

**Experiment Number:** 60311 - 05  
**Test Type:** CHRONIC  
**Route:** RESPIRATORY EXPOSURE WHOLE BODY  
**Species/Strain:** RATS/F344/N Tac

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
Cobalt  
**CAS Number:** 7440-48-4

**Date Report Requested:** 01/18/2012  
**Time Report Requested:** 14:48:12  
**First Dose M/F:** 05/08/06 / 05/08/06  
**Lab:** BNW

F2\_RD

**NTP Study Number:** C60311  
**Lock Date:** 12/03/2008  
**Cage Range:** ALL  
**Date Range:** ALL  
**Reasons For Removal:** ALL  
**Removal Date Range:** ALL  
**Treatment Groups:** Include ALL  
**Study Gender:** Both  
**TDMSE Version:** 2.6.0.0\_007  
**PWG Approval Date:** NONE

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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	
	<b>FISCHER 344-TACONIC RATS MALE</b>	3	6	6	6	7	6	6	7	6	7	6	5	7	7	5	7	6	7	6	5	7	7	6	6
	8	1	2	9	2	8	1	3	7	2	6	4	3	2	6	2	8	0	3	8	8	0	1	6	8
<b>Control</b>	3	1	6	7	9	2	6	0	6	9	3	2	0	9	2	9	8	5	0	3	3	3	2	9	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
<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	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	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
																									<b>males (cont...)</b>

**ALIMENTARY SYSTEM**

Esophagus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Inflammation, Suppurative										4														
Intestine Large, Cecum	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Intestine Large, Colon	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Intestine Large, Rectum	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Intestine Small, Duodenum	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Intestine Small, Ileum	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+	+	+	+
Intestine Small, Jejunum	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+	+	+	+
Liver	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Atrophy			2																					
Basophilic Focus					X										X		X	X						
Clear Cell Focus					X			X							X			X			X			
Eosinophilic Focus																								
Fatty Change												3							1					
Hepatodiaphragmatic Nodule			X																		X			
Inflammation, Chronic Active																2								
Necrosis																								
Thrombosis																								1
Bile Duct, Hyperplasia																								3
Mesentery	+					+				+	+	+									+			+
Artery, Thrombosis																								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  
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1-4 .. Lesion qualified as:  
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FISCHER 344-TACONIC RATS MALE	DAY ON TEST																									males (cont...)
	0338	0361	0362	0366	0367	0366	0367	0366	0367	0366	0367	0365	0367	0367	0365	0367	0366	0367	0366	0365	0367	0367	0366	0366		
Control	ANIMAL ID																									males (cont...)
	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	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000		
Fat, Necrosis	1				1				1	1			1	1						1			1			
Pancreas	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Acinus, Atrophy	1	1	1	1				1	1				1						1	1				1		
Acinus, Hyperplasia													2													
Salivary Glands	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Stomach, Forestomach	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Edema																				3			2			
Hyperplasia, Squamous										2	3									3	2	1		3		
Inflammation, Chronic Active																				1						
Mineralization																										
Ulcer										1	4							2			3					
Stomach, Glandular	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Edema																								2		
Mineralization																										
Ulcer																										

### CARDIOVASCULAR SYSTEM

Blood Vessel  
 Aorta, Mineralization

Heart	0338	0361	0362	0366	0367	0366	0367	0366	0367	0366	0367	0365	0367	0367	0365	0367	0366	0367	0366	0365	0367	0367	0366	0366	
Cardiomyopathy	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Thrombosis	1	1	2	2	1		2	1		1	3	2	1	1	2	1	1	3	2		3	1	2	3	1

### ENDOCRINE SYSTEM

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 + .. Tissue examined microscopically  
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FISCHER 344-TACONIC RATS MALE	DAY ON TEST																									males (cont...)
	0 3 8 3	0 6 1 1	0 6 2 6	0 6 9 7	0 7 2 9	0 6 8 2	0 6 1 6	0 7 3 0	0 6 7 6	0 7 2 9	0 6 6 3	0 7 4 2	0 5 3 5	0 7 2 6	0 7 6 2	0 6 8 9	0 7 5 8	0 6 3 5	0 6 8 0	0 5 8 3	0 7 8 2	0 7 1 9	0 6 6 8	0 6 8 8		
Control	0 0 0 0 1	0 0 0 0 2	0 0 0 0 3	0 0 0 0 4	0 0 0 0 5	0 0 0 0 6	0 0 0 0 7	0 0 0 0 8	0 0 0 0 9	0 0 0 0 0	0 0 0 0 1	0 0 0 0 1	0 0 0 0 2	0 0 0 0 3	0 0 0 0 4	0 0 0 0 5	0 0 0 0 6	0 0 0 0 7	0 0 0 0 8	0 0 0 0 9	0 0 0 0 0	0 0 0 0 1	0 0 0 0 2	0 0 0 0 3	0 0 0 0 4	0 0 0 0 5

Adrenal Cortex	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Accessory Adrenal Cortical Nodule Degeneration																							1		
Hyperplasia		1	1	1	2	1			1	3		1	3	1		1		2	1			1	2		2
Adrenal Medulla	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Hyperplasia		1		2				3	4		3		1	3				1	4					2	
Islets, Pancreatic	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Parathyroid Gland	+	+	+	M	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Pituitary Gland	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Angiectasis			1																						
Cyst											X														
Pars Distalis, Hyperplasia				1	2		1					1										1			
Thyroid Gland	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Hemorrhage																									
C-cell, Hyperplasia									1					1	2					3			1		

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

Epididymis	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Cyst																									
Preputial Gland	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

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FISCHER 344-TACONIC RATS MALE Control	DAY ON TEST																									males (cont...)
	0383	0668	0667	0667	0762	0666	0667	0667	0667	0667	0667	0667	0667	0667	0667	0667	0667	0667	0667	0667	0667	0667	0667	0667		
ANIMAL ID	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000		
Ectasia Inflammation, Chronic Active	2				1		1													2				2		
Prostate Hyperplasia Inflammation, Chronic Active	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
		2	2	1		1		1	3	1	2		2	4		1	2	1	1	2		3	3	1	1	
Seminal Vesicle Inflammation, Chronic Active	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Testes Atrophy Infarct Arteriole, Inflammation, Chronic Active Interstitial Cell, Hyperplasia	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
		1	1	4	4		4	4	4	3		3	2		4				2	4	2	4	4	4	4	
									3										3							
			1							3					3				2							
<b>HEMATOPOIETIC SYSTEM</b>																										
Bone Marrow	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Lymph Node Iliac, Ectasia Pancreatic, Ectasia Renal, Ectasia				+	+				+				+										+	+		
																								3		
Lymph Node, Bronchial	M	M	M	+	+	+	M	+	M	+	M	M	+	M	M	+	+	M	+	M	+	M	+	+	M	
Lymph Node, Mandibular Atrophy Ectasia Hyperplasia	+	+	+	+	+	+	+	+	+	+	M	+	+	+	+	+	+	+	+	+	+	+	+	+		
																								4		
																								2		

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DAY ON TEST	FISCHER 344-TACONIC RATS MALE																									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	
Control	0	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	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	

Necrosis

Lymph Node, Mediastinal

M +

Lymph Node, Mesenteric Hemorrhage

+ 2

Spleen  
 Fibrosis  
 Hematopoietic Cell Proliferation  
 Hemorrhage  
 Necrosis  
 Capsule, Angiectasis

+  
 1  
 2 1  
 3  
 1

Thymus

M + + + M M +

**INTEGUMENTARY SYSTEM**

Mammary Gland  
 Galactocele  
 Hyperplasia  
 Inflammation, Chronic Active

+ M + + + + + M + + M + M + + + + M M + M M  
 3  
 3  
 1

Skin  
 Cyst Epithelial Inclusion  
 Hyperplasia, Squamous  
 Inflammation

+  
 2  
 3 3 1

**MUSCULOSKELETAL SYSTEM**

Bone

+ +

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|                                      |                  | 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 |   |   |                            |
| <b>FISCHER 344-TACONIC RATS MALE</b> |                  | 3           | 6 | 6 | 6 | 7 | 6 | 6 | 7 | 6 | 7 | 6 | 5 | 7 | 7 | 5 | 7 | 6 | 7 | 6 | 5 | 7 | 7 | 6 | 6 |   |   |                            |
|                                      |                  | 8           | 1 | 2 | 9 | 2 | 8 | 1 | 3 | 7 | 2 | 6 | 4 | 3 | 2 | 6 | 2 | 8 | 0 | 3 | 8 | 8 | 0 | 1 | 6 | 8 |   |                            |
|                                      |                  | 3           | 1 | 6 | 7 | 9 | 2 | 6 | 0 | 6 | 9 | 3 | 2 | 0 | 9 | 2 | 9 | 8 | 5 | 0 | 3 | 3 | 3 | 2 | 9 | 8 | 8 |                            |
|                                      | <b>Control</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 |                            |
|                                      | <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 | <b>males<br/>(cont...)</b> |

Skeletal Muscle

### NERVOUS SYSTEM

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| Brain                                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |  |  |
| Compression                             |   | 2 |   |   |   |   |   |   | 2 |   |   |   | 2 |   | 2 | 1 |   | 2 |   |   |   | 3 |   | 2 | 3 |  |  |
| Edema                                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Hemorrhage                              |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Infiltration Cellular, Mononuclear Cell |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Metaplasia, Osseous                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Meninges, Inflammation, Suppurative     |   |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Spinal Cord                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Infiltration Cellular                   |   |   |   |   |   |   |   |   |   |   |   |   | + |   |   |   |   |   |   |   |   |   |   |   |   |  |  |

### RESPIRATORY SYSTEM

|                                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
|----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| Larynx                           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |  |  |
| Foreign Body                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X | X |   |  |  |
| Inflammation                     | 1 |   |   |   | 1 | 1 | 1 | 1 | 1 |   | 1 | 1 |   | 1 | 1 | 1 | 1 | 1 | 1 |   | 1 | 1 | 1 | 1 | 2 |  |  |
| Metaplasia, Squamous             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 | 1 |   |  |  |
| Ulcer                            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Lung                             | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |  |  |
| Inflammation, Chronic Active     |   |   |   |   | 1 |   |   |   |   |   | 1 | 1 | 1 |   |   | 1 | 1 | 2 |   | 1 |   | 1 |   |   |   |  |  |
| Metaplasia, Osseous              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Mineralization                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Thrombosis                       |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| Alveolar Epithelium, Hyperplasia |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   | 1 |   |   |   |   |   |   |  |  |

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**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| DAY ON TEST | FISCHER 344-TACONIC RATS MALE |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 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 |                    |
| Control     | 3                             | 6 | 6 | 6 | 7 | 6 | 6 | 7 | 6 | 7 | 6 | 5 | 7 | 7 | 5 | 7 | 6 | 7 | 6 | 5 | 7 | 7 | 6 | 6 | 6 |                    |
| ANIMAL ID   | 8                             | 1 | 2 | 9 | 2 | 8 | 1 | 3 | 7 | 2 | 6 | 4 | 3 | 2 | 6 | 2 | 8 | 0 | 3 | 8 | 8 | 0 | 1 | 6 | 8 |                    |
|             | 3                             | 1 | 6 | 7 | 9 | 2 | 6 | 0 | 6 | 9 | 3 | 2 | 0 | 9 | 2 | 9 | 8 | 5 | 0 | 3 | 3 | 3 | 2 | 9 | 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 |                    |
|             | 0                             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |                    |
|             | 0                             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 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 | 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 |                    |

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nose  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | I | + | + | + | + | + |
| Foreign Body  |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |   |
| Inflammation, Suppurative                           |   |   | 1 |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |
| Inflammation, Chronic Active                        | 1 |   | 1 |   | 1 |   | 1 |   |   | 1 | 2 |   | 1 |   | 1 | 1 |   | 1 | 1 |   | 1 |   | 1 | 1 | 1 |
| Thrombosis  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 4 |   | 2 |   |   |
| Olfactory Epithelium, Accumulation, Hyaline Droplet |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |
| Olfactory Epithelium, Atrophy                       |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |
| Olfactory Epithelium, Metaplasia, Respiratory       |   | 1 |   |   |   |   |   | 1 |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   | 1 | 1 |   |
| Respiratory Epithelium, Hyperplasia                 |   |   | 2 |   |   |   |   | 1 | 1 |   | 1 |   |   |   | 1 | 2 |   | 1 | 1 |   | 1 | 1 |   |   |   |
| Respiratory Epithelium, Necrosis                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Turbinate, Atrophy                                  |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Turbinate, Hyperostosis                             |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

|         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Trachea | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**SPECIAL SENSES SYSTEM**

|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ear                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | + |
|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |
| Eye                          | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Cataract                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   | 1 |   |
| Inflammation, Suppurative    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Metaplasia, Osseous          |   |   | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |   | 1 |   | 1 |   | 1 |   | 1 |   |   | 1 |   | 1 | 1 |   |
| Harderian Gland              | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Zymbal's 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  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked







Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
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 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |        |
|-------------------------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|--------|
|                               | 0730        | 0732  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  |          | 0739  | 0739   |
| Control                       | ANIMAL ID   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |        |
|                               | 00026       | 00007 | 00008 | 00009 | 00010 | 00011 | 00012 | 00013 | 00014 | 00015 | 00016 | 00017 | 00018 | 00019 | 00020 | 00021 | 00022 | 00023 | 00024 | 00025 |          | 00026 | 00027  |
| Fat, Necrosis                 | 2           | 1     |       |       |       |       |       |       | 1     |       |       |       |       |       |       |       |       |       | 1     | 1     |          |       | 14 1.1 |
| Pancreas                      | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | 50     |
| Acinus, Atrophy               |             |       | 1     | 1     | 1     |       |       | 1     | 1     |       |       |       |       | 1     |       |       |       |       | 1     | 3     |          | 1     | 1 1    |
| Acinus, Hyperplasia           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 1 2.0  |
| Salivary Glands               | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | 50     |
| Stomach, Forestomach          | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | 50     |
| Edema                         |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 2 2.5  |
| Hyperplasia, Squamous         |             |       | 2     |       |       |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       |       | 2        | 2     | 10 2.2 |
| Inflammation, Chronic Active  |             |       |       |       |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 2 1.5  |
| Mineralization                |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1     | 3        |       | 2 2.0  |
| Ulcer                         |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 4 2.5  |
| Stomach, Glandular            | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | 50     |
| Edema                         |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 1 2.0  |
| Mineralization                |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2        |       | 1 2.0  |
| Ulcer                         |             |       |       |       |       |       |       |       |       |       |       |       | 3     |       |       |       |       |       |       |       |          |       | 1 3.0  |
| <b>CARDIOVASCULAR SYSTEM</b>  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |        |
| Blood Vessel                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 1      |
| Aorta, Mineralization         |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 3        |       | 1 3.0  |
| Heart                         | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | 50     |
| Cardiomyopathy                | 1           | 2     | 1     | 2     | 2     | 2     | 1     | 3     | 2     | 1     |       | 2     |       | 2     | 1     | 2     | 1     | 1     | 1     | 3     | 2        | 3     | 45 1.7 |
| Thrombosis                    |             |       |       |       |       |       |       |       | 3     |       |       | 2     |       | 3     |       |       |       |       |       |       | 4        |       | 4 3.0  |
| <b>ENDOCRINE SYSTEM</b>       |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |        |

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| FISCHER 344-TACONIC RATS MALE<br>Control | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |        |       |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|--------|-------|
|  | 0730        | 0732  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  | 0739  |          | 0739  | 0739  |        |       |
| ANIMAL ID                                | 00026       | 00007 | 00008 | 00009 | 00010 | 00011 | 00012 | 00013 | 00014 | 00015 | 00016 | 00017 | 00018 | 00019 | 00020 | 00021 | 00022 | 00023 | 00024 | 00025 | 00026    | 00027 | 00028 | 00029  | 00030 |
| Adrenal Cortex                           | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +      | 50    |
| Accessory Adrenal Cortical Nodule        |             |       |       |       |       |       |       | 1     |       |       |       |       |       | 1     |       |       |       |       |       |       |          |       |       |        | 3 1.0 |
| Degeneration                             |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |        | 1 3.0 |
| Hyperplasia                              | 1           | 3     | 1     |       | 1     |       | 2     | 1     | 1     | 1     | 1     | 1     |       |       | 2     | 1     | 2     | 2     | 1     |       | 1        | 2     | 1     | 35 1.4 |       |
| Adrenal Medulla                          | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50     |       |
| Hyperplasia                              |             | 1     |       |       | 1     |       | 3     | 2     | 1     |       |       |       | 4     |       |       |       |       | 1     | 4     | 3     |          |       |       | 19 2.3 |       |
| Islets, Pancreatic                       | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50     |       |
| Parathyroid Gland                        | +           | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | M     | M     | +     | +     | +     | +     | +     | +     | +     | M        | +     | +     | 45     |       |
| Pituitary Gland                          | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50     |       |
| Angiectasis                              |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 1 1.0  |       |
| Cyst                                     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 1      |       |
| Pars Distalis, Hyperplasia               |             | 4     | 3     | 1     |       |       |       |       | 1     | 1     | 2     |       | 4     |       | 4     | 1     |       | 4     | 2     | 4     |          |       | 1     | 18 2.1 |       |
| Thyroid Gland                            | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | M        | +     | +     | 49     |       |
| Hemorrhage                               |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1     |       |       |       |          |       |       | 1 1.0  |       |
| C-cell, Hyperplasia                      |             |       |       |       |       |       |       |       |       | 1     |       |       |       |       |       |       |       | 1     |       |       |          |       |       | 7 1.4  |       |

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

|                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|
| Epididymis      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |
| Cyst            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |   |   | 1  |
| Preputial Gland | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |

\* .. 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:

A .. Autolysis precludes evaluation

1) Minimal 3) Moderate

X .. Lesion present

BLANK .. Not examined microscopically

2) Mild 4) Marked

I .. Insufficient tissue





Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
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 Species/Strain: RATS/F344/N Tac

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| FISCHER 344-TACONIC RATS MALE | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |       |
|-------------------------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|-------|
|                               | 0730        | 0722  | 0722  | 0722  | 0722  | 0713  | 0708  | 0706  | 0706  | 0706  | 0706  | 0706  | 0706  | 0706  | 0706  | 0706  | 0706  | 0706  | 0706  | 0706  |          | 0706  | 0706  |       |       |
| Control                       | 00026       | 00027 | 00028 | 00029 | 00030 | 00031 | 00032 | 00033 | 00034 | 00035 | 00036 | 00037 | 00038 | 00039 | 00040 | 00041 | 00042 | 00043 | 00044 | 00045 | 00046    | 00047 | 00048 | 00049 | 00050 |

Skeletal Muscle + 1

**NERVOUS SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------|
| Brain                                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Compression                             |   |   |   |   | 3 |   | 1 |   |   |   |   |   |   |   | 1 |   | 2 |   |   |   | 2 |   | 2 |   | 15 2.0 |
| Edema                                   |   |   |   |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   | 3 |   |   |   | 2 3.0  |
| Hemorrhage                              |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 2.0  |
| Infiltration Cellular, Mononuclear Cell |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 1.0  |
| Metaplasia, Osseous                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 4 |   |   | 1 4.0  |
| Meninges, Inflammation, Suppurative     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 3.0  |
| Spinal Cord                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1      |
| Infiltration Cellular                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 2.0  |

**RESPIRATORY SYSTEM**

|                                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        |
|----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------|
| Larynx                           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Foreign Body                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3      |
| Inflammation                     | 1 | 1 |   |   |   | 1 |   | 2 | 2 |   | 2 |   | 2 |   | 1 |   |   | 1 |   | 1 |   |   |   | 2 | 28 1.2 |
| Metaplasia, Squamous             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   | 3 1.3  |
| Ulcer                            |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   | 1 1.0  |
| Lung                             | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Inflammation, Chronic Active     | 1 |   | 1 | 1 | 1 |   |   | 1 |   |   |   |   | 1 | 1 |   |   | 1 | 1 |   |   | 1 | 2 |   |   | 22 1.1 |
| Metaplasia, Osseous              |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   | 1 |   |   | 3 1.0  |
| Mineralization                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   | 1 2.0  |
| Thrombosis                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   | 2 1.5  |
| Alveolar Epithelium, Hyperplasia |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE | 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 |                    |
| 1.25 mg/m3                    | 5           | 7 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 7 | 7 | 6 | 7 | 7 | 6 | 6 | 5 | 7 | 6 | 6 | 6 | 6 | 5 | 6 | 7                  |
|                               | 4           | 3 | 2 | 2 | 0 | 8 | 2 | 7 | 2 | 2 | 2 | 8 | 3 | 2 | 9 | 3 | 8 | 3 | 7 | 6 | 6 | 6 | 7 | 8 | 2                  |
|                               | 0           | 0 | 0 | 9 | 4 | 8 | 3 | 9 | 5 | 9 | 9 | 4 | 0 | 9 | 9 | 4 | 3 | 0 | 4 | 7 | 7 | 3 | 7 | 4 | 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                  |
|                               | 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 | 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                  |
| Acinus, Atrophy               | 1           | 2 | 1 | 1 |   | 2 | 1 |   | 1 | 1 | 2 | 3 |   | 2 |   | 1 | 1 | 1 | 1 | 2 | 1 |   | 1 | 2 |                    |
| Salivary Glands               | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |                    |
| Stomach, Forestomach          | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |                    |
| Hyperplasia, Squamous         |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   | 2 |                    |
| Inflammation, Chronic Active  |             |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |
| Ulcer                         |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   | 3 |                    |
| Stomach, Glandular            | +           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |                    |
| Erosion                       |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |
| Inflammation, Chronic Active  |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |
| Ulcer                         |             |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |                    |
| Tooth                         |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | + |   |   |   |                    |
| Inflammation, Chronic Active  |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |   |   |   |                    |

**CARDIOVASCULAR SYSTEM**

|                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Blood Vessel                         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | + |
| Heart                                | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Cardiomyopathy                       | 1 | 2 | 3 | 2 | 1 |   | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 |   | 1 | 1 |   | 1 | 1 | 2 | 2 | 1 |
| Inflammation, Suppurative            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Thrombosis                           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |
| Artery, Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Atrium, Congestion                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Epicardium, Hyperplasia              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**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  
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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE<br>1.25 mg/m3 | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID                | males<br>(cont...) |  |
|---|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------------------------|--------------------|--|
|   | 0540        | 0730 | 0770 | 0620 | 0760 | 0770 | 0670 | 0760 | 0770 | 0770 | 0660 | 0770 | 0770 | 0660 | 0660 | 0550 | 0770 | 0660 | 0660 | 0660 | 0660 | 0550 | 0660 | 0670 | 0670 |                          |                    |  |
|   | 0           | 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 |                    |  |
| Adrenal Cortex Atrophy                      | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                          |                    |  |
| Hyperplasia                                 |             | 2    | 1    |      |      |      |      |      | 3    | 1    |      | 2    | 1    |      | 2    | 3    |      |      | 2    |      |      |      | 1    |      | 3    | 1                        |                    |  |
| Necrosis                                    |             |      |      |      | 2    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                          |                    |  |
| Adrenal Medulla                             | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                          |                    |  |
| Hyperplasia                                 | 2           |      | 3    |      | 1    |      |      |      | 4    |      |      |      |      |      |      |      |      | 1    | 2    | 2    | 4    | 1    |      | 1    | 1    | 3                        |                    |  |
| Necrosis                                    |             |      |      |      | 4    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                          |                    |  |
| Islets, Pancreatic                          | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                          |                    |  |
| Hyperplasia                                 |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                          |                    |  |
| Parathyroid Gland                           | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | M    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                          | M                  |  |
| Pituitary Gland                             | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                          |                    |  |
| Hemorrhage                                  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                          |                    |  |
| Pars Distalis, Hyperplasia                  | 2           | 2    |      |      | 1    |      |      |      |      |      |      | 1    | 1    |      |      |      |      |      |      | 1    | 1    |      |      |      | 1    |                          | 1                  |  |
| Thyroid Gland                               | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                          |                    |  |
| C-cell, Hyperplasia                         |             |      |      |      | 1    |      |      |      |      |      |      |      | 1    |      |      | 1    |      |      |      |      |      | 1    |      |      |      |                          |                    |  |

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

Epididymis

+ + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

Penis

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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
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 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
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 Lab: BNW

| FISCHER 344-TACONIC RATS MALE<br>1.25 mg/m3 | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID | males<br>(cont...) |                       |                  |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|--------------------|-----------------------|------------------|
|   | 0<br>5<br>4<br>0 | 0<br>7<br>3<br>0 | 0<br>7<br>2<br>0 | 0<br>6<br>2<br>4 | 0<br>7<br>0<br>8 | 0<br>6<br>8<br>3 | 0<br>7<br>2<br>9 | 0<br>6<br>7<br>5 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>6<br>8<br>4 | 0<br>7<br>3<br>0 | 0<br>7<br>2<br>9 | 0<br>6<br>9<br>9 | 0<br>6<br>3<br>4 | 0<br>5<br>8<br>3 | 0<br>7<br>3<br>0 | 0<br>6<br>6<br>7 | 0<br>6<br>6<br>6 | 0<br>5<br>7<br>4 |           |                    | 0<br>6<br>8<br>2      | 0<br>7<br>9<br>5 |
|   | 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>2<br>0<br>1 |                  |

Concretion

Preputial Gland  
 Ectasia  
 Inflammation, Chronic Active

+  
 1 2 1

Prostate  
 Hyperplasia  
 Inflammation, Chronic Active

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

Seminal Vesicle  
 Inflammation, Chronic Active

+ +

Testes  
 Atrophy  
 Interstitial Cell, Hyperplasia

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

**HEMATOPOIETIC SYSTEM**

Bone Marrow

+ +

Lymph Node  
 Iliac, Lumbar, Ectasia  
 Iliac, Renal, Ectasia  
 Lumbar, Hyperplasia  
 Pancreatic, Necrosis  
 Renal, Ectasia

