

Experiment Number: 20725 - 01
Test Type: 90-DAY
Route: RESPIRATORY EXPOSURE WHOLE BODY
Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
Time Report Requested: 15:54:18
First Dose M/F: 07/28/08 / 07/29/08
Lab: BNW

F1_Rev.2_RE

NTP Study Number: C20725
Lock Date: 02/27/2009
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: NONE

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WISTAR HAN RATS MALE CONTROL	DAY ON TEST										* TOTALS
	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	
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	1	
	1	2	3	4	5	6	7	8	9	0	

ALIMENTARY SYSTEM

Esophagus	+	+	+	+	+	+	+	+	+	+	10	
Intestine Large, Cecum	+	+	+	+	+	+	+	+	+	+	10	
Intestine Large, Colon	+	+	+	+	+	+	+	+	+	+	10	
Intestine Large, Rectum	+	+	+	+	+	+	+	+	+	+	10	
Intestine Small, Duodenum	+	+	+	+	+	+	+	+	+	+	10	
Intestine Small, Ileum	+	+	+	+	+	+	+	+	+	+	10	
Intestine Small, Jejunum	+	+	+	+	+	+	+	+	+	+	10	
Liver	+	+	+	+	+	+	+	+	+	+	10	
Pancreas Atrophy	+	+	+	+	+	+	+	+	+	+	10	3 1.7
Salivary Glands	+	+	+	+	+	+	+	+	+	+	10	
Stomach, Forestomach	+	+	+	+	+	+	+	+	+	+	10	
Stomach, Glandular	+	+	+	+	+	+	+	+	+	+	10	

CARDIOVASCULAR SYSTEM

Blood Vessel	+	+	+	+	+	+	+	+	+	+	10
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* .. 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

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	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 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	1	0			
	1	2	3	4	5	6	7	8	9	0				* TOTALS
Heart	+	+	+	+	+	+	+	+	+	+				10
Cardiomyopathy		1												1 1.0
ENDOCRINE SYSTEM														
Adrenal Cortex	+	+	+	+	+	+	+	+	+	+				10
Adrenal Medulla	+	+	+	+	+	+	+	+	+	+				10
Islets, Pancreatic	+	+	+	+	+	+	+	+	+	+				10
Parathyroid Gland	+	+	+	+	+	+	+	+	+	+				10
Pituitary Gland	+	+	+	+	+	+	+	+	+	+				10
Thyroid Gland	+	+	+	+	+	+	+	+	+	+				10
GENERAL BODY SYSTEM														
NONE														
GENITAL SYSTEM														
Epididymis	+	+	+	+	+	+	+	+	+	+				10
Preputial Gland	+	+	+	+	+	+	+	+	+	+				10
Inflammation, Chronic Active				1	1					1				3 1.0
Prostate	+	+	+	+	+	+	+	+	+	+				10
Inflammation, Chronic Active		2		1										2 1.5

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	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	
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	1	
	1	2	3	4	5	6	7	8	9	0	
Seminal Vesicle	+	+	+	+	+	+	+	+	+	+	10
Testes	+	+	+	+	+	+	+	+	+	+	10
HEMATOPOIETIC SYSTEM											
Bone Marrow	+	+	+	+	+	+	+	+	+	+	10
Lymph Node, Bronchial	+	M	+	+	+	+	+	+	M	+	8
Lymph Node, Mandibular	+	+	+	+	+	+	+	+	+	+	10
Lymph Node, Mediastinal	+	+	+	+	+	+	+	+	+	+	10
Lymph Node, Mesenteric	+	+	+	+	+	+	+	+	+	+	10
Spleen	+	+	+	+	+	+	+	+	+	+	10
Thymus	+	+	+	+	+	+	+	+	+	+	10
INTEGUMENTARY SYSTEM											
Mammary Gland	M	M	+	M	M	+	M	M	M	M	2
Skin	+	+	+	+	+	+	+	+	+	+	10
MUSCULOSKELETAL SYSTEM											
Bone	+	+	+	+	+	+	+	+	+	+	10
NERVOUS SYSTEM											

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	0	0	0	0	0	0	0	0	0	0	0				
	0	0	0	0	0	0	0	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	2	3	4	5	6	7	8	9	0					
															* TOTALS
Brain	+	+	+	+	+	+	+	+	+	+					10
RESPIRATORY SYSTEM															
Larynx	+	+	+	+	+	+	+	+	+	+					10
Lung	+	+	+	+	+	+	+	+	+	+					10
Infiltration Cellular, Histiocyte														1	1 1.0
Inflammation, Eosinophil			1					1							2 1.0
Metaplasia, Osseous				1											1 1.0
Nose	+	+	+	+	+	+	+	+	+	+					10
Trachea	+	+	+	+	+	+	+	+	+	+					10
SPECIAL SENSES SYSTEM															
Eye	+	+	+	+	+	+	+	+	+	+					10
Harderian Gland	+	+	+	+	+	+	+	+	+	+					10
URINARY SYSTEM															
Kidney	+	+	+	+	+	+	+	+	+	+					10
Urinary Bladder	+	+	+	+	+	+	+	+	+	+					10

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WISTAR HAN RATS MALE	DAY ON TEST	0	0	0	0	0	0	0	0	0	0	
		0	0	0	0	0	0	0	0	0	0	
6.25 ppm	ANIMAL ID	9	9	9	9	9	9	9	9	9	9	
		3	3	3	3	3	3	3	3	3	3	
		0	0	0	0	0	0	0	0	0	0	* TOTALS
		0	0	0	0	0	0	0	0	0		
		2	2	2	2	2	2	2	2	2		
		0	0	0	0	0	0	0	0	1		
		1	2	3	4	5	6	7	8	9	0	

