

**Experiment Number:** 20725 - 04  
**Test Type:** CHRONIC  
**Route:** RESPIRATORY EXPOSURE WHOLE BODY  
**Species/Strain:** MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
2,3-Butanedione  
**CAS Number:** 431-03-8

**Date Report Requested:** 04/15/2016  
**Time Report Requested:** 10:33:42  
**First Dose M/F:** 08/31/09 / 08/31/09  
**Lab:** BNW

F1\_Mice

**NTP Study Number:** C20725  
**Lock Date:** 10/11/2012  
**Cage Range:** ALL  
**Date Range:** ALL  
**Reasons For Removal:** ALL  
**Removal Date Range:** ALL  
**Treatment Groups:** Include ALL  
**Study Gender:** Both  
**TDMSE Version:** 3.0.2.3\_002  
**PWG Approval Date:** 01/25/2016

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First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

<b>B6C3F1 MICE MALE</b>	DAY ON TEST	0731	0519	0729	0729	0686	0730	0667	0729	0729	0550	0664	0770	0773	0777	0777	0777	0777	0474	0773	0773	0683	0664	<b>males (cont...)</b>	
	ANIMAL ID	0001	0002	0003	0004	0005	0006	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022		0023

**ALIMENTARY SYSTEM**

Esophagus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Gallbladder	+	A	+	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+
Intestine Large, Cecum Inflammation	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+
				2					2				2	1							1			
Intestine Large, Colon	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+
Intestine Large, Rectum	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Intestine Small, Duodenum Inflammation Necrosis	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+
Intestine Small, Ileum Hyperplasia, Lymphoid Inflammation	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+
										1				1										
Intestine Small, Jejunum Hyperplasia, Lymphoid Inflammation	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+
												1												
Liver	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Basophilic Focus																						X	X	
Clear Cell Focus																					X	X		
Cyst												X												
Eosinophilic Focus																								
Hepatodiaphragmatic Nodule																								

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade

+ .. Tissue examined microscopically

X .. Lesion present

I .. Insufficient tissue

M .. Missing tissue

A .. Autolysis precludes evaluation

BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:

1) Minimal 3) Moderate

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Lab: BNW

B6C3F1 MICE MALE Control	DAY ON TEST	0731	0512	0722	0678	0736	0670	0729	0729	0590	0664	0770	0773	0777	0777	0773	0773	0773	0773	0442	0743	0773	0668	0664	males (cont...)		
	ANIMAL ID	0001	0002	0003	0004	0005	0006	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023		0024	0025
Mixed Cell Focus Pigmentation, Ceroid	X												X	X						X							
Hepatocyte, Degeneration		1					4																			2	
Hepatocyte, Necrosis							4	1													1						
Mesentery Hemorrhage												+	+		+												
Artery, Thrombosis												2															
Fat, Necrosis															2												
Pancreas Acinus, Atrophy		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Salivary Glands		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Stomach, Forestomach Inflammation		+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Epithelium, Hyperplasia						1					1																
Stomach, Glandular Inflammation		+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Epithelium, Hyperplasia				1																							
Tooth Dysplasia													+														

CARDIOVASCULAR SYSTEM

Blood Vessel Inflammation		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
		1																								1	

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B6C3F1 MICE MALE Control	DAY ON TEST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ANIMAL ID	males (cont...)
	7	5	7	7	6	7	6	7	7	5	6	7	7	7	7	7	7	7	7	4	7	7	6	6			
	3	1	2	2	8	3	6	2	2	9	3	3	3	2	2	3	3	2	3	3	4	3	3	8	4		
	1	9	9	9	6	0	7	9	9	0	4	0	0	9	9	1	0	9	0	0	0	0	0	0	1		
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	0	
	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	1	

Heart	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Cardiomyopathy															1										1	
Inflammation, Acute																										
Necrosis					4																					
Polyarteritis					2																					
Thrombosis																										
Valve, Inflammation, Chronic Active			1																							

**ENDOCRINE SYSTEM**

Adrenal Cortex	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Hyperplasia																					2					
Vacuolization Cytoplasmic																										
Zona Fasciculata, Hypertrophy, Focal			1		1				1				1	1	1		1			1			2	1		
Adrenal Medulla	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Islets, Pancreatic	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Hyperplasia																										
Parathyroid Gland	+	+	+	+	M	+	+	M	+	+	+	+	M	M	+	+	M	+	+	+	+	+	+	+		
Pituitary Gland	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Pars Distalis, Hyperplasia																										
Thyroid Gland	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Cyst																										
Inflammation, Chronic Active																										1

**GENERAL BODY SYSTEM**

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically M .. Missing tissue 1-4 .. Lesion qualified as:  
 X .. Lesion present A .. Autolysis precludes evaluation 1) Minimal 3) Moderate  
 I .. Insufficient tissue BLANK .. Not examined microscopically 2) Mild 4) Marked

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B6C3F1 MICE MALE Control	DAY ON TEST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ANIMAL ID			
	7	5	7	7	6	7	6	7	7	5	6	7	7	7	7	7	7	7	7	7	4	7	7	6	6				
		3	1	2	2	8	3	6	2	2	9	3	3	3	2	2	3	3	2	3	3	4	3	3	8	4			
		1	9	9	9	6	0	7	9	9	0	4	0	0	9	9	1	0	9	0	0	2	0	0	3	1			
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	males (cont...)	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	1		

NONE

### GENITAL SYSTEM

Epididymis	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Exfoliated Germ Cell	X			X		X		X	X	X	X	X	X	X	X	X	X	X	X	X				X	X	
Granuloma Sperm																										
Infiltration Cellular, Lymphoid																										
Inflammation																									2	
Preputial Gland	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Inflammation																										
Prostate	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Seminal Vesicle	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Dilatation																										
Testes	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Seminiferous Tubule, Degeneration									1						1											

### HEMATOPOIETIC SYSTEM

Bone Marrow	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Necrosis																										
Myeloid Cell, Hyperplasia																										
Lymph Node																										
Renal, Ectasia																										

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B6C3F1 MICE MALE Control	DAY ON TEST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ANIMAL ID	males (cont...)	
		7	5	7	7	6	7	6	7	7	5	6	7	7	7	7	7	7	7	7	4	7	7	6	6				
		3	1	2	2	8	3	6	2	2	9	3	3	3	2	2	3	3	2	3	3	4	3	3	8	4			
		1	9	9	9	6	0	7	9	9	0	4	0	0	9	9	1	0	0	0	0	2	0	0	3	1			
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
		1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2			
Lymph Node, Bronchial		+	+	+	+	I	+	I	+	+	+	M	M	+	+	M	+	+	+	+	M	M	M	+	I	M			
Lymph Node, Mandibular Hyperplasia, Lymphoid Infiltration Cellular, Plasma Cell		+	+	+	+		+	+	+		I	M	M	+	+	+	+	+	+	M	+	M	M	M	+	+	M		
Lymph Node, Mediastinal		+	+	+	I	+	I	+	+	+	+	+	+	+	+	+	+	I	+	M	+	+	I	+	I	M			
Lymph Node, Mesenteric Ectasia Hematopoietic Cell Proliferation Hyperplasia, Lymphoid		+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	I		
Spleen Hematopoietic Cell Proliferation Inflammation		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
Thymus Atrophy Cyst Ectopic Parathyroid Gland Inflammation, Chronic Active		+	+	+	+	+	+	+	+	+	+	+	I	+	+	+	+	+	+	+	+	+	+	+	+	I	I		

**INTEGUMENTARY SYSTEM**

Mammary Gland	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Skin Inflammation, Chronic Active Epidermis, Ulcer	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

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<b>B6C3F1 MICE MALE</b>	DAY ON TEST	0731	0512	0722	0728	0633	0662	0722	0729	0590	0664	0770	0773	0777	0779	0779	0779	0779	0779	0442	0773	0776	0664	0661	<b>males (cont...)</b>
	ANIMAL ID	0001	0002	0003	0004	0005	0006	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	

**MUSCULOSKELETAL SYSTEM**

Bone	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Fibro-Osseous Lesion																									
Skeletal Muscle										+															

**NERVOUS SYSTEM**

Brain	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Inflammation, Acute																									
Necrosis, Chronic																									

**RESPIRATORY SYSTEM**

Larynx	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Inflammation, Suppurative																					1				1
Inflammation, Chronic Active					1				1												1				
Respiratory Epithelium, Hyperplasia					1																				
Respiratory Epithelium, Metaplasia, Squamous																									1
Respiratory Epithelium, Necrosis										1											1				
Squamous Epithelium, Hyperplasia					1																		1		
Lung	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Inflammation, Chronic Active																									
Mineralization														1											
Thrombosis					1																				1
Alveolar Epithelium, Hyperplasia															1										
Alveolar Epithelium, Hyperplasia, Focal																						3			1
Alveolus, Infiltration Cellular, Histiocyte																									1
Bronchiole, Epithelium, Hyperplasia																						1			

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B6C3F1 MICE MALE	DAY ON TEST																									males (cont...)
	0731	0751	0772	0776	0768	0773	0767	0777	0777	0755	0766	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	
Control	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	
	1234	5678	9012	3456	7890	1234	5678	9012	3456	7890	1234	5678	9012	3456	7890	1234	5678	9012	3456	7890	1234	5678	9012	3456	7890	

Interstitialium, Fibrosis  
 Mediastinum, Inflammation, Chronic Active

1

Nose  
 Inflammation, Suppurative  
 Lateral Wall, Inflammation, Chronic Active  
 Olfactory Epithelium, Accumulation, Hyaline Droplet  
 Olfactory Epithelium, Metaplasia, Respiratory  
 Olfactory Epithelium, Metaplasia, Squamous  
 Respiratory Epithelium, Accumulation, Hyaline Droplet  
 Respiratory Epithelium, Hyperplasia

+  
 1  
 3 1  
 1  
 1  
 1  
 1  
 1

Trachea

+ +

**SPECIAL SENSES SYSTEM**

Eye  
 Cornea, Inflammation, Acute  
 Cornea, Epithelium, Hyperplasia  
 Lens, Cataract

+  
 1  
 1

Harderian Gland  
 Hyperplasia

+ +

**URINARY SYSTEM**

Kidney  
 Cyst  
 Infarct

+ +

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|   |  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                            |
|---|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------------------------|
| <b>B6C3F1 MICE MALE</b><br><br><b>Control</b> | DAY ON TEST  | 0731 | 0519 | 0729 | 0729 | 0686 | 0760 | 0677 | 0769 | 0550 | 0664 | 0773 | 0773 | 0779 | 0779 | 0773 | 0773 | 0773 | 0773 | 0773 | 0472 | 0770 | 0773 | 0683 | 0664 | 0661 | <b>males<br/>(cont...)</b> |
|   | ANIMAL ID  | 0001 | 0002 | 0003 | 0004 | 0005 | 0006 | 0007 | 0008 | 0009 | 0010 | 0011 | 0012 | 0013 | 0014 | 0015 | 0016 | 0017 | 0018 | 0019 | 0020 | 0021 | 0022 | 0023 | 0024 | 0025 |                            |
|   | Inflammation<br>Metaplasia, Osseous<br>Nephropathy | 1    | 1    | 1    | 1    | 1    | 1    |      | 1    | 1    |      |      | 1    | 1    |      |      | 1    | 1    | 1    | 1    |      |      |      |      | 1    | 2    |                            |
| Urinary Bladder<br>Angiectasis                | +  | A    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 1                          |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
+ .. Tissue examined microscopically  
X .. Lesion present  
I .. Insufficient tissue  
M .. Missing tissue  
A .. Autolysis precludes evaluation  
BLANK .. Not examined microscopically  
1-4 .. Lesion qualified as:  
1) Minimal 3) Moderate  
2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

|                         |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                 |
|-------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| <b>B6C3F1 MICE MALE</b> | DAY ON TEST | 0730 | 0666 | 0730 | 0571 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0677 | 0777 | 0777 | 0777 | 0677 | 0571 | 0677 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | <b>* TOTALS</b> |
|                         | ANIMAL ID   | 0002 | 0007 | 0008 | 0009 | 0011 | 0012 | 0013 | 0014 | 0015 | 0016 | 0017 | 0018 | 0019 | 0020 | 0021 | 0022 | 0023 | 0024 | 0025 | 0026 | 0027 | 0028 | 0029 | 0030 |                 |

**ALIMENTARY SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |                |                |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|----------------|----------------|
| Esophagus   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |                |                |
| Gallbladder   | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | 45 |                |                |
| Intestine Large, Cecum Inflammation                         | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | 2 | 1 | 46 | 7 1.6          |                |
| Intestine Large, Colon                                      | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | 46 |                |                |
| Intestine Large, Rectum                                     | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | I | A | + | + | + | + | + | + | + | + | 46 |                |                |
| Intestine Small, Duodenum Inflammation Necrosis             | + | A | + | A | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | 3 | 2  | 45             | 1 3.0<br>1 2.0 |
| Intestine Small, Ileum Hyperplasia, Lymphoid Inflammation   | + | A | + | A | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | 45 | 1 1.0<br>3 1.0 |                |
| Intestine Small, Jejunum Hyperplasia, Lymphoid Inflammation | + | + | + | A | + | + | + | + | + | + | + | + | + | A | + | + | + | A | + | + | A | + | + | + | + | 44 | 1 1.0<br>1 1.0 |                |
| Liver Basophilic Focus                                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 | 7              |                |
| Liver Clear Cell Focus                                      |   |   |   |   |   |   |   |   |   | X |   |   |   |   |   | X |   |   |   |   |   |   |   |   |   | 2  |                |                |
| Liver Cyst  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1              |                |
| Liver Eosinophilic Focus                                    |   |   |   |   |   |   |   |   |   |   |   | X |   |   |   | X |   |   | X |   |   |   |   | X |   |    | 4              |                |
| Liver Hepatodiaphragmatic Nodule                            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |   |   |   |   |   |   |   |   |   |    | 1              |                |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL

Date Report Requested: 04/15/2016

Test Type: CHRONIC

2,3-Butanedione

Time Report Requested: 10:33:42

Route: RESPIRATORY EXPOSURE WHOLE BODY

CAS Number: 431-03-8

First Dose M/F: 08/31/09 / 08/31/09

Species/Strain: MICE/B6C3F1

Lab: BNW

|                         |             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                 |  |  |
|-------------------------|-------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|--|--|
| <b>B6C3F1 MICE MALE</b> | DAY ON TEST | 07<br>30       | 06<br>66       | 07<br>33       | 05<br>19       | 07<br>29       | 07<br>31       | 07<br>33       | 07<br>33       | 07<br>33       | 07<br>33       | 07<br>33       | 07<br>33       | 06<br>97       | 07<br>29       | 07<br>23       | 07<br>22       | 07<br>22       | 07<br>34       | 05<br>55       | 06<br>74       | 07<br>30       | 07<br>29       | 07<br>31       | 07<br>33       | <b>* TOTALS</b> |  |  |
|                         | ANIMAL ID   | 00<br>00<br>26 | 00<br>00<br>27 | 00<br>00<br>28 | 00<br>00<br>29 | 00<br>00<br>30 | 00<br>00<br>31 | 00<br>00<br>32 | 00<br>00<br>33 | 00<br>00<br>34 | 00<br>00<br>35 | 00<br>00<br>36 | 00<br>00<br>37 | 00<br>00<br>38 | 00<br>00<br>39 | 00<br>00<br>40 | 00<br>00<br>41 | 00<br>00<br>42 | 00<br>00<br>43 | 00<br>00<br>44 | 00<br>00<br>45 | 00<br>00<br>46 | 00<br>00<br>47 | 00<br>00<br>48 | 00<br>00<br>49 |                 |  |  |

|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |           |            |            |
|--------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|-----------|------------|------------|
| Mixed Cell Focus         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>4</b>  |            |            |
| Pigmentation, Ceroid     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>1</b>  | <b>2.0</b> |            |
| Hepatocyte, Degeneration |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>2</b>  | <b>2.5</b> |            |
| Hepatocyte, Necrosis     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>4</b>  | <b>2.0</b> |            |
| Mesentery                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>4</b>  |            |            |
| Hemorrhage               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |           | <b>1</b>   | <b>2.0</b> |
| Artery, Thrombosis       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>1</b>  | <b>2.0</b> |            |
| Fat, Necrosis            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>1</b>  | <b>2.0</b> |            |
| Pancreas                 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>48</b> |            |            |
| Acinus, Atrophy          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>2</b>  | <b>2.5</b> |            |
| Salivary Glands          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |           | <b>50</b>  |            |
| Stomach, Forestomach     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>48</b> |            |            |
| Inflammation             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |           | <b>2</b>   | <b>1.0</b> |
| Epithelium, Hyperplasia  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>3</b>  | <b>1.3</b> |            |
| Stomach, Glandular       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>47</b> |            |            |
| Inflammation             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>3</b>  | <b>1.0</b> |            |
| Epithelium, Hyperplasia  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>1</b>  | <b>1.0</b> |            |
| Tooth                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>2</b>  |            |            |
| Dysplasia                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>1</b>  | <b>1.5</b> |            |

|                              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |           |            |
|------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|-----------|------------|
| <b>CARDIOVASCULAR SYSTEM</b> |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |           |            |
| Blood Vessel                 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>50</b> |            |
| Inflammation                 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>2</b>  | <b>1.0</b> |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
+ .. Tissue examined microscopically  
X .. Lesion present  
I .. Insufficient tissue  
M .. Missing tissue  
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1-4 .. Lesion qualified as:  
1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE                     | DAY ON TEST |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | * TOTALS |    |    |    |        |    |  |
|--------------------------------------|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------|----|----|----|--------|----|--|
|                                      | 07          | 06 | 07 | 05 | 07 | 07 | 07 | 07 | 07 | 07 | 07 | 07 | 07 | 06 | 07 | 07 | 07 | 06 | 07 | 05 |          | 06 | 07 | 07 | 07     | 07 |  |
| Control                              | ANIMAL ID   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |    |    |        |    |  |
|                                      | 00          | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00       | 00 | 00 | 00 | 00     |    |  |
|                                      | 00          | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00       | 00 | 00 | 00 | 00     |    |  |
|                                      | 02          | 02 | 02 | 02 | 03 | 03 | 03 | 03 | 03 | 03 | 03 | 03 | 03 | 03 | 04 | 04 | 04 | 04 | 04 | 04 | 04       | 04 | 04 | 04 | 05     |    |  |
|                                      | 06          | 07 | 08 | 09 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 00 | 01 | 02 | 03 | 04 | 05 | 06       | 07 | 08 | 09 | 00     |    |  |
| Heart                                | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +        | +  | +  | +  | 50     |    |  |
| Cardiomyopathy                       |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1  |    |    |          | 1  |    |    | 4 1.0  |    |  |
| Inflammation, Acute                  |             | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |    |    | 1 1.0  |    |  |
| Necrosis                             |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |    |    | 1 4.0  |    |  |
| Polyarteritis                        |             |    |    | 2  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 2  |          |    |    |    | 3 2.0  |    |  |
| Thrombosis                           |             | 2  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |    |    | 1 2.0  |    |  |
| Valve, Inflammation, Chronic Active  |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |    |    | 1 1.0  |    |  |
| <b>ENDOCRINE SYSTEM</b>              |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |    |    |        |    |  |
| Adrenal Cortex                       | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +        | +  | +  | +  | 50     |    |  |
| Hyperplasia                          |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |    |    | 1 2.0  |    |  |
| Vacuolization Cytoplasmic            |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 2  |          |    |    |    | 1 2.0  |    |  |
| Zona Fasciculata, Hypertrophy, Focal | 1           | 1  |    |    | 1  | 2  |    | 2  | 1  | 1  | 1  | 1  |    |    |    |    |    | 1  |    | 1  |          |    |    | 1  | 23 1.1 |    |  |
| Adrenal Medulla                      | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +        | +  | +  | +  | 50     |    |  |
| Islets, Pancreatic                   | +           | +  | +  | A  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | A  | +  | +  | +        | +  | +  | +  | 48     |    |  |
| Hyperplasia                          |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          | 1  |    |    | 1 1.0  |    |  |
| Parathyroid Gland                    | +           | +  | +  | +  | +  | M  | +  | +  | +  | +  | M  | +  | +  | +  | M  | +  | +  | +  | +  | M  | +        | M  | +  | +  | 40     |    |  |
| Pituitary Gland                      | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +        | +  | +  | +  | 50     |    |  |
| Pars Distalis, Hyperplasia           | 1           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |    |    | 1 1.0  |    |  |
| Thyroid Gland                        | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +        | +  | +  | +  | 50     |    |  |
| Cyst                                 |             | X  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |    |    | 1      |    |  |
| Inflammation, Chronic Active         |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |    |    | 1 1.0  |    |  |

**GENERAL BODY SYSTEM**

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
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**Experiment Number:** 20725 - 04  
**Test Type:** CHRONIC  
**Route:** RESPIRATORY EXPOSURE WHOLE BODY  
**Species/Strain:** MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
**CAS Number:** 431-03-8

**Date Report Requested:** 04/15/2016  
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**First Dose M/F:** 08/31/09 / 08/31/09  
**Lab:** BNW

| B6C3F1 MICE MALE<br>Control | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |
|-----------------------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|
|                             | 0730        | 0666  | 0730  | 0512  | 0771  | 0777  | 0777  | 0777  | 0777  | 0777  | 0777  | 0676  | 0777  | 0777  | 0772  | 0772  | 0676  | 0777  | 0557  | 0667  |          | 0777  | 0777  | 0777  |
| ANIMAL ID                   | 00026       | 00027 | 00028 | 00029 | 00030 | 00031 | 00032 | 00033 | 00034 | 00035 | 00036 | 00037 | 00038 | 00039 | 00040 | 00041 | 00042 | 00043 | 00044 | 00045 | 00046    | 00047 | 00048 | 00049 |

NONE

**GENITAL SYSTEM**

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------------|
| Epididymis                                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | 49             |
| Exfoliated Germ Cell                         | X |   | X |   | X | X |   | X |   | X |   |   |   |   | X | X |   | X | X | X | X |   | X | 32             |
| Granuloma Sperm                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   | 1 2.0          |
| Infiltration Cellular, Lymphoid Inflammation |   |   | 1 |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   | 2 |   |   |   |   |   | 1 1.0<br>3 1.7 |
| Preputial Gland                              | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50             |
| Inflammation                                 |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 2.0          |
| Prostate                                     | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49             |
| Seminal Vesicle                              | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49             |
| Dilatation                                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 1.0          |
| Testes                                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | 49             |
| Seminiferous Tubule, Degeneration            |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 14 1.3         |

**HEMATOPOIETIC SYSTEM**

|                           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |       |
|---------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------|
| Bone Marrow               | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | 48    |
| Necrosis                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 1.0 |
| Myeloid Cell, Hyperplasia | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   | 9 2.1 |
| Lymph Node                |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 5     |
| Renal, Ectasia            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   | 1 1.0 |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked



Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>Control | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | * TOTALS |
|-----------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------|
|                             | ANIMAL ID   | 7 | 6 | 7 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 6 | 7 | 5 | 6 | 7 | 7 | 7 |          |
|                             |             | 3 | 6 | 3 | 1 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 9 | 2 | 3 | 2 | 2 | 3 | 5 | 7 | 3 | 2 | 3 | 3 |          |
|                             |             | 0 | 6 | 0 | 9 | 9 | 1 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 7 | 2 | 0 | 9 | 4 | 0 | 5 | 4 | 0 | 9 | 1 | 0 |          |
|                             |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |          |
|                             |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |          |
|                             |             | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 |          |
|                             |             | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |          |

**MUSCULOSKELETAL SYSTEM**

|                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |       |
|----------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-------|
| Bone                 | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |       |
| Fibro-Osseous Lesion |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 1.0 |
| Skeletal Muscle      |   |   |   |   |   |   |   |   |   |   |   |   |   |   | + |   |   |   |   |   |   |   |   |   |   | 2  |       |

**NERVOUS SYSTEM**

|                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |       |
|---------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-------|
| Brain               | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |       |
| Inflammation, Acute |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 2.0 |
| Necrosis, Chronic   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 2.0 |

**RESPIRATORY SYSTEM**

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |       |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-------|
| Larynx                                       | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49 |       |
| Inflammation, Suppurative                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 2 1.0 |
| Inflammation, Chronic Active                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 4 1.0 |
| Respiratory Epithelium, Hyperplasia          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 1.0 |
| Respiratory Epithelium, Metaplasia, Squamous |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |    | 3 1.0 |
| Respiratory Epithelium, Necrosis             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 2 1.0 |
| Squamous Epithelium, Hyperplasia             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 3 1.3 |
| Lung   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |       |
| Inflammation, Chronic Active                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 1.0 |
| Mineralization                               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 1.0 |
| Thrombosis                                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 2 1.0 |
| Alveolar Epithelium, Hyperplasia             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 1.0 |
| Alveolar Epithelium, Hyperplasia, Focal      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 3 2.0 |
| Alveolus, Infiltration Cellular, Histiocyte  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 7 2.0 |
| Bronchiole, Epithelium, Hyperplasia          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 1.0 |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically M .. Missing tissue 1-4 .. Lesion qualified as:  
 X .. Lesion present A .. Autolysis precludes evaluation 1) Minimal 3) Moderate  
 I .. Insufficient tissue BLANK .. Not examined microscopically 2) Mild 4) Marked

Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

| B6C3F1 MICE MALE<br>Control                           | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | * TOTALS |       |
|---|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------|-------|
|   | ANIMAL ID   | 7 | 6 | 7 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 6 | 7 | 5 | 6 | 7 | 7 | 7 |          | 7     |
|   |             | 3 | 6 | 3 | 1 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 9 | 2 | 3 | 2 | 2 | 3 | 5 | 7 | 3 | 2 | 3 | 3        |       |
|   |             | 0 | 6 | 0 | 9 | 9 | 1 | 0 | 9 | 0 | 0 | 0 | 0 | 7 | 2 | 0 | 9 | 4 | 0 | 5 | 4 | 0 | 9 | 1 | 0        |       |
|   |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0        |       |
|   |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0        |       |
|   |             | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5        |       |
|   |             | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9        |       |
| Interstitial, Fibrosis                                |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1        | 1 1.0 |
| Mediastinum, Inflammation, Chronic Active             |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 1 1.0 |
| Nose  |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 49    |
| Inflammation, Suppurative                             |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1        | 2 1.0 |
| Lateral Wall, Inflammation, Chronic Active            |             | 3 | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2        | 5 2.2 |
| Olfactory Epithelium, Accumulation, Hyaline Droplet   |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 1 1.0 |
| Olfactory Epithelium, Metaplasia, Respiratory         |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 1 1.0 |
| Olfactory Epithelium, Metaplasia, Squamous            |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 1 1.0 |
| Respiratory Epithelium, Accumulation, Hyaline Droplet |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1        | 3 1.0 |
| Respiratory Epithelium, Hyperplasia                   |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 1 1.0 |
| Trachea   |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 48    |
| <b>SPECIAL SENSES SYSTEM</b>                          |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |       |
| Eye   |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 49    |
| Cornea, Inflammation, Acute                           |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2        | 2 1.5 |
| Cornea, Epithelium, Hyperplasia                       |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 1 1.0 |
| Lens, Cataract  |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2        | 1 2.0 |
| Harderian Gland                                       |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 50    |
| Hyperplasia   |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1        | 2 1.5 |
| <b>URINARY SYSTEM</b>                                 |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |       |
| Kidney  |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 49    |
| Cyst  |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 1     |
| Infarct   |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2        | 2 2.0 |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
+ .. Tissue examined microscopically  
X .. Lesion present  
I .. Insufficient tissue  
M .. Missing tissue  
A .. Autolysis precludes evaluation  
BLANK .. Not examined microscopically  
1-4 .. Lesion qualified as:  
1) Minimal 3) Moderate  
2) Mild 4) Marked



Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br><br>Control | DAY ON TEST | 0<br>7 | 0<br>6 | 0<br>7 | 0<br>5 | 0<br>7 | 0<br>7 | 0<br>7 | 0<br>7 | 0<br>7 | 0<br>7 | 0<br>7 | 0<br>7 | 0<br>6 | 0<br>7 | 0<br>7 | 0<br>7 | 0<br>6 | 0<br>7 | 0<br>5 | 0<br>6 | 0<br>7 | 0<br>7 | 0<br>7 | * TOTALS |        |     |     |
|---------------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------|--------|-----|-----|
|                                 | ANIMAL ID   | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 | 0<br>0 |          | 0<br>0 |     |     |
|                                 |             | 3      | 6      | 3      | 1      | 2      | 3      | 3      | 2      | 3      | 3      | 3      | 3      | 3      | 9      | 2      | 3      | 2      | 2      | 3      | 5      | 7      | 3      | 2      | 3        | 3      |     |     |
|                                 |             | 0      | 6      | 0      | 9      | 9      | 1      | 0      | 9      | 0      | 0      | 0      | 0      | 0      | 7      | 2      | 0      | 9      | 4      | 0      | 5      | 4      | 0      | 9      | 1        | 0      |     |     |
| Inflammation                    |             |        | 2      |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |          | 1      | 2.0 |     |
| Metaplasia, Osseous             |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |          | 1      | 1.0 |     |
| Nephropathy                     |             | 1      |        |        | 2      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      |        |        | 1      | 1      |        | 1      | 1      | 1      | 1      | 1      | 1      | 1        | 1      | 34  | 1.1 |
| Urinary Bladder<br>Angiectasis  |             | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +        | 49     | 1   | 1.0 |

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 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
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 Lab: BNW

|                         |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <b>B6C3F1 MICE MALE</b> | DAY ON TEST | 0729 | 0730 | 0731 | 0732 | 0733 | 0734 | 0735 | 0736 | 0737 | 0738 | 0739 | 0740 | 0741 | 0742 | 0743 | 0744 | 0745 | 0746 | 0747 | 0748 | 0749 | 0750 | 0751 | 0752 | 0753 | 0754 | 0755 | 0756 | 0757 | 0758 | 0759 | 0760 | 0761 | 0762 | 0763 | 0764 | 0765 | 0766 | 0767 | 0768 | 0769 | 0770 | 0771 | 0772 | 0773 | 0774 | 0775 | 0776 | 0777 | 0778 | 0779 | 0780 | 0781 | 0782 | 0783 | 0784 | 0785 | 0786 | 0787 | 0788 | 0789 | 0790 | 0791 | 0792 | 0793 | 0794 | 0795 | 0796 | 0797 | 0798 | 0799 | 0800 | 0801 | 0802 | 0803 | 0804 | 0805 | 0806 | 0807 | 0808 | 0809 | 0810 | 0811 | 0812 | 0813 | 0814 | 0815 | 0816 | 0817 | 0818 | 0819 | 0820 | 0821 | 0822 | 0823 | 0824 | 0825 | 0826 | 0827 | 0828 | 0829 | 0830 | 0831 | 0832 | 0833 | 0834 | 0835 | 0836 | 0837 | 0838 | 0839 | 0840 | 0841 | 0842 | 0843 | 0844 | 0845 | 0846 | 0847 | 0848 | 0849 | 0850 | 0851 | 0852 | 0853 | 0854 | 0855 | 0856 | 0857 | 0858 | 0859 | 0860 | 0861 | 0862 | 0863 | 0864 | 0865 | 0866 | 0867 | 0868 | 0869 | 0870 | 0871 | 0872 | 0873 | 0874 | 0875 | 0876 | 0877 | 0878 | 0879 | 0880 | 0881 | 0882 | 0883 | 0884 | 0885 | 0886 | 0887 | 0888 | 0889 | 0890 | 0891 | 0892 | 0893 | 0894 | 0895 | 0896 | 0897 | 0898 | 0899 | 0900 | 0901 | 0902 | 0903 | 0904 | 0905 | 0906 | 0907 | 0908 | 0909 | 0910 | 0911 | 0912 | 0913 | 0914 | 0915 | 0916 | 0917 | 0918 | 0919 | 0920 | 0921 | 0922 | 0923 | 0924 | 0925 | 0926 | 0927 | 0928 | 0929 | 0930 | 0931 | 0932 | 0933 | 0934 | 0935 | 0936 | 0937 | 0938 | 0939 | 0940 | 0941 | 0942 | 0943 | 0944 | 0945 | 0946 | 0947 | 0948 | 0949 | 0950 | 0951 | 0952 | 0953 | 0954 | 0955 | 0956 | 0957 | 0958 | 0959 | 0960 | 0961 | 0962 | 0963 | 0964 | 0965 | 0966 | 0967 | 0968 | 0969 | 0970 | 0971 | 0972 | 0973 | 0974 | 0975 | 0976 | 0977 | 0978 | 0979 | 0980 | 0981 | 0982 | 0983 | 0984 | 0985 | 0986 | 0987 | 0988 | 0989 | 0990 | 0991 | 0992 | 0993 | 0994 | 0995 | 0996 | 0997 | 0998 | 0999 | 1000 |      |      |      |      |      |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|                         | 12.5 ppm    | 0020 | 0021 | 0022 | 0023 | 0024 | 0025 | 0026 | 0027 | 0028 | 0029 | 0030 | 0031 | 0032 | 0033 | 0034 | 0035 | 0036 | 0037 | 0038 | 0039 | 0040 | 0041 | 0042 | 0043 | 0044 | 0045 | 0046 | 0047 | 0048 | 0049 | 0050 | 0051 | 0052 | 0053 | 0054 | 0055 | 0056 | 0057 | 0058 | 0059 | 0060 | 0061 | 0062 | 0063 | 0064 | 0065 | 0066 | 0067 | 0068 | 0069 | 0070 | 0071 | 0072 | 0073 | 0074 | 0075 | 0076 | 0077 | 0078 | 0079 | 0080 | 0081 | 0082 | 0083 | 0084 | 0085 | 0086 | 0087 | 0088 | 0089 | 0090 | 0091 | 0092 | 0093 | 0094 | 0095 | 0096 | 0097 | 0098 | 0099 | 0100 | 0101 | 0102 | 0103 | 0104 | 0105 | 0106 | 0107 | 0108 | 0109 | 0110 | 0111 | 0112 | 0113 | 0114 | 0115 | 0116 | 0117 | 0118 | 0119 | 0120 | 0121 | 0122 | 0123 | 0124 | 0125 | 0126 | 0127 | 0128 | 0129 | 0130 | 0131 | 0132 | 0133 | 0134 | 0135 | 0136 | 0137 | 0138 | 0139 | 0140 | 0141 | 0142 | 0143 | 0144 | 0145 | 0146 | 0147 | 0148 | 0149 | 0150 | 0151 | 0152 | 0153 | 0154 | 0155 | 0156 | 0157 | 0158 | 0159 | 0160 | 0161 | 0162 | 0163 | 0164 | 0165 | 0166 | 0167 | 0168 | 0169 | 0170 | 0171 | 0172 | 0173 | 0174 | 0175 | 0176 | 0177 | 0178 | 0179 | 0180 | 0181 | 0182 | 0183 | 0184 | 0185 | 0186 | 0187 | 0188 | 0189 | 0190 | 0191 | 0192 | 0193 | 0194 | 0195 | 0196 | 0197 | 0198 | 0199 | 0200 | 0201 | 0202 | 0203 | 0204 | 0205 | 0206 | 0207 | 0208 | 0209 | 0210 | 0211 | 0212 | 0213 | 0214 | 0215 | 0216 | 0217 | 0218 | 0219 | 0220 | 0221 | 0222 | 0223 | 0224 | 0225 | 0226 | 0227 | 0228 | 0229 | 0230 | 0231 | 0232 | 0233 | 0234 | 0235 | 0236 | 0237 | 0238 | 0239 | 0240 | 0241 | 0242 | 0243 | 0244 | 0245 | 0246 | 0247 | 0248 | 0249 | 0250 | 0251 | 0252 | 0253 | 0254 | 0255 | 0256 | 0257 | 0258 | 0259 | 0260 | 0261 | 0262 | 0263 | 0264 | 0265 | 0266 | 0267 | 0268 | 0269 | 0270 | 0271 | 0272 | 0273 | 0274 | 0275 | 0276 | 0277 | 0278 | 0279 | 0280 | 0281 | 0282 | 0283 | 0284 | 0285 | 0286 | 0287 | 0288 | 0289 | 0290 | 0291 | 0292 | 0293 | 0294 | 0295 | 0296 | 0297 | 0298 | 0299 | 0300 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|                         | ANIMAL ID   | 001  | 002  | 003  | 004  | 005  | 006  | 007  | 008  | 009  | 010  | 011  | 012  | 013  | 014  | 015  | 016  | 017  | 018  | 019  | 020  | 021  | 022  | 023  | 024  | 025  | 026  | 027  | 028  | 029  | 030  | 031  | 032  | 033  | 034  | 035  | 036  | 037  | 038  | 039  | 040  | 041  | 042  | 043  | 044  | 045  | 046  | 047  | 048  | 049  | 050  | 051  | 052  | 053  | 054  | 055  | 056  | 057  | 058  | 059  | 060  | 061  | 062  | 063  | 064  | 065  | 066  | 067  | 068  | 069  | 070  | 071  | 072  | 073  | 074  | 075  | 076  | 077  | 078  | 079  | 080  | 081  | 082  | 083  | 084  | 085  | 086  | 087  | 088  | 089  | 090  | 091  | 092  | 093  | 094  | 095  | 096  | 097  | 098  | 099  | 100  | 101  | 102  | 103  | 104  | 105  | 106  | 107  | 108  | 109  | 110  | 111  | 112  | 113  | 114  | 115  | 116  | 117  | 118  | 119  | 120  | 121  | 122  | 123  | 124  | 125  | 126  | 127  | 128  | 129  | 130  | 131  | 132  | 133  | 134  | 135  | 136  | 137  | 138  | 139  | 140  | 141  | 142  | 143  | 144  | 145  | 146  | 147  | 148  | 149  | 150  | 151  | 152  | 153  | 154  | 155  | 156  | 157  | 158  | 159  | 160  | 161  | 162  | 163  | 164  | 165  | 166  | 167  | 168  | 169  | 170  | 171  | 172  | 173  | 174  | 175  | 176  | 177  | 178  | 179  | 180  | 181  | 182  | 183  | 184  | 185  | 186  | 187  | 188  | 189  | 190  | 191  | 192  | 193  | 194  | 195  | 196  | 197  | 198  | 199  | 200  | 201  | 202  | 203  | 204  | 205  | 206  | 207  | 208  | 209  | 210  | 211  | 212  | 213  | 214  | 215  | 216  | 217  | 218  | 219  | 220  | 221  | 222  | 223  | 224  | 225  | 226  | 227  | 228  | 229  | 230  | 231  | 232  | 233  | 234  | 235  | 236  | 237  | 238  | 239  | 240  | 241  | 242  | 243  | 244  | 245  | 246  | 247  | 248  | 249  | 250  | 251  | 252  | 253  | 254  | 255  | 256  | 257  | 258  | 259  | 260  | 261  | 262  | 263  | 264  | 265  | 266  | 267  | 268  | 269  | 270  | 271  | 272  | 273  | 274  | 275  | 276  | 277  | 278  | 279  | 280  | 281  | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 |

males  
(cont...)