+  
 +  
 1 2

Lymph Node, Bronchial

+ + + + M M + M + M M + M M M M + M + M M + + M M

Lymph Node, Mandibular

+ M + +

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 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE | DAY ON TEST           |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | males<br>(cont...)    |
|-------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                               | 0<br>5<br>4<br>0      | 0<br>7<br>3<br>0      | 0<br>7<br>2<br>0      | 0<br>6<br>2<br>4      | 0<br>7<br>0<br>8      | 0<br>6<br>8<br>3      | 0<br>7<br>2<br>9      | 0<br>6<br>7<br>5      | 0<br>7<br>2<br>9      | 0<br>7<br>2<br>9      | 0<br>6<br>8<br>4      | 0<br>7<br>3<br>0      | 0<br>7<br>2<br>9      | 0<br>6<br>9<br>4      | 0<br>6<br>3<br>4      | 0<br>5<br>8<br>3      | 0<br>7<br>6<br>4      | 0<br>6<br>6<br>7      | 0<br>6<br>6<br>3      | 0<br>5<br>7<br>7      | 0<br>6<br>8<br>4      | 0<br>6<br>7<br>3      | 0<br>6<br>8<br>4      | 0<br>7<br>9<br>5      |                       |
| 1.25 mg/m3                    | 0<br>0<br>2<br>0<br>1 | 0<br>0<br>0<br>0<br>2 | 0<br>0<br>2<br>0<br>3 | 0<br>0<br>2<br>0<br>4 | 0<br>0<br>2<br>0<br>5 | 0<br>0<br>2<br>0<br>6 | 0<br>0<br>2<br>0<br>7 | 0<br>0<br>2<br>0<br>8 | 0<br>0<br>2<br>0<br>9 | 0<br>0<br>2<br>1<br>0 | 0<br>0<br>2<br>1<br>1 | 0<br>0<br>2<br>1<br>1 | 0<br>0<br>2<br>1<br>1 | 0<br>0<br>2<br>1<br>1 | 0<br>0<br>2<br>1<br>1 | 0<br>0<br>2<br>1<br>1 | 0<br>0<br>2<br>1<br>1 | 0<br>0<br>2<br>2<br>0 | 0<br>0<br>2<br>2<br>1 | 0<br>0<br>2<br>2<br>2 | 0<br>0<br>2<br>2<br>2 | 0<br>0<br>2<br>2<br>2 | 0<br>0<br>2<br>2<br>2 | 0<br>0<br>2<br>2<br>2 | 0<br>0<br>2<br>2<br>2 |
| 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                     | 5                     |

Congestion  
 Ectasia  
 Hyperplasia  
 Necrosis

4

2

2

Lymph Node, Mediastinal

Lymph Node, Mesenteric

Spleen

Congestion  
 Fibrosis  
 Hematopoietic Cell Proliferation  
 Hemorrhage  
 Necrosis

1

2

2

1

2

Thymus

**INTEGUMENTARY SYSTEM**

Mammary Gland  
 Galactocele  
 Hyperplasia

Skin

Hemorrhage  
 Hyperplasia, Squamous  
 Inflammation  
 Inflammation, Granulomatous

3

1

3

4

**MUSCULOSKELETAL SYSTEM**

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
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| FISCHER 344-TACONIC RATS MALE<br>1.25 mg/m3 | DAY ON TEST |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | males<br>(cont...) |   |   |   |   |   |   |   |   |   |   |
|---|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------------|---|---|---|---|---|---|---|---|---|---|
|   | 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 |   |
|   | 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 | 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 |
|   | 1           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 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 | 2 | 2 |   |

|                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
|---------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|
| Bone                                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| Cranium, Fibrosis                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| Cranium, Inflammation, Chronic Active |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| Vertebra, Degeneration                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 |

**NERVOUS SYSTEM**

|             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Brain       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Compression |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hemorrhage  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**RESPIRATORY SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larynx  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Metaplasia, Squamous                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Lung  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation, Suppurative                         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation, Chronic Active                      | 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 | 3 |   |
| Metaplasia, Osseous                               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Alveolar Epithelium, Hyperplasia                  |   | 3 | 4 | 4 | 4 | 2 | 3 | 2 | 2 | 3 | 4 | 3 | 4 | 3 | 4 |   | 1 | 3 | 2 | 2 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Alveolus, Proteinosis                             | 1 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 1 | 1 | 3 | 1 | 3 | 3 | 3 | 3 | 1 | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Artery, Mediastinum, Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Bronchiole, Epithelium, Hyperplasia               |   |   | 2 | 1 |   | 1 |   | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Mediastinum, Metaplasia, Osseous                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 4 |
| Nose  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Foreign Body                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation, Suppurative                         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 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  
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1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked

Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE<br>1.25 mg/m3         | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID | males<br>(cont...) |                  |                  |   |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|--------------------|------------------|------------------|---|
|   | 0<br>5<br>4<br>0 | 0<br>7<br>3<br>0 | 0<br>7<br>2<br>0 | 0<br>6<br>2<br>4 | 0<br>7<br>0<br>8 | 0<br>6<br>8<br>3 | 0<br>7<br>2<br>9 | 0<br>6<br>7<br>5 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>6<br>8<br>4 | 0<br>7<br>3<br>0 | 0<br>7<br>2<br>9 | 0<br>6<br>9<br>4 | 0<br>6<br>3<br>8 | 0<br>5<br>8<br>3 | 0<br>7<br>6<br>4 | 0<br>6<br>6<br>7 | 0<br>6<br>6<br>3 | 0<br>5<br>7<br>4 |           |                    | 0<br>6<br>8<br>2 | 0<br>7<br>9<br>5 |   |
| Inflammation, Chronic Active                        |                  | 1                |                  | 1                | 2                |                  | 1                |                  | 2                | 1                | 1                |                  | 1                | 1                |                  | 2                | 1                | 1                | 2                |                  | 2         | 1                  | 1                | 2                | 2 |
| Thrombosis  | 2                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 3                |                  |           |                    |                  |                  |   |
| Olfactory Epithelium, Accumulation, Hyaline Droplet |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 1                |           |                    |                  |                  |   |
| Olfactory Epithelium, Atrophy                       |                  | 1                |                  | 1                |                  | 1                |                  | 1                |                  | 1                |                  |                  |                  |                  |                  | 1                | 1                | 1                |                  |                  |           |                    |                  |                  | 1 |
| Olfactory Epithelium, Hyperplasia                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 1                |                  |                  |                  |                  |           |                    |                  |                  |   |
| Olfactory Epithelium, Hyperplasia, Basal Cell       |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                    |                  |                  |   |
| Olfactory Epithelium, Metaplasia, Respiratory       |                  | 1                |                  |                  |                  | 1                | 2                |                  | 2                |                  | 2                |                  | 2                | 1                |                  | 1                | 1                |                  | 1                | 3                | 1         |                    | 3                | 4                |   |
| Olfactory Epithelium, Necrosis                      |                  |                  |                  |                  |                  | 1                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                    |                  |                  |   |
| Respiratory Epithelium, Hyperplasia                 | 1                | 2                |                  | 1                | 1                |                  | 1                |                  | 1                | 1                | 1                |                  | 1                |                  | 1                |                  |                  | 1                | 1                |                  |           |                    | 1                | 3                |   |
| Respiratory Epithelium, Metaplasia, Squamous        |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 1                |                  |                  |           |                    |                  |                  |   |
| Respiratory Epithelium, Necrosis                    |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                    |                  |                  |   |
| Turbinate, Atrophy                                  | 1                | 1                | 1                | 1                |                  | 1                | 1                |                  | 1                | 1                | 1                |                  | 1                |                  |                  |                  | 1                |                  | 1                | 1                |           | 1                  | 1                |                  |   |
| Trachea   | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                  | +                | +                |   |

**SPECIAL SENSES SYSTEM**

|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|
| Ear                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
| Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
| Eye                          | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |  |
| Cataract                     |   | 1 |   |   |   |   | 2 |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   | 1 |  |
| Metaplasia, Osseous          | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 |   |   | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 |   |   |   | 1 | 1 |  |
| Harderian Gland              | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |  |
| Zymbal's Gland               |   |   |   |   |   | + |   |   |   |   |   |   |   |   |   | + |   |   |   |   |   |   |   |   |  |

**URINARY 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE<br>1.25 mg/m3 | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID                | males<br>(cont...) |
|---|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------------------------|--------------------|
|   | 0540        | 0730 | 0774 | 0624 | 0708 | 0673 | 0765 | 0776 | 0776 | 0776 | 0676 | 0776 | 0776 | 0676 | 0664 | 0664 | 0573 | 0776 | 0666 | 0666 | 0666 | 0666 | 0577 | 0668 | 0678 |                          |                    |
|   | 0           | 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 | 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    | 000000000000000000000000 |                    |
|   | 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    | 000000000000000000000000 |                    |
|   | 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    | 000000000000000000000000 |                    |
| Kidney                                      | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |      |                          |                    |
| Accumulation, Hyaline Droplet               |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                          |                    |
| Cyst  |             |      |      |      |      |      |      |      | X    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                          |                    |
| Nephropathy                                 | 2           | 3    | 3    | 3    | 2    | 3    | 3    | 4    | 3    | 3    | 4    | 2    | 4    | 3    | 3    | 3    | 3    | 3    | 2    | 3    | 2    | 3    | 3    | 3    | 3    |                          |                    |
| Thrombosis                                  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                          |                    |
| Urinary Bladder                             | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |                          |                    |
| Transitional Epithelium, Hyperplasia        |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |                          |                    |

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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
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 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE<br>1.25 mg/m3 | DAY ON TEST |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        | * TOTALS  |            |
|---|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----------|------------|
|   | 0729        | 0729   | 0729   | 0723   | 0723   | 0711   | 0711   | 0702   | 0702   | 0609   | 0609   | 0603   | 0603   | 0602   | 0602   | 0602   | 0601   | 0601   | 0601   | 0601   | 0601   | 0601   | 0601   | 0601   |           |            |
| ANIMAL ID                                   | 002226      | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 | 000022 |           |            |
| Acinus, Atrophy                             |             | 2      | 1      | 1      | 4      | 1      | 1      | 1      |        | 1      | 1      | 2      |        | 1      | 2      | 1      |        |        |        | 1      | 1      | 1      |        |        | <b>35</b> | <b>1.4</b> |
| Salivary Glands                             | +           | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | <b>50</b> |            |
| Stomach, Forestomach                        | +           | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | <b>50</b> |            |
| Hyperplasia, Squamous                       |             | 1      |        |        |        | 2      | 2      |        |        |        |        |        |        | 3      | 3      | 3      | 3      | 1      |        | 1      | 3      |        | 3      | 2      | <b>14</b> | <b>2.2</b> |
| Inflammation, Chronic Active                |             |        |        |        |        |        |        |        |        |        |        | 3      |        |        | 3      | 3      |        |        |        |        |        |        |        |        | <b>4</b>  | <b>2.8</b> |
| Ulcer                                       |             |        |        |        |        | 1      |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 2      |        | <b>4</b>  | <b>2.0</b> |
| Stomach, Glandular                          | +           | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | +      | <b>50</b> |            |
| Erosion                                     |             |        |        |        |        |        |        |        |        |        |        |        |        | 1      |        |        |        |        |        |        |        |        |        |        | <b>1</b>  | <b>1.0</b> |
| Inflammation, Chronic Active                |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 3      |        |        |        |        |        |        |        |        | <b>1</b>  | <b>3.0</b> |
| Ulcer                                       |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 2      |        | <b>2</b>  | <b>1.5</b> |
| Tooth                                       |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        | <b>2</b>  |            |
| Inflammation, Chronic Active                |             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        | <b>2</b>  | <b>2.5</b> |

**CARDIOVASCULAR SYSTEM**

|                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |           |            |
|--------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----------|------------|
| Blood Vessel                         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>1</b>  |            |
| Heart                                | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>50</b> |            |
| Cardiomyopathy                       | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 4 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |   | <b>44</b> | <b>1.5</b> |
| Inflammation, Suppurative            |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>1</b>  | <b>2.0</b> |
| Thrombosis                           |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>2</b>  | <b>2.0</b> |
| Artery, Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   | <b>1</b>  | <b>3.0</b> |
| Atrium, Congestion                   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>1</b>  | <b>2.0</b> |
| Epicardium, Hyperplasia              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   | <b>1</b>  | <b>2.0</b> |

