gauge, P/N 63-3142

Regulator

MG Industries, Series 325

Valve

Metering Valve, Model 31RS4 and 316 (Whitey)

Metering Valve, Model SS-4L Series, (Nupro® Co.)

Metering Valve, Model SS-SS2 VH (Swagelok)

Tubing

Teflon® size 1/8" and 1/4"

Plastic, size 1/4" and 1/2" (Norton, Baxter)

Stainless steel, size 1/8" and 1/2"

Quick-disconnect with toggle valve (REGO®)

Quick-connect (Swagelok)

Vacuum Pump

Thomas Industries Inc., Model 707CM 50

	Equipment List	Appendix P
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Air Analyzer

MIRAN® 1A-CVF Ambient Air Analyzer (Wilks) with a Cole Parmer Strip Chart Recorder, Model 201, and a Micronta® LCD Benchtop Digital Multimeter No. 22-195

Balston® Microfibre™ Disposable Filter Unit, Grade DQ, was attached in-line

Particle Sizer

TSI Aerodynamic Particle Sizer, Model 331001 and a DELL computer, Model 486P/25, equipped with an Epson LQ-570+ Dot matrix printer, Model P630B

Environmental Monitoring

VWR Temperature and Humidity Gauge, tested prestudy with a Traceable Big Digit Hygrometer/Thermometer

Oxygen/Gas Analyzer, Model 1214S (Gastech)

Digital Sound Level Meter, Model 840029 (SPER Scientific)

Photometer 1 Light Meter (Quantum Instruments)

Chamber Air Flow

Dwyer® Magnehelic® gauge, calibrated prestudy with Side Trak™ III, with Digital Meter, Model 831-N2 (Sierra Instruments Inc.) and on study with a Dry Gas Meter, Model 2M (Singer)

Chamber Static Pressure

Dwyer® Magnehelic® gauge (Dwyer® Instruments Inc.); calibrated prestudy with a Dwyer® Mark II Manometer, Model 25 (Dwyer® Instruments Inc.)

Miscellaneous

Water bath

Thermomix 1420

Precision thermometer, range -10 – 260 and -20 - 150°C (ERTCO)

Syringes, size 0 – 10 and 0 - 100 mL (Precision, Hamilton)

Stainless Steel Nupro Valve

	MIRAN® Calibration	Appendix Q
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Methodology for Liquified Petroleum Gas

Miran No. B/D 2225

Settings: The instrument settings for the unit are summarized below:

Wavelength, microns	10.9
Pathlength, dial setting	4.65
Slit width, mm	1
Range, absorbance	1A
Response, seconds	1
Gain	High
Chart speed, cm/min	1
Chart volts	1

Calibrations: The MIRAN® was turned on and allowed to warm up for approximately 10 minutes. The cell was flushed with room air for approximately one minute. The loop was closed, the unit was zeroed and the calibration series was performed as shown below. The resultant data were plotted to obtain a calibration curve. Each observer used a separate syringe for calibration.

Injection Volume (μ L)	Calculated Concentration ¹ (ppm)	Absorbance		
		Operator 1 (volts)	Operator 2 (volts)	Average (volts)
4000	709	0.0530	0.0540	0.0535
6000	1064	0.0766	0.0809	0.0788
17000	3014	0.2090	0.2227	0.2159
28000	4965	0.337	0.342	0.340
45000	7979	0.514	0.530	0.522
56000	9929	0.620	0.646	0.633
68000	12057	0.729	0.741	0.735

¹Calculated Conc. (ppm) = $\frac{\text{Volume injected } (\mu\text{L})}{5.64\text{L}}$

where: 5.64L = volume of MIRAN® closed-loop

	MIRAN® Calibration	Appendix Q
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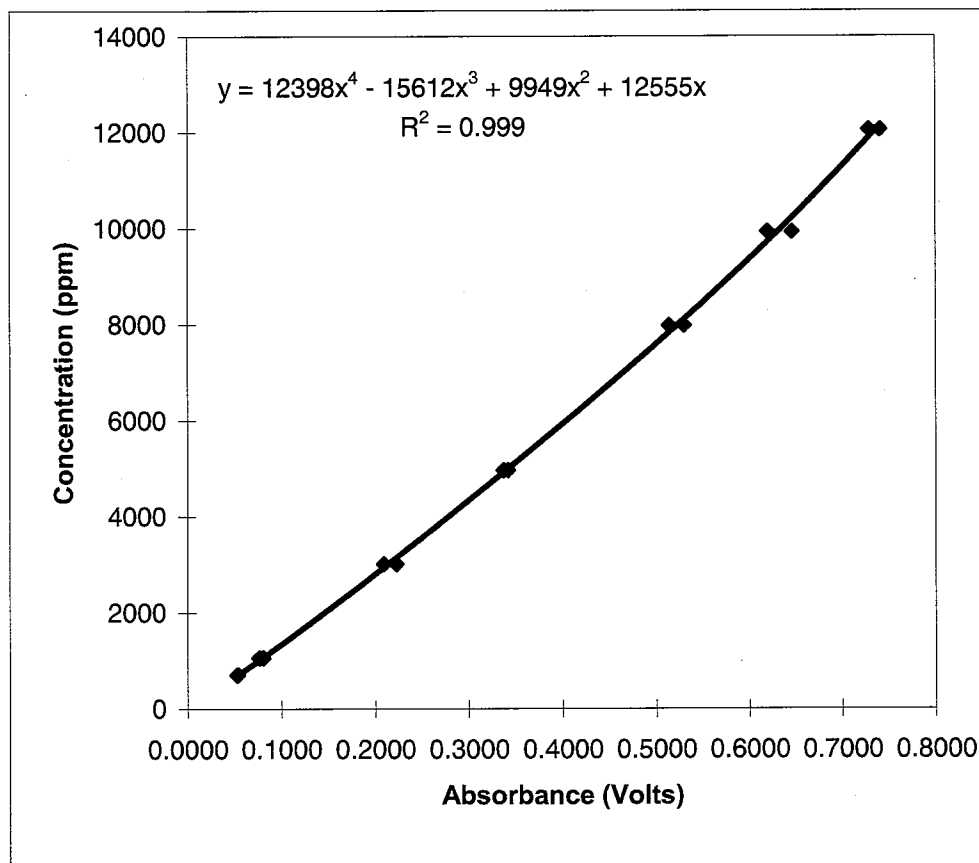
Calibration Checks: A three-point calibration check of the MIRAN® was performed prior to each exposure. The parameters are shown below:

Injection Volume (µL)	Calculated Concentration (ppm)	Expected Absorbance Reading (volts)	Acceptable Absorbance Range (volts)
6000	1064	0.0788	0.0670 – 0.0906
28000	4965	0.340	0.2890 – 0.391
56000	9929	0.633	0.538 – 0.728

The absorbance was recorded after each injection. The absorbance was considered satisfactory if it was within 15% of the original calibration series. If the absorbance value fell outside the 15% range, the injection was rechecked as follows. The volume for the value that was out of range was reinjected twice. The closer pair of the three injections were averaged and the results were compared to the original curve. If the average of the pair was within the 15% range, the original was accepted. If the value of the average was outside the 15% range, the Study Director decided if a new graph was to be prepared.

	MIRAN® Calibration	Appendix Q
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Calibration Curve for Liquified Petroleum Gas



	Chamber Distribution Results (Pretest)	Appendix R
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<u>Group (target)</u>	<u>Date</u>	<u>Port</u>	<u>IR Conc (ppm)</u>	<u>Ratio to H-1</u>
2 (1000 ppm)	7 April 05	H-1	1000	1.00
		H-2	1000	1.00
		H-7	1000	1.00
		H-1	1100	1.00
		H-8	1000	0.91
	8 April 05	H-1	1100	1.00
		H-12	1000	0.90
		H-11	1000	0.90
		H-1	970	1.00
		H-14	960	0.96
		H-13	960	0.96
3 (5000 ppm)	7 April 05	H-1	5100	1.00
		H-2	5400	1.05
		H-7	5200	1.01
		H-1	5000	1.00
		H-8	5400	1.05
	8 April 05	H-1	4800	1.00
		H-12	5100	1.06
		H-11	5100	1.06
		H-1	4900	1.00
		H-14	5300	1.08
		H-13	5200	1.06
4 (10000 ppm)	7 April 05	H-1	9800	1.00
		H-2	9900	1.01
		H-7	9600	0.98
		H-1	10000	1.00
		H-8	10000	1.00
	8 April 05	H-1	10000	1.00
		H-12	10000	1.00
		H-11	10000	1.00
		H-1	10000	1.00
		H-14	10000	1.00
		H-13	10000	1.00

	Chamber and Exposure Room Environmental Monitoring	Appendix S
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Interval	Location	Test Substance (ppm) ^a	Light (Ft Candles)	Noise (dB)	Oxygen (%)	Particle Sizing (mg/m ³) ^b
Pretest	Front Room	0	34.4	66.7	NM	NM
	Back Room	0	34.0	64.6	NM	NM
	Group 1	0	NM	NM	21	1.81 x 10 ⁻³
	Group 2	1100	NM	NM	21	1.96 x 10 ⁻³
	Group 3	4800	NM	NM	21	4.48 x 10 ⁻³
	Group 4	10000	NM	NM	21	4.67 x 10 ⁻³
Exposure 2	Front Room	0	32.2	65.8	NM	
	Back Room	0	34.7	63.7	NM	
	Group 1	0	NM	NM	21	
	Group 2	1000	NM	NM	21	
	Group 3	5100	NM	NM	21	
	Group 4	10000	NM	NM	21	
Exposure 37	Front Room	0	30.7	66.6	NM	
	Back Room	0	32.9	63.4	NM	
	Group 1	0	NM	NM	21	
	Group 2	1000	NM	NM	21	
	Group 3	5000	NM	NM	21	
	Group 4	10000	NM	NM	21	
Exposure 65	Front Room	0	35.5	63.9	NM	
	Back Room	0	32.3	60.0	NM	
	Group 1	0	NM	NM	21	
	Group 2	1000	NM	NM	21	
	Group 3	5000	NM	NM	21	
	Group 4	9900	NM	NM	21	

NM = Not measured

^aValues presented are the daily average for the chamber samples and a single time point for the room air samples.

^bPretest results presented. For on-test results, see CMR (Appendix A).

21-OCT-2005 14:07

Huntingdon Life Sciences 03-6141

Page 879

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

MALES GROUP 1 0 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
1311	Terminal Sacrifice	20-JUL-05	14	91
1312	Terminal Sacrifice	20-JUL-05	14	91
1313	Terminal Sacrifice	20-JUL-05	14	91
1314	Terminal Sacrifice	20-JUL-05	14	91
1315	Terminal Sacrifice	20-JUL-05	14	91
1316	Terminal Sacrifice	21-JUL-05	14	92
1317	Terminal Sacrifice	21-JUL-05	14	92
1318	Terminal Sacrifice	21-JUL-05	14	92
1319	Terminal Sacrifice	21-JUL-05	14	92
1320	Terminal Sacrifice	21-JUL-05	14	92

21-OCT-2005 14:07

Huntingdon Life Sciences 03-6141

Page 880

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

MALES GROUP 2 1000 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
2311	Terminal Sacrifice	20-JUL-05	14	91
2312	Terminal Sacrifice	20-JUL-05	14	91
2313	Terminal Sacrifice	20-JUL-05	14	91
2314	Terminal Sacrifice	20-JUL-05	14	91
2315	Terminal Sacrifice	20-JUL-05	14	91
2316	Terminal Sacrifice	21-JUL-05	14	92
2317	Terminal Sacrifice	21-JUL-05	14	92
2318	Terminal Sacrifice	21-JUL-05	14	92
2319	Terminal Sacrifice	21-JUL-05	14	92
2320	Terminal Sacrifice	21-JUL-05	14	92

21-OCT-2005 14:07

Huntingdon Life Sciences 03-6141

Page 881

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

MALES GROUP 3 5000 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
3311	Terminal Sacrifice	20-JUL-05	14	91
3312	Terminal Sacrifice	20-JUL-05	14	91
3313	Terminal Sacrifice	20-JUL-05	14	91
3314	Terminal Sacrifice	20-JUL-05	14	91
3315	Terminal Sacrifice	20-JUL-05	14	91
3316	Terminal Sacrifice	21-JUL-05	14	92
3317	Terminal Sacrifice	21-JUL-05	14	92
3318	Terminal Sacrifice	21-JUL-05	14	92
3319	Terminal Sacrifice	21-JUL-05	14	92
3320	Terminal Sacrifice	21-JUL-05	14	92

21-OCT-2005 14:07

Huntingdon Life Sciences 03-6141

Page 882

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

MALES GROUP 4 10000 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
4311	Terminal Sacrifice	20-JUL-05	14	91
4312	Terminal Sacrifice	20-JUL-05	14	91
4313	Terminal Sacrifice	20-JUL-05	14	91
4314	Terminal Sacrifice	20-JUL-05	14	91
4315	Terminal Sacrifice	20-JUL-05	14	91
4316	Terminal Sacrifice	21-JUL-05	14	92
4317	Terminal Sacrifice	21-JUL-05	14	92
4318	Terminal Sacrifice	21-JUL-05	14	92
4319	Terminal Sacrifice	21-JUL-05	14	92
4320	Terminal Sacrifice	21-JUL-05	14	92

21-OCT-2005 14:07

Huntingdon Life Sciences 03-6141

Page 883

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

MALES GROUP 5 40 MG/KG

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
5311	Terminal Sacrifice	21-JUL-05	14	92
5312	Terminal Sacrifice	21-JUL-05	14	92
5313	Terminal Sacrifice	21-JUL-05	14	92
5314	Terminal Sacrifice	21-JUL-05	14	92
5315	Terminal Sacrifice	21-JUL-05	14	92

21-OCT-2005 14:07

Huntingdon Life Sciences 03-6141

Page 884

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

FEMALES GROUP 1 0 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
1811	Terminal Sacrifice	20-JUL-05	14	91
1812	Terminal Sacrifice	20-JUL-05	14	91
1813	Terminal Sacrifice	20-JUL-05	14	91
1814	Terminal Sacrifice	20-JUL-05	14	91
1815	Terminal Sacrifice	20-JUL-05	14	91
1816	Terminal Sacrifice	22-JUL-05	14	93
1817	Terminal Sacrifice	22-JUL-05	14	93
1818	Terminal Sacrifice	22-JUL-05	14	93
1819	Terminal Sacrifice	22-JUL-05	14	93
1820	Terminal Sacrifice	22-JUL-05	14	93

21-OCT-2005 14:07

Huntingdon Life Sciences 03-6141

Page 885

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

FEMALES GROUP 2 1000 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
2811	Terminal Sacrifice	20-JUL-05	14	91
2812	Terminal Sacrifice	20-JUL-05	14	91
2813	Terminal Sacrifice	20-JUL-05	14	91
2814	Terminal Sacrifice	20-JUL-05	14	91
2815	Terminal Sacrifice	20-JUL-05	14	91
2816	Terminal Sacrifice	22-JUL-05	14	93
2817	Terminal Sacrifice	22-JUL-05	14	93
2818	Terminal Sacrifice	22-JUL-05	14	93
2819	Terminal Sacrifice	22-JUL-05	14	93
2820	Terminal Sacrifice	22-JUL-05	14	93

21-OCT-2005 14:07

Huntingdon Life Sciences 03-6141

Page 886

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

FEMALES GROUP 3 5000 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
3811	Terminal Sacrifice	20-JUL-05	14	91
3812	Terminal Sacrifice	20-JUL-05	14	91
3813	Terminal Sacrifice	20-JUL-05	14	91
3814	Terminal Sacrifice	20-JUL-05	14	91
3815	Terminal Sacrifice	20-JUL-05	14	91
3816	Terminal Sacrifice	22-JUL-05	14	93
3817	Terminal Sacrifice	22-JUL-05	14	93
3818	Terminal Sacrifice	22-JUL-05	14	93
3819	Terminal Sacrifice	22-JUL-05	14	93
3820	Terminal Sacrifice	22-JUL-05	14	93

21-OCT-2005 14:07

Huntingdon Life Sciences 03-6141

Page 887

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

FEMALES GROUP 4 10000 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
4811	Terminal Sacrifice	20-JUL-05	14	91
4812	Moribund Sacrifice	12-JUL-05	12	83
4813	Terminal Sacrifice	20-JUL-05	14	91
4814	Terminal Sacrifice	20-JUL-05	14	91
4815	Terminal Sacrifice	20-JUL-05	14	91
4816	Terminal Sacrifice	22-JUL-05	14	93
4817	Terminal Sacrifice	22-JUL-05	14	93
4818	Terminal Sacrifice	22-JUL-05	14	93
4819	Terminal Sacrifice	22-JUL-05	14	93
4820	Terminal Sacrifice	22-JUL-05	14	93

21-OCT-2005 14:07

Huntingdon Life Sciences 03-6141

Page 888

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

FEMALES GROUP 5 40 MG/KG

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
5811	Terminal Sacrifice	22-JUL-05	14	93
5812	Terminal Sacrifice	22-JUL-05	14	93
5813	Terminal Sacrifice	22-JUL-05	14	93
5814	Terminal Sacrifice	22-JUL-05	14	93
5815	Terminal Sacrifice	22-JUL-05	14	93

21-OCT-2005 14:08

Huntingdon Life Sciences 03-6141N

Page 889

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

MALES GROUP 1 0 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
1321	Terminal Sacrifice	26-JUL-05	14	97
1322	Terminal Sacrifice	26-JUL-05	14	97
1323	Terminal Sacrifice	26-JUL-05	14	97
1324	Terminal Sacrifice	27-JUL-05	15	98
1325	Terminal Sacrifice	27-JUL-05	15	98

21-OCT-2005 14:08

Huntingdon Life Sciences 03-6141N

Page 890

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

MALES GROUP 2 1000 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
2321	Terminal Sacrifice	26-JUL-05	14	97
2322	Terminal Sacrifice	26-JUL-05	14	97
2323	Terminal Sacrifice	27-JUL-05	15	98
2324	Terminal Sacrifice	27-JUL-05	15	98
2325	Terminal Sacrifice	27-JUL-05	15	98

21-OCT-2005 14:08

Huntingdon Life Sciences 03-6141N

Page 891

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

MALES GROUP 3 5000 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
3321	Terminal Sacrifice	26-JUL-05	14	97
3322	Terminal Sacrifice	26-JUL-05	14	97
3323	Terminal Sacrifice	26-JUL-05	14	97
3324	Terminal Sacrifice	27-JUL-05	15	98
3325	Terminal Sacrifice	27-JUL-05	15	98

21-OCT-2005 14:08

Huntingdon Life Sciences 03-6141N

Page 892

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

MALES GROUP 4 10000 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
4321	Terminal Sacrifice	26-JUL-05	14	97
4322	Terminal Sacrifice	26-JUL-05	14	97
4323	Terminal Sacrifice	27-JUL-05	15	98
4324	Terminal Sacrifice	27-JUL-05	15	98
4325	Terminal Sacrifice	27-JUL-05	15	98

21-OCT-2005 14:08

Huntingdon Life Sciences 03-6141N

Page 893

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

FEMALES GROUP 1 0 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
1821	Terminal Sacrifice	26-JUL-05	14	97
1822	Terminal Sacrifice	26-JUL-05	14	97
1823	Terminal Sacrifice	27-JUL-05	15	98
1824	Terminal Sacrifice	27-JUL-05	15	98
1825	Terminal Sacrifice	27-JUL-05	15	98

21-OCT-2005 14:08

Huntingdon Life Sciences 03-6141N

Page 894

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

FEMALES GROUP 2 1000 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
2821	Terminal Sacrifice	26-JUL-05	14	97
2822	Terminal Sacrifice	26-JUL-05	14	97
2823	Terminal Sacrifice	26-JUL-05	14	97
2824	Terminal Sacrifice	27-JUL-05	15	98
2825	Terminal Sacrifice	27-JUL-05	15	98

21-OCT-2005 14:08

Huntingdon Life Sciences 03-6141N

Page 895

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

FEMALES GROUP 3 5000 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
3821	Terminal Sacrifice	26-JUL-05	14	97
3822	Terminal Sacrifice	26-JUL-05	14	97
3823	Terminal Sacrifice	27-JUL-05	15	98
3824	Terminal Sacrifice	27-JUL-05	15	98
3825	Terminal Sacrifice	27-JUL-05	15	98

21-OCT-2005 14:08

Huntingdon Life Sciences 03-6141N

Page 896

APPENDIX T

LIQUIFIED PETROLEUM GAS: A 13-WEEK WHOLE-BODY INHALATION
TOXICITY STUDY IN RATS WITH NEUROTOXICITY ASSESSMENTS AND
IN VIVO GENOTOXICITY ASSESSMENTS

ANIMAL TERMINATION HISTORY

FEMALES GROUP 4 10000 PPM

ANIMAL#	TYPE OF DEATH	DATE OF DEATH	WEEK OF STUDY	STUDY DAY
4821	Terminal Sacrifice	26-JUL-05	14	97
4822	Terminal Sacrifice	26-JUL-05	14	97
4823	Terminal Sacrifice	26-JUL-05	14	97
4824	Terminal Sacrifice	27-JUL-05	15	98
4825	Terminal Sacrifice	27-JUL-05	15	98

Huntingdon Life Sciences

03-6141

Page 1
Final Report

	Analytical Report	Appendix U
--	-------------------	------------

STUDY TITLE

Analytical Report For:

**Liquified Petroleum Gas:
A 13-Week Whole Body Inhalation Toxicity Study in Rats with Neurotoxicity
Assessments and In Vivo Genotoxicity Assessments**

AUTHOR



REPORT DATE

9 February 2010

STUDY NUMBER

03-6141

Huntingdon Life Sciences

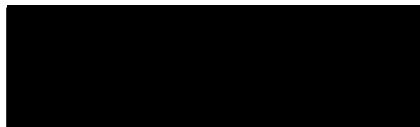
03-6141

Page 2
Final Report

	Analytical Report	Appendix U
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SIGNATURES

Written by:

09 Feb 10

Date



Formulation Chemistry Services

Reviewed by:

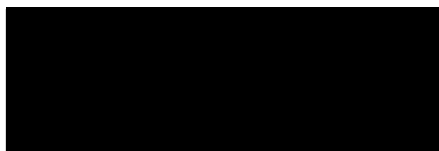
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Date

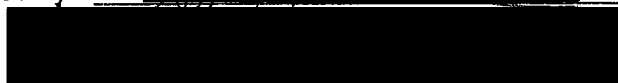


Formulation Chemistry Services

Approved by:

9 Feb 10

Date



Analytical Services

	Analytical Report	Appendix U
--	-------------------	------------

Table of Contents

Study Title Page.....	1
Signature Page	2
Table of Contents.....	3
1. Summary.....	4
2. Experimental Procedures	4
3. Results and Discussion	5

Tables

I-A Liquified Petroleum Gas Characterization ("Trial 1").....	6
I-B Liquified Petroleum Gas Characterization ("Trial 2").....	6
II-A Liquified Petroleum Gas Characterization ("Exposure 4").....	7
II-B Liquified Petroleum Gas Characterization ("Exposure 8").....	7
II-C Liquified Petroleum Gas Characterization ("Exposure 14").....	8
II-D Liquified Petroleum Gas Characterization ("Exposure 19").....	8
II-E Liquified Petroleum Gas Characterization ("Exposure 25").....	9
II-F Liquified Petroleum Gas Characterization ("Exposure 30")	9
II-G Liquified Petroleum Gas Characterization ("Exposure 35").....	10
II-H Liquified Petroleum Gas Characterization ("Exposure 40").....	10
II-I Liquified Petroleum Gas Characterization ("Exposure 46")	11
II-J Liquified Petroleum Gas Characterization ("Exposure 51").....	11
II-K Liquified Petroleum Gas Characterization ("Exposure 55").....	12
II-L Liquified Petroleum Gas Characterization ("Exposure 65")	12
II-M Liquified Petroleum Gas Characterization ("Exposure 71").....	13

Figures

I A Typical Gas Chromatogram of Group 1 (Air Control) Chamber Sample	14
II A Typical Gas Chromatogram of Group 2 (LPG) Chamber Sample.....	15
III A Typical Gas Chromatogram of Group 3 (LPG) Chamber Sample.....	16
IV A Typical Gas Chromatogram of Group 4 (LPG) Chamber Sample.....	17

	Analytical Report	Appendix U
--	-------------------	------------

1. Summary

The Liquified Petroleum Gas (LPG) chamber samples were analyzed to determine the purity and stability of the test substance by comparison to the Liquid Petroleum Gas (LPG) test substance. The analytical method (HLS-012-04) was validated at Huntingdon Life Sciences (HLS). The analytical method involved gas-tight syringe sampling of the test substance and quantification using Gas Chromatography with Flame Ionization Detection (FID).