ALIMENTARY SYSTEM

NONE

CARDIOVASCULAR SYSTEM

NONE

ENDOCRINE SYSTEM

NONE

GENERAL BODY SYSTEM

NONE

GENITAL SYSTEM

NONE

HEMATOPOIETIC SYSTEM

NONE

INTEGUMENTARY SYSTEM

NONE

MUSCULOSKELETAL SYSTEM

NONE

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WISTAR HAN RATS 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	0
6.25 ppm		9	9	9	9	9	9	9	9	9	9	9	9	9
		3	3	3	3	3	3	3	3	3	3	3	3	3
	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
		2	2	2	2	2	2	2	2	2	2	2	2	2
		0	0	0	0	0	0	0	0	0	0	0	1	0
		1	2	3	4	5	6	7	8	9	0			
* TOTALS														

NERVOUS SYSTEM

NONE

RESPIRATORY SYSTEM

Larynx	+	+	+	+	+	+	+	+	+	+	+	+	+	10
Lung	+	+	+	+	+	+	+	+	+	+	+	+	+	10
Nose	+	+	+	+	+	+	+	+	+	+	+	+	+	10
Trachea	+	+	+	+	+	+	+	+	+	+	+	+	+	10

SPECIAL SENSES SYSTEM

NONE

URINARY SYSTEM

NONE

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WISTAR HAN RATS MALE	DAY ON TEST	0	0	0	0	0	0	0	0	0	
		0	0	0	0	0	0	0	0	0	
		9	9	9	9	9	9	9	9	9	
		3	3	3	3	3	3	3	3	3	
12.5 ppm	ANIMAL ID	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	
		0	0	0	0	0	0	0	0	1	
	1	2	3	4	5	6	7	8	9	0	* TOTALS

ALIMENTARY SYSTEM

Liver + 1

CARDIOVASCULAR SYSTEM

NONE

ENDOCRINE SYSTEM

NONE

GENERAL BODY SYSTEM

NONE

GENITAL SYSTEM

NONE

HEMATOPOIETIC SYSTEM

NONE

INTEGUMENTARY SYSTEM

NONE

MUSCULOSKELETAL SYSTEM

NONE

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WISTAR HAN RATS MALE	DAY ON TEST	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
12.5 ppm		9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
		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
		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	0	0	0	0	0	0	0	0	0	1
		1	2	3	4	5	6	7	8	9	0									
* TOTALS																				

NERVOUS SYSTEM

NONE

RESPIRATORY SYSTEM

Larynx	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10
Lung	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10
Infiltration Cellular, Histiocyte				1																1 1.0
Inflammation, Eosinophil				1							1	1								3 1.0
Nose	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10
Trachea	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10

SPECIAL SENSES SYSTEM

NONE

URINARY SYSTEM

NONE

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WISTAR HAN RATS MALE	DAY ON TEST	0	0	0	0	0	0	0	0	0	
		0	0	0	0	0	0	0	0	0	
		9	9	9	9	9	9	9	9	9	
		3	3	3	3	3	3	3	3	3	
25 ppm	ANIMAL ID	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	
		0	0	0	0	0	0	0	0	1	
		1	2	3	4	5	6	7	8	9	0
* TOTALS											

ALIMENTARY SYSTEM

Liver + + 2

CARDIOVASCULAR SYSTEM

NONE

ENDOCRINE SYSTEM

NONE

GENERAL BODY SYSTEM

NONE

GENITAL SYSTEM

NONE

HEMATOPOIETIC SYSTEM

NONE

INTEGUMENTARY SYSTEM

NONE

MUSCULOSKELETAL SYSTEM

NONE

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DAY ON TEST	0	0	0	0	0	0	0	0	0	0	
	93	00	00	00	00	00	00	00	00	00	
ANIMAL ID	0	0	0	0	0	0	0	0	0	0	
	0601	00	00	00	00	00	00	00	00	01	
	12	33	44	55	66	77	88	99	00		* TOTALS
Pelvis, Dilatation	2									1 2.0	

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		0	0	0	0	0	0	0	0	0	0
WISTAR HAN RATS MALE	DAY ON TEST	0	0	0	0	0	0	0	0	0	0
		9	9	9	9	9	9	9	9	9	9
		3	3	3	3	3	3	3	3	3	3
	50 ppm										
	ANIMAL ID	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0
		8	8	8	8	8	8	8	8	8	8
		0	0	0	0	0	0	0	0	0	1
		1	2	3	4	5	6	7	8	9	0
* TOTALS											

ALIMENTARY SYSTEM

NONE

CARDIOVASCULAR SYSTEM

NONE

ENDOCRINE SYSTEM

NONE

GENERAL BODY SYSTEM

NONE

GENITAL SYSTEM

NONE

HEMATOPOIETIC SYSTEM

Lymph Node, Mandibular	+	1
Hemorrhage	2	1 2.0

INTEGUMENTARY SYSTEM

Skin	+	1
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MUSCULOSKELETAL SYSTEM

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DAY ON TEST	0	0	0	0	0	0	0	0	0	0
	WISTAR HAN RATS MALE	0	0	0	0	0	0	0	0	0
50 ppm	9	9	9	9	9	9	9	9	9	9
ANIMAL ID	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
	8	8	8	8	8	8	8	8	8	8
	0	0	0	0	0	0	0	0	0	1
	1	2	3	4	5	6	7	8	9	0
* TOTALS										