**ENDOCRINE SYSTEM**

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| FISCHER 344-TACONIC RATS MALE<br>1.25 mg/m3 | DAY ON TEST          |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | * TOTALS             |                      |
|---|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|   | 07<br>29             | 07<br>29             | 07<br>29             | 07<br>29             | 07<br>29             | 07<br>29             | 07<br>29             | 06<br>29             | 07<br>29             | 05<br>29             | 06<br>29             | 05<br>29             | 07<br>29             | 07<br>29             | 07<br>29             | 06<br>29             | 06<br>29             | 05<br>29             | 06<br>29             | 04<br>29             | 07<br>29             | 04<br>29             | 07<br>29             | 06<br>29             |                      | 05<br>29             |
| ANIMAL ID                                   | 00<br>22<br>22<br>66 | 00<br>22<br>22<br>77 | 00<br>22<br>22<br>88 | 00<br>22<br>22<br>99 | 00<br>22<br>22<br>00 | 00<br>22<br>22<br>11 | 00<br>22<br>22<br>22 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 | 00<br>22<br>22<br>33 |
| Adrenal Cortex                              | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | 50                   |
| Atrophy                                     | 1                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 1 1.0                |
| Hyperplasia                                 | 2                    |                      |                      | 1                    |                      |                      | 1                    | 1                    |                      | 1                    |                      | 1                    | 1                    | 2                    | 1                    |                      |                      |                      |                      |                      | 1                    | 3                    |                      | 1                    |                      | 24 1.6               |
| Necrosis                                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 1 2.0                |
| Adrenal Medulla                             | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | 50                   |
| Hyperplasia                                 |                      | 1                    | 3                    |                      |                      |                      | 1                    | 3                    |                      |                      |                      | 3                    | 4                    | 4                    |                      | 4                    | 4                    |                      |                      | +                    | +                    | +                    | +                    | +                    | +                    | 21 2.5               |
| Necrosis                                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 1 4.0                |
| Islets, Pancreatic                          | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | 50                   |
| Hyperplasia                                 |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 2                    |                      | 1 2.0                |
| Parathyroid Gland                           | +                    | +                    | +                    | +                    | +                    | M                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | M                    | M                    | +                    | +                    | +                    | +                    | 45                   |                      |
| Pituitary Gland                             | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | 50                   |
| Hemorrhage                                  |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 3                    |                      |                      |                      |                      |                      | 1 3.0                |
| Pars Distalis, Hyperplasia                  | 3                    | 2                    |                      |                      | 4                    |                      |                      |                      |                      |                      |                      |                      | 3                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 12 1.8               |
| Thyroid Gland                               | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | +                    | 50                   |
| C-cell, Hyperplasia                         |                      |                      | 3                    |                      | 4                    |                      |                      |                      |                      |                      |                      |                      |                      | 1                    |                      |                      |                      |                      |                      |                      |                      |                      |                      | 1                    |                      | 8 1.6                |

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

|            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |
|------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|
| Epididymis | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |
| Penis      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE<br>1.25 mg/m3                | DAY ON TEST          |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | * TOTALS             |                      |                      |                      |                      |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|  | 07<br>29             | 07<br>29             | 07<br>29             | 07<br>23             | 07<br>33             | 07<br>11             | 07<br>11             | 07<br>29             | 07<br>05             | 07<br>06             | 07<br>05             | 07<br>07             | 07<br>07             | 07<br>07             | 07<br>06             | 07<br>06             | 07<br>05             | 07<br>06             | 07<br>04             | 07<br>07             |                      | 07<br>04             | 07<br>07             | 07<br>06             | 07<br>05             |
| ANIMAL ID  | 00<br>22<br>22<br>66 | 00<br>00<br>22<br>22 | 00<br>00<br>22<br>22 | 00<br>00<br>22<br>22 | 00<br>00<br>33<br>33 | 00<br>00<br>33<br>33 | 00<br>00<br>33<br>33 | 00<br>00<br>33<br>33 | 00<br>00<br>33<br>33 | 00<br>00<br>33<br>33 | 00<br>00<br>33<br>33 | 00<br>00<br>33<br>33 | 00<br>00<br>33<br>33 | 00<br>00<br>33<br>33 | 00<br>00<br>44<br>44 | 00<br>00<br>44<br>44 | 00<br>00<br>44<br>44 | 00<br>00<br>44<br>44 | 00<br>00<br>44<br>44 | 00<br>00<br>44<br>44 | 00<br>00<br>44<br>44 | 00<br>00<br>44<br>44 | 00<br>00<br>44<br>44 | 00<br>00<br>44<br>44 | 00<br>00<br>44<br>44 |
| Concretion   |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 2                    | 1 2.0                |
| Preputial Gland<br>Ectasia<br>Inflammation, Chronic Active | +                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 50                   | 1 3.0                |
|  |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 3                    | 4 1.3                |
| Prostate<br>Hyperplasia<br>Inflammation, Chronic Active    | +                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 50                   | 6 2.0                |
|  | 1                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 2                    | 39 1.5               |
| Seminal Vesicle<br>Inflammation, Chronic Active            | +                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 50                   | 1 2.0                |
|  |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 2                    |                      |
| Testes<br>Atrophy<br>Interstitial Cell, Hyperplasia        | +                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 50                   | 34 3.0               |
|  | 4 3 2 3              |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      | 4                    | 10 2.1               |
|  | 2                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |

**HEMATOPOIETIC SYSTEM**

|  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |       |
|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|----|-------|
| Bone Marrow  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 50 |       |
| Lymph Node<br>Iliac, Lumbar, Ectasia<br>Iliac, Renal, Ectasia<br>Lumbar, Hyperplasia<br>Pancreatic, Necrosis<br>Renal, Ectasia |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 9  | 1 1.0 |
|  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1  | 1 3.0 |
|  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 3  | 1 1.0 |
|  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 3  | 1 4.0 |
|  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 3  | 3 2.7 |
| Lymph Node, Bronchial  | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 25 |       |
| Lymph Node, Mandibular   | + |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 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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 Lab: BNW

| FISCHER 344-TACONIC RATS MALE    | DAY ON TEST |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
|----------------------------------|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|----|-----|--|--|--|--|--|--|--|--|--|---|-----|--|--|--|--|--|--|--|--|--|---|-----|--|--|--|--|--|--|--|--|--|---|-----|
|                                  | 07          | 07 | 07 | 07 | 07 | 07 | 06 | 07 | 05 | 06 | 05 | 07 | 07 | 07 | 06 | 06 | 05 | 06 | 04 | 07 | 04 | 07 |    |    | 07              | 06 | 05  |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
| <b>1.25 mg/m3</b>                | 29          | 29 | 29 | 30 | 33 | 33 | 15 | 11 | 29 | 80 | 03 | 69 | 22 | 29 | 00 | 18 | 75 | 64 | 13 | 33 | 22 | 19 | 63 | 93 | <b>* TOTALS</b> |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
|                                  | 00          | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
|                                  | 22          | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
|                                  | 22          | 22 | 22 | 22 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
|                                  | 66          | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
| Congestion                       |             |    |    |    |    |    |    |    |    |    |    |    |    |    | 3  |    |    |    |    |    |    |    |    |    |                 | 1  | 3.0 |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
| Ectasia                          |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 | 2  |     |  |  |  |  |  |  |  |  |  | 2 | 3.0 |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
| Hyperplasia                      |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 |    |     |  |  |  |  |  |  |  |  |  | 1 |     |  |  |  |  |  |  |  |  |  | 2 | 1.5 |  |  |  |  |  |  |  |  |  |   |     |
| Necrosis                         |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  | 1 | 2.0 |  |  |  |  |  |  |  |  |  |   |     |
| Lymph Node, Mediastinal          | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | M  | +  | +  | +  | +  | 48              |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
| Lymph Node, Mesenteric           | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | 50              |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
| Spleen                           | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | 50 |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
| Congestion                       |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 |    |     |  |  |  |  |  |  |  |  |  | 1 | 1.0 |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
| Fibrosis                         |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 | 1  |     |  |  |  |  |  |  |  |  |  | 2 | 1.6 |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
| Hematopoietic Cell Proliferation |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  | 2 | 2.0 |  |  |  |  |  |  |  |  |  |   |     |
| Hemorrhage                       |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  | 1 | 1.0 |  |  |  |  |  |  |  |  |  |   |     |
| Necrosis                         |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 | 3  |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  | 2 | 2.0 |  |  |  |  |  |  |  |  |  |   |     |
| Thymus                           | +           | +  | +  | +  | M  | +  | +  | M  | +  | +  | M  | +  | +  | +  | +  | +  | +  | +  | M  | +  | +  | +  | +  | M  | +               | 44 |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
| <b>INTEGUMENTARY SYSTEM</b>      |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
| Mammary Gland                    | +           | M  | M  | +  | M  | +  | +  | +  | +  | M  | +  | +  | +  | +  | M  | +  | M  | M  | M  | M  | +  | +  | M  | +  | 32              |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
| Galactocele                      |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 | 2  |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  | 1 | 2.0 |  |  |  |  |  |  |  |  |  |   |     |
| Hyperplasia                      |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  | 3 |     |  |  |  |  |  |  |  |  |  | 1 | 3.0 |
| Skin                             | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | 50 |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |
| Hemorrhage                       |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  | 1 | 2.0 |  |  |  |  |  |  |  |  |  |   |     |
| Hyperplasia, Squamous            |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 |    |     |  |  |  |  |  |  |  |  |  | 2 |     |  |  |  |  |  |  |  |  |  | 2 | 2.5 |  |  |  |  |  |  |  |  |  |   |     |
| Inflammation                     |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  | 3 |     |  |  |  |  |  |  |  |  |  | 3 | 2.2 |
| Inflammation, Granulomatous      |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  | 1 | 4.0 |
| <b>MUSCULOSKELETAL SYSTEM</b>    |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                 |    |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |  |  |   |     |

\* .. 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

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

Cobalt

CAS Number: 7440-48-4

Date Report Requested: 01/18/2012

Time Report Requested: 14:48:12

First Dose M/F: 05/08/06 / 05/08/06

Lab: BNW

| FISCHER 344-TACONIC RATS MALE<br>1.25 mg/m3       | DAY ON TEST |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | * TOTALS |          |          |          |          |          |          |        |
|---|-------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------|
|   | 07<br>29    | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 06<br>29 | 07<br>29 | 05<br>29 | 06<br>29 | 05<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 06<br>29 | 06<br>29 | 05<br>29 | 06<br>29 | 04<br>29 |          | 07<br>29 | 04<br>29 | 07<br>29 | 07<br>29 | 06<br>29 | 05<br>29 |        |
| ANIMAL ID   | 002226      | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   | 000222   |        |
| Bone  | +           | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | 50       |        |
| Cranium, Fibrosis                                 |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | 1 2.0  |
| Cranium, Inflammation, Chronic Active             |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | 1 2.0  |
| Vertebra, Degeneration                            |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | 1 2.0  |
| <b>NERVOUS SYSTEM</b>                             |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |        |
| Brain   | +           | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | 50       |        |
| Compression                                       |             |          | 2        |          |          |          |          |          |          |          |          |          |          |          |          |          | 1        | 2        | 2        | 2        |          | 2        |          |          |          | 2        |          | 14 1.9 |
| Hemorrhage  |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | 2        | 2        |          |          |          |          |          |          |          | 3 2.0  |
| <b>RESPIRATORY SYSTEM</b>                         |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |        |
| Larynx  | +           | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | 50       |        |
| Inflammation                                      |             | 1        |          | 1        | 1        | 1        |          | 1        | 1        |          |          |          |          |          |          | 1        |          |          |          |          | 2        |          | 1        | 1        |          | 1        |          | 18 1.1 |
| Metaplasia, Squamous                              |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | 1 1.0  |
| Lung  | +           | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | 50       |        |
| Inflammation, Suppurative                         |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | 4        |          |          |          |          |          |          |          |          |          |          | 1 4.0  |
| Inflammation, Chronic Active                      | 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        | 50 3.0   |        |
| Metaplasia, Osseous                               |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | 1        |          |          |          |          |          |          |          |          |          |          | 3 2.0  |
| Alveolar Epithelium, Hyperplasia                  | 4           | 3        | 3        | 4        | 2        | 2        | 2        | 2        | 4        | 3        | 3        | 4        | 3        | 2        | 2        | 2        | 2        | 2        | 2        | 3        | 2        | 1        | 3        | 4        | 2        | 2        | 47 2.8   |        |
| Alveolus, Proteinosis                             | 3           | 1        | 3        | 3        | 3        | 3        | 2        | 3        | 3        | 3        | 3        | 3        | 3        | 3        | 3        | 3        | 3        | 3        | 3        | 3        | 3        | 3        | 3        | 3        | 3        |          | 48 2.6   |        |
| Artery, Mediastinum, Inflammation, Chronic Active |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | 2        |          | 1 2.0  |
| Bronchiole, Epithelium, Hyperplasia               | 1           |          | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 2        | 2        | 1        | 3        | 4        | 1        | 1        | 1        | 1        | 1        | 2        | 1        | 1        | 3        | 3        | 1        | 1        | 44 1.5   |        |
| Mediastinum, Metaplasia, Osseous                  |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | 1 4.0  |
| Nose  | +           | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | 47       |        |
| Foreign Body                                      |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | 2      |
| Inflammation, Suppurative                         |             |          |          |          |          |          |          |          |          |          | 1        | 1        | 2        |          |          |          |          |          |          |          |          |          |          |          |          |          |          | 12 1.7 |