2. Experimental Procedures

The analytical method (HLS-012-04) was validated by Formulation Chemistry at HLS. Details of the analytical method is maintained in this study file.

Gas-tight syringe sampling of the test substance and the analytical standard was performed in the Inhalation Department at HLS. The test substance and the analytical standard were analyzed using a Gas Chromatograph equipped with a HP Plot Q (30 m x 0.32 mm, 20 μ m) column and Flame Ionization Detector (FID) to determine the purity of LPG test substance. An HP 3396A integrator was used for data collection and Excel was used for processing the data.

Date of sample analysis is listed as follows:

Interval	Date Analyzed
Trial 1	07 April 05
Trial 2	12 April 05
Exposure 4	25 April 05
Exposure 8	29 April 05
Exposure 14	06 May 05
Exposure 19	13 May 05
Exposure 25	20 May 05
Exposure 30	27 May 05
Exposure 35	03 June 05
Exposure 40	10 June 05
Exposure 46	17 June 05
Exposure 51	24 June 05
Exposure 55	30 June 05
Exposure 65	14 July 05
Exposure 71	21 July 05

	Analytical Report	Appendix U
--	-------------------	------------

3. Results and Discussion

The Liquified Petroleum Gas (LPG) chambers were analyzed prior to the initiation of the study and at 13 intervals during the study to determine the purity and stability of the test substance. The results of the characterization of the pretest/trials and exposures are presented in Tables I-A & I-B and Tables II-A to II-M, respectively. The data indicates that the test substance was stable throughout the study. Typical chromatograms of Liquified Petroleum Gas (LPG) chamber samples (Groups 1 to 4) are presented in Figures I-IV.

	Analytical Report	Appendix U
--	-------------------	------------

Table I-A: LPG Characterization ("Trial 1")

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	0.84	6.37	85.61	1.91	5.27	100.00
LPG-2	0.85	6.39	85.55	2.04	5.18	100.01
LPG-3	1.03	6.61	85.03	1.87	4.95	99.49
Group-2	0.78	6.22	85.54	2.10	5.29	99.93
Group-3	0.76	6.42	85.33	1.99	5.51	100.01
Group-4	1.04	6.60	85.74	1.67	4.95	100.00

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample**Table I-B: LPG Characterization ("Trial 2")**

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	0.89	5.89	86.05	1.95	5.23	100.01
LPG-2	0.83	6.36	85.58	2.04	5.19	100.00
LPG-3	1.09	6.55	85.24	1.83	4.77	99.48
Group-2	0.85	6.51	85.15	1.94	5.19	99.64
Group-3	0.76	6.26	85.48	2.08	5.34	99.92
Group-4	1.09	6.57	85.70	1.86	4.77	99.99

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample

	Analytical Report	Appendix U
--	-------------------	------------

Table II-A: LPG Characterization ("Exposure 4")

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	0.84	6.16	85.68	1.99	5.22	99.89
LPG-2	0.78	6.15	85.66	2.03	5.27	99.89
LPG-3	0.89	6.12	85.86	1.92	5.12	99.91
Group-1	ND	ND	ND	ND	ND	0.00
Group-2	0.86	6.43	85.23	1.95	5.53	100.00
Group-3	0.74	6.14	85.55	2.07	5.50	100.00
Group-4	1.05	6.36	85.76	1.95	4.88	100.00

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample
 ND = None Detected

Table II-B: LPG Characterization ("Exposure 8")

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	0.82	6.14	85.25	2.13	5.51	99.85
LPG-2	1.28	6.69	85.77	1.70	4.44	99.88
LPG-3	0.99	6.42	85.62	1.93	4.93	99.89
Group-1	ND	ND	<LOQ	ND	ND	0.00
Group-2	0.90	6.57	87.24	ND	5.29	100.00
Group-3	1.03	6.50	85.65	1.84	4.96	99.98
Group-4	0.98	6.44	85.62	1.87	5.09	100.00

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample
 ND = None Detected

<LOQ = Less than the limit of quantification = Less than 25% of the area count of the component in the test substance

	Analytical Report	Appendix U
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Table II-C: LPG Characterization ("Exposure 14")

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	0.85	6.36	85.48	2.06	5.25	100.00
LPG-2	0.91	6.41	85.62	1.95	5.11	100.00
LPG-3	1.01	6.47	85.89	1.89	4.74	100.00
Group-1	ND	ND	<LOQ	ND	ND	0.00
Group-2	0.89	6.52	87.13	ND	5.46	100.00
Group-3	1.01	6.51	85.75	1.85	4.88	100.00
Group-4	0.93	6.43	85.52	2.02	5.11	100.01

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample

ND = None Detected

<LOQ = Less than the limit of quantification = Less than 25% of the area count of the component in the test substance

Table II-D: LPG Characterization ("Exposure 19")

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	0.92	6.44	85.57	1.99	5.09	100.01
LPG-2	0.93	6.43	85.67	1.91	5.03	99.97
LPG-3	0.93	6.45	85.77	1.87	4.99	100.01
Group-1	ND	ND	<LOQ	ND	ND	0.00
Group-2	0.84	6.39	87.07	ND	5.32	99.62
Group-3	1.00	6.46	85.56	2.00	4.98	100.00
Group-4	0.85	6.35	85.61	2.04	5.15	100.00

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample

ND = None Detected

<LOQ = Less than the limit of quantification = Less than 25% of the area count of the component in the test substance

	Analytical Report	Appendix U
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Table II-E: LPG Characterization ("Exposure 25")

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	0.92	6.41	85.79	1.73	5.10	99.95
LPG-2	0.94	6.39	85.71	1.91	5.04	99.99
LPG-3	0.92	6.40	85.56	1.96	5.11	99.95
Group-1	ND	ND	ND	ND	ND	0.00
Group-2	0.95	6.57	87.58	ND	4.90	100.00
Group-3	0.90	6.43	85.74	1.85	5.08	100.00
Group-4	1.21	6.64	85.77	1.75	4.63	100.00

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample
ND = None Detected

Table II-F: LPG Characterization ("Exposure 30")

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	0.91	6.31	85.89	1.90	4.98	99.99
LPG-2	0.92	6.40	85.76	1.91	5.01	100.00
LPG-3	0.92	6.34	85.83	1.91	5.00	100.00
Group-1	ND	ND	ND	ND	ND	0.00
Group-2	1.06	6.41	87.39	ND	5.14	100.00
Group-3	0.76	6.22	85.73	1.91	5.38	100.00
Group-4	0.88	6.33	85.78	2.01	5.00	100.00

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample
ND = None Detected

	Analytical Report	Appendix U
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Table II-G: LPG Characterization ("Exposure 35")

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	0.96	6.46	85.85	1.96	4.77	100.00
LPG-2	0.96	6.42	85.70	1.97	4.95	100.00
LPG-3	0.96	6.46	85.71	1.88	5.00	100.01
Group-1	ND	ND	ND	ND	ND	0.00
Group-2	1.22	6.46	87.29	ND	5.03	100.00
Group-3	0.73	6.22	85.67	1.99	5.39	100.00
Group-4	0.84	6.30	85.70	1.93	5.23	100.00

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample
ND = None Detected

Table II-H: LPG Characterization ("Exposure 40")

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	1.06	6.45	85.94	1.83	4.72	100.00
LPG-2	1.03	6.47	85.84	1.94	4.72	100.00
LPG-3	1.05	6.43	85.95	1.87	4.70	100.00
Group-1	ND	ND	ND	ND	ND	0.00
Group-2	0.89	6.53	87.52	ND	5.06	100.00
Group-3	0.73	6.13	85.54	2.21	5.39	100.00
Group-4	0.84	6.27	85.61	2.06	5.22	100.00

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample
ND = None Detected

	Analytical Report	Appendix U
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Table II-I: LPG Characterization ("Exposure 46")

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	1.22	6.61	85.89	1.81	4.47	100.00
LPG-2	1.23	6.66	85.87	1.81	4.43	100.00
LPG-3	1.23	6.64	85.98	1.70	4.44	99.99
Group-1	ND	ND	ND	ND	ND	0.00
Group-2	0.92	6.54	87.59	ND	4.95	100.00
Group-3	0.67	6.12	85.52	2.09	5.60	100.00
Group-4	1.17	6.58	85.73	1.88	4.64	100.00

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample
 ND = None Detected

Table II-J: LPG Characterization ("Exposure 51")

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	0.80	6.28	85.60	2.05	5.28	100.01
LPG-2	0.80	6.27	85.60	1.90	5.33	99.90
LPG-3	0.81	6.26	85.87	1.92	5.14	100.00
Group-1	ND	ND	ND	ND	ND	0.00
Group-2	0.96	6.47	87.54	ND	5.03	100.00
Group-3	1.05	6.37	85.81	1.88	4.90	100.01
Group-4	1.10	6.54	85.73	1.90	4.73	100.00

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample
 ND = None Detected

<LOQ = Less than the limit of quantification = Less than 25% of the area count of the component in the test substance

	Analytical Report	Appendix U
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Table II-K: LPG Characterization ("Exposure 55")

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	0.94	6.39	85.84	1.87	4.96	100.00
LPG-2	0.93	6.37	85.95	1.82	4.93	100.00
LPG-3	0.99	6.47	85.71	1.94	4.87	99.98
Group-1	ND	ND	ND	ND	ND	0.00
Group-2	0.99	6.53	87.25	ND	5.24	100.01
Group-3	1.02	6.46	85.68	1.94	4.89	99.99
Group-4	1.01	6.43	85.72	1.97	4.87	100.00

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample

ND = None Detected

<LOQ = Less than the limit of quantification = Less than 25% of the area count of the component in the test substance

Table II-L: LPG Characterization ("Exposure 65")

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	0.95	6.39	85.59	1.99	5.04	99.96
LPG-2	0.96	6.41	85.76	1.91	4.96	100.00
LPG-3	0.96	6.42	85.68	1.92	5.02	100.00
Group-1	ND	ND	ND	ND	ND	0.00
Group-2	0.97	6.48	87.14	ND	5.02	99.61
Group-3	1.02	6.48	85.70	1.86	4.94	100.00
Group-4	0.98	6.43	85.60	2.02	4.96	99.99

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample

ND = None Detected

<LOQ = Less than the limit of quantification = Less than 25% of the area count of the component in the test substance

	Analytical Report	Appendix U
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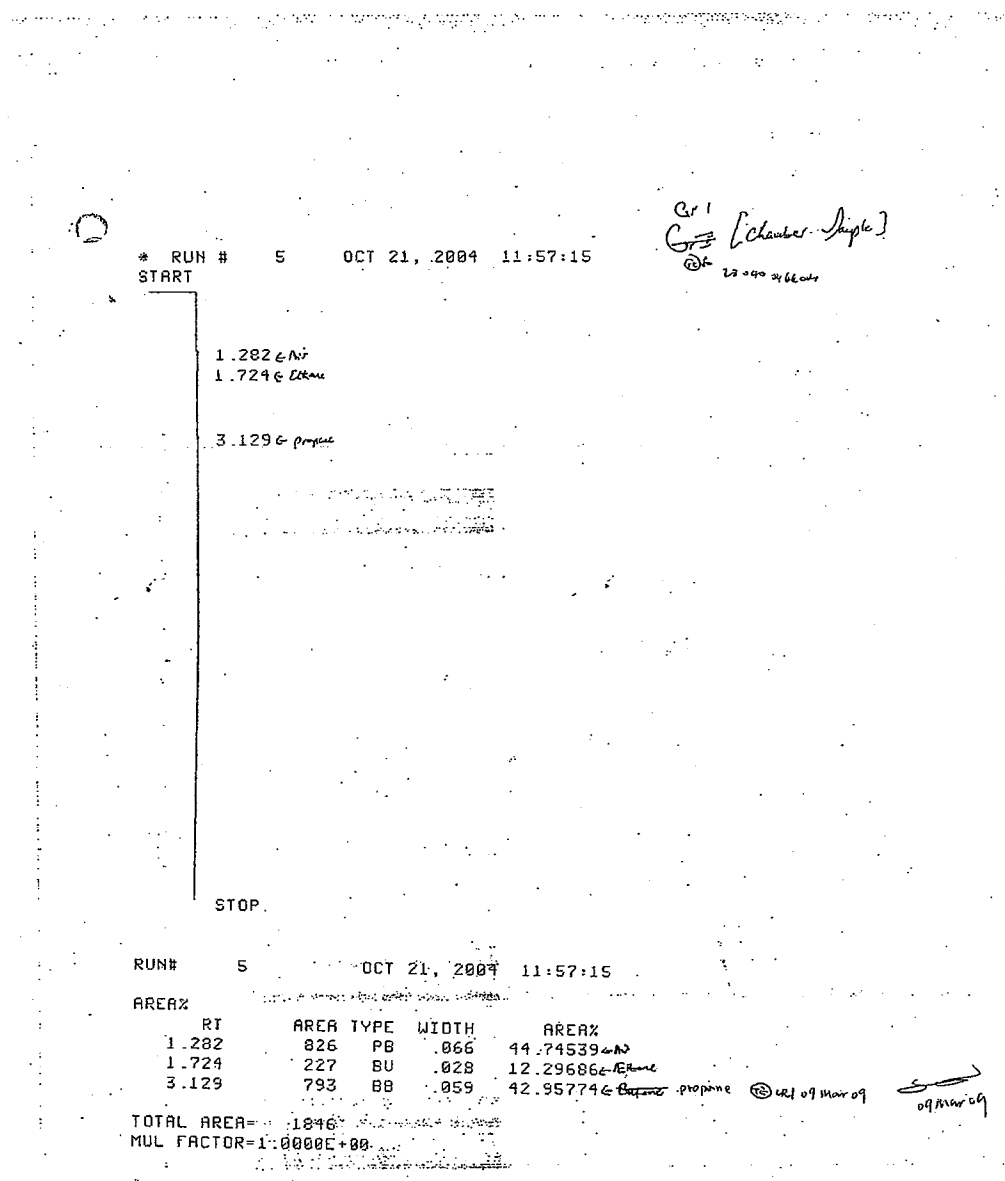
Table II-M: LPG Characterization ("Exposure 71")

Sample ID ^a	Area % of Ethane	Area % of Propylene	Area % of Propane	Area % of Isobutane	Area % of Butane	Total Area %
LPG-1	0.99	6.46	85.97	1.64	4.94	100.00
LPG-2	0.94	6.42	85.77	1.88	4.99	100.00
LPG-3	0.95	6.42	85.68	2.04	4.91	100.00
Group-1	ND	ND	ND	ND	ND	0.00
Group-2	0.90	6.47	87.20	ND	5.43	100.00
Group-3	1.00	6.47	85.82	1.88	4.83	100.00
Group-4	0.90	6.37	85.58	2.04	5.11	100.00

^a LPG-1, etc. is a liquid standard and Group-2, etc. is a chamber sample

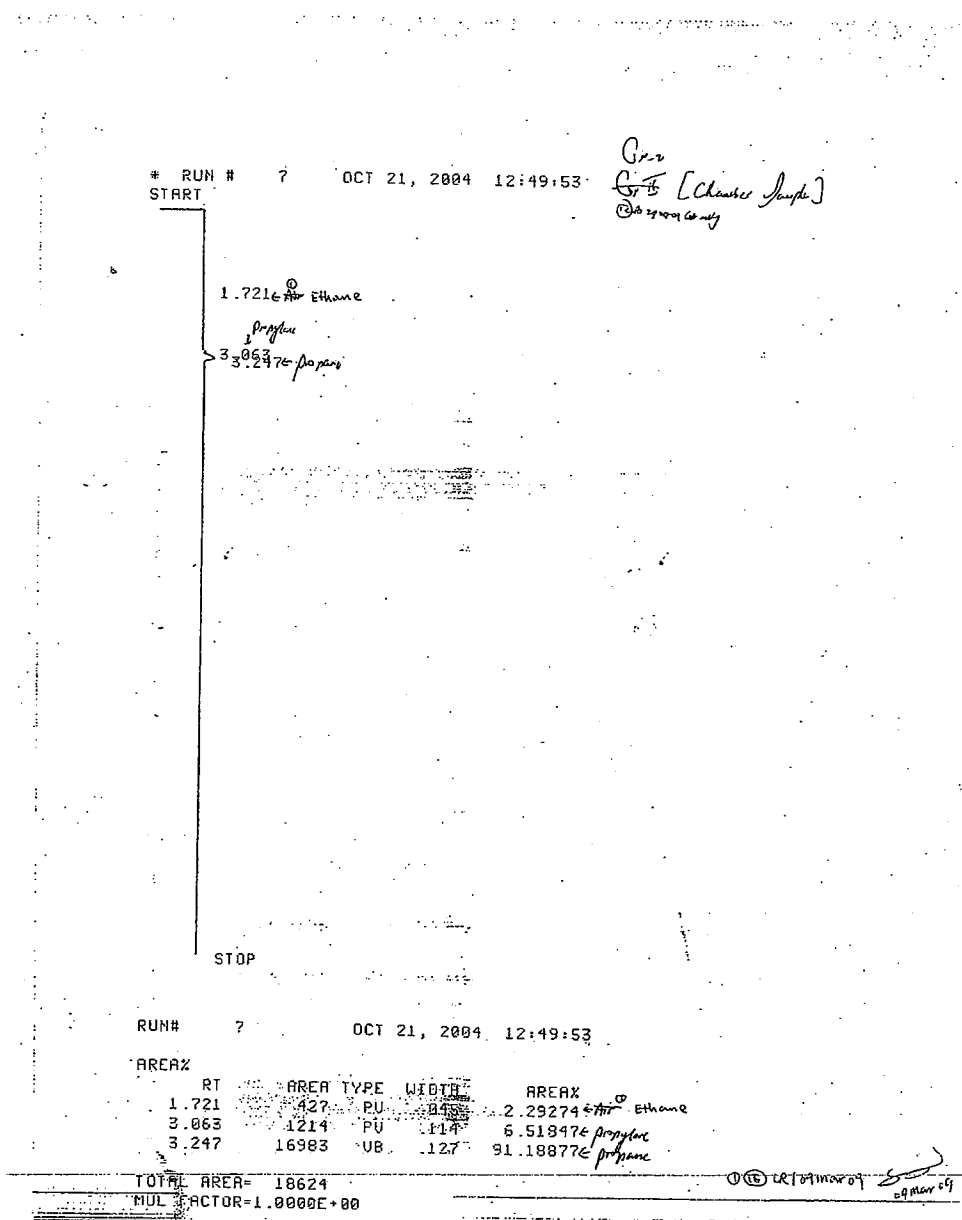
ND = None Detected

	Analytical Report	Appendix U
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Figure I. A Typical Gas Chromatogram of Group 1 (Air Control) Chamber Sample**Response (mV) vs Time (minutes)**

	Analytical Report	Appendix U
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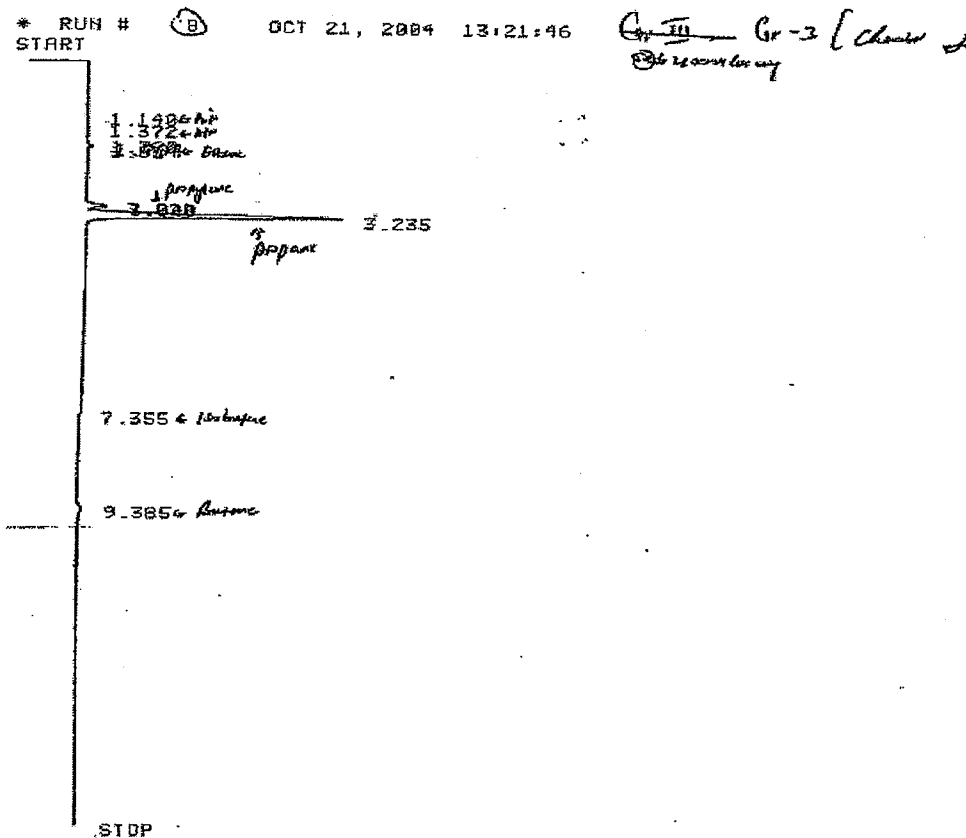
Figure II. A Typical Gas Chromatogram of Group 2 (LPG) Chamber Sample



Response (mV) vs Time (minutes)

	Analytical Report	Appendix U
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Figure III. A Typical Gas Chromatogram of Group 3 (LPG) Chamber Sample