**ALIMENTARY SYSTEM**

|                           |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Esophagus                 | +   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Epithelium, Hyperplasia   | 2   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Gallbladder               | + + + + + + + + + M M + + + + + + + + + A + + + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intestine Large, Cecum    | + + + + + + + + + + + + + + + + + + + A + + +   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intestine Large, Colon    | + + + + + + + + + + + + + + + + + + + A + + +   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intestine Large, Rectum   | + + + + + + + + + + + + + + + + + + + A + + +   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intestine Small, Duodenum | + + + + + + + + + + + + + + + + + + + A + + +   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intestine Small, Ileum    | + + + + + + + + + + + + + + + + + + + A + + +   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hyperplasia, Lymphoid     | 2   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intestine Small, Jejunum  | + + + + + + + + + + + + + + + + + + + A + + +   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Inflammation              |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Liver                     | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Basophilic Focus          | X X X   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Clear Cell Focus          | X   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cyst                      | X   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eosinophilic Focus        | X X X X X X X X                                 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mixed Cell Focus          | X X X X X X                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Syncytial Alteration      |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Tension Lipidosis         | 1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Thrombosis                |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked





Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

| B6C3F1 MICE MALE | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|                  |             | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 4 | 7 | 7 | 6 |
| <b>12.5 ppm</b>  | ANIMAL ID   | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 8 | 3 | 3 | 3 | 8 | 2 | 1 | 7 |
|                  |             | 9 | 0 | 1 | 9 | 1 | 1 | 0 | 9 | 9 | 9 | 0 | 9 | 0 | 9 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 9 | 3 | 6 |
|                  |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|                  |             | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
|                  |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |

males  
(cont...)

Seminal Vesicle

+ A + + +

Testes

+ A + + +

Seminiferous Tubule, Degeneration

1 1 1 2

HEMATOPOIETIC SYSTEM

Bone Marrow

+ A + + +

Myeloid Cell, Hyperplasia

1 3 1 1

Lymph Node

+ +

Lymph Node, Bronchial Hyperplasia, Lymphoid

1

Lymph Node, Mandibular Hyperplasia, Lymphoid

+ + + M + + + M + + + + + + M + + + + + + + + M I  
1 2

Lymph Node, Mediastinal

+ + + + + + I I M + M M + M + + + + + + I + + + I +

Lymph Node, Mesenteric Hematopoietic Cell Proliferation Hyperplasia, Lymphoid

+ A + + +  
3

Spleen Angiectasis Hematopoietic Cell Proliferation Hyperplasia, Lymphoid

+  
2 1 2 1 1 3 1 2  
1 1

Thymus Atrophy

+ + + + + + + + + + + I + + + + + + + + + + + + + + +  
1 1

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade
+ .. Tissue examined microscopically M .. Missing tissue 1-4 .. Lesion qualified as:
X .. Lesion present A .. Autolysis precludes evaluation 1) Minimal 3) Moderate
I .. Insufficient tissue BLANK .. Not examined microscopically 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

|                         |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                        |   |   |   |   |   |   |
|-------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|------------------------|---|---|---|---|---|---|
| <b>B6C3F1 MICE MALE</b> | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | 0 |   |
|                         | ANIMAL ID   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | 0 | 0 |
| <b>12.5 ppm</b>         |             | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7                      | 7 | 7 | 7 | 7 | 7 | 7 |
|                         |             | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 8 | 3 | 3 | 3 | 3 | 8 | 2 | 1 | 1 | 3 | 7                      | 6 | 7 | 6 | 7 | 6 |   |
|                         |             | 9 | 0 | 1 | 9 | 1 | 1 | 0 | 9 | 9 | 9 | 0 | 9 | 0 | 9 | 0 | 9 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 3 | 7 | 6 | 7                      | 6 | 7 | 6 | 7 | 6 |   |
|                         |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | 0 |   |
|                         |             | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2                      | 2 | 2 | 2 | 2 | 2 |   |
|                         |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2                      | 2 | 2 | 2 | 2 | 2 |   |
|                         |             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9                      | 0 | 1 | 2 | 3 | 4 | 5 |
|                         |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>males (cont...)</b> |   |   |   |   |   |   |

Ectopic Parathyroid Gland

1 1

### INTEGUMENTARY SYSTEM

Mammary Gland

M M

Skin

+ A + + +

Inflammation, Chronic Active  
 Pigmentation, Melanin  
 Epidermis, Hyperplasia  
 Epidermis, Ulcer

3  
  
2  
  
3

### MUSCULOSKELETAL SYSTEM

Bone

+ +

Fibro-Osseous Lesion

1

Skeletal Muscle

+ +

Degeneration  
 Hemorrhage, Acute  
 Inflammation  
 Necrosis, Acute

+  
1

### NERVOUS SYSTEM

Brain

+ +

Peripheral Nerve  
 Degeneration

+  
1

Spinal Cord

+ +

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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**Experiment Number:** 20725 - 04  
**Test Type:** CHRONIC  
**Route:** RESPIRATORY EXPOSURE WHOLE BODY  
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**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
**2,3-Butanedione**  
**CAS Number:** 431-03-8

**Date Report Requested:** 04/15/2016  
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**First Dose M/F:** 08/31/09 / 08/31/09  
**Lab:** BNW

|                         |                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-------------------------|--------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <b>B6C3F1 MICE MALE</b> | <b>DAY ON TEST</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|                         |                    | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 4 | 7 | 7 | 6 |
|                         |                    | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 8 | 3 | 3 | 3 | 8 | 2 | 1 | 7 | 6 |
|                         |                    | 9 | 0 | 1 | 9 | 1 | 1 | 0 | 9 | 9 | 9 | 0 | 9 | 0 | 9 | 0 | 1 | 1 | 0 | 0 | 0 | 9 | 3 | 6 | 6 |
| <b>12.5 ppm</b>         | <b>ANIMAL ID</b>   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |
|                         |                    | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |
|                         |                    | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |   |
|                         |                    | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |   |
|                         |                    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 |

**males**  
**(cont...)**

Lens, Cataract

1

Harderian Gland  
Hyperplasia

+ A + + +

2

### URINARY SYSTEM

|                                   |   |
|-----------------------------------|---|
| Kidney                            | +         |
| Cyst                              | X   |
| Infarct                           |   |
| Infiltration Cellular, Lymphocyte |   |
| Metaplasia, Osseous               | 1   |
| Mineralization                    | 1   |
| Nephropathy                       | 1 1 1 1 1 1   |
| Pelvis, Dilatation                | 1   |
| Urinary Bladder                   | + A + + + |
| Inflammation                      | 1   |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
+ .. Tissue examined microscopically  
X .. Lesion present  
I .. Insufficient tissue  
M .. Missing tissue  
A .. Autolysis precludes evaluation  
BLANK .. Not examined microscopically  
1-4 .. Lesion qualified as:  
1) Minimal 3) Moderate  
2) Mild 4) Marked



Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

|                         |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |                 |   |
|-------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----------------|---|
| <b>B6C3F1 MICE MALE</b> | DAY ON TEST | 0<br>7 | 0<br>7 | 0<br>7 | 0<br>7 | 0<br>7 | 0<br>7 | 0<br>7 | 0<br>6 | 0<br>7 | 0<br>5 | 0<br>5 | 0<br>7 | 0<br>7 | 0<br>6 | 0<br>6 | 0<br>7 | 0<br>7 | 0<br>6 | 0<br>7 | 0<br>7 | 0<br>7 | 0<br>3 | 0<br>7 | <b>* TOTALS</b> |   |
|                         |             | 3      | 3      | 2      | 3      | 3      | 3      | 3      | 1      | 3      | 8      | 7      | 3      | 3      | 0      | 5      | 3      | 3      | 5      | 2      | 3      | 3      | 3      | 9      |                 | 2 |
|                         | ANIMAL ID   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |                 | 0 |
| <b>12.5 ppm</b>         |             | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      |                 |   |
|                         |             | 2      | 2      | 2      | 2      | 3      | 3      | 3      | 3      | 3      | 3      | 3      | 3      | 3      | 3      | 4      | 4      | 4      | 4      | 4      | 4      | 4      | 4      | 4      | 5               |   |
|                         |             | 6      | 7      | 8      | 9      | 0      | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 0      | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9               |   |

**ALIMENTARY SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |              |              |              |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|--------------|--------------|
| Esophagus<br>Epithelium, Hyperplasia            | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +            | <b>50</b>    | <b>1 2.0</b> |
| Gallbladder                                     | + | + | + | + | + | + | + | + | + | A | + | M | + | M | + | + | + | + | M | + | + | + | + | M | <b>42</b>    |              |              |
| Intestine Large, Cecum                          | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>48</b>    |              |              |
| Intestine Large, Colon                          | + | + | + | + | + | + | + | + | A | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>47</b>    |              |              |
| Intestine Large, Rectum                         | + | + | + | + | + | + | + | I | + | A | A | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>46</b>    |              |              |
| Intestine Small, Duodenum                       | + | + | + | + | + | + | + | + | A | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>47</b>    |              |              |
| Intestine Small, Ileum<br>Hyperplasia, Lymphoid | + | + | + | + | + | + | + | + | + | A | A | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>47</b>    | <b>1 2.0</b> |              |
| Intestine Small, Jejunum<br>Inflammation        | + | + | + | + | + | + | + | A | + | A | A | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>46</b>    | <b>1 2.0</b> |              |
| Liver   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>50</b>    |              |              |
| Basophilic Focus                                |   |   |   |   |   |   |   |   |   |   |   |   | X |   |   |   |   |   |   |   |   | X |   | X | <b>5</b>     |              |              |
| Clear Cell Focus                                |   | X |   |   |   |   |   |   |   |   |   |   |   | X |   |   |   |   | X | X |   |   |   |   | <b>5</b>     |              |              |
| Cyst  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>1</b>     |              |              |
| Eosinophilic Focus                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |   |   | <b>6</b>     |              |              |
| Mixed Cell Focus                                |   |   |   |   |   | X | X |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>7</b>     |              |              |
| Syncytial Alteration                            |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   | <b>1 1.0</b> |              |              |
| Tension Lipidosis                               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>2 1.0</b> |              |              |
| Thrombosis                                      |   |   |   |   |   |   |   |   |   |   |   |   | 4 |   |   |   |   |   |   |   |   |   |   |   | <b>1 4.0</b> |              |              |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade

+ .. Tissue examined microscopically

X .. Lesion present

I .. Insufficient tissue

M .. Missing tissue

A .. Autolysis precludes evaluation

BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:

1) Minimal 3) Moderate

2) Mild 4) Marked



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 Lab: BNW

| B6C3F1 MICE MALE<br>12.5 ppm                            | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | * TOTALS             |  |
|---|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------------------|--|
|   | 0730        | 0733 | 0732 | 0733 | 0733 | 0733 | 0733 | 0731 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 |                      |  |
| ANIMAL ID   | 0022        | 0022 | 0022 | 0022 | 0023 | 0023 | 0023 | 0023 | 0023 | 0024 | 0025 | 0026 | 0027 | 0028 | 0029 | 0030 | 0031 | 0032 | 0033 | 0034 | 0035 | 0036 | 0037 | 0038 | 0039                 |  |
| Adrenal Medulla   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | A    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 48                   |  |
| Islets, Pancreatic<br>Hyperplasia                       | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | A    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 48<br>1 1.0          |  |
| Parathyroid Gland                                       | M           | M    | +    | +    | +    | +    | +    | M    | +    | +    | M    | +    | +    | M    | +    | +    | M    | M    | M    | +    | +    | +    | +    | 39   |                      |  |
| Pituitary Gland<br>Pars Distalis, Hyperplasia           | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | A    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 49<br>2 1.5          |  |
| Thyroid Gland<br>Follicular Cell, Hyperplasia           | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | A    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 49<br>1 1.0          |  |
| <b>GENERAL BODY SYSTEM</b>                              |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                      |  |
| NONE  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                      |  |
| <b>GENITAL SYSTEM</b>                                   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                      |  |
| Epididymis  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 49                   |  |
| Exfoliated Germ Cell<br>Granuloma Sperm<br>Inflammation | X           | X    | X    | X    | X    |      |      |      |      |      | X    |      |      |      |      |      | X    | X    | X    |      | X    | X    |      |      | 23<br>2 1.5<br>2 2.0 |  |
| Preputial Gland   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 49                   |  |
| Ectasia<br>Inflammation                                 |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 2 1.0<br>3 1.3       |  |
| Prostate  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 49                   |  |
| Inflammation  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 2 1.0                |  |

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Experiment Number: 20725 - 04  
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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

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 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>12.5 ppm  | DAY ON TEST |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        | * TOTALS |        |       |        |
|---|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------|--------|-------|--------|
|   | 0730        | 0733   | 0739   | 0733   | 0733   | 0730   | 0731   | 0730   | 0731   | 0734   | 0735   | 0737   | 0737   | 0736   | 0736   | 0737   | 0737   | 0736   | 0737   | 0737   |          | 0733   | 0737  |        |
| ANIMAL ID   | 002226      | 002227 | 002228 | 002229 | 002230 | 002231 | 002232 | 002233 | 002234 | 002235 | 002236 | 002237 | 002238 | 002239 | 002240 | 002241 | 002242 | 002243 | 002244 | 002245 | 002246   | 002247 |       |        |
| Seminal Vesicle   | +           | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +        | +      | 49    |        |
| Testes  | +           | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +        | +      | 49    |        |
| Seminiferous Tubule, Degeneration   |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 1      |        |        | 1      |        |          |        | 6 1.2 |        |
| <b>HEMATOPOIETIC SYSTEM</b>   |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |          |        |       |        |
| Bone Marrow   | +           | +      | +      | +      | +      | +      | +      | +      | +      | +      | A      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +        | A      | +     | 47     |
| Myeloid Cell, Hyperplasia   |             |        |        |        |        |        |        |        |        |        | 1      |        | 2      |        |        | 1      |        | 1      |        |        |          |        |       | 8 1.4  |
| Lymph Node  |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |          |        |       | 1      |
| Lymph Node, Bronchial Hyperplasia, Lymphoid                                   | +           | +      | I      | +      | I      | +      | +      | +      | M      | M      | A      | +      | +      | I      | +      | +      | +      | +      | M      | +      | +        | +      | +     | 43     |
|   |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |          |        |       | 1 1.0  |
| Lymph Node, Mandibular Hyperplasia, Lymphoid                                  | I           | +      | +      | I      | +      | +      | M      | M      | M      | M      | M      | +      | M      | +      | +      | +      | M      | +      | M      | +      | +        | +      | +     | 33     |
|   |             | 1      |        |        |        |        |        |        |        |        |        |        |        |        |        | 1      |        |        |        |        |          | 1      |       | 5 1.2  |
| Lymph Node, Mediastinal   | M           | I      | +      | I      | +      | +      | +      | +      | +      | +      | A      | +      | I      | I      | +      | +      | +      | I      | +      | +      | +        | +      | I     | 33     |
| Lymph Node, Mesenteric Hematopoietic Cell Proliferation Hyperplasia, Lymphoid | +           | +      | +      | +      | +      | +      | +      | +      | +      | +      | M      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +        | +      | I     | 47     |
|   |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 1      |        |        |          |        |       | 1 1.0  |
|   |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |          |        |       | 1 3.0  |
| Spleen  | +           | +      | +      | +      | +      | +      | +      | +      | +      | +      | A      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +        | +      | +     | 49     |
| Angiectasis   |             |        |        |        |        |        | 1      |        |        |        |        |        |        |        |        |        |        |        |        |        |          |        |       | 1 1.0  |
| Hematopoietic Cell Proliferation Hyperplasia, Lymphoid                        |             |        |        |        |        |        |        |        |        |        | 1      |        |        |        |        | 3      |        |        | 3      |        |          | 1      | 1     | 12 1.7 |
|   |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |          |        |       | 4 1.3  |
| Thymus  | +           | +      | +      | +      | +      | +      | +      | +      | +      | +      | A      | +      | I      | I      | +      | I      | +      | +      | +      | +      | +        | +      | I     | 42     |
| Atrophy   |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |          |        |       | 5 1.2  |
|   |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 1      |        |        |          |        | 2     |        |

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|                         |             |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                 |
|-------------------------|-------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------------|
| <b>B6C3F1 MICE MALE</b> | DAY ON TEST | 0<br>7           | 0<br>7           | 0<br>7           | 0<br>7           | 0<br>7           | 0<br>7           | 0<br>7           | 0<br>6           | 0<br>7           | 0<br>5           | 0<br>5           | 0<br>7           | 0<br>7           | 0<br>6           | 0<br>6           | 0<br>7           | 0<br>7           | 0<br>6           | 0<br>7           | 0<br>7           | 0<br>7           | 0<br>3           | 0<br>7           |                  |                 |
|                         | ANIMAL ID   | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           | 0<br>0           |                  |                 |
| <b>12.5 ppm</b>         |             | 3<br>0           | 3<br>0           | 2<br>9           | 3<br>0           | 3<br>0           | 3<br>0           | 3<br>0           | 1<br>1           | 3<br>0           | 8<br>9           | 7<br>4           | 3<br>0           | 3<br>0           | 0<br>4           | 5<br>3           | 3<br>0           | 3<br>0           | 5<br>3           | 2<br>9           | 7<br>9           | 3<br>0           | 3<br>1           | 9<br>6           |                  |                 |
|                         |             | 2<br>2<br>2<br>6 | 2<br>2<br>2<br>7 | 2<br>2<br>2<br>8 | 2<br>2<br>2<br>9 | 2<br>2<br>3<br>0 | 2<br>2<br>3<br>1 | 2<br>2<br>3<br>2 | 2<br>2<br>3<br>3 | 2<br>2<br>3<br>4 | 2<br>2<br>3<br>5 | 2<br>2<br>3<br>6 | 2<br>2<br>3<br>7 | 2<br>2<br>3<br>8 | 2<br>2<br>3<br>9 | 2<br>2<br>4<br>0 | 2<br>2<br>4<br>1 | 2<br>2<br>4<br>2 | 2<br>2<br>4<br>3 | 2<br>2<br>4<br>4 | 2<br>2<br>4<br>5 | 2<br>2<br>4<br>6 | 2<br>2<br>4<br>7 | 2<br>2<br>4<br>8 | 2<br>2<br>4<br>9 | <b>* TOTALS</b> |

Ectopic Parathyroid Gland

1

1

4 1.0

**INTEGUMENTARY SYSTEM**

Mammary Gland

M 0

Skin

+ 49

Inflammation, Chronic Active

1 3.0

Pigmentation, Melanin

2 1 2.0

Epidermis, Hyperplasia

2 2 2.0

Epidermis, Ulcer

1 3.0

**MUSCULOSKELETAL SYSTEM**

Bone

+ 50

Fibro-Osseous Lesion

1 1.0

Skeletal Muscle

+ + + 4

Degeneration

1 1.0

Hemorrhage, Acute

4 3 2 3.5

Inflammation

1 1 1.0

Necrosis, Acute

3 1 3.0

**NERVOUS SYSTEM**

Brain

+ 50

Peripheral Nerve

+ 2

Degeneration

1 1.0

Spinal Cord

+ 2

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade

+ .. Tissue examined microscopically

M .. Missing tissue

1-4 .. Lesion qualified as:

X .. Lesion present

A .. Autolysis precludes evaluation

1) Minimal 3) Moderate

I .. Insufficient tissue

BLANK .. Not examined microscopically

2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

|                         |             |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                 |                            |                            |
|-------------------------|-------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------------|----------------------------|----------------------------|
| <b>B6C3F1 MICE MALE</b> | DAY ON TEST | 0<br>7<br>3<br>0           | 0<br>7<br>3<br>0           | 0<br>7<br>2<br>0           | 0<br>7<br>3<br>0           | 0<br>7<br>3<br>0           | 0<br>7<br>3<br>0           | 0<br>7<br>3<br>0           | 0<br>6<br>1<br>0           | 0<br>7<br>5<br>9           | 0<br>5<br>8<br>4           | 0<br>7<br>3<br>0           | 0<br>7<br>3<br>0           | 0<br>6<br>0<br>4           | 0<br>6<br>5<br>3           | 0<br>7<br>3<br>0           | 0<br>6<br>3<br>5           | 0<br>7<br>2<br>9           | 0<br>7<br>3<br>0           | 0<br>7<br>3<br>1           | 0<br>3<br>9<br>6           | 0<br>7<br>2<br>9           | <b>* TOTALS</b> |                            |                            |
|                         | ANIMAL ID   | 0<br>0<br>2<br>2<br>2<br>6 | 0<br>0<br>2<br>2<br>2<br>7 | 0<br>0<br>2<br>2<br>2<br>8 | 0<br>0<br>2<br>2<br>2<br>9 | 0<br>0<br>2<br>2<br>3<br>1 | 0<br>0<br>2<br>2<br>3<br>2 | 0<br>0<br>2<br>2<br>3<br>3 | 0<br>0<br>2<br>2<br>3<br>3 | 0<br>0<br>2<br>2<br>3<br>4 | 0<br>0<br>2<br>2<br>3<br>5 | 0<br>0<br>2<br>2<br>3<br>6 | 0<br>0<br>2<br>2<br>3<br>7 | 0<br>0<br>2<br>2<br>3<br>8 | 0<br>0<br>2<br>2<br>3<br>9 | 0<br>0<br>2<br>2<br>4<br>0 | 0<br>0<br>2<br>2<br>4<br>1 | 0<br>0<br>2<br>2<br>4<br>2 | 0<br>0<br>2<br>2<br>4<br>3 | 0<br>0<br>2<br>2<br>4<br>4 | 0<br>0<br>2<br>2<br>4<br>5 | 0<br>0<br>2<br>2<br>4<br>6 |                 | 0<br>0<br>2<br>2<br>4<br>7 | 0<br>0<br>2<br>2<br>4<br>8 |

**RESPIRATORY SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |     |     |     |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|----|-----|-----|-----|
| Larynx  | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49 |    |     |     |     |
| Inflammation, Chronic Active                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1  | 2  | 1.0 |     |     |
| Respiratory Epithelium, Necrosis                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1  | 1  | 1.0 |     |     |
| Squamous Epithelium, Hyperplasia                      |   |   |   |   |   |   |   |   |   | 2 | 1 |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   | 1  | 1  | 7   | 1.3 |     |
| Lung  | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | 49 |     |     |     |
| Thrombosis  |   |   |   |   |   |   |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    | 1   | 1   | 1.0 |
| Alveolar Epithelium, Hyperplasia                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |     | 3   | 1.3 |
| Alveolar Epithelium, Hyperplasia, Focal               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |     | 2   | 2.0 |
| Nose  | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | 48 |     |     |     |
| Inflammation, Suppurative                             |   |   |   | 1 | 1 |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |     | 4   | 1.0 |
| Glands, Olfactory Epithelium, Inflammation, Acute     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |     | 1   | 1.0 |
| Glands, Respiratory Epithelium, Cyst                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |     | 1   | 3.0 |
| Lateral Wall, Inflammation, Chronic Active            | 2 |   |   |   |   | 1 |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |     | 8   | 1.9 |
| Olfactory Epithelium, Atrophy                         |   |   |   | 1 | 2 |   |   | 1 |   |   |   |   |   |   |   |   |   |   | 1 | 1 |   |   |   |   |   | 1  | 1  |     | 14  | 1.1 |
| Respiratory Epithelium, Accumulation, Hyaline Droplet |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |     | 1   | 1.0 |
| Respiratory Epithelium, Cyst                          |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |     | 1   | 3.0 |
| Respiratory Epithelium, Metaplasia, Squamous          |   |   |   | 1 | 1 |   |   | 1 |   |   |   |   |   |   | 1 |   |   |   |   | 1 |   |   |   |   |   |    |    |     | 6   | 1.0 |
| Turbinate, Atrophy                                    |   |   |   |   | 1 |   |   | 1 |   |   |   | 2 |   |   |   |   |   |   | 1 |   |   |   |   |   |   |    |    |     | 8   | 1.1 |
| Trachea   | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | +  | 49  |     |     |

**SPECIAL SENSES SYSTEM**

|     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|
| Eye | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49 |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>12.5 ppm             | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |             | * TOTALS    |  |  |
|--|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------------|-------------|--|--|
|  | 0730        | 0733 | 0732 | 0733 | 0733 | 0733 | 0731 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730 | 0730        |             |  |  |
| ANIMAL ID                                | 0022        | 0022 | 0022 | 0022 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023 | 0023        |             |  |  |
| Lens, Cataract                           |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |             | 1 1.0       |  |  |
| Harderian Gland Hyperplasia              | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +           | 49<br>3 2.0 |  |  |
| <b>URINARY SYSTEM</b>                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |             |             |  |  |
| Kidney Cyst                              | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +           | 50<br>2     |  |  |
| Kidney Infarct                           |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |             | 1 1.0       |  |  |
| Kidney Infiltration Cellular, Lymphocyte |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |             | 1 1.0       |  |  |
| Kidney Metaplasia, Osseous               |             |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |             | 2 1.0       |  |  |
| Kidney Mineralization                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |             | 1 1.0       |  |  |
| Kidney Nephropathy                       | 1           |      | 1    | 1    | 1    |      |      | 2    |      |      |      |      |      |      | 1    | 1    | 1    | 1    | 1    | 1    |      | 1    | 1    |             | 26 1.1      |  |  |
| Kidney Pelvis, Dilatation                |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |             | 1 1.0       |  |  |
| Urinary Bladder Inflammation             | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | A    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 48<br>1 1.0 |             |  |  |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
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 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

|                         |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                            |
|-------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------------------------|
| <b>B6C3F1 MICE MALE</b> | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <b>males<br/>(cont...)</b> |
|                         |             | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 3 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |                            |
|                         |             | 2 | 2 | 2 | 3 | 8 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 0 | 2 | 2 | 2 | 2 | 3 | 2 |                            |
| <b>25 ppm</b>           | ANIMAL ID   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                            |
|                         |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                            |
|                         |             | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |                            |
|                         |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |                            |
|                         |             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 |                            |

**ALIMENTARY SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Esophagus   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Gallbladder   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | M | + | A | + | A | + | + | + | + | + |
| Intestine Large, Cecum<br>Inflammation                          | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + |
| Intestine Large, Colon  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + |
| Intestine Large, Rectum   | + | + | + | + | + | + | + | + | + | I | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + |
| Intestine Small, Duodenum                                       | + | + | + | + | A | + | + | + | + | + | A | + | + | + | + | + | + | + | A | + | A | + | + | + | + | + |
| Intestine Small, Ileum<br>Hyperplasia, Lymphoid<br>Inflammation | + | + | + | + | A | + | + | + | + | + | A | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + |
|   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Intestine Small, Jejunum<br>Hyperplasia, Lymphoid               | + | + | + | + | A | + | + | + | + | + | A | + | + | + | + | + | + | + | A | + | A | + | + | + | + | + |
| Liver   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Basophilic Focus  |   |   |   |   |   |   |   |   |   | X |   |   |   |   |   |   | X |   | X |   |   |   |   |   |   |   |
| Clear Cell Focus  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |   |   |   | X |   |   |   |   |   |
| Eosinophilic Focus  |   |   |   |   |   | X |   |   |   |   |   |   |   | X |   |   |   |   |   |   |   |   | X |   |   |   |
| Mixed Cell Focus  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |
| Hepatocyte, Necrosis  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |
| Mesentery   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | + |

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M .. Missing tissue  
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Experiment Number: 20725 - 04  
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 Route: RESPIRATORY EXPOSURE WHOLE BODY  
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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>25 ppm | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | males<br>(cont...) |  |
|----------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------------|--|
|                            |             | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 3 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |   |                    |  |
|                            |             | 2 | 2 | 2 | 3 | 8 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 0 | 2 | 2 | 3 | 0 | 2 |                    |  |
|                            | ANIMAL ID   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |                    |  |
|                            |             | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |   |                    |  |
|                            |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |   |                    |  |
|                            |             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5                  |  |

Fat, Necrosis

Pancreas  
 Necrosis  
 Acinus, Atrophy

+ +

Salivary Glands

+ +

Stomach, Forestomach  
 Inflammation  
 Necrosis  
 Epithelium, Hyperplasia

+ + + + + + + + + + + + + + + + + + A + + + + + + +

Stomach, Glandular  
 Inflammation  
 Mineralization

+ + + + + + + + + + + + + + + + + + A + + + + + + +

Tooth  
 Dysplasia

+  
 1

**CARDIOVASCULAR SYSTEM**

Blood Vessel

+ +

Heart  
 Cardiomyopathy  
 Inflammation, Acute  
 Inflammation, Chronic Active

+  
 1 2 2

**ENDOCRINE SYSTEM**

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br><br>25 ppm                         | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | males<br>(cont...) |
|--|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------------------|
|  | ANIMAL ID   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                    |
|  | 0729        | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 | 0729 |                    |
| Adrenal Cortex<br>Zona Fasciculata, Hypertrophy, Focal | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                    |
|  | 1           |      | 1    |      | 1    | 1    | 1    | 1    | 1    | 1    |      | 1    | 1    | 2    |      |      | 1    | 1    | 1    |      | 1    | 1    | 1    | 1    |                    |
| Adrenal Medulla<br>Hyperplasia                         | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                    |
|  |             | 1    |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                    |
| Islets, Pancreatic<br>Hyperplasia                      | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | M    | +    | +    |                    |
|  |             |      | 2    |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |                    |
| Parathyroid Gland                                      | +           | +    | M    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | M    |                    |
| Pituitary Gland  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                    |
| Thyroid Gland  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                    |

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Epididymis<br>Exfoliated Germ Cell<br>Inflammation | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|  |   | X |   | X |   |   |   | X |   |   |   | X | X |   | X |   | X | X |   |   |   | X | X |   |
|  |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Preputial Gland<br>Ectasia<br>Inflammation         | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|  |   |   |   | 1 |   |   |   |   |   |   |   |   | 1 |   |   | 2 |   | 3 |   |   |   |   |   |   |
| Prostate   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
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 1-4 .. Lesion qualified as:  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>25 ppm                                  | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ANIMAL ID | males<br>(cont...) |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
|---|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----------|--------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
|   |             | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 3 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |           |                    | 7 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
|   |             | 2 | 2 | 2 | 3 | 8 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 0 | 2 | 2 | 3 | 0 | 2 | 2 | 2 | 2         | 0                  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |   |  |  |
|   |             | 9 | 9 | 9 | 1 | 9 | 9 | 9 | 9 | 9 | 9 | 0 | 9 | 0 | 0 | 9 | 9 | 9 | 1 | 6 | 9 | 3 | 9 | 0 | 9 | 9 | 1 | 6         | 9                  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |   |  |  |
| Seminal Vesicle   |             | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +         | +                  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |   |   |  |  |
| Testes<br>Interstitial Cell, Hyperplasia                    |             | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +         | +                  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 2 |   |   |  |  |
| Seminiferous Tubule, Degeneration                           |             | 1 |   |   |   |   |   |   |   |   |   | 1 | 1 |   | 4 |   |   |   |   |   |   | 2 |   |   |   |   |   |           | 1                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |  |  |
| <b>HEMATOPOIETIC SYSTEM</b>                                 |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Bone Marrow<br>Infiltration Cellular, Mast Cell             |             | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +         | +                  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 1 |   |   |   |  |  |
| Myeloid Cell, Hyperplasia                                   |             | 1 | 2 | 1 |   |   | 1 |   |   |   |   | 1 |   | 2 |   | 1 |   |   |   |   |   |   |   |   | 1 |   |   |           |                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |  |  |
| Lymph Node<br>Pancreatic, Ectasia                           |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   | + |   |   |   |   |   |   |   |   | + |   |   |           |                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Renal, Ectasia  |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |           |                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Lymph Node, Bronchial<br>Hematopoietic Cell Proliferation   |             | M | + | + | + | M | + | + | + | + | + | M | + | + | I | + | M | + | + | + | A | I | + | M | + | + | + | +         | +                  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 2 |   |   |   |   |  |  |
| Hyperplasia, Lymphoid                                       |             |   |   |   |   |   |   |   |   |   |   | 1 |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |           |                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |  |  |
| Lymph Node, Mandibular<br>Hyperplasia, Lymphoid             |             | M | M | M | + | M | I | M | + | M | + | M | M | M | + | + | + | + | + | + | M | I | + | M | + | M |   |           |                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |  |  |
| Infiltration Cellular, Plasma Cell                          |             |   |   |   | 1 |   |   |   |   |   | 1 |   |   |   |   | 1 | 2 |   | 1 | 2 | 1 |   |   |   |   |   |   |           |                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Lymph Node, Mediastinal<br>Hematopoietic Cell Proliferation |             | I | + | + | + | + | + | I | + | M | + | M | + | + | + | + | + | + | + | + | I | + | + | + | + | + | + | +         | +                  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 1 |   |  |  |
| Infiltration Cellular, Plasma Cell                          |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Lymph Node, Mesenteric<br>Ectasia                           |             | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +         | +                  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 2 |  |  |

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Experiment Number: 20725 - 04  
Test Type: CHRONIC  
Route: RESPIRATORY EXPOSURE WHOLE BODY  
Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
2,3-Butanedione  
CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
Time Report Requested: 10:33:42  
First Dose M/F: 08/31/09 / 08/31/09  
Lab: BNW

| B6C3F1 MICE MALE<br><br>25 ppm                 | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | males<br>(cont...) |
|--|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|--------------------|
|  | 0729        | 0729 | 0729 | 0729 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 | 0738 |           |                    |
| Hyperplasia, Lymphoid Inflammation             |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |           |                    |
|  |             |      |      |      |      |      |      |      |      |      |      |      | 2    |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Spleen   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |           |                    |
| Hematopoietic Cell Proliferation               |             | 2    |      | 2    | 2    |      |      |      |      |      |      |      | 2    | 1    | 1    |      |      |      |      |      |      |      |      | 2    |      |           |                    |
| Hyperplasia, Lymphoid                          |             |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Thymus   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |           |                    |
| Atrophy  |             |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Ectopic Parathyroid Gland                      |             |      |      |      | 1    |      |      |      |      |      |      | 1    |      |      |      |      |      | 1    |      |      | 1    | 1    | 1    | 1    |      |           |                    |
| <b>INTEGUMENTARY SYSTEM</b>                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Mammary Gland                                  | M           | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M    | M         |                    |
| Skin   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         |                    |
| Hyperkeratosis                                 |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Inflammation, Chronic Active                   |             |      |      |      |      |      |      |      |      |      |      |      | 3    |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Epidermis, Hyperplasia                         |             |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Epidermis, Necrosis                            |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 3    |      |      |      |      |           |                    |
| Epidermis, Ulcer                               |             |      |      |      |      |      |      |      |      |      |      |      | 2    |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Subcutaneous Tissue, Cyst Epithelial Inclusion |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 3    |      |           |                    |
| Subcutaneous Tissue, Inflammation, Suppurative |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 4    |           |                    |
| Subcutaneous Tissue, Necrosis                  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| <b>MUSCULOSKELETAL SYSTEM</b>                  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Bone   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         |                    |
| Fibro-Osseous Lesion                           |             |      | 2    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 2    |      | 2         |                    |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

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|                         |             |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                    |
|-------------------------|-------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--------------------|
| <b>B6C3F1 MICE MALE</b> | DAY ON TEST | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>7<br>3<br>1 | 0<br>6<br>8<br>9 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>3<br>2<br>9 | 0<br>7<br>2<br>0 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>0 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>7<br>3<br>1 | 0<br>7<br>0<br>6 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>3 | 0<br>7<br>2<br>9 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>9 | males<br>(cont...) |
|                         | ANIMAL ID   | 0<br>4<br>0<br>1 | 0<br>4<br>0<br>2 | 0<br>4<br>0<br>3 | 0<br>4<br>0<br>4 | 0<br>4<br>0<br>5 | 0<br>4<br>0<br>6 | 0<br>4<br>0<br>7 | 0<br>4<br>0<br>8 | 0<br>4<br>0<br>9 | 0<br>4<br>0<br>0 | 0<br>4<br>0<br>1 | 0<br>4<br>0<br>2 | 0<br>4<br>0<br>3 | 0<br>4<br>0<br>4 | 0<br>4<br>0<br>5 | 0<br>4<br>0<br>6 | 0<br>4<br>0<br>7 | 0<br>4<br>0<br>8 | 0<br>4<br>0<br>9 | 0<br>4<br>0<br>0 | 0<br>4<br>0<br>1 | 0<br>4<br>0<br>2 | 0<br>4<br>0<br>3 |                    |

|                 |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |
|-----------------|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|
| Skeletal Muscle |  |  |  |  |  |  |  |  |  |  | + |  |  |  |  |  |  |  |  |  |
|-----------------|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|