\* .. 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: 60311 - 05  
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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
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| FISCHER 344-TACONIC RATS MALE<br>1.25 mg/m3         | DAY ON TEST |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | * TOTALS |          |          |              |               |
|---|-------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------------|---------------|
|   | 07<br>29    | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 | 07<br>29 |          | 07<br>29 | 07<br>29 |              |               |
| ANIMAL ID   | 002226      | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   | 000022   |              |               |
| Inflammation, Chronic Active                        | 1           |          | 1        | 1        | 1        |          |          | 1        |          | 1        | 1        | 1        | 2        | 1        |          |          | 1        | 1        |          | 1        | 1        | 1        | 3        | 1            | <b>35 1.3</b> |
| Thrombosis  |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |              | <b>2 2.5</b>  |
| Olfactory Epithelium, Accumulation, Hyaline Droplet |             |          |          |          |          |          |          | 1        | 1        |          |          |          |          |          |          |          | 1        |          |          |          |          |          |          | <b>4 1.0</b> |               |
| Olfactory Epithelium, Atrophy                       | 1           |          |          | 1        | 1        |          |          | 1        | 1        |          |          |          | 1        | 1        |          |          | 1        |          |          | 1        | 1        | 1        |          | 1            | <b>21 1.0</b> |
| Olfactory Epithelium, Hyperplasia                   |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |              | <b>1 1.0</b>  |
| Olfactory Epithelium, Hyperplasia, Basal Cell       |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | 1        |          |              | <b>1 1.0</b>  |
| Olfactory Epithelium, Metaplasia, Respiratory       | 1           | 2        |          |          | 1        |          |          | 1        |          |          |          | 1        |          | 3        |          | 2        |          |          |          | 2        | 1        |          | 2        | 1            | <b>26 1.7</b> |
| Olfactory Epithelium, Necrosis                      |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |              | <b>1 1.0</b>  |
| Respiratory Epithelium, Hyperplasia                 | 1           | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 3        | 1        |          |          | 1        | 1        |          | 1        | 2        | 1        | 3        | 1            | <b>35 1.2</b> |
| Respiratory Epithelium, Metaplasia, Squamous        |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |              | <b>1 1.0</b>  |
| Respiratory Epithelium, Necrosis                    |             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | 1        |          |              | <b>4 1.8</b>  |
| Turbinate, Atrophy                                  | 1           | 1        | 1        | 1        |          | 1        | 1        | 1        | 1        | 1        |          | 1        | 1        |          | 1        |          | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1            | <b>35 1.0</b> |
| Trachea   | +           | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +        | +            | <b>50</b>     |

**SPECIAL SENSES SYSTEM**

|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |               |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---------------|
| Ear                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>5</b>      |
| Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>5 1.8</b>  |
| Eye                          | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>50</b>     |
| Cataract                     | 1 |   | 3 | 1 |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   | 3 |   |   | <b>9 1.8</b>  |
| Metaplasia, Osseous          | 1 | 2 | 1 | 1 | 1 |   | 1 |   | 1 |   |   | 1 |   | 2 | 1 | 2 |   | 1 |   | 2 |   | 1 | 1 |   | <b>36 1.3</b> |
| Harderian Gland              | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | <b>50</b>     |
| Zymbal's Gland               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | <b>3</b>      |

**URINARY 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  
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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
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**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
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 Lab: BNW

| FISCHER 344-TACONIC RATS MALE | DAY ON TEST           |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |  | males<br>(cont...) |
|-------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--|--------------------|
|                               | 0<br>7<br>1<br>9      | 0<br>7<br>0<br>5      | 0<br>6<br>6<br>7      | 0<br>7<br>2<br>9      | 0<br>7<br>2<br>9      | 0<br>6<br>8<br>3      | 0<br>7<br>2<br>9      | 0<br>6<br>5<br>2      | 0<br>7<br>2<br>1      | 0<br>6<br>8<br>8      | 0<br>7<br>3<br>0      | 0<br>6<br>2<br>9      | 0<br>7<br>3<br>8      | 0<br>6<br>4<br>6      | 0<br>7<br>2<br>9      | 0<br>6<br>3<br>0      | 0<br>7<br>8<br>8      | 0<br>6<br>3<br>0      | 0<br>7<br>2<br>5      | 0<br>6<br>1<br>8      | 0<br>6<br>2<br>5      | 0<br>5<br>8<br>2      | 0<br>5<br>4<br>8      | 0<br>6<br>5<br>4      |  |                    |
| 2.5 mg/m3                     | 0<br>0<br>4<br>0<br>1 | 0<br>0<br>4<br>0<br>2 | 0<br>0<br>4<br>0<br>3 | 0<br>0<br>4<br>0<br>4 | 0<br>0<br>4<br>0<br>5 | 0<br>0<br>4<br>0<br>6 | 0<br>0<br>4<br>0<br>7 | 0<br>0<br>4<br>0<br>8 | 0<br>0<br>4<br>0<br>9 | 0<br>0<br>4<br>1<br>0 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>2<br>0 | 0<br>0<br>4<br>2<br>1 | 0<br>0<br>4<br>2<br>2 | 0<br>0<br>4<br>2<br>3 | 0<br>0<br>4<br>2<br>4 | 0<br>0<br>4<br>2<br>5 |  |                    |

**ALIMENTARY SYSTEM**

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Esophagus  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Intestine Large, Cecum<br>Epithelium, Hyperplasia                              | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Intestine Large, Colon<br>Epithelium, Hyperplasia                              | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Intestine Large, Rectum  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Intestine Small, Duodenum<br>Inflammation, Chronic Active<br>Necrosis          | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Intestine Small, Ileum<br>Inflammation, Suppurative<br>Epithelium, Hyperplasia | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Intestine Small, Jejunum<br>Epithelium, Hyperplasia                            | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Liver  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Basophilic Focus   |   |   |   | X | X |   |   |   |   | X | X | X | X | X | X |   |   | X |   |   |   |   | X |   |
| Clear Cell Focus   |   |   |   | X |   |   |   |   |   | X | X |   |   | X |   | X |   |   |   |   |   |   |   |   |
| Fatty Change   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hepatodiaphragmatic Nodule   |   |   |   |   | X |   |   |   |   |   |   | X |   | X | X |   | X |   | X | X | X | X |   |   |
| Mixed Cell Focus   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Necrosis   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

\* .. 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: 60311 - 05

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL

Cobalt

CAS Number: 7440-48-4

Date Report Requested: 01/18/2012

Time Report Requested: 14:48:12

First Dose M/F: 05/08/06 / 05/08/06

Lab: BNW

| FISCHER 344-TACONIC RATS MALE<br>2.5 mg/m3 | 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 |   |
|  | 7           | 7 | 6 | 7 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 6 | 7 | 7 | 6 | 7 | 6 | 6         | 5                  | 5 | 6 |
|  | 1           | 0 | 6 | 2 | 2 | 8 | 2 | 5 | 2 | 8 | 3 | 0 | 0 | 2 | 4 | 2 | 3 | 8 | 3 | 1 | 2         | 8                  | 4 | 5 |
|  | 9           | 5 | 7 | 9 | 9 | 3 | 9 | 2 | 1 | 8 | 0 | 9 | 3 | 8 | 6 | 9 | 0 | 8 | 0 | 5 | 8         | 5                  | 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 |
|  | 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 | 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 |

|                              |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Regeneration                 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mesentery                    |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Infiltration Cellular        |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Fat, Necrosis                |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pancreas                     |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Acinus, Atrophy              |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Salivary Glands              |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Stomach, Forestomach         |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hyperplasia, Squamous        |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Inflammation, Chronic Active |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ulcer                        |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Stomach, Glandular           |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Erosion                      |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Inflammation, Chronic Active |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ulcer                        |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

CARDIOVASCULAR SYSTEM

|                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Heart                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cardiomyopathy            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Inflammation, Suppurative |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Thrombosis                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Atrium, Congestion        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

ENDOCRINE SYSTEM

\* .. 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:  
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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE<br>2.5 mg/m3 | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID | males<br>(cont...) |                  |                  |                  |                  |
|--|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|--------------------|------------------|------------------|------------------|------------------|
|  | 0<br>7<br>1<br>9 | 0<br>7<br>0<br>5 | 0<br>6<br>6<br>7 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>6<br>8<br>3 | 0<br>7<br>2<br>9 | 0<br>6<br>5<br>2 | 0<br>7<br>2<br>1 | 0<br>6<br>8<br>8 | 0<br>7<br>3<br>0 | 0<br>6<br>2<br>9 | 0<br>7<br>0<br>3 | 0<br>6<br>4<br>6 | 0<br>7<br>2<br>3 | 0<br>6<br>3<br>8 | 0<br>7<br>8<br>0 | 0<br>6<br>3<br>5 | 0<br>7<br>2<br>8 | 0<br>6<br>1<br>5 |           |                    | 0<br>6<br>2<br>5 | 0<br>5<br>8<br>2 | 0<br>5<br>4<br>8 | 0<br>5<br>4<br>5 |
| Adrenal Cortex                             | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                  | +                | +                | +                | +                |
| Accessory Adrenal Cortical Nodule          |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                    |                  |                  |                  |                  |
| Hyperplasia                                | 3                | 2                |                  | 1                | 2                | 1                | 1                |                  |                  |                  |                  |                  | 1                | 2                |                  |                  |                  |                  |                  |                  | 2         |                    |                  | 1                | 1                |                  |
| Necrosis                                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                    |                  |                  |                  |                  |
| Adrenal Medulla                            | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                  | +                | +                | +                | +                |
| Hyperplasia                                |                  | 4                |                  |                  |                  |                  | 4                |                  |                  |                  |                  |                  | 1                |                  |                  |                  | 4                |                  |                  |                  | 2         |                    |                  |                  |                  | 3                |
| Islets, Pancreatic                         | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | M         | +                  | +                | +                | +                | +                |
| Hyperplasia                                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                    |                  |                  |                  |                  |
| Parathyroid Gland                          | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | M                | +                | M                | +         | +                  | +                | +                | +                | +                |
| Pituitary Gland                            | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                  | +                | +                | +                | +                |
| Hemorrhage                                 |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                    |                  |                  |                  |                  |
| Pars Distalis, Hyperplasia                 |                  |                  |                  | 4                | 4                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 2                |                  |                  |                  |                  |           | 2                  | 1                |                  |                  | 1                |
| Thyroid Gland                              | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                  | +                | +                | +                | +                |
| C-cell, Hyperplasia                        |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 2                | 2                |                  |                  |                  |                  |           | 1                  |                  |                  |                  | 1                |

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

Epididymis

+ + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

Preputial Gland  
Ectasia

+ + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

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 Cobalt  
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| FISCHER 344-TACONIC RATS MALE<br>2.5 mg/m3 | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | males<br>(cont...)   |      |
|--|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|----------------------|------|
|  | 0719        | 0705 | 0667 | 0779 | 0779 | 0663 | 0779 | 0662 | 0779 | 0661 | 0779 | 0663 | 0779 | 0662 | 0779 | 0661 | 0779 | 0663 | 0779 | 0662 |           |                      | 0779 |
|  | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00000000000000000000 |      |
|  | 7           | 7    | 6    | 7    | 7    | 6    | 7    | 6    | 7    | 6    | 7    | 6    | 7    | 6    | 7    | 6    | 7    | 6    | 7    | 6    | 7         | 44444444444444444444 |      |
|  | 1           | 0    | 6    | 2    | 2    | 8    | 2    | 5    | 2    | 8    | 3    | 0    | 0    | 2    | 4    | 2    | 3    | 8    | 3    | 2    | 1         | 00000000000000000000 |      |
|  | 9           | 5    | 7    | 9    | 9    | 3    | 9    | 2    | 1    | 8    | 0    | 9    | 3    | 8    | 6    | 9    | 0    | 8    | 0    | 5    | 8         | 00000000000000000000 |      |
| Inflammation, Chronic Active               |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           | 1                    | 1    |
| Prostate                                   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         |                      |      |
| Fibrosis                                   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           | 2                    |      |
| Hyperplasia                                |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |      |
| Inflammation, Chronic Active               | 1           |      | 1    | 1    | 1    | 1    | 3    | 1    | 1    | 2    | 1    |      | 1    | 1    |      | 2    | 2    | 1    | 1    | 3    | 1         | 2                    | 1    |
| Seminal Vesicle                            | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         |                      |      |
| Testes                                     | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         |                      |      |
| Atrophy                                    | 4           | 2    | 4    |      | 4    | 1    | 4    |      | 4    | 1    | 4    |      | 4    | 2    | 1    | 4    | 4    | 4    | 1    | 1    |           |                      | 4    |
| Infarct                                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           | 3                    |      |
| Arteriole, Inflammation, Chronic Active    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           | 2                    |      |
| Interstitial Cell, Hyperplasia             |             |      |      |      |      | 1    |      |      |      | 1    | 1    |      |      |      | 1    |      |      | 1    |      |      | 2         | 1                    |      |

**HEMATOPOIETIC SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bone Marrow                                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |   |
| Necrosis                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |
| Lymph Node                                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Pancreatic, Infiltration Cellular, Histiocyte |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |   |
| Renal, Ectasia                                |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |
| Lymph Node, Bronchial                         | M | M | M | + | M | M | M | M | + | M | + | M | + | + | M | M | M | M | + | M | + | M | M |
| Lymph Node, Mandibular                        | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |   |
| Ectasia                                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hyperplasia                                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |
| Lymph Node, Mediastinal                       | + | M | M | + | + | + | + | + | + | + | + | M | + | + | + | M | + | + | + | + | + |   |   |