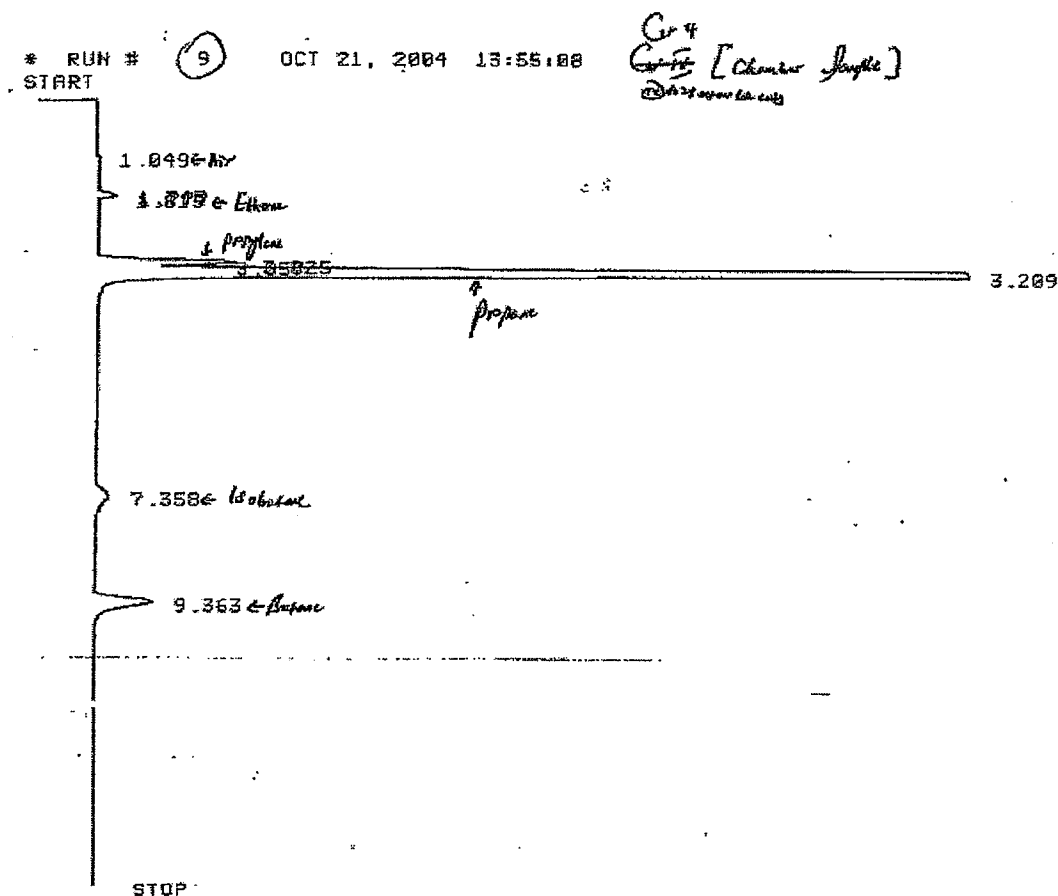


RUN#	8	OCT 21, 2004	13:21:46	
AREA#				
RT	AREA	TYPE	WIDTH	AREA#
1.140	166	PB	.016	.06858 Air
1.372	792	PU	.103	.32718 Air
1.720	842	PU	.036	.34784
1.767	1686	UU	.034	.69658
1.794	1107	UU	.021	.45731
1.824	278	UB	.018	.11484
3.020	8431	PU	.047	3.48291
3.040	7244	UU	.038	2.99255
3.235	207083	UB	.091	85.54746 Isobutane
7.355	4217	BU	.364	1.74207 Butane
9.385	10222	BB	.208	4.22278
TOTAL AREA= 242068				
MUL FACTOR=1.0000E+00				

Response (mV) vs Time (minutes)

	Analytical Report	Appendix U
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Figure IV. A Typical Gas Chromatogram of Group 4 (LPG) Chamber Sample



RUN# 9 OCT 21, 2004 13:55:08

AREA#	RT	AREA	TYPE	WIDTH	AREA%
	1.049	194	BB	.010	.00876 Air
	1.745	8994	UU	.059	.40611 Ethane: 0.82
	1.777	6466	UU	.038	.29196
	1.815	2798	UB	.020	.12634
	3.025	112362	PU	.091	5.07348 Propane: 6.35
	3.057	28285	UU	.028	1.27715
	3.209	1090204	UB	.124	85.35210 Propane
	7.358	43014	PU	.355	1.94221 Isobutane
	9.363	112773	PB	.222	5.09204 Butane
	27.056	9520	UU	.040	.42986

TOTAL AREA=2214690
MUL FACTOR=1.0000E+00

Response (mV) vs Time (minutes)

ChevronTexaco Energy Research
& Technology Company
Integrated Lab Technologies
100 Chevron Way
P.O.Box 1627
Richmond, CA 94802-0627
Tel 510-242-4993

July 23, 2003

ChevronTexaco

American Petroleum Institute
1220 L Street, Northwest
Washington, DC 20005-4070

Dear [REDACTED]:

Enclosed are the analytical results for each of the five 100 gallon cylinders of liquefied petroleum gas that have been prepared for HPV light gases task group and are being stored at our facility. I have included individual analyses of each of the tanks plus two duplicates. Additionally since the five cylinders were filled from the same truck, should theoretically have the same composition, and in fact calculate to have very similar compositions, I summed the chromatographic signals of all seven analyses and calculated the average results for the LPG based on the summed signal. This technique reduces signal to noise and provides a more precise measurement of the smaller concentration constituents.

Liquid samples were injected at 100 psig using a liquid sampling loop. The coefficient of variation of the seven total sample areas was 12.8%, and the average total sample area had a 95% confidence limit of +/- 11.8 %, reflecting the difficulty of injecting truly repeatable amounts of such a volatile material.

Results were quantified by normalizing the total area counts to the average area counts for all seven analyses and then calculating the concentration of ethane, n-butane, isobutene, and isopentane by comparing peak areas with the average areas of a certified LPG master standard from Scott Specialty gases, run in triplicate. The concentrations of all other compounds heavier than propane were determined by applying weight response factors and ratioing adjusted peak areas to the n-butane adjusted peak area. The concentration of methane was treated similarly but ratioed to ethane. We were unfortunately unable to separate propane and propylene, given the high concentration of the propane. The two compounds were quantified by difference from 100.0 percent to account for detector overload, and were reported as a sum.

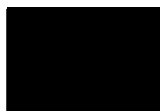
Neither benzene nor 1,3-butadiene were detected in any of the samples. The instrument detection limit for 1,3-butadiene was <10 ppm for all samples except LPG1 duplicate. In that sample the baseline was noisier than usual in the region where 1,3-butadiene elutes, necessitating an instrument detection limit of <20 ppm.

July 22, 2003
Page 2

ChevronTexaco

If you have any questions concerning this report please feel free to contact me.

Sincerely,

A black rectangular redaction box covering the signature.A black rectangular redaction box covering the contact information.

Sample Name: LPG 1, tank V64452

Method: GC-FID using a liquid sampling valve, manual calculation based on a certified LPG standard

	weight %	volume %	mole %
normal paraffins			
methane	0.012	0.015	0.025
ethane	2.048	1.947	2.262
propane + propylene	93.263	92.176	92.688
n-butane	2.857	3.607	3.167
n-pentane	0.068	0.079	0.061
isoparaffins			
isobutane	1.264	1.538	1.301
neopentane	0.003	0.004	0.003
isopentane	0.392	0.523	0.396
2,3-dimethylbutane	nd<0.001	nd<0.001	nd<0.001
cycloparaffins			
cyclopentane	nd<0.001	nd<0.001	nd<0.001
olefins, dienes			
isobutene	0.036	0.045	0.042
1,3-butadiene	nd<0.001	nd<0.001	nd<0.001
t-2-butene	0.009	0.011	0.010
c-2-butene	0.009	0.010	0.010
3-methyl-1-butene	0.003	0.003	0.003
1-pentene	0.011	0.012	0.010
2-methyl-1-butene	0.004	0.005	0.004
t-2-pentene	0.006	0.007	0.006
c-2-pentene	0.004	0.005	0.004
2-methyl-2-butene	0.010	0.011	0.009
aromatics			
benzene	nd<0.001	nd<0.001	nd<0.001

EAG 7/23/03

Sample Name: LPG 1, tank V64452, duplicate injection

Method: GC-FID using a liquid sampling valve, manual calculation based on a certified LPG standard

	weight %	volume %	mole %
normal paraffins			
methane	0.007	0.009	0.014
ethane	1.652	1.647	1.915
propane + propylene	93.647	92.178	92.778
n-butane	2.867	3.794	3.335
n-pentane	0.062	0.076	0.058
isoparaffins			
isobutane	1.262	1.610	1.363
neopentane	0.002	0.003	0.002
isopentane	0.393	0.549	0.416
2,3-dimethylbutane	nd<0.001	nd<0.001	nd<0.001
cycloparaffins			
cyclopentane	nd<0.001	nd<0.001	nd<0.001
olefins, dienes			
isobutene	0.040	0.051	0.048
1,3-butadiene	nd<0.002	nd<0.002	nd<0.002
t-2-butene	0.008	0.010	0.010
c-2-butene	0.009	0.011	0.011
3-methyl-1-butene	0.003	0.003	0.003
1-pentene	0.019	0.023	0.018
2-methyl-1-butene	0.010	0.011	0.009
t-2-pentene	0.012	0.014	0.011
c-2-pentene	0.002	0.002	0.002
2-methyl-2-butene	0.006	0.007	0.006
aromatics			
benzene	nd<0.001	nd<0.001	nd<0.001

END 7/23/03

Sample Name: LPG 2, tank V641461

Method: GC-FID using a liquid sampling valve, manual calculation based on a certified LPG standard

	weight %	volume %	mole %
normal paraffins			
methane	0.014	0.016	0.026
ethane	2.175	1.914	2.223
propane + propylene	92.887	92.362	92.856
n-butane	2.999	3.503	3.075
n-pentane	0.066	0.071	0.054
isoparaffins			
isobutane	1.358	1.529	1.293
neopentane	0.002	0.002	0.001
isopentane	0.404	0.499	0.377
2,3-dimethylbutane	nd<0.001	nd<0.001	nd<0.001
cycloparaffins			
cyclopentane	nd<0.001	nd<0.001	nd<0.001
olefins, dienes			
isobutene	0.042	0.047	0.044
1,3-butadiene	nd<0.001	nd<0.001	nd<0.001
t-2-butene	0.007	0.008	0.008
c-2-butene	0.011	0.012	0.011
3-methyl-1-butene	0.003	0.003	0.003
1-pentene	0.010	0.011	0.009
2-methyl-1-butene	0.006	0.007	0.005
t-2-pentene	0.005	0.005	0.004
c-2-pentene	0.003	0.003	0.003
2-methyl-2-butene	0.007	0.007	0.006
aromatics			
benzene	nd<0.001	nd<0.001	nd<0.001

EO# 7/23/03

Sample Name: LPG 3, tank V641455

Method: GC-FID using a liquid sampling valve, manual calculation based on a certified LPG standard

	weight %	volume %	mole %
normal paraffins			
methane	0.020	0.027	0.044
ethane	2.076	2.108	2.448
propane + propylene	93.650	92.169	92.625
n-butane	2.633	3.550	3.115
n-pentane	0.059	0.074	0.056
isoparaffins			
isobutane	1.123	1.458	1.233
neopentane	0.003	0.004	0.003
isopentane	0.351	0.501	0.378
2,3-dimethylbutane	nd<0.001	nd<0.001	nd<0.001
cycloparaffins			
cyclopentane	nd<0.001	nd<0.001	nd<0.001
olefins, dienes			
isobutene	0.036	0.047	0.044
1,3-butadiene	nd<0.001	nd<0.001	nd<0.001
t-2-butene	0.007	0.009	0.009
c-2-butene	0.009	0.011	0.011
3-methyl-1-butene	nd<0.001	nd<0.001	nd<0.001
1-pentene	0.011	0.013	0.011
2-methyl-1-butene	0.005	0.006	0.005
t-2-pentene	0.006	0.008	0.006
c-2-pentene	0.005	0.006	0.005
2-methyl-2-butene	0.004	0.005	0.004
aromatics			
benzene	nd<0.001	nd<0.001	nd<0.001

EOL 7/23/03

Sample Name: LPG 3, tank V641455, duplicate injection

Method: GC-FID using a liquid sampling valve, manual calculation based on a certified LPG standard

	weight %	volume %	mole %
normal paraffins			
methane	0.012	0.016	0.027
ethane	1.809	1.849	2.150
propane + propylene	93.517	91.854	92.436
n-butane	2.854	3.872	3.402
n-pentane	0.064	0.080	0.061
isoparaffins			
isobutane	1.246	1.629	1.380
neopentane	0.003	0.004	0.003
isopentane	0.404	0.579	0.438
2,3-dimethylbutane	nd<0.001	nd<0.001	nd<0.001
cycloparaffins			
cyclopentane	nd<0.001	nd<0.001	nd<0.001
olefins, dienes			
isobutene	0.038	0.050	0.047
1,3-butadiene	nd<0.001	nd<0.001	nd<0.001
t-2-butene	0.009	0.012	0.011
c-2-butene	0.007	0.008	0.008
3-methyl-1-butene	0.004	0.004	0.003
1-pentene	0.014	0.017	0.014
2-methyl-1-butene	0.005	0.006	0.005
t-2-pentene	0.005	0.006	0.005
c-2-pentene	0.004	0.005	0.004
2-methyl-2-butene	0.006	0.007	0.005
aromatics			
benzene	nd<0.001	nd<0.001	nd<0.001

EW 7/23/03

Sample Name: LPG 4, tank V641456

Method: GC-FID using a liquid sampling valve, manual calculation based on a certified LPG standard

	weight %	volume %	mole %
normal paraffins			
methane	0.016	0.019	0.031
ethane	2.264	2.027	2.355
propane + propylene	92.619	91.935	92.455
n-butane	3.111	3.698	3.247
n-pentane	0.072	0.079	0.060
isoparaffins			
isobutane	1.357	1.554	1.315
neopentane	0.003	0.003	0.002
isopentane	0.443	0.557	0.421
2,3-dimethylbutane	0.008	0.008	0.005
cycloparaffins			
cyclopentane	0.003	0.003	0.003
olefins, dienes			
isobutene	0.042	0.048	0.045
1,3-butadiene	nd<0.001	nd<0.001	nd<0.001
t-2-butene	0.010	0.011	0.011
c-2-butene	0.009	0.010	0.010
3-methyl-1-butene	0.003	0.004	0.003
1-pentene	0.015	0.017	0.013
2-methyl-1-butene	0.007	0.008	0.006
t-2-pentene	0.005	0.005	0.004
c-2-pentene	0.005	0.005	0.004
2-methyl-2-butene	0.009	0.009	0.007
aromatics			
benzene	nd<0.001	nd<0.001	nd<0.001

EQ# 7/23/03

Sample Name: LPG 5, tank V641437

Method: GC-FID using a liquid sampling valve, manual calculation based on a certified LPG standard

	weight %	volume %	mole %
normal paraffins			
methane	0.014	0.022	0.036
ethane	1.816	2.100	2.439
propane + propylene	94.328	92.023	92.509
n-butane	2.332	3.581	3.143
n-pentane	0.057	0.080	0.061
isoparaffins			
isobutane	1.027	1.520	1.286
neopentane	0.004	0.006	0.004
isopentane	0.330	0.535	0.405
2,3-dimethylbutane	nd<0.001	nd<0.001	nd<0.001
cycloparaffins			
cyclopentane	nd<0.001	nd<0.001	nd<0.001
olefins, dienes			
isobutene	0.032	0.048	0.045
1,3-butadiene	nd<0.001	nd<0.001	nd<0.001
t-2-butene	0.007	0.011	0.010
c-2-butene	0.008	0.012	0.012
3-methyl-1-butene	0.003	0.004	0.003
1-pentene	0.014	0.020	0.016
2-methyl-1-butene	0.010	0.014	0.011
t-2-pentene	0.005	0.007	0.006
c-2-pentene	0.005	0.007	0.006
2-methyl-2-butene	0.007	0.009	0.008
aromatics			
benzene	nd<0.001	nd<0.001	nd<0.001

EOL 7/23/03

Sample Name: Average Signal

Integration of the summed chromatographic signal of all samples and duplicates to gain improved signal to noise

Method: GC-FID using a liquid sampling valve, manual calculation based on a certified LPG standard

	weight %	volume %	mole %
normal paraffins			
methane	0.012	0.016	0.027
ethane	1.809	1.849	2.150
propane + propylene	93.513	91.851	92.434
n-butane	2.854	3.872	3.402
n-pentane	0.064	0.080	0.061
isoparaffins			
isobutane	1.246	1.629	1.380
neopentane	0.003	0.004	0.003
isopentane	0.404	0.579	0.438
2,3-dimethylbutane	0.006	0.007	0.005
cycloparaffins			
cyclopentane	nd<0.001	nd<0.001	nd<0.001
olefins, dienes			
isobutene	0.038	0.050	0.047
1,3-butadiene	nd<0.001	nd<0.001	nd<0.001
t-2-butene	0.009	0.012	0.011
c-2-butene	0.007	0.008	0.008
3-methyl-1-butene	0.004	0.004	0.003
1-pentene	0.014	0.017	0.014
2-methyl-1-butene	0.005	0.006	0.005
t-2-pentene	0.003	0.003	0.003
c-2-pentene	0.003	0.004	0.003
2-methyl-2-butene	0.005	0.006	0.005
aromatics			
benzene	nd<0.001	nd<0.001	nd<0.001

END 7/23/03

API LPG Comparative Analysis -- August 23, 2004

Cylinder Serial Number	K634083	K634086	K634106	V641453	12/19/2001	
33# Cylinder Number				420#	Trap Target	
Filling Sequence	42	20	1	Cylinder 5	Wagon Spec's	
	wt %	wt %	wt %	wt %	wt %	vol %
methane	0.00	0.00	0.00	0.00	0.02	
ethylene	0.00	0.00	0.00	0.00		
ethane	0.56	1.10	1.14	1.32	2.48	
propylene	0.00	0.00	0.00	0.00		<10
propane	88.84	91.60	91.00	91.12	87.32	>85
isobutane	2.44	1.85	1.94	1.88	1.21	
1-butene + isobutene	0.09	0.03	0.07	0.06	0.01	<2
butane	6.52	4.52	4.82	4.65	2.70	<5
trans-2-butene	0.02	0.02	0.02	0.00	0.01	
2,2-dimethylpropane	0.02	0.01	0.01	0.02		
cis-2-butene	0.02	0.01	0.01	0.01	0.39	
3-methyl-1-butene	0.01	0.00	0.00	0.01		
isopentane	1.23	0.68	0.80	0.76		
1-pentene	0.04	0.02	0.02	0.03		
2-methyl-1-butene	0.01	0.01	0.01	0.01		
pentane	0.18	0.10	0.11	0.11		<0.5
isoprene	0.02	0.00	0.01	0.01		
trans-2-pentene	0.00	0.00	0.03	0.00		
cis-2-pentene	0.02	0.01	0.01	0.01		

August 23, 2004
file: P:API LPG

Sample ID: K634083, 33# Cyl, 3rd sample

	wt %
methane	0.00
ethylene	0.00
ethane	0.56
propylene	0.00
propane	88.84
isobutane	2.44
1-butene + isobutene	0.09
butane	6.52
trans-2-butene	0.02
2,2-dimethylpropane	0.02
cis-2-butene	0.02
3-methyl-1-butene	0.01
isopentane	1.23
1-pentene	0.04
2-methyl-1-butene	0.01
pentane	0.18
isoprene	0.02
trans-2-pentene	0.00
cis-2-pentene	0.02

K634086.AIA

	wt %
methane	0.00
ethylene	0.00
ethane	1.10
propylene	0.00
propane	91.60
isobutane	1.85
1-butene + isobutene	0.06
butane	4.52
trans-2-butene	0.02
2,2-dimethylpropane	0.01
cis-2-butene	0.01
3-methyl-1-butene	0.00
isopentane	0.68
1-pentene	0.02
2-methyl-1-butene	0.01
pentane	0.10
isoprene	0.00
trans-2-pentene	0.00
cis-2-pentene	0.01

K634106

	wt %	
methane	0.00	0
ethylene	0.00	0
ethane	1.14	1.14
propylene	0.00	0
propane	91.00	91
isobutane	1.94	1.94
1-butene + isobutene	0.07	0.07
butane	4.82	4.82
trans-2-butene	0.02	0.02
2,2-dimethylpropane	0.01	0.01
cis-2-butene	0.01	
3-methyl-1-butene	0.00	
isopentane	0.80	
1-pentene	0.02	
2-methyl-1-butene	0.01	
pentane	0.11	
isoprene	0.01	
trans-2-pentene	0.03	
cis-2-pentene	0.01	

V641453

	wt %
methane	0.00
ethylene	0.00
ethane	1.32
propylene	0.00
propane	91.12
isobutane	1.88
1-butene + isobutene	0.06
butane	4.65
trans-2-butene	0.00
2,2-dimethylpropane	0.02
cis-2-butene	0.01
3-methyl-1-butene	0.01
isopentane	0.76
1-pentene	0.03
2-methyl-1-butene	0.01
pentane	0.11
isoprene	0.01
trans-2-pentene	0.00
cis-2-pentene	0.01

	Neurobehavioral Positive Control Data: Functional Observational Battery Preface	Appendix W
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This is an abridged version of text and tables from Study No. H-34, 00-14500 as amended on 24 November 2008.

Table of Contents

Introduction930

Materials and Methods930

Results and Discussion.....950

Conclusion955

Mean Body Weights, Grip Strength and Landing Foot Splay Values956

Incidence Summary of Functional Observational Battery Evaluations.....967

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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1. INTRODUCTION

This study was designed to train technicians to perform the functional observational battery evaluations for rats and to provide evidence, by use of test materials with known neurological effects, that the observational methods used at Huntingdon Life Sciences, Princeton Research Center, are capable of detecting major neurotoxic endpoints. In addition, these studies were used to demonstrate interobserver reliability for neurobehavioral assessments by evaluating consistency of observations performed by different technicians.

2. MATERIALS AND METHODS

2.1. REGULATORY REFERENCES

2.1.1. TEST GUIDELINES

This study was designed to provide positive control data for neurotoxicity screening studies in accord with the US EPA Health Effects Test Guidelines, OPPTS 870.6200 Neurotoxicity Screening Battery, August 1998.

2.1.2. GOOD LABORATORY PRACTICES

This study was conducted in compliance with Part 160 of 40 CFR (EPA/FIFRA Good Laboratory Practice Standards) with the exception that assays to verify concentration, stability and homogeneity of the test articles in carriers were not performed.

2.1.3. ANIMAL WELFARE ACT COMPLIANCE

This study complied with all appropriate parts of the Animal Welfare Act regulations: 9 CFR Parts 1 and 2 Final Rules, Federal Register, Volume 54, No. 168, August 31, 1989, pp. 36112-36163 effective October 30, 1989 and 9 CFR Part 3 Animal Welfare Standards; Final Rule, Federal Register, Volume 56, No. 32, February 15, 1991, pp. 6426-6505 effective March 18, 1991.

2.1.4. FACILITIES MANAGEMENT/ANIMAL HUSBANDRY

Currently acceptable practices of good animal husbandry were followed e.g., *Guide for the Care and Use of Laboratory Animals*; National Academy Press, 1996. Huntingdon Life Sciences, East

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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Millstone, New Jersey is fully accredited by the Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC).

2.2. STUDY MANAGEMENT

2.2.1. SPONSOR

Huntingdon Life Sciences
P.O. Box 2360
Mettlers Road
East Millstone, New Jersey 08875-2360

2.2.2. TESTING FACILITY

Huntingdon Life Sciences
P.O. Box 2360
Mettlers Road
East Millstone, New Jersey 08875-2360

2.2.3. STUDY DIRECTOR

[REDACTED]

2.3. EXPERIMENTAL DESIGN

2.3.1. TRAINING SESSIONS

Training consisted of two parts. In the first part, the technicians were required to view a training video for a functional observational battery (United States Environmental Protection Agency/American Industrial Health Council Training Video and Reference Manual for an FOB, 1996). The second part consisted of observations of animals treated with chemicals known to produce neurological effects as indicated below:

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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Group	Route of Admin.	Test Article	Daily Doses ^a			Number of Animals			
						Initial		Functional Observational Battery	
			Dose (mg/kg)	Volume (mL/kg)	Conc. (mg/mL)	M	F	M	F
1 ^b	i.p.	Control	-	5	-	3	-	3	-
2	i.p.	Chlorpromazine	4	5	0.8	3	-	3	-
3	i.p.	Amphetamine	2	5	0.4	3	-	3	-
4	i.p.	Amphetamine	8	5	1.6	-	3	-	3
5	i.p.	Physostigmine	1	5	0.2	-	3	-	3
6	Oral	Ethanol	3000	10	300	-	3	-	3

^aRepresent doses of test article as supplied; i.e., no correction for percent active ingredient was made.