NONE

NERVOUS SYSTEM

NONE

RESPIRATORY SYSTEM

Larynx	+	+	+	+	+	+	+	+	+	+	10	
Respiratory Epithelium, Hyperplasia	2			1			1				3	1.3
Respiratory Epithelium, Metaplasia, Squamous	2			1	1	2	2	1	1	1	8	1.4
Lung	+	+	+	+	+	+	+	+	+	+	10	
Nose	+	+	+	+	+	+	+	+	+	+	10	
Inflammation, Suppurative	3	3	2	3	2	3	2	2	3	2	10	2.5
Lymphoid Tissue, Hyperplasia	2	2	1	1	2		2	1	2	2	9	1.7
Olfactory Epithelium, Degeneration	2	2	2	2			1	1	1	2	9	1.6
Olfactory Epithelium, Metaplasia, Respiratory				1		2	2	3	1	2	7	1.9
Respiratory Epithelium, Hyperplasia	2	2	3	3	3	3	2	3	3	2	10	2.6
Respiratory Epithelium, Metaplasia, Squamous	3	1	3	2	1	3	3	1	3	3	10	2.3
Respiratory Epithelium, Necrosis				1		1					2	1.0
Respiratory Epithelium, Regeneration	1		1	1			1				4	1.0
Turbinates, Atrophy			1			1	1				3	1.0
Trachea	+	+	+	+	+	+	+	+	+	+	10	
Epithelium, Hyperplasia	1			1							2	1.0

SPECIAL SENSES SYSTEM

Eye	+	+	+	+	+	+	+	+	+	+	10	
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* .. 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 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

		0	0	0	0	0	0	0	0	0	
WISTAR HAN RATS MALE	DAY ON TEST	0	0	0	0	0	0	0	0	0	
		9	9	9	9	9	9	9	9	9	
		3	3	3	3	3	3	3	3	3	
	50 ppm										
	ANIMAL ID	0	0	0	0	0	0	0	0	0	
		0	0	0	0	0	0	0	0	0	
		8	8	8	8	8	8	8	8	8	
		0	0	0	0	0	0	0	0	1	
		1	2	3	4	5	6	7	8	9	0
* TOTALS											
Cornea, Mineralization		1									1 1.0

URINARY SYSTEM

NONE

* .. 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 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL
 2,3-Butanedione
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Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

WISTAR HAN RATS MALE 100 ppm	DAY ON TEST										ANIMAL ID	
	0093	0093	0093	0092	0093	0093	0093	0091	0093	0093		
	0	0	0	0	0	0	0	0	0	0	0	
	1	1	1	1	1	1	1	1	1	1	1	
	0	0	0	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	0	1	1	
	1	2	3	4	5	6	7	8	9	0		
											* TOTALS	

ALIMENTARY SYSTEM

Esophagus	+	+	+	+	+	+	+	+	+	+		10
Intestine Large, Cecum	+	+	+	A	+	+	+	A	+	+		8
Intestine Large, Colon	+	+	+	A	+	+	+	A	+	+		8
Intestine Large, Rectum	+	+	+	A	+	+	+	A	+	+		8
Intestine Small, Duodenum	+	+	+	A	+	+	+	+	+	+		9
Intestine Small, Ileum	+	+	+	A	+	+	+	A	+	+		8
Intestine Small, Jejunum	+	+	+	A	+	+	+	A	+	+		8
Liver	+	+	+	+	+	+	+	+	+	+		10
Pancreas Basophilic Focus	+	+	+	+	+	+	+	+	+	X		10 1
Salivary Glands	+	+	+	+	+	+	+	+	+	+		10
Stomach, Forestomach	+	+	+	+	+	+	+	+	+	+		10
Stomach, Glandular	+	+	+	A	+	+	+	A	+	+		8

CARDIOVASCULAR SYSTEM

Blood Vessel	+	+	+	+	+	+	+	+	+	+		10
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* .. 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 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

WISTAR HAN RATS MALE 100 ppm	DAY ON TEST										ANIMAL ID	
	0 9 3	0 9 3	0 9 3	0 9 2	0 9 3	0 9 3	0 9 3	0 9 1	0 9 3	0 9 3		
	0 1 0 0 1	0 1 0 0 2	0 1 0 0 3	0 1 0 0 4	0 1 0 0 5	0 1 0 0 6	0 1 0 0 7	0 1 0 0 8	0 1 0 0 9	0 1 0 0 0		
											* TOTALS	

Heart	+	+	+	+	+	+	+	+	+	+	10
Cardiomyopathy						1					1 1.0

ENDOCRINE SYSTEM

Adrenal Cortex	+	+	+	+	+	+	+	+	+	+	10
Adrenal Medulla	+	+	+	+	+	+	+	+	+	+	10
Islets, Pancreatic	+	+	+	+	+	+	+	+	+	+	10
Parathyroid Gland	+	+	+	M	+	M	+	+	M	+	7
Pituitary Gland	+	+	+	+	+	+	+	+	+	+	10
Thyroid Gland	+	+	+	+	+	+	+	+	+	+	10

GENERAL BODY SYSTEM

NONE

GENITAL SYSTEM

Epididymis	+	+	+	+	+	+	+	+	+	+	10
Preputial Gland	+	+	+	M	+	+	+	+	+	+	9
Inflammation, Chronic Active	1		1			1					3 1.0
Prostate	+	+	+	+	+	+	+	+	+	+	10
Inflammation, Chronic Active		2	1	1		1		3	1		6 1.5

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 + .. Tissue examined microscopically
 X .. Lesion present
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 M .. Missing tissue
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1-4 .. Lesion qualified as:
 1) Minimal 3) Moderate
 2) Mild 4) Marked

Experiment Number: 20725 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL
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Date Report Requested: 01/12/2017
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 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

WISTAR HAN RATS MALE 100 ppm	DAY ON TEST										ANIMAL ID	
	0 9 3	0 9 3	0 9 3	0 9 2	0 9 3	0 9 3	0 9 3	0 9 1	0 9 3	0 9 3		
	0 1 0 0 1	0 1 0 0 2	0 1 0 0 3	0 1 0 0 4	0 1 0 0 5	0 1 0 0 6	0 1 0 0 7	0 1 0 0 8	0 1 0 0 9	0 1 0 0 0		
* TOTALS												