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 Cobalt  
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| FISCHER 344-TACONIC RATS MALE | 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 | 0 |           |                    |
| 2.5 mg/m3                     | 7           | 7 | 6 | 7 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 6 | 7 | 7 | 6 | 7 | 7 | 6 | 6 | 5 | 5 | 6 |           |                    |
|                               | 1           | 0 | 6 | 2 | 2 | 8 | 2 | 5 | 2 | 8 | 3 | 0 | 0 | 2 | 4 | 2 | 3 | 8 | 3 | 8 | 3 | 2 | 8 | 4 | 5 |           |                    |
|                               | 9           | 5 | 7 | 9 | 9 | 3 | 9 | 2 | 1 | 8 | 0 | 9 | 3 | 8 | 6 | 9 | 0 | 8 | 0 | 5 | 8 | 5 | 2 | 8 | 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 | 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 | 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 |           |                    |

Hyperplasia, Lymphoid

2

Lymph Node, Mesenteric

+ + + + + + + + + + + + + + + + + M + + + + +

Spleen

+ +

Fibrosis

2

Necrosis

1

Stromal Hyperplasia

4

Thymus

+ + + + + + + + + + + + + + + M + + M + + + + +

### INTEGUMENTARY SYSTEM

Mammary Gland

+ M + M M + M + M + + M M M M + + + + M + + M + +

Galactoceles

4

Hyperplasia

Skin

+ +

Hyperplasia, Squamous

4

Inflammation

3

2

3

3

3 2

### MUSCULOSKELETAL SYSTEM

Bone

+ +

Cranium, Fracture

X

### NERVOUS SYSTEM

Brain

+ +

Compression

2

2

2

2

2

1

2

1

2

2

Hemorrhage

2

3

\* .. 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:

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| DAY ON TEST | FISCHER 344-TACONIC RATS MALE |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | males<br>(cont...)     |                      |
|-------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|------------------------|----------------------|
|             | 0719                          | 0719 | 0667 | 0772 | 0772 | 0668 | 0772 | 0668 | 0772 | 0668 | 0772 | 0668 | 0772 | 0668 | 0772 | 0668 | 0772 | 0668 | 0772 | 0668 |           |                        | 0772                 |
| 2.5 mg/m3   | 0                             | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 0040000000000000000000 | 11111111111111111111 |

RESPIRATORY SYSTEM

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larynx  | + |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Autolysis   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Foreign Body  | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |   |   |   |   |
| Inflammation  | 1 | 1 |   | 1 | 1 |   |   |   | 1 |   |   |   |   |   |   |   | 1 | 1 |   | 1 | 1 | 2 |   |   |   |
| Metaplasia, Squamous                                |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Lung  | + |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation, Suppurative                           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation, Chronic Active                        | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 |   |   |
| Alveolar Epithelium, Hyperplasia                    | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 3 | 1 | 4 | 3 | 1 | 4 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 2 | 4 |   |
| Alveolus, Proteinosis                               | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 |   | 3 | 2 | 3 | 3 |   |
| Bronchiole, Epithelium, Hyperplasia                 | 1 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |   | 2 | 3 | 4 | 3 | 3 | 2 | 1 | 2 | 3 | 3 | 1 | 4 | 3 |
| Mediastinum, Inflammation, Suppurative              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Nose  | + |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Foreign Body  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hemorrhage  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation, Suppurative                           |   | 1 | 3 |   | 2 |   |   | 4 |   | 2 |   | 2 |   | 1 | 3 |   | 1 | 2 |   |   |   |   |   | 3 |   |
| Inflammation, Chronic Active                        | 1 | 1 | 3 | 1 |   | 3 |   | 1 | 3 | 2 |   | 2 | 1 | 1 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 1 |   | 1 |   |
| Thrombosis  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Olfactory Epithelium, Accumulation, Hyaline Droplet |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Olfactory Epithelium, Atrophy                       | 1 | 1 |   | 1 | 1 | 1 | 1 | 1 | 1 | 1 |   |   | 1 | 1 |   |   | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |   |
| Olfactory Epithelium, Hyperplasia                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Olfactory Epithelium, Metaplasia, Respiratory       | 1 | 2 | 3 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 |   | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 2 |   |
| Olfactory Epithelium, Necrosis                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Respiratory Epithelium, Hyperplasia                 | 2 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |   | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 |   |
| Respiratory Epithelium, Metaplasia, Squamous        | 1 |   | 1 |   |   |   |   | 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| DAY ON TEST  | FISCHER 344-TACONIC RATS MALE |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | ANIMAL ID             | males<br>(cont...)    |                       |                       |                  |
|--|-------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------|
|  | 0<br>7<br>1<br>9              | 0<br>7<br>0<br>5      | 0<br>6<br>6<br>7      | 0<br>7<br>2<br>9      | 0<br>7<br>2<br>9      | 0<br>6<br>8<br>3      | 0<br>7<br>2<br>9      | 0<br>6<br>5<br>2      | 0<br>7<br>2<br>1      | 0<br>6<br>8<br>8      | 0<br>7<br>3<br>0      | 0<br>6<br>0<br>9      | 0<br>7<br>0<br>3      | 0<br>6<br>2<br>8      | 0<br>7<br>4<br>6      | 0<br>6<br>2<br>9      | 0<br>7<br>3<br>0      | 0<br>6<br>8<br>8      | 0<br>7<br>3<br>5      | 0<br>6<br>2<br>8      |                       |                       | 0<br>5<br>8<br>2      | 0<br>5<br>4<br>8      | 0<br>6<br>5<br>4 |
| 2.5 mg/m3  | 0<br>0<br>4<br>0<br>1         | 0<br>0<br>4<br>0<br>2 | 0<br>0<br>4<br>0<br>3 | 0<br>0<br>4<br>0<br>4 | 0<br>0<br>4<br>0<br>5 | 0<br>0<br>4<br>0<br>6 | 0<br>0<br>4<br>0<br>7 | 0<br>0<br>4<br>0<br>8 | 0<br>0<br>4<br>0<br>9 | 0<br>0<br>4<br>1<br>0 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>1<br>1 | 0<br>0<br>4<br>2<br>0 | 0<br>0<br>4<br>2<br>1 | 0<br>0<br>4<br>2<br>2 | 0<br>0<br>4<br>2<br>3 | 0<br>0<br>4<br>2<br>4 | 0<br>0<br>4<br>2<br>5 |                  |
| Respiratory Epithelium, Necrosis<br>Turbinate, Atrophy | 1                             | 1                     | 1                     | 1                     | 1                     |                       |                       |                       |                       | 2<br>1                | 1                     |                       | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     | 1                     |                  |
| Trachea  | +                             | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     |                  |
| <b>SPECIAL SENSES SYSTEM</b>                           |                               |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                  |
| Eye  | +                             | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     |                  |
| Cataract   |                               |                       |                       |                       |                       |                       |                       |                       |                       | 1                     |                       |                       |                       |                       | 3                     |                       |                       | 2                     |                       |                       |                       |                       |                       |                       |                  |
| Metaplasia, Osseous                                    |                               |                       | 1                     |                       | 1                     | 1                     |                       | 1                     | 1                     | 1                     |                       | 1                     |                       | 1                     | 2                     | 1                     | 1                     | 1                     | 2                     | 2                     | 1                     |                       | 1                     | 1                     |                  |
| Harderian Gland  | +                             | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     |                  |
| <b>URINARY SYSTEM</b>                                  |                               |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                  |
| Kidney   | +                             | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     |                  |
| Accumulation, Hyaline Droplet                          |                               |                       |                       | 2                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 2                     |                       |                       |                       |                       |                       |                  |
| Congestion   |                               |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                  |
| Nephropathy  | 3                             | 3                     | 3                     | 4                     | 3                     | 1                     | 3                     | 3                     | 2                     | 3                     | 3                     | 2                     | 3                     | 2                     | 3                     | 3                     | 3                     | 3                     | 3                     | 3                     | 3                     | 3                     | 1                     | 2                     | 4                |
| Pelvis, Inflammation, Suppurative                      |                               |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                  |
| Urinary Bladder  | +                             | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     |                  |
| Inflammation   |                               |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                  |
| Transitional Epithelium, Hyperplasia                   |                               |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                  |

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 X .. Lesion present  
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 A .. Autolysis precludes evaluation  
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1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE | DAY ON TEST |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | * TOTALS |    |
|-------------------------------|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------|----|
|                               | 06          | 05 | 07 | 06 | 07 | 05 | 07 | 07 | 07 | 07 | 06 | 06 | 06 | 04 | 05 | 07 | 06 | 07 | 07 | 06 | 06 | 07 | 07 | 07 |          | 07 |
| 2.5 mg/m3                     | 09          | 08 | 02 | 08 | 02 | 09 | 01 | 02 | 03 | 03 | 01 | 08 | 05 | 07 | 03 | 02 | 05 | 03 | 01 | 07 | 01 | 00 | 02 | 00 | 03       |    |
|                               | 08          | 03 | 09 | 09 | 09 | 08 | 06 | 09 | 00 | 00 | 08 | 00 | 02 | 02 | 05 | 09 | 04 | 00 | 06 | 08 | 01 | 04 | 09 | 05 | 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       |    |
|                               | 04          | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04 | 04       |    |
|                               | 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       |    |
| Regeneration                  |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1  | 2.0      |    |
| Mesentery                     |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 9  |          |    |
| Infiltration Cellular         |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1  | 2.0      |    |
| Fat, Necrosis                 |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 8  | 1.1      |    |
| Pancreas                      |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 49 |          |    |
| Acinus, Atrophy               |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 28 | 1.4      |    |
| Salivary Glands               |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 50 |          |    |
| Stomach, Forestomach          |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 50 |          |    |
| Hyperplasia, Squamous         |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 13 | 1.9      |    |
| Inflammation, Chronic Active  |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 2  | 2.5      |    |
| Ulcer                         |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 10 | 2.8      |    |
| Stomach, Glandular            |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 49 |          |    |
| Erosion                       |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 2  | 2.0      |    |
| Inflammation, Chronic Active  |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1  | 2.0      |    |
| Ulcer                         |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 2  | 3.0      |    |
| <b>CARDIOVASCULAR SYSTEM</b>  |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |
| Heart                         |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 50 |          |    |
| Cardiomyopathy                |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 46 | 1.6      |    |
| Inflammation, Suppurative     |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 2  | 2.0      |    |
| Thrombosis                    |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 2  | 1.5      |    |
| Atrium, Congestion            |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1  | 2.0      |    |
| <b>ENDOCRINE SYSTEM</b>       |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |

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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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
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 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE | DAY ON TEST |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | * TOTALS |     |     |
|-------------------------------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|-----|-----|
|                               | 068         | 058 | 072 | 068 | 072 | 059 | 077 | 077 | 077 | 066 | 066 | 066 | 044 | 055 | 077 | 066 | 077 | 066 | 066 | 077 |          | 077 | 077 |
| 2.5 mg/m3                     | ANIMAL ID   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |          |     |     |
|                               | 004         | 004 | 004 | 004 | 004 | 004 | 004 | 004 | 004 | 004 | 004 | 004 | 004 | 004 | 004 | 004 | 004 | 004 | 004 | 004 | 004      |     |     |
|                               | 226         | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246      | 247 |     |

|                                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |     |     |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|---|-----|-----|
| Adrenal Cortex                    | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |   |     |     |
| Accessory Adrenal Cortical Nodule |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 2 | 1.0 |     |
| Hyperplasia                       |   |   |   |   | 1 |   | 1 |   | 1 | 1 |   |   |   | 1 | 2 |   | 2 | 1 |   |   | 2 | 2 | 1  |   | 23  | 1.5 |
| Necrosis                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   | 1   | 1.0 |
| Adrenal Medulla                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |   |     |     |
| Hyperplasia                       |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |   | 4 |   |   |   |   |   | 2 |    |   | 9   | 3.0 |
| Islets, Pancreatic                | + | + | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | 48 |   |     |     |
| Hyperplasia                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   | 1   | 4.0 |
| Parathyroid Gland                 | + | + | + | + | + | + | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | + | 47 |   |     |     |
| Pituitary Gland                   | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49 |   |     |     |
| Hemorrhage                        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |    |   | 1   | 3.0 |
| Pars Distalis, Hyperplasia        |   |   |   | 1 |   | 3 |   | 1 | 2 | 4 |   |   |   |   |   |   | 4 | 1 |   |   |   |   |    |   | 14  | 2.4 |
| Thyroid Gland                     | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |   |     |     |
| C-cell, Hyperplasia               |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   | 5   | 1.8 |