**NERVOUS SYSTEM**

|                                   |   |  |  |  |  |  |  |  |  |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|--|--|--|--|--|--|--|--|---|--|---|--|--|--|--|--|--|--|--|--|--|--|
| Brain                             | + |  |  |  |  |  |  |  |  |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |
| Infiltration Cellular, Lymphocyte |   |  |  |  |  |  |  |  |  |  | 1 |  |   |  |  |  |  |  |  |  |  |  |  |  |
| Inflammation, Acute               |   |  |  |  |  |  |  |  |  |  |   |  |   |  |  |  |  |  |  |  |  |  |  |  |
| Peripheral Nerve                  |   |  |  |  |  |  |  |  |  |  |   |  | + |  |  |  |  |  |  |  |  |  |  |  |
| Degeneration                      |   |  |  |  |  |  |  |  |  |  |   |  | 1 |  |  |  |  |  |  |  |  |  |  |  |
| Spinal Cord                       |   |  |  |  |  |  |  |  |  |  |   |  | + |  |  |  |  |  |  |  |  |  |  |  |

**RESPIRATORY SYSTEM**

|  |   |  |  |  |  |   |  |  |  |  |   |  |  |  |  |  |  |  |  |  |   |  |  |  |   |  |  |  |   |  |  |  |
|--|---|--|--|--|--|---|--|--|--|--|---|--|--|--|--|--|--|--|--|--|---|--|--|--|---|--|--|--|---|--|--|--|
| Larynx                                       | + |  |  |  |  |   |  |  |  |  |   |  |  |  |  |  |  |  |  |  |   |  |  |  |   |  |  |  |   |  |  |  |
| Inflammation, Chronic Active                 |   |  |  |  |  | 1 |  |  |  |  | 2 |  |  |  |  |  |  |  |  |  | 1 |  |  |  | A |  |  |  | 1 |  |  |  |
| Respiratory Epithelium, Metaplasia, Squamous |   |  |  |  |  |   |  |  |  |  | 2 |  |  |  |  |  |  |  |  |  |   |  |  |  |   |  |  |  |   |  |  |  |
| Respiratory Epithelium, Necrosis             |   |  |  |  |  |   |  |  |  |  | 1 |  |  |  |  |  |  |  |  |  |   |  |  |  | 1 |  |  |  |   |  |  |  |
| Squamous Epithelium, Hyperplasia             |   |  |  |  |  | 1 |  |  |  |  | 3 |  |  |  |  |  |  |  |  |  | 1 |  |  |  | 2 |  |  |  |   |  |  |  |
| Lung   | + |  |  |  |  |   |  |  |  |  |   |  |  |  |  |  |  |  |  |  |   |  |  |  |   |  |  |  |   |  |  |  |
| Inflammation, Chronic Active                 |   |  |  |  |  |   |  |  |  |  | 1 |  |  |  |  |  |  |  |  |  |   |  |  |  |   |  |  |  |   |  |  |  |
| Alveolar Epithelium, Hyperplasia, Focal      |   |  |  |  |  |   |  |  |  |  |   |  |  |  |  |  |  |  |  |  | 3 |  |  |  |   |  |  |  |   |  |  |  |
| Alveolus, Infiltration Cellular, Histiocyte  |   |  |  |  |  |   |  |  |  |  | 2 |  |  |  |  |  |  |  |  |  | 1 |  |  |  |   |  |  |  |   |  |  |  |
| Bronchiole, Epithelium, Hyperplasia          |   |  |  |  |  |   |  |  |  |  | 1 |  |  |  |  |  |  |  |  |  |   |  |  |  |   |  |  |  |   |  |  |  |
| Interstitial Fibrosis                        |   |  |  |  |  |   |  |  |  |  | 1 |  |  |  |  |  |  |  |  |  |   |  |  |  |   |  |  |  |   |  |  |  |
| Pleura, Inflammation, Chronic Active         |   |  |  |  |  |   |  |  |  |  |   |  |  |  |  |  |  |  |  |  |   |  |  |  |   |  |  |  |   |  |  |  |
| Nose   | + |  |  |  |  |   |  |  |  |  |   |  |  |  |  |  |  |  |  |  |   |  |  |  |   |  |  |  |   |  |  |  |
| Foreign Body                                 |   |  |  |  |  |   |  |  |  |  | X |  |  |  |  |  |  |  |  |  |   |  |  |  | X |  |  |  |   |  |  |  |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
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 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>25 ppm  | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID | males<br>(cont...) |                  |                  |                  |                  |  |  |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|--------------------|------------------|------------------|------------------|------------------|--|--|
|   | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>7<br>3<br>1 | 0<br>6<br>8<br>9 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>3<br>2<br>0 | 0<br>7<br>1<br>9 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>0 | 0<br>7<br>2<br>9 | 0<br>7<br>3<br>9 | 0<br>7<br>3<br>1 | 0<br>7<br>0<br>6 | 0<br>7<br>2<br>9 |           |                    | 0<br>7<br>2<br>3 | 0<br>7<br>2<br>9 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>0 |  |  |
| Inflammation, Suppurative<br>Glands, Sinus, Metaplasia, Respiratory<br>Lamina Propria, Fibrosis           | 2                | 2                | 1                | 1                | 1                | 1                | 2                | 2                | 2                | 1                | 1                | 1                | 1                | 2                | 2                | 2                | 2                | 2                |                  | 2                | 1         | 2                  | 1                | 2                | 1                |                  |  |  |
| Lateral Wall, Inflammation, Chronic Active<br>Mucosa, Regeneration  | 2                | 2                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                |                  |                  | 1         | 1                  | 1                | 1                | 1                |                  |  |  |
| Olfactory Epithelium, Accumulation, Hyaline<br>Droplet  | 1                | 1                |                  |                  | 1                | 1                | 1                | 1                | 1                | 2                | 1                | 2                | 1                | 2                | 1                | 1                | 1                | 1                | 1                | 1                | 1         | 1                  | 2                | 1                | 1                |                  |  |  |
| Olfactory Epithelium, Atrophy   | 2                | 1                | 3                | 3                | 2                | 2                | 1                | 2                | 2                | 2                | 2                | 3                | 2                | 2                | 2                | 3                | 2                | 3                | 2                |                  | 2         | 2                  | 3                | 2                | 3                |                  |  |  |
| Olfactory Epithelium, Metaplasia, Respiratory<br>Respiratory Epithelium, Accumulation, Hyaline<br>Droplet | 2                |                  | 2                |                  | 1                | 1                |                  | 2                | 2                | 1                | 1                | 1                |                  | 2                | 2                | 1                | 2                | 2                | 2                |                  | 1         | 2                  | 1                | 2                | 1                |                  |  |  |
| Respiratory Epithelium, Metaplasia, Squamous  | 2                | 2                | 1                | 2                | 2                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 2                | 2                | 2                | 1                | 2                | 1                | 2                | 2         | 2                  | 1                | 2                |                  |                  |  |  |
| Respiratory Epithelium, Necrosis  | 1                | 2                | 1                | 1                | 1                |                  | 1                |                  | 1                |                  |                  |                  | 1                | 1                | 2                | 1                | 1                |                  | 2                |                  |           | 1                  | 1                | 1                | 1                |                  |  |  |
| Respiratory Epithelium, Regeneration  |                  |                  | 2                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                    |                  |                  |                  |                  |  |  |
| Septum, Perforation   |                  |                  | X                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           | X                  |                  |                  |                  |                  |  |  |
| Turbinate, Atrophy  | 2                | 2                | 1                | 1                | 2                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 2                | 2                | 2                | 2                | 1                |                  |           | 1                  | 1                | 1                | 1                | 1                |  |  |
| Turbinate, Necrosis   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                    |                  |                  |                  |                  |  |  |
| Trachea   | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | A         | +                  | +                | +                | +                | +                |  |  |
| Inflammation, Chronic Active  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 1                |                  |                  |                  |                  |                  |                  |                  |                  |           |                    |                  |                  |                  |                  |  |  |
| <b>SPECIAL SENSES SYSTEM</b>  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                    |                  |                  |                  |                  |  |  |
| Eye   | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                  | +                | +                | +                | +                |  |  |
| Cornea, Inflammation, Acute   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                    |                  |                  |                  |                  |  |  |
| Harderian Gland   | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                  | +                | +                | +                | +                |  |  |
| Hyperplasia   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                    |                  |                  |                  |                  |  |  |
| <b>URINARY SYSTEM</b>   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                    |                  |                  |                  |                  |  |  |

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 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>25 ppm | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | males<br>(cont...) |
|----------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------------------|
|                            | 0729        | 0729 | 0729 | 0731 | 0738 | 0739 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 | 0779 |                    |
| ANIMAL ID                  | 0040        | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040 | 0040               |
| Kidney                     | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                    |
| Cyst                       |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                    |
| Infarct                    |             |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                    |
| Inflammation               |             |      |      |      |      |      |      |      |      |      |      |      |      | 4    |      |      |      |      |      |      |      |      |      |      |      |      |                    |
| Metaplasia, Osseous        |             |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |                    |
| Nephropathy                |             |      | 1    | 1    |      |      |      |      | 1    |      | 1    |      | 2    | 1    | 1    | 1    |      | 1    | 1    | 1    |      |      |      | 1    |      | 1    |                    |
| Pigmentation, Hemosiderin  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                    |
| Pelvis, Dilatation         |             |      |      |      |      |      |      |      |      |      |      |      | 4    |      |      |      |      |      |      |      |      |      |      |      |      |      |                    |
| Urinary Bladder            | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +                  |
| Hyperplasia, Lymphoid      |             |      |      |      |      |      |      |      | 2    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                    |

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Experiment Number: 20725 - 04  
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**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

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 Lab: BNW

| B6C3F1 MICE MALE<br>25 ppm | DAY ON TEST | 0729  | 0730  | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  | 0749  | 0750  | * TOTALS |       |
|----------------------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|
|                            | ANIMAL ID   | 00426 | 00447 | 00448 | 00449 | 00450 | 00451 | 00452 | 00453 | 00454 | 00455 | 00456 | 00457 | 00458 | 00459 | 00460 | 00461 | 00462 | 00463 | 00464 | 00465 | 00466 | 00467 |          | 00468 |
|                            |             | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0        |       |
|                            |             | 7     | 7     | 7     | 7     | 5     | 7     | 7     | 7     | 7     | 7     | 7     | 7     | 6     | 7     | 7     | 5     | 5     | 6     | 5     | 6     | 7     | 7     | 7        |       |
|                            |             | 2     | 3     | 2     | 3     | 8     | 2     | 2     | 2     | 3     | 3     | 2     | 3     | 3     | 8     | 3     | 3     | 5     | 2     | 0     | 9     | 3     | 2     | 2        |       |
|                            |             | 9     | 0     | 9     | 0     | 8     | 9     | 9     | 9     | 1     | 1     | 2     | 0     | 3     | 0     | 0     | 4     | 7     | 0     | 7     | 7     | 9     | 2     | 2        |       |
|                            |             | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0        |       |
|                            |             | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4        |       |
|                            |             | 2     | 2     | 2     | 2     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 5        |       |
|                            |             | 6     | 7     | 8     | 9     | 0     | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 0     | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 9        |       |

**ALIMENTARY SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     |     |   |     |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-----|-----|---|-----|
| Esophagus   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |     |     |   |     |
| Gallbladder   | + | M | + | + | A | + | + | + | + | + | + | M | + | A | + | + | + | + | + | + | + | + | + | + | 43 |     |     |   |     |
| Intestine Large, Cecum<br>Inflammation                          | + | + | + | + | A | + | + | + | + | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | 47 | 2   | 1.0 |   |     |
| Intestine Large, Colon  | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 48 |     |     |   |     |
| Intestine Large, Rectum   | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | I | I | + | + | + | + | + | + | 45 |     |     |   |     |
| Intestine Small, Duodenum                                       | + | + | + | + | A | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | 44 |     |     |   |     |
| Intestine Small, Ileum<br>Hyperplasia, Lymphoid<br>Inflammation | + | + | + | + | A | + | + | + | + | + | + | + | + | A | + | + | A | + | + | + | + | + | + | + | 44 | 2   | 2.0 | 1 | 1.0 |
| Intestine Small, Jejunum<br>Hyperplasia, Lymphoid               | + | + | + | + | A | + | + | + | + | + | + | + | + | A | + | + | A | + | + | + | + | + | + | + | 43 | 1   | 2.0 |   |     |
| Liver   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |     |     |   |     |
| Basophilic Focus  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |   |   |   |   | X | X | X | 7  |     |     |   |     |
| Clear Cell Focus  |   |   |   |   |   |   |   | X | X |   |   |   |   |   |   |   | X |   |   |   |   |   |   |   | 5  |     |     |   |     |
| Eosinophilic Focus  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |   |   |   |   |   | 4  |     |     |   |     |
| Mixed Cell Focus  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |   |   | 2  |     |     |   |     |
| Hepatocyte, Necrosis  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   | 1  | 2.0 |     |   |     |
| Mesentery   |   |   |   |   | + | + | + |   |   |   |   |   |   | + |   |   |   |   |   |   |   |   |   |   | 5  |     |     |   |     |

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 X .. Lesion present  
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|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------------------------------|
|  | 0729        | 0730  | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  |          | 0749                          |
| ANIMAL ID  | 00426       | 00447 | 00408 | 00409 | 00410 | 00411 | 00412 | 00413 | 00414 | 00415 | 00416 | 00417 | 00418 | 00419 | 00420 | 00421 | 00422 | 00423 | 00424 | 00425 | 00426    |                               |
| Fat, Necrosis  |             |       |       |       | 1     | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 2 1.5                         |
| Pancreas<br>Necrosis<br>Acinus, Atrophy  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | 50<br>1 1.0<br>1 1.0          |
| Salivary Glands  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | 50                            |
| Stomach, Forestomach<br>Inflammation<br>Necrosis<br>Epithelium, Hyperplasia    | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | 49<br>1 2.0<br>1 1.0<br>1 3.0 |
| Stomach, Glandular<br>Inflammation<br>Mineralization                           | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | 49<br>2 1.0<br>1 1.0<br>1 3.0 |
| Tooth<br>Dysplasia   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 1<br>1 1.0                    |
| <b>CARDIOVASCULAR SYSTEM</b>   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |                               |
| Blood Vessel   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | 50                            |
| Heart<br>Cardiomyopathy<br>Inflammation, Acute<br>Inflammation, Chronic Active | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | 50<br>8 1.3<br>1 3.0<br>1 1.0 |
| <b>ENDOCRINE SYSTEM</b>  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |                               |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>25 ppm                             | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS     |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------|
|  | 0729        | 0730  | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  | 0749  | 0750  | 0751  |       |              |
| ANIMAL ID  | 00426       | 00447 | 00468 | 00489 | 00510 | 00531 | 00552 | 00573 | 00594 | 00615 | 00636 | 00657 | 00678 | 00699 | 00720 | 00741 | 00762 | 00783 | 00804 | 00825 | 00846 | 00867 | 00888 | 00909 |              |
| Adrenal Cortex<br>Zona Fasciculata, Hypertrophy, Focal | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50<br>35 1.1 |
| Adrenal Medulla<br>Hyperplasia                         | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50<br>3 1.0  |
| Islets, Pancreatic<br>Hyperplasia                      | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 49<br>4 1.5  |
| Parathyroid Gland                                      | +           | +     | M     | +     | +     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +     | M     | +     | +     | +     | M     | +     | +     | 44           |
| Pituitary Gland  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50           |
| Thyroid Gland  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50           |

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                      |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------------------|
| Epididymis<br>Exfoliated Germ Cell<br>Inflammation | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50<br>25<br>1 1.0    |
| Preputial Gland<br>Ectasia<br>Inflammation         | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50<br>2 1.5<br>5 2.0 |
| Prostate   | + | + | + | + | + | + | + | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + | 49                   |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade

+ .. Tissue examined microscopically

X .. Lesion present

I .. Insufficient tissue

M .. Missing tissue

A .. Autolysis precludes evaluation

BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:

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2) Mild 4) Marked

Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

| B6C3F1 MICE MALE<br>25 ppm         | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |        | * TOTALS |
|------------------------------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|----------|
|                                    | 0729        | 0730  | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  | 0749  | 0750  | 0751  |        |          |
| ANIMAL ID                          | 00426       | 00427 | 00428 | 00429 | 00430 | 00431 | 00432 | 00433 | 00434 | 00435 | 00436 | 00437 | 00438 | 00439 | 00440 | 00441 | 00442 | 00443 | 00444 | 00445 | 00446 | 00447 | 00448 | 00449  |          |
| Seminal Vesicle                    | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50     |          |
| Testes                             | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50     |          |
| Interstitial Cell, Hyperplasia     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 2.0  |          |
| Seminiferous Tubule, Degeneration  | 1           | 1     | 1     |       |       |       |       |       |       |       |       |       | 2     |       |       |       |       |       | 1     | 1     | 1     |       |       | 13 1.4 |          |
| <b>HEMATOPOIETIC SYSTEM</b>        |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |        |          |
| Bone Marrow                        | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50     |          |
| Infiltration Cellular, Mast Cell   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 1.0  |          |
| Myeloid Cell, Hyperplasia          |             | 2     | 1     | 1     | 2     | 1     |       | 1     |       |       |       | 1     |       |       |       | 1     | 2     | 2     | 1     |       |       |       |       | 20 1.3 |          |
| Lymph Node                         |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 3      |          |
| Pancreatic, Ectasia                |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 3.0  |          |
| Renal, Ectasia                     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 2.0  |          |
| Lymph Node, Bronchial              | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 38     |          |
| Hematopoietic Cell Proliferation   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 2.0  |          |
| Hyperplasia, Lymphoid              |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 3 1.0  |          |
| Lymph Node, Mandibular             | +           | +     | M     | I     | +     | +     | M     | +     | I     | +     | M     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +     | 30     |          |
| Hyperplasia, Lymphoid              | 1           | 2     |       |       |       |       |       |       |       | 1     |       |       |       |       |       | 1     |       |       |       |       |       |       |       | 11 1.3 |          |
| Infiltration Cellular, Plasma Cell |             | 1     |       |       |       |       |       |       |       | 1     |       |       |       |       |       |       |       |       |       |       |       |       |       | 2 1.0  |          |
| Lymph Node, Mediastinal            | +           | +     | M     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | I     | +     | +     | M     | I     | M     | +     | I     | +      | 38       |
| Hematopoietic Cell Proliferation   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |        | 1 1.0    |
| Infiltration Cellular, Plasma Cell |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |        | 1 2.0    |
| Lymph Node, Mesenteric             | +           | +     | +     | +     | I     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 49     |          |
| Ectasia                            |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |        | 1 2.0    |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade

+ .. Tissue examined microscopically

X .. Lesion present

I .. Insufficient tissue

M .. Missing tissue

A .. Autolysis precludes evaluation

BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:

1) Minimal 3) Moderate

2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>25 ppm                     | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |      |    |     |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|------|----|-----|
|  | 0729        | 0732  | 0739  | 0748  | 0757  | 0766  | 0775  | 0784  | 0793  | 0802  | 0811  | 0820  | 0829  | 0838  | 0847  | 0856  | 0865  | 0874  | 0883  | 0892  |          | 0901 |    |     |
| ANIMAL ID                                      | 00426       | 00447 | 00468 | 00489 | 00510 | 00531 | 00552 | 00573 | 00594 | 00615 | 00636 | 00657 | 00678 | 00699 | 00720 | 00741 | 00762 | 00783 | 00804 | 00825 | 00846    |      |    |     |
| Hyperplasia, Lymphoid Inflammation             |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 1    | 2  | 1.0 |
| Spleen   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +    | 50 |     |
| Hematopoietic Cell Proliferation               |             | 1     | 2     | 1     |       |       |       |       |       | 3     |       |       |       |       |       | 2     | 1     |       |       |       |          |      | 15 | 1.8 |
| Hyperplasia, Lymphoid                          |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      | 1  | 1.0 |
| Thymus   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +    | 44 |     |
| Atrophy  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      | 2  | 1.5 |
| Ectopic Parathyroid Gland                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1     | 1     | 1     |       |       |          |      | 11 | 1.0 |
| <b>INTEGUMENTARY SYSTEM</b>                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |    |     |
| Mammary Gland                                  | M           | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M        | M    | 0  |     |
| Skin   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +    | 50 |     |
| Hyperkeratosis                                 |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      | 2  | 2.0 |
| Inflammation, Chronic Active                   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      | 4  | 3.5 |
| Epidermis, Hyperplasia                         |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      | 1  | 1.0 |
| Epidermis, Necrosis                            |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      | 1  | 3.0 |
| Epidermis, Ulcer                               |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      | 1  | 2.0 |
| Subcutaneous Tissue, Cyst Epithelial Inclusion |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      | 1  | 3.0 |
| Subcutaneous Tissue, Inflammation, Suppurative |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      | 1  | 4.0 |
| Subcutaneous Tissue, Necrosis                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      | 3  | 3.0 |
| <b>MUSCULOSKELETAL SYSTEM</b>                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |    |     |
| Bone   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +    | 50 |     |
| Fibro-Osseous Lesion                           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      | 3  | 2.0 |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

|                         |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                 |   |
|-------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----------------|---|
| <b>B6C3F1 MICE MALE</b> | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0               |   |
|                         |             | 7 | 7 | 7 | 7 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 5 | 5 | 6 | 5 | 6 | 7 | 7 | 7               | 7 |
| <b>25 ppm</b>           | ANIMAL ID   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0               |   |
|                         |             | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4               |   |
|                         |             | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5               |   |
|                         |             | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8               |   |
|                         |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>* TOTALS</b> |   |

Skeletal Muscle

+ +

+

5

**NERVOUS SYSTEM**

Brain

+ 50

Infiltration Cellular, Lymphocyte Inflammation, Acute

1

1

2 1.0  
1 1.0

Peripheral Nerve

Degeneration

1

1 1.0

Spinal Cord

1

**RESPIRATORY SYSTEM**

Larynx

+ 49

Inflammation, Chronic Active  
Respiratory Epithelium, Metaplasia, Squamous  
Respiratory Epithelium, Necrosis  
Squamous Epithelium, Hyperplasia

11 1.2  
6 1.2  
9 1.0  
15 1.4

Lung

+ 50

Inflammation, Chronic Active  
Alveolar Epithelium, Hyperplasia, Focal  
Alveolus, Infiltration Cellular, Histiocyte  
Bronchiole, Epithelium, Hyperplasia  
Interstitial, Fibrosis  
Pleura, Inflammation, Chronic Active

2 1.5  
4 2.8  
3 1.3  
1 2.0  
1 1.0  
1 2.0

Nose

Foreign Body

+ 50

X

3

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
+ .. Tissue examined microscopically M .. Missing tissue  
X .. Lesion present A .. Autolysis precludes evaluation  
I .. Insufficient tissue BLANK .. Not examined microscopically  
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1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
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 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>25 ppm  | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |      |    |     |       |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|------|----|-----|-------|
|   | 0729        | 0730  | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  |          | 0749 |    |     |       |
| ANIMAL ID   | 00426       | 00427 | 00428 | 00429 | 00430 | 00431 | 00432 | 00433 | 00434 | 00435 | 00436 | 00437 | 00438 | 00439 | 00440 | 00441 | 00442 | 00443 | 00444 | 00445 | 00446    |      |    |     |       |
| Inflammation, Suppurative Glands, Sinus, Metaplasia, Respiratory Lamina Propria, Fibrosis | 1           | 2     | 1     | 1     | 2     | 2     | 1     | 1     | 1     | 1     | 2     | 1     | 1     | 1     | 2     | 1     | 2     | 1     | 2     | 1     | 1        | 1    | 47 | 1.4 |       |
| Lateral Wall, Inflammation, Chronic Active Mucosa, Regeneration                           | 1           | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1        | 1    | 44 | 1.0 |       |
| Olfactory Epithelium, Accumulation, Hyaline Droplet                                       | 2           | 1     | 2     | 1     | 1     | 1     | 2     | 2     | 1     | 1     | 1     | 1     | 2     | 1     | 1     | 1     | 2     | 1     | 1     | 1     | 2        | 1    | 1  | 47  | 1.2   |
| Olfactory Epithelium, Atrophy   | 2           | 2     | 2     | 2     | 2     | 2     | 3     | 1     | 2     | 2     | 2     | 2     | 3     | 3     | 2     | 2     | 2     | 2     | 1     | 1     | 2        | 1    | 2  | 48  | 2.1   |
| Olfactory Epithelium, Metaplasia, Respiratory Epithelium, Accumulation, Hyaline Droplet   | 3           | 2     | 2     | 1     | 2     | 2     | 2     | 2     | 2     | 2     | 1     | 2     | 2     | 2     | 1     | 2     | 1     | 2     | 1     | 1     | 1        | 1    | 39 | 1.6 |       |
| Respiratory Epithelium, Metaplasia, Squamous  | 2           | 2     | 2     | 2     | 2     | 1     | 1     | 1     | 1     | 1     | 2     | 2     | 2     | 1     | 1     | 2     | 2     | 1     | 1     | 2     | 2        | 1    | 1  | 47  | 1.5   |
| Respiratory Epithelium, Necrosis  | 1           | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 2     | 1        | 1    | 34 | 1.1 |       |
| Respiratory Epithelium, Regeneration  |             |       |       |       |       |       |       |       |       |       | 2     |       |       |       |       |       |       |       |       |       |          |      | 2  | 2.0 |       |
| Septum, Perforation   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | X     |          |      | 3  |     |       |
| Turbinate, Atrophy  | 1           | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 2     | 1     | 1     | 1     | 1     | 2     | 1        | 1    | 1  | 49  | 1.2   |
| Turbinate, Necrosis   |             |       |       |       |       |       |       |       |       |       |       |       | 1     |       | 1     |       |       | 1     |       | 1     |          |      | 4  | 1.0 |       |
| Trachea Inflammation, Chronic Active  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +    | +  | 49  | 2 1.0 |
| <b>SPECIAL SENSES SYSTEM</b>  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |    |     |       |
| Eye Cornea, Inflammation, Acute   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +    | +  | 50  | 1 1.0 |
| Harderian Gland Hyperplasia   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +    | +  | 50  | 1 2.0 |
| <b>URINARY SYSTEM</b>   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |    |     |       |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>25 ppm | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |        | * TOTALS |
|----------------------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|----------|
|                            | 0729        | 0730  | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  | 0749  | 0750  | 0751  | 0752   |          |
| ANIMAL ID                  | 00426       | 00427 | 00428 | 00429 | 00430 | 00431 | 00432 | 00433 | 00434 | 00435 | 00436 | 00437 | 00438 | 00439 | 00440 | 00441 | 00442 | 00443 | 00444 | 00445 | 00446 | 00447 | 00448 | 00449  |          |
| Kidney                     | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50     |          |
| Cyst                       |             |       | X     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1      |          |
| Infarct                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 3     |       |       |       |       |       | 2 2.0  |          |
| Inflammation               |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 3     |       |       |       |       |       |       | 2 3.5  |          |
| Metaplasia, Osseous        |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2     | 1     | 4 1.3  |          |
| Nephropathy                | 1           | 1     | 3     | 1     |       | 1     | 1     |       |       |       |       |       | 3     |       | 1     | 1     |       | 3     |       |       | 1     |       | 1     | 25 1.3 |          |
| Pigmentation, Hemosiderin  |             |       |       |       |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 2.0  |          |
| Pelvis, Dilatation         |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 4.0  |          |
| Urinary Bladder            | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50     |          |
| Hyperplasia, Lymphoid      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 2.0  |          |

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 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
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Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL

2,3-Butanedione

CAS Number: 431-03-8

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First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

|  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                    |
|--|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------------------|
| <b>B6C3F1 MICE MALE</b><br><b>50 ppm</b> | DAY ON TEST | 0731 | 0407 | 0340 | 0729 | 0771 | 0743 | 0773 | 0773 | 0773 | 0777 | 0761 | 0776 | 0768 | 0772 | 0749 | 0663 | 0773 | 0772 | 0729 | 0566 | 0320 | 0729 | 0730 | males<br>(cont...) |
|  | ANIMAL ID   | 0060 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 | 0066 |                    |
|  |             | 12   | 34   | 56   | 78   | 90   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   |                    |

ALIMENTARY SYSTEM

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Esophagus<br>Periesophageal Tissue, Inflammation, Chronic Active<br>Submucosa, Inflammation, Chronic Active                  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Gallbladder<br>Inflammation  | M | M | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + |
| Intestine Large, Cecum   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Intestine Large, Colon   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Intestine Large, Rectum<br>Inflammation  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Intestine Small, Duodenum  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + |
| Intestine Small, Ileum<br>Hemorrhage   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Intestine Small, Jejunum<br>Hyperplasia, Lymphoid  | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | A | + | + | + |
| Liver<br>Basophilic Focus<br>Eosinophilic Focus<br>Hematopoietic Cell Proliferation<br>Mixed Cell Focus<br>Tension Lipidosis | + | + | + | + | + | + | + | X | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade

+ .. Tissue examined microscopically

X .. Lesion present

I .. Insufficient tissue

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Experiment Number: 20725 - 04  
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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
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 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br><br>50 ppm  | DAY ON TEST   |   | ANIMAL ID |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | males<br>(cont...) |   |   |  |
|---|---|---|-----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------------|---|---|--|
|   | 0   | 0 | 0         | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                    | 0 | 0 |  |
|   | 7   | 4 | 3         | 7 | 7 | 4 | 7 | 7 | 7 | 7 | 6 | 7 | 6 | 7 | 4 | 6 | 7 | 7 | 7 | 5 | 3 | 7 | 7                  |   |   |  |
|   | 3   | 0 | 4         | 2 | 3 | 7 | 1 | 3 | 3 | 2 | 2 | 1 | 1 | 8 | 2 | 0 | 9 | 3 | 3 | 2 | 6 | 2 | 2                  | 3 |   |  |
|   | 1   | 7 | 0         | 9 | 1 | 7 | 7 | 0 | 0 | 9 | 3 | 9 | 8 | 9 | 9 | 5 | 1 | 0 | 9 | 9 | 0 | 2 | 9                  | 0 |   |  |
|   | 0   | 0 | 0         | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                  | 0 |   |  |
|   | 6   | 6 | 6         | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6                  | 6 |   |  |
|   | 0   | 0 | 0         | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2                  | 2 |   |  |
|   | 1   | 2 | 3         | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3                  | 4 | 5 |  |
| Hepatocyte, Necrosis  | 1   |   |           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |   |  |
| Pancreas  | +                     |   |           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |   |  |
| Salivary Glands   | +                     |   |           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |   |  |
| Stomach, Forestomach<br>Epithelium, Hyperplasia   | +<br>1                |   |           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |   |  |
| Stomach, Glandular  | +                     |   |           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |   |  |
| <b>CARDIOVASCULAR SYSTEM</b>  |   |   |           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |   |  |
| Blood Vessel<br>Inflammation  | +<br>1                |   |           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |   |  |
| Heart<br>Cardiomyopathy<br>Inflammation, Acute<br>Inflammation, Chronic Active<br>Necrosis<br>Polyarteritis | +<br>1 1 2 3<br>1 1 2 |   |           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |   |  |
| <b>ENDOCRINE SYSTEM</b>   |   |   |           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |   |  |
| Adrenal Cortex<br>Inflammation, Suppurative<br>Zona Fasciculata, Hypertrophy, Focal                         | +<br>1 1 1 1 1        |   |           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |   |  |
| Adrenal Medulla   | +                     |   |           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |   |  |

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Experiment Number: 20725 - 04  
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**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br><br>50 ppm | DAY ON TEST |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | males<br>(cont...) |   |
|--------------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------------|---|
|                                | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                    |   |
|                                | 7           | 4 | 3 | 7 | 7 | 4 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 6 | 7 | 4 | 6 | 7 | 7 | 7 | 2 | 7 | 5 | 3 | 7 |                    | 7 |
|                                | 3           | 0 | 4 | 2 | 3 | 7 | 1 | 3 | 3 | 2 | 2 | 1 | 1 | 8 | 2 | 0 | 9 | 3 | 3 | 2 | 2 | 6 | 2 | 2 | 3 |                    |   |
|                                | 1           | 7 | 0 | 9 | 1 | 7 | 7 | 0 | 0 | 9 | 3 | 9 | 8 | 8 | 9 | 9 | 5 | 1 | 0 | 9 | 9 | 0 | 0 | 2 | 0 |                    |   |
| ANIMAL ID                      | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                    |   |
|                                | 6           | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |                    |   |
|                                | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |                    |   |
|                                | 1           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 |                    |   |
| Islets, Pancreatic             | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |                    |   |
| Parathyroid Gland              | M           | + | + | M | + | + | + | + | M | M | + | + | + | + | + | + | + | + | M | + | + | + | + | + |   |                    |   |
| Pituitary Gland                | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |                    |   |
| Thyroid Gland                  | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |                    |   |
| Inflammation, Chronic Active   |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |
| Follicular Cell, Hyperplasia   |             |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |
| <b>GENERAL BODY SYSTEM</b>     |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |
| Tissue NOS                     |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |
| Inflammation, Chronic Active   |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |
| <b>GENITAL SYSTEM</b>          |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |
| Epididymis                     | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |                    |   |
| Exfoliated Germ Cell           | X           | X | X | X |   |   | X | X |   |   | X |   |   | X |   | X |   |   |   |   | X |   |   |   |   |                    |   |
| Granuloma Sperm                |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |
| Inflammation                   |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |
| Preputial Gland                | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |                    |   |
| Ectasia                        |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |
| Inflammation                   |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   | 3 |                    |   |
| Prostate                       | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |                    |   |
| Inflammation                   |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |
|                                |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |
|                                |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |
|                                |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |   |
| Seminal Vesicle                | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |                    |   |

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1-4 .. Lesion qualified as:  
1) Minimal 3) Moderate  
2) Mild 4) Marked

Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

|                         |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <b>B6C3F1 MICE MALE</b> | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|                         |             | 7 | 4 | 3 | 7 | 7 | 4 | 7 | 7 | 7 | 7 | 6 | 7 | 6 | 7 | 4 | 6 | 7 | 7 | 7 | 5 | 3 | 7 | 7 | 7 | 7 |
|                         |             | 3 | 0 | 4 | 2 | 3 | 7 | 1 | 3 | 3 | 2 | 2 | 1 | 1 | 8 | 2 | 0 | 9 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 |
|                         |             | 1 | 7 | 0 | 9 | 1 | 7 | 7 | 0 | 0 | 9 | 3 | 9 | 8 | 8 | 9 | 9 | 5 | 1 | 0 | 9 | 9 | 0 | 0 | 0 | 0 |
| <b>50 ppm</b>           | ANIMAL ID   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |
|                         |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |
|                         |             | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |   |
|                         |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |   |
|                         |             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 |

males (cont...)

|                                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| Testes                            | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |  |  |
| Interstitial Cell, Hyperplasia    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |  |  |
| Seminiferous Tubule, Degeneration |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |  |  |

HEMATOPOIETIC SYSTEM

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bone Marrow                                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + |   |   |   |
| Myeloid Cell, Hyperplasia                         | 3 | 4 | 4 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 4 | 3 |   | 1 | 4 | 4 | 1 |   |   |   |   | 1 | 2 |   |   | 4 | 1 | 2 |
| Lymph Node  |   |   |   |   | + |   |   |   |   |   | + |   |   |   |   | + |   |   |   |   |   |   |   | + |   |   |   |   |
| Deep Cervical, Ectasia                            |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Deep Cervical, Hematopoietic Cell Proliferation   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Deep Cervical, Hyperplasia, Lymphoid              |   |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |
| Deep Cervical, Infiltration Cellular, Plasma Cell |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |
| Pancreatic, Hyperplasia, Lymphoid                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Renal, Hematopoietic Cell Proliferation           |   |   |   |   |   |   |   |   |   |   |   | 4 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Lymph Node, Bronchial                             | + | + | + | + | I | + | M | + | I | M | I | + | + | + | + | + | M | + | + | + | + | + | + | M | M | + | M | + |
| Ectasia   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |
| Hyperplasia, Lymphoid                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   | 1 |
| Infiltration Cellular, Plasma Cell                |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation, Chronic Active                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Pigmentation                                      |   |   | 1 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Lymph Node, Mandibular                            | + | + | + | + | + | + | + | + | + | M | + | I | + | + | + | + | M | M | M | M | + | + | + | + | M | + |   |   |
| Ectasia   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hematopoietic Cell Proliferation                  |   |   |   |   |   |   |   |   |   | 3 |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hyperplasia, Lymphoid                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |
| Infiltration Cellular, Plasma Cell                |   |   | 1 | 2 | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |
|   |   |   | 2 | 2 |   |   | 1 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>50 ppm   | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID             | males<br>(cont...) |                  |
|--|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------------------|--------------------|------------------|
|  | 0<br>7<br>3<br>1 | 0<br>4<br>0<br>7 | 0<br>3<br>4<br>0 | 0<br>7<br>2<br>9 | 0<br>7<br>3<br>7 | 0<br>4<br>1<br>7 | 0<br>7<br>7<br>7 | 0<br>7<br>1<br>7 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>0 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>3 | 0<br>6<br>1<br>1 | 0<br>7<br>1<br>8 | 0<br>6<br>2<br>8 | 0<br>7<br>0<br>9 | 0<br>4<br>0<br>5 | 0<br>6<br>3<br>1 | 0<br>7<br>3<br>0 | 0<br>7<br>2<br>9 | 0<br>5<br>6<br>0 | 0<br>3<br>2<br>0 | 0<br>7<br>2<br>0 | 0<br>7<br>2<br>2 | 0<br>7<br>2<br>2 |                       |                    | 0<br>5<br>6<br>0 |
| Lymph Node, Mediastinal<br>Hematopoietic Cell Proliferation<br>Hyperplasia, Lymphoid<br>Infiltration Cellular, Plasma Cell<br>Inflammation, Chronic Active |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 0<br>0<br>6<br>0<br>1 | +                  |                  |
| Lymph Node, Mesenteric<br>Hematopoietic Cell Proliferation   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 0<br>0<br>6<br>0<br>1 |                    |                  |
| Spleen<br>Congestion<br>Hematopoietic Cell Proliferation<br>Hyperplasia, Lymphoid<br>Inflammation<br>Necrosis<br>Lymphoid Follicle, Atrophy                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 0<br>0<br>6<br>0<br>1 |                    |                  |
| Thymus<br>Atrophy<br>Cyst<br>Ectopic Parathyroid Gland<br>Inflammation, Chronic Active   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 0<br>0<br>6<br>0<br>1 |                    |                  |