Seminal Vesicle	+	+	+	+	+	+	+	+	+	+	10
Testes	+	+	+	+	+	+	+	+	+	+	10

HEMATOPOIETIC SYSTEM

Bone Marrow	+	+	+	A	+	+	+	+	+	+	9	
Lymph Node, Bronchial	+	+	+	+	+	M	+	+	+	+	9	
Lymph Node, Mandibular Atrophy, Lymphoid	+	+	+	+	+	+	+	+	+	+	10	1 4.0
Lymph Node, Mediastinal	+	M	+	+	+	+	+	+	+	+	9	
Lymph Node, Mesenteric Atrophy, Lymphoid	+	+	+	+	+	+	+	+	+	+	10	1 3.0
Spleen Atrophy, Lymphoid	+	+	+	+	+	+	+	+	+	+	10	1 3.0
Thymus Atrophy, Lymphoid	+	+	+	+	+	+	+	+	+	+	10	1 4.0

INTEGUMENTARY SYSTEM

Mammary Gland	+	+	M	M	M	M	M	+	M	M	3
Skin	+	+	+	+	+	+	+	+	+	+	10

MUSCULOSKELETAL SYSTEM

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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 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

DAY ON TEST		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
WISTAR HAN RATS MALE		9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	
		3	3	3	2	3	3	3	1	3	3	1	3	3	3	3	3	3	3	
	100 ppm	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	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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										
* TOTALS																				
Bone		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10	
NERVOUS SYSTEM																				
Brain		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10	
RESPIRATORY SYSTEM																				
Larynx		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10	
Inflammation, Chronic Active		1					1												2 1.0	
Epithelium, Necrosis		2	2																2 2.0	
Respiratory Epithelium, Hyperplasia							2												1 2.0	
Respiratory Epithelium, Metaplasia, Squamous		4	4	4	4	3	3	3	3	4	3								10 3.5	
Squamous Epithelium, Hyperplasia					2	2	2	2	2										5 2.0	
Squamous Epithelium, Hyperplasia, Atypical		2	2																2 2.0	
Lung		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10	
Congestion			2							2									2 2.0	
Infiltration Cellular, Histiocyte		1	1			1	2	2	1	2									7 1.4	
Inflammation, Eosinophil				2			2	3	1	2	2								6 2.0	
Inflammation, Acute					4														1 4.0	
Metaplasia, Osseous		1																	1 1.0	
Bronchiole, Epithelium, Hyperplasia				2		1	1			1	1								5 1.2	
Bronchus, Inflammation, Chronic		1																	1 1.0	
Bronchus, Epithelium, Hyperplasia				1	2		2	2											4 1.8	
Bronchus, Epithelium, Hyperplasia, Atypical		2				2						2							3 2.0	
Bronchus, Epithelium, Necrosis						1		2	4	2									4 2.3	
Bronchus, Epithelium, Regeneration			2			1		2	3	2									5 2.0	
Nose		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10	

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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 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

WISTAR HAN RATS MALE 100 ppm	DAY ON TEST										ANIMAL ID			
	0	0	0	0	0	0	0	0	0	0				
	0	0	0	0	0	0	0	0	0	0	0			
	9	9	9	9	9	9	9	9	9	9	9			
	3	3	3	2	3	3	3	1	3	3	3			
	0	0	0	0	0	0	0	0	0	0	0			
	1	1	1	1	1	1	1	1	1	1	1			
	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	0			
												* TOTALS		
Inflammation, Suppurative	3	4	4	2	4	3	4	4	4	4			10	3.6
Lymphoid Tissue, Hyperplasia		2	2		3		2		3	2			6	2.3
Olfactory Epithelium, Atrophy										2			1	2.0
Olfactory Epithelium, Metaplasia, Respiratory	1	2	2	1	2	2	3		2	3			9	2.0
Olfactory Epithelium, Necrosis	2	2	3	1	2	2	1	3		3			9	2.1
Respiratory Epithelium, Hyperplasia	2	3	3	1	3	3	3		3	3			9	2.7
Respiratory Epithelium, Metaplasia, Squamous	4	3	4	2	4	3	4	4	4	3			10	3.5
Respiratory Epithelium, Necrosis	3	2	2	1	2	2	2	3	2	3			10	2.2
Respiratory Epithelium, Regeneration	1	1	1	2	1	2	1	1	1	1			10	1.2
Septum, Necrosis				1									1	1.0
Turbinate, Atrophy	2	2	2	3	1	2	3	3	2	2			10	2.2
Trachea	+	+	+	+	+	+	+	+	+	+			10	
Inflammation, Chronic Active	1							2					2	1.5
Epithelium, Hyperplasia				2			1						2	1.5
Epithelium, Metaplasia, Squamous			1					2	1	1			4	1.3
Epithelium, Necrosis	4	4	2	4	3	3	3	4	4	4			10	3.5
Epithelium, Regeneration	2	1	1		1	1	2	2	2	1			9	1.4
SPECIAL SENSES SYSTEM														
Eye	+	+	+	+	+	+	+	+	+	+			10	
Cornea, Inflammation, Acute				2				1					2	1.5
Cornea, Neovascularization				1									1	1.0
Harderian Gland	+	+	+	+	+	+	+	+	+	+			10	
URINARY SYSTEM														
Kidney	+	+	+	+	+	+	+	+	+	+			10	

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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 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

WISTAR HAN RATS MALE 100 ppm	DAY ON TEST										ANIMAL ID	
	003	003	009	009	009	009	009	009	009	009		
	0	0	0	0	0	0	0	0	0	0	0	
	1	1	1	1	1	1	1	1	1	1	1	
	0	0	0	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	0	1	1	
	1	2	3	4	5	6	7	8	9	0	0	
												* TOTALS
Nephropathy	1											1 1.0
Urinary Bladder	+ + + + + + + + + +											10