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

|                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |  |   |     |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|--|---|-----|
| Epididymis      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |  |   |     |
| Preputial Gland | M | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49 |  |   |     |
| Ectasia         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 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  
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1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE                 | DAY ON TEST |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | * TOTALS      |    |    |    |    |
|---|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|----|----|----|----|
|   | 06          | 05 | 07 | 06 | 07 | 05 | 07 | 07 | 07 | 07 | 06 | 06 | 06 | 04 | 05 | 07 | 06 | 07 | 06 | 06 |               | 07 | 07 | 07 | 07 |
| <b>2.5 mg/m3</b>                              | 09          | 08 | 02 | 08 | 02 | 09 | 01 | 02 | 03 | 03 | 01 | 08 | 05 | 07 | 03 | 02 | 05 | 03 | 01 | 07 | 01            | 00 | 02 | 00 | 03 |
| 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 |    |
|   | 44          | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44            | 44 | 44 | 44 |    |
|   | 22          | 22 | 22 | 22 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 44 | 44 | 44 | 44 | 44 | 44 | 44            | 44 | 44 | 55 |    |
|   | 66          | 77 | 88 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 00 | 01 | 02 | 03 | 04 | 05 | 06            | 07 | 08 | 09 |    |
| Inflammation, Chronic Active                  | 4           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>3 2.0</b>  |    |    |    |    |
| Prostate                                      | +           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>50</b>     |    |    |    |    |
| Fibrosis                                      |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>1 2.0</b>  |    |    |    |    |
| Hyperplasia                                   | 1           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>1 1.0</b>  |    |    |    |    |
| Inflammation, Chronic Active                  | 1           | 2  |    | 1  | 3  | 1  | 2  | 1  |    | 2  | 3  | 2  | 2  | 1  | 2  | 4  |    |    | 1  | 3  |               | 1  | 2  | 2  | 2  |
|   |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>42 1.6</b> |    |    |    |    |
| Seminal Vesicle                               | +           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>50</b>     |    |    |    |    |
| Testes  | +           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>50</b>     |    |    |    |    |
| Atrophy                                       | 3           | 1  | 4  |    | 4  |    | 4  | 3  | 2  | 4  | 3  | 2  |    |    |    | 3  |    | 4  | 4  | 2  |               | 4  | 3  | 3  | 2  |
| Infarct                                       |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>2 3.5</b>  |    |    |    |    |
| Arteriole, Inflammation, Chronic Active       |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>1 2.0</b>  |    |    |    |    |
| Interstitial Cell, Hyperplasia                | 1           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>12 1.3</b> |    |    |    |    |
| <b>HEMATOPOIETIC SYSTEM</b>                   |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |               |    |    |    |    |
| Bone Marrow                                   | +           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>50</b>     |    |    |    |    |
| Necrosis                                      |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>1 2.0</b>  |    |    |    |    |
| Lymph Node                                    |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>5</b>      |    |    |    |    |
| Pancreatic, Infiltration Cellular, Histiocyte | +           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>1 3.0</b>  |    |    |    |    |
| Renal, Ectasia                                |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>1 2.0</b>  |    |    |    |    |
| Lymph Node, Bronchial                         | +           | M  | M  | +  | M  | M  | +  | +  | M  | M  | +  | +  | +  | M  | +  | +  | M  | M  | M  | +  | +             | +  | M  | +  | M  |
|   |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>21</b>     |    |    |    |    |
| Lymph Node, Mandibular                        | +           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>50</b>     |    |    |    |    |
| Ectasia                                       |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>1 3.0</b>  |    |    |    |    |
| Hyperplasia                                   | 3           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>1 1.0</b>  |    |    |    |    |
| Lymph Node, Mediastinal                       | +           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | <b>46</b>     |    |    |    |    |

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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

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 Lab: BNW

| FISCHER 344-TACONIC RATS MALE<br>2.5 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|
|  | 0698        | 0583  | 0729  | 0689  | 0729  | 0598  | 0776  | 0777  | 0777  | 0777  | 0666  | 0666  | 0666  | 0444  | 0555  | 0777  | 0666  | 0777  | 0777  | 0666  | 0666  | 0777  | 0777  | 0777  |          |       |
| 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 | 00469 |          |       |
| Hyperplasia, Lymphoid                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 2.0    |       |
| Lymph Node, Mesenteric                     | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 49       |       |
| Spleen                                     | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50       |       |
| Fibrosis                                   | 3           |       |       |       | 3     |       | 1     |       |       |       |       |       |       |       |       |       | 2     |       |       | 1     |       | 3     |       |       | 7 2.1    |       |
| Necrosis                                   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 1.0    |       |
| Stromal Hyperplasia                        |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 4.0    |       |
| Thymus                                     | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 47    |          |       |
| <b>INTEGUMENTARY SYSTEM</b>                |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |
| Mammary Gland                              | M           | +     | M     | +     | M     | +     | +     | +     | M     | +     | +     | +     | M     | +     | +     | +     | +     | M     | +     | +     | M     | +     | M     | +     | M        | 30    |
| Galactocoele                               |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 1 4.0 |
| Hyperplasia                                |             |       |       |       |       |       |       |       |       |       |       |       | 3     |       |       |       |       |       |       |       |       |       |       |       | 1 3.0    |       |
| Skin                                       | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50       |       |
| Hyperplasia, Squamous                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 5 3.0    |       |
| Inflammation                               | 3           |       |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       | 3     | 3     |       |       |       | 3     | 9 2.7    |       |
| <b>MUSCULOSKELETAL SYSTEM</b>              |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |
| Bone                                       | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50       |       |
| Cranium, Fracture                          |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1        |       |
| <b>NERVOUS SYSTEM</b>                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |
| Brain                                      | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50       |       |
| Compression                                |             | 2     |       |       | 1     |       |       |       |       |       |       |       | 1     |       | 2     |       |       | 1     |       |       |       | 2     | 3     | 2     | 18 1.8   |       |
| Hemorrhage                                 |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1     | 2     |       | 4 2.0    |       |

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 Cobalt  
 CAS Number: 7440-48-4

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| FISCHER 344-TACONIC RATS MALE<br>2.5 mg/m3 | DAY ON TEST |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | * TOTALS |    |    |    |    |    |     |
|--|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------|----|----|----|----|----|-----|
|  | 06          | 05 | 07 | 06 | 07 | 05 | 07 | 07 | 07 | 07 | 06 | 06 | 06 | 04 | 05 | 07 | 06 | 07 | 07 | 06 |          |    | 07 | 07 | 07 | 07 |     |
| ANIMAL ID                                  | 09          | 08 | 02 | 08 | 02 | 09 | 01 | 02 | 03 | 03 | 01 | 08 | 05 | 07 | 03 | 02 | 05 | 03 | 01 | 07 | 06       | 01 | 00 | 02 | 00 | 03 |     |
|  | 08          | 03 | 09 | 09 | 09 | 08 | 06 | 09 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00       | 00 | 00 | 00 | 00 | 00 |     |
| Respiratory Epithelium, Necrosis           |             |    | 1  |    |    | 2  |    |    |    |    |    |    |    |    |    |    |    |    | 1  |    |          |    |    |    |    | 5  | 1.4 |
| Turbinate, Atrophy                         | 1           | 1  | 1  |    | 1  |    | 1  | 1  |    | 1  | 1  |    | 1  |    | 1  | 1  | 1  | 1  |    | 1  |          | 1  |    | 1  |    | 35 | 1.0 |
| Trachea                                    | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +        | +  | +  | +  | +  | 50 |     |
| <b>SPECIAL SENSES SYSTEM</b>               |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |    |    |    |    |     |
| Eye  | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +        | +  | +  | +  | +  | 50 |     |
| Cataract                                   |             |    |    |    | 1  |    | 2  |    | 1  |    |    |    |    |    |    |    |    |    | 4  | 4  | 2        |    |    |    |    | 9  | 2.2 |
| Metaplasia, Osseous                        |             |    | 2  |    | 1  | 2  | 1  | 1  | 2  |    |    | 1  | 1  |    |    | 1  | 1  | 2  | 1  | 1  |          | 1  | 2  | 1  |    | 33 | 1.2 |
| Harderian Gland                            | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +        | +  | +  | +  | +  | 50 |     |
| <b>URINARY SYSTEM</b>                      |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |          |    |    |    |    |    |     |
| Kidney                                     | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +        | +  | +  | +  | +  | 50 |     |
| Accumulation, Hyaline Droplet              | 4           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 3  |    |    |          |    |    |    |    | 4  | 2.8 |
| Congestion                                 |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1  |    |          |    |    |    |    | 1  | 1.0 |
| Nephropathy                                | 4           | 3  | 3  | 3  | 3  | 2  | 3  | 3  | 3  | 4  | 4  | 3  | 3  | 3  | 3  | 4  | 2  | 3  | 3  | 2  | 2        | 3  | 3  | 3  | 3  | 50 | 2.9 |
| Pelvis, Inflammation, Suppurative          |             |    |    |    |    |    |    |    |    |    |    |    |    |    | 2  |    |    |    |    |    |          |    |    |    |    | 1  | 2.0 |
| Urinary Bladder                            | +           | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +        | +  | +  | +  | +  | 50 |     |
| Inflammation                               |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 3  |    | 3  |    |          |    |    |    |    | 2  | 3.0 |
| Transitional Epithelium, Hyperplasia       |             |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 3  |    |    |    |    |          |    |    |    |    | 1  | 3.0 |

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| FISCHER 344-TACONIC RATS MALE | DAY ON TEST    |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                | ANIMAL ID      | males<br>(cont...) |                |                |                |
|-------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------------|----------------|----------------|----------------|
|                               | 07<br>30       | 06<br>91       | 06<br>28       | 05<br>16       | 05<br>52       | 06<br>46       | 07<br>70       | 07<br>77       | 06<br>61       | 06<br>66       | 07<br>78       | 07<br>73       | 07<br>72       | 07<br>72       | 07<br>72       | 07<br>72       | 05<br>52       | 06<br>68       | 07<br>71       | 06<br>69       |                |                    | 07<br>71       | 07<br>72       | 04<br>49       |
| 5.0 mg/m3                     | 00<br>60<br>01 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00     | 00<br>66<br>00 | 00<br>66<br>00 | 00<br>66<br>00 |

**ALIMENTARY SYSTEM**

|                                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Esophagus                             | + | + | + | + | + | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Intestine Large, Cecum                | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Intestine Large, Colon                | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Intestine Large, Rectum               | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Intestine Small, Duodenum<br>Necrosis | + | + | + | + | + | + | + | + | + | + | + | + | 3 | + | + | + | + | + | + | + | + | + | + | + | + |
| Intestine Small, Ileum                | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Intestine Small, Jejunum              | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Liver                                 | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Atrophy                               |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 2 |   |   |   |   |   |   |   |   |   |   |
| Basophilic Focus                      | X |   | X |   |   | X |   | X | X | X | X |   |   | X | X | X | X |   | X |   |   |   | X | X |   |
| Clear Cell Focus                      |   |   |   |   |   |   |   |   |   |   |   |   |   | X | X | X | X |   | X |   |   |   |   |   |   |
| Degeneration, Cystic                  |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Eosinophilic Focus                    |   |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Fatty Change                          |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hepatodiaphragmatic Nodule            | X |   |   |   | X |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |
| Inflammation, Chronic Active          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |
| Mixed Cell Focus                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Necrosis                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |
| Mesentery                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Artery, Inflammation, Chronic Active  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | + |
|                                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |

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 M .. Missing tissue  
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 BLANK .. Not examined microscopically  
 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID        | males<br>(cont...) |                  |                  |
|-------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--------------------|------------------|------------------|
|                               | 0<br>7<br>3<br>0 | 0<br>6<br>9<br>1 | 0<br>6<br>2<br>8 | 0<br>5<br>1<br>6 | 0<br>5<br>5<br>2 | 0<br>6<br>4<br>6 | 0<br>7<br>3<br>0 | 0<br>7<br>1<br>7 | 0<br>6<br>7<br>9 | 0<br>6<br>9<br>8 | 0<br>7<br>2<br>3 | 0<br>7<br>1<br>3 | 0<br>7<br>2<br>2 | 0<br>7<br>2<br>9 | 0<br>7<br>2<br>9 | 0<br>5<br>7<br>2 | 0<br>6<br>8<br>9 | 0<br>7<br>1<br>7 | 0<br>6<br>9<br>1 | 0<br>6<br>1<br>9 |                  |                    | 0<br>7<br>2<br>9 | 0<br>4<br>7<br>2 |
| 5.0 mg/m3                     | 0<br>0<br>6<br>0 | 0<br>0<br>6<br>0 | 0<br>0<br>6<br>0 | 0<br>0<br>6<br>0 | 0<br>0<br>6<br>0 | 0<br>0<br>6<br>0 | 0<br>0<br>6<br>0 | 0<br>0<br>6<br>0 | 0<br>0<br>6<br>0 | 0<br>0<br>6<br>0 | 0<br>0<br>6<br>1 | 0<br>0<br>6<br>1 | 0<br>0<br>6<br>1 | 0<br>0<br>6<br>1 | 0<br>0<br>6<br>1 | 0<br>0<br>6<br>1 | 0<br>0<br>6<br>1 | 0<br>0<br>6<br>2 | 0<br>0<br>6<br>2 | 0<br>0<br>6<br>2 | 0<br>0<br>6<br>2 | 0<br>0<br>6<br>3   | 0<br>0<br>6<br>4 | 0<br>0<br>6<br>5 |