**INTEGUMENTARY SYSTEM**

|                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mammary Gland                        | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M |
| Skin<br>Inflammation, Chronic Active | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                      | 0 | 0 |
|------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|------------------------|---|---|
|                  |             | 7 | 4 | 3 | 7 | 7 | 4 | 7 | 7 | 7 | 7 | 6 | 7 | 6 | 7 | 4 | 6 | 7 | 7 | 7 | 2 | 7 | 5 | 3                      | 7 | 7 |
| 50 ppm           | ANIMAL ID   | 3 | 0 | 4 | 2 | 3 | 7 | 1 | 3 | 3 | 2 | 2 | 1 | 1 | 8 | 2 | 0 | 9 | 3 | 3 | 2 | 2 | 2 | 2                      | 3 |   |
|                  |             | 1 | 7 | 0 | 9 | 1 | 7 | 7 | 0 | 0 | 0 | 9 | 3 | 9 | 8 | 8 | 9 | 9 | 5 | 1 | 0 | 9 | 0 | 0                      | 0 |   |
|                  |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                      | 0 |   |
|                  |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                      | 0 |   |
|                  |             | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6                      | 6 |   |
|                  |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2                      | 2 |   |
|                  |             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3                      | 4 | 5 |
|                  |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>males (cont...)</b> |   |   |

**MUSCULOSKELETAL SYSTEM**

|                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-----------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bone                  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Fibro-Osseous Lesion  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Maxilla, Osteomalacia | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Skeletal Muscle       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Degeneration          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**NERVOUS SYSTEM**

|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Brain                        | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Peripheral Nerve             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Degeneration                 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Spinal Cord                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**RESPIRATORY SYSTEM**

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larynx                                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Inflammation, Chronic Active                 | 1 | 1 | 1 | 2 | 2 | 4 | 2 | 3 | 1 | 2 | 1 | 4 |   | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Artery, Inflammation, Chronic Active         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Lumen, Exudate                               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Respiratory Epithelium, Hyperplasia          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Respiratory Epithelium, Metaplasia, Squamous | 4 | 2 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 4 | 3 | 4 | 3 | 1 | 4 | 3 | 1 | 2 | 2 | 4 | 3 | 4 | 2 | 2 |
| Respiratory Epithelium, Necrosis             | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Respiratory Epithelium, Regeneration         | 2 | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

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 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br><br>50 ppm                        | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | males<br>(cont...) |
|---|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|--------------------|
|   | 0731        | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 | 0731 |           |                    |
| Squamous Epithelium, Hyperplasia                      | 2           | 1    | 3    | 1    | 1    | 2    | 3    | 2    | 2    |      | 3    | 1    | 3    | 1    | 3    | 2    |      | 1    |      | 2    | 2    | 3    | 1    |      | 2    |           |                    |
| Lung  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         | +                  |
| Foreign Body  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Inflammation, Suppurative                             |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |           |                    |
| Thrombosis  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Alveolus, Infiltration Cellular, Histiocyte           | 1           |      | 1    |      |      |      |      |      | 2    |      |      |      |      | 3    |      |      |      |      |      |      | 2    |      |      |      |      |           |                    |
| Bronchiole, Epithelium, Hyperplasia                   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Bronchus, Inflammation, Suppurative                   |             |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Bronchus, Epithelium, Necrosis                        |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Bronchus, Epithelium, Regeneration                    | 2           | 2    |      | 3    | 2    | 1    | 2    | 2    |      | 2    | 2    | 1    | 2    | 3    |      |      |      | 1    | 2    | 1    | 1    | 2    |      | 1    | 1    |           |                    |
| Mediastinum, Inflammation, Suppurative                |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |           |                    |
| Mediastinum, Inflammation, Chronic Active             |             |      |      | 1    |      | 1    | 2    |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |           |                    |
| Mediastinum, Necrosis                                 |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Pleura, Inflammation, Suppurative                     |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |           |                    |
| Nose  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         | +                  |
| Inflammation, Suppurative                             | 4           | 4    | 4    | 4    | 3    | 4    | 4    | 3    | 4    | 2    | 4    | 4    | 2    | 2    | 4    | 4    | 3    | 3    | 2    | 2    | 4    | 4    | 4    | 2    | 3    |           |                    |
| Glands, Respiratory Epithelium, Cyst                  |             |      |      | X    |      |      |      |      | X    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Glands, Sinus, Metaplasia, Respiratory                |             |      |      | 1    |      |      |      |      | 1    |      | 1    | 1    |      |      | 1    |      |      |      |      |      | 1    |      | 1    |      |      |           |                    |
| Lamina Propria, Fibrosis                              | 2           | 3    | 2    | 2    | 3    | 3    | 3    | 1    | 2    | 2    | 2    | 1    | 2    | 2    | 1    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 3    | 2    |           |                    |
| Lateral Wall, Inflammation, Chronic Active            |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 2    |      |      | 3    |      |           |                    |
| Mucosa, Regeneration                                  | 2           | 2    | 3    | 2    | 2    | 2    | 1    | 1    |      | 1    | 2    | 2    | 2    | 2    | 1    | 2    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 2    | 2    | 2         |                    |
| Nasopharyngeal Duct, Polyp, Inflammatory              |             |      |      | X    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Olfactory Epithelium, Accumulation, Hyaline Droplet   |             |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                    |
| Olfactory Epithelium, Atrophy                         |             |      | 1    | 1    | 1    | 2    |      | 2    | 2    | 1    | 1    | 1    | 3    | 2    |      |      | 3    | 2    | 3    | 2    |      | 2    | 2    | 2    | 2    |           |                    |
| Olfactory Epithelium, Metaplasia, Respiratory         | 4           | 3    | 3    | 3    | 3    | 4    | 2    | 1    | 3    |      | 2    | 4    | 2    |      | 4    | 4    | 1    | 3    | 1    |      | 4    | 3    | 3    |      | 2    |           |                    |
| Olfactory Epithelium, Necrosis                        |             |      | 3    |      | 1    |      | 3    | 2    |      | 3    |      | 4    | 2    |      | 2    | 3    |      |      |      |      |      | 3    | 1    |      |      |           |                    |
| Respiratory Epithelium, Accumulation, Hyaline Droplet |             |      |      |      | 1    |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |           |                    |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically M .. Missing tissue  
 X .. Lesion present A .. Autolysis precludes evaluation  
 I .. Insufficient tissue BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>50 ppm | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ANIMAL ID | males<br>(cont...) |
|----------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----------|--------------------|
|                            | 7           | 4 | 3 | 7 | 7 | 4 | 7 | 7 | 7 | 7 | 6 | 7 | 6 | 7 | 4 | 6 | 7 | 7 | 7 | 2 | 5 | 3 | 7 | 7 |           |                    |

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| Respiratory Epithelium, Hyperplasia          | 1 |   |   | 1 | 1 |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |  |  |
| Respiratory Epithelium, Metaplasia, Squamous | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 2 | 3 | 2 | 3 | 3 | 2 | 1 | 4 | 3 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |  |  |
| Respiratory Epithelium, Necrosis             | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 |  |  |
| Septum, Perforation                          |   | X | X |   | X | X |   |   |   |   | X | X | X |   | X |   |   |   |   |   |   |   |   |   |  |  |
| Turbinate, Atrophy                           | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 |  |  |
| Turbinate, Necrosis                          | 1 |   |   | 1 | 1 | 1 | 1 | 1 | 1 |   |   | 1 | 1 |   | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |  |

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| Trachea   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |  |  |
| Inflammation, Chronic Active                    | 1 | 1 | 1 | 1 | 4 | 1 | 4 | 1 | 1 | 1 | 3 | 1 | 4 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 |  |  |
| Necrosis  | 1 | 2 | 1 | 1 | 2 | 1 | 4 | 2 | 1 | 1 | 2 | 1 | 4 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 |  |  |
| Carina, Epithelium, Hyperplasia                 |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Carina, Epithelium, Necrosis                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Carina, Submucosa, Fibrosis                     |   | 1 |   | 2 | 2 |   | 1 | 1 |   | 1 | 2 |   | 2 | 2 |   | 2 |   |   |   | 2 |   |   | 2 | 2 |  |  |
| Carina, Submucosa, Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Carina, Submucosa, Mineralization               |   |   |   | 2 | 2 |   | 1 |   |   | 2 | 2 |   | 2 | 2 |   | 2 | 2 |   |   | 2 |   | 2 |   | 2 |  |  |
| Epithelium, Hyperplasia                         |   |   |   |   |   | 2 |   |   |   | 2 | 2 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Epithelium, Metaplasia, Squamous                | 1 |   |   | 1 |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |  |  |
| Epithelium, Regeneration                        | 3 | 3 | 2 | 3 |   | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 4 | 3 | 4 | 3 | 2 | 4 | 2 | 2 | 3 |  |  |
| Lumen, Exudate                                  |   |   |   |   |   |   | 3 |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Submucosa, Fibrosis                             | 2 | 2 | 1 | 4 | 2 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 4 | 1 | 2 | 2 | 2 | 1 | 2 |  |  |

**SPECIAL SENSES SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| Eye   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |  |  |
| Phthisis Bulbi                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |  |  |
| Anterior Chamber, Inflammation, Suppurative |   |   |   | 1 |   |   |   |   |   | 1 |   |   |   |   | 3 |   |   |   |   |   | 3 |   |   | 2 |  |  |
| Cornea, Edema                               |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Cornea, Inflammation, Acute                 | 1 |   |   | 1 | 1 |   |   |   | 1 |   | 1 |   |   |   | 2 | 1 | 1 |   |   |   | 3 |   |   | 2 |  |  |
| Cornea, Mineralization                      |   |   |   |   | 1 |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Cornea, Neovascularization                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically M .. Missing tissue 1-4 .. Lesion qualified as:  
 X .. Lesion present A .. Autolysis precludes evaluation 1) Minimal 3) Moderate  
 I .. Insufficient tissue BLANK .. Not examined microscopically 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>50 ppm      | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | males<br>(cont...) |
|---------------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------------|
|                                 | ANIMAL ID   | 7 | 4 | 3 | 7 | 7 | 4 | 7 | 7 | 7 | 7 | 6 | 7 | 6 | 7 | 4 | 6 | 7 | 7 | 7 | 5 | 3 | 7 | 7 |                    |
|                                 |             | 3 | 0 | 4 | 2 | 3 | 7 | 1 | 3 | 3 | 2 | 2 | 1 | 1 | 8 | 2 | 0 | 9 | 3 | 3 | 2 | 2 | 2 | 3 |                    |
|                                 |             | 1 | 7 | 0 | 9 | 1 | 7 | 7 | 0 | 0 | 9 | 3 | 9 | 8 | 9 | 9 | 5 | 1 | 0 | 9 | 9 | 0 | 0 | 0 |                    |
|                                 |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                    |
|                                 |             | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |                    |
|                                 |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |                    |
|                                 |             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 |                    |
| Cornea, Epithelium, Hyperplasia |             | 1 |   |   | 1 |   |   |   | 1 |   |   |   |   |   | 1 | 2 |   |   |   | 1 |   |   | 1 |   |                    |
| Cornea, Epithelium, Ulcer       |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |                    |
| Lens, Cataract                  |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |                    |
| Harderian Gland<br>Hyperplasia  |             | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |                    |
| <b>URINARY SYSTEM</b>           |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |
| Kidney                          |             | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |                    |
| Infarct                         |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |                    |
| Inflammation                    |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |
| Metaplasia, Osseous             |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |
| Nephropathy                     |             |   |   |   | 1 |   |   |   |   | 1 | 1 |   |   |   |   |   |   |   |   |   | 1 |   |   |   |                    |
| Papilla, Necrosis               |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |
| Urinary Bladder                 |             | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |                    |
| Mineralization                  |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |                    |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked



Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE | DAY ON TEST |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | * TOTALS |    |    |    |    |    |    |    |
|------------------|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------|----|----|----|----|----|----|----|
|                  | 04          | 03 | 06 | 06 | 07 | 07 | 07 | 07 | 05 | 07 | 02 | 06 | 01 | 07 | 07 | 07 | 05 | 07 | 06 | 06 |          | 07 | 07 | 06 | 07 | 07 | 06 | 07 |
| 50 ppm           | 1           | 3  | 8  | 6  | 3  | 2  | 3  | 3  | 5  | 3  | 6  | 6  | 4  | 3  | 2  | 2  | 0  | 2  | 9  | 6  | 3        | 3  | 5  | 3  | 1  | 0  | 1  | 8  |
|                  | 00          | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00       | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
|                  | 66          | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66       | 66 | 66 | 66 | 66 | 66 | 66 | 66 |
|                  | 22          | 22 | 22 | 22 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 44 | 44 | 44 | 44 | 44 | 44 | 44       | 44 | 44 | 44 | 44 | 44 | 44 | 55 |
|                  | 67          | 78 | 89 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07       | 08 | 09 | 00 | 01 | 02 | 03 | 00 |

**ALIMENTARY SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |       |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------|-------|
| Esophagus   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +        | 50    |
| Periesophageal Tissue, Inflammation, Chronic Active |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 3 1.7 |
| Submucosa, Inflammation, Chronic Active             |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 1 1.0 |
| Gallbladder Inflammation                            | + | + | + | + | + | + | + | + | + | A | A | + | + | + | + | + | + | + | A | + | + | A | + | + |   | 2 | 43 1 2.0 |       |
| Intestine Large, Cecum                              | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + |   | 48       |       |
| Intestine Large, Colon                              | + | + | + | + | + | + | + | + | + | A | A | + | + | + | + | + | + | + | A | + | + | + | + | + | + |   | 47       |       |
| Intestine Large, Rectum Inflammation                | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + |   | 49 1 1.0 |       |
| Intestine Small, Duodenum                           | + | + | A | + | + | + | + | + | + | A | A | + | + | + | + | + | + | + | A | + | + | A | + | + |   |   | 44       |       |
| Intestine Small, Ileum Hemorrhage                   | + | + | + | + | + | + | + | + | + | A | A | + | + | + | + | + | + | + | A | + | + | A | + | + |   |   | 46 1 2.0 |       |
| Intestine Small, Jejunum Hyperplasia, Lymphoid      | + | + | A | + | + | + | + | + | + | A | A | + | + | + | + | + | + | + | A | + | + | A | + | + | 1 |   | 43 1 1.0 |       |
| Liver   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +        | 50    |
| Basophilic Focus                                    |   |   |   |   |   |   |   |   |   |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 6     |
| Eosinophilic Focus                                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 4     |
| Hematopoietic Cell Proliferation                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |          | 1 1.0 |
| Mixed Cell Focus                                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |          | 1     |
| Tension Lipidosis                                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          | 1 1.0 |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

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 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>50 ppm   | DAY ON TEST |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | * TOTALS |       |  |
|------------------------------|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------|-------|--|
|                              | 04          | 03 | 06 | 06 | 07 | 07 | 07 | 07 | 05 | 07 | 02 | 06 | 01 | 07 | 07 | 07 | 05 | 07 | 06 | 06 | 07 | 07 | 06 | 07 |          | 07    |  |
| ANIMAL ID                    | 01          | 03 | 08 | 06 | 03 | 02 | 03 | 03 | 05 | 03 | 06 | 06 | 04 | 03 | 02 | 02 | 00 | 02 | 09 | 00 | 05 | 01 | 01 | 00 | 00       |       |  |
| Islets, Pancreatic           | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | 50       |       |  |
| Parathyroid Gland            | +           | M  | +  | +  | +  | M  | +  | M  | +  | +  | M  | +  | +  | M  | +  | +  | +  | +  | M  | +  | M  | +  | +  | +  | 37       |       |  |
| Pituitary Gland              | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | 50       |       |  |
| Thyroid Gland                | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | 50       |       |  |
| Inflammation, Chronic Active |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 2 1.5    |       |  |
| Follicular Cell, Hyperplasia |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1 1.0    |       |  |
| <b>GENERAL BODY SYSTEM</b>   |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |       |  |
| Tissue NOS                   |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          | 1     |  |
| Inflammation, Chronic Active |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          | 1 2.0 |  |
| <b>GENITAL SYSTEM</b>        |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |       |  |
| Epididymis                   | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | A  | +  | +  | +  | +  | +  | 49       |       |  |
| Exfoliated Germ Cell         | X           | X  | X  |    | X  | X  | X  |    | X  | X  |    |    | X  | X  |    | X  | X  | X  |    |    | X  | X  |    |    | 26       |       |  |
| Granuloma Sperm              |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 4  | 1 4.0    |       |  |
| Inflammation                 |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1 1.0    |       |  |
| Preputial Gland              | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | I  | +  | +  | +  | +  | +  | 49       |       |  |
| Ectasia                      |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1 1.0    |       |  |
| Inflammation                 |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 3 2.0    |       |  |
| Prostate                     | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | 50       |       |  |
| Inflammation                 |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1 2.0    |       |  |
| Seminal Vesicle              | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | 50       |       |  |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>50 ppm                        | DAY ON TEST           |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | * TOTALS              |                       |                       |                       |                       |                  |  |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------|--|
|   | 0<br>4<br>1<br>1      | 0<br>3<br>3<br>2      | 0<br>6<br>8<br>0      | 0<br>6<br>6<br>6      | 0<br>7<br>3<br>0      | 0<br>7<br>2<br>9      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>0      | 0<br>5<br>3<br>1      | 0<br>7<br>6<br>1      | 0<br>2<br>6<br>6      | 0<br>6<br>4<br>0      | 0<br>1<br>7<br>0      | 0<br>7<br>2<br>9      | 0<br>7<br>2<br>9      | 0<br>5<br>0<br>6      | 0<br>7<br>2<br>9      | 0<br>6<br>6<br>5      | 0<br>6<br>3<br>1      | 0<br>7<br>3<br>1      |                       | 0<br>6<br>5<br>0      | 0<br>7<br>3<br>0      | 0<br>7<br>3<br>0      | 0<br>6<br>3<br>0      | 0<br>7<br>1<br>0 |  |
| ANIMAL ID   | 0<br>0<br>6<br>2<br>6 | 0<br>0<br>6<br>2<br>7 | 0<br>0<br>6<br>2<br>8 | 0<br>0<br>6<br>2<br>9 | 0<br>0<br>6<br>3<br>0 | 0<br>0<br>6<br>3<br>1 | 0<br>0<br>6<br>3<br>2 | 0<br>0<br>6<br>3<br>3 | 0<br>0<br>6<br>3<br>4 | 0<br>0<br>6<br>3<br>5 | 0<br>0<br>6<br>3<br>6 | 0<br>0<br>6<br>3<br>7 | 0<br>0<br>6<br>3<br>8 | 0<br>0<br>6<br>4<br>9 | 0<br>0<br>6<br>4<br>0 | 0<br>0<br>6<br>4<br>1 | 0<br>0<br>6<br>4<br>2 | 0<br>0<br>6<br>4<br>3 | 0<br>0<br>6<br>4<br>4 | 0<br>0<br>6<br>4<br>5 | 0<br>0<br>6<br>4<br>6 | 0<br>0<br>6<br>4<br>7 | 0<br>0<br>6<br>4<br>8 | 0<br>0<br>6<br>4<br>9 | 0<br>0<br>6<br>5<br>0 |                  |  |
| Testes  | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | A                     | +                     | +                     | +                     | +                     | +                     | 49               |  |
| Interstitial Cell, Hyperplasia                    |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 2.0            |  |
| Seminiferous Tubule, Degeneration                 |                       |                       | 1                     |                       |                       |                       |                       |                       |                       |                       | 1                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1                     | 1                     |                       | 6 1.2            |  |
| <b>HEMATOPOIETIC SYSTEM</b>                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                  |  |
| Bone Marrow                                       | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | 49               |  |
| Myeloid Cell, Hyperplasia                         | 4                     | 4                     |                       | 2                     | 3                     | 1                     | 2                     | 3                     | 3                     | 3                     |                       | 2                     | 2                     |                       | 2                     | 2                     |                       | 2                     | 4                     |                       | 3                     | 2                     |                       |                       | 3                     | 39 2.5           |  |
| Lymph Node  |                       |                       |                       |                       |                       | +                     |                       | +                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | +                     |                       |                       |                       |                       | +                     |                       | 8                |  |
| Deep Cervical, Ectasia                            |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 2.0            |  |
| Deep Cervical, Hematopoietic Cell Proliferation   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 3                     | 1 3.0            |  |
| Deep Cervical, Hyperplasia, Lymphoid              |                       |                       |                       |                       |                       |                       |                       |                       |                       | 3                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 2                     | 4 2.8            |  |
| Deep Cervical, Infiltration Cellular, Plasma Cell |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 3.0            |  |
| Pancreatic, Hyperplasia, Lymphoid                 |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 4.0            |  |
| Renal, Hematopoietic Cell Proliferation           |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 2.0            |  |
| Lymph Node, Bronchial                             | M                     | I                     | I                     | +                     | +                     | +                     | +                     | +                     | I                     | +                     | I                     | +                     | I                     | M                     | M                     | +                     | M                     | +                     | +                     | +                     | +                     | M                     | +                     | +                     | M                     | 31               |  |
| Ectasia   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 2.0            |  |
| Hyperplasia, Lymphoid                             |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 2 1.0            |  |
| Infiltration Cellular, Plasma Cell                |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 2                     |                       |                       |                       |                       |                       | 1 2.0            |  |
| Inflammation, Chronic Active                      |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 2                     |                       | 2 1.5            |  |
| Pigmentation                                      |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 3 1.0            |  |
| Lymph Node, Mandibular                            | +                     | +                     | M                     | +                     | +                     | M                     | M                     | M                     | +                     | +                     | +                     | M                     | M                     | M                     | I                     | M                     | +                     | M                     | +                     | +                     | +                     | M                     | +                     | +                     | +                     | 32               |  |
| Ectasia   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 4 2.0            |  |
| Hematopoietic Cell Proliferation                  |                       |                       |                       | 2                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 3 2.7            |  |
| Hyperplasia, Lymphoid                             |                       |                       |                       |                       | 2                     |                       |                       |                       |                       |                       | 2                     | 1                     |                       |                       |                       |                       | 1                     |                       |                       |                       |                       | 2                     |                       |                       |                       | 10 1.7           |  |
| Infiltration Cellular, Plasma Cell                | 2                     | 3                     |                       |                       |                       |                       |                       |                       |                       | 4                     | 2                     | 1                     |                       |                       |                       |                       | 2                     |                       | 2                     |                       |                       |                       |                       |                       |                       | 14 2.0           |  |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE | DAY ON TEST |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | * TOTALS |    |    |
|------------------|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------|----|----|
|                  | 04          | 03 | 06 | 06 | 07 | 07 | 07 | 07 | 05 | 07 | 02 | 06 | 01 | 07 | 07 | 07 | 05 | 07 | 06 | 06 | 07 |          | 07 | 06 |
| 50 ppm           | ANIMAL ID   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |    |
|                  | 00          | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00       | 00 | 00 |
|                  | 66          | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66       | 66 | 66 |
|                  | 22          | 22 | 22 | 22 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 44 | 44 | 44 | 44 | 44 | 44       | 44 | 44 |
|                  | 66          | 67 | 68 | 69 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07       | 08 | 09 |

|                                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        |
|------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------|
| Lymph Node, Mediastinal            | + | + | I | + | + | M | M | + | I | I | I | + | + | + | M | + | I | + | + | + | I | I | + | + | + | 32     |
| Hematopoietic Cell Proliferation   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 2.0  |
| Hyperplasia, Lymphoid              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 1.0  |
| Infiltration Cellular, Plasma Cell |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 1.5  |
| Inflammation, Chronic Active       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 3.0  |
| Lymph Node, Mesenteric             | + | I | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 47     |
| Hematopoietic Cell Proliferation   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 1.5  |
| Spleen                             | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Congestion                         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 2.0  |
| Hematopoietic Cell Proliferation   | 2 | 2 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 25 2.0 |
| Hyperplasia, Lymphoid              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 1.7  |
| Inflammation                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 1.5  |
| Necrosis                           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 1.5  |
| Lymphoid Follicle, Atrophy         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 2.0  |
| Thymus                             | I | I | + | I | + | + | + | + | M | + | + | + | + | + | + | I | I | + | I | + | + | I | + | + | + | 30     |
| Atrophy                            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 5 1.6  |
| Cyst                               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1      |
| Ectopic Parathyroid Gland          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 4 1.0  |
| Inflammation, Chronic Active       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 2.0  |

### INTEGUMENTARY SYSTEM

|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |       |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------|
| Mammary Gland                | M | M | M | M | M | M | M | M | M | M | M | + | M | M | M | M | M | M | M | M | M | M | M | M | M | 1     |
| Skin                         | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49    |
| Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 3.0 |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>50 ppm | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | * TOTALS |   |
|----------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------|---|
|                            | ANIMAL ID   | 4 | 3 | 6 | 6 | 7 | 7 | 7 | 7 | 5 | 7 | 2 | 6 | 1 | 7 | 7 | 7 | 5 | 7 | 6 | 6 | 7 | 7 | 6 | 7 |          | 7 |
|                            |             | 1 | 3 | 8 | 6 | 3 | 2 | 3 | 3 | 5 | 3 | 6 | 6 | 4 | 3 | 2 | 2 | 0 | 2 | 9 | 6 | 3 | 3 | 5 | 3 | 1        |   |
|                            |             | 1 | 2 | 0 | 6 | 0 | 9 | 1 | 0 | 1 | 1 | 6 | 0 | 1 | 0 | 9 | 9 | 6 | 9 | 0 | 5 | 1 | 1 | 0 | 0 | 8        |   |
|                            |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0        |   |
|                            |             | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6        |   |
|                            |             | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5        |   |
|                            |             | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0        |   |

**MUSCULOSKELETAL SYSTEM**

|                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |          |            |
|-----------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----------|----------|------------|
| Bone                  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>50</b> |          |            |
| Fibro-Osseous Lesion  |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |           | <b>2</b> | <b>1.5</b> |
| Maxilla, Osteomalacia |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           | <b>1</b> | <b>2.0</b> |
| Skeletal Muscle       |   |   |   |   |   |   |   |   |   |   |   |   | + |   |   |   |   |   |   |   |   |   |   |   |   |           | <b>2</b> |            |
| Degeneration          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           | <b>1</b> | <b>1.0</b> |
| Inflammation          |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |           | <b>1</b> | <b>2.0</b> |

**NERVOUS SYSTEM**

|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |          |            |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----------|----------|------------|
| Brain                        | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>50</b> |          |            |
| Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |           | <b>1</b> | <b>2.0</b> |
| Peripheral Nerve             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           | <b>1</b> |            |
| Degeneration                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           | <b>1</b> | <b>1.0</b> |
| Spinal Cord                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           | <b>1</b> |            |

**RESPIRATORY SYSTEM**

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |           |            |            |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----------|-----------|------------|------------|
| Larynx                                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>50</b> |           |            |            |
| Inflammation, Chronic Active                 | 3 | 1 | 2 | 2 | 1 | 1 |   | 2 | 2 |   | 2 | 4 |   |   |   |   | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1         |           | <b>42</b>  | <b>1.6</b> |
| Artery, Inflammation, Chronic Active         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |           | <b>1</b>   | <b>2.0</b> |
| Lumen, Exudate                               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |           | <b>2</b>   | <b>3.5</b> |
| Respiratory Epithelium, Hyperplasia          | 2 |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   | 1 | 1 |   |   |   |           | <b>11</b> | <b>1.3</b> |            |
| Respiratory Epithelium, Metaplasia, Squamous | 2 | 3 | 3 | 4 | 4 | 3 | 2 | 3 | 4 | 4 | 3 | 4 | 2 | 2 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 4 | 2 | 3 | 3 |           | <b>50</b> | <b>3.1</b> |            |
| Respiratory Epithelium, Necrosis             | 2 | 1 | 2 |   | 1 | 1 | 1 | 1 |   |   |   | 2 |   | 2 | 1 | 1 | 1 | 1 |   | 1 | 1 | 1 | 2 |   | 1 |           | <b>34</b> | <b>1.2</b> |            |
| Respiratory Epithelium, Regeneration         |   |   |   |   | 1 | 1 | 1 | 3 | 2 | 2 |   |   |   | 2 | 2 | 2 | 2 |   |   | 3 | 2 |   |   | 2 | 2 |           | <b>32</b> | <b>1.8</b> |            |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade

+ .. Tissue examined microscopically

X .. Lesion present

I .. Insufficient tissue

M .. Missing tissue

A .. Autolysis precludes evaluation

BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:

1) Minimal 3) Moderate

2) Mild 4) Marked

Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

| B6C3F1 MICE MALE<br>50 ppm                            | DAY ON TEST           |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | * TOTALS              |                       |                       |                       |                       |                       |                  |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------|
|   | 0<br>4<br>1<br>1      | 0<br>3<br>3<br>2      | 0<br>6<br>8<br>0      | 0<br>6<br>6<br>6      | 0<br>7<br>3<br>0      | 0<br>7<br>2<br>9      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>0      | 0<br>5<br>3<br>1      | 0<br>7<br>5<br>1      | 0<br>2<br>6<br>6      | 0<br>1<br>4<br>0      | 0<br>7<br>3<br>0      | 0<br>7<br>2<br>9      | 0<br>7<br>2<br>9      | 0<br>5<br>0<br>6      | 0<br>7<br>2<br>9      | 0<br>6<br>6<br>5      | 0<br>6<br>3<br>1      | 0<br>7<br>3<br>1      |                       |                       | 0<br>6<br>5<br>0      | 0<br>7<br>3<br>0      | 0<br>7<br>3<br>0      | 0<br>7<br>1<br>0      | 0<br>7<br>8<br>0 |
| ANIMAL ID   | 0<br>0<br>6<br>2<br>6 | 0<br>0<br>6<br>2<br>7 | 0<br>0<br>6<br>2<br>8 | 0<br>0<br>6<br>2<br>9 | 0<br>0<br>6<br>3<br>0 | 0<br>0<br>6<br>3<br>1 | 0<br>0<br>6<br>3<br>2 | 0<br>0<br>6<br>3<br>3 | 0<br>0<br>6<br>3<br>3 | 0<br>0<br>6<br>3<br>3 | 0<br>0<br>6<br>3<br>3 | 0<br>0<br>6<br>3<br>3 | 0<br>0<br>6<br>3<br>3 | 0<br>0<br>6<br>3<br>3 | 0<br>0<br>6<br>4<br>0 | 0<br>0<br>6<br>4<br>1 | 0<br>0<br>6<br>4<br>2 | 0<br>0<br>6<br>4<br>3 | 0<br>0<br>6<br>4<br>4 | 0<br>0<br>6<br>4<br>4 | 0<br>0<br>6<br>4<br>5 | 0<br>0<br>6<br>4<br>6 | 0<br>0<br>6<br>4<br>7 | 0<br>0<br>6<br>4<br>8 | 0<br>0<br>6<br>4<br>9 | 0<br>0<br>6<br>5<br>0 |                  |
| Squamous Epithelium, Hyperplasia                      | 1                     | 1                     | 3                     | 2                     |                       | 1                     | 2                     | 2                     | 2                     | 1                     | 2                     | 1                     | 1                     | 1                     |                       | 1                     | 1                     | 3                     | 1                     |                       | 2                     | 3                     |                       | 1                     | 3                     | <b>42</b>             | <b>1.8</b>       |
| Lung  | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | <b>50</b>             |                  |
| Foreign Body  |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | X                     |                       |                       | <b>1</b>              |                  |
| Inflammation, Suppurative                             |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 2                     | 4                     |                       |                       |                       |                       |                       |                       | <b>3</b>              | <b>2.3</b>       |
| Thrombosis  |                       |                       |                       | X                     |                       |                       |                       |                       |                       |                       | X                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | <b>2</b>              |                  |
| Alveolus, Infiltration Cellular, Histiocyte           |                       | 1                     |                       |                       |                       |                       |                       |                       |                       | 1                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1                     |                       |                       | 1                     |                       | <b>9</b>              | <b>1.4</b>       |
| Bronchiole, Epithelium, Hyperplasia                   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1                     | 3                     |                       |                       |                       |                       |                       |                       | <b>2</b>              | <b>2.0</b>            |                  |
| Bronchus, Inflammation, Suppurative                   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | <b>1</b>              | <b>1.0</b>            |                  |
| Bronchus, Epithelium, Necrosis                        |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 2                     |                       |                       |                       | 1                     |                       |                       |                       |                       |                       |                       |                       |                       | <b>2</b>              | <b>1.5</b>            |                  |
| Bronchus, Epithelium, Regeneration                    |                       |                       | 1                     | 1                     | 2                     | 1                     | 2                     | 2                     | 1                     | 2                     |                       | 2                     |                       |                       | 2                     | 2                     |                       |                       | 4                     |                       | 3                     |                       | 3                     | 2                     | <b>34</b>             | <b>1.9</b>            |                  |
| Mediastinum, Inflammation, Suppurative                |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 2                     | 1                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | <b>3</b>              | <b>1.3</b>            |                  |
| Mediastinum, Inflammation, Chronic Active             |                       |                       |                       | 1                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1                     | 1                     |                       |                       |                       |                       | 1                     |                       | <b>8</b>              | <b>1.1</b>            |                  |
| Mediastinum, Necrosis                                 |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 2                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | <b>1</b>              | <b>2.0</b>            |                  |
| Pleura, Inflammation, Suppurative                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 2                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | <b>2</b>              | <b>1.5</b>            |                  |
| Nose  | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | <b>50</b>             |                       |                  |
| Inflammation, Suppurative                             | 4                     | 4                     | 2                     | 3                     | 4                     | 2                     | 4                     | 4                     | 4                     | 4                     | 1                     | 2                     | 2                     | 2                     | 3                     | 4                     | 3                     | 4                     | 4                     | 2                     | 4                     | 4                     | 2                     | 2                     | <b>50</b>             | <b>3.2</b>            |                  |
| Glands, Respiratory Epithelium, Cyst                  |                       |                       |                       |                       |                       |                       |                       | X                     |                       |                       | X                     |                       |                       |                       | X                     |                       |                       |                       |                       |                       |                       |                       |                       |                       | <b>5</b>              |                       |                  |
| Glands, Sinus, Metaplasia, Respiratory                |                       |                       |                       |                       |                       |                       | 1                     | 1                     |                       | 1                     |                       |                       |                       |                       |                       |                       | 1                     | 1                     |                       |                       | 1                     |                       |                       |                       | <b>13</b>             | <b>1.0</b>            |                  |
| Lamina Propria, Fibrosis                              | 2                     | 2                     | 2                     | 2                     | 2                     | 2                     | 1                     | 2                     | 2                     | 2                     | 2                     | 2                     | 1                     | 2                     | 2                     | 1                     | 2                     | 2                     | 2                     | 2                     | 2                     | 2                     | 3                     | 3                     | <b>50</b>             | <b>2.0</b>            |                  |
| Lateral Wall, Inflammation, Chronic Active            |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | <b>2</b>              | <b>2.5</b>            |                  |
| Mucosa, Regeneration                                  | 2                     | 2                     |                       | 1                     | 2                     | 1                     | 3                     | 2                     | 3                     | 2                     | 1                     |                       | 1                     | 1                     | 1                     | 2                     | 1                     | 2                     | 2                     | 1                     | 1                     | 2                     | 1                     | 1                     | <b>47</b>             | <b>1.6</b>            |                  |
| Nasopharyngeal Duct, Polyp, Inflammatory              |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | <b>1</b>              |                       |                  |
| Olfactory Epithelium, Accumulation, Hyaline Droplet   |                       |                       |                       | 2                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | <b>2</b>              | <b>1.5</b>            |                  |
| Olfactory Epithelium, Atrophy                         | 1                     |                       | 2                     | 2                     | 1                     | 2                     |                       | 1                     |                       | 1                     | 1                     | 3                     | 2                     | 2                     | 2                     |                       | 2                     |                       |                       | 2                     | 1                     |                       | 2                     | 3                     | <b>38</b>             | <b>1.8</b>            |                  |
| Olfactory Epithelium, Metaplasia, Respiratory         | 4                     | 3                     | 1                     | 3                     | 4                     | 2                     | 4                     | 4                     | 4                     | 3                     |                       | 1                     | 1                     | 2                     | 1                     | 4                     | 2                     | 4                     | 4                     | 1                     | 3                     | 4                     | 1                     | 2                     | <b>45</b>             | <b>2.7</b>            |                  |
| Olfactory Epithelium, Necrosis                        | 2                     | 3                     |                       |                       |                       |                       |                       | 1                     | 3                     | 1                     |                       |                       |                       |                       |                       | 1                     |                       | 1                     | 2                     |                       |                       |                       |                       |                       | <b>19</b>             | <b>2.2</b>            |                  |
| Respiratory Epithelium, Accumulation, Hyaline Droplet |                       |                       | 1                     |                       |                       | 1                     |                       |                       |                       |                       |                       |                       |                       |                       | 1                     |                       | 1                     |                       |                       |                       |                       |                       |                       |                       | <b>7</b>              | <b>1.0</b>            |                  |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade

+ .. Tissue examined microscopically

X .. Lesion present

I .. Insufficient tissue

M .. Missing tissue

A .. Autolysis precludes evaluation

BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:

1) Minimal 3) Moderate

2) Mild 4) Marked

Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

| B6C3F1 MICE MALE<br>50 ppm | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | * TOTALS |                  |                  |                  |
|----------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|----------|------------------|------------------|------------------|
|                            | 0<br>4<br>1<br>1 | 0<br>3<br>3<br>2 | 0<br>6<br>8<br>0 | 0<br>6<br>6<br>6 | 0<br>7<br>3<br>0 | 0<br>7<br>2<br>9 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>0 | 0<br>5<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>2<br>6<br>6 | 0<br>6<br>4<br>0 | 0<br>1<br>7<br>0 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>5<br>0<br>6 | 0<br>7<br>2<br>9 | 0<br>6<br>6<br>5 | 0<br>6<br>3<br>1 | 0<br>7<br>3<br>1 |          | 0<br>6<br>5<br>0 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>0 |
|                            | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0        | 0                | 0                |                  |
|                            | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0        | 0                | 0                |                  |
|                            | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6        | 6                | 6                |                  |
|                            | 2                | 2                | 2                | 2                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 4                | 4                | 4                | 4                | 4                | 4                | 4        | 4                | 5                |                  |
|                            | 6                | 7                | 8                | 9                | 0                | 1                | 2                | 3                | 4                | 5                | 6                | 7                | 8                | 9                | 0                | 1                | 2                | 3                | 4                | 5                | 6        | 7                | 8                |                  |

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-----|
| Respiratory Epithelium, Hyperplasia          |   |   |   |   |   |   |   |   | 1 | 1 | 1 |   |   |   |   |   |   |   |   |   |   |   |   | 8  | 1.0 |
| Respiratory Epithelium, Metaplasia, Squamous | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 50 | 2.4 |
| Respiratory Epithelium, Necrosis             | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 50 | 1.6 |
| Septum, Perforation                          | X | X |   |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 11 |     |
| Turbinate, Atrophy                           | 3 | 3 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 50 | 2.3 |
| Turbinate, Necrosis                          |   |   | 1 |   |   | 1 |   |   |   | 1 | 1 | 1 |   | 1 | 1 |   | 1 | 1 |   |   | 1 | 1 | 1 | 27 | 1.0 |

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-----|
| Trachea   | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | 49 |     |
| Inflammation, Chronic Active                    | 1 |   |   | 4 | 2 | 1 | 1 | 2 | 2 | 3 |   | 4 |   | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 45 | 1.6 |
| Necrosis  | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 |   | 4 |   | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 47 | 1.5 |
| Carina, Epithelium, Hyperplasia                 |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   | 1  | 1.0 |
| Carina, Epithelium, Necrosis                    |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   | 1  | 1.0 |
| Carina, Submucosa, Fibrosis                     |   |   |   |   | 2 |   |   | 2 | 2 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   | 16 | 1.7 |
| Carina, Submucosa, Inflammation, Chronic Active |   |   |   |   |   |   |   | 2 | 2 | 1 |   | 2 |   |   |   |   |   |   |   |   |   |   |   | 4  | 1.8 |
| Carina, Submucosa, Mineralization               |   |   |   |   |   |   |   | 2 | 2 | 2 |   | 1 |   |   |   |   |   |   |   |   |   |   |   | 15 | 1.9 |
| Epithelium, Hyperplasia                         |   |   |   | 3 |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   | 6  | 2.0 |
| Epithelium, Metaplasia, Squamous                |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   | 1 |   |   |   |   |   |   |   | 5  | 1.0 |
| Epithelium, Regeneration                        | 3 |   | 4 | 2 | 3 | 3 | 4 | 3 | 4 | 4 |   |   |   | 2 | 3 | 3 | 3 | 3 | 4 |   | 4 | 3 | 3 | 45 | 2.9 |
| Lumen, Exudate                                  |   |   |   | 3 |   |   |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   | 4  | 3.0 |
| Submucosa, Fibrosis                             |   |   | 1 | 3 | 3 | 1 | 2 | 3 | 2 | 3 |   | 3 |   | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 2 | 46 | 2.3 |

**SPECIAL SENSES SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-----|
| Eye   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |     |
| Phthisis Bulbi                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1  |     |
| Anterior Chamber, Inflammation, Suppurative |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 5  | 2.0 |
| Cornea, Edema                               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1  | 1.0 |
| Cornea, Inflammation, Acute                 |   |   |   |   | 1 |   | 1 |   |   | 1 |   |   | 1 |   | 4 |   | 1 |   |   | 1 |   |   |   | 17 | 1.4 |
| Cornea, Mineralization                      |   |   |   |   |   |   | 1 |   |   | 3 |   |   |   |   |   |   | 1 |   |   |   |   |   |   | 5  | 1.4 |
| Cornea, Neovascularization                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   | 1  | 3.0 |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade

+ .. Tissue examined microscopically

X .. Lesion present

I .. Insufficient tissue

M .. Missing tissue

A .. Autolysis precludes evaluation

BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:

1) Minimal 3) Moderate

2) Mild 4) Marked



Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE MALE<br>50 ppm      | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | * TOTALS     |                  |                  |                  |
|---------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--------------|------------------|------------------|------------------|
|                                 | 0<br>4<br>1<br>1 | 0<br>3<br>3<br>2 | 0<br>6<br>8<br>0 | 0<br>6<br>6<br>6 | 0<br>7<br>3<br>0 | 0<br>7<br>2<br>9 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>0 | 0<br>5<br>3<br>1 | 0<br>7<br>6<br>1 | 0<br>2<br>6<br>6 | 0<br>6<br>6<br>0 | 0<br>1<br>4<br>1 | 0<br>7<br>3<br>0 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>5<br>0<br>6 | 0<br>7<br>9<br>0 | 0<br>6<br>6<br>5 | 0<br>7<br>3<br>1 |              | 0<br>7<br>3<br>1 | 0<br>6<br>5<br>0 | 0<br>7<br>3<br>0 |
|                                 | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0            | 0                | 0                |                  |
|                                 | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0            | 0                | 0                |                  |
|                                 | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6            | 6                | 6                |                  |
|                                 | 2                | 2                | 2                | 2                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 4                | 4                | 4                | 4                | 4                | 4                | 4            | 4                | 4                |                  |
|                                 | 6                | 7                | 8                | 9                | 0                | 1                | 2                | 3                | 4                | 5                | 6                | 7                | 8                | 9                | 0                | 1                | 2                | 3                | 4                | 5                | 6            | 7                | 8                |                  |
|                                 |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | <b>9 1.2</b> |                  |                  |                  |
| Cornea, Epithelium, Hyperplasia |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | <b>3 2.0</b> |                  |                  |                  |
| Cornea, Epithelium, Ulcer       |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | <b>2 2.0</b> |                  |                  |                  |
| Lens, Cataract                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |              |                  |                  |                  |
| Harderian Gland                 | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +            | +                | <b>50</b>        |                  |
| Hyperplasia                     |                  |                  | 1                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |              |                  | <b>2 1.0</b>     |                  |
| <b>URINARY SYSTEM</b>           |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |              |                  |                  |                  |
| Kidney                          | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +            | +                | <b>50</b>        |                  |
| Infarct                         |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | <b>1 1.0</b> |                  |                  |                  |
| Inflammation                    |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | <b>1 2.0</b> |                  |                  |                  |
| Metaplasia, Osseous             |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | <b>2 1.0</b> |                  |                  |                  |
| Nephropathy                     |                  |                  | 1                |                  |                  |                  |                  |                  |                  | 1                |                  |                  |                  |                  | 1                | 1                |                  |                  |                  | 1                | 1            |                  | <b>10 1.0</b>    |                  |
| Papilla, Necrosis               |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | <b>1 2.0</b> |                  |                  |                  |
| Urinary Bladder                 | +                | +                | +                | +                | +                | I                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +            | +                | <b>49</b>        |                  |
| Mineralization                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | <b>1 1.0</b> |                  |                  |                  |

\*\*\* END OF MALE DATA \*\*\*

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ANIMAL ID | females<br>(cont...) |
|--------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----------|----------------------|
|                    | 6           | 7 | 7 | 7 | 7 | 6 | 7 | 5 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 6 | 7 | 7 |   |           |                      |
| Control            | 8           | 3 | 3 | 3 | 3 | 9 | 3 | 8 | 3 | 3 | 3 | 8 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 6 | 5 | 0 | 3 | 0         |                      |
|                    | 4           | 3 | 3 | 1 | 2 | 0 | 1 | 7 | 3 | 3 | 3 | 7 | 1 | 3 | 2 | 2 | 3 | 1 | 2 | 2 | 2 | 3 | 3 | 9 | 2 | 0         |                      |
|                    | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1         |                      |
|                    | 1           | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0         |                      |
|                    | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1         |                      |
|                    | 1           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 |           |                      |

ALIMENTARY SYSTEM

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------|
| Esophagus  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |        |
| Gallbladder  | + | + | + | + | + | M | A | + | + | + | + | + | + | M | + | + | + | + | + | M | A | + | A | + |        |
| Intestine Large, Cecum<br>Inflammation<br>Inflammation, Granulomatous                      | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | 2      |
| Intestine Large, Colon   | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + |        |
| Intestine Large, Rectum  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + |        |
| Intestine Small, Duodenum<br>Inflammation<br>Necrosis                                      | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | A | + | 4<br>4 |
| Intestine Small, Ileum<br>Inflammation<br>Necrosis<br>Ulcer                                | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + |        |
| Intestine Small, Jejunum   | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | A | + |        |
| Liver<br>Angiectasis<br>Basophilic Focus<br>Clear Cell Focus<br>Cyst<br>Eosinophilic Focus | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | X<br>X |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

| B6C3F1 MICE FEMALE<br>Control   | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |  |   | ANIMAL ID | females<br>(cont...) |   |   |   |   |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--|---|-----------|----------------------|---|---|---|---|
|   | 0<br>6<br>8<br>4 | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>2 | 0<br>6<br>9<br>0 | 0<br>7<br>3<br>1 | 0<br>5<br>8<br>7 | 0<br>7<br>3<br>7 | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>3 | 0<br>6<br>8<br>7 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>2 | 0<br>6<br>3<br>2 | 0<br>6<br>5<br>3 | 0<br>7<br>0<br>9 | 0<br>7<br>3<br>2 |  |   |           |                      |   |   |   |   |
| Mixed Cell Focus<br>Hepatocyte, Necrosis  | 1                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | X                |                  |                  |                  |                  |                  |                  |                  |                  |                  | X                |  | 2 |           |                      |   |   |   |   |
| Mesentery<br>Fat, Necrosis  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | +                |                  |                  |                  |                  |                  |                  |                  |                  |                  | +                |  | + |           |                      |   |   |   |   |
| Pancreas<br>Cyst<br>Inflammation, Chronic Active<br>Acinus, Atrophy   | +                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | +                |                  |                  |                  |                  |                  |                  |                  |                  |                  | +                |  | + | 2         |                      |   |   |   |   |
| Salivary Glands   | +                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | +                |                  |                  |                  |                  |                  |                  |                  |                  |                  | M                |  | + | +         |                      |   |   |   |   |
| Stomach, Forestomach<br>Inflammation<br>Mineralization<br>Epithelium, Hyperplasia                           | +                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | +                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |  | 2 | 1         | 2                    | 2 |   |   |   |
| Stomach, Glandular<br>Cyst<br>Infiltration Cellular, Lymphoid<br>Inflammation<br>Mineralization<br>Necrosis | +                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | +                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |  | 1 | 1         | 2                    | 2 | 1 | A | + |
| Tooth   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |  |   |           |                      |   |   |   |   |

CARDIOVASCULAR SYSTEM

|              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Blood Vessel | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|--------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>Control | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | females<br>(cont...) |
|-------------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------------------|
|                               | 0684        | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 |                      |
| ANIMAL ID                     | 0010        | 0011 | 0012 | 0013 | 0014 | 0015 | 0016 | 0017 | 0018 | 0019 | 0020 | 0021 | 0022 | 0023 | 0024 | 0025 | 0026 | 0027 | 0028 | 0029 | 0030 | 0031 | 0032 | 0033 |                      |

Inflammation

|                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Heart               | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Cardiomyopathy      |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation, Acute | 2 |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Necrosis            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Polyarteritis       |   |   |   |   |   |   |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |
| Valve, Thrombosis   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |

ENDOCRINE SYSTEM

|                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Adrenal Cortex                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Accessory Adrenal Cortical Nodule    |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Necrosis                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |
| Vacuolization Cytoplasmic            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Zona Fasciculata, Hypertrophy, Focal |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   | 1 |   |
| Adrenal Medulla                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Hyperplasia                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |
| Islets, Pancreatic                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | M | + | + |
| Parathyroid Gland                    | + | + | M | M | + | + | + | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + |
| Pituitary Gland                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Pars Distalis, Angiectasis           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |
| Pars Distalis, Hyperplasia           |   | 1 |   |   |   |   | 2 |   |   |   |   |   |   | 1 | 2 |   | 1 |   |   |   |   | 2 |   | 1 |
| Thyroid Gland                        | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

GENERAL BODY SYSTEM

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
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1-4 .. Lesion qualified as:  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
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 Lab: BNW

|                           |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <b>B6C3F1 MICE FEMALE</b> | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|                           | ANIMAL ID   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

NONE

**GENITAL SYSTEM**

|                                  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Clitoral Gland                   | +     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ovary                            | + + + + + + + + +   + + + + + + + + + + + + + + + + + + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cyst                             | X     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Inflammation                     | 4 4   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Uterus                           | +     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Angiectasis                      |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hemorrhage                       | 2   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Inflammation                     | 2 3 2   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Thrombosis                       |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Artery, Necrosis                 | 4   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Endometrium, Hyperplasia, Cystic | 2 3 3 2 2 3 3 2 3 1 4 3 3 3 3 3 3 3 2 2 3               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**HEMATOPOIETIC SYSTEM**

|                               |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Bone Marrow                   | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Myeloid Cell, Hyperplasia     |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lymph Node                    | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lumbar, Ectasia               | 2   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lumbar, Hyperplasia           | 2   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lumbar, Hyperplasia, Lymphoid | 1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Renal, Amyloid Deposition     | 2   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Renal, Hyperplasia, Lymphoid  | 2   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Renal, Necrosis               | 2   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically M .. Missing tissue  
 X .. Lesion present A .. Autolysis precludes evaluation  
 I .. Insufficient tissue BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**

Date Report Requested: 04/15/2016

Test Type: CHRONIC

2,3-Butanedione

Time Report Requested: 10:33:42

Route: RESPIRATORY EXPOSURE WHOLE BODY

CAS Number: 431-03-8

First Dose M/F: 08/31/09 / 08/31/09

Species/Strain: MICE/B6C3F1

Lab: BNW

| B6C3F1 MICE FEMALE<br>Control | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | females<br>(cont...) |
|-------------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|----------------------|
|                               | 0684        | 0733 | 0773 | 0777 | 0777 | 0676 | 0777 | 0575 | 0777 | 0777 | 0777 | 0676 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0676 | 0676 | 0777 | 0777 |           |                      |
|                               | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |           |                      |
|                               | 1           | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    |           |                      |

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lymph Node, Bronchial Ectasia<br>Hyperplasia, Lymphoid | I | + | M | + | + | + | + | + | + | + | + | + | + | + | M | + | + | + | + | M | + | M | + | + | + | + |
|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lymph Node, Mandibular Amyloid Deposition<br>Hyperplasia, Lymphoid Infiltration Cellular, Plasma Cell | + | + | + | + | + | + | + | M | + | M | + | + | + | + | + | + | M | M | M | + | M | + | + | + | + | + |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lymph Node, Mediastinal Hyperplasia, Lymphoid Inflammation, Acute | + | + | + | + | + | + | + | + | I | + | + | + | + | + | + | + | + | + | + | + | + | I | + | + | + | + |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lymph Node, Mesenteric Hyperplasia, Lymphoid Infiltration Cellular, Plasma Cell | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Spleen Hematopoietic Cell Proliferation<br>Hyperplasia, Lymphoid Inflammation | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thymus Atrophy<br>Ectopic Parathyroid Gland<br>Hyperplasia, Lymphoid Inflammation, Chronic | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**INTEGUMENTARY SYSTEM**

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

**Experiment Number:** 20725 - 04  
**Test Type:** CHRONIC  
**Route:** RESPIRATORY EXPOSURE WHOLE BODY  
**Species/Strain:** MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
**CAS Number:** 431-03-8

**Date Report Requested:** 04/15/2016  
**Time Report Requested:** 10:33:42  
**First Dose M/F:** 08/31/09 / 08/31/09  
**Lab:** BNW

| B6C3F1 MICE FEMALE | DAY ON TEST | Animals |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | females<br>(cont...) |
|--------------------|-------------|---------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------------------|
|                    |             | 0684    | 0733 | 0773 | 0773 | 0773 | 0677 | 0757 | 0777 | 0777 | 0777 | 0677 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0677 | 0677 | 0777 | 0777 |                      |
| Control            | ANIMAL ID   |         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                      |

Mammary Gland  
Hyperplasia  
Inflammation, Chronic

+  
1

Skin  
Erosion  
Inflammation, Chronic Active  
Epidermis, Hyperplasia

+ +

**MUSCULOSKELETAL SYSTEM**

Bone  
Fibro-Osseous Lesion

+  
1 1 1 1 1

Skeletal Muscle  
Degeneration

+  
1

**NERVOUS SYSTEM**

Brain  
Infiltration Cellular, Lymphocyte  
Inflammation, Acute

+  
1

Peripheral Nerve  
Degeneration

+ +

Spinal Cord

+ +

**RESPIRATORY SYSTEM**

Larynx

+ + + + + + + A +

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
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Experiment Number: 20725 - 04  
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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
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 Lab: BNW

| B6C3F1 MICE FEMALE<br>Control                         | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  | females<br>(cont...) |
|---|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|----------------------|
|   | 0684        | 0733 | 0773 | 0777 | 0777 | 0676 | 0777 | 0575 | 0777 | 0777 | 0777 | 0676 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0676 | 0676 | 0777 | 0777 |  |                      |
| ANIMAL ID   | 0001        | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 | 0001 |  |                      |
| Inflammation, Chronic Active                          | 1           |      |      |      |      |      |      |      |      |      | 2    |      |      |      |      |      |      |      |      |      |      | 1    | 1    |      |  |                      |
| Respiratory Epithelium, Metaplasia, Squamous          | 1           |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |  |                      |
| Respiratory Epithelium, Necrosis                      |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |  |                      |
| Squamous Epithelium, Hyperplasia                      |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 2    | 1    |      |  |                      |
| Lung  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |  |                      |
| Hemorrhage  | 1           |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |                      |
| Hyperplasia, Lymphoid                                 |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |                      |
| Inflammation, Chronic Active                          |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |                      |
| Alveolar Epithelium, Hyperplasia, Focal               |             |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |                      |
| Alveolus, Infiltration Cellular, Histiocyte           |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |                      |
| Bronchiole, Epithelium, Hyperplasia                   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |                      |
| Bronchus, Epithelium, Necrosis                        |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |                      |
| Bronchus, Epithelium, Regeneration                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |                      |
| Nose  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |  |                      |
| Inflammation, Suppurative                             |             |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |  |                      |
| Lateral Wall, Inflammation, Chronic Active            |             |      |      |      |      |      |      |      |      |      |      |      |      | 2    |      |      |      |      |      |      |      |      |      |      |  |                      |
| Olfactory Epithelium, Accumulation, Hyaline Droplet   |             | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      | 1    |      |      |      |  |                      |
| Respiratory Epithelium, Accumulation, Hyaline Droplet |             | 2    | 1    |      |      |      |      |      |      |      | 1    | 2    |      |      | 1    |      |      |      |      |      | 2    |      |      |      |  |                      |
| Respiratory Epithelium, Metaplasia, Squamous          |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |  |                      |
| Respiratory Epithelium, Necrosis                      |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |  |                      |
| Trachea   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |  |                      |
| Inflammation, Chronic Active                          |             |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |  |                      |

**SPECIAL SENSES SYSTEM**

|     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eye | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

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Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

| <b>B6C3F1 MICE FEMALE</b> |           | DAY ON TEST |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                 |
|---------------------------|-----------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----------------|
|                           |           | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                 |
| <b>Control</b>            | ANIMAL ID | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                 |
|                           | 0         | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                 |
|                           | 1         | 1           | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |                 |
|                           |           | 2           | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 |                 |
|                           |           | 6           | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | <b>* TOTALS</b> |

**ALIMENTARY SYSTEM**

|                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     |     |     |
|-----------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-----|-----|-----|
| Esophagus                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |     |     |     |
| Gallbladder                 | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | M | + | + | + | +  | 42  |     |     |
| Intestine Large, Cecum      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | 47 |     |     |     |
| Inflammation                |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   | 2  | 1.5 |     |     |
| Inflammation, Granulomatous |   |   |   |   |   |   |   |   |   |   |   | 4 |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1   | 4.0 |     |
| Intestine Large, Colon      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | 47 |     |     |     |
| Intestine Large, Rectum     | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49 |     |     |     |
| Intestine Small, Duodenum   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 47 |     |     |     |
| Inflammation                |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1   | 4.0 |     |
| Necrosis                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1   | 4.0 |     |
| Intestine Small, Ileum      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | 47 |     |     |     |
| Inflammation                |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 4 |    | 1   | 4.0 |     |
| Necrosis                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 4 |    | 1   | 4.0 |     |
| Ulcer                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 4 |    | 1   | 4.0 |     |
| Intestine Small, Jejunum    | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | 46 |     |     |     |
| Liver                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |     |     |     |
| Angiectasis                 |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     | 1   | 2.0 |
| Basophilic Focus            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     | 1   |     |
| Clear Cell Focus            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     | 1   |     |
| Cyst                        |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     | 1   |     |
| Eosinophilic Focus          | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |   |   |    |     | 4   |     |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade

+ .. Tissue examined microscopically

X .. Lesion present

I .. Insufficient tissue

M .. Missing tissue

A .. Autolysis precludes evaluation

BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:

1) Minimal 3) Moderate

2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE              | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | * TOTALS |
|---------------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------|
|                                 | 0732        | 0733 | 0732 | 0771 | 0772 | 0773 | 0774 | 0775 | 0776 | 0777 | 0778 | 0779 | 0770 | 0771 | 0772 | 0773 | 0774 | 0775 | 0776 | 0777 | 0778 | 0779 | 0770 |      |          |
| <b>Control</b>                  | 0012        | 0013 | 0014 | 0015 | 0016 | 0017 | 0018 | 0019 | 0020 | 0021 | 0022 | 0023 | 0024 | 0025 | 0026 | 0027 | 0028 | 0029 | 0030 | 0031 | 0032 | 0033 | 0034 | 0035 |          |
| Mixed Cell Focus                |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 2        |
| Hepatocyte, Necrosis            |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 3 1.7    |
| Mesentery                       |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 6        |
| Fat, Necrosis                   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 4 1.3    |
| Pancreas                        |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 50       |
| Cyst                            |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1        |
| Inflammation, Chronic Active    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1 2.0    |
| Acinus, Atrophy                 |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1 1.0    |
| Salivary Glands                 |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 49       |
| Stomach, Forestomach            |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 50       |
| Inflammation                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 3 1.3    |
| Mineralization                  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1 1.0    |
| Epithelium, Hyperplasia         |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 3 1.7    |
| Stomach, Glandular              |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 49       |
| Cyst                            |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1        |
| Infiltration Cellular, Lymphoid |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1 1.0    |
| Inflammation                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 5 1.6    |
| Mineralization                  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 3 1.3    |
| Necrosis                        |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1 1.0    |
| Tooth                           |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1        |
| <b>CARDIOVASCULAR SYSTEM</b>    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |
| Blood Vessel                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 50       |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
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1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE                   | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | * TOTALS |      |        |
|--------------------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------|------|--------|
|                                      | 0732        | 0733 | 0732 | 0731 | 0732 | 0732 | 0737 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 |          | 0732 |        |
| Control                              | 0012        | 0017 | 0018 | 0019 | 0020 | 0021 | 0022 | 0023 | 0024 | 0025 | 0026 | 0027 | 0028 | 0029 | 0030 | 0031 | 0032 | 0033 | 0034 | 0035 | 0036 | 0037 | 0038 | 0039 | 0040     |      |        |
| Inflammation                         |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          | 2    | 1 2.0  |
| Heart                                | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | 50   |        |
| Cardiomyopathy                       |             |      |      |      | 1    |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |          |      | 4 1.0  |
| Inflammation, Acute                  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      | 2 1.5  |
| Necrosis                             |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |          |      | 1 1.0  |
| Polyarteritis                        |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      | 1 3.0  |
| Valve, Thrombosis                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      | 1 2.0  |
| <b>ENDOCRINE SYSTEM</b>              |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |        |
| Adrenal Cortex                       | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | 50   |        |
| Accessory Adrenal Cortical Nodule    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      | 1 1.0  |
| Necrosis                             |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      | 1 1.0  |
| Vacuolization Cytoplasmic            |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 3    |      |          |      | 1 3.0  |
| Zona Fasciculata, Hypertrophy, Focal |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      | 2 1.0  |
| Adrenal Medulla                      | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | 50   |        |
| Hyperplasia                          |             |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      | 2 1.5  |
| Islets, Pancreatic                   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | 49   |        |
| Parathyroid Gland                    | +           | +    | +    | +    | +    | M    | M    | +    | M    | +    | M    | M    | +    | M    | +    | +    | +    | +    | +    | +    | M    | +    | M    | M    | +        | 38   |        |
| Pituitary Gland                      | +           | +    | +    | +    | +    | +    | +    | +    | M    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | 49   |        |
| Pars Distalis, Angiectasis           | 1           |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |          |      | 3 1.3  |
| Pars Distalis, Hyperplasia           | 1           |      | 2    | 2    | 1    | 1    |      | 2    |      |      |      |      |      |      |      |      |      | 2    |      | 1    |      |      |      |      |          |      | 15 1.5 |
| Thyroid Gland                        | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | 50   |        |
| <b>GENERAL BODY SYSTEM</b>           |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |        |

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Experiment Number: 20725 - 04  
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 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | * TOTALS |
|--------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------|
|                    | 0732        | 0733 | 0732 | 0731 | 0732 | 0732 | 0737 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 | 0732 |          |
| Control            | 0012        | 0017 | 0018 | 0019 | 0020 | 0021 | 0022 | 0023 | 0024 | 0025 | 0026 | 0027 | 0028 | 0029 | 0030 | 0031 | 0032 | 0033 | 0034 | 0035 | 0036 | 0037 | 0038 | 0039 | 0040 | 0041     |

NONE

**GENITAL SYSTEM**

|                                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |       |       |        |
|----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------|-------|--------|
| Clitoral Gland                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | M | + | + | + | M | M     | 47    |        |
| Ovary                            | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +     | 49    |        |
| Cyst                             | X | X | X |   |   |   |   |   |   |   |   |   |   | X |   |   |   |   |   |   | X |   | X | X |       | 15    |        |
| Inflammation                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |       | 2 4.0 |        |
| Uterus                           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50    |       |        |
| Angiectasis                      |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 3.0 |       |        |
| Hemorrhage                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 2.0 |       |        |
| Inflammation                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 4 2.5 |       |        |
| Thrombosis                       |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 3.0 |       |        |
| Artery, Necrosis                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 4.0 |       |        |
| Endometrium, Hyperplasia, Cystic | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 1 | 1 | 3 | 2 | 1 | 2 | 3 | 3 | 2 |   |   |   | 1 | 1 |   | 3 | 2 | 3     | 2     | 42 2.4 |

**HEMATOPOIETIC SYSTEM**

|                               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |       |
|-------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-------|
| Bone Marrow                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |       |
| Myeloid Cell, Hyperplasia     |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   | 4 |   | 2  | 3 2.3 |
| Lymph Node                    |   |   | + |   |   |   |   |   |   | + |   |   |   |   |   |   |   |   |   |   |   |   |   | + |    | 11    |
| Lumbar, Ectasia               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 2.0 |
| Lumbar, Hyperplasia           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 2.0 |
| Lumbar, Hyperplasia, Lymphoid |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 1.0 |
| Renal, Amyloid Deposition     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 2.0 |
| Renal, Hyperplasia, Lymphoid  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |    | 2 2.5 |
| Renal, Necrosis               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 2.0 |

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Date Report Requested: 04/15/2016  
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| B6C3F1 MICE FEMALE<br>Control                    | DAY ON TEST           |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | * TOTALS              |                       |                       |                       |                       |                          |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------------|
|  | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>2      | 0<br>6<br>4<br>7      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>2      | 0<br>5<br>9<br>0      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>3      | 0<br>6<br>6<br>9      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>1      | 0<br>4<br>9<br>2      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>7      | 0<br>1<br>3<br>2      | 0<br>5<br>9<br>3      |                       | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>2      | 0<br>6<br>6<br>3      |                          |
| ANIMAL ID  | 0<br>0<br>1<br>2<br>6 | 0<br>0<br>1<br>2<br>7 | 0<br>0<br>1<br>2<br>8 | 0<br>0<br>1<br>2<br>9 | 0<br>0<br>1<br>3<br>0 | 0<br>0<br>1<br>3<br>1 | 0<br>0<br>1<br>3<br>2 | 0<br>0<br>1<br>3<br>3 | 0<br>0<br>1<br>3<br>4 | 0<br>0<br>1<br>3<br>5 | 0<br>0<br>1<br>3<br>6 | 0<br>0<br>1<br>3<br>7 | 0<br>0<br>1<br>3<br>8 | 0<br>0<br>1<br>4<br>9 | 0<br>0<br>1<br>4<br>0 | 0<br>0<br>1<br>4<br>1 | 0<br>0<br>1<br>4<br>2 | 0<br>0<br>1<br>4<br>3 | 0<br>0<br>1<br>4<br>4 | 0<br>0<br>1<br>4<br>5 | 0<br>0<br>1<br>4<br>6 | 0<br>0<br>1<br>4<br>7 | 0<br>0<br>1<br>4<br>8 | 0<br>0<br>1<br>4<br>9 | 0<br>0<br>1<br>5<br>0 |                          |
| Lymph Node, Bronchial<br>Ectasia                 | +                     | M                     | +                     | +                     | +                     | +                     | M                     | +                     | +                     | M                     | +                     | +                     | +                     | +                     | +                     | M                     | I                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | 40                       |
| Hyperplasia, Lymphoid                            |                       |                       |                       |                       |                       |                       |                       | 1                     |                       |                       |                       | 1                     |                       |                       | 1                     |                       |                       |                       |                       |                       |                       |                       |                       | 1                     |                       | 1 1.0<br>5 1.6           |
| Lymph Node, Mandibular<br>Amyloid Deposition     | +                     | +                     | +                     | +                     | +                     | +                     | M                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | M                     | +                     | +                     | I                     | M                     | +                     | M                     | 39                       |
| Hyperplasia, Lymphoid                            | 1                     |                       |                       |                       |                       | 1                     |                       | 1                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 2.0<br>4 1.3<br>1 1.0  |
| Lymph Node, Mediastinal<br>Hyperplasia, Lymphoid | I                     | +                     | +                     | +                     | M                     | I                     | I                     | +                     | +                     | +                     | M                     | +                     | I                     | I                     | +                     | +                     | +                     | +                     | I                     | +                     | +                     | +                     | +                     | +                     | +                     | 40                       |
| Inflammation, Acute                              |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 4.0<br>1 2.0           |
| Lymph Node, Mesenteric<br>Hyperplasia, Lymphoid  | +                     | +                     | +                     | +                     | +                     | +                     | I                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | 49                       |
| Infiltration Cellular, Plasma Cell               |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 2                     |                       | 2                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 4                     |                       | 2 2.0<br>1 4.0           |
| Spleen<br>Hematopoietic Cell Proliferation       | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | 50                       |
| Hyperplasia, Lymphoid                            |                       |                       |                       |                       |                       |                       | 2                     | 1                     |                       |                       | 1                     | 2                     |                       |                       | 2                     |                       |                       | 3                     |                       | 2                     |                       |                       | 4                     |                       | 2                     | 8 2.3<br>10 1.6<br>1 1.0 |
| Inflammation                                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                          |
| Thymus<br>Atrophy                                | +                     | +                     | +                     | +                     | +                     | +                     | I                     | +                     | +                     | +                     | I                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | 47                       |
| Ectopic Parathyroid Gland                        |                       |                       |                       |                       |                       |                       | 1                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 4 1.5<br>4 1.0           |
| Hyperplasia, Lymphoid                            |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1                     | 3                     | 3 1.7                    |
| Inflammation, Chronic                            |                       |                       |                       |                       |                       |                       | 2                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 2                     | 2 2.0                    |

### INTEGUMENTARY SYSTEM

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>Control   | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | * TOTALS |   |    |     |     |     |
|---|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------|---|----|-----|-----|-----|
|   | 0732        | 0733 | 0772 | 0773 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 |          |   |    |     |     |     |
| ANIMAL ID   | 0012        | 0017 | 0018 | 0019 | 0020 | 0021 | 0022 | 0023 | 0024 | 0025 | 0026 | 0027 | 0028 | 0029 | 0030 | 0031 | 0032 | 0033 | 0034 | 0035 | 0036 | 0037 | 0038 | 0039 | 0040     |   |    |     |     |     |
| Mammary Gland<br>Hyperplasia<br>Inflammation, Chronic                     | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | M    | +    | +    | +    | +        | + | 49 | 1.0 | 2.0 | 1.0 |
| Skin<br>Erosion<br>Inflammation, Chronic Active<br>Epidermis, Hyperplasia | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | + | 50 | 1.0 | 1.0 | 2.0 |
| <b>MUSCULOSKELETAL SYSTEM</b>   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |   |    |     |     |     |
| Bone<br>Fibro-Osseous Lesion  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | + | 50 | 1.1 | 1.3 |     |
| Skeletal Muscle<br>Degeneration   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | +    |      |      |          |   | 6  | 1.0 | 2.0 |     |
| <b>NERVOUS SYSTEM</b>   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |   |    |     |     |     |
| Brain<br>Infiltration Cellular, Lymphocyte<br>Inflammation, Acute         | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | + | 50 | 1.0 | 2.0 | 1.0 |
| Peripheral Nerve<br>Degeneration  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |   |    | 2   | 1.0 | 1.0 |
| Spinal Cord   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |   |    | 2   |     |     |
| <b>RESPIRATORY SYSTEM</b>   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |   |    |     |     |     |
| Larynx  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | + | 49 |     |     |     |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE                                    | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | * TOTALS |
|---|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------|
|   | 0732        | 0733 | 0732 | 0771 | 0772 | 0773 | 0776 | 0777 | 0777 | 0775 | 0777 | 0776 | 0777 | 0774 | 0777 | 0777 | 0771 | 0777 | 0775 | 0777 | 0777 | 0777 | 0776 |      |      |          |
| <b>Control</b>  | 0012        | 0017 | 0018 | 0019 | 0020 | 0021 | 0022 | 0023 | 0024 | 0025 | 0026 | 0027 | 0028 | 0029 | 0030 | 0031 | 0032 | 0033 | 0034 | 0035 | 0036 | 0037 | 0038 | 0039 | 0040 |          |
| Inflammation, Chronic Active                          |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 4 1.3    |
| Respiratory Epithelium, Metaplasia, Squamous          |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 2 1.0    |
| Respiratory Epithelium, Necrosis                      |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1 1.0    |
| Squamous Epithelium, Hyperplasia                      |             |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      | 1    |      |      |      |      |      |      |      |      |      | 4 1.3    |
| <b>Lung</b>   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 50   |          |
| Hemorrhage  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1 1.0    |
| Hyperplasia, Lymphoid                                 |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      | 1 1.0    |
| Inflammation, Chronic Active                          |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 2    |      | 1 2.0    |
| Alveolar Epithelium, Hyperplasia, Focal               |             |      | 2    |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      | 3 1.3    |
| Alveolus, Infiltration Cellular, Histiocyte           |             |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 3    |      | 2 2.0    |
| Bronchiole, Epithelium, Hyperplasia                   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 2    |      |      |      |      |      |      |      |      |      | 1 2.0    |
| Bronchus, Epithelium, Necrosis                        |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    | 1    | 2 1.0    |
| Bronchus, Epithelium, Regeneration                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    | 1    | 2 1.0    |
| <b>Nose</b>   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 50   |          |
| Inflammation, Suppurative                             |             |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      | 3 1.0    |
| Lateral Wall, Inflammation, Chronic Active            |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1 2.0    |
| Olfactory Epithelium, Accumulation, Hyaline Droplet   | 1           | 1    |      | 1    |      |      |      |      |      |      |      |      | 1    |      |      |      |      | 1    |      | 1    |      | 1    | 1    |      |      | 11 1.0   |
| Respiratory Epithelium, Accumulation, Hyaline Droplet | 1           | 1    | 1    |      | 1    | 1    |      | 1    |      |      |      | 1    |      | 1    |      | 2    | 1    |      |      | 1    |      | 1    |      |      |      | 18 1.2   |
| Respiratory Epithelium, Metaplasia, Squamous          |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1 1.0    |
| Respiratory Epithelium, Necrosis                      |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1 1.0    |
| <b>Trachea</b>  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 50   |          |
| Inflammation, Chronic Active                          |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1 1.0    |

**SPECIAL SENSES SYSTEM**

|            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|
| <b>Eye</b> | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |
|------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
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 I .. Insufficient tissue

M .. Missing tissue  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
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 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE                    | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        | * TOTALS |
|---------------------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------|----------|
|                                       | 0732        | 0733 | 0732 | 0731 | 0722 | 0707 | 0702 | 0703 | 0704 | 0705 | 0706 | 0707 | 0708 | 0709 | 0710 | 0711 | 0712 | 0713 | 0714 | 0715 | 0716 | 0717 | 0718 | 0719   |          |
| Control                               | 0012        | 0017 | 0018 | 0019 | 0020 | 0021 | 0022 | 0023 | 0024 | 0025 | 0026 | 0027 | 0028 | 0029 | 0030 | 0031 | 0032 | 0033 | 0034 | 0035 | 0036 | 0037 | 0038 | 0039   |          |
| Cornea, Inflammation, Acute           |             |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        | 1 1.0    |
| Cornea, Epithelium, Hyperplasia       |             |      |      |      |      |      | 2    |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |        | 2 1.5    |
| Harderian Gland Hyperplasia           | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 50     |          |
|                                       |             |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 2 1.5  |          |
| <b>URINARY SYSTEM</b>                 |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |          |
| Kidney Cyst                           | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 50     |          |
| Hyperplasia, Lymphoid                 |             | X    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1      |          |
| Metaplasia, Osseous                   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 2    |      | 1 2.0  |          |
| Nephropathy                           |             |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      | 1 1.0  |          |
|                                       |             |      |      |      |      | 1    |      |      |      | 1    | 1    |      |      |      |      |      | 1    |      |      |      |      |      | 1    | 14 1.2 |          |
| Urinary Bladder Hyperplasia, Lymphoid | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | 50     |          |
|                                       |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1 3.0  |          |

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Experiment Number: 20725 - 04

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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL

2,3-Butanedione

CAS Number: 431-03-8

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|                           |                 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |
|---------------------------|-----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
| <b>B6C3F1 MICE FEMALE</b> | DAY ON TEST     | 0644 | 0732 | 0772 | 0772 | 0772 | 0671 | 0767 | 0665 | 0773 | 0773 | 0773 | 0773 | 0670 | 0773 | 0773 | 0773 | 0773 | 0773 | 0676 | 0773 | 0773 | 0773 | 0573 | 0732 |  |
|                           | <b>12.5 ppm</b> | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 | 0030 |  |
|                           | ANIMAL ID       | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    |  |

females (cont...)