^bControl animals received 0.9% saline.

M = Male; F = Female; i.p. = intraperitoneal; Oral, via gastric intubation;
mg/kg = milligrams of test article per kilogram of body weight

2.3.2. FOB PERFORMANCE EVALUATIONS

After completion of the training session, each technician was required to perform a functional observational battery evaluation in which the technician was blinded as to the treatment group. Each technician evaluated 20 males or 20 females (5 animals/group).

Group	Route of Admin.	Test Article	Daily Doses ^a			Number of Animals			
						Initial		Functional Observational Battery	
			Dose (mg/kg)	Volume (mL/kg)	Conc. (mg/mL)	M	F	M	F
1 ^b	i.p.	Control	-	5	-	5	5	5	5
2	i.p.	Chlorpromazine	4	5	0.8	5	5	5	5
3	i.p.	Amphetamine	2	5	0.4	5	5	5	5
4	s.c. ^c	Physostigmine	1	5	0.2	5	5	5	5

^aRepresent doses of test article as supplied; i.e., no correction for percent active ingredient was made.

^bControl animals received 0.9% saline.

^cIntraperitoneal injections were administered for the Training Sessions and for the Performance Evaluations conducted by Observer 8; subcutaneous injections were administered for the Performance Evaluations conducted by all other observers.

M = Male; F = Female; i.p. = intraperitoneal; s.c. = subcutaneous injection
mg/kg = milligrams of test article per kilogram of body weight

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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2.4. STUDY DATES**2.4.1. STUDY INITIATION**

15 February 2000 (Date Study Director signed the Protocol)

2.4.2. DATE OF ANIMAL RECEIPT

3 March 2000

2.4.3. DOSING INITIATION

Training Session: 23 March 2000 (Experimental Start Date)

Performance Evaluations: 26 April 2000

2.4.4. DOSING TERMINATION

6 July 2000

2.4.5. EXPERIMENTAL TERMINATION

1 August 2001

2.4.6. STUDY COMPLETION

1 August 2003 (Date Study Director signed the Final Report)

2.5. TEST ARTICLES**2.5.1. CHLORPROMAZINE****Manufacturer**

Sigma Chemical Company
St. Louis, Missouri 63178

Lot Number

48H1403

Purity

98%

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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Description

White/white with a yellow cast powder

Date Received

1 December 1999

Expiration Date

April 2001

Storage

Room temperature, protected from light

2.5.2. D-AMPHETAMINE SULFATE**Manufacturer**Sigma Chemical Company
St. Louis, Missouri 63178**Lot Number**

69H1239

Purity

Assume 100%

Description

Powder

Date Received

7 January 2000

Expiration Date

June 2001

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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Storage

Room temperature

2.5.3. PHYSOSTIGMINE**Manufacturer**Sigma Chemical Company
St. Louis, Missouri 63178**Lot Number**

48H1126

Purity

Assume 100%

Description

Powder

Date Received

1 December 1999

Expiration Date

1 December 2004

Storage

Room temperature, protected from light

2.5.4. ETHANOL**Manufacturer**Spectrum Chemical Manufacturing Corporation
Gardena, California 90248**Lot Number**

MI0504

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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Purity

100%

Description

Clear liquid

Date Received

16 March 1998

Expiration Date

March 2003

Storage

Room temperature

2.5.5. ANALYSIS

Documentation of the identity, strength, purity, composition and stability; and synthesis, fabrication, and/or derivation of the test articles was the responsibility of the Manufacturers.

2.5.6. ARCHIVAL SAMPLE

Samples from the lots of Chlorpromazine, D-Amphetamine Sulfate, Physostigmine and Ethanol are stored in the Archives of the Testing Facility under conditions specified for test article storage.

2.5.7. DISPOSITION

The unused portions of Chlorpromazine, D-Amphetamine Sulfate and Physostigmine were submitted to the Archives of the Testing Facility as archival samples. The remaining portions of Ethanol were retained by the Testing Facility for possible future use.

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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2.6. CONTROL ARTICLE

0.9% Saline

2.6.1. MANUFACTURERBaxter Healthcare Corporation
Deerfield, Illinois 60015**2.6.2. LOT NUMBER**

G949941

2.6.3. PURITY

100%

2.6.4. DESCRIPTION

Clear, colorless liquid

2.6.5. DATE RECEIVED

5 November 1999

2.6.6. EXPIRATION DATE

October 2000

2.6.7. STORAGE

Room Temperature

2.6.8. ANALYSIS

Documentation of the identity, strength, purity, composition and stability; and synthesis, fabrication, and/or derivation of the control article was the responsibility of the Manufacturer.

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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2.6.9. ARCHIVAL SAMPLE

A sample from each lot of control article is stored in the Archives of the Testing Facility under conditions specified for control article storage.

2.6.10. DISPOSITION

The unused portion of the control article will be retained for use in future studies. Any empty control article containers will be discarded by the Testing Facility following completion of the study.

2.7. TEST ANIMALS

2.7.1. SPECIES

Albino Rats (Outbred) VAF/Plus®
CD® (Sprague-Dawley derived) [CrI:CD® (SD)IGS BR]

2.7.2. SUPPLIER

Charles River Laboratories
Kingston, New York 12484

2.7.3. JUSTIFICATION FOR ANIMAL SELECTION

The rat is the animal model recommended by the testing guidelines for use in neurotoxicity screening studies. In addition, a historical database is available for comparative evaluation.

2.7.4. NUMBER OF ANIMALS

Transferred from the In-house Colony:
60 total (30 males, 30 females)

Placed on test:
40 total (20 males, 20 females)

Females were nulliparous and non-pregnant.

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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2.7.5. JUSTIFICATION FOR NUMBER OF ANIMALS

The neurotoxicants used in this study were chosen because they produce transient neurological effects and do not cause permanent damage to the nervous system at the doses used in this study. Therefore, the animals were used more than once during the training program. During the training portion of the study, a total of 18 animals (3 males or 3 females/chemical) were used. This was considered the minimum number necessary to demonstrate the range of effects of the chemical based on individual animal variability. During the performance part of the study, a total of 20 males and 20 females were used (including animals used in the training portion of the study). This allowed each technician undergoing training to perform the FOB evaluation for 20 animals (5 males or 5 females/group) and allowed two separate evaluations per week. Five animals per group were considered the minimum number necessary to produce scientific and statistically valid data.

2.7.6. AGE AT RECEIPT

23 days

2.7.7. AGE AT INITIATION OF TRAINING SESSION

43 days

**2.7.8. AGE AT INITIATION OF PERFORMANCE
EVALUATIONS**

77 days

**2.7.9. WEIGHT AT INITIATION OF TRAINING SESSION
(GRAMS)**

	Mean	Range
Male:	205	178 to 225
Female:	172	161 to 180

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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2.7.10. WEIGHT AT INITIATION OF PERFORMANCE EVALUATIONS (GRAMS)

	Mean	Range
Male:	440	379 to 498
Female:	270	235 to 339

2.7.11. ACCLIMATION PERIOD

Animals were acclimated for approximately 3 weeks. All animals were examined during the acclimation period to confirm suitability for study.

2.8. SELECTION AND GROUP ASSIGNMENT

More animals than required for the study were transferred from the in-house colony. Twenty males and twenty females were randomly selected for use on study and randomly assigned to control or treatment groups. Individual weights of animals used on study at initiation of the training session were within $\pm 20\%$ of the mean weight for each sex. Disposition of all animals not utilized in the study is maintained in the study file.

2.9. ANIMAL IDENTIFICATION

Each rat was identified with a metal ear tag bearing its assigned animal number. The assigned animal number plus the study number comprised the unique animal number for each animal. In addition, each cage was provided with a cage card which was color-coded for dose level identification and contained study number and animal number information.

2.10. VETERINARY CARE

Animals were monitored by the technical staff for any conditions requiring possible veterinary care.

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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2.11. HUSBANDRY

2.11.1. HOUSING

Animals were doubly housed in elevated, stainless steel, wire mesh cages during the first week of the acclimation period and individually housed thereafter.

2.11.2. FEED

Certified Rodent Diet, No. 5002; (Meal) (PMI Nutrition International, St. Louis, Missouri) was available without restriction. Fresh feed was presented weekly.

2.11.3. FEED ANALYSIS

Analysis of each feed lot used during this study was performed by the manufacturer. Results are maintained on file.

2.11.4. WATER

Water was available without restriction via an automated watering system (Elizabethtown Water Company, Westfield, New Jersey).

2.11.5. WATER ANALYSIS

Water analyses are conducted by Elizabethtown Water Company, Westfield, New Jersey (Raritan-East Millstone Plant) to ensure that water meets standards specified under the EPA Federal Safe Drinking Water Act Regulations (40 CFR Part 141). In addition, water samples are collected biannually from representative rooms in the Testing Facility; chemical and microbiological water analyses are conducted on these samples by a subcontract laboratory. Results of all water analyses are maintained on file at the Testing Facility.

2.11.6. CONTAMINANTS

There were no known contaminants in the feed or water which were expected to interfere with the results of this study.

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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2.11.7. ENVIRONMENTAL CONDITIONS

Light/Dark Cycle

A twelve hour light/dark cycle was provided and controlled via an automatic timer.

Temperature

Temperature was monitored and recorded twice daily and maintained within the specified range to the maximum extent possible. Excursions outside the specified range were not considered to have affected the integrity of the study.

Desired: 18 to 26°C

Actual: 15 to 24°C

Relative Humidity

Relative humidity was monitored and recorded once daily and maintained within the specified range to the maximum extent possible. Excursions outside the specified range were not considered to have affected the integrity of the study.

Desired: 30 to 70%

Actual: 28 to 68%

2.12. TEST ARTICLE PREPARATION

Appropriate amounts of the test articles were mixed with 0.9% saline to achieve the desired concentrations. Dosing solutions were prepared either the day prior to or the day of dose administration and were stored refrigerated when not in use.

2.13. ANALYSIS OF DOSE SOLUTIONS

Analysis of the dosing solutions was not performed for this study.

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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2.14. TEST ARTICLE ADMINISTRATION

2.14.1. ROUTE OF ADMINISTRATION

Chlorpromazine, D-Amphetamine Sulfate and saline were administered by intraperitoneal injection into the abdominal cavity near the inguinal region using a sterile needle and syringe of appropriate size. Doses were calculated using the most recent body weights available. A volume of 5 mL/kg of body weight was administered.

Physostigmine was administered by intraperitoneal injection into the abdominal cavity near the inguinal region or by subcutaneous injection into an area on the back, using a sterile needle and syringe of appropriate size. Intraperitoneal injections were administered for the Training Sessions and for the Performance Evaluations conducted by Observer 8; subcutaneous injections were administered for the Performance Evaluations conducted by all other observers. Doses were calculated using the most recent body weights available. A volume of 5 mL/kg of body weight was administered.

Ethanol was administered by oral intubation using a stainless steel dosing needle and syringe of appropriate size. Doses were calculated using the most recent body weights available. A volume of 10 mL/kg of body weight was administered.

2.14.2. ROUTE JUSTIFICATION

The intraperitoneal, subcutaneous and oral routes provide rapid test article absorption and have been used in previous studies with the test articles.

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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2.14.3. DOSE LEVELS

Training Sessions

4 mg Chlorpromazine/kg body weight (males)
2 mg D-Amphetamine Sulfate/kg body weight (males)
8 mg D-Amphetamine Sulfate/kg body weight (females)
1 mg Physostigmine/kg body weight (females)
3000 mg Ethanol/kg body weight (females)

Performance Evaluations

4 mg Chlorpromazine/kg body weight
2 mg D-Amphetamine Sulfate/kg body weight
1 mg Physostigmine/kg body weight

2.14.4. DOSE VOLUME

0.9% Saline, Chlorpromazine, D-Amphetamine Sulfate, and Physostigmine were administered at a volume of 5 mL/kg of body weight. Ethanol was administered at a volume of 10 mL/kg of body weight.

2.14.5. FREQUENCY OF DOSING

Each animal was dosed no more than once per week. There was a washout period of approximately one to five weeks between doses.

2.15. EXPERIMENTAL EVALUATIONS

2.15.1. VIABILITY CHECKS

Animals were observed in their cages once daily for mortality and signs of severe toxic or pharmacologic effects.

2.15.2. PHYSICAL/NEUROBEHAVIORAL EXAMINATIONS

Animals were removed from their cages and examined once pretest to determine suitability for study. Examinations included observations of general condition, skin and fur, eyes, nose, oral cavity, abdomen and external genitalia, occurrence of secretions and excretions, autonomic activity (e.g., lacrimation, piloerection,

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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pupil size, unusual respiratory pattern), changes in gait or posture, response to handling, presence of clonic or tonic movements, stereotypy (e.g., excessive grooming, repetitive circling) and bizarre behavior (e.g., self-mutilation, walking backward).

2.15.3. BODY WEIGHT

Animals were removed from their cages and weighed once pretest and once prior to each dose to determine dose volumes. Body weights were also recorded during the study as part of the functional observational battery.

2.15.4. FUNCTIONAL OBSERVATIONAL BATTERY EVALUATIONS

Training Session

Training consisted of two parts. In the first part, all technicians were required to view a training video for a functional observational battery (United States Environmental Protection Agency/American Industrial Health Council Training Video and Reference Manual for an FOB, 1996). The second part consisted of observations of animals treated with chemicals known to produce neurological effects. Two experienced technicians performed the FOB evaluations and instructed the novice technicians, under the direction of the Study Director or other senior staff member. These evaluations were not performed "blind".

FOB Performance Evaluation

After training, the experienced and novice technicians were each required to evaluate 20 animals (5 males or females/group) using the Functional Observational Battery. Observations by each technician were performed blind, i.e., the observer was unaware of the treatment of each animal. Animals were randomized and blinded according to the standard operating procedures of the Testing Facility.

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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The results of each FOB evaluation were tabulated and the Study Director determined whether the observations performed by each technician comprised a treatment profile consistent with known neurological effects of each test article. Interobserver reliability was considered established for technicians that accurately identified the treatment profile for each test article. The expected neurological effects were based on published reports in the literature, a previous validation study conducted at the Testing Facility (Study No. 96-4516), and observations by the experienced technicians.

Technicians not accurately identifying the treatment profile for each test article were given additional training and/or conducted additional performance evaluations before being allowed to conduct FOB evaluations on a study.

In addition to being able to identify the treatment profile for each test article, each technician was required to demonstrate consistency in performing the quantitative measures of hindlimb and forelimb grip strength and landing foot splay. This was done by determining the mean and standard deviation for the control animals during the performance evaluation for each technician and calculating the coefficient of variance $[(\text{standard deviation}/\text{mean}) \times 100\%]$. The coefficient of variance was required to be approximately 25% or lower to be considered consistent. If a technician did not achieve this level of consistency, further training and evaluations were performed.

Parameters Evaluated

Temperature, humidity, noise level and illumination were measured and recorded to ensure that variations in environmental conditions were minimal during all evaluations.

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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Evaluations were performed according to the Testing Facility's standard operating procedures that include defined scales for each function listed below:

1. Assessment of signs of autonomic function:
Ranking of the degree of lacrimation and salivation
Presence or absence of piloerection and exophthalmus
Count of urination and defecation
Pupillary function (constriction of pupil in response to light)
Degree of palpebral closure
2. Description, incidence, and severity of any convulsions, tremors, or abnormal motor movements
3. Ranking of general level of activity in the open field
4. Description and incidence of posture and gait abnormalities and ranking of gait abnormalities
5. Quantitative measures of forelimb and hindlimb grip strength
6. Quantitative measure of landing foot splay
7. Ranking of reactivity to general stimuli; sensorimotor responses to visual and auditory stimuli; and the response to a tail pinch.

2.16. POSTMORTEM

At the conclusion of all evaluations, all animals were sacrificed and discarded. No necropsy was performed and no tissues were collected. Animals were euthanized by carbon dioxide inhalation.

2.17. STATISTICAL ANALYSIS

The following parameters were analyzed statistically:

body weight (from the functional observational battery)
forelimb and hindlimb grip strength measurements
landing foot splay measurements

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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2.17.1. METHOD OF ANALYSIS

Mean values of all dose groups were compared to the mean value for the control group at each time interval.

Evaluation of equality of group means was made by the appropriate statistical method, followed by a multiple comparison test if needed. Bartlett's test (Bartlett, 1937) was performed to determine if groups had equal variances. If the variances were equal, parametric procedures were used; if not, nonparametric procedures were used. The parametric method was the standard one-way analysis of variance (ANOVA) using the F ratio to assess significance (Armitage, 1971). If significant differences among the means were indicated, Dunnett's test (Dunnett, 1955, 1964) or Williams test (Williams, 1971, 1972) were used to determine which means were significantly different from the control. The nonparametric method was the Kruskal-Wallis test (Kruskal and Wallis, 1952, 1953) and if differences were indicated, Shirley's test (Shirley, 1977) or Dunn's test (Dunn, 1964) were used to determine which means differed from control. Bartlett's test for equality of variance was conducted at the 1% significance level; all other statistical tests were conducted at the 5% and 1% significance levels.

2.18. DATA STORAGE

All raw data and retained samples, as well as the original study protocol and the original final report will be maintained in the Archives of the Testing Facility upon completion of the study.

2.19. PROTOCOL DEVIATIONS

The following protocol deviations occurred during the study but were not considered to have compromised the validity or integrity of the study.

1. Viability checks were performed once per day instead of twice per day as specified in the Protocol.

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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2. Animals were approximately 3 weeks old at receipt instead of approximately 4 weeks old as specified in the protocol. In addition, the animals were approximately 11 weeks old at initiation of performance evaluations rather than 8 weeks or less as specified by the protocol.
3. Animals were not randomly assigned to study groups to try to equalize mean body weights as specified in the Protocol. Animals were arbitrarily assigned animal numbers and placed into groups by animal number (i.e. Nos. 5001 to 5005 were assigned to Group 1; Nos. 5006 to 5010 were assigned to Group 2; etc.).
4. Body weights of some animals exceeded the Protocol specified range of 150 to 250 grams at first dose.
5. Initial FOB performance evaluations by Observers 1 and 6 conducted on 26 April 2000 were performed on 10 animals/sex/observer instead of 20 males or 20 females/observer as specified in the Protocol. Evaluations were re-conducted by these observers using the correct number of animals. The initial evaluations are not presented in this report, but are maintained with the study data.
6. The washout period between doses was approximately one to five weeks instead of approximately one week as specified in the Protocol.
7. Body weights for the calculation of dose volumes were not recorded weekly as specified in the Protocol, but were recorded prior to each dose.
8. Fresh dosing solutions were prepared on the day prior to or on day of dose rather than once weekly as required by protocol.
9. The acceptable variability established in the report of 25-30% differed from the range specified in the protocol of 25% or less.

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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3. RESULTS AND DISCUSSION

3.1. FUNCTIONAL OBSERVATIONAL BATTERY (FOB) EVALUATIONS

Nine technicians were trained or retrained in the performance of the FOB evaluations and subsequently tested for their ability to identify the behavioral pattern produced by three test articles that are known to produce neurological effects. Three of the technicians (Observers 1, 5, and 6) had been previously trained and helped to set the standard for the expected pattern of observations for each compound. Results of a previous training study conducted at the Testing Facility (Study No. 96-4516), as well as published data, were also used to set the performance standards. Results of the FOB evaluations for each test article are presented in Table 2 for all nine observers. The standard pattern of effects for each of the test articles and the comparative evaluations for each observer are presented in the following sections for all observers, with the exception of Observer 3 who is no longer employed at the Testing Facility.

3.2. FOB EVALUATIONS FOR RATS TREATED WITH CHLORPROMAZINE

The pattern of effects observed after administration of chlorpromazine (Text Table 1) are consistent with the actions of the drug which is a central nervous system depressant. The pattern of effects is also similar to that observed in previous training studies. All observers noted postural effects in the home cage, with the animal lying on its side or flattened; effects on gait and posture in the open field, mainly body drags or limbs splayed or dragging; decreased or no locomotion; low or very low arousal level; and no response to the approach of a blunt object. Seven of the eight observers that were compared also noted effects on palpebral closure in the home cage, with eyelids slightly drooping or half-closed and moderate or extreme lacrimation. Six of the eight observers also noted no response to an auditory stimulus and some in coordination in the air righting reflex. In the functional evaluations, there was an increase in landing foot splay of

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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17% to 46% for the Chlorpromazine-treated animals, as compared to the saline controls, for 7/7 observers.

Text Table 1 - FOB Evaluations for Rats Treated with Chlorpromazine

Evaluations	No. of Observations							
	Males (n = 5)				Females (n = 5)			
	Obs. 1	Obs. 2	Obs. 4	Obs. 5	Obs. 6	Obs. 7	Obs. 8	Obs. 9
<u>Home Cage</u>								
• Posture								
lying on Side	2	0	2	0	1	0	0	0
flattened	1	1	0	1	2	2	1	4
• Palpebral Closure								
sl. drooping	4	1	0	1	1	2	4	4
half-closed	1	0	0	1	0	0	0	0
<u>Handling</u>								
• Lacrimation								
moderate	4	1	2	0	1	1	2	2
extreme	0	0	0	0	3	2	1	2
<u>Open Field</u>								
• Gait and Posture								
body drags	1	0	2	2	1	2	3	2
limbs splayed	5	5	1	1	3	2	2	3
• Locomotion								
decreased	0	0	0	1	0	1	4	1
none	5	5	3	4	4	4	1	4
• Arousal								
low	0	0	0	0	0	2	1	1
very low	5	5	3	5	4	3	4	4
<u>Reflex</u>								
• Approach								
no response	3	3	2	4	3	5	2	5
• Audition								
no response	0	2	2	0	2	2	2	4
• Air Righting								
sl. uncoordinated	3	2	0	3	2	0	0	1
lands on side	1	0	1	0	0	0	0	1
<u>Landing Foot Splay</u>								
• % increase	35%	34%	17%	21%	46%	17%	^a	25%

^aSome measurements were performed incorrectly and not considered valid. The number of valid measurements was considered to be too small to provide a valid comparison.

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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3.3. FOB EVALUATIONS FOR RATS TREATED WITH AMPHETAMINE

D-amphetamine, a catecholamine analog, is a central nervous system stimulant that induces increased locomotor activity, mainly through noradrenergic receptors, and/or produces stereotypic behavior via dopaminergic mechanisms. The predominant effects that are produced are dependent on both the dose of amphetamine and individual variability. The effects observed in the FOB after administration of D-amphetamine to rats are consistent with both actions of the drug. Stereotypic behavior, consisting of excessive repetitive actions such as sniffing, was noted by all eight observers and was seen in most of the animals. Increased locomotor activity and high or very high arousal state was noted by seven of eight observers, although the incidence was lower than that for stereotypic behavior. Decreased locomotor activity and low or very low arousal was also noted by some observers. This paradoxical effect was attributed to the predominance of the stereotypic effects compared to the stimulation of motor activity, which resulted in less movement and arousal in the animals.