*** 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:
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Experiment Number: 20725 - 01
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 Species/Strain: RATS/Wistar Han

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 2,3-Butanedione
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Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

WISTAR HAN RATS FEMALE CONTROL	DAY ON TEST										ANIMAL ID	
	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3		
	0	0	0	0	0	0	0	0	0	0	0 0 1 0 1	
	2	3	4	5	6	7	8	9	0			
											* TOTALS	

ALIMENTARY SYSTEM

Esophagus	+	+	+	+	+	+	+	+	+	+		10
Intestine Large, Cecum	+	+	+	+	+	+	+	+	+	+		10
Intestine Large, Colon	+	+	+	+	+	+	+	+	+	+		10
Intestine Large, Rectum	+	+	+	+	+	+	+	+	+	+		10
Intestine Small, Duodenum	+	+	+	+	+	+	+	+	+	+		10
Intestine Small, Ileum	+	+	+	+	+	+	+	+	+	+		10
Intestine Small, Jejunum	+	+	+	+	+	+	+	+	+	+		10
Liver Inflammation, Chronic Active	+	+	+	+	+	+	+	+	+	+	1	10 1 1.0
Pancreas	+	+	+	+	+	+	+	+	+	+		10
Salivary Glands	+	+	+	+	+	+	+	+	+	+		10
Stomach, Forestomach	+	+	+	+	+	+	+	+	+	+		10
Stomach, Glandular	+	+	+	+	+	+	+	+	+	+		10

CARDIOVASCULAR SYSTEM

Blood Vessel	+	+	+	+	+	+	+	+	+	+		10
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* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade
 + .. Tissue examined microscopically
 X .. Lesion present
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 Lab: BNW

DAY ON TEST	0	0	0	0	0	0	0	0	0	0	ANIMAL ID		
	9	9	9	9	9	9	9	9	9	9			
WISTAR HAN RATS FEMALE	3	3	3	3	3	3	3	3	3	3			
CONTROL	0	0	0	0	0	0	0	0	0	0			
	1	1	1	1	1	1	1	1	1	1			
	0	0	0	0	0	0	0	0	0	1			
	1	2	3	4	5	6	7	8	9	0			* TOTALS
Heart	+	+	+	+	+	+	+	+	+	+			10
ENDOCRINE SYSTEM													
Adrenal Cortex	+	+	+	+	+	+	+	+	+	+			10
Adrenal Medulla	+	+	+	+	+	+	+	+	+	+			10
Islets, Pancreatic	+	+	+	+	+	+	+	+	+	+			10
Parathyroid Gland	+	+	+	+	+	+	+	+	+	+			10
Pituitary Gland	+	+	+	+	+	+	+	+	+	+			10
Pars Distalis, Cyst	X												1
Thyroid Gland	+	+	+	+	+	+	+	+	+	+			10
GENERAL BODY SYSTEM													
NONE													
GENITAL SYSTEM													
Clitoral Gland	+	+	+	+	+	+	+	+	+	+			10
Inflammation, Chronic Active	2	1			2								3 1.7
Ovary	+	+	+	+	+	+	+	+	+	+			10
Uterus	+	+	+	+	+	+	+	+	+	+			10
HEMATOPOIETIC SYSTEM													

* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade
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 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 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL
 2,3-Butanedione
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Date Report Requested: 01/12/2017
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 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

WISTAR HAN RATS FEMALE CONTROL	DAY ON TEST										* TOTALS
	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	
ANIMAL ID	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	
	0	0	0	0	0	0	0	0	0	1	
	1	2	3	4	5	6	7	8	9	0	
Bone Marrow	+	+	+	+	+	+	+	+	+	+	10
Lymph Node, Bronchial	+	+	+	+	+	+	+	+	+	+	10
Lymph Node, Mandibular	+	+	+	+	+	+	+	+	+	+	10
Lymph Node, Mediastinal	+	+	+	+	+	+	+	+	+	+	10
Lymph Node, Mesenteric	+	+	+	+	+	+	+	+	+	+	10
Spleen	+	+	+	+	+	+	+	+	+	+	10
Thymus	+	+	+	+	+	+	+	+	+	+	10
INTEGUMENTARY SYSTEM											
Mammary Gland	+	+	+	+	+	+	+	+	+	+	10
Skin	+	+	+	+	+	+	+	+	+	+	10
MUSCULOSKELETAL SYSTEM											
Bone	+	+	+	+	+	+	+	+	+	+	10
NERVOUS SYSTEM											
Brain	+	+	+	+	+	+	+	+	+	+	10
RESPIRATORY SYSTEM											
Larynx	+	+	+	+	+	+	+	+	+	+	10

* .. 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 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

WISTAR HAN RATS FEMALE	DAY ON TEST	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
6.25 ppm		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
		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
		1	2	3	4	5	6	7	8	9	0									
* TOTALS																				

ALIMENTARY SYSTEM

NONE

CARDIOVASCULAR SYSTEM

NONE

ENDOCRINE SYSTEM

NONE

GENERAL BODY SYSTEM

NONE

GENITAL SYSTEM

NONE

HEMATOPOIETIC SYSTEM

NONE

INTEGUMENTARY SYSTEM

NONE

MUSCULOSKELETAL SYSTEM

NONE

* .. 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
 2) Mild 4) Marked

Experiment Number: 20725 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

DAY ON TEST		0	0	0	0	0	0	0	0	0	0
WISTAR HAN RATS FEMALE		0	0	0	0	0	0	0	0	0	0
		9	9	9	9	9	9	9	9	9	9
		3	3	3	3	3	3	3	3	3	3
6.25 ppm		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
		0	0	0	0	0	0	0	0	0	1
		1	2	3	4	5	6	7	8	9	0
* TOTALS											