ALIMENTARY SYSTEM

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Esophagus<br>Epithelium, Hyperplasia  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Gallbladder<br>Hyperplasia<br>Ulcer   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | M | + | + | + | + | + |   |
| Intestine Large, Cecum<br>Necrosis  | + | + | + | + | + | + | + | 1 | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Intestine Large, Colon  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Intestine Large, Rectum<br>Inflammation   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Intestine Small, Duodenum<br>Inflammation   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Intestine Small, Ileum<br>Hyperplasia, Lymphoid<br>Necrosis                         | + | + | + | + | + | + | + | 1 | + | + | + | + | + | 1 | + | + | + | + | + | + | + | + | + | + |   |
| Intestine Small, Jejunum  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Liver<br>Basophilic Focus<br>Clear Cell Focus<br>Eosinophilic Focus<br>Fatty Change | + | + | + | + | + | + | + | + | + | + | + | + | X | + | + | + | + | + | + | X | + | + | + | + |   |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
+ .. Tissue examined microscopically      M .. Missing tissue  
X .. Lesion present                                A .. Autolysis precludes evaluation  
I .. Insufficient tissue                        BLANK .. Not examined microscopically  
1-4 .. Lesion qualified as:  
1) Minimal    3) Moderate  
2) Mild      4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>12.5 ppm | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID | females<br>(cont...) |                       |                  |
|--------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|----------------------|-----------------------|------------------|
|                                | 0<br>6<br>4<br>4 | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>1 | 0<br>6<br>9<br>7 | 0<br>7<br>3<br>1 | 0<br>6<br>3<br>5 | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>1 | 0<br>6<br>3<br>2 | 0<br>7<br>3<br>1 | 0<br>6<br>9<br>0 | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>3 | 0<br>6<br>3<br>2 | 0<br>7<br>3<br>5 | 0<br>7<br>3<br>3 |           |                      | 0<br>5<br>6<br>1      | 0<br>7<br>3<br>2 |
|                                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0<br>0<br>3<br>0<br>1 |                  |

Fibrosis, Focal  
 Hematopoietic Cell Proliferation  
 Hyperplasia, Lymphoid  
 Hepatocyte, Degeneration  
 Hepatocyte, Necrosis

Mesentery  
 Fat, Necrosis

Pancreas  
 Inflammation, Chronic Active  
 Necrosis  
 Acinus, Atrophy

Salivary Glands

Stomach, Forestomach  
 Inflammation  
 Epithelium, Hyperplasia

Stomach, Glandular  
 Degeneration

**CARDIOVASCULAR SYSTEM**

Blood Vessel  
 Inflammation

Heart  
 Cardiomyopathy  
 Inflammation, Chronic Active

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

|                           |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                          |   |   |   |   |   |   |   |
|---------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------------------|---|---|---|---|---|---|---|
| <b>B6C3F1 MICE FEMALE</b> | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                        | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|                           | ANIMAL ID   | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 6 | 7 | 7                        | 7 | 7 | 7 | 5 | 7 | 7 | 7 |
| <b>12.5 ppm</b>           |             | 4 | 3 | 3 | 3 | 3 | 9 | 3 | 3 | 3 | 3 | 3 | 9 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3                        | 6 | 3 | 3 | 3 | 3 | 3 |   |
|                           |             | 4 | 2 | 2 | 2 | 1 | 7 | 1 | 5 | 3 | 1 | 2 | 1 | 0 | 2 | 3 | 1 | 1 | 3 | 3 | 2 | 5 | 3 | 2 | 5 | 3 | 2 | 2 | 2 | 1                        | 2 | 2 | 1 | 2 | 2 | 2 |   |
|                           |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                        | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|                           |             | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3                        | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
|                           |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                        | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|                           |             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9                        | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|                           |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>females (cont...)</b> |   |   |   |   |   |   |   |

Mineralization

1

**ENDOCRINE SYSTEM**

|                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Adrenal Cortex                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Vacuolization Cytoplasmic            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |
| Zona Fasciculata, Hyperplasia, Focal |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |
| Adrenal Medulla                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Hyperplasia                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Islets, Pancreatic                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Hyperplasia                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Parathyroid Gland                    | M | + | + | + | + | + | + | + | + | + | + | M | + | M | M | + | + | + | + | M | + | + | M | M | + | M | M | + | M | + | + | + | + | + | + | + |   |   |
| Pituitary Gland                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Pars Distalis, Angiectasis           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Pars Distalis, Hyperplasia           | 2 |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Thyroid Gland                        | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Follicular Cell, Hyperplasia         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

|                |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Clitoral Gland | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>12.5 ppm   | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID                  | females<br>(cont...) |
|----------------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------------------------|----------------------|
|                                  | 0644        | 0743 | 0773 | 0773 | 0773 | 0679 | 0773 | 0676 | 0773 | 0676 | 0773 | 0773 | 0773 | 0676 | 0773 | 0773 | 0773 | 0676 | 0773 | 0676 | 0773 | 0773 | 0773 | 0575 | 0773 |                            |                      |
|                                  | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 000000000000000000000000   |                      |
|                                  | 3           | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 333333333333333333333333   |                      |
|                                  | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 000000000000000000000000   |                      |
|                                  | 1           | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 2    | 2    | 2    | 2    | 2    | 12345678901111111111222222 |                      |
| Ovary                            | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                            |                      |
| Cyst                             | X           | X    |      |      |      |      |      |      | X    |      |      | X    |      |      |      |      |      |      |      | X    |      |      | X    |      |      |                            |                      |
| Hemorrhage                       |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                            |                      |
| Hyperplasia, Tubular             |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                            |                      |
| Inflammation                     |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                            |                      |
| Mineralization                   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                            |                      |
| Necrosis                         |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                            |                      |
| Uterus                           | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                            |                      |
| Angiectasis                      |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                            |                      |
| Inflammation                     |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                            |                      |
| Thrombosis                       |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                            |                      |
| Endometrium, Hyperplasia, Cystic | 3           | 2    | 2    | 2    | 3    | 1    | 1    | 2    | 2    | 4    | 2    | 1    | 3    | 3    | 3    | 2    | 3    | 3    |      |      |      |      |      |      |      |                            |                      |

**HEMATOPOIETIC SYSTEM**

|                                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
|----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| Bone Marrow                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |   |  |  |
| Myeloid Cell, Hyperplasia        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Lymph Node                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Iliac, Ectasia                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Lumbar, Ectasia                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Renal, Hyperplasia, Lymphoid     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Lymph Node, Bronchial            | I | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + | + | + | I | I | + | + | + | M | + |  |  |
| Hematopoietic Cell Proliferation |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Hyperplasia, Lymphoid            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Necrosis, Lymphoid               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Lymph Node, Mandibular           | + | + | + | + | + | + | M | + | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + |   |   |  |  |

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 + .. Tissue examined microscopically  
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 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

## P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

| B6C3F1 MICE FEMALE | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|--------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|                    |             | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 5 | 3 | 3 |
| 12.5 ppm           | ANIMAL ID   | 4 | 3 | 3 | 3 | 3 | 9 | 3 | 3 | 3 | 3 | 3 | 9 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 5 | 3 | 3 | 3 | 2 |
|                    |             | 4 | 2 | 2 | 2 | 1 | 7 | 1 | 5 | 3 | 1 | 2 | 1 | 0 | 2 | 3 | 1 | 1 | 3 | 1 | 3 | 3 | 2 | 5 | 3 | 3 | 2 | 2 |
|                    |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|                    |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|                    |             | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
|                    |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|                    |             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |   |
|                    |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|                    |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|                    |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|                    |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|                    |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|                    |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|                    |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|                    |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|                    |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|                    |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|                    |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|                    |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

females  
(cont...)Ectasia  
Hyperplasia, Lymphoid

1 1 1

Lymph Node, Mediastinal  
Hematopoietic Cell Proliferation  
Hyperplasia, Lymphoid  
Necrosis, Lymphoid+ + M + + + + + + + M I M + + + + + + + + + + + +  
1Lymph Node, Mesenteric  
Ectasia  
Hyperplasia, Lymphoid+  
1 2Spleen  
Hematopoietic Cell Proliferation  
Hyperplasia, Lymphoid  
Inflammation  
Necrosis+  
2 3 1 1 2 1 1 1 1 2 2 2Thymus  
Atrophy  
Cyst  
Ectopic Parathyroid Gland  
Hyperplasia, Lymphoid+  
1 1 X 1 1 1 1 1 2 2 2

## INTEGUMENTARY SYSTEM

Mammary Gland

+ +

Skin  
Inflammation, Chronic Active+  
1

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade

+ .. Tissue examined microscopically

X .. Lesion present

I .. Insufficient tissue

M .. Missing tissue

A .. Autolysis precludes evaluation

BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:

1) Minimal 3) Moderate

2) Mild 4) Marked

Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

|                           |                 |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                              |   |
|---------------------------|-----------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|------------------------------|---|
| <b>B6C3F1 MICE FEMALE</b> | <b>12.5 ppm</b> | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <b>females<br/>(cont...)</b> |   |
|                           |                 |             | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 5 |                              | 7 |
|                           |                 |             | 4 | 3 | 3 | 3 | 3 | 9 | 3 | 3 | 3 | 3 | 3 | 3 | 9 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 6 |                              | 3 |
|                           | ANIMAL ID       | 4           | 2 | 2 | 2 | 1 | 7 | 1 | 5 | 3 | 1 | 2 | 1 | 0 | 2 | 3 | 1 | 1 | 3 | 2 | 5 | 3 | 2 | 2 | 1 | 2 |   |                              |   |
|                           |                 | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                              |   |
|                           |                 | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                              |   |
|                           |                 | 3           | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |                              |   |
|                           |                 | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |                              |   |
|                           |                 | 1           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 |   |                              |   |

MUSCULOSKELETAL SYSTEM

|                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|----------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bone                 | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Fibro-Osseous Lesion |   |   | 1 |   |   |   |   |   | 2 |   |   |   |   | 2 |   | 1 |   |   |   |   |   |   |   |   |   | 2 |
| Skeletal Muscle      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | + |
| Inflammation         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |

NERVOUS SYSTEM

|                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-----------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Brain                 | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Infiltration Cellular |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Peripheral Nerve      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | + |
| Spinal Cord           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | + |

RESPIRATORY SYSTEM

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larynx  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Inflammation, Chronic Active                                      |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Respiratory Epithelium, Metaplasia, Atypical, Squamous            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Respiratory Epithelium, Necrosis Squamous Epithelium, Hyperplasia | 1 |   | 1 |   | 1 | 1 |   | 1 |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |
| Submucosa, Mineralization   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Lung  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Hematopoietic Cell Proliferation                                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hyperplasia, Lymphoid Inflammation, Suppurative                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
+ .. Tissue examined microscopically M .. Missing tissue  
X .. Lesion present A .. Autolysis precludes evaluation  
I .. Insufficient tissue BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
1) Minimal 3) Moderate  
2) Mild 4) Marked

Experiment Number: 20725 - 04  
Test Type: CHRONIC  
Route: RESPIRATORY EXPOSURE WHOLE BODY  
Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
2,3-Butanedione  
CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
Time Report Requested: 10:33:42  
First Dose M/F: 08/31/09 / 08/31/09  
Lab: BNW

| B6C3F1 MICE FEMALE | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  | ANIMAL ID | females<br>(cont...) |
|--------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|-----------|----------------------|
|                    | 0644        | 0732 | 0772 | 0777 | 0777 | 0676 | 0777 | 0676 | 0777 | 0777 | 0777 | 0777 | 0676 | 0777 | 0777 | 0777 | 0777 | 0777 | 0676 | 0777 | 0777 | 0777 | 0575 | 0777 |  |           |                      |
| 12.5 ppm           | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |  |           |                      |
|                    | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |  |           |                      |
|                    | 3           | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    |  |           |                      |
|                    | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |  |           |                      |
|                    | 1           | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 2    | 2    | 2    | 2    | 2    |  |           |                      |

Alveolus, Infiltration Cellular, Histiocyte  
Mediastinum, Inflammation, Suppurative 1 1

Nose  
Inflammation, Suppurative +  
Olfactory Epithelium, Accumulation, Hyaline Droplet 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1  
Olfactory Epithelium, Atrophy 2 2 2 1 2 2 1 1 2 1 2 2 1 2 1 2 2 1 2 2 1 1 1 2  
Olfactory Epithelium, Metaplasia, Respiratory 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 1 1 1 2  
Respiratory Epithelium, Accumulation, Hyaline Droplet 1 1 2 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1  
Respiratory Epithelium, Hyperplasia 1  
Respiratory Epithelium, Metaplasia, Squamous 1 1 1 1 1  
Respiratory Epithelium, Necrosis 1 1  
Turbinate, Atrophy 1

Trachea +

**SPECIAL SENSES SYSTEM**

Eye  
Cornea, Inflammation, Acute 1  
Cornea, Epithelium, Hyperplasia 1  
Harderian Gland  
Hyperplasia + + + + + + + + + + + + + + + + + + + 1 1 1

**URINARY SYSTEM**

Kidney  
Hyperplasia, Lymphoid + 2 1

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
+ .. Tissue examined microscopically M .. Missing tissue  
X .. Lesion present A .. Autolysis precludes evaluation  
I .. Insufficient tissue BLANK .. Not examined microscopically  
1-4 .. Lesion qualified as:  
1) Minimal 3) Moderate  
2) Mild 4) Marked



Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>12.5 ppm | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                           | ANIMAL ID | females<br>(cont...) |
|--------------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------------------|-----------|----------------------|
|                                | 0644        | 0732 | 0772 | 0777 | 0777 | 0676 | 0777 | 0676 | 0777 | 0777 | 0777 | 0777 | 0676 | 0777 | 0777 | 0777 | 0777 | 0777 | 0676 | 0777 | 0777 | 0777 | 0575 | 0777 |                           |           |                      |
|                                | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 000000000000000000000000  |           |                      |
|                                | 3           | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 000000000000000000000000  |           |                      |
|                                | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 000000000000000000000000  |           |                      |
|                                | 1           | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 1234567890123456789012345 |           |                      |
| Infarct                        |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      | 1    |      |      | 1    |                           |           |                      |
| Metaplasia, Osseous            |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |                           |           |                      |
| Necrosis                       |             |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                           |           |                      |
| Nephropathy                    | 1           | 1    |      |      |      |      |      | 1    | 1    |      |      |      |      | 1    |      |      |      |      | 1    |      | 1    |      |      | 2    | 2                         |           |                      |
| Capsule, Inflammation          |             |      |      |      |      |      |      |      | 2    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                           |           |                      |
| Urinary Bladder                | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                           |           |                      |
| Hyperplasia, Lymphoid          |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                           |           |                      |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
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 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>12.5 ppm   | DAY ON TEST           |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | * TOTALS              |                       |                       |                       |                       |                       |  |   |     |     |     |
|----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--|---|-----|-----|-----|
|                                  | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>8      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>3      | 0<br>6<br>8<br>0      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>2      |                       | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>4      |  |   |     |     |     |
| ANIMAL ID                        | 0<br>0<br>3<br>2<br>6 | 0<br>0<br>3<br>2<br>7 | 0<br>0<br>3<br>2<br>8 | 0<br>0<br>3<br>2<br>9 | 0<br>0<br>3<br>3<br>0 | 0<br>0<br>3<br>3<br>1 | 0<br>0<br>3<br>3<br>2 | 0<br>0<br>3<br>3<br>3 | 0<br>0<br>3<br>3<br>4 | 0<br>0<br>3<br>3<br>5 | 0<br>0<br>3<br>3<br>6 | 0<br>0<br>3<br>3<br>7 | 0<br>0<br>3<br>3<br>8 | 0<br>0<br>3<br>3<br>9 | 0<br>0<br>3<br>3<br>0 | 0<br>0<br>3<br>3<br>1 | 0<br>0<br>3<br>3<br>2 | 0<br>0<br>3<br>3<br>3 | 0<br>0<br>3<br>3<br>4 | 0<br>0<br>3<br>3<br>5 | 0<br>0<br>3<br>3<br>6 | 0<br>0<br>3<br>3<br>7 | 0<br>0<br>3<br>3<br>8 | 0<br>0<br>3<br>3<br>9 | 0<br>0<br>3<br>3<br>0 | 0<br>0<br>3<br>3<br>0 |  |   |     |     |     |
| Fibrosis, Focal                  |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  | 1 | 2.0 |     |     |
| Hematopoietic Cell Proliferation |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   | 2   | 1   | 2.0 |
| Hyperplasia, Lymphoid            |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   | 2   | 1.0 |     |
| Hepatocyte, Degeneration         |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   | 1   | 3.0 |     |
| Hepatocyte, Necrosis             | 2                     |                       |                       |                       |                       |                       |                       |                       |                       | 1                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  | 2 | 4   | 2.0 |     |
| Mesentery                        |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   |     | 10  |     |
| Fat, Necrosis                    |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   |     | 9   | 1.6 |
| Pancreas                         |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   |     | 50  |     |
| Inflammation, Chronic Active     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   |     | 1   | 3.0 |
| Necrosis                         |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   |     | 1   | 3.0 |
| Acinus, Atrophy                  |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   | 3   | 2   | 2.0 |
| Salivary Glands                  |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   |     | 50  |     |
| Stomach, Forestomach             |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   |     | 50  |     |
| Inflammation                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   |     | 1   | 1.0 |
| Epithelium, Hyperplasia          |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   |     | 2   | 1.5 |
| Stomach, Glandular               |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   |     | 50  |     |
| Degeneration                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  |   |     | 1   | 1.0 |

**CARDIOVASCULAR SYSTEM**

|                              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |     |     |
|------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|----|-----|-----|
| Blood Vessel                 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 50 |     |     |
| Inflammation                 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2  | 1   | 2.0 |
| Heart                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 50 |     |     |
| Cardiomyopathy               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1  | 1   | 1.0 |
| Inflammation, Chronic Active |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2  | 1.0 |     |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>12.5 ppm | DAY ON TEST |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | ANIMAL ID |   | * TOTALS |   |   |   |
|--------------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----------|---|----------|---|---|---|
|                                | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0         | 0 |          | 0 | 0 |   |
|                                | 7           | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7         | 7 |          | 7 | 6 |   |
|                                | 3           | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 8 | 3 | 3 | 3 | 3 | 3         | 3 | 4        | 0 | 0 |   |
|                                | 1           | 3 | 2 | 2 | 2 | 8 | 3 | 3 | 1 | 1 | 2 | 1 | 3 | 3 | 2 | 3 | 2 | 0 | 3 | 2 | 2         | 1 | 2        | 7 | 0 | 0 |
|                                | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0         | 0 | 0        | 0 | 0 | 0 |
|                                | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0         | 0 | 0        | 0 | 0 | 0 |
|                                | 3           | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3         | 3 | 3        | 3 | 3 | 3 |
|                                | 2           | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4         | 4 | 4        | 5 | 5 | 0 |
|                                | 6           | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6         | 7 | 8        | 9 | 0 | 0 |

Mineralization 1 1.0

**ENDOCRINE SYSTEM**

|                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |     |
|--------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|----|-----|
| Adrenal Cortex                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |    |     |
| Vacuolization Cytoplasmic            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1  | 2.0 |
| Zona Fasciculata, Hyperplasia, Focal |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1  | 1.0 |
| Adrenal Medulla                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | 50 |     |
| Hyperplasia                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |    | 4  | 1.0 |
| Islets, Pancreatic                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | 50 |     |
| Hyperplasia                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1  | 2.0 |
| Parathyroid Gland                    | + | + | + | + | + | M | M | + | + | + | + | + | + | + | + | + | + | M | + | + | + | + | + | + | +  | 39 |     |
| Pituitary Gland                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | 49 |     |
| Pars Distalis, Angiectasis           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1  | 1.0 |
| Pars Distalis, Hyperplasia           |   |   |   |   |   | 1 |   | 1 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 7  | 1.1 |
| Thyroid Gland                        | + | + | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | 49 |     |
| Follicular Cell, Hyperplasia         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1  | 2  | 1.0 |

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

|                |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|
| Clitoral Gland | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49 |
|----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically M .. Missing tissue  
 X .. Lesion present A .. Autolysis precludes evaluation  
 I .. Insufficient tissue BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>12.5 ppm   | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | * TOTALS |      |      |      |      |      |      |      |      |      |      |      |      |        |      |       |
|----------------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------|------|------|------|------|------|------|------|------|------|------|------|------|--------|------|-------|
|                                  | 0731        | 0733 | 0732 | 0732 | 0732 | 0738 | 0733 | 0733 | 0731 | 0731 | 0732 | 0731 | 0733 | 0733 | 0732 | 0733 | 0732 | 0730 | 0733 | 0732 |          | 0731 | 0732 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0734 | 0734 | 0734 | 0734 | 0734   | 0734 | 0735  |
| ANIMAL ID                        | 0026        | 0007 | 0008 | 0009 | 0000 | 0001 | 0002 | 0003 | 0004 | 0005 | 0006 | 0007 | 0008 | 0009 | 0000 | 0001 | 0002 | 0003 | 0004 | 0005 | 0006     | 0007 | 0008 | 0009 | 0000 | 0001 | 0002 | 0003 | 0004 | 0005 | 0006 | 0007 | 0008 | 0009   | 0000 |       |
| Ovary                            | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +      | +    | 50    |
| Cyst                             |             |      | X    |      |      |      |      |      |      | X    |      | X    | X    |      | X    |      | X    | X    |      | X    |          | X    |      |      |      |      |      |      |      |      |      |      |      |        |      | 17    |
| Hemorrhage                       |             |      |      |      |      |      | 2    |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 1 2.0 |
| Hyperplasia, Tubular             |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 1 1.0 |
| Inflammation                     |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 1 1.0 |
| Mineralization                   |             |      |      |      |      | 2    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 1 2.0 |
| Necrosis                         |             |      |      |      |      | 3    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 1 3.0 |
| Uterus                           | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +      | 50   |       |
| Angiectasis                      |             |      |      |      |      |      | 1    |      |      |      |      |      | 1    |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 4 1.8 |
| Inflammation                     |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 2 2.0 |
| Thrombosis                       |             |      |      |      |      |      |      |      |      |      |      | 1    | 2    |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 3 1.7 |
| Endometrium, Hyperplasia, Cystic | 3           | 1    | 2    | 1    | 1    | 2    |      | 1    | 4    | 3    | 1    |      | 4    | 2    | 3    | 2    | 3    | 3    |      |      |          |      |      |      |      | 3    | 2    | 3    | 1    | 3    |      |      |      | 43 2.3 |      |       |
| <b>HEMATOPOIETIC SYSTEM</b>      |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      |       |
| Bone Marrow                      | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +      | 50   |       |
| Myeloid Cell, Hyperplasia        |             | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 2 1.0 |
| Lymph Node                       |             |      |      |      |      |      |      |      |      | +    |      |      |      |      |      |      | +    |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 10    |
| Iliac, Ectasia                   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 1 2.0 |
| Lumbar, Ectasia                  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 1 2.0 |
| Renal, Hyperplasia, Lymphoid     |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 1 2.0 |
| Lymph Node, Bronchial            | +           | +    | +    | +    | +    | +    | I    | +    | M    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +      | 42   |       |
| Hematopoietic Cell Proliferation |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 1 2.0 |
| Hyperplasia, Lymphoid            |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 7 1.1 |
| Necrosis, Lymphoid               |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |      |      |      |      |      |      |      |      |      |      |        |      | 1 1.0 |
| Lymph Node, Mandibular           | +           | +    | +    | +    | +    | M    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +      | 47   |       |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
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1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

|                           |             |                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------------------------|-------------|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <b>B6C3F1 MICE FEMALE</b> | DAY ON TEST | 0               | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|                           |             | 7               | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 6 |
|                           |             | 3               | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 3 | 8 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 7 | 4 |
| <b>12.5 ppm</b>           | ANIMAL ID   | 0               | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |
|                           |             | 0               | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |
|                           |             | 3               | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |   |
|                           |             | 2               | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 |   |   |
|                           |             | 6               | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |
|                           |             | <b>* TOTALS</b> |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

|                                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |     |     |     |   |     |   |           |           |
|----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----|-----|-----|---|-----|---|-----------|-----------|
| Ectasia                          | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 2.0 |     |     |   |     |   |           |           |
| Hyperplasia, Lymphoid            |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1   | 5   | 1.0 |   |     |   |           |           |
| Lymph Node, Mediastinal          | + | + | I | + | I | + | + | + | + | + | + | + | + | + | + | + | + | + | + | M | I | + | + | + | + | + | + | M | I | +   | I   | I   |   |     |   | <b>38</b> |           |
| Hematopoietic Cell Proliferation |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2   | 1   | 2.0 |   |     |   |           |           |
| Hyperplasia, Lymphoid            |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2   | 1.5 |     |   |     |   |           |           |
| Necrosis, Lymphoid               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1   | 1.0 |     |   |     |   |           |           |
| Lymph Node, Mesenteric           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +   | +   | +   | + | +   | + | +         | <b>50</b> |
| Ectasia                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1   | 2.0 |     |   |     |   |           |           |
| Hyperplasia, Lymphoid            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1   | 1.0 |     |   |     |   |           |           |
| Spleen                           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +   | +   | +   | + | +   | + | <b>50</b> |           |
| Hematopoietic Cell Proliferation | 1 | 1 |   |   |   |   |   |   |   | 2 | 3 |   |   |   | 1 |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |     |     |     |   |     |   |           | <b>14</b> |
| Hyperplasia, Lymphoid            | 1 |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   | 1 |   |   |   |   |   |   |   | 1 |   | 1 |     |     |     |   |     |   | <b>15</b> |           |
| Inflammation                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1   | 2.0 |     |   |     |   |           |           |
| Necrosis                         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1   | 3.0 |     |   |     |   |           |           |
| Thymus                           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +   | +   | +   | + | +   | + | +         | <b>50</b> |
| Atrophy                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |     |     | 2   | 5 | 1.2 |   |           |           |
| Cyst                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |     | 1   |     |   |     |   |           |           |
| Ectopic Parathyroid Gland        |   |   |   |   | 1 | 1 |   |   |   |   |   |   | 1 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |     |     |     |   |     |   |           | <b>8</b>  |
| Hyperplasia, Lymphoid            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |     |     | 2   | 4 | 2.0 |   |           |           |

INTEGUMENTARY SYSTEM

|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |     |   |   |   |           |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----|---|---|---|-----------|
| Mammary Gland                | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +   | + | + | + | <b>50</b> |
| Skin                         | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +   | + | + | + | <b>50</b> |
| Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 | 1.0 |   |   |   |           |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | * TOTALS |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|--------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                    | 0731        | 0733 | 0732 | 0733 | 0733 | 0732 | 0733 | 0733 | 0731 | 0731 | 0732 | 0731 | 0733 | 0733 | 0732 | 0733 | 0730 | 0738 | 0733 | 0733 |          | 0732 | 0732 | 0731 | 0732 | 0733 | 0733 | 0734 | 0737 | 0734 |      |      |      |      |      |
| 12.5 ppm           | 0026        | 0007 | 0008 | 0009 | 0000 | 0001 | 0002 | 0003 | 0004 | 0005 | 0006 | 0007 | 0008 | 0009 | 0000 | 0001 | 0002 | 0003 | 0004 | 0005 | 0006     | 0007 | 0008 | 0009 | 0000 | 0001 | 0002 | 0003 | 0004 | 0005 | 0006 | 0007 | 0008 | 0009 | 0000 |

**MUSCULOSKELETAL SYSTEM**

|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |        |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|--------|
| Bone Fibro-Osseous Lesion    | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |        |
|                              |   |   |   | 3 |   |   |   |   |   | 1 |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 12 1.5 |
| Skeletal Muscle Inflammation |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1  |        |
|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 3.0  |

**NERVOUS SYSTEM**

|                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |       |
|-----------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-------|
| Brain Infiltration Cellular | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |       |
|                             | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 1.0 |
| Peripheral Nerve            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1     |
| Spinal Cord                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1     |

**RESPIRATORY SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |        |       |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|--------|-------|
| Larynx Inflammation, Chronic Active   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |        |       |
| Respiratory Epithelium, Metaplasia, Atypical, Squamous                                      |   |   |   |   | 1 |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1      |       |
| Respiratory Epithelium, Necrosis Squamous Epithelium, Hyperplasia Submucosa, Mineralization |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1      |       |
|   |   |   |   |   |   | 1 |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1      |       |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 2      |       |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 13 1.2 |       |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 1.0  |       |
| Lung Hematopoietic Cell Proliferation   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |        |       |
| Hyperplasia, Lymphoid Inflammation, Suppurative   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 3      |       |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |        | 1 3.0 |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |        | 1 1.0 |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |        | 1 1.0 |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br><br>12.5 ppm | DAY ON TEST |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | * TOTALS |   |   |   |   |
|------------------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------|---|---|---|---|
|                                    | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |          | 0 | 0 |   |   |
|                                    | 7           | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 |          | 7 | 7 | 7 | 7 |
|                                    | 3           | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 3 | 8 | 3 | 3 | 3        | 3 | 3 | 7 |   |
|                                    | 1           | 3 | 2 | 2 | 2 | 8 | 3 | 3 | 1 | 1 | 2 | 1 | 3 | 3 | 2 | 3 | 2 | 0 | 3 | 2 | 2        | 1 | 2 | 3 | 4 |
| ANIMAL ID                          | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0        | 0 | 0 | 0 |   |
|                                    | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0        | 0 | 0 | 0 |   |
|                                    | 3           | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3        | 3 | 3 | 3 |   |
|                                    | 2           | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4        | 4 | 4 | 5 |   |
|                                    | 6           | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6        | 7 | 8 | 9 | 0 |

|   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |              |              |
|---|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--------------|--------------|
| Alveolus, Infiltration Cellular, Histiocyte | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | <b>3 1.0</b> |              |
| Mediastinum, Inflammation, Suppurative      |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |              | <b>1 1.0</b> |

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |               |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|---------------|
| Nose  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |  | <b>50</b>     |
| Inflammation, Suppurative                             |   | 2 |   | 2 | 2 |   |   |   | 1 |   | 1 | 1 |   | 1 |   | 1 |   |   |   |   |   |   |   |   |   |  | <b>20 1.2</b> |
| Olfactory Epithelium, Accumulation, Hyaline Droplet   |   | 1 |   | 1 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  | <b>11 1.1</b> |
| Olfactory Epithelium, Atrophy                         |   | 2 | 1 | 2 | 2 | 2 |   |   | 1 | 1 | 1 | 2 | 2 |   |   | 1 | 2 | 1 | 2 | 2 |   | 1 |   | 2 | 1 |  | <b>41 1.6</b> |
| Olfactory Epithelium, Metaplasia, Respiratory         |   | 1 |   |   | 2 | 1 |   |   | 1 |   | 1 |   | 1 |   |   | 1 | 1 |   | 1 |   |   |   |   |   |   |  | <b>22 1.2</b> |
| Respiratory Epithelium, Accumulation, Hyaline Droplet |   | 1 | 1 | 1 | 1 | 2 |   |   | 1 |   | 1 | 1 | 1 | 1 |   | 2 |   | 1 |   |   |   | 1 |   | 1 |   |  | <b>28 1.1</b> |
| Respiratory Epithelium, Hyperplasia                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  | <b>1 1.0</b>  |
| Respiratory Epithelium, Metaplasia, Squamous          |   | 1 |   | 1 | 1 |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  | <b>9 1.0</b>  |
| Respiratory Epithelium, Necrosis                      |   |   |   | 1 |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |  | <b>5 1.0</b>  |
| Turbinate, Atrophy                                    |   | 1 |   | 1 | 1 |   |   | 2 |   | 1 |   | 1 |   | 1 | 1 |   |   | 1 | 1 |   |   | 1 | 1 | 1 | 1 |  | <b>32 1.0</b> |

|         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |           |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|-----------|
| Trachea | + | + | + | + | + | + | + | I | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |  | <b>49</b> |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|-----------|

**SPECIAL SENSES SYSTEM**

|                                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |              |
|---------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|
| Eye                             | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   | <b>49</b>    |
| Cornea, Inflammation, Acute     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | <b>2 1.0</b> |
| Cornea, Epithelium, Hyperplasia |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | <b>2 1.0</b> |
| Harderian Gland                 | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   | <b>50</b>    |
| Hyperplasia                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   | <b>4 1.3</b> |

**URINARY SYSTEM**

|                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |              |
|-----------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--------------|
| Kidney                | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |  | <b>50</b>    |
| Hyperplasia, Lymphoid |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  | <b>3 1.7</b> |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

|                                |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        |          |  |
|--------------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------|----------|--|
| B6C3F1 MICE FEMALE<br>12.5 ppm | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0      | * TOTALS |  |
|                                | ANIMAL ID   | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6      |          |  |
|                                |             | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 3 | 8 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 7      |          |  |
|                                |             | 1 | 3 | 2 | 2 | 2 | 8 | 3 | 3 | 1 | 1 | 2 | 1 | 3 | 3 | 2 | 3 | 2 | 0 | 3 | 2 | 2 | 1 | 2 | 4      |          |  |
|                                |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0      |          |  |
|                                |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0      |          |  |
|                                |             | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3      |          |  |
|                                |             | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5      |          |  |
|                                |             | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9      | 0        |  |
|                                |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        |          |  |
| Infarct                        |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 1.0  |          |  |
| Metaplasia, Osseous            |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 1.0  |          |  |
| Necrosis                       |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 1.0  |          |  |
| Nephropathy                    |             |   |   |   |   | 1 | 1 | 1 |   |   |   |   | 1 |   |   | 1 |   |   |   |   |   |   | 1 |   | 15 1.1 |          |  |
| Capsule, Inflammation          |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 2.0  |          |  |
| Urinary Bladder                |             | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |          |  |
| Hyperplasia, Lymphoid          |             | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 1.0  |          |  |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
Test Type: CHRONIC  
Route: RESPIRATORY EXPOSURE WHOLE BODY  
Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
2,3-Butanedione  
CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
Time Report Requested: 10:33:42  
First Dose M/F: 08/31/09 / 08/31/09  
Lab: BNW

| <b>B6C3F1 MICE FEMALE</b> | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|---------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|                           |             | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 |
| <b>25 ppm</b>             | ANIMAL ID   | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 9 | 3 | 3 | 3 | 3 | 3 | 8 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 0 |   |
|                           |             | 3 | 1 | 2 | 2 | 2 | 3 | 3 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 3 | 1 | 2 | 2 | 4 | 2 | 2 | 4 | 2 | 2 | 3 | 0 |   |

0 0

5 5

0 0

1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 2 2 2 2 2 5

**females  
(cont...)**

**ALIMENTARY SYSTEM**

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Esophagus                                    | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Gallbladder                                  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Intestine Large, Cecum Inflammation          | + | + | + | + | + | + | + | + | + | 1 | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Intestine Large, Colon                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Intestine Large, Rectum                      | + | + | + | + | + | + | + | + | + | + | + | + | I | I | + | + | I | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Intestine Small, Duodenum                    | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Intestine Small, Ileum Hyperplasia, Lymphoid | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Intestine Small, Jejunum                     | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Liver  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Amyloid Deposition                           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 4 |   |
| Basophilic Focus                             |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Clear Cell Focus                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |   |   |   |   |   |   |   | X |   |   |   |   |
| Cyst   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Fatty Change                                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |
| Hematopoietic Cell Proliferation             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |
| Hyperplasia, Lymphoid                        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |
| Inflammation                                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 4 |   |   |   |   |
| Hepatocyte, Necrosis                         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 4 |   |   |   |   |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
+ .. Tissue examined microscopically  
X .. Lesion present  
I .. Insufficient tissue  
M .. Missing tissue  
A .. Autolysis precludes evaluation  
BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
1) Minimal 3) Moderate  
2) Mild 4) Marked

**Experiment Number:** 20725 - 04  
**Test Type:** CHRONIC  
**Route:** RESPIRATORY EXPOSURE WHOLE BODY  
**Species/Strain:** MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
**CAS Number:** 431-03-8