Text Table 2 – FOB Evaluations for Rats Treated with Amphetamine

Evaluations	No. of Observations							
	Males (n = 5)				Females (n = 5)			
	Obs. 1	Obs. 2	Obs. 4	Obs. 5	Obs. 6	Obs. 7	Obs. 8	Obs. 9
Open Field								
• Locomotion increased	1	2	2	0	3	5	4	4
decreased	3	1	0	0	2	0	0	0
• Arousal high, sl. excitement	1	0	2	4	4	5	4	5
very high, hyperalert	1	1	0	0	0	0	0	0
low	1	1	0	1	1	0	0	0
very low	1	1	0	0	0	0	0	0
Stereotypic Behavior								
present	4	5	2	4	5	5	4	5
Reflex								
• Approach no response	1	0	3	1	4	1	0	0

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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3.4. FOB EVALUATIONS FOR RATS TREATED WITH PHYSOSTIGMINE

Physostigmine is a cholinesterase inhibitor whose administration results in an excess of the neurotransmitter acetylcholine at cholinergic nerve endings. This results in stimulation of cholinergic nerves in both the peripheral and central nervous system. The effects observed in the FOB are consistent with the wide range of effects produced by cholinergic stimulation (Text Table 3). Findings associated with stimulation of the parasympathetic nervous system, including increased salivation and miosis, were noted by all observers in most of the animals. Effects on muscles, as indicated by abnormal posture in the home cage, abnormal posture and gait in the open field, decreased or absent locomotion, muscle fasciculations, and incoordination in the air righting reflex, were also noted by all observers in most animals. In addition, 5/7 observers noted increases of 19% to 30% in mean landing foot splay measurements. Findings indicative of depression of the central nervous system included a low or very low arousal state, as noted by all observers, and no reaction to the approach of a blunt object (6/8 observers) and no reaction to a pain stimulus (7/8 observers). The incidence scores for Observer No. 8 were lower than those recorded by the other observers. Since the scores were low for all measures of cholinergic activity, this suggests that the animals were not evaluated at the time of peak effect or that the animals did not receive a full dose of physostigmine and this was not considered an indication of inability to recognize these effects.

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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Text Table 3 – FOB Evaluations for Rats Treated with Physostigmine

Evaluations	No. of Observations							
	Males (n = 5)				Females (n = 5)			
	Obs. 1	Obs. 2	Obs. 4	Obs. 5	Obs. 6	Obs. 7	Obs. 8	Obs. 9
Home Cage								
• Posture								
lying on side	0	3	0	0	0	0	0	0
flattened	5	2	4	5	5	1	1	5
Handling								
• Salivation								
slight	3	2	2	2	2	3	1	2
moderate	2	1	3	3	1	1	0	0
extreme	0	2	0	0	0	0	0	0
Open Field								
• Gait and Posture								
ataxia	0	0	0	0	0	2	0	2
body drags	3	5	5	5	3	1	1	3
limbs splayed	5	3	0	3	3	1	0	1
hunched posture	0	0	0	0	0	1	0	0
• Locomotion								
decreased	0	0	3	0	2	5	1	3
none	5	5	2	5	3	0	0	2
• Arousal								
low	2	0	1	0	1	3	1	0
very low	3	5	4	5	4	2	0	5
Motor Movements								
• Fasciculations								
slight	4	4	5	4	1	5	1	3
severe	1	1	0	1	4	0	0	2
Reflex								
• Approach								
no response	2	0	3	4	2	2	0	2
• Pain								
no reaction	4	4	5	5	1	1	0	4
• Pupil Response								
miosis	5	5	5	5	5	5	2	5
• Air Righting								
sl. uncoordinated	3	5	1	2	2	2	0	2
lands on side	2	0	3	0	3	2	1	1
lands on back	0	0	1	1	0	0	0	0
Landing Foot Splay								
• % increase	29%	22%	^a	23%	30%	^a	^b	19%

^aNo change in landing foot splay, as compared to saline-treated animals.^bSome measurements were performed incorrectly and not considered valid. The number of valid measurements was considered to be too small to provide a valid comparison.

	Neurobehavioral Positive Control Data: Functional Observational Battery	Appendix W
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3.5. CONSISTENCY OF GRIP STRENGTH AND LANDING FOOT SPLAY MEASUREMENTS

Acceptable variability (25-30%) in the measurement of forelimb and hindlimb grip strength and landing foot splay was achieved by all observers.

Text Table 4 - Consistency of Grip Strength and Landing Foot Splay Measurements

Evaluations	Coefficient of Variability (%)							
	Obs. 1	Obs. 2	Obs. 4	Obs. 5	Obs. 6	Obs. 7	Obs. 8	Obs. 9
Forelimb grip strength	11.1	21.1	21.3	22.0	16.0 ^b	8.7	8.8	21.1 ^b
Hindlimb grip strength	15.3	25.3	32.8 ^a 27.2 ^a	13.6	18.4	20.5	16.0	20.6
Landing foot splay	23.5	19.1	25.4	22.4	15.4	23.4	9.8 ^c	29.1

^aOriginal value was unacceptable. Evaluations were repeated using untreated animals (5 males and 5 females).

^bOriginal value was unacceptable. Evaluations were repeated using untreated animals (10 females).

^cMeasurements of landing foot splay were performed incorrectly and were repeated with ten untreated animals.

4. CONCLUSION

Treatment of Sprague-Dawley rats with Chlorpromazine, D-Amphetamine Sulfate, or Physostigmine produced patterns of behavior consistent with their expected neurological effects. These data provide evidence that the procedures used for the Functional Observational Battery evaluations in the Testing Facility are capable of detecting major neurotoxic endpoints. In addition, the neurobehavioral profiles for each compound were correctly identified by Observers 1-2 and 4-9, who were blinded with respect to treatment. This demonstrates that there is interobserver reliability among the trained technicians at the Testing Facility in the conduct of the Functional Observational Battery evaluations. Acceptable variability in the performance of forelimb and hindlimb grip strength measurements and landing foot splay measurements were achieved by all observers. In conclusion, Observers 1, 2, 4, 5, 6, 7, 8, and 9 were considered to be fully qualified to perform Functional Observational Battery evaluations.

Males	Neurobehavioral Positive Control Data: Functional Observational Battery Mean Body Weights, Grip Strength and Landing Foot Splay Values	Appendix W
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Observer 1 Test Article:		Group 1 Saline	Group 2 Chlorpromazine	Group 3 D-Amphetamine Sulfate	Group 4 Physostigmine
Body Weight	Mean	567.0	569.7	604.1	544.0
	S.D.	27.9	25.0	39.8	45.7
	N	5	5	5	5
Forelimb Grip Strength	Mean	926.0	680.5	1070.0	851.5
	S.D.	102.5	142.5	137.5	167.6
	N	5	5	5	5
	%CV	11.1			
Hindlimb Grip Strength	Mean	781.5	635.5	831.0	622.5
	S.D.	119.8	85.6	69.9	80.4
	N	5	5	5	5
	%CV	15.3			
Landing Foot Splay	Mean	4.8	6.5	5.4	6.2
	S.D.	1.1	1.6	1.7	1.6
	N	5	5	5	5
	%CV	23.5			

*Significantly different from control mean; $p \leq 0.05$.

**Significantly different from control mean; $p \leq 0.01$.

If no asterisks, no statistically significant differences from control mean.

%CV = (Control Group S.D./Control Group Mean) x 100.

Males	Neurobehavioral Positive Control Data: Functional Observational Battery Mean Body Weights, Grip Strength and Landing Foot Splay Values	Appendix W
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Observer 2 Test Article:		Group 1 Saline	Group 2 Chlorpromazine	Group 3 D-Amphetamine Sulfate	Group 4 Physostigmine
Body Weight	Mean	572.4	572.0	608.2	547.6
	S.D.	20.9	26.6	36.4	45.9
	N	5	5	5	5
Forelimb Grip Strength	Mean	858.0	1210.0	797.0	941.5
	S.D.	181.2	369.8	266.0	244.6
	N	5	5	5	5
	%CV	21.1			
Hindlimb Grip Strength	Mean	908.5	876.5	773.0	807.5
	S.D.	230.1	216.4	103.4	127.5
	N	5	5	5	5
	%CV	25.3			
Landing Foot Splay	Mean	6.7	9.0	5.7	8.2
	S.D.	1.3	1.8	0.9	1.0
	N	5	5	5	5
	%CV	19.1	*		

*Significantly different from control mean; $p \leq 0.05$.

**Significantly different from control mean; $p \leq 0.01$.

If no asterisks, no statistically significant differences from control mean.

%CV = (Control Group S.D./Control Group Mean) x 100.

Males	Neurobehavioral Positive Control Data: Functional Observational Battery Mean Body Weights, Grip Strength and Landing Foot Splay Values	Appendix W
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Observer 3 Test Article:		Group 1 Saline	Group 2 Chlorpromazine	Group 3 D-Amphetamine Sulfate	Group 4 Physostigmine
Body Weight	Mean	475.4	490.0	506.3	462.3
	S.D.	24.2	30.2	28.9	37.5
	N	5	5	5	5
Forelimb Grip Strength	Mean	1499.5	1323.5	1909.0	1278.0
	S.D.	470.4	715.3	344.9	351.5
	N	5	5	5	5
	%CV	31.4			
Hindlimb Grip Strength	Mean	955.5	837.5	1102.0	906.5
	S.D.	270.5	255.7	230.2	251.5
	N	5	5	5	5
	%CV	28.3			
Landing Foot Splay	Mean	6.8	8.3	6.1	6.3
	S.D.	0.9	2.5	0.8	1.4
	N	5	5	5	5
	%CV	13.4			

*Significantly different from control mean; $p \leq 0.05$.

**Significantly different from control mean; $p \leq 0.01$.

If no asterisks, no statistically significant differences from control mean.

%CV = (Control Group S.D./Control Group Mean) x 100.

Males	Neurobehavioral Positive Control Data: Functional Observational Battery Mean Body Weights, Grip Strength and Landing Foot Splay Values	Appendix W
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Observer 4 Test Article:		Group 1 Saline	Group 2 Chlorpromazine	Group 3 D-Amphetamine Sulfate	Group 4 Physostigmine
Body Weight	Mean	456.9	468.7	494.6	448.3
	S.D.	21.3	30.1	26.5	37.0
	N	5	5	5	5
					*
Forelimb Grip Strength	Mean	1224.0	1161.0	1311.0	901.5
	S.D.	261.3	149.0	179.6	276.0
	N	5	5	5	5
	%CV	21.3			
Hindlimb Grip Strength	Mean	622.5	577.5	601.0	572.0
	S.D.	238.7	202.9	122.3	206.0
	N	5	5	5	5
	%CV	38.3			
Landing Foot Splay	Mean	7.2	8.4	7.1	6.9
	S.D.	1.8	1.8	1.1	1.5
	N	5	5	5	5
	%CV	25.4			

*Significantly different from control mean; $p \leq 0.05$.

**Significantly different from control mean; $p \leq 0.01$.

If no asterisks, no statistically significant differences from control mean.

%CV = (Control Group S.D./Control Group Mean) x 100.

Males	Neurobehavioral Positive Control Data: Functional Observational Battery Mean Body Weights, Grip Strength and Landing Foot Splay Values	Appendix W
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Observer 5 Test Article:		Group 1 Saline	Group 2 Chlorpromazine	Group 3 D-Amphetamine Sulfate	Group 4 Physostigmine
Body Weight	Mean	558.9	564.5	591.7	530.9
	S.D.	27.4	30.3	37.8	41.4
	N	5	5	5	5
					*
Forelimb Grip Strength	Mean	1352.5	1179.0	1458.5	980.5
	S.D.	296.9	327.7	170.8	186.7
	N	5	5	5	5
	%CV	22.0			
Hindlimb Grip Strength	Mean	1428.0	1105.0	1266.0	941.0
	S.D.	193.8	312.4	162.7	300.3
	N	5	5	5	5
	%CV	13.6			**
Landing Foot Splay	Mean	8.7	10.5	8.9	10.7
	S.D.	1.9	1.7	1.3	1.5
	N	5	5	5	5
	%CV	22.4			

*Significantly different from control mean; $p \leq 0.05$.

**Significantly different from control mean; $p \leq 0.01$.

If no asterisks, no statistically significant differences from control mean.

%CV = (Control Group S.D./Control Group Mean) x 100.

Females	Neurobehavioral Positive Control Data: Functional Observational Battery Mean Body Weights, Grip Strength and Landing Foot Splay Values	Appendix W
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Observer 6 Test Article:		Group 1 Saline	Group 2 Chlorpromazine	Group 3 D-Amphetamine Sulfate	Group 4 Physostigmine
Body Weight	Mean	313.0	314.5	311.5	311.0
	S.D.	18.4	26.3	46.9	10.5
	N	5	5	5	5
Forelimb Grip Strength	Mean	667.0	847.5	1005.5	708.0
	S.D.	294.4	143.6	159.5	203.3
	N	5	5	5	5
	%CV	44.1			
Hindlimb Grip Strength	Mean	827.5	835.5	947.0	820.0
	S.D.	152.2	161.6	50.1	136.6
	N	5	5	5	5
	%CV	18.4			
Landing Foot Splay	Mean	5.0	*	4.0	6.5
	S.D.	0.8	0.6	0.8	1.8
	N	5	5	5	5
	%CV	15.4			

*Significantly different from control mean; $p \leq 0.05$.

**Significantly different from control mean; $p \leq 0.01$.

If no asterisks, no statistically significant differences from control mean.

%CV = (Control Group S.D./Control Group Mean) x 100.

Females	Neurobehavioral Positive Control Data: Functional Observational Battery Mean Body Weights, Grip Strength and Landing Foot Splay Values	Appendix W
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Observer 7 Test Article:		Group 1 Saline	Group 2 Chlorpromazine	Group 3 D-Amphetamine Sulfate	Group 4 Physostigmine
Body Weight	Mean	313.0	312.3	305.5	310.1
	S.D.	17.5	26.1	33.0	13.2
	N	5	5	5	5
Forelimb Grip Strength	Mean	815.0	869.5	975.5	766.5
	S.D.	71.2	124.3	147.4	161.4
	N	5	5	5	5
	%CV	8.7			
Hindlimb Grip Strength	Mean	620.0	560.5	673.0	642.5
	S.D.	127.2	116.7	105.2	174.5
	N	5	5	5	5
	%CV	20.5			
Landing Foot Splay	Mean	6.6	7.7	5.7	6.4
	S.D.	1.5	0.8	0.8	1.8
	N	5	5	5	5
	%CV	23.4			

*Significantly different from control mean; $p \leq 0.05$.

**Significantly different from control mean; $p \leq 0.01$.

If no asterisks, no statistically significant differences from control mean.

%CV = (Control Group S.D./Control Group Mean) x 100.

Females	Neurobehavioral Positive Control Data: Functional Observational Battery Mean Body Weights, Grip Strength and Landing Foot Splay Values	Appendix W
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Observer 8 Test Article:		Group 1 Saline	Group 2 Chlorpromazine	Group 3 D-Amphetamine Sulfate	Group 4 Physostigmine
Body Weight	Mean	268.7	298.0	276.1	280.3
	S.D.	19.5	55.7	27.3	12.4
	N	5	5	5	5
	%CV	8.8			
Forelimb Grip Strength	Mean	1006.5	799.5	912.5	829.5
	S.D.	88.6	148.1	108.9	180.2
	N	5	5	5	5
	%CV	8.8			
Hindlimb Grip Strength	Mean	735.0	605.5	571.0	695.5
	S.D.	117.9	158.6	101.9	238.0
	N	5	5	5	5
	%CV	16.0			
Landing Foot Splay	Mean	6.4	6.2	6.0	5.1
	S.D.	1.6	0.3	-	0.6
	N	3	3	1	2
	%CV	25.0			

*Significantly different from control mean; $p \leq 0.05$.

**Significantly different from control mean; $p \leq 0.01$.

If no asterisks, no statistically significant differences from control mean.

%CV = (Control Group S.D./Control Group Mean) x 100.

Females	Neurobehavioral Positive Control Data: Functional Observational Battery Mean Body Weights, Grip Strength and Landing Foot Splay Values	Appendix W
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Observer 9 Test Article:		Group 1 Saline	Group 2 Chlorpromazine	Group 3 D-Amphetamine Sulfate	Group 4 Physostigmine
Body Weight	Mean	315.9	313.5	310.8	311.1
	S.D.	18.3	25.5	48.3	11.1
	N	5	5	5	5
Forelimb Grip Strength	Mean	539.5	963.0	823.0	606.5
	S.D.	292.8	456.9	330.6	327.3
	N	5	5	5	5
	%CV	54.3			
Hindlimb Grip Strength	Mean	632.0	588.0	637.0	647.5
	S.D.	130.3	67.2	128.0	161.7
	N	5	5	5	5
	%CV	20.6			
Landing Foot Splay	Mean	6.3	7.9	4.4	7.5
	S.D.	1.8	1.4	1.3	1.8
	N	5	5	5	5
	%CV	29.1			

*Significantly different from control mean; $p \leq 0.05$.

**Significantly different from control mean; $p \leq 0.01$.

If no asterisks, no statistically significant differences from control mean.

%CV = (Control Group S.D./Control Group Mean) x 100.

Repeats	Neurobehavioral Positive Control Data: Functional Observational Battery Mean Body Weights, Grip Strength and Landing Foot Splay Values	Appendix W
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Observer 4 Repeat

Test Article:		Untreated Males	Untreated Females
Forelimb Grip Strength	Mean	1373.0	1167.0
	S.D.	168.3	293.8
	N	5	5
	%CV	12.3	25.2
Hindlimb Grip Strength	Mean	864.5	645.5
	S.D.	235.0	211.9
	N	5	5
	%CV	27.2	32.8

Observer 6 Repeat

Test Article:		Untreated Females
Forelimb Grip Strength	Mean	970.5
	S.D.	154.9
	N	10
	%CV	16.0
Hindlimb Grip Strength	Mean	743.3
	S.D.	147.0
	N	10
	%CV	19.8

Observer 8 Repeat

Test Article:		Saline Males
Landing Foot Splay	Mean	9.5
	S.D.	0.9
	N	10
	%CV	9.8

%CV = (Control Group S.D./Control Group Mean) x 100.

Repeats	Neurobehavioral Positive Control Data: Functional Observational Battery Mean Body Weights, Grip Strength and Landing Foot Splay Values	Appendix W
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Observer 9 Repeat
Test Article:**Untreated
Females**

Forelimb Grip Strength	Mean	882.0
	S.D.	186.0
	N	10
	%CV	21.1

Hindlimb Grip Strength	Mean	555.8
	S.D.	178.3
	N	10
	%CV	32.1

%CV = (Control Group S.D./Control Group Mean) x 100.

	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations Preface	Appendix W
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Corresponding test articles for each group were as follows:

Group 1	-	Saline
Group 2	-	Chlorpromazine
Group 3	-	D-Amphetamine Sulfate
Group 4	-	Physostigmine

For summarization purposes, comments describing location [i.e., forelimb, hindlimb, right, unilateral, etc.] are not presented in this appendix. These data are contained in the study raw data if needed.

When an animal received two scores during Open Field Evaluations of Gait and Posture (i.e. the animal was noted to be dragging it's body and it's limbs were splayed or dragging), the two scores were summarized individually. Therefore, the total incidence of scores may be greater than the number of animals examined.

	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	
Males		Appendix W

Observer 1		Group:	1	2	3	4
Number of Animals Examined			5	5	5	5
Home Cage Evaluations						
Posture	Sitting or Standing Normally		1	2	1	0
	Alert, Oriented Toward Observer		4	0	4	0
	Asleep		0	0	0	0
	Lying on Side		0	2	0	0
	Flattened		0	1	0	5
	Crouched		0	0	0	0
Vocalizations	Not Present		5	5	5	5
	Present		0	0	0	0
Palpebral Closure	Eyelids Open		5	0	5	5
	Eyelids Completely Closed		0	0	0	0
	Eyelids Slightly Drooping		0	4	0	0
	Eyelids Half Closed		0	1	0	0
Handling Evaluations						
Ease of Removal	Very Easy		3	4	2	5
	Easy		1	1	2	0
	Moderately Difficult		1	0	1	0
	Freezes		0	0	0	0
	Difficult		0	0	0	0
Ease of Handling	Normal (easy, alert)		4	5	4	5
	Moderately Difficult		1	0	1	0
	Freezes		0	0	0	0
	Difficult		0	0	0	0
	Totally limp		0	0	0	0
Chromodacryorrhea	Not Present		5	5	5	5
	Present		0	0	0	0
Lacrimation	Not Present		5	1	5	5
	Moderate		0	4	0	0
	Extreme		0	0	0	0
Coat	Normal		5	5	5	5
	Slightly Soiled		0	0	0	0
	Moderately Soiled		0	0	0	0
	Extremely Soiled		0	0	0	0
Salivation	Not Present		5	5	4	0
	Slight		0	0	1	3
	Moderate		0	0	0	2
	Extreme		0	0	0	0

Males	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 1	Group:	1	2	3	4
Number of Animals Examined		5	5	5	5
Open Field Evaluations					
Gait and Posture	Normal	5	0	4	0
	Ataxia	0	0	1	0
	Body Drags	0	1	0	3
	Limbs Splayed or Dragging	0	5	0	5
	Hunched Posture	0	0	0	0
Locomotion	Normal	5	0	1	0
	Increased Movement	0	0	1	0
	Decreased Movement	0	0	3	0
	None	0	5	0	5
Arousal	Normal	4	0	1	0
	Low, Slight Stupor	1	0	1	2
	Very Low, Stupor	0	5	1	3
	High, Slight Excitement, Tense	0	0	1	0
	Very High, Hyper-Alert	0	0	1	0
Piloerection	Not Present	5	5	5	5
	Present	0	0	0	0
Exophthalmia	Not Present	5	5	5	5
	Present	0	0	0	0
Feces	Number of Boluses	6	11	0	3
	Unformed Stool	0	0	0	0
Urine	Number of Pools	4	3	0	5
	Polyuria	0	0	0	0
Stereotypic Behavior					
Stereotypic Behavior	Not Present	5	5	1	5
	Present	0	0	4	0
Motor Movements					
Fasciculations	Not Present	5	5	5	0
	Slight	0	0	0	4
	Severe	0	0	0	1
Convulsions	Not Present	5	5	5	5
	Slight	0	0	0	0
	Severe	0	0	0	0
Tremors	Not Present	5	5	5	5
	Slight	0	0	0	0
	Severe	0	0	0	0

	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	
Males		Appendix W

Observer 1		Group:	1	2	3	4
Number of Animals Examined			5	5	5	5
Reflex Assessments						
Approach Response	Normal: Slowly Approaches, Sniffs and/or Turns Away		5	2	4	3
	No Reaction		0	3	1	2
	Freezes or Pulls Away Slightly		0	0	0	0
	Jumps or Turns Abruptly to Avoid, or attacks and/or bites		0	0	0	0
Audition	Normal: Flinches or Flicks Ears		5	5	5	5
	No Reaction		0	0	0	0
	Exaggerated; Jumps, Flips, Bites		0	0	0	0
Pain	Normal: Turns/Bites or Walks Forward/Away		5	4	3	1
	No Reaction		0	1	2	4
	Apparent Increased Pain		0	0	0	0
Pupil Response	Pupil Constricts		5	4	5	0
	No Constriction		0	0	0	0
	Miosis		0	1	0	5
	Mydriasis		0	0	0	0
Pinna	Ear Flattens Against Head		0	0	0	0
	Animal Shakes Head		5	5	5	5
	No Response		0	0	0	0
Proprioception	Normal: Returns Leg to Original Position		5	5	5	5
	Returns Leg Only Partially to Original Position		0	0	0	0
	No Response		0	0	0	0
Air Righting Reflex	Normal: Lands on All Four Feet		5	1	5	0
	Slightly Uncoordinated		0	3	0	3
	Lands on Side		0	1	0	2
	Lands on Back		0	0	0	0