NERVOUS SYSTEM

NONE

RESPIRATORY SYSTEM

Larynx	+	+	+	+	+	+	+	+	+	+	10
Lung	+	+	+	+	+	+	+	+	+	+	10
Inflammation, Eosinophil				1				1	1		3 1.0
Alveolar Epithelium, Inflammation, Focal, Acute										1	1 1.0
Nose	+	+	+	+	+	+	+	+	+	+	10
Lymphoid Tissue, Hyperplasia						1					1 1.0
Trachea	+	+	+	+	+	+	+	+	+	+	10

SPECIAL SENSES SYSTEM

NONE

URINARY SYSTEM

NONE

* .. 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 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

WISTAR HAN RATS FEMALE	DAY ON TEST	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
12.5 ppm		9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
		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
		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	1
		1	2	3	4	5	6	7	8	9	0								
* TOTALS																			

ALIMENTARY SYSTEM

NONE

CARDIOVASCULAR SYSTEM

NONE

ENDOCRINE SYSTEM

NONE

GENERAL BODY SYSTEM

NONE

GENITAL SYSTEM

NONE

HEMATOPOIETIC SYSTEM

NONE

INTEGUMENTARY SYSTEM

NONE

MUSCULOSKELETAL SYSTEM

NONE

* .. 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
 2) Mild 4) Marked

Experiment Number: 20725 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

WISTAR HAN RATS FEMALE	DAY ON TEST	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
12.5 ppm		9	9	9	9	9	9	9	9	9	9	9	9	9	9
		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
		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	1	0
		1	2	3	4	5	6	7	8	9	0				
* TOTALS															

NERVOUS SYSTEM

NONE

RESPIRATORY SYSTEM

Larynx	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10
Lung	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10
Nose	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10
Trachea	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10

SPECIAL SENSES SYSTEM

NONE

URINARY SYSTEM

NONE

* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade
 + .. Tissue examined microscopically
 X .. Lesion present
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 M .. Missing tissue
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1-4 .. Lesion qualified as:
 1) Minimal 3) Moderate
 2) Mild 4) Marked

Experiment Number: 20725 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

DAY ON TEST		0	0	0	0	0	0	0	0	0	0
WISTAR HAN RATS FEMALE	0	0	0	0	0	0	0	0	0	0	0
	9	9	9	9	9	9	9	9	9	9	9
	3	3	3	3	3	3	3	3	3	3	3
25 ppm	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
	0	0	0	0	0	0	0	0	0	0	1
	1	2	3	4	5	6	7	8	9	0	
* TOTALS											

ALIMENTARY SYSTEM

NONE

CARDIOVASCULAR SYSTEM

NONE

ENDOCRINE SYSTEM

NONE

GENERAL BODY SYSTEM

NONE

GENITAL SYSTEM

NONE

HEMATOPOIETIC SYSTEM

Lymph Node, Mandibular	+	1
Thymus	+	1
Hemorrhage	2	1 2.0

INTEGUMENTARY SYSTEM

NONE

* .. 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 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL
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Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

WISTAR HAN RATS FEMALE	DAY ON TEST	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ANIMAL ID	9	9	9	9	9	9	9	9	9	9	9	9	9	9
25 ppm		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
		7	7	7	7	7	7	7	7	7	7	7	7	7	7
		0	0	0	0	0	0	0	0	0	0	0	0	1	0
		1	2	3	4	5	6	7	8	9	0				
* TOTALS															

MUSCULOSKELETAL SYSTEM

NONE

NERVOUS SYSTEM

NONE

RESPIRATORY SYSTEM

Larynx	+	+	+	+	+	+	+	+	+	+	10
Lung	+	+	+	+	+	+	+	+	+	+	10
Inflammation, Eosinophil									1		1 1.0
Nose	+	+	+	+	+	+	+	+	+	+	10
Lymphoid Tissue, Hyperplasia	1	1									2 1.0
Olfactory Epithelium, Degeneration			1		1				1	1	4 1.0
Respiratory Epithelium, Metaplasia, Squamous		1	1	1				1	1		5 1.0
Trachea	+	+	+	+	+	+	+	+	+	+	10

SPECIAL SENSES SYSTEM

NONE

URINARY SYSTEM

NONE

* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade
 + .. Tissue examined microscopically
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 1) Minimal 3) Moderate
 2) Mild 4) Marked

Experiment Number: 20725 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

WISTAR HAN RATS 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
		9	9	9	9	9	9	9	9	9	9	9	9	9
		3	3	3	3	3	3	3	3	3	3	3	3	3
50 ppm	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
		9	9	9	9	9	9	9	9	9	9	9	9	9
		0	0	0	0	0	0	0	0	0	0	1	0	0
		1	2	3	4	5	6	7	8	9	0			
* TOTALS														

ALIMENTARY SYSTEM

NONE

CARDIOVASCULAR SYSTEM

NONE

ENDOCRINE SYSTEM

NONE

GENERAL BODY SYSTEM

NONE

GENITAL SYSTEM

Clitoral Gland	+	1
Inflammation, Chronic Active	3	1 3.0

HEMATOPOIETIC SYSTEM

NONE

INTEGUMENTARY SYSTEM

NONE

MUSCULOSKELETAL 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
 2) Mild 4) Marked

Experiment Number: 20725 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

WISTAR HAN RATS FEMALE	DAY ON TEST										* TOTALS
	0	0	0	0	0	0	0	0	0	0	
50 ppm	9	9	9	9	9	9	9	9	9	9	
	3	3	3	3	3	3	3	3	3	3	
	ANIMAL ID										
	0	0	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	0	0	
	9	9	9	9	9	9	9	9	9	9	
	0	0	0	0	0	0	0	0	0	1	
	1	2	3	4	5	6	7	8	9	0	