**Date Report Requested:** 04/15/2016  
**Time Report Requested:** 10:33:42  
**First Dose M/F:** 08/31/09 / 08/31/09  
**Lab:** BNW

| DAY ON TEST | B6C3F1 MICE FEMALE |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | ANIMAL ID | females<br>(cont...) |   |   |
|-------------|--------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----------|----------------------|---|---|
|             | 0                  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |           |                      | 0 | 0 |
| 7           | 7                  | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7         | 6                    | 0 |   |
| 3           | 3                  | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3         | 3                    | 2 |   |
| 3           | 1                  | 2 | 2 | 2 | 3 | 3 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 3 | 1 | 2 | 2 | 4 | 2         | 2                    | 0 |   |
| 0           | 0                  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0         | 0                    | 0 |   |
| 0           | 0                  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0         | 0                    | 0 |   |
| 5           | 5                  | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5         | 5                    | 5 |   |
| 0           | 0                  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2         | 2                    | 2 |   |
| 1           | 2                  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2         | 3                    | 4 |   |

Mesentery  
Fat, Necrosis

+ +  
1 1

Pancreas  
Inflammation, Chronic Active  
Acinus, Atrophy

+  
1

Salivary Glands

+ +

Stomach, Forestomach  
Infiltration Cellular, Lymphoid  
Inflammation  
Epithelium, Hyperplasia

+  
1  
1

Stomach, Glandular  
Infiltration Cellular, Lymphoid  
Inflammation

+  
1  
1

**CARDIOVASCULAR SYSTEM**

Blood Vessel

+ +

Heart  
Cardiomyopathy  
Inflammation, Chronic Active

+  
1  
2

**ENDOCRINE SYSTEM**

Adrenal Cortex  
Hyperplasia  
Inflammation, Chronic Active

+  
4

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04  
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 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
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 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE | DAY ON TEST |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | females<br>(cont...) |
|--------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------------------|
|                    | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                      |
| 25 ppm             | 7           | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 7 | 7 | 7 | 7 | 7                    |
|                    | 3           | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 9 | 3 | 3 | 3 | 3 | 3 | 8 | 3 | 3 | 3 | 3 | 3 | 3                    |
|                    | 3           | 1 | 2 | 2 | 2 | 3 | 3 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 3 | 1 | 2 | 2 | 4 | 2 | 2                    |
|                    | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                    |
|                    | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                    |
|                    | 5           | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5                    |
|                    | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2                    |
|                    | 1           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3                    |

Necrosis  
 Zona Fasciculata, Hypertrophy, Focal 1 4

Adrenal Medulla  
 Hyperplasia + + + + + + + + + + + + + + I + + + + + + + + 1

Islets, Pancreatic + + + + + + + + + + M + + + + + + + + + + + + + +

Parathyroid Gland  
 Hyperplasia +

Pituitary Gland  
 Pars Distalis, Angiectasis  
 Pars Distalis, Hyperplasia  
 Pars Distalis, Inflammation, Suppurative  
 Pars Intermedia, Angiectasis + 1

Thyroid Gland  
 Follicular Cell, Hyperplasia I + M 1

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

Clitoral Gland + + + + + + + + + M + + + + + + + + + + + + + + + +

Ovary  
 Angiectasis  
 Cyst + + + + + + + + + M + + + + + + + + + + + + + + + +  
 X X X X X X X X X

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
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**Experiment Number:** 20725 - 04  
**Test Type:** CHRONIC  
**Route:** RESPIRATORY EXPOSURE WHOLE BODY  
**Species/Strain:** MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
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**Lab:** BNW

|  |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <b>B6C3F1 MICE FEMALE</b><br><b>25 ppm</b> | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |   |
|  | ANIMAL ID   | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 |
|  |             | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 9 | 3 | 3 | 3 | 3 | 3 | 3 | 8 | 3 | 3 | 1 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |   |
|  |             | 3 | 1 | 2 | 2 | 2 | 3 | 3 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 4 | 2 | 2 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 0 |   |   |
|  |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |
|  |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |
|  |             | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |   |
|  |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  |             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |   |

females  
(cont...)

|                                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hyperplasia, Plasma Cell         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Lymph Node, Mesenteric Ectasia   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Hyperplasia, Lymphoid            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Spleen Amyloid Deposition        | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Hematopoietic Cell Proliferation |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hyperplasia, Lymphoid            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Necrosis                         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Thymus Atrophy                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Ectopic Parathyroid Gland        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hyperplasia, Lymphoid            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**INTEGUMENTARY SYSTEM**

|               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mammary Gland | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |   |
| Skin          | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

**MUSCULOSKELETAL SYSTEM**

|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bone Fibro-Osseous Lesion    | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Skeletal Muscle Degeneration |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
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 1-4 .. Lesion qualified as:  
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Experiment Number: 20725 - 04  
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 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

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 CAS Number: 431-03-8

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 Lab: BNW

| B6C3F1 MICE FEMALE<br>25 ppm | DAY ON TEST |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | females<br>(cont...) |
|------------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------------------|
|                              | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                      |
|                              | 7           | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 7 | 7 | 7 | 7 | 7 | 5 | 7 | 7 | 7 | 7 | 7 | 6 | 6 |                      |
|                              | 3           | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 9 | 3 | 3 | 3 | 3 | 3 | 8 | 3 | 3 | 1 | 3 | 3 | 3 | 2 | 2 |                      |
|                              | 3           | 1 | 2 | 2 | 2 | 3 | 3 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 3 | 1 | 2 | 2 | 4 | 2 | 2 | 3 | 3 | 0 |                      |
|                              | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                      |
|                              | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                      |
|                              | 5           | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |                      |
|                              | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |                      |
|                              | 1           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 |                      |

**NERVOUS SYSTEM**

|                                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Brain                             | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Infiltration Cellular, Lymphocyte |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 | + | + | + |
| Inflammation, Chronic             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |
| Peripheral Nerve                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | + |
| Degeneration                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |
| Spinal Cord                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | + |

**RESPIRATORY SYSTEM**

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larynx                                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Inflammation, Chronic Active                 |   |   |   |   | 4 |   | 1 | 1 | 1 |   | 1 | 1 |   |   |   |   | 1 |   | 1 | 1 |   |   |   |   | 1 |
| Respiratory Epithelium, Hyperplasia          |   |   |   | 1 | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Respiratory Epithelium, Metaplasia, Squamous |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Respiratory Epithelium, Necrosis             |   |   |   | 1 | 1 | 2 |   |   |   | 1 | 1 |   |   |   |   |   |   |   | 1 | 1 | 1 |   |   |   | 1 |
| Respiratory Epithelium, Regeneration         |   |   |   |   | 1 |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Squamous Epithelium, Hyperplasia             | 1 |   | 1 |   | 2 |   |   | 2 | 1 |   | 2 | 1 | 1 | 1 | 1 | 1 |   | 3 | 1 | 2 | 1 | 1 | 1 |   | 1 |
| Lung   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Inflammation, Chronic Active                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |
| Alveolus, Infiltration Cellular, Histiocyte  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |
| Alveolus, Epithelium, Hyperplasia            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Mediastinum, Inflammation, Suppurative       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Mediastinum, Inflammation, Chronic Active    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |
| Pleura, Inflammation, Chronic Active         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Nose   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked









Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>25 ppm   | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS                      |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------------------------|
|  | 0733        | 0733  | 0772  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  | 0771  |                               |
| ANIMAL ID  | 00526       | 00527 | 00528 | 00529 | 00530 | 00531 | 00532 | 00533 | 00534 | 00535 | 00536 | 00537 | 00538 | 00539 | 00540 | 00541 | 00542 | 00543 | 00544 | 00545 | 00546 | 00547 | 00548 | 00549 |                               |
| Mesentery<br>Fat, Necrosis   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 4<br>4 1.5                    |
| Pancreas<br>Inflammation, Chronic Active<br>Acinus, Atrophy  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50<br>1 1.0<br>1 1.0          |
| Salivary Glands  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50                            |
| Stomach, Forestomach<br>Infiltration Cellular, Lymphoid<br>Inflammation<br>Epithelium, Hyperplasia | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50<br>1 1.0<br>3 1.0<br>2 1.0 |
| Stomach, Glandular<br>Infiltration Cellular, Lymphoid<br>Inflammation                              | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50<br>1 1.0<br>1 1.0          |
| <b>CARDIOVASCULAR SYSTEM</b>   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |                               |
| Blood Vessel   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50                            |
| Heart<br>Cardiomyopathy<br>Inflammation, Chronic Active  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50<br>2 1.0<br>1 2.0          |
| <b>ENDOCRINE SYSTEM</b>  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |                               |
| Adrenal Cortex<br>Hyperplasia<br>Inflammation, Chronic Active                                      | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50<br>1 1.0<br>1 4.0          |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
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1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

| B6C3F1 MICE FEMALE                       | DAY ON TEST |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |     | * TOTALS |   |    |   |   |     |
|--|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----|----------|---|----|---|---|-----|
|  | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0   |          |   |    |   |   |     |
| 25 ppm                                   | 7           | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 6 | 7 |     |          |   |    |   |   |     |
| ANIMAL ID                                | 3           | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |     |          |   |    |   |   |     |
|  | 3           | 3 | 2 | 1 | 1 | 3 | 1 | 2 | 2 | 2 | 2 | 1 | 3 | 2 | 0 | 1 | 1 | 1 | 3 | 2 | 2 | 2 | 1 |     |          |   |    |   |   |     |
|  | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |     |          |   |    |   |   |     |
|  | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |     |          |   |    |   |   |     |
|  | 5           | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |     |          |   |    |   |   |     |
|  | 2           | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 |     |          |   |    |   |   |     |
|  | 6           | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 0 |     |          |   |    |   |   |     |
| Necrosis                                 |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 4.0 |          |   |    |   |   |     |
| Zona Fasciculata, Hypertrophy, Focal     |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 1.0 |          |   |    |   |   |     |
| Adrenal Medulla                          | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49  |          |   |    |   |   |     |
| Hyperplasia                              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 1.0 |          |   |    |   |   |     |
| Islets, Pancreatic                       | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49  |          |   |    |   |   |     |
| Parathyroid Gland                        | +           | + | + | M | + | + | + | + | + | + | M | M | + | + | + | + | M | + | + | + | + | + | + | 46  |          |   |    |   |   |     |
| Hyperplasia                              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 1.0 |          |   |    |   |   |     |
| Pituitary Gland                          | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50  |          |   |    |   |   |     |
| Pars Distalis, Angiectasis               |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 | 2.0 |          |   |    |   |   |     |
| Pars Distalis, Hyperplasia               | 1           | 2 | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |     |          | 2 | 1  | 1 | 6 | 1.7 |
| Pars Distalis, Inflammation, Suppurative |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 1.0 |          |   |    |   |   |     |
| Pars Intermedia, Angiectasis             |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 1.0 |          |   |    |   |   |     |
| Thyroid Gland                            | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 48  |          |   |    |   |   |     |
| Follicular Cell, Hyperplasia             |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 1.0 |          |   |    |   |   |     |
| <b>GENERAL BODY SYSTEM</b>               |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |     |          |   |    |   |   |     |
| NONE                                     |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |     |          |   |    |   |   |     |
| <b>GENITAL SYSTEM</b>                    |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |     |          |   |    |   |   |     |
| Clitoral Gland                           | +           | + | + | + | + | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + | + | 48  |          |   |    |   |   |     |
| Ovary                                    | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49  |          |   |    |   |   |     |
| Angiectasis                              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 1.0 |          |   |    |   |   |     |
| Cyst                                     | X           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X   | X        | X | 12 |   |   |     |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
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Experiment Number: 20725 - 04

Test Type: CHRONIC

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Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**

2,3-Butanedione

CAS Number: 431-03-8

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First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

| B6C3F1 MICE FEMALE<br>25 ppm                          | DAY ON TEST           |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | * TOTALS              |                       |                       |                       |                       |     |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----|
|   | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>9      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>0      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>3      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>2      |                       | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>0      | 0<br>7<br>3<br>1      |                       |     |
| ANIMAL ID   | 0<br>0<br>5<br>2<br>6 | 0<br>0<br>5<br>2<br>7 | 0<br>0<br>5<br>2<br>8 | 0<br>0<br>5<br>2<br>9 | 0<br>0<br>5<br>3<br>0 | 0<br>0<br>5<br>3<br>1 | 0<br>0<br>5<br>3<br>2 | 0<br>0<br>5<br>3<br>3 | 0<br>0<br>5<br>3<br>4 | 0<br>0<br>5<br>3<br>5 | 0<br>0<br>5<br>3<br>6 | 0<br>0<br>5<br>3<br>7 | 0<br>0<br>5<br>3<br>8 | 0<br>0<br>5<br>3<br>9 | 0<br>0<br>5<br>4<br>0 | 0<br>0<br>5<br>4<br>1 | 0<br>0<br>5<br>4<br>2 | 0<br>0<br>5<br>4<br>3 | 0<br>0<br>5<br>4<br>4 | 0<br>0<br>5<br>4<br>5 | 0<br>0<br>5<br>4<br>6 | 0<br>0<br>5<br>4<br>7 | 0<br>0<br>5<br>4<br>8 | 0<br>0<br>5<br>4<br>9 | 0<br>0<br>5<br>4<br>0 |     |
| Foreign Body  |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | X                     |                       |                       |                       |                       |                       |                       |                       |                       |                       | X                     | 3                     |     |
| Inflammation, Suppurative                             | 2                     | 3                     | 2                     | 2                     | 2                     | 4                     | 1                     | 1                     | 3                     | 2                     | 1                     | 2                     | 1                     | 2                     | 1                     | 2                     | 1                     | 1                     | 2                     | 1                     | 1                     | 2                     | 1                     | 1                     | 50                    | 1.6 |
| Lamina Propria, Fibrosis                              | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 47                    | 1.0                   |     |
| Lateral Wall, Inflammation, Chronic Active            |                       |                       | 2                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1                     | 2.0                   |     |
| Mucosa, Regeneration                                  | 1                     |                       | 2                     | 1                     |                       | 3                     | 1                     | 1                     | 2                     | 1                     | 1                     | 1                     |                       | 1                     | 1                     | 1                     |                       | 1                     | 1                     |                       | 1                     | 1                     | 1                     | 39                    | 1.2                   |     |
| Olfactory Epithelium, Accumulation, Hyaline Droplet   |                       |                       |                       | 1                     |                       |                       |                       | 1                     |                       |                       |                       | 1                     | 2                     |                       |                       |                       |                       | 1                     | 1                     | 1                     | 1                     |                       | 1                     | 17                    | 1.2                   |     |
| Olfactory Epithelium, Atrophy                         | 2                     | 3                     | 2                     | 3                     | 3                     |                       | 3                     | 3                     | 2                     | 2                     | 1                     | 3                     | 3                     | 3                     | 3                     | 3                     | 3                     | 3                     | 3                     | 2                     | 2                     | 3                     | 1                     | 2                     | 49                    | 2.2 |
| Olfactory Epithelium, Metaplasia, Respiratory         | 1                     | 1                     | 2                     | 1                     | 2                     | 4                     | 2                     | 1                     | 1                     | 1                     |                       | 1                     | 1                     | 2                     | 1                     | 1                     | 2                     | 2                     | 2                     | 2                     | 2                     | 2                     | 1                     | 46                    | 1.7                   |     |
| Olfactory Epithelium, Necrosis                        |                       |                       |                       |                       | 2                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1                     | 2.0                   |     |
| Respiratory Epithelium, Accumulation, Hyaline Droplet | 1                     | 1                     | 1                     | 1                     |                       |                       |                       |                       |                       |                       | 1                     | 1                     |                       | 2                     | 1                     | 1                     |                       |                       | 1                     | 1                     | 1                     |                       | 1                     | 28                    | 1.0                   |     |
| Respiratory Epithelium, Metaplasia, Squamous          | 1                     | 2                     | 1                     | 1                     | 1                     | 3                     | 1                     | 1                     | 2                     | 2                     | 1                     | 1                     | 1                     | 1                     | 1                     | 2                     | 1                     | 2                     | 1                     | 1                     | 2                     | 1                     | 1                     | 48                    | 1.3                   |     |
| Respiratory Epithelium, Necrosis                      | 1                     | 2                     | 1                     | 1                     |                       | 2                     |                       | 1                     | 2                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 2                     | 1                     | 1                     | 1                     | 1                     | 1                     |                       | 2                     | 33                    | 1.2                   |     |
| Septum, Perforation                                   |                       |                       | X                     |                       |                       |                       |                       |                       | X                     |                       |                       |                       |                       |                       | X                     |                       |                       |                       |                       |                       |                       |                       |                       | 6                     |                       |     |
| Turbinate, Atrophy                                    | 1                     | 1                     | 1                     | 1                     | 1                     | 2                     | 1                     | 1                     | 2                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 2                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 50                    | 1.1                   |     |
| Turbinate, Necrosis                                   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1                     | 1.0                   |     |
| Pleura  |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1                     |     |
| Trachea   | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | 50                    |                       |     |
| Inflammation, Chronic Active                          |                       |                       |                       |                       |                       |                       |                       |                       | 2                     | 1                     |                       |                       |                       |                       |                       |                       |                       | 1                     |                       |                       |                       |                       |                       | 4                     | 1.5                   |     |
| Necrosis  |                       |                       |                       |                       |                       |                       |                       |                       | 1                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1                     |                       | 3                     | 1.0                   |     |
| Epithelium, Hyperplasia                               |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1                     | 2.0                   |     |
| Epithelium, Regeneration                              |                       |                       |                       |                       |                       |                       |                       |                       | 1                     |                       | 1                     |                       | 1                     | 1                     |                       |                       |                       |                       |                       |                       |                       | 1                     |                       | 9                     | 1.1                   |     |

**SPECIAL SENSES SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-----|
| Eye   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |     |
| Anterior Chamber, Inflammation, Suppurative |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   | 4  | 1.8 |
| Cornea, Fibrosis                            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   | 1  | 1.0 |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked



Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>25 ppm    | DAY ON TEST | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>2 | 0<br>6<br>3<br>9 | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>2 | 0<br>6<br>3<br>0 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>2 | 0<br>6<br>3<br>0 | 0<br>7<br>3<br>1 | * TOTALS |                  |
|---------------------------------|-------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|----------|------------------|
|                                 | ANIMAL ID   | 0<br>5<br>2<br>6 | 0<br>5<br>2<br>7 | 0<br>5<br>2<br>8 | 0<br>5<br>2<br>9 | 0<br>5<br>3<br>0 | 0<br>5<br>3<br>1 | 0<br>5<br>3<br>2 | 0<br>5<br>3<br>3 | 0<br>5<br>3<br>4 | 0<br>5<br>3<br>5 | 0<br>5<br>3<br>6 | 0<br>5<br>3<br>7 | 0<br>5<br>3<br>8 | 0<br>5<br>3<br>9 | 0<br>5<br>4<br>0 | 0<br>5<br>4<br>1 | 0<br>5<br>4<br>2 | 0<br>5<br>4<br>3 | 0<br>5<br>4<br>4 | 0<br>5<br>4<br>5 | 0<br>5<br>4<br>6 |          | 0<br>5<br>4<br>7 |
| Cornea, Inflammation, Acute     |             |                  | 1                | 1                | 1                | 1                | 1                |                  | 1                |                  |                  |                  | 1                |                  |                  |                  | 1                | 1                | 2                |                  |                  |                  | 1        | 20 1.2           |
| Cornea, Mineralization          |             | 1                |                  | 1                |                  |                  | 1                |                  |                  |                  |                  | 1                |                  |                  |                  |                  |                  | 1                | 1                |                  |                  | 1                |          | 13 1.0           |
| Cornea, Epithelium, Hyperplasia |             | 1                |                  | 1                |                  |                  | 1                |                  |                  | 1                |                  |                  | 1                |                  |                  |                  |                  |                  |                  | 1                |                  |                  |          | 10 1.1           |
| Cornea, Epithelium, Ulcer       |             |                  |                  |                  |                  | 1                |                  |                  | 2                |                  | 1                |                  |                  |                  |                  |                  |                  |                  | 1                |                  |                  | 2                |          | 10 1.4           |
| Harderian Gland<br>Hyperplasia  |             | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +        | 50<br>1 1.0      |
| <b>URINARY SYSTEM</b>           |             |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |          |                  |
| Kidney                          |             | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +        | 50               |
| Amyloid Deposition              |             |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |          | 1 4.0            |
| Hyperplasia, Lymphoid           |             | 1                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 2                |                  |                  |                  | 1                |                  |                  |                  |                  |                  |          | 3 1.3            |
| Infarct                         |             |                  |                  |                  |                  |                  |                  | 1                |                  |                  |                  |                  | 1                |                  |                  |                  |                  |                  |                  |                  |                  |                  |          | 3 1.0            |
| Metaplasia, Osseous             |             |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 1                |                  |          | 1 1.0            |
| Nephropathy                     |             |                  |                  | 2                |                  |                  |                  |                  | 1                | 1                |                  |                  |                  |                  | 1                |                  |                  |                  |                  |                  |                  |                  |          | 6 1.5            |
| Urinary Bladder                 |             | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +        | 50               |
| Hyperplasia, Lymphoid           |             |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |          | 1 1.0            |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

|  |             |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                              |                       |                       |
|--|-------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------------|-----------------------|-----------------------|
| <b>B6C3F1 MICE FEMALE</b><br><br><b>50 ppm</b> | DAY ON TEST | 0<br>7<br>3<br>2      | 0<br>3<br>4<br>6      | 0<br>6<br>4<br>6      | 0<br>7<br>3<br>2      | 0<br>4<br>6<br>6      | 0<br>7<br>3<br>0      | 0<br>2<br>6<br>3      | 0<br>7<br>3<br>0      | 0<br>4<br>6<br>6      | 0<br>6<br>9<br>0      | 0<br>6<br>6<br>1      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>1      | 0<br>2<br>7<br>1      | 0<br>3<br>5<br>8      | 0<br>5<br>3<br>5      | 0<br>7<br>3<br>5      | 0<br>6<br>5<br>1      | 0<br>7<br>3<br>2      | 0<br>7<br>5<br>1      | 0<br>7<br>3<br>1      | 0<br>5<br>1<br>5      | <b>females<br/>(cont...)</b> |                       |                       |
|  | ANIMAL ID   | 0<br>0<br>7<br>0<br>1 | 0<br>0<br>7<br>0<br>2 | 0<br>0<br>7<br>0<br>3 | 0<br>0<br>7<br>0<br>4 | 0<br>0<br>7<br>0<br>5 | 0<br>0<br>7<br>0<br>6 | 0<br>0<br>7<br>0<br>7 | 0<br>0<br>7<br>0<br>8 | 0<br>0<br>7<br>0<br>9 | 0<br>0<br>7<br>0<br>0 | 0<br>0<br>7<br>0<br>1 | 0<br>0<br>7<br>0<br>1 | 0<br>0<br>7<br>0<br>1 | 0<br>0<br>7<br>0<br>1 | 0<br>0<br>7<br>0<br>1 | 0<br>0<br>7<br>0<br>1 | 0<br>0<br>7<br>0<br>1 | 0<br>0<br>7<br>0<br>1 | 0<br>0<br>7<br>0<br>2 | 0<br>0<br>7<br>0<br>2 | 0<br>0<br>7<br>0<br>2 | 0<br>0<br>7<br>0<br>3 |                              | 0<br>0<br>7<br>0<br>4 | 0<br>0<br>7<br>0<br>5 |

**ALIMENTARY SYSTEM**

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Esophagus<br>Periesophageal Tissue, Inflammation, Chronic Active | + | + | + | + | + | + | + | + | + | + | 1 | + | + | + | + | + | + | 2 | + | 1 | + | + | + | + | + | + |
| Gallbladder<br>Inflammation                                      | + | + | A | + | + | + | + | + | + | + | A | + | + | + | + | + | + | A | + | + | + | + | + | + | + | A |
| Intestine Large, Cecum   | + | + | A | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A |
| Intestine Large, Colon   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A |
| Intestine Large, Rectum  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Intestine Small, Duodenum  | + | + | A | + | + | + | + | + | + | + | A | + | + | + | + | + | + | A | + | + | + | A | + | + | + | + |
| Intestine Small, Ileum   | + | + | A | + | + | + | + | + | + | + | A | + | + | + | A | + | + | A | + | + | + | + | + | + | + | A |
| Intestine Small, Jejunum   | + | + | A | + | + | + | + | + | + | + | A | + | + | + | + | + | + | A | + | + | + | + | + | + | + | A |
| Liver<br>Angiectasis   | + | + | + | + | + | + | + | + | + | + | + | 2 | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Basophilic Focus   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Cyst   |   |   |   |   |   |   |   | X |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Eosinophilic Focus   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |
| Hematopoietic Cell Proliferation                                 |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hepatodiaphragmatic Nodule                                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Infiltration Cellular, Lymphocyte                                |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Tension Lipidosis  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Centrilobular, Hepatocyte, Hypertrophy                           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
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 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
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 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

|                           |               |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                              |        |  |
|---------------------------|---------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------------|--------|--|
| <b>B6C3F1 MICE FEMALE</b> | DAY ON TEST   | 0<br>7                | 0<br>3                | 0<br>6                | 0<br>7                | 0<br>4                | 0<br>7                | 0<br>2                | 0<br>7                | 0<br>4                | 0<br>6                | 0<br>6                | 0<br>6                | 0<br>7                | 0<br>7                | 0<br>2                | 0<br>7                | 0<br>3                | 0<br>3                | 0<br>7                | 0<br>3                | 0<br>5                | 0<br>7                | 0<br>7                | 0<br>7                | 0<br>5                | 0<br>1                       | 0<br>5 |  |
|                           | <b>50 ppm</b> | 3<br>2                | 4<br>6                | 4<br>6                | 3<br>2                | 6<br>6                | 3<br>2                | 6<br>0                | 3<br>3                | 8<br>0                | 5<br>6                | 6<br>9                | 3<br>0                | 3<br>1                | 7<br>1                | 2<br>8                | 7<br>5                | 3<br>9                | 5<br>3                | 5<br>5                | 3<br>3                | 5<br>5                | 3<br>1                | 5<br>2                | 3<br>1                | 3<br>1                | 1<br>5                       |        |  |
|                           | ANIMAL ID     | 0<br>0<br>7<br>0<br>1 | 0<br>0<br>7<br>0<br>2 | 0<br>0<br>7<br>0<br>3 | 0<br>0<br>7<br>0<br>4 | 0<br>0<br>7<br>0<br>5 | 0<br>0<br>7<br>0<br>6 | 0<br>0<br>7<br>0<br>7 | 0<br>0<br>7<br>0<br>8 | 0<br>0<br>7<br>0<br>9 | 0<br>0<br>7<br>0<br>0 | 0<br>0<br>7<br>0<br>1 | 0<br>0<br>7<br>0<br>2 | 0<br>0<br>7<br>0<br>3 | 0<br>0<br>7<br>0<br>4 | 0<br>0<br>7<br>0<br>5 | 0<br>0<br>7<br>0<br>6 | 0<br>0<br>7<br>0<br>7 | 0<br>0<br>7<br>0<br>8 | 0<br>0<br>7<br>0<br>9 | 0<br>0<br>7<br>0<br>0 | 0<br>0<br>7<br>0<br>1 | 0<br>0<br>7<br>0<br>2 | 0<br>0<br>7<br>0<br>3 | 0<br>0<br>7<br>0<br>4 | 0<br>0<br>7<br>0<br>5 | <b>females<br/>(cont...)</b> |        |  |

Valve, Inflammation, Chronic Active

**ENDOCRINE SYSTEM**

|                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Adrenal Cortex                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Angiectasis                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hematopoietic Cell Proliferation     |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hemorrhage                           |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hyperplasia                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |
| Hypertrophy                          |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Zona Fasciculata, Hypertrophy, Focal |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |
| Adrenal Medulla                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Hyperplasia                          |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |
| Islets, Pancreatic                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Parathyroid Gland                    | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Pituitary Gland                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Pars Distalis, Hyperplasia           |   |   |   |   |   |   |   | I |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Thyroid Gland                        | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Inflammation, Chronic Active         |   |   |   |   |   |   |   |   |   |   |   | 1 | 2 |   |   |   |   |   |   |   |   |   |   |   | 1 | 1 |   |
| Mineralization                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
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1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
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 Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm                      | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID | females<br>(cont...) |                  |                  |                  |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|----------------------|------------------|------------------|------------------|
|   | 0<br>7<br>3<br>2 | 0<br>3<br>4<br>6 | 0<br>6<br>4<br>6 | 0<br>7<br>3<br>2 | 0<br>4<br>6<br>6 | 0<br>7<br>3<br>2 | 0<br>2<br>6<br>0 | 0<br>7<br>3<br>3 | 0<br>4<br>8<br>0 | 0<br>6<br>5<br>6 | 0<br>6<br>6<br>9 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>2<br>7<br>1 | 0<br>7<br>0<br>8 | 0<br>3<br>5<br>5 | 0<br>5<br>3<br>9 | 0<br>7<br>6<br>3 | 0<br>6<br>5<br>5 | 0<br>7<br>3<br>1 |           |                      | 0<br>2<br>5<br>2 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 |
| Clitoral Gland                                    | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | M                | +                | +                | +                | +                | M         | +                    | +                | +                |                  |
| Ovary   | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                | +                |                  |
| Cyst  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | X                |                  |                  |                  |                  |                  | X                | X                |                  | X                | X         |                      |                  |                  |                  |
| Inflammation                                      |                  |                  |                  |                  |                  |                  |                  |                  | 4                |                  | 2                |                  |                  | 2                |                  |                  |                  |                  |                  | 1                |           |                      | 3                |                  |                  |
| Uterus  | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                |                  |                  |
| Endometrium, Hyperplasia, Cystic                  | 2                | 2                | 1                |                  | 2                | 4                | 2                | 1                |                  | 3                | 3                |                  | 1                | 1                | 1                |                  | 3                | 2                |                  | 3                |           |                      | 1                | 2                |                  |
| <b>HEMATOPOIETIC SYSTEM</b>                       |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |
| Bone Marrow                                       | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                |                  |                  |
| Myeloid Cell, Hyperplasia                         |                  | 2                | 3                | 3                | 2                |                  |                  | 2                | 2                | 1                |                  | 3                | 2                | 2                | 1                | 2                |                  | 1                | +                | +                | +         | +                    | 1                | 2                |                  |
| Lymph Node  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | +                | +                | +                |                  |                  |                  |                  |           |                      | +                |                  |                  |
| Deep Cervical, Hyperplasia, Lymphoid              |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 2                | 2                |                  |                  |                  |                  |                  |                  |           |                      | 3                |                  |                  |
| Deep Cervical, Infiltration Cellular, Plasma Cell |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |
| Lymph Node, Bronchial                             | M                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | I                    | +                | +                |                  |
| Hematopoietic Cell Proliferation                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |
| Hyperplasia, Lymphoid                             |                  |                  |                  |                  |                  | 1                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |
| Inflammation, Chronic Active                      |                  | 1                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           | 4                    |                  |                  |                  |
| Necrosis, Lymphoid                                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 1                |                  |                  |                  |                  |           |                      |                  |                  |                  |
| Lymph Node, Mandibular                            | +                | +                | +                | M                | M                | +                | +                | +                | +                | +                | M                | +                | +                | +                | +                | +                | +                | M                | M                | +                | +         | +                    | +                | M                |                  |
| Ectasia   |                  |                  |                  |                  |                  | 2                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |
| Hematopoietic Cell Proliferation                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 3                |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |
| Hyperplasia, Lymphoid                             |                  | 2                |                  |                  |                  | 1                |                  |                  |                  |                  |                  |                  | 2                |                  |                  |                  |                  | 1                |                  |                  |           |                      | 2                |                  |                  |
| Hyperplasia, Plasma Cell                          |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 3                |                  |                  | 2                |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |
| Infiltration Cellular, Plasma Cell                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           | 3                    |                  |                  |                  |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID        | females<br>(cont...) |                  |  |  |
|------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|----------------------|------------------|--|--|
|                              | 0<br>7<br>3<br>2 | 0<br>3<br>4<br>6 | 0<br>6<br>4<br>6 | 0<br>7<br>3<br>2 | 0<br>4<br>6<br>6 | 0<br>7<br>3<br>2 | 0<br>2<br>6<br>0 | 0<br>7<br>3<br>3 | 0<br>4<br>6<br>8 | 0<br>6<br>6<br>5 | 0<br>6<br>9<br>6 | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>1 | 0<br>2<br>7<br>1 | 0<br>7<br>0<br>8 | 0<br>3<br>5<br>5 | 0<br>7<br>3<br>3 | 0<br>6<br>5<br>5 | 0<br>7<br>3<br>1 | 0<br>2<br>5<br>2 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>5<br>3<br>1 | 0<br>7<br>3<br>1 |                  |                  |                      |                  |  |  |
|                              | 0<br>7<br>3<br>2 | 0<br>3<br>4<br>6 | 0<br>6<br>4<br>6 | 0<br>7<br>3<br>2 | 0<br>4<br>6<br>6 | 0<br>7<br>3<br>2 | 0<br>2<br>6<br>0 | 0<br>7<br>3<br>3 | 0<br>4<br>6<br>8 | 0<br>6<br>6<br>5 | 0<br>6<br>9<br>6 | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>1 | 0<br>2<br>7<br>1 | 0<br>3<br>5<br>5 | 0<br>7<br>3<br>3 | 0<br>6<br>5<br>5 | 0<br>7<br>3<br>1 | 0<br>2<br>5<br>2 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>5<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>5<br>3<br>1 | 0<br>7<br>3<br>1 |                      |                  |  |  |
|                              | 0<br>7<br>3<br>2 | 0<br>3<br>4<br>6 | 0<br>6<br>4<br>6 | 0<br>7<br>3<br>2 | 0<br>4<br>6<br>6 | 0<br>7<br>3<br>2 | 0<br>2<br>6<br>0 | 0<br>7<br>3<br>3 | 0<br>4<br>6<br>8 | 0<br>6<br>6<br>5 | 0<br>6<br>9<br>6 | 0<br>7<br>3<br>3 | 0<br>7<br>3<br>1 | 0<br>2<br>7<br>1 | 0<br>3<br>5<br>5 | 0<br>7<br>3<br>3 | 0<br>6<br>5<br>5 | 0<br>7<br>3<br>1 | 0<br>2<br>5<br>2 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>5<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>5<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>5<br>3<br>1     | 0<br>7<br>3<br>1 |  |  |

Infiltration Cellular, Polymorphonuclear  
 Inflammation, Suppurative

1

Lymph Node, Mediastinal  
 Hyperplasia, Lymphoid  
 Hyperplasia, Plasma Cell  
 Inflammation, Chronic Active  
 Necrosis, Lymphoid

+ M + + + + + + + M + + I + + I + + + + I + + + +  
 2  
 2  
 2  
 1

Lymph Node, Mesenteric  
 Hematopoietic Cell Proliferation  
 Hyperplasia, Lymphoid

+  
 2  
 1  
 1

Spleen  
 Angiectasis  
 Hematopoietic Cell Proliferation  
 Hyperplasia, Lymphoid  
 Inflammation  
 Necrosis  
 Lymphoid Follicle, Atrophy

+  
 3  
 1 1 4 3  
 3  
 3 1  
 2

Thymus  
 Atrophy  
 Ectopic Parathyroid Gland  
 Hyperplasia, Lymphoid  
 Inflammation, Chronic Active

+ + + I +  
 1  
 2 3 2  
 1  
 3  
 4 1 2

**INTEGUMENTARY SYSTEM**

Mammary Gland

+ I + + + +

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
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1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm                           | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID | females<br>(cont...) |                  |                  |                  |                  |                  |
|--|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|----------------------|------------------|------------------|------------------|------------------|------------------|
|  | 0<br>7<br>3<br>2 | 0<br>3<br>4<br>6 | 0<br>6<br>4<br>6 | 0<br>7<br>3<br>2 | 0<br>4<br>6<br>6 | 0<br>7<br>3<br>0 | 0<br>2<br>6<br>0 | 0<br>7<br>3<br>3 | 0<br>4<br>6<br>0 | 0<br>6<br>6<br>6 | 0<br>7<br>3<br>0 | 0<br>4<br>6<br>9 | 0<br>6<br>6<br>3 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>2<br>7<br>1 | 0<br>7<br>0<br>8 | 0<br>3<br>5<br>5 | 0<br>7<br>3<br>3 | 0<br>6<br>5<br>5 |           |                      | 0<br>7<br>3<br>1 | 0<br>2<br>7<br>2 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>5<br>1<br>5 |
| Respiratory Epithelium, Hyperplasia                    |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Respiratory Epithelium, Metaplasia, Atypical, Squamous |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Respiratory Epithelium, Metaplasia, Squamous           | 2                | 2                | 4                | 2                | 2                | 3                | 1                | 4                | 4                | 4                | 1                | 4                | 3                | 4                | 2                | 4                | 2                | 4                | 4                | 4                | 4         | 3                    | 3                | 4                | 2                |                  |                  |
| Respiratory Epithelium, Necrosis                       | 1                | 1                | 2                | 1                | 1                |                  | 1                | 1                | 1                | 3                | 1                | 1                | 1                |                  | 1                |                  |                  | 1                | 3                | 1                |           |                      | 1                | 1                |                  |                  |                  |
| Respiratory Epithelium, Regeneration                   | 3                | 3                |                  | 2                | 2                |                  | 1                |                  |                  |                  | 1                | 1                | 1                | 1                | 2                |                  | 1                |                  | 1                | 1                | 1         | 1                    | 2                | 1                |                  |                  |                  |
| Squamous Epithelium, Hyperplasia                       |                  | 3                | 1                | 2                |                  | 2                |                  | 2                |                  | 3                | 3                | 3                | 1                | 1                | 2                | 2                | 2                | 1                | 2                | 2                | 2         | 1                    | 2                | 2                |                  |                  |                  |
| Lung   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Foreign Body   | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                | +                |                  |                  |                  |
| Inflammation, Suppurative                              |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Inflammation, Chronic Active                           |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Necrosis   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Alveolus, Infiltration Cellular, Histiocyte            |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Alveolus, Inflammation, Suppurative                    |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Artery, Mediastinum, Inflammation, Chronic Active      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Bronchiole, Inflammation, Suppurative                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Bronchiole, Inflammation, Chronic                      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Bronchiole, Epithelium, Hyperplasia                    |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Bronchus, Inflammation, Suppurative                    |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Bronchus, Regeneration                                 |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Bronchus, Epithelium, Degeneration                     |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Bronchus, Epithelium, Necrosis                         |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Bronchus, Epithelium, Regeneration                     | 2                |                  | 3                |                  | 3                | 2                |                  | 4                | 3                | 3                | 2                | 3                |                  | 1                | 4                | 2                | 3                | 3                | 3                | 2                | 1         |                      | 3                |                  |                  |                  |                  |
| Bronchus, Smooth Muscle, Mineralization                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Bronchus, Submucosa, Fibrosis                          |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Interstitial, Fibrosis                                 |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Mediastinum, Inflammation, Suppurative                 |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |
| Mediastinum, Inflammation, Chronic Active              | 1                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |

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**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
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 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm                          | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID | females<br>(cont...) |                  |                  |                  |                  |                  |  |  |  |  |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|----------------------|------------------|------------------|------------------|------------------|------------------|--|--|--|--|
|   | 0<br>7<br>3<br>2 | 0<br>3<br>4<br>6 | 0<br>6<br>4<br>6 | 0<br>7<br>4<br>2 | 0<br>4<br>3<br>6 | 0<br>7<br>6<br>2 | 0<br>2<br>3<br>0 | 0<br>7<br>6<br>3 | 0<br>4<br>8<br>0 | 0<br>6<br>5<br>6 | 0<br>6<br>6<br>9 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>2<br>7<br>1 | 0<br>7<br>0<br>8 | 0<br>3<br>2<br>5 | 0<br>5<br>5<br>9 | 0<br>7<br>3<br>5 | 0<br>6<br>5<br>1 | 0<br>7<br>2<br>2 |           |                      | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>5<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>5<br>3<br>1 |  |  |  |  |
| Pleura, Inflammation, Suppurative                     | 2                |                  |                  |                  |                  |                  |                  |                  |                  |                  | 1                |                  |                  |                  |                  |                  |                  |                  |                  |                  | 2         |                      |                  |                  |                  |                  |                  |  |  |  |  |
| Nose  | +                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |  |  |  |  |
| Foreign Body  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | X         | X                    |                  |                  |                  |                  |                  |  |  |  |  |
| Inflammation, Suppurative                             | 3                | 4                | 4                | 4                | 4                | 3                | 2                | 4                | 3                | 3                | 2                | 4                | 4                | 4                | 4                | 4                | 4                | 3                | 3                | 2                | 4         | 4                    | 2                | 2                |                  |                  |                  |  |  |  |  |
| Glands, Respiratory Epithelium, Cyst                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | X         |                      |                  |                  |                  |                  |                  |  |  |  |  |
| Glands, Sinus, Metaplasia, Respiratory                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 1         | 1                    |                  |                  |                  |                  |                  |  |  |  |  |
| Lamina Propria, Fibrosis                              | 2                | 2                | 2                | 3                | 2                | 2                | 1                | 1                | 1                | 2                | 1                | 2                | 2                | 2                | 1                | 2                | 1                | 2                |                  | 3                | 2         | 1                    | 2                | 3                | 1                |                  |                  |  |  |  |  |
| Mucosa, Regeneration                                  | 1                | 3                | 2                | 3                | 3                | 2                | 1                | 3                | 3                | 1                | 1                | 4                | 3                | 3                | 2                | 4                | 2                | 1                | 3                | 2                | 1         | 2                    | 2                | 2                | 2                |                  |                  |  |  |  |  |
| Olfactory Epithelium, Accumulation, Hyaline Droplet   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 1         | 1                    |                  |                  |                  |                  |                  |  |  |  |  |
| Olfactory Epithelium, Atrophy                         | 2                | 1                | 3                | 1                | 1                | 3                | 1                | 1                | 1                | 1                | 2                | 1                | 1                | 1                | 1                | 2                | 1                | 1                | 1                | 1                | 2         | 1                    | 1                | 1                |                  |                  |                  |  |  |  |  |
| Olfactory Epithelium, Metaplasia, Respiratory         | 3                | 4                | 2                | 4                | 4                | 2                |                  | 4                | 3                | 4                | 1                | 4                | 4                | 4                | 3                | 4                | 2                | 4                | 4                | 3                | 4         | 3                    | 4                | 3                | 4                |                  |                  |  |  |  |  |
| Olfactory Epithelium, Necrosis                        |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 3         |                      |                  |                  |                  |                  |                  |  |  |  |  |
| Respiratory Epithelium, Accumulation, Hyaline Droplet |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           | 1                    |                  |                  |                  |                  |                  |  |  |  |  |
| Respiratory Epithelium, Hyperplasia                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           | 1                    |                  |                  |                  |                  |                  |  |  |  |  |
| Respiratory Epithelium, Metaplasia, Squamous          | 3                | 4                | 3                | 3                | 4                | 2                | 2                | 3                | 2                | 3                | 2                | 2                | 3                | 2                | 3                | 2                | 3                | 3                | 4                | 3                | 3         | 3                    | 3                | 3                | 3                |                  |                  |  |  |  |  |
| Respiratory Epithelium, Necrosis                      | 2                | 2                | 2                | 2                | 1                | 2                | 1                | 2                | 1                | 1                | 1                | 2                | 2                | 2                | 2                | 2                | 2                | 2                | 2                | 1                | 2         | 2                    | 2                | 2                | 2                |                  |                  |  |  |  |  |
| Septum, Perforation                                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | X         |                      |                  |                  |                  |                  |                  |  |  |  |  |
| Turbinate, Atrophy                                    | 2                | 2                | 2                | 2                | 2                | 1                | 2                | 2                | 3                | 2                | 2                | 3                | 3                | 2                | 2                | 1                | 2                | 2                | 2                | 2                | 2         | 2                    | 3                | 2                | 3                |                  |                  |  |  |  |  |
| Turbinate, Necrosis                                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 1         | 1                    |                  |                  |                  |                  |                  |  |  |  |  |
| Trachea   | +                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |                  |                  |  |  |  |  |
| Inflammation, Chronic Active                          | 1                |                  | 4                | 2                | 1                | 1                |                  | 1                | 4                | 4                |                  | 2                | 1                | 1                |                  | 2                |                  | 4                | 1                | 4                | 1         |                      | 1                | 2                | 1                |                  |                  |  |  |  |  |
| Necrosis  | 3                | 1                | 4                | 2                | 1                | 1                | 1                | 1                | 4                | 4                |                  | 1                | 1                | 1                | 1                | 1                | 1                | 2                | 1                | 4                | 1         | 1                    | 1                | 2                | 3                |                  |                  |  |  |  |  |
| Carina, Inflammation, Chronic Active                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           | 1                    |                  |                  |                  |                  |                  |  |  |  |  |
| Carina, Epithelium, Regeneration                      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           | 1                    |                  |                  |                  |                  |                  |  |  |  |  |
| Carina, Submucosa, Fibrosis                           |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           | 1                    |                  |                  |                  |                  |                  |  |  |  |  |
| Carina, Submucosa, Mineralization                     |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           | 2                    |                  |                  |                  |                  |                  |  |  |  |  |
| Epithelium, Hyperplasia                               |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 2         |                      |                  |                  |                  |                  |                  |  |  |  |  |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
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1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm     | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID | females<br>(cont...) |
|----------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|----------------------|
|                                  | 0<br>7<br>3<br>2 | 0<br>3<br>4<br>6 | 0<br>6<br>4<br>6 | 0<br>7<br>3<br>2 | 0<br>4<br>6<br>6 | 0<br>7<br>3<br>2 | 0<br>2<br>6<br>0 | 0<br>7<br>3<br>3 | 0<br>4<br>6<br>0 | 0<br>6<br>8<br>6 | 0<br>6<br>5<br>9 | 0<br>6<br>6<br>0 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>2<br>7<br>1 | 0<br>7<br>0<br>8 | 0<br>3<br>5<br>5 | 0<br>5<br>3<br>9 | 0<br>7<br>6<br>3 | 0<br>6<br>5<br>5 | 0<br>7<br>3<br>1 | 0<br>2<br>5<br>2 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>5<br>1<br>5 |           |                      |
| Epithelium, Metaplasia, Squamous |                  |                  |                  |                  |                  | 1                |                  | 2                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |
| Epithelium, Regeneration         | 3                | 3                |                  | 3                | 3                | 3                | 3                | 2                | 3                | 1                | 4                | 3                | 3                | 3                | 3                | 4                | 3                | 4                | 3                | 2                | 3                | 3                | 3                | 3                | 1                |           |                      |
| Glands, Hyperplasia              |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 2                |                  |                  |                  |                  |                  |                  |                  |           |                      |
| Lumen, Exudate                   |                  |                  | 4                |                  |                  |                  |                  |                  |                  | 4                | 3                |                  |                  |                  |                  |                  |                  | 4                |                  | 4                |                  |                  |                  |                  |                  |           |                      |
| Submucosa, Fibrosis              | 1                |                  | 1                | 1                | 3                | 3                |                  | 3                | 3                | 4                | 1                | 3                | 2                | 4                |                  | 2                |                  | 3                | 4                | 3                | 2                |                  | 3                | 2                | 1                |           |                      |

**SPECIAL SENSES SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ear   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation, Suppurative                   |   |   |   |   |   | + |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Eye   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Anterior Chamber, Inflammation, Suppurative |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Cornea, Inflammation, Acute                 | 1 |   | 2 | 1 |   | 1 |   | 1 | 1 |   |   | 1 | 1 | 1 |   |   |   |   |   |   |   |   | 1 |   |   |   |
| Cornea, Mineralization                      |   |   |   |   |   |   |   | 3 |   |   |   |   | 1 | 1 |   | 1 |   | 1 | 1 |   |   | 1 | 1 | 1 | 2 |   |
| Cornea, Necrosis                            |   |   | 2 |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Cornea, Epithelium, Hyperplasia             | 1 |   |   |   |   |   |   |   |   |   |   |   | 1 | 1 |   |   |   |   |   |   | 1 |   |   |   |   |   |
| Cornea, Epithelium, Ulcer                   |   |   |   |   |   |   |   | 2 |   |   |   |   | 1 |   |   | 2 |   |   | 2 |   |   |   | 2 | 1 | 2 |   |
| Lens, Cataract                              |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Harderian Gland                             | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Hyperplasia                                 | 1 |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation                                |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Pigmentation, Porphyrin                     |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**URINARY SYSTEM**

|              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kidney       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Infarct      |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 4 |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
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 Lab: BNW

|                           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |                 |
|---------------------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|
| <b>B6C3F1 MICE FEMALE</b> | DAY ON TEST | 0730  | 0412  | 0670  | 0723  | 0626  | 0773  | 0773  | 0223  | 0666  | 0773  | 0773  | 0334  | 0445  | 0566  | 0337  | 0555  | 0557  | 0744  | 0666  | 0773  | 0446  | 0667  | <b>* TOTALS</b> |
|                           | ANIMAL ID   | 00726 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 | 00077 |                 |

**ALIMENTARY SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |           |            |            |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----------|-----------|------------|------------|--|
| Esophagus   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>50</b> |           |            |            |  |
| Periesophageal Tissue, Inflammation, Chronic Active |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   | 1 |   | 2 |   | 1 |   |   | 1 |   |           | <b>9</b>  | <b>1.6</b> |            |  |
| Gallbladder Inflammation                            | + | A | + | + | A | + | + | + | A | + | + | + | M | A | + | A | A | + | A | + | + | + | A | +         | <b>37</b> | <b>3</b>   | <b>1.0</b> |  |
| Intestine Large, Cecum                              | + | A | I | + | + | + | + | + | A | + | + | + | + | + | + | A | A | + | A | + | + | + | + | +         | <b>41</b> |            |            |  |
| Intestine Large, Colon                              | + | A | + | + | + | + | + | + | A | + | + | + | + | + | + | + | A | + | + | + | + | + | + | +         | <b>46</b> |            |            |  |
| Intestine Large, Rectum                             | + | A | + | + | + | + | + | + | A | I | + | + | + | + | + | A | I | + | A | + | I | + | + | +         | <b>43</b> |            |            |  |
| Intestine Small, Duodenum                           | + | A | + | + | A | + | + | + | A | + | + | + | + | + | + | A | A | + | A | + | A | + | + | M         | +         | <b>38</b>  |            |  |
| Intestine Small, Ileum                              | + | A | + | + | + | + | + | + | A | + | + | + | + | + | + | A | A | + | A | + | + | + | + | A         | +         | <b>39</b>  |            |  |
| Intestine Small, Jejunum                            | + | A | + | + | + | + | + | + | A | + | + | + | + | A | + | + | A | + | A | + | A | + | + | A         | +         | <b>39</b>  |            |  |
| Liver   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +         | <b>50</b> |            |            |  |
| Angiectasis   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |           | <b>1</b>   | <b>2.0</b> |  |
| Basophilic Focus                                    | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |           | <b>1</b>   |            |  |
| Cyst  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |           | <b>2</b>   |            |  |
| Eosinophilic Focus                                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |           | <b>1</b>   |            |  |
| Hematopoietic Cell Proliferation                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |           | <b>1</b>   | <b>2.0</b> |  |
| Hepatodiaphragmatic Nodule                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |           |           | <b>1</b>   | <b>2.0</b> |  |
| Infiltration Cellular, Lymphocyte                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2         |           | <b>1</b>   | <b>2.0</b> |  |
| Tension Lipidosis                                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |           | <b>1</b>   | <b>1.0</b> |  |
| Centrilobular, Hepatocyte, Hypertrophy              |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |           |           | <b>1</b>   | <b>1.0</b> |  |

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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

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 Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   | * TOTALS  |            |
|------------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|-----------|------------|
|                              | 0730        | 0731 | 0732 | 0733 | 0734 | 0735 | 0736 | 0737 | 0738 | 0739 | 0740 | 0741 | 0742 | 0743 | 0744 | 0745 | 0746 | 0747 | 0748 | 0749 | 0750 | 0751 | 0752 |   |           |            |
|                              | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |   |           |            |
|                              | 7           | 4    | 6    | 7    | 2    | 6    | 7    | 7    | 2    | 6    | 7    | 6    | 7    | 3    | 4    | 5    | 6    | 3    | 7    | 5    | 5    | 7    | 4    | 6 | 7         |            |
|                              | 3           | 1    | 7    | 3    | 6    | 9    | 3    | 3    | 2    | 9    | 3    | 0    | 3    | 4    | 2    | 8    | 9    | 2    | 1    | 9    | 4    | 3    | 0    | 0 | 3         |            |
|                              | 0           | 2    | 0    | 2    | 7    | 0    | 3    | 3    | 5    | 6    | 1    | 5    | 1    | 7    | 4    | 5    | 8    | 0    | 0    | 6    | 7    | 3    | 3    | 0 | 2         |            |
|                              | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0 | 0         |            |
|                              | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0 | 0         |            |
|                              | 7           | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7    | 7 | 7         |            |
|                              | 2           | 2    | 2    | 2    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4 | 5         |            |
|                              | 6           | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9 | 0         |            |
|                              |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   | <b>1</b>  | <b>1.0</b> |
| Hepatocyte, Necrosis         |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   | <b>1</b>  | <b>1.0</b> |
| Kupffer Cell, Hypertrophy    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   | <b>1</b>  | <b>1.0</b> |
| Mesentery                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   | <b>1</b>  |            |
| Pancreas                     | +           | A    | +    | +    | +    | +    | +    | +    | A    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | + | <b>47</b> | <b>1</b>   |
| Cyst                         |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   |           |            |
| Salivary Glands              | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | + | <b>50</b> | <b>3</b>   |
| Inflammation, Chronic Active |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   |           | <b>2.0</b> |
| Stomach, Forestomach         | +           | +    | +    | +    | +    | +    | +    | +    | A    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | + | <b>49</b> | <b>1</b>   |
| Epithelium, Hyperplasia      |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   |           | <b>1.0</b> |
| Stomach, Glandular           | +           | A    | +    | +    | +    | +    | +    | +    | A    | +    | +    | +    | +    | +    | +    | +    | A    | +    | +    | +    | +    | +    | +    | + | <b>46</b> | <b>2</b>   |
| Inflammation                 |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   |           | <b>1.0</b> |
| Mineralization               |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   | <b>1</b>  | <b>1.0</b> |

**CARDIOVASCULAR SYSTEM**

|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |            |            |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------|------------|------------|
| Blood Vessel                 | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +        | <b>50</b>  |            |
| Inflammation                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |            | <b>3</b>   |
| Heart                        | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +        | <b>50</b>  |            |
| Cardiomyopathy               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |            | <b>4</b>   |
| Inflammation, Acute          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |            | <b>1.0</b> |
| Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |            | <b>2</b>   |
| Mineralization               | 2 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 | <b>7</b> | <b>1.0</b> |            |
| Necrosis                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |            | <b>1</b>   |
| Polyarteritis                |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |            | <b>2</b>   |
|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |            | <b>1.5</b> |
|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |            | <b>1.7</b> |
|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |            | <b>1.0</b> |
|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |            | <b>1.5</b> |
|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |            | <b>1.7</b> |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |       |
|------------------------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|-------|
|                              | 0730        | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  | 0749  |          | 0750  |       |       |       |
| ANIMAL ID                    | 00726       | 00727 | 00728 | 00729 | 00730 | 00731 | 00732 | 00733 | 00734 | 00735 | 00736 | 00737 | 00738 | 00739 | 00740 | 00741 | 00742 | 00743 | 00744 | 00745 | 00746    | 00747 | 00748 | 00749 | 00750 |

Valve, Inflammation, Chronic Active

1

1 1.0

**ENDOCRINE SYSTEM**

|                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |       |
|--------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-------|
| Adrenal Cortex                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | 50    |
| Angiectasis                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |    | 2 1.0 |
| Hematopoietic Cell Proliferation     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 2.0 |
| Hemorrhage                           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 2.0 |
| Hyperplasia                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 1.0 |
| Hypertrophy                          |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |    | 2 1.0 |
| Zona Fasciculata, Hypertrophy, Focal |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |    | 3 1.0 |
| Adrenal Medulla                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | 50    |
| Hyperplasia                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 2 1.0 |
| Islets, Pancreatic                   | + | A | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | 48    |
| Parathyroid Gland                    | + | + | M | + | + | + | + | + | + | + | + | + | M | + | + | + | + | + | + | + | M | + | M | + | 46 |       |
| Pituitary Gland                      | + | + | + | + | + | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | 48    |
| Pars Distalis, Hyperplasia           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 1.0 |
| Thyroid Gland                        | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | 50    |
| Inflammation, Chronic Active         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 9 1.2 |
| Mineralization                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 1.0 |

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm                      | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |        |        |    |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|--------|--------|----|
|   | 0730        | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  | 0749  |          |       |       |        |        |    |
| ANIMAL ID   | 00726       | 00727 | 00728 | 00729 | 00730 | 00731 | 00732 | 00733 | 00734 | 00735 | 00736 | 00737 | 00738 | 00739 | 00740 | 00741 | 00742 | 00743 | 00744 | 00745 | 00746    | 00747 | 00748 | 00749  |        |    |
| Clitoral Gland                                    | +           | +     | +     | +     | M     | M     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +        | +     | +     | 44     |        |    |
| Ovary   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50     |        |    |
| Cyst  |             |       | X     | X     |       |       | X     | X     |       | X     |       |       |       |       | X     |       |       |       |       |       | X        |       |       | 12     |        |    |
| Inflammation                                      |             |       |       |       |       |       |       |       | 1     |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 6 2.2  |        |    |
| Uterus  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50     |        |    |
| Endometrium, Hyperplasia, Cystic                  |             |       | 1     | 1     |       |       | 2     | 1     | 1     | 3     | 4     | 1     |       | 1     | 2     | 1     |       | 1     |       |       |          | 3     |       | 30 1.9 |        |    |
| <b>HEMATOPOIETIC SYSTEM</b>                       |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |        |        |    |
| Bone Marrow                                       | +           | +     | +     | +     | +     | +     | +     | +     | A     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 49     |        |    |
| Myeloid Cell, Hyperplasia                         | 3           |       |       | 2     | 1     | 3     | 2     | 2     |       |       | 2     | 2     | 2     | 2     | 3     | 1     | 2     | 4     | 2     | 3     |          | 2     | 4     |        | 33 2.2 |    |
| Lymph Node  |             |       |       |       | +     |       |       |       |       |       | +     |       |       |       |       |       |       |       |       |       |          |       |       | 7      |        |    |
| Deep Cervical, Hyperplasia, Lymphoid              |             |       |       |       | 3     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 4 2.5  |        |    |
| Deep Cervical, Infiltration Cellular, Plasma Cell |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 3     |       |       |          |       |       | 1 3.0  |        |    |
| Lymph Node, Bronchial                             | +           | +     | +     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +     | +     | I     | M     | +     | +     | +        | +     | M     | +      | I      | 43 |
| Hematopoietic Cell Proliferation                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1     |       |       |       |          |       |       |        | 1 1.0  |    |
| Hyperplasia, Lymphoid                             |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |        | 1 1.0  |    |
| Inflammation, Chronic Active                      |             |       |       | 3     |       |       | 1     |       |       |       |       |       | 4     |       |       |       |       |       |       |       |          |       |       |        | 5 2.6  |    |
| Necrosis, Lymphoid                                |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |        | 1 1.0  |    |
| Lymph Node, Mandibular                            | +           | +     | M     | +     | +     | +     | +     | +     | M     | M     | +     | M     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | M     | +      | +      | 39 |
| Ectasia   |             |       |       |       |       |       |       |       |       |       |       |       | 2     |       |       |       |       | 2     |       |       |          |       |       |        | 3 2.0  |    |
| Hematopoietic Cell Proliferation                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |        | 1 3.0  |    |
| Hyperplasia, Lymphoid                             |             |       |       | 1     |       |       | 1     |       |       |       |       |       | 2     | 2     |       |       | 2     |       |       |       | 2        |       | 1     |        | 12 1.6 |    |
| Hyperplasia, Plasma Cell                          |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |        | 2 2.5  |    |
| Infiltration Cellular, Plasma Cell                |             |       |       |       |       |       | 3     |       | 2     |       |       |       |       |       | 2     |       |       | 3     |       |       |          |       |       |        | 5 2.6  |    |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm   | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |                | * TOTALS |   |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------------|----------|---|
|  | 0730        | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  | 0749  | 0750  | 0751  | 0752  |                |          |   |
| ANIMAL ID  | 00726       | 00727 | 00728 | 00729 | 00730 | 00731 | 00732 | 00733 | 00734 | 00735 | 00736 | 00737 | 00738 | 00739 | 00740 | 00741 | 00742 | 00743 | 00744 | 00745 | 00746 | 00747 | 00748 |                |          |   |
| Infiltration Cellular, Polymorphonuclear<br>Inflammation, Suppurative  |             |       |       |       |       | 3     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 1.0<br>1 3.0 |          |   |
| Lymph Node, Mediastinal<br>Hyperplasia, Lymphoid<br>Hyperplasia, Plasma Cell<br>Inflammation, Chronic Active<br>Necrosis, Lymphoid           | +           | I     | M     | +     | +     | I     | I     | +     | +     | +     | M     | I     | I     | M     | +     | +     | M     | +     | +     | M     | +     | M     | I     | +              | +        | 33<br>1 2.0<br>1 2.0<br>2 1.5<br>1 1.0                    |
| Lymph Node, Mesenteric<br>Hematopoietic Cell Proliferation<br>Hyperplasia, Lymphoid  | +           | A     | +     | +     | +     | I     | +     | +     | A     | +     | +     | +     | +     | +     | +     | A     | +     | +     | +     | +     | +     | +     | +     | +              | M        | 45<br>2 1.5<br>1 1.0                                      |
| Spleen<br>Angiectasis<br>Hematopoietic Cell Proliferation<br>Hyperplasia, Lymphoid<br>Inflammation<br>Necrosis<br>Lymphoid Follicle, Atrophy | +           | A     | +     | +     | +     | +     | +     | +     | A     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +              | +        | 48<br>1 1.0<br>11 2.3<br>4 2.3<br>2 2.5<br>3 1.7<br>1 2.0 |
| Thymus<br>Atrophy<br>Ectopic Parathyroid Gland<br>Hyperplasia, Lymphoid<br>Inflammation, Chronic Active                                      | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | I     | +     | +     | +     | +     | +     | I     | +     | +     | +     | +     | I     | I              | +        | 45<br>12 1.8<br>3 1.0<br>1 3.0<br>8 2.1                   |
| <b>INTEGUMENTARY SYSTEM</b>  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |                |          |   |
| Mammary Gland  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +              | +        | 49  |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
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**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
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 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm      | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |        |
|-----------------------------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|--------|
|                                   | 0730        | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  | 0749  |          |       |       |       |        |
| ANIMAL ID                         | 00726       | 00727 | 00728 | 00729 | 00730 | 00731 | 00732 | 00733 | 00734 | 00735 | 00736 | 00737 | 00738 | 00739 | 00740 | 00741 | 00742 | 00743 | 00744 | 00745 | 00746    | 00747 | 00748 | 00749 |        |
| Skin                              | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50    |        |
| Fibrosis                          |             |       |       |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 1 2.0 |        |
| Inflammation, Chronic Active      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 3 3.7 |        |
| Epidermis, Hyperplasia            |             |       |       |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 1 2.0 |        |
| Subcutaneous Tissue, Necrosis     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 2 2.5 |        |
| <b>MUSCULOSKELETAL SYSTEM</b>     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |        |
| Bone                              | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50    |        |
| Fibro-Osseous Lesion              |             |       |       |       |       |       |       |       |       |       |       |       | 2     |       |       |       |       |       |       |       |          |       |       | 3 1.7 |        |
| Skeletal Muscle                   |             |       |       |       |       |       | +     |       |       |       |       | +     |       |       |       |       |       |       |       |       | +        |       |       | 4     |        |
| Degeneration                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 2     |       | 1 2.0 |        |
| <b>NERVOUS SYSTEM</b>             |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |        |
| Brain                             | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50    |        |
| Infiltration Cellular             |             |       | 1     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 1 1.0 |        |
| Infiltration Cellular, Lymphocyte |             |       |       |       | 1     |       | 1     |       |       |       |       |       |       |       |       | 1     |       |       |       |       |          |       |       | 5 1.2 |        |
| Inflammation, Acute               | 3           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 1 3.0 |        |
| Peripheral Nerve                  |             |       |       |       |       |       | +     |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 2     |        |
| Degeneration                      |             |       |       |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 1 2.0 |        |
| Spinal Cord                       |             |       |       |       |       |       | +     |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 2     |        |
| <b>RESPIRATORY SYSTEM</b>         |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |        |
| Larynx                            | +           | A     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 49    |        |
| Inflammation, Chronic Active      |             |       | 3     | 1     |       | 3     | 1     | 2     |       | 4     | 1     | 1     | 2     |       | 1     | 3     | 4     |       | 2     | 3     | 2        | 1     | 4     | 1     | 36 2.1 |
| Lumen, Exudate                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 3     |       |       |       |       |          |       |       | 4 3.8 |        |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm                           | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |        |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|--------|
|  | 0730        | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  | 0749  | 0750  | 0751  | 0752  |       |          |        |
| ANIMAL ID  | 00726       | 00727 | 00728 | 00729 | 00730 | 00731 | 00732 | 00733 | 00734 | 00735 | 00736 | 00737 | 00738 | 00739 | 00740 | 00741 | 00742 | 00743 | 00744 | 00745 | 00746 | 00747 | 00748 | 00749 |          |        |
| Respiratory Epithelium, Hyperplasia                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 2.0    |        |
| Respiratory Epithelium, Metaplasia, Atypical, Squamous |             |       | 3     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 3.0    |        |
| Respiratory Epithelium, Metaplasia, Squamous           | 4           |       |       | 4     | 1     | 4     | 2     | 2     | 3     | 4     | 1     | 1     | 4     | 2     | 3     | 4     | 3     | 2     | 4     | 4     | 4     | 4     | 1     | 4     | 2        | 48 3.0 |
| Respiratory Epithelium, Necrosis                       |             |       | 3     | 1     |       | 2     | 1     |       | 1     | 3     | 1     |       | 1     |       | 1     | 3     | 2     | 2     | 1     |       |       |       | 2     |       | 32 1.5   |        |
| Respiratory Epithelium, Regeneration                   |             |       |       | 1     | 1     |       | 1     | 1     | 1     |       | 2     | 1     | 1     | 2     | 1     |       | 1     | 2     |       |       | 1     |       |       | 1     | 30 1.4   |        |
| Squamous Epithelium, Hyperplasia                       | 2           |       | 4     | 2     | 1     | 4     | 2     | 2     | 2     | 2     | 1     | 1     | 2     | 3     | 3     |       | 3     | 2     | 2     |       |       | 3     | 1     | 1     | 40 2.1   |        |
| Lung   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50       |        |
| Foreign Body   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1        |        |
| Inflammation, Suppurative                              |             |       | 3     |       |       | 1     |       |       |       |       |       |       |       |       | 2     |       |       |       |       |       |       |       | 1     |       | 5 1.8    |        |
| Inflammation, Chronic Active                           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2 1.5    |        |
| Necrosis   |             |       | 3     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 3.0    |        |
| Alveolus, Infiltration Cellular, Histiocyte            |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1     |       |       | 4 1.0    |        |
| Alveolus, Inflammation, Suppurative                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 3     |       |       |       |       |       |       | 1 3.0    |        |
| Artery, Mediastinum, Inflammation, Chronic Active      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 4     |       |       |       |       |       | 1 4.0    |        |
| Bronchiole, Inflammation, Suppurative                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 2.0    |        |
| Bronchiole, Inflammation, Chronic                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 1.0    |        |
| Bronchiole, Epithelium, Hyperplasia                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2 1.0    |        |
| Bronchus, Inflammation, Suppurative                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2 2.5    |        |
| Bronchus, Regeneration                                 |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 1.0    |        |
| Bronchus, Epithelium, Degeneration                     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 3     |       | 4 2.5    |        |
| Bronchus, Epithelium, Necrosis                         |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 5 1.4    |        |
| Bronchus, Epithelium, Regeneration                     | 4           |       | 2     | 4     |       | 2     | 4     | 3     |       | 2     | 2     | 2     | 2     | 2     | 4     | 3     | 4     |       | 1     | 3     | 3     | 4     | 3     | 4     | 38 2.8   |        |
| Bronchus, Smooth Muscle, Mineralization                |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 3 1.7    |        |
| Bronchus, Submucosa, Fibrosis                          |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 5 1.2    |        |
| Interstitial, Fibrosis                                 |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 1.0    |        |
| Mediastinum, Inflammation, Suppurative                 |             |       |       |       |       | 2     |       |       | 1     |       |       |       |       | 3     |       | 2     |       |       |       |       |       |       | 2     |       | 8 2.0    |        |
| Mediastinum, Inflammation, Chronic Active              |             |       | 4     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 7 1.7    |        |

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 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
 M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

First Dose M/F: 08/31/09 / 08/31/09

Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm                          | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |        |        |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|--------|--------|
|   | 0730        | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  | 0749  |          | 0750  |       |       |        |        |
| ANIMAL ID   | 00726       | 00727 | 00728 | 00729 | 00730 | 00731 | 00732 | 00733 | 00734 | 00735 | 00736 | 00737 | 00738 | 00739 | 00740 | 00741 | 00742 | 00743 | 00744 | 00745 | 00746    | 00747 | 00748 | 00749 | 00750  |        |
| Pleura, Inflammation, Suppurative                     |             |       |       |       | 3     |       |       |       |       |       |       |       | 2     |       |       |       |       |       |       |       |          |       |       |       | 5 2.0  |        |
| Nose  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50     |        |
| Foreign Body  |             |       |       |       |       | X     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 3      |        |
| Inflammation, Suppurative                             | 4           | 3     | 3     | 4     | 3     | 4     | 4     | 4     | 2     | 2     | 3     | 2     | 4     | 4     | 4     | 3     | 4     | 4     | 3     | 4     | 2        | 4     | 4     | 2     | 3      | 50 3.3 |
| Glands, Respiratory Epithelium, Cyst                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 2 2.0  |        |
| Glands, Sinus, Metaplasia, Respiratory                | 1           |       |       |       |       |       |       |       |       |       |       | 1     | 1     | 1     |       |       | 1     |       | 1     |       | 1        | 1     |       |       | 12 1.0 |        |
| Lamina Propria, Fibrosis                              | 2           | 2     | 3     | 2     | 2     | 1     | 2     | 1     | 1     | 3     | 2     | 1     | 2     | 1     | 3     | 3     | 2     | 2     | 2     | 1     | 1        | 2     | 2     | 2     | 3      | 49 1.9 |
| Mucosa, Regeneration                                  | 4           |       | 2     | 2     | 2     | 2     | 2     | 3     | 2     | 2     | 2     | 2     | 2     |       | 2     | 2     | 1     | 2     | 2     | 2     | 1        | 2     | 2     | 2     | 48 2.1 |        |
| Olfactory Epithelium, Accumulation, Hyaline Droplet   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 2 1.0  |        |
| Olfactory Epithelium, Atrophy                         | 1           | 1     | 1     |       | 1     | 1     |       | 1     | 3     | 2     | 2     | 2     | 1     | 1     | 1     | 2     | 1     |       | 2     | 1     | 2        | 1     | 1     |       | 45 1.4 |        |
| Olfactory Epithelium, Metaplasia, Respiratory         | 3           | 4     | 4     | 4     | 3     | 4     | 3     | 3     | 1     | 4     | 3     | 3     | 3     | 4     | 4     | 3     | 3     | 4     | 3     | 3     | 3        | 3     | 3     | 4     | 3      | 49 3.3 |
| Olfactory Epithelium, Necrosis                        |             | 1     |       | 1     | 2     | 2     |       | 1     |       |       |       |       | 1     | 1     | 1     |       | 2     | 3     |       | 1     |          |       | 2     |       | 20 1.6 |        |
| Respiratory Epithelium, Accumulation, Hyaline Droplet |             |       |       |       |       |       |       |       |       |       |       | 1     |       |       |       | 1     |       |       |       |       |          |       |       |       | 3 1.0  |        |
| Respiratory Epithelium, Hyperplasia                   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 2     |       | 2 1.5  |        |
| Respiratory Epithelium, Metaplasia, Squamous          | 4           | 3     | 3     | 4     | 2     | 2     | 2     | 2     | 2     | 3     | 2     | 2     | 2     | 2     | 3     | 2     | 3     | 3     | 2     | 2     | 2        | 2     | 3     | 2     | 50 2.7 |        |
| Respiratory Epithelium, Necrosis                      | 2           | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 1     | 2        | 2     | 2     | 1     | 50 1.8 |        |
| Septum, Perforation                                   |             |       | X     |       |       |       |       |       |       | X     |       |       |       |       |       |       |       | X     |       |       |          |       |       |       | 5      |        |
| Turbinate, Atrophy                                    | 2           | 3     | 2     | 3     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2        | 2     | 2     | 2     | 50 2.1 |        |
| Turbinate, Necrosis                                   |             |       |       |       | 1     |       |       |       |       |       |       | 1     | 1     |       | 1     | 1     |       | 1     |       |       |          | 1     |       |       | 11 1.0 |        |
| Trachea   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50     |        |
| Inflammation, Chronic Active                          | 1           | 1     | 4     | 2     |       | 4     | 1     | 1     | 1     | 4     | 1     | 1     | 1     |       | 1     | 4     | 4     | 1     | 4     | 2     | 4        | 2     | 1     | 4     | 1      | 42 2.1 |
| Necrosis  | 1           | 1     | 4     | 1     |       | 2     | 1     | 1     | 1     | 4     | 2     | 1     | 1     | 1     | 1     | 4     | 4     | 1     | 4     | 2     | 3        | 2     | 1     | 4     | 1      | 48 1.9 |
| Carina, Inflammation, Chronic Active                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1 1.0  |        |
| Carina, Epithelium, Regeneration                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1 1.0  |        |
| Carina, Submucosa, Fibrosis                           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 1     |       | 1     | 6 1.3  |        |
| Carina, Submucosa, Mineralization                     |             |       |       |       |       |       |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       | 2        |       |       |       | 5 1.8  |        |
| Epithelium, Hyperplasia                               |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1 2.0  |        |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade

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Experiment Number: 20725 - 04

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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL

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CAS Number: 431-03-8

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Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm | DAY ON TEST | ANIMAL ID |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |              | * TOTALS |
|------------------------------|-------------|-----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|----------|
|                              |             | 0         | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |              |          |
|                              | 7           | 4         | 6 | 7 | 2 | 6 | 7 | 7 | 2 | 6 | 7 | 6 | 7 | 3 | 4 | 5 | 6 | 3 | 7 | 5 | 5 | 7 | 4 | 6 | 7 |              |          |
|                              | 3           | 1         | 7 | 3 | 6 | 9 | 3 | 3 | 2 | 9 | 3 | 0 | 3 | 4 | 2 | 8 | 9 | 2 | 1 | 9 | 4 | 3 | 0 | 0 | 3 |              |          |
|                              | 0           | 2         | 0 | 2 | 7 | 0 | 3 | 3 | 5 | 6 | 1 | 5 | 1 | 7 | 4 | 5 | 8 | 0 | 0 | 6 | 7 | 3 | 3 | 0 | 2 |              |          |
|                              | 0           | 0         | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |              |          |
|                              | 7           | 7         | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |              |          |
|                              | 2           | 2         | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 |              |          |
|                              | 6           | 7         | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |              |          |
|                              |             |           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>6 1.2</b> |          |
| Nephropathy                  | 1           |           |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |              |          |
| Urinary Bladder              | +           | +         | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>49</b>    |          |

\*\*\* END OF REPORT \*\*\*

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