	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	
Males		Appendix W

Observer 2		Group:	1	2	3	4
Number of Animals Examined			5	5	5	5
Home Cage Evaluations						
Posture	Sitting or Standing Normally		4	3	1	0
	Alert, Oriented Toward Observer		1	1	4	0
	Asleep		0	0	0	0
	Lying on Side		0	0	0	3
	Flattened		0	1	0	2
	Crouched		0	0	0	0
Vocalizations	Not Present		5	5	5	5
	Present		0	0	0	0
Palpebral Closure	Eyelids Open		5	4	5	5
	Eyelids Completely Closed		0	0	0	0
	Eyelids Slightly Drooping		0	1	0	0
	Eyelids Half Closed		0	0	0	0
Handling Evaluations						
Ease of Removal	Very Easy		0	1	4	4
	Easy		5	4	1	1
	Moderately Difficult		0	0	0	0
	Freezes		0	0	0	0
	Difficult		0	0	0	0
Ease of Handling	Normal (easy, alert)		5	5	5	5
	Moderately Difficult		0	0	0	0
	Freezes		0	0	0	0
	Difficult		0	0	0	0
	Totally limp		0	0	0	0
Chromodacryorrhea	Not Present		5	4	5	5
	Present		0	1	0	0
Lacrimation	Not Present		5	4	5	5
	Moderate		0	1	0	0
	Extreme		0	0	0	0
Coat	Normal		5	5	5	5
	Slightly Soiled		0	0	0	0
	Moderately Soiled		0	0	0	0
	Extremely Soiled		0	0	0	0
Salivation	Not Present		5	5	4	0
	Slight		0	0	1	2
	Moderate		0	0	0	1
	Extreme		0	0	0	2

Males	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 2		Group:	1	2	3	4
Number of Animals Examined			5	5	5	5
Open Field Evaluations						
Gait and Posture	Normal		5	0	4	0
	Ataxia		0	0	1	0
	Body Drags		0	0	0	5
	Limbs Splayed or Dragging		0	5	0	3
	Hunched Posture		0	0	0	0
Locomotion	Normal		4	0	2	0
	Increased Movement		0	0	2	0
	Decreased Movement		1	0	1	0
	None		0	5	0	5
Arousal	Normal		4	0	2	0
	Low, Slight Stupor		1	0	1	0
	Very Low, Stupor		0	5	1	5
	High, Slight Excitement, Tense		0	0	0	0
	Very High, Hyper-Alert		0	0	1	0
Piloerection	Not Present		5	5	5	5
	Present		0	0	0	0
Exophthalmia	Not Present		5	5	5	5
	Present		0	0	0	0
Feces	Number of Boluses		6	1	1	1
	Unformed Stool		0	0	0	0
Urine	Number of Pools		12	7	6	12
	Polyuria		0	0	0	0
Stereotypic Behavior						
Stereotypic Behavior	Not Present		5	5	0	4
	Present		0	0	5	1
Motor Movements						
Fasciculations	Not Present		5	5	5	0
	Slight		0	0	0	4
	Severe		0	0	0	1
Convulsions	Not Present		5	5	5	5
	Slight		0	0	0	0
	Severe		0	0	0	0
Tremors	Not Present		5	5	5	5
	Slight		0	0	0	0
	Severe		0	0	0	0

	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	
Males		Appendix W

Observer 2		Group:	1	2	3	4
Number of Animals Examined			5	5	5	5
Reflex Assessments						
Approach Response	Normal: Slowly Approaches, Sniffs and/or Turns Away		5	2	5	5
	No Reaction		0	3	0	0
	Freezes or Pulls Away Slightly		0	0	0	0
	Jumps or Turns Abruptly to Avoid, or attacks and/or bites		0	0	0	0
Audition	Normal: Flinches or Flicks Ears		4	3	5	3
	No Reaction		1	2	0	0
	Exaggerated; Jumps, Flips, Bites		0	0	0	2
Pain	Normal: Turns/Bites or Walks Forward/Away		5	5	5	1
	No Reaction		0	0	0	4
	Apparent Increased Pain		0	0	0	0
Pupil Response	Pupil Constricts		5	3	4	0
	No Constriction		0	0	0	0
	Miosis		0	2	1	5
	Mydriasis		0	0	0	0
Pinna	Ear Flattens Against Head		0	0	1	0
	Animal Shakes Head		5	5	4	5
	No Response		0	0	0	0
Proprioception	Normal: Returns Leg to Original Position		5	5	5	5
	Returns Leg Only Partially to Original Position		0	0	0	0
	No Response		0	0	0	0
Air Righting Reflex	Normal: Lands on All Four Feet		5	3	5	0
	Slightly Uncoordinated		0	2	0	5
	Lands on Side		0	0	0	0
	Lands on Back		0	0	0	0

Males	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 3		Group:	1	2	3	4
Number of Animals Examined			5	5	5	5
Home Cage Evaluations						
Posture	Sitting or Standing Normally		2	3	0	1
	Alert, Oriented Toward Observer		3	0	5	0
	Asleep		0	0	0	0
	Lying on Side		0	0	0	1
	Flattened		0	2	0	3
	Crouched		0	0	0	0
Vocalizations	Not Present		5	5	5	5
	Present		0	0	0	0
Palpebral Closure	Eyelids Open		5	3	5	5
	Eyelids Completely Closed		0	0	0	0
	Eyelids Slightly Drooping		0	2	0	0
	Eyelids Half Closed		0	0	0	0
Handling Evaluations						
Ease of Removal	Very Easy		3	3	5	5
	Easy		1	2	0	0
	Moderately Difficult		1	0	0	0
	Freezes		0	0	0	0
	Difficult		0	0	0	0
Ease of Handling	Normal (easy, alert)		3	4	5	5
	Moderately Difficult		2	1	0	0
	Freezes		0	0	0	0
	Difficult		0	0	0	0
	Totally limp		0	0	0	0
Chromodacryorrhea	Not Present		5	5	5	4
	Present		0	0	0	1
Lacrimation	Not Present		5	3	5	5
	Moderate		0	2	0	0
	Extreme		0	0	0	0
Coat	Normal		5	5	5	4
	Slightly Soiled		0	0	0	1
	Moderately Soiled		0	0	0	0
	Extremely Soiled		0	0	0	0
Salivation	Not Present		5	5	5	2
	Slight		0	0	0	1
	Moderate		0	0	0	2
	Extreme		0	0	0	0

Males	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 3	Group:	1	2	3	4
Number of Animals Examined		5	5	5	5
Open Field Evaluations					
Gait and Posture	Normal	5	0	5	0
	Ataxia	0	1	0	1
	Body Drags	0	3	0	4
	Limbs Splayed or Dragging	0	3	0	3
	Hunched Posture	0	0	0	0
Locomotion	Normal	5	0	4	0
	Increased Movement	0	0	1	1
	Decreased Movement	0	2	0	1
	None	0	3	0	3
Arousal	Normal	5	0	1	0
	Low, Slight Stupor	0	2	0	2
	Very Low, Stupor	0	3	0	3
	High, Slight Excitement, Tense	0	0	4	0
	Very High, Hyper-Alert	0	0	0	0
Piloerection	Not Present	5	5	5	5
	Present	0	0	0	0
Exophthalmia	Not Present	5	5	5	5
	Present	0	0	0	0
Feces	Number of Boluses	1	1	0	2
	Unformed Stool	0	0	0	0
Urine	Number of Pools	3	5	0	3
	Polyuria	0	0	0	0
Stereotypic Behavior					
Stereotypic Behavior	Not Present	5	5	2	5
	Present	0	0	3	0
Motor Movements					
Fasciculations	Not Present	5	5	5	2
	Slight	0	0	0	2
	Severe	0	0	0	1
Convulsions	Not Present	5	5	5	5
	Slight	0	0	0	0
	Severe	0	0	0	0
Tremors	Not Present	5	5	5	4
	Slight	0	0	0	0
	Severe	0	0	0	1

Males	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 3**Group: 1 2 3 4**

Number of Animals Examined

5 5 5 5

Reflex Assessments**Approach Response**

Normal: Slowly Approaches, Sniffs and/or Turns Away

5 1 2 3

No Reaction

0 4 3 2

Freezes or Pulls Away Slightly

0 0 0 0

Jumps or Turns Abruptly to Avoid, or attacks and/or bites

0 0 0 0

Audition

Normal: Flinches or Flicks Ears

5 4 5 4

No Reaction

0 1 0 1

Exaggerated; Jumps, Flips, Bites

0 0 0 0

Pain

Normal: Turns/Bites or Walks Forward/Away

5 5 5 3

No Reaction

0 0 0 2

Apparent Increased Pain

0 0 0 0

Pupil Response

Pupil Constricts

5 5 5 2

No Constriction

0 0 0 1

Miosis

0 0 0 2

Mydriasis

0 0 0 0

Pinna

Ear Flattens Against Head

0 0 1 0

Animal Shakes Head

5 5 4 5

No Response

0 0 0 0

Proprioception

Normal: Returns Leg to Original Position

5 5 5 4

Returns Leg Only Partially to Original Position

0 0 0 0

No Response

0 0 0 1

Air Righting Reflex

Normal: Lands on All Four Feet

5 5 5 1

Slightly Uncoordinated

0 0 0 2

Lands on Side

0 0 0 2

Lands on Back

0 0 0 0

Males	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 4	Group:	1	2	3	4
Number of Animals Examined		5	5	5	5
Home Cage Evaluations					
Posture	Sitting or Standing Normally	5	3	3	1
	Alert, Oriented Toward Observer	0	0	2	0
	Asleep	0	0	0	0
	Lying on Side	0	0	0	0
	Flattened	0	2	0	4
	Crouched	0	0	0	0
Vocalizations	Not Present	5	5	5	5
	Present	0	0	0	0
Palpebral Closure	Eyelids Open	5	5	5	5
	Eyelids Completely Closed	0	0	0	0
	Eyelids Slightly Drooping	0	0	0	0
	Eyelids Half Closed	0	0	0	0
Handling Evaluations					
Ease of Removal	Very Easy	4	4	4	5
	Easy	1	1	0	0
	Moderately Difficult	0	0	1	0
	Freezes	0	0	0	0
	Difficult	0	0	0	0
Ease of Handling	Normal (easy, alert)	5	5	5	5
	Moderately Difficult	0	0	0	0
	Freezes	0	0	0	0
	Difficult	0	0	0	0
	Totally limp	0	0	0	0
Chromodacryorrhea	Not Present	5	5	5	5
	Present	0	0	0	0
Lacrimation	Not Present	5	3	5	3
	Moderate	0	2	0	0
	Extreme	0	0	0	2
Coat	Normal	5	5	5	5
	Slightly Soiled	0	0	0	0
	Moderately Soiled	0	0	0	0
	Extremely Soiled	0	0	0	0
Salivation	Not Present	5	5	5	0
	Slight	0	0	0	2
	Moderate	0	0	0	3
	Extreme	0	0	0	0

	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	
Males		Appendix W

Observer 4**Group: 1 2 3 4**

Number of Animals Examined

5 5 5 5

Open Field Evaluations

Gait and Posture

Normal	5	2	5	0
Ataxia	0	0	0	0
Body Drags	0	2	0	5
Limbs Splayed or Dragging	0	1	0	0
Hunched Posture	0	0	0	0

Locomotion

Normal	5	2	3	0
Increased Movement	0	0	2	0
Decreased Movement	0	0	0	3
None	0	3	0	2

Arousal

Normal	4	2	3	0
Low, Slight Stupor	0	0	0	1
Very Low, Stupor	0	3	0	4
High, Slight Excitement, Tense	1	0	2	0
Very High, Hyper-Alert	0	0	0	0

Piloerection

Not Present	5	5	4	5
Present	0	0	1	0

Exophthalmia

Not Present	5	5	5	5
Present	0	0	0	0

Feces

Number of Boluses	5	8	0	1
Unformed Stool	0	0	0	0

Urine

Number of Pools	4	5	2	6
Polyuria	0	0	0	0

Stereotypic Behavior

Stereotypic Behavior

Not Present	5	5	3	4
Present	0	0	2	1

Motor Movements

Fasciculations

Not Present	5	5	5	0
Slight	0	0	0	5
Severe	0	0	0	0

Convulsions

Not Present	5	5	5	5
Slight	0	0	0	0
Severe	0	0	0	0

Tremors

Not Present	5	5	5	3
Slight	0	0	0	1
Severe	0	0	0	1

Males	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 4	Group:	1	2	3	4
Number of Animals Examined		5	5	5	5
Reflex Assessments					
Approach Response	Normal: Slowly Approaches, Sniffs and/or Turns Away	5	3	2	2
	No Reaction	0	2	3	3
	Freezes or Pulls Away Slightly	0	0	0	0
	Jumps or Turns Abruptly to Avoid, or attacks and/or bites	0	0	0	0
Audition	Normal: Flinches or Flicks Ears	5	3	5	4
	No Reaction	0	2	0	0
	Exaggerated; Jumps, Flips, Bites	0	0	0	1
Pain	Normal: Turns/Bites or Walks Forward/Away	5	5	4	0
	No Reaction	0	0	1	5
	Apparent Increased Pain	0	0	0	0
Pupil Response	Pupil Constricts	5	5	5	0
	No Constriction	0	0	0	0
	Miosis	0	0	0	5
	Mydriasis	0	0	0	0
Pinna	Ear Flattens Against Head	0	1	1	0
	Animal Shakes Head	5	4	4	5
	No Response	0	0	0	0
Proprioception	Normal: Returns Leg to Original Position	5	5	5	5
	Returns Leg Only Partially to Original Position	0	0	0	0
	No Response	0	0	0	0
Air Righting Reflex	Normal: Lands on All Four Feet	5	4	5	0
	Slightly Uncoordinated	0	0	0	1
	Lands on Side	0	1	0	3
	Lands on Back	0	0	0	1

	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	
Males		Appendix W

Observer 5		Group:	1	2	3	4
Number of Animals Examined			5	5	5	5
Home Cage Evaluations						
Posture	Sitting or Standing Normally		3	3	0	0
	Alert, Oriented Toward Observer		2	1	5	0
	Asleep		0	0	0	0
	Lying on Side		0	0	0	0
	Flattened		0	1	0	5
	Crouched		0	0	0	0
Vocalizations	Not Present		5	5	5	5
	Present		0	0	0	0
Palpebral Closure	Eyelids Open		5	3	5	5
	Eyelids Completely Closed		0	0	0	0
	Eyelids Slightly Drooping		0	1	0	0
	Eyelids Half Closed		0	1	0	0
Handling Evaluations						
Ease of Removal	Very Easy		5	4	5	5
	Easy		0	1	0	0
	Moderately Difficult		0	0	0	0
	Freezes		0	0	0	0
	Difficult		0	0	0	0
Ease of Handling	Normal (easy, alert)		5	4	5	5
	Moderately Difficult		0	1	0	0
	Freezes		0	0	0	0
	Difficult		0	0	0	0
	Totally limp		0	0	0	0
Chromodacryorrhea	Not Present		5	5	5	5
	Present		0	0	0	0
Lacrimation	Not Present		5	5	5	5
	Moderate		0	0	0	0
	Extreme		0	0	0	0
Coat	Normal		5	5	5	4
	Slightly Soiled		0	0	0	1
	Moderately Soiled		0	0	0	0
	Extremely Soiled		0	0	0	0
Salivation	Not Present		5	5	4	0
	Slight		0	0	1	2
	Moderate		0	0	0	3
	Extreme		0	0	0	0

	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	
Males		Appendix W

Observer 5		Group:	1	2	3	4
Number of Animals Examined			5	5	5	5
Open Field Evaluations						
Gait and Posture*	Normal		5	1	5	0
	Ataxia		0	0	0	0
	Body Drags		0	2	0	5
	Limbs Splayed or Dragging		0	1	0	3
	Hunched Posture		0	0	0	0
Locomotion	Normal		5	0	5	0
	Increased Movement		0	0	0	0
	Decreased Movement		0	1	0	0
	None		0	4	0	5
Arousal	Normal		4	0	0	0
	Low, Slight Stupor		1	0	1	0
	Very Low, Stupor		0	5	0	5
	High, Slight Excitement, Tense		0	0	4	0
	Very High, Hyper-Alert		0	0	0	0
Piloerection	Not Present		5	5	5	5
	Present		0	0	0	0
Exophthalmia	Not Present		5	5	5	5
	Present		0	0	0	0
Feces	Number of Boluses		6	4	0	1
	Unformed Stool		0	0	0	0
Urine	Number of Pools		2	6	0	6
	Polyuria		0	0	0	0
Stereotypic Behavior						
Stereotypic Behavior	Not Present		5	5	1	5
	Present		0	0	4	0
Motor Movements						
Fasciculations	Not Present		5	5	5	0
	Slight		0	0	0	4
	Severe		0	0	0	1
Convulsions	Not Present		5	5	5	5
	Slight		0	0	0	0
	Severe		0	0	0	0
Tremors	Not Present		5	5	5	5
	Slight		0	0	0	0
	Severe		0	0	0	0

*Gait for two Group 2 animals could not be determined because the animals did not move during the observation period.

Males	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 5**Group: 1 2 3 4**

Number of Animals Examined

5 5 5 5

Reflex Assessments**Approach Response**

Normal: Slowly Approaches, Sniffs and/or Turns Away

5 1 4 1

No Reaction

0 4 1 4

Freezes or Pulls Away Slightly

0 0 0 0

Jumps or Turns Abruptly to Avoid, or attacks and/or bites

0 0 0 0

Audition

Normal: Flinches or Flicks Ears

5 5 4 4

No Reaction

0 0 0 0

Exaggerated; Jumps, Flips, Bites

0 0 1 1

Pain

Normal: Turns/Bites or Walks Forward/Away

5 5 4 0

No Reaction

0 0 0 5

Apparent Increased Pain

0 0 1 0

Pupil Response

Pupil Constricts

5 5 5 0

No Constriction

0 0 0 0

Miosis

0 0 0 5

Mydriasis

0 0 0 0

Pinna

Ear Flattens Against Head

2 1 1 0

Animal Shakes Head

3 4 4 5

No Response

0 0 0 0

Proprioception

Normal: Returns Leg to Original Position

5 4 5 1

Returns Leg Only Partially to Original Position

0 0 0 1

No Response

0 1 0 3

Air Righting Reflex

Normal: Lands on All Four Feet

5 2 5 2

Slightly Uncoordinated

0 3 0 2

Lands on Side

0 0 0 0

Lands on Back

0 0 0 1

	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	
Females		Appendix W

Observer 6		Group:	1	2	3	4
Number of Animals Examined			5	5	5	5
Home Cage Evaluations						
Posture	Sitting or Standing Normally		4	1	0	0
	Alert, Oriented Toward Observer		1	1	5	0
	Asleep		0	0	0	0
	Lying on Side		0	1	0	0
	Flattened		0	2	0	5
	Crouched		0	0	0	0
Vocalizations	Not Present		5	5	5	5
	Present		0	0	0	0
Palpebral Closure	Eyelids Open		5	4	5	5
	Eyelids Completely Closed		0	0	0	0
	Eyelids Slightly Drooping		0	1	0	0
	Eyelids Half Closed		0	0	0	0
Handling Evaluations						
Ease of Removal	Very Easy		3	5	4	5
	Easy		1	0	1	0
	Moderately Difficult		0	0	0	0
	Freezes		0	0	0	0
	Difficult		0	0	0	0
Ease of Handling	Normal (easy, alert)		5	5	5	5
	Moderately Difficult		0	0	0	0
	Freezes		0	0	0	0
	Difficult		0	0	0	0
	Totally limp		0	0	0	0
Chromodacryorrhea	Not Present		5	5	5	5
	Present		0	0	0	0
Lacrimation	Not Present		5	1	5	3
	Moderate		0	1	0	1
	Extreme		0	3	0	1
Coat	Normal		5	5	5	5
	Slightly Soiled		0	0	0	0
	Moderately Soiled		0	0	0	0
	Extremely Soiled		0	0	0	0
Salivation	Not Present		5	5	5	2
	Slight		0	0	0	2
	Moderate		0	0	0	1
	Extreme		0	0	0	0

Females	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 6**Group:** 1 2 3 4

Number of Animals Examined

5 5 5 5

Open Field Evaluations

Gait and Posture

Normal	5	1	5	0
Ataxia	0	0	0	0
Body Drags	0	1	0	3
Limbs Splayed or Dragging	0	3	0	3
Hunched Posture	0	1	0	0

Locomotion

Normal	5	1	0	0
Increased Movement	0	0	3	0
Decreased Movement	0	0	2	2
None	0	4	0	3

Arousal

Normal	5	1	0	0
Low, Slight Stupor	0	0	1	1
Very Low, Stupor	0	4	0	4
High, Slight Excitement, Tense	0	0	4	0
Very High, Hyper-Alert	0	0	0	0

Piloerection

Not Present	5	5	5	5
Present	0	0	0	0

Exophthalmia

Not Present	5	5	5	5
Present	0	0	0	0

Feces

Number of Boluses	0	3	0	0
Unformed Stool	0	0	0	0

Urine

Number of Pools	0	5	0	4
Polyuria	0	0	0	0

Stereotypic Behavior

Stereotypic Behavior

Not Present	5	5	0	3
Present	0	0	5	2

Motor Movements

Fasciculations

Not Present	5	5	5	0
Slight	0	0	0	1
Severe	0	0	0	4

Convulsions

Not Present	5	5	5	5
Slight	0	0	0	0
Severe	0	0	0	0

Tremors

Not Present	5	5	5	5
Slight	0	0	0	0
Severe	0	0	0	0

	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	
Females		Appendix W

Observer 6		Group:	1	2	3	4
Number of Animals Examined			5	5	5	5
Reflex Assessments						
Approach Response	Normal: Slowly Approaches, Sniffs and/or Turns Away		5	2	1	3
	No Reaction		0	3	4	2
	Freezes or Pulls Away Slightly		0	0	0	0
	Jumps or Turns Abruptly to Avoid, or attacks and/or bites		0	0	0	0
Audition	Normal: Flinches or Flicks Ears		5	3	5	5
	No Reaction		0	2	0	0
	Exaggerated; Jumps, Flips, Bites		0	0	0	0
Pain	Normal: Turns/Bites or Walks Forward/Away		5	5	5	4
	No Reaction		0	0	0	1
	Apparent Increased Pain		0	0	0	0
Pupil Response	Pupil Constricts		5	5	5	0
	No Constriction		0	0	0	0
	Miosis		0	0	0	5
	Mydriasis		0	0	0	0
Pinna	Ear Flattens Against Head		0	0	2	0
	Animal Shakes Head		5	5	3	5
	No Response		0	0	0	0
Proprioception	Normal: Returns Leg to Original Position		5	3	5	3
	Returns Leg Only Partially to Original Position		0	1	0	1
	No Response		0	1	0	1
Air Righting Reflex	Normal: Lands on All Four Feet		5	3	5	0
	Slightly Uncoordinated		0	2	0	2
	Lands on Side		0	0	0	3
	Lands on Back		0	0	0	0