NONE

NERVOUS SYSTEM

NONE

RESPIRATORY SYSTEM

Larynx	+	+	+	+	+	+	+	+	+	+	10	
Respiratory Epithelium, Metaplasia, Squamous	1	1			1	1	1	1	1	1		8 1.0
Lung	+	+	+	+	+	+	+	+	+	+	10	
Inflammation, Eosinophil	1											1 1.0
Nose	+	+	+	+	+	+	+	+	+	+	10	
Inflammation, Suppurative	4	1	1	1	2	2	3	2	2	2		10 2.0
Lymphoid Tissue, Hyperplasia	2		1	2	3	1	1	2	2			8 1.8
Olfactory Epithelium, Degeneration	1	1		1	1	1	1	1	1	1		9 1.0
Olfactory Epithelium, Metaplasia, Respiratory	3	1	1	2	1	1	1	2	1	1		10 1.4
Respiratory Epithelium, Hyperplasia	2	3	1	3	3	2	3	3	3	3		10 2.6
Respiratory Epithelium, Metaplasia, Squamous	2	3	2	3	3	3	3	3	3	3		10 2.8
Respiratory Epithelium, Necrosis		1							1	1		3 1.0
Respiratory Epithelium, Regeneration		1			1					1		3 1.0
Turbinate, Atrophy	2	1			1	1						4 1.3
Trachea	+	+	+	+	+	+	+	+	+	+	10	
Epithelium, Necrosis	2											1 2.0
Epithelium, Regeneration	1							1				2 1.0

SPECIAL SENSES SYSTEM

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 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 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

		0	0	0	0	0	0	0	0	0	
WISTAR HAN RATS FEMALE	DAY ON TEST	0	0	0	0	0	0	0	0	0	
		9	9	9	9	9	9	9	9	9	
		3	3	3	3	3	3	3	3	3	
	50 ppm										
	ANIMAL ID	0	0	0	0	0	0	0	0	0	
		0	0	0	0	0	0	0	0	0	
		9	9	9	9	9	9	9	9	9	
		0	0	0	0	0	0	0	0	1	
	1	2	3	4	5	6	7	8	9	0	
* TOTALS											

Eye	+	+	+	+	+	+	+	+	+	+	10
Cornea, Inflammation, Acute						2					1 2.0

URINARY SYSTEM

NONE

* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade
 + .. Tissue examined microscopically
 X .. Lesion present
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 M .. Missing tissue
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1-4 .. Lesion qualified as:
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Experiment Number: 20725 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
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 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

WISTAR HAN RATS FEMALE	DAY ON TEST										* TOTALS
	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	0 9 3	
100 ppm	0 1 1 0 1	0 1 1 0 2	0 1 1 0 3	0 1 1 0 4	0 1 1 0 5	0 1 1 0 6	0 1 1 0 7	0 1 1 0 8	0 1 1 0 9	0 1 1 0 0	

ALIMENTARY SYSTEM

Esophagus	+	+	+	+	+	+	+	+	+	+	10
Intestine Large, Cecum	+	+	+	+	+	+	+	+	+	+	10
Intestine Large, Colon	+	+	+	+	+	+	+	+	+	+	10
Intestine Large, Rectum	+	+	+	+	+	+	+	+	+	+	10
Intestine Small, Duodenum	+	+	+	+	+	+	+	+	+	+	10
Intestine Small, Ileum	+	+	+	+	+	+	+	+	+	+	10
Intestine Small, Jejunum	+	+	+	+	+	+	+	+	+	+	10
Liver	+	+	+	+	+	+	+	+	+	+	10
Pancreas	+	+	+	+	+	+	+	+	+	+	10
Salivary Glands	+	+	+	+	+	+	+	+	+	+	10
Stomach, Forestomach	+	+	+	+	+	+	+	+	+	+	10
Stomach, Glandular	+	+	+	+	+	+	+	+	+	+	10

CARDIOVASCULAR SYSTEM

Blood Vessel	+	+	+	+	+	+	+	+	+	+	10
Heart	+	+	+	+	+	+	+	+	+	+	10

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 1) Minimal 3) Moderate
 2) Mild 4) Marked

Experiment Number: 20725 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

DAY ON TEST		0	0	0	0	0	0	0	0	0	0
WISTAR HAN RATS FEMALE		0	0	0	0	0	0	0	0	0	0
		9	9	9	9	9	9	9	9	9	9
		3	3	3	3	3	3	3	3	3	3
100 ppm		0	0	0	0	0	0	0	0	0	0
	ANIMAL ID	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	1
		1	2	3	4	5	6	7	8	9	0
* TOTALS											

ENDOCRINE SYSTEM

Adrenal Cortex	+	+	+	+	+	+	+	+	+	+	10	
Adrenal Medulla	+	+	+	+	+	+	+	+	+	+	10	
Islets, Pancreatic	+	+	+	+	+	+	+	+	+	+	10	
Parathyroid Gland	+	+	M	+	+	M	M	+	+	+	7	
Pituitary Gland Pars Distalis, Cyst	+	+	+	+	+	+	+	+	+	+	10	1
Thyroid Gland	+	+	+	+	+	+	+	+	+	+	10	

GENERAL BODY SYSTEM

NONE

GENITAL SYSTEM

Clitoral Gland Inflammation, Chronic Active	+	+	+	+	+	+	+	+	+	+	10	2 2.0
Ovary Cyst	+	+	+	+	+	+	+	+	+	+	10	1 2.0
Uterus	+	+	+	+	+	+	+	+	+	+	10	

HEMATOPOIETIC SYSTEM

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 1) Minimal 3) Moderate
 2) Mild 4) Marked

Experiment Number: 20725 - 01
 Test Type: 90-DAY
 Route: RESPIRATORY EXPOSURE WHOLE BODY
 Species/Strain: RATS/Wistar Han

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

Date Report Requested: 01/12/2017
 Time Report Requested: 15:54:18
 First Dose M/F: 07/28/08 / 07/29/08
 Lab: BNW