Females	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 7		Group: 1 2 3 4
Number of Animals Examined		5 5 5 5
Home Cage Evaluations		
Posture	Sitting or Standing Normally	2 3 1 3
	Alert, Oriented Toward Observer	3 0 4 1
	Asleep	0 0 0 0
	Lying on Side	0 0 0 0
	Flattened	0 2 0 1
	Crouched	0 0 0 0
Vocalizations	Not Present	5 5 5 5
	Present	0 0 0 0
Palpebral Closure	Eyelids Open	5 3 5 5
	Eyelids Completely Closed	0 0 0 0
	Eyelids Slightly Drooping	0 2 0 0
	Eyelids Half Closed	0 0 0 0
Handling Evaluations		
Ease of Removal	Very Easy	5 5 4 5
	Easy	0 0 1 0
	Moderately Difficult	0 0 0 0
	Freezes	0 0 0 0
	Difficult	0 0 0 0
Ease of Handling	Normal (easy, alert)	5 5 4 5
	Moderately Difficult	0 0 1 0
	Freezes	0 0 0 0
	Difficult	0 0 0 0
	Totally limp	0 0 0 0
Chromodacryorrhea	Not Present	5 4 5 5
	Present	0 1 0 0
Lacrimation	Not Present	5 2 5 5
	Moderate	0 1 0 0
	Extreme	0 2 0 0
Coat	Normal	5 5 5 5
	Slightly Soiled	0 0 0 0
	Moderately Soiled	0 0 0 0
	Extremely Soiled	0 0 0 0
Salivation	Not Present	4 5 5 1
	Slight	1 0 0 3
	Moderate	0 0 0 1
	Extreme	0 0 0 0

Females	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 7**Group: 1 2 3 4**

Number of Animals Examined

5 5 5 5

Open Field Evaluations

Gait and Posture

Normal	5	1	5	0
Ataxia	0	0	0	2
Body Drags	0	2	0	1
Limbs Splayed or Dragging	0	2	0	1
Hunched Posture	0	0	0	1

Locomotion

Normal	2	0	0	0
Increased Movement	1	0	5	0
Decreased Movement	2	1	0	5
None	0	4	0	0

Arousal

Normal	3	0	0	0
Low, Slight Stupor	2	2	0	3
Very Low, Stupor	0	3	0	2
High, Slight Excitement, Tense	0	0	5	0
Very High, Hyper-Alert	0	0	0	0

Piloerection

Not Present	5	5	5	5
Present	0	0	0	0

Exophthalmia

Not Present	5	5	5	5
Present	0	0	0	0

Feces

Number of Boluses	0	8	0	0
Unformed Stool	0	0	0	0

Urine

Number of Pools	0	4	1	4
Polyuria	0	0	0	0

Stereotypic Behavior

Stereotypic Behavior

Not Present	5	5	0	1
Present	0	0	5	4

Motor Movements

Fasciculations

Not Present	5	5	5	0
Slight	0	0	0	5
Severe	0	0	0	0

Convulsions

Not Present	5	5	5	5
Slight	0	0	0	0
Severe	0	0	0	0

Tremors

Not Present	5	5	5	5
Slight	0	0	0	0
Severe	0	0	0	0

Females	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 7	Group: 1 2 3 4
Number of Animals Examined	5 5 5 5
Reflex Assessments	
Approach Response	Normal: Slowly Approaches, Sniffs and/or Turns Away 3 0 4 3 No Reaction 2 5 1 2 Freezes or Pulls Away Slightly 0 0 0 0 Jumps or Turns Abruptly to Avoid, or attacks and/or bites 0 0 0 0
Audition	Normal: Flinches or Flicks Ears 5 3 5 5 No Reaction 0 2 0 0 Exaggerated; Jumps, Flips, Bites 0 0 0 0
Pain	Normal: Turns/Bites or Walks Forward/Away 5 5 5 4 No Reaction 0 0 0 1 Apparent Increased Pain 0 0 0 0
Pupil Response	Pupil Constricts 5 4 5 0 No Constriction 0 1 0 0 Miosis 0 0 0 5 Mydriasis 0 0 0 0
Pinna	Ear Flattens Against Head 3 0 4 0 Animal Shakes Head 2 5 1 5 No Response 0 0 0 0
Proprioception	Normal: Returns Leg to Original Position 5 4 5 5 Returns Leg Only Partially to Original Position 0 1 0 0 No Response 0 0 0 0
Air Righting Reflex	Normal: Lands on All Four Feet 4 5 4 1 Slightly Uncoordinated 1 0 1 2 Lands on Side 0 0 0 2 Lands on Back 0 0 0 0

Females	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 8		Group:	1	2	3	4
Number of Animals Examined			5	5	5	5
Home Cage Evaluations						
Posture	Sitting or Standing Normally		0	4	0	3
	Alert, Oriented Toward Observer		4	0	4	1
	Asleep		1	0	0	0
	Lying on Side		0	0	0	0
	Flattened		0	1	0	1
	Crouched		0	0	0	0
Vocalizations	Not Present		5	5	5	5
	Present		0	0	0	0
Palpebral Closure	Eyelids Open		4	1	5	5
	Eyelids Completely Closed		1	0	0	0
	Eyelids Slightly Drooping		0	4	0	0
	Eyelids Half Closed		0	0	0	0
Handling Evaluations						
Ease of Removal	Very Easy		3	4	4	3
	Easy		2	1	1	2
	Moderately Difficult		0	0	0	0
	Freezes		0	0	0	0
	Difficult		0	0	0	0
Ease of Handling	Normal (easy, alert)		4	5	5	5
	Moderately Difficult		1	0	0	0
	Freezes		0	0	0	0
	Difficult		0	0	0	0
	Totally limp		0	0	0	0
Chromodacryorrhea	Not Present		5	4	5	5
	Present		0	1	0	0
Lacrimation	Not Present		5	2	5	5
	Moderate		0	2	0	0
	Extreme		0	1	0	0
Coat	Normal		5	5	5	5
	Slightly Soiled		0	0	0	0
	Moderately Soiled		0	0	0	0
	Extremely Soiled		0	0	0	0
Salivation	Not Present		5	5	5	4
	Slight		0	0	0	1
	Moderate		0	0	0	0
	Extreme		0	0	0	0

Females	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 8	Group:	1	2	3	4
Number of Animals Examined		5	5	5	5
Open Field Evaluations					
Gait and Posture	Normal	5	1	5	4
	Ataxia	0	0	0	0
	Body Drags	0	3	0	1
	Limbs Splayed or Dragging	0	2	0	0
	Hunched Posture	0	0	0	0
Locomotion	Normal	5	0	1	4
	Increased Movement	0	0	4	0
	Decreased Movement	0	4	0	1
	None	0	1	0	0
Arousal	Normal	5	0	1	4
	Low, Slight Stupor	0	1	0	1
	Very Low, Stupor	0	4	0	0
	High, Slight Excitement, Tense	0	0	4	0
	Very High, Hyper-Alert	0	0	0	0
Piloerection	Not Present	5	5	5	5
	Present	0	0	0	0
Exophthalmia	Not Present	5	5	5	5
	Present	0	0	0	0
Feces	Number of Boluses	0	4	0	0
	Unformed Stool	0	0	0	0
Urine	Number of Pools	0	0	0	1
	Polyuria	0	0	0	0
Stereotypic Behavior					
Stereotypic Behavior	Not Present	5	5	1	4
	Present	0	0	4	1
Motor Movements					
Fasciculations	Not Present	5	5	5	4
	Slight	0	0	0	1
	Severe	0	0	0	0
Convulsions	Not Present	5	5	5	5
	Slight	0	0	0	0
	Severe	0	0	0	0
Tremors	Not Present	5	5	5	5
	Slight	0	0	0	0
	Severe	0	0	0	0

Females	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 8	Group:	1	2	3	4
Number of Animals Examined		5	5	5	5
Reflex Assessments					
Approach Response	Normal: Slowly Approaches, Sniffs and/or Turns Away	5	3	5	5
	No Reaction	0	2	0	0
	Freezes or Pulls Away Slightly	0	0	0	0
	Jumps or Turns Abruptly to Avoid, or attacks and/or bites	0	0	0	0
Audition	Normal: Flinches or Flicks Ears	5	3	5	5
	No Reaction	0	2	0	0
	Exaggerated; Jumps, Flips, Bites	0	0	0	0
Pain	Normal: Turns/Bites or Walks Forward/Away	5	4	5	5
	No Reaction	0	1	0	0
	Apparent Increased Pain	0	0	0	0
Pupil Response	Pupil Constricts	5	3	4	2
	No Constriction	0	2	0	1
	Miosis	0	0	0	2
	Mydriasis	0	0	1	0
Pinna	Ear Flattens Against Head	0	1	1	0
	Animal Shakes Head	5	4	4	5
	No Response	0	0	0	0
Proprioception	Normal: Returns Leg to Original Position	5	5	5	5
	Returns Leg Only Partially to Original Position	0	0	0	0
	No Response	0	0	0	0
Air Righting Reflex	Normal: Lands on All Four Feet	5	5	5	4
	Slightly Uncoordinated	0	0	0	0
	Lands on Side	0	0	0	1
	Lands on Back	0	0	0	0

Females	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 9		Group:	1	2	3	4
Number of Animals Examined			5	5	5	5
Home Cage Evaluations						
Posture	Sitting or Standing Normally		4	1	4	0
	Alert, Oriented Toward Observer		1	0	1	0
	Asleep		0	0	0	0
	Lying on Side		0	0	0	0
	Flattened		0	4	0	5
	Crouched		0	0	0	0
Vocalizations	Not Present		5	5	5	5
	Present		0	0	0	0
Palpebral Closure	Eyelids Open		5	1	5	5
	Eyelids Completely Closed		0	0	0	0
	Eyelids Slightly Drooping		0	4	0	0
	Eyelids Half Closed		0	0	0	0
Handling Evaluations						
Ease of Removal	Very Easy		3	4	4	4
	Easy		2	1	1	1
	Moderately Difficult		0	0	0	0
	Freezes		0	0	0	0
	Difficult		0	0	0	0
Ease of Handling	Normal (easy, alert)		5	5	5	5
	Moderately Difficult		0	0	0	0
	Freezes		0	0	0	0
	Difficult		0	0	0	0
	Totally limp		0	0	0	0
Chromodacryorrhea	Not Present		5	4	5	5
	Present		0	1	0	0
Lacrimation	Not Present		5	1	5	3
	Moderate		0	2	0	2
	Extreme		0	2	0	0
Coat	Normal		5	5	4	2
	Slightly Soiled		0	0	1	3
	Moderately Soiled		0	0	0	0
	Extremely Soiled		0	0	0	0
Salivation	Not Present		5	5	5	3
	Slight		0	0	0	2
	Moderate		0	0	0	0
	Extreme		0	0	0	0

Females	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 9	Group:	1	2	3	4
Number of Animals Examined		5	5	5	5
Open Field Evaluations					
Gait and Posture	Normal	5	1	5	0
	Ataxia	0	0	0	2
	Body Drags	0	2	0	3
	Limbs Splayed or Dragging	0	3	0	1
	Hunched Posture	0	0	0	0
Locomotion	Normal	3	0	1	0
	Increased Movement	0	0	4	0
	Decreased Movement	2	1	0	3
	None	0	4	0	2
Arousal	Normal	3	0	0	0
	Low, Slight Stupor	2	1	0	0
	Very Low, Stupor	0	4	0	5
	High, Slight Excitement, Tense	0	0	5	0
	Very High, Hyper-Alert	0	0	0	0
Piloerection	Not Present	5	5	5	5
	Present	0	0	0	0
Exophthalmia	Not Present	5	5	5	5
	Present	0	0	0	0
Feces	Number of Boluses	0	3	0	0
	Unformed Stool	0	0	0	0
Urine	Number of Pools	0	2	0	0
	Polyuria	0	0	0	0
Stereotypic Behavior					
Stereotypic Behavior	Not Present	5	5	0	0
	Present	0	0	5	5
Motor Movements					
Fasciculations	Not Present	5	5	5	0
	Slight	0	0	0	3
	Severe	0	0	0	2
Convulsions	Not Present	5	5	5	5
	Slight	0	0	0	0
	Severe	0	0	0	0
Tremors	Not Present	5	5	5	5
	Slight	0	0	0	0
	Severe	0	0	0	0

Females	Neurobehavioral Positive Control Data: Functional Observational Battery Incidence Summary of Functional Observational Battery Evaluations	Appendix W
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Observer 9	Group:	1	2	3	4
Number of Animals Examined		5	5	5	5
Reflex Assessments					
Approach Response	Normal: Slowly Approaches, Sniffs and/or Turns Away	3	0	5	3
	No Reaction	2	5	0	2
	Freezes or Pulls Away Slightly	0	0	0	0
	Jumps or Turns Abruptly to Avoid, or attacks and/or bites	0	0	0	0
Audition	Normal: Flinches or Flicks Ears	5	1	5	3
	No Reaction	0	4	0	2
	Exaggerated; Jumps, Flips, Bites	0	0	0	0
Pain	Normal: Flinches or Flicks Ears	5	5	5	1
	No Reaction	0	0	0	4
	Exaggerated; Jumps, Flips, Bites	0	0	0	0
Pupil Response	Pupil Constricts	4	3	5	0
	No Constriction	1	1	0	0
	Miosis	0	1	0	5
	Mydriasis	0	0	0	0
Pinna	Ear Flattens Against Head	0	0	0	0
	Animal Shakes Head	5	5	5	5
	No Response	0	0	0	0
Proprioception	Normal: Returns Leg to Original Position	5	5	5	5
	Returns Leg Only Partially to Original Position	0	0	0	0
	No Response	0	0	0	0
Air Righting Reflex	Normal: Lands on All Four Feet	5	3	5	2
	Slightly Uncoordinated	0	1	0	2
	Lands on Side	0	1	0	1
	Lands on Back	0	0	0	0

	Neurobehavioral Positive Control Data: Motor Activity Preface	Appendix W
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This is an abridged version of text and tables from Study No. H-34, 00-14501 as amended on 23 December 2008.

Table of Contents

Introduction	996
Materials and Methods	996
Results	1011
Discussion	1011
Conclusion	1012
Mean Motor Activity Values	1013

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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1. INTRODUCTION

This study was designed to assess the effect of Amphetamine and Chlorpromazine on the locomotor activity in young rats 13, 17, 21, and 62 days of age. This work was performed in order to provide Positive Control data and was conducted according to test guidelines of the U.S. Environmental Protection Agency (Office of Prevention, Pesticides and Toxic Substances, Health Effects Guidelines, OPPTS 870.6300, Developmental Neurotoxicity, August 1998).

2. MATERIALS AND METHODS

2.1. REGULATORY REFERENCES

2.1.1. TEST GUIDELINES

This study was designed to provide positive control data for neurotoxicity screening studies in accord with the US EPA Health Effects Test Guidelines, OPPTS 870.6200 Neurotoxicity Screening Battery, August 1998.

2.1.2. GOOD LABORATORY PRACTICES

This study was conducted in compliance with Part 160 of 40 CFR (EPA/FIFRA Good Laboratory Practice Regulations) with the exception that assays to verify concentration, stability and homogeneity of the test articles in carriers were not performed.

2.1.3. ANIMAL WELFARE ACT COMPLIANCE

This study complied with all appropriate parts of the Animal Welfare Act regulations: 9 CFR Parts 1 and 2 final Rules, Federal Register, Volume 54, No. 168, August 31, 1989, pp. 36112-36163 effective October 30, 1989 and 9 CFR Part 3 Animal Welfare Standards; Final Rule, Federal Register, Volume 56, No. 32, February 15, 1991, pp. 6426-6505 effective March 18, 1991.

2.2. FACILITIES MANAGEMENT/ANIMAL HUSBANDRY

Currently acceptable practices of good animal husbandry were followed, e.g., *Guide for the Care and Use of Laboratory Animals*; National

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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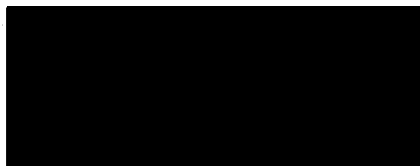
Academy Press, 1996. Huntingdon Life Sciences is fully accredited by the Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC).

2.3. STUDY MANAGEMENT

2.3.1. SPONSOR AND TESTING FACILITY

Huntingdon Life Sciences
Mettlers Road
PO Box 2360
East Millstone, NJ 08875-2360

2.3.2. STUDY DIRECTOR¹



2.4. EXPERIMENTAL DESIGN

Group	Treatment	Dosage (mg/kg)	Dose Volume (mL/kg)	Treatment Schedule	Locomotor Activity Assessment	Number of Animals
I ^a	Control	0	5	Postnatal Day 13, 17, 21, 62	Approximately 30 minutes after injection	10/sex
II	Amphetamine	2.0	5	Postnatal Day 13, 17, 21, 62	Approximately 30 minutes after injection	10/sex
III	Chlorpromazine	10.0	5	Postnatal Day 13, 17, 21, 62	Approximately 30 minutes after injection	10/sex

^aControl animals were administered 0.9% saline at the same dose volume as the test articles.

¹ [REDACTED] served as Study Director during the testing portion of Study No. 00-14501. Effective 19 May 2000, [REDACTED] assumed the responsibilities of Study Director. [REDACTED] assumed all Study Director responsibilities following [REDACTED] departure from Huntingdon Life Sciences, effective 22 December 2000. Effective 10 Nov 2008, [REDACTED] assumed Study Director responsibilities for Study No. 00-14501 for the purpose of amending the Final Report only.

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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2.5. STUDY DATES**2.5.1. STUDY INITIATION**

10 February 2000

2.5.2. DATE OF ANIMAL RECEIPT

11 February 2000

**2.5.3. DOSE INITIATION DATES FOR LOCOMOTOR
ACTIVITY ASSESSMENTS**

Postnatal Day 13: 14 February 2000

Postnatal Day 17: 18 February 2000

Postnatal Day 21: 22 February 2000

Postnatal Day 62: 03 April 2000

2.5.4. TRANSFER OF ANIMALS TO EXTRA RAT COLONY

04 April 2000

2.5.5. STUDY COMPLETION

13 March 2001 (Date Study Director signed the Final Report)

2.6. TEST ARTICLES**2.6.1. AMPHETAMINE****Supplier**Sigma
3050 Spruce Strret
St. Louis, MO 63103**Lot Number**

69H1239

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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Purity

Assume 100%

Date Received

07 January 2000

Expiration Date

June 2001

Description

Powder

Storage

Room temperature

Archival Sample

A sample of amphetamine is stored in the Archives of the Testing Facility under conditions specified for test article storage.

Disposition of Unused Test Article

Unused test article was used as the archival sample for this test article.

2.6.2. CHLORPROMAZINE**Supplier**

Sigma
3050 Spruce Street
St. Louis, MO 63103

Lot Number

48H1403

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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Purity

98%

Date Received

01 December 1999

Expiration Date

April 2001

Description

White/White with a yellow cast, powder

Characteristics

Light sensitive

Storage

Room temperature, protected from light

Archival Sample

A sample of chlorpromazine is stored in the Archives of the Testing Facility under conditions specified for test article storage.

Disposition of Unused Test Article

Unused test article was used as the archival sample for this test article.

2.7. CONTROL ARTICLE

0.9 % Saline

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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2.7.1. SUPPLIER

VWR Scientific Products
200 Center Square Rd.
Bridgeport, NJ 08014

2.7.2. LOT/BATCH NUMBER

G-949941 / 173-191

2.7.3. DATE RECEIVED

04 June 1999

2.7.4. EXPIRATION DATE

October 2000

2.7.5. DESCRIPTION

Clear liquid

2.7.6. STORAGE

Room temperature

2.7.7. ARCHIVAL SAMPLE

A sample of the control article is stored in the Archives of the Testing Facility under conditions specified for test article storage.

2.8. TEST ARTICLE AND CONTROL ARTICLE PREPARATION**2.8.1. CONTROL ARTICLE PREPARATION**

Control article was used neat; as received.

2.8.2. TEST ARTICLE PREPARATION

Appropriate amounts of test article were mixed with 0.9% saline to achieve the desired concentrations in a graduated cylinder, capped,

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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inverted and shaken well prior to use. Fresh dosing solutions were prepared either 1 or 3 days prior to or the day of dose administration and were refrigerated (2-8°C) when not in use.

2.9. ANALYSIS OF DOSING SUSPENSIONS

Analyses were not performed in this study.

2.10. TEST ANIMALS

2.10.1. SPECIES

Albino Rats
[CrI: CD[®] (SD) IGS BR]

2.10.2. SUPPLIER

Charles River Laboratories
Kingston, NY facility

2.10.3. JUSTIFICATION FOR TEST SYSTEM SELECTION

The rat is a rodent animal model commonly utilized in reproduction studies as recommended in the referenced guidelines.

2.10.4. ANIMAL RECEIPT INFORMATION

Purchased	8 litters (dam and 5 pups/sex/litter)
Placed on study	6 litters (dam and 5/sex/litter)

2.10.5. AGE OF PUPS AT RECEIPT

Pups were received on Postnatal Day 10.

2.10.6. ACCLIMATION PERIOD

All female rats and their litters were acclimated from the time they were received until locomotor activity assessment began on the pups.

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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2.11. SELECTION/GROUP ASSIGNMENT

More animals than required for the study were purchased and acclimated. Animals considered suitable for the study on the basis of pretest physical examinations were randomized into groups at receipt using a method which ranked the Postnatal Day 10 body weights and randomly assigned each within the block of three into groups. Animals were replaced as required based on physical examinations and/or body weight change up to Postnatal Day 13 to achieve the desired number of animals (10/sex/group). Disposition of all animals not utilized in this study is maintained in the study file.

2.12. ANIMAL IDENTIFICATION

Each female was ear tagged (metal ear tag) with a unique identification number by the supplier. Each Postnatal Day 10 pup was uniquely identified by tattoo upon receipt. At weaning (Postnatal Day 21), each pup was ear-tagged with a number assigned by the Testing Facility upon receipt. These numbers plus the study number served as each animal's unique and permanent identification for the duration of the study. Each cage was also provided with a cage card which contained the study number and animal number.

2.13. VETERINARY CARE

Animals were monitored by the technical staff for any conditions requiring possible veterinary care.

2.14. ANIMAL HUSBANDRY

2.14.1. HOUSING

Each female rat and litter, from the time of receipt through Postnatal Day 20 were individually housed in a covered, clear plastic "shoebox" with bedding. From Postnatal Day 21 until Postnatal Day 28, the weanling pups (two or three of the same sex) were housed in stainless steel suspended cages with wire mesh floors and fronts. After Postnatal Day 28, and for the remainder of the study, animals were individually housed in stainless steel

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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suspended cages with wire mesh floors. A glass food jar with a stainless steel lid, and food saver, was secured in each cage. Clean food jars and fresh feed were provided at least weekly.

2.14.2. FEED

Certified Rodent Diet, No. 5002; (Meal) (PMI Nutrition International, St. Louis, MO) was provided *ad libitum*.

Analytical certification of batches of feed, provided by the manufacturer, were maintained on file at the Testing Facility. Feed was analyzed for nutritional content (protein, fat, fiber), inorganic constituents (arsenic, cadmium, calcium, lead, mercury, phosphorus, selenium), organophosphates (diazinon, ethion, methyl parathion, thimet, trithion, disulfoton, malathion, parathion, thiodan), and pesticides (aldrin, beta-BHC, DDE, delta-BHC, endrin, heptachlor, lindane, mirex, alpha-BHC, chlordane, total DDT, dieldrin, HCB, heptachlor epoxide, methoxychlor), plus PCB, and aflatoxin.

There were no known contaminants in the feed which were considered capable of interfering with the results of this study.

2.14.3. WATER

Facility water was supplied by Elizabethtown Water Company, (Westfield, NJ); and was provided *ad libitum* to individual animal cages via an automated watering system.

Monthly water analyses were conducted by Elizabethtown Water Company, Westfield, New Jersey (Raritan-East Millstone Plant) to ensure that water meets standards specified under the EPA Federal Safe Drinking Water Act Regulations (40 CFR part 141). Water analyses, provided by the supplier, were maintained on file at the Testing Facility. In addition, water samples were collected biannually from representative rooms in the Testing Facility; chemical and microbiological water analyses were conducted on these samples by a subcontract laboratory. Results were

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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maintained on file at the Testing Facility. There are no known contaminants in the water which are expected to interfere with this study.

2.14.4. BEDDING ARTICLE

Ground corncob bedding (Bed-O'-Cobs[®] 1/4 inch Irradiated, The Andersons, Maumee, Ohio) was provided for each female rat and litter from time of receipt through Postnatal Day 20. Fresh bedding was provided weekly and as needed.

Bedding was analyzed for inorganic constituents (arsenic, bismuth, cadmium, lead, magnesium, manganese, mercury, nickel, zinc), organophosphates (diazinon, ethion, methyl parathion, trithion, malthion, ethyl parathion), and pesticides (aldrin, beta-BHC, DDE, delta-BHC, endrin, heptchlor, lindane, mirex, alpha-BHC, chlordane, total DDT, dieldrin, HCB, heptachlor epoxide, methoxychlor), plus PCB, and aflatoxin. There were no known contaminants in the bedding which were expected to interfere with the results of this study. Contaminant analyses were performed periodically. Results of the bedding analysis were maintained on file at the Testing Facility.

2.14.5. ENVIRONMENTAL CONDITIONS

Light/Dark Cycle

Twelve-hour light/dark cycle provided via automatic timer.

Temperature

Temperature was monitored and recorded twice daily and maintained within the desired ranges to the maximum extent possible.

Desired: 18 - 26°C

Actual: 21 - 24°C

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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Relative Humidity

Relative humidity was monitored and recorded once daily and maintained within the desired ranges to the maximum extent possible.

Desired: 30 - 70%

Actual: 20 - 68%

Relative humidity was not within the specified range on eight occasions during this study (20-28%). This was not considered to have affected the integrity of the study.

2.15. TEST ARTICLE ADMINISTRATION**2.15.1. ROUTE OF ADMINISTRATION**

Intraperitoneal injection

2.15.2. JUSTIFICATION FOR ROUTE OF ADMINISTRATION

The intraperitoneal route provides rapid test article absorption and has been used in previous studies with the test articles.

2.15.3. FREQUENCY AND DURATION OF ADMINISTRATION

The test articles (Amphetamine, Chlorpromazine) and control article were administered to pups on Postnatal Days 13, 17, 21, and 62. Each animal was dosed more than once per week with a washout period of 4 to 41 days between doses.

2.15.4. ADMINISTRATION OF TEST AND/OR CONTROL ARTICLE

The test articles (Amphetamine, Chlorpromazine) and the control article (saline) were administered by intraperitoneal injection into the abdominal cavity near the inguinal region using a sterile needle and syringe of appropriate size. Doses were calculated using the most recent body weights available. A volume of 5 mL/kg of body weight was administered.

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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2.16. EXPERIMENTAL EVALUATION

2.16.1. VIABILITY OBSERVATIONS (CAGESIDE)

Observations for mortality, morbidity and signs of severe toxic or pharmacological effects were made at least twice daily (morning and afternoon) for the female rats and pups.

2.16.2. CLINICAL OBSERVATIONS

A detailed physical examination was given to all female rats and pups upon receipt. The rat pups had a detailed physical examination on the day of locomotor activity behavioral assessment and weekly during the postweaning period until they were placed in a colony.

2.16.3. BODY WEIGHTS

Body weights were recorded for pups on Postnatal Days 10, 13, 17, 21, 62, and weekly during the postweaning period.

2.17. LITTER EVALUATIONS

2.17.1. OBSERVATIONS

Litters were observed and each pup was sexed at the time of receipt. Pups in the litter were counted on Postnatal Days 10, 13, 17, and 21.

2.17.2. WEANING

Pups were weaned on Postnatal Day 21 and housed two or three of the same sex per cage.

2.17.3. LOCOMOTOR ACTIVITY BEHAVIORAL ASSESSMENT

The locomotor activity assessment was measured in 10 pups/sex/group on Postnatal Days 13, 17, 21 and 62. On each day of testing, 10 rat pups/sex/group were administered either vehicle, amphetamine, or chlorpromazine. Approximately thirty

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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minutes after the injection they were placed in a clear plastic shoebox cage equipped with a 5-beam automated Photobeam Activity System (PAS; San Diego Instruments, Inc.). Activity was monitored during a 60-minute session composed of 12, five-minute intervals. A record was made of the total number of photobeam breaks which occurred during each of the 12, five-minute intervals. The locomotor activity was assessed using a repeated measures analysis of variance to determine if there was a test article effect. Rat pups were randomized so that there was an equal representation of the treatment groups during each locomotor activity session.

Temperature

Temperature was monitored and recorded twice daily, just prior to the first evaluation and just after the last evaluation.

Desired: 18 to 26°C
Actual: 22 to 24°C

Relative Humidity

Relative humidity was monitored and recorded twice daily, just prior to the first evaluation and just after the last evaluation.

Desired: 30 to 70%
Actual: 29 to 56%

Noise Level

Noise level was monitored using a Digital Sound Level Meter, Model 840029 (Sper Scientific, Ltd., Scottsdale, Arizona) and recorded twice daily, just prior to the first evaluation and just after the last evaluation.

Desired: 55 to 65 dB
Actual: 60.1 to 61.4 dB

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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Illumination

Illumination was monitored using a Photometer 1 (Quantum Instruments, Inc., Garden City, New York) and recorded twice daily, just prior to the first evaluation and just after the last evaluation.

Desired: <80 footcandles

Actual: 36.5 to 55.3 footcandles

2.18. POSTMORTEM

No postmortem examinations were performed as all animals were transferred to the in-house rat colony.

2.19. DISPOSITION OF ANIMALS

After the pups were weaned, the female rats were euthanized via an overdose of carbon dioxide and discarded. After the locomotor activity behavioral assessment on 62, the rats were transferred to the in-house rat colony.

2.20. PRESERVATION OF RECORDS AND SPECIMENS

All data documenting experimental details and study procedures and observations were recorded and maintained as raw data.

At the completion of the study, all reports, raw data, protocol and amendments, and retained samples will be maintained in the Testing Facility's Archives.

2.21. PROTOCOL DEVIATIONS

The following protocol deviations occurred during the study, but were not considered to have compromised the validity or integrity of the study.

1. Litter counts were not recorded on Postnatal Days 10, 13, 17, and 21 due to technician error. However, individual body weights recorded for those days (Postnatal Days 10, 13, 17, and 21) are considered documentation for the count.

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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2. Documentation of pups not selected for this study was omitted from the data due to technician error.
3. As there is no documentation in the study data indicating the age of the dams at time of receipt at the Testing Facility, it can not be determined that the protocol requirement that the dams be 75-90 days old was met.
4. Protocol specified that the washout period between doses would be approximately 2 days even though it also specified dosing would occur on Postnatal Days 13, 17, 21 and 60 (± 2) days. The washout periods in this study ranged from 4 to 41 days.
5. Fresh dosing solutions were prepared either 1 or 3 days prior to or the day of dose administration rather than once weekly as specified in the protocol.

2.22. COMPUTER SYSTEM

The Toxicology Analysis System Customized - Reproduction Module (TASC-R), version 1.1.13, from Pathologist Associates International (PAI), Frederick, Maryland, was the computer software system utilized during the conduct of this study for randomizations, data collection, reporting, and statistical analysis.

2.23. STATISTICAL EVALUATIONS

The locomotor activity behavioral assessments were analyzed for each period using split-plot repeated measures analysis of variance with model terms for group, animal within group, interval and group by interval interaction. If the group by treatment interaction was statistically significant, indicating non-parallelism in the behavioral profile between groups, a separate one-way ANOVA for group effects was performed at each interval. If the response data passed on the parallel hypothesis, an ANOVA (using summed responses over intervals for each animal) was used to test for the overall treatment effect with respect to the level hypothesis. If any significant overall treatment group effect was found by any of the above ANOVAs, Dunnett's t-test was used to find groups that differed from control. No investigation of model fit was requested or performed. Analyses were performed for sexes separately and combined.

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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Treatment group effects were deemed significant at the $\alpha=0.05$ level. Plots, tables, listings, and analyses were generated using SAS® version 6.12 for WINDOWS. Analyses were conducted by CATO Research, 200 Westpark Corporate Center, 4364 South Alston Avenue, Durham, NC 27713-2280.

3. RESULTS

Results from pups treated with 2 mg/kg Amphetamine (Group II) indicate a statistically significant increase in locomotor activity for male and female rats combined, on Postnatal Days 13, 17, 21, and 62, when compared to the control group. Statistically significant increases in locomotor activity were observed for Group II male and female rats individually, on Postnatal Day 21 and 62 only.

Results from pups treated with 10 mg/kg Chlorpromazine (Group III) indicated a statistically significant decrease in locomotor activity for male and female rats combined, on Postnatal Days 17, 21, and 62, when compared to the control group. Statistically significant decreases in locomotor activity were observed for Group III male and female rats individually, on Postnatal Days 17, 21, and 62 only.

4. DISCUSSION

This study evaluated the behavioral effects of Amphetamine and Chlorpromazine on locomotor activity of young male and female rats, in order to generate positive control data for future developmental neurotoxicity studies.

Rats dosed and tested on Postnatal Day 17, 21, and 62 responded to test article treatment, with increased activity for Group II (2 mg/kg amphetamine) and decreased activity for Group III (10 mg/kg chlorpromazine). Amphetamine or Chlorpromazine behavioral effects were observed equally in both male and female rats in the treatment groups.

Rats treated with Amphetamine exhibited locomotor activity similar to control levels at the beginning of the testing period. Unlike the control animals, the Amphetamine treated animals did not habituate, and remained in a more active state for the duration of the 60-minute testing period.

Rats treated with Chlorpromazine exhibited decreased locomotor activity compared to control levels at the beginning of the testing period. Unlike the

	Neurobehavioral Positive Control Data: Motor Activity	Appendix W
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control animals, the Chlorpromazine treated animals did not habituate, and remained in a less active state for the duration of the 60-minute testing period.

The pups dosed and tested on Postnatal Day 13 did not respond to treatment as dramatically as in latter dosing/testing days. The lack of statistically significant locomotor activity differences in the Postnatal Day 13 treatment groups may stem from the low basal level of activity in pups of such a young age. The presence of age-related differences in locomotor activity in this study suggests the importance of evaluating behavioral endpoints at several different time-points, when testing for developmental neurotoxicity.

5. CONCLUSION

Under the conditions of this study, 2 mg/kg of Amphetamine or 10 mg/kg of Chlorpromazine, administered to young male and female rats on Postnatal Days 13, 17, 21, and 62, via intraperitoneal injection produced statistically significant behavioral effects on locomotor activity. Based on these results, it was shown that both amphetamine and chlorpromazine are excellent model compounds for the generation of locomotor activity alterations in young Sprague Dawley rats.

	Neurobehavioral Positive Control Data: Motor Activity Mean Motor Activity Values	Appendix W
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Summary of Statistical Results for Motor Activity Data

Post Natal Day	Sex	Parallel Hypothesis (p-value)	Level Hypothesis (p-value)	Significant Pairwise Results*
13	Male	0.1824	0.3593	NA
	Female	0.1097	0.0723	NA
	Combined	0.0074	NA	1:NS; 2:NS; 10:II>I; 11:II>I; 12:II>I
17	Male	0.0203	NA	1:I>III; 2:I>III; 4:I>III
	Female	0.0001	NA	1:I>III; 2:I>III; 3:I>III; 4:NS; 5:I>III
	Combined	0.0001	NA	1:I>III; 2:I>III; 3:I>III; 4:I>III; 5:I>III; 8:NS; 10:NS; 11:NS; 12:II>I
21	Male	0.0001	NA	1:II>I, I>III; 2:II>I, I>III; 3:II>I, I>III; 4:II>I; 5:II>I; 6:II>I; 7:II>I; 8:II>I; 9:II>I; 10:II>I; 11:II>I; 12:II>I
	Female	0.0001	NA	1:II>I, I>III; 2:II>I, I>III; 3:II>I, I>III; 4:II>I; 5:II>I; 6:II>I; 7:II>I; 8:II>I; 9:II>I; 10:II>I; 11:II>I; 12:II>I
	Combined	0.0001	NA	1:II>I, I>III; 2:II>I, I>III; 3:II>I, I>III; 4:II>I; 5:II>I; 6:II>I, I>III; 7:II>I; 8:II>I; 9:II>I; 10:II>I; 11:II>I; 12:II>I
62	Male	0.0001	NA	1:I>III; 2:I>III; 3:I>III; 4:I>III; 5:I>III; 6:II>I, I>III; 7:II>I, I>III; 8:II>I, I>III; 9:II>I, I>III; 10:II>I, I>III; 11:II>I; 12:II>I
	Female	0.0001	NA	1:I>III; 2:I>III; 3:I>III; 4:I>III; 5:II>I, I>III; 6:II>I, I>III; 7:I>III; 8:II>I, I>III; 9:II>I, I>III; 10:II>I, I>III; 11:II>I; 12:II>I, I>III
	Combined	0.0001	NA	1:I>III; 2:I>III; 3:I>III; 4:I>III; 5:II>I, I>III; 6:II>I, I>III; 7:II>I, I>III; 8:II>I, I>III; 9:II>I, I>III; 10:II>I, I>III; 11:II>I, I>III; 12:II>I, I>III

*Only intervals with significant differences between treatments are reported.

NA = Not applicable; NS = No significant differences from control

x: a>b indicates mean for group a significantly greater than mean for group b in interval x.

I = control, II = amphetamine, III = chlorpromazine

Males	Neurobehavioral Positive Control Data: Motor Activity Mean Motor Activity Values Postnatal Day 13	Appendix W
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[illegible]

Females	Neurobehavioral Positive Control Data: Motor Activity Mean Motor Activity Values Postnatal Day 13	Appendix W
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[illegible]

Males	Neurobehavioral Positive Control Data: Motor Activity Mean Motor Activity Values Postnatal Day 17	Appendix W
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[illegible]

Females	Neurobehavioral Positive Control Data: Motor Activity Mean Motor Activity Values Postnatal Day 17	Appendix W
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[illegible]

Males	Neurobehavioral Positive Control Data: Motor Activity Mean Motor Activity Values Postnatal Day 21	Appendix W
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[illegible]

Males	Neurobehavioral Positive Control Data: Motor Activity Mean Motor Activity Values Postnatal Day 62	Appendix W
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[illegible]

Females	Neurobehavioral Positive Control Data: Motor Activity Mean Motor Activity Values Postnatal Day 62	Appendix W
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[illegible]

	Neuropathology Historical Control Data	Appendix X
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Supplier: Charles River

Termination Year Identification Number	Individual Study Data - Male Animals							
	TOTAL	1993 92-4505	1993 93-4507	1995 94-4512	1996 96-4084***	1997 98-4522*	1999 98-4522**	1999 98-4521**
MICROSCOPIC FINDINGS								
BRAIN								
NUMBER EXAMINED	37	5	5	5	6	6	5	5
Within Normal Limits	37	5	5	5	6	6	5	5
CERVICAL SPINAL CORD								
NUMBER EXAMINED	37	5	5	5	6	6	5	5
Within Normal Limits	37	5	5	5	6	6	5	5
THORACIC SPINAL CORD								
NUMBER EXAMINED	31	5	5	5	0	6	5	5
Within Normal Limits	31	5	5	5	0	6	5	5
LUMBAR SPINAL CORD								
NUMBER EXAMINED	37	5	5	5	6	6	5	5
Within Normal Limits	37	5	5	5	6	6	5	5
SCIATIC NERVE								
NUMBER EXAMINED	37	5	5	5	6	6	5	5
Within Normal Limits	37	5	5	5	6	6	5	5
SURAL NERVE								
NUMBER EXAMINED	35	5	5	5	6	6	3	5
Within Normal Limits	35	5	5	5	6	6	3	5
TIBIAL NERVE								
NUMBER EXAMINED	36	5	5	5	6	6	4	5
Within Normal Limits	36	5	5	5	6	6	4	5
PERONEAL NERVES								
NUMBER EXAMINED	6	0	0	0	6	0	0	0
Within Normal Limits	6	0	0	0	6	0	0	0
GASSERION GANGLION								
NUMBER EXAMINED	12	0	0	0	6	6	0	0
Within Normal Limits	12	0	0	0	6	6	0	0
DORSAL ROOT GANGLION								
NUMBER EXAMINED	6	0	0	0	0	6	0	0
Within Normal Limits	6	0	0	0	0	6	0	0
DORSAL ROOT FIBER								
NUMBER EXAMINED	6	0	0	0	0	6	0	0
Within Normal Limits	6	0	0	0	0	6	0	0
VENTRAL ROOT FIBER								
NUMBER EXAMINED	6	0	0	0	0	6	0	0
Within Normal Limits	6	0	0	0	0	6	0	0
TRIGEMINAL GANGLION								
NUMBER EXAMINED	10	0	0	0	0	0	5	5
Within Normal Limits	10	0	0	0	0	0	5	5

Supplier: Charles River

	Individual Study Data - Male Animals							
Termination Year		1993	1993	1995	1996	1997	1999	1999
Identification Number	TOTAL	92-4505	93-4507	94-4512	96-4084***	98-4522*	98-4522**	98-4521**
TRIGEMINAL NERVE								
NUMBER EXAMINED	5	0	0	0	0	0	5	0
Nerve fiber degeneration	1	0	0	0	0	0	1	0
Within Normal Limits	4	0	0	0	0	0	4	0
CERVICAL-DORSAL ROOT GANGLION								
NUMBER EXAMINED	15	0	0	0	6	0	5	4
Within Normal Limits	15	0	0	0	6	0	5	4
CERVICAL-DORSAL ROOT FIBER								
NUMBER EXAMINED	16	0	0	0	6	0	5	5
Within Normal Limits	16	0	0	0	6	0	5	5
LUMBAR-DORSAL ROOT GANGLION								
NUMBER EXAMINED	13	0	0	0	6	0	3	4
Within Normal Limits	13	0	0	0	6	0	3	4
LUMBAR-DORSAL ROOT FIBER								
NUMBER EXAMINED	16	0	0	0	6	0	5	5
Within Normal Limits	16	0	0	0	6	0	5	5
EYES								
NUMBER EXAMINED	16	0	0	0	6	0	5	5
Within Normal Limits	16	0	0	0	6	0	5	5
OPTIC NERVE								
NUMBER EXAMINED	16	0	0	0	6	0	5	5
Within Normal Limits	16	0	0	0	6	0	5	5

*From positive control study data

**Control animals received standard laboratory diet mixed with acetone

***Control animals received corn oil only

Supplier: Charles River

Termination Date Study Number	Individual Study Data - Female Animals						
	TOTAL	1993 92-4505	1993 93-4507	1995 94-4512	1997 98-4522*	1999 98-4522**	1999 98-4521**
MICROSCOPIC FINDINGS							
BRAIN							
NUMBER EXAMINED	31	5	5	5	6	5	5
Within Normal Limits	31	5	5	5	6	5	5
CERVICAL SPINAL CORD							
NUMBER EXAMINED	31	5	5	5	6	5	5
Within Normal Limits	31	5	5	5	6	5	5
THORACIC SPINAL CORD							
NUMBER EXAMINED	31	5	5	5	6	5	5
Within Normal Limits	31	5	5	5	6	5	5
LUMBAR SPINAL CORD							
NUMBER EXAMINED	31	5	5	5	6	5	5
Within Normal Limits	31	5	5	5	6	5	5
SCIATIC NERVE							
NUMBER EXAMINED	31	5	5	5	6	5	5
Nerve fiber degeneration	2	0	0	0	0	1	1
Within Normal Limits	29	5	5	5	6	4	4
SURAL NERVE							
NUMBER EXAMINED	30	5	5	5	6	4	5
Within Normal Limits	30	5	5	5	6	4	5
TIBIAL NERVE							
NUMBER EXAMINED	31	5	5	5	6	5	5
Nerve fiber degeneration	2	0	0	0	0	1	1
Within Normal Limits	29	5	5	5	6	4	4
GASSERION GANGLION							
NUMBER EXAMINED	6	0	0	0	6	0	0
Within Normal Limits	6	0	0	0	6	0	0
DORSAL ROOT GANGLION							
NUMBER EXAMINED	6	0	0	0	6	0	0
Within Normal Limits	6	0	0	0	6	0	0
DORSAL ROOT FIBER							
NUMBER EXAMINED	6	0	0	0	6	0	0
Within Normal Limits	6	0	0	0	6	0	0
VENTRAL ROOT FIBER							
NUMBER EXAMINED	6	0	0	0	6	0	0
Within Normal Limits	6	0	0	0	6	0	0
TRIGEMINAL GANGLION							
NUMBER EXAMINED	10	0	0	0	0	5	5
Within Normal Limits	10	0	0	0	0	5	5

Supplier: Charles River

Termination Date Study Number	Individual Study Data - Female Animals						
	TOTAL	1993 92-4505	1993 93-4507	1995 94-4512	1997 98-4522*	1999 98-4522**	1999 98-4521**
TRIGEMINAL NERVE							
NUMBER EXAMINED	5	0	0	0	0	5	0
Nerve fiber degeneration	1	0	0	0	0	1	0
Within Normal Limits	4	0	0	0	0	4	0
CERVICAL-DORSAL ROOT GANGLION							
NUMBER EXAMINED	9	0	0	0	0	4	5
Within Normal Limits	9	0	0	0	0	4	5
CERVICAL-DORSAL ROOT FIBER							
NUMBER EXAMINED	10	0	0	0	0	5	5
Within Normal Limits	10	0	0	0	0	5	5
LUMBAR-DORSAL ROOT GANGLION							
NUMBER EXAMINED	7	0	0	0	0	4	3
Within Normal Limits	7	0	0	0	0	4	3
LUMBAR-DORSAL ROOT FIBER							
NUMBER EXAMINED	10	0	0	0	0	5	5
Within Normal Limits	10	0	0	0	0	5	5
EYES							
NUMBER EXAMINED	10	0	0	0	0	5	5
Within Normal Limits	10	0	0	0	0	5	5
OPTIC NERVE							
NUMBER EXAMINED	10	0	0	0	0	5	5
Within Normal Limits	10	0	0	0	0	5	5

*From positive control study data

**Control animals received standard laboratory diet mixed with acetone

NEUROPATHOLOGY STUDY INFORMATION

Page 1027

Study Number	Length of Study	Number/Sex	Supplier	Route of Administration	Age at Initiation	Initiation Date	Termination Date	Species	Strain
92-4505	3 Months	5	Charles River Kingston, NY	dietary	42 days	25-Mar-93	24, 25, 28 and 29 June 1993	rat	Sprague-Dawley
93-4507	3 Months	5	Charles River Kingston, NY	dietary	49 days	8-Jul-93	11-15, 18 and 19 October 1993	rat	Sprague-Dawley
94-4512	3 Months	5	Charles River Stone Ridge, NY	dietary	43 days	1-Nov-94	30 and 31 January 1995	rat	Sprague-Dawley
96-4084	28 Days	6*	Charles River Portage, MI	gastric intubation	45 days	6-Nov-96	4-Dec-96	rat	Sprague-Dawley
98-4522**	10 Days	6	Charles River Kingston, NY	intraperitoneal injection	7 weeks	19-May-97	29 and 30 May 1997	rat	Sprague-Dawley
98-4522	13 Weeks	5	Charles River Kingston, NY	dietary	28 days	19-Jan-99	13-16, 19-23 April 1999	rat	Sprague-Dawley
98-4521	13 Weeks	5	Charles River Kingston, NY	dietary	43 days	27-Oct-98	19-22, 25-29 Jan 1999	rat	Sprague-Dawley

*males only

**positive control study data