DAY ON TEST	0	0	0	0	0	0	0	0	0	0	
	9	9	9	9	9	9	9	9	9	9	
3	3	3	3	3	3	3	3	3	3	3	
ANIMAL ID	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	
	0	0	0	0	0	0	0	0	0	0	1
	1	2	3	4	5	6	7	8	9	0	
											* TOTALS
Bone Marrow	+	+	+	+	+	+	+	+	+	+	10
Lymph Node	+										1
Deep Cervical, Hyperplasia, Lymphoid	1										1 1.0
Lymph Node, Bronchial	+	+	M	+	+	M	+	+	+	+	8
Lymph Node, Mandibular	+	M	+	+	+	+	+	+	+	+	9
Lymph Node, Mediastinal	+	M	+	+	+	+	+	+	+	+	9
Lymph Node, Mesenteric	+	+	+	+	+	+	+	+	+	+	10
Spleen	+	+	+	+	+	+	+	+	+	+	10
Atrophy, Lymphoid				3		3					2 3.0
Thymus	+	+	+	+	+	M	+	+	+	+	9
Atrophy, Lymphoid				2							1 2.0
INTEGUMENTARY SYSTEM											
Mammary Gland	+	+	+	+	+	+	+	+	+	+	10
Skin	+	+	+	+	+	+	+	+	+	+	10
MUSCULOSKELETAL SYSTEM											
Bone	+	+	+	+	+	+	+	+	+	+	10
NERVOUS SYSTEM											

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	9	9	9	9	9	9	9	9	9	9
WISTAR HAN RATS FEMALE	3	3	3	3	3	3	3	3	3	3
100 ppm	ANIMAL ID	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
	0	0	0	0	0	0	0	0	0	1
	1	2	3	4	5	6	7	8	9	0

*** TOTALS**

Brain + + + + + + + + + + **10**

RESPIRATORY SYSTEM

Larynx	+ + + + + + + + + +										10		
Inflammation, Chronic Active			1		1	1			1	1		5	1.0
Epithelium, Necrosis	1		2		2		2	2	1		6	1.7	
Respiratory Epithelium, Hyperplasia					2		1				2	1.5	
Respiratory Epithelium, Metaplasia, Squamous	3	3	3	3	3	3	3	3	3	3	10	3.0	
Respiratory Epithelium, Regeneration									1		1	1.0	
Squamous Epithelium, Hyperplasia	2	2		2	2	2	2	2	2	2	9	2.0	
Lung	+ + + + + + + + + +										10		
Foreign Body				X		X					2		
Infiltration Cellular, Histiocyte					1			1	1		3	1.0	
Inflammation, Eosinophil	2		2	2	2		2	2	2		7	2.0	
Inflammation, Acute						3					1	3.0	
Bronchiole, Epithelium, Hyperplasia		1	1	1	1	1	1	1	1		8	1.0	
Bronchus, Epithelium, Hyperplasia			2	2	1	2		2			5	1.8	
Bronchus, Epithelium, Hyperplasia, Atypical	2	2					2		2		4	2.0	
Bronchus, Epithelium, Metaplasia, Squamous							2		2		2	2.0	
Bronchus, Epithelium, Necrosis	2						2				2	2.0	
Bronchus, Epithelium, Regeneration	3	1					2		1		4	1.8	
Nose	+ + + + + + + + + +										10		
Inflammation, Suppurative	4	4	4	4	4	4	4	4	1	3	10	3.6	
Lymphoid Tissue, Hyperplasia	1	2		3	2		3	1			6	2.0	
Olfactory Epithelium, Atrophy	1			2		2	1				4	1.5	
Olfactory Epithelium, Degeneration	1							2	2	2	4	1.8	
Olfactory Epithelium, Metaplasia, Respiratory	3	3	3	2	2	2	3	2	2	3	10	2.5	

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	9	9	9	9	9	9	9	9	9	9	
WISTAR HAN RATS FEMALE	3	3	3	3	3	3	3	3	3	3	
100 ppm											
ANIMAL ID	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	
	0	0	0	0	0	0	0	0	0	0	1
	1	2	3	4	5	6	7	8	9	0	
* TOTALS											
Olfactory Epithelium, Necrosis	1	1	1		1						4 1.0
Respiratory Epithelium, Hyperplasia	3	3	3	3	3	2	3	3	2	3	10 2.8
Respiratory Epithelium, Metaplasia, Squamous	4	4	4	3	4	3	4	3	4	4	10 3.7
Respiratory Epithelium, Necrosis	2	2	2	2	3	2	3	2	2	2	10 2.2
Respiratory Epithelium, Regeneration	2	2	2	1	1	1		1	1	1	9 1.3
Septum, Necrosis							2		1		2 1.5
Turbinate, Atrophy	2	2	1	2	1	3	2	2	2	3	10 2.0
Trachea	+	+	+	+	+	+	+	+	+	+	10
Inflammation, Chronic Active										1	1 1.0
Epithelium, Hyperplasia		2	3	3	3	3	2	3	1	2	9 2.4
Epithelium, Necrosis	2	3	2	2	4	4	4	2	2	2	10 2.7
Epithelium, Regeneration	1	1	2	1	1	1	2	1	1	1	10 1.2
SPECIAL SENSES SYSTEM											
Eye	+	+	+	+	+	+	+	+	+	+	10
Cornea, Inflammation, Acute	2				1	1					3 1.3
Cornea, Neovascularization	1										1 1.0
Cornea, Epithelium, Vacuolation	1										1 1.0
Harderian Gland	+	+	+	+	+	+	+	+	+	+	10
URINARY SYSTEM											
Kidney	+	+	+	+	+	+	+	+	+	+	10
Urinary Bladder	+	+	+	+	+	+	+	+	+	+	10

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