Fat, Necrosis

1

Pancreas

+ +

Acinus, Atrophy

1 1 1 1 2 2 2 1 1 2 2 2 1 2 2 1 2 2 1 2 2 2 2

Artery, Mineralization

2

Salivary Glands

+ +

Degeneration

Stomach, Forestomach

+ +

Hyperplasia, Squamous

2 1 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 2 2

Inflammation, Chronic Active

Ulcer

2

2

Stomach, Glandular

+ +

Inflammation, Chronic Active

Ulcer

1

3

**CARDIOVASCULAR SYSTEM**

Heart

+ +

Cardiomyopathy

1 2 1 2 1 2 1 1 2 1 2 2 1 2 2 1 2 1 2 2 2 2

Artery, Inflammation, Chronic Active

2

**ENDOCRINE SYSTEM**

Adrenal Cortex

+ +

Accessory Adrenal Cortical Nodule

1 1

Hyperplasia

Adrenal Medulla

+ +

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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | males<br>(cont...) |      |      |        |      |
|-------------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|--------------------|------|------|--------|------|
|                               | 0730        | 0691 | 0628 | 0516 | 0554 | 0663 | 0777 | 0776 | 0666 | 0666 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0555 | 0666 | 0777 | 0666 |           |                    | 0666 | 0777 | 0777   | 0444 |
| 5.0 mg/m3                     | 0000        | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000      | 0000               | 0000 | 0000 | 000001 |      |

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hyperplasia  |   |   | 1 | 1 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |
| Islets, Pancreatic Hyperplasia                         | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Parathyroid Gland                                      | + | + | + | + | + | + | + | + | + | + | M | + | + | M | + | M | + | + | + | + | + | + | + | + | + |   |
| Pituitary Gland Angiectasis Pars Distalis, Hyperplasia | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
|  |   |   | 2 | 3 | 2 | 2 |   |   |   |   | 4 |   | 4 |   | 1 |   | 3 |   |   | 1 |   |   | 2 | 3 |   |   |
| Thyroid Gland C-cell, Hyperplasia Follicle, Cyst       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
|  |   |   |   |   |   | 1 |   |   |   |   | 3 |   |   |   |   | 2 |   | 2 |   |   |   | 4 |   |   |   |   |

**GENERAL BODY SYSTEM**

|   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |   |
|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|---|
| Peritoneum Inflammation, Chronic Active |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | 2 |
|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|---|

**GENITAL SYSTEM**

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Epididymis   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |   |
| Preputial Gland Atrophy Inflammation, Chronic Active | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | M | + | 3 |
|  |   |   | 3 |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Prostate Hyperplasia Inflammation, Chronic Active    | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
|  | 2 | 1 | 1 |   | 1 | 1 |   |   |   | 1 |   | 3 | 2 |   |   | 1 |   |   | 3 | 2 | 1 | 1 | 1 |   |   | 2 |   |   |

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 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
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 Lab: BNW

| FISCHER 344-TACONIC RATS MALE | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | males<br>(cont...) |
|-------------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|--------------------|
|                               | 0730        | 0691 | 0628 | 0516 | 0554 | 0662 | 0777 | 0777 | 0666 | 0666 | 0777 | 0777 | 0777 | 0777 | 0777 | 0777 | 0555 | 0666 | 0777 | 0666 | 0666 | 0777 | 0777 | 0447 | 0772 |           |                    |
| 5.0 mg/m3                     | 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 |           |                    |

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Seminal Vesicle<br>Inflammation, Chronic Active | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Testes<br>Atrophy                               | 4 | 2 | 1 | 1 |   |   | 4 | 4 | 1 | 1 | 4 |   | 4 | 1 | 2 | 4 | 2 | 1 | 3 | 1 | 2 | 3 | 1 |   | 4 |
| Infarct   |   |   |   |   |   | 4 | 2 |   |   |   |   | 2 | 3 |   |   |   |   |   |   | 2 |   | 2 |   |   | 4 |
| Interstitial Cell, Hyperplasia                  |   | 2 |   | 1 |   |   |   |   |   | 1 |   |   |   | 1 |   |   |   |   |   | 1 |   | 3 |   |   |   |

**HEMATOPOIETIC SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bone Marrow   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Lymph Node<br>Pancreatic, Ectasia                           |   |   | + |   | + |   |   |   |   |   |   | + |   |   |   |   |   |   | + |   |   |   | + |   |   |
| Renal, Ectasia  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |
| Renal, Hemorrhage   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |
| Lymph Node, Bronchial                                       | + | M | + | M | M | M | M | M | + | + | M | M | M | M | M | + | + | + | M | + | + | M | M | M |   |
| Lymph Node, Mandibular<br>Ectasia                           | + | + | + | + | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Hyperplasia   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |
| Lymph Node, Mediastinal                                     | + | + | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Lymph Node, Mesenteric<br>Infiltration Cellular, Histiocyte | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Spleen<br>Fibrosis  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Hematopoietic Cell Proliferation                            |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |

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Experiment Number: 60311 - 05  
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 Route: RESPIRATORY EXPOSURE WHOLE BODY  
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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
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 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE | DAY ON TEST |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | ANIMAL ID | males<br>(cont...) |    |    |    |
|-------------------------------|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------|--------------------|----|----|----|
|                               | 07          | 06 | 06 | 05 | 05 | 06 | 07 | 07 | 06 | 06 | 07 | 07 | 07 | 07 | 07 | 07 | 05 | 06 | 07 | 06 |           |                    | 06 | 07 | 07 |
| 5.0 mg/m3                     | 3           | 9  | 2  | 1  | 5  | 4  | 3  | 1  | 7  | 9  | 8  | 3  | 3  | 2  | 2  | 2  | 2  | 7  | 8  | 1  | 9         | 1                  | 2  | 7  | 2  |
|                               | 0           | 1  | 8  | 6  | 2  | 6  | 0  | 7  | 9  | 8  | 3  | 3  | 2  | 9  | 9  | 9  | 2  | 9  | 7  | 1  | 9         | 1                  | 9  | 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  |
|                               | 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  | 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  |    |

Necrosis

2

Thymus

+ + + + + M + + + M + + + + + M + + + + + + + +

**INTEGUMENTARY SYSTEM**

Mammary Gland

+ + + + M + + + + M + + M + M M M + M M + + + + +

Skin  
 Cyst Epithelial Inclusion  
 Hyperplasia, Squamous  
 Inflammation

+  
 3  
 3

**MUSCULOSKELETAL SYSTEM**

Bone  
 Maxilla, Inflammation, Chronic Active

+ +

Skeletal Muscle

+ +

**NERVOUS SYSTEM**

Brain  
 Compression  
 Edema  
 Hemorrhage  
 Infiltration Cellular, Mononuclear Cell

+  
 3  
 2 2  
 3  
 2  
 1

**RESPIRATORY SYSTEM**

Larynx

+ +

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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| DAY ON TEST   | FISCHER 344-TACONIC RATS MALE |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | ANIMAL ID | males<br>(cont...) |    |          |    |  |  |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------|--------------------|----|----------|----|--|--|
|   | 07                            | 06 | 06 | 05 | 05 | 06 | 07 | 07 | 06 | 06 | 07 | 07 | 07 | 07 | 07 | 07 | 05 | 06 | 07 | 06 |           |                    | 07 | 04       | 07 |  |  |
| 5.0 mg/m3   | 30                            | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50        | 51                 | 52 | 00060001 |    |  |  |
| Hyperkeratosis                                      |                               |    |    |    |    |    |    |    | 2  |    |    |    |    |    |    |    |    |    |    |    |           |                    |    |          |    |  |  |
| Inflammation, Metaplasia, Squamous                  | 1                             | 1  |    |    | 1  |    |    |    |    |    |    |    |    | 1  | 1  |    |    |    |    | 2  | 1         | 1                  |    | 1        |    |  |  |
| Respiratory Epithelium, Hyperplasia                 |                               |    |    |    |    |    |    |    |    |    |    |    |    | 2  |    |    |    |    |    |    |           |                    |    |          |    |  |  |
| Squamous Epithelium, Hyperplasia                    |                               |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |           |                    |    |          |    |  |  |
| Lung  |                               |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |           |                    |    |          |    |  |  |
| Inflammation, Chronic Active                        | 3                             | 3  | 2  | 3  | 2  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3         | 3                  | 3  | 3        |    |  |  |
| Alveolar Epithelium, Hyperplasia                    | 4                             | 3  | 3  | 3  | 4  | 4  | 4  | 4  | 4  | 3  | 3  | 3  | 4  | 4  | 4  | 4  | 4  | 3  | 4  | 3  | 4         | 4                  | 4  | 2        | 4  |  |  |
| Alveolus, Proteinosis                               | 3                             | 3  | 3  | 3  | 2  | 3  | 3  |    | 4  | 4  | 3  | 4  | 4  | 4  | 3  | 3  | 3  | 4  | 3  | 3  | 4         | 3                  | 4  | 3        | 3  |  |  |
| Bronchiole, Epithelium, Hyperplasia                 | 3                             | 3  | 3  | 4  | 4  | 4  | 4  | 3  | 3  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 3  | 4  | 4  | 4  | 4         | 4                  | 4  | 3        | 4  |  |  |
| Nose  |                               |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |           |                    |    |          |    |  |  |
| Foreign Body  |                               |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |           |                    |    |          |    |  |  |
| Inflammation, Suppurative                           | 3                             | 3  | 2  | 3  | 1  | 2  | 3  | 2  | 3  | 4  | 3  |    | 4  | 3  | 2  | 3  | 3  | 3  | 3  | 3  | 2         | 3                  | 2  | 3        | 2  |  |  |
| Inflammation, Chronic Active                        | 3                             | 3  | 1  | 3  | 1  | 3  | 3  | 3  | 3  | 3  | 3  | 1  | 4  | 3  | 2  | 3  | 3  | 3  | 3  | 3  | 2         | 3                  | 2  | 3        | 2  |  |  |
| Thrombosis  |                               |    |    | 2  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |           |                    |    |          |    |  |  |
| Olfactory Epithelium, Accumulation, Hyaline Droplet |                               |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |           |                    |    |          |    |  |  |
| Olfactory Epithelium, Atrophy                       | 1                             | 1  |    | 1  | 1  | 1  | 2  | 1  | 1  |    |    |    | 1  | 1  | 1  |    | 1  |    | 1  |    | 1         |                    |    | 1        |    |  |  |
| Olfactory Epithelium, Hyperplasia                   | 2                             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |           | 1                  |    | 1        |    |  |  |
| Olfactory Epithelium, Hyperplasia, Basal Cell       | 1                             |    | 1  |    |    |    |    |    |    |    |    |    | 1  |    |    |    | 1  |    |    | 1  |           |                    | 1  |          |    |  |  |
| Olfactory Epithelium, Metaplasia, Respiratory       | 2                             | 2  | 2  | 2  | 2  | 3  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 3  | 2  | 3         | 3                  | 2  | 2        | 2  |  |  |
| Olfactory Epithelium, Necrosis                      |                               |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |           |                    |    |          |    |  |  |
| Respiratory Epithelium, Hyperplasia                 | 2                             | 2  | 1  | 2  | 2  | 3  | 3  | 3  | 2  | 3  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 3  | 2  | 1         | 3                  | 2  | 2        | 1  |  |  |
| Respiratory Epithelium, Metaplasia, Squamous        | 1                             | 1  |    |    | 1  | 2  | 1  |    | 1  | 2  | 1  |    | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |           |                    |    |          |    |  |  |
| Respiratory Epithelium, Necrosis                    |                               |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |           |                    |    |          |    |  |  |
| Turbinate, Atrophy                                  | 1                             | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |    |           | 1                  | 1  | 1        | 1  |  |  |
| Trachea   |                               |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |           |                    |    |          |    |  |  |
| Inflammation, Suppurative                           |                               |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |           |                    |    |          |    |  |  |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
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 I .. Insufficient tissue  
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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE | 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 |   |   |
| 5.0 mg/m3                     | 7           | 6 | 6 | 5 | 5 | 6 | 7 | 7 | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 6 | 7 | 6 | 6         | 7                  | 7 | 4 | 7 |
|                               | 3           | 9 | 2 | 1 | 5 | 4 | 3 | 1 | 7 | 9 | 2 | 1 | 2 | 2 | 2 | 2 | 7 | 8 | 1 | 9 | 1         | 2                  | 2 | 7 | 2 |
|                               | 0           | 1 | 8 | 6 | 2 | 6 | 0 | 7 | 9 | 8 | 3 | 3 | 2 | 9 | 9 | 9 | 2 | 9 | 7 | 1 | 9         | 9                  | 9 | 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 |
|                               | 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 | 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 |

Metaplasia, Squamous

1

**SPECIAL SENSES SYSTEM**

|                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eye                 | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Cataract            |   |   |   |   | 3 |   |   |   |   |   | 2 |   | 1 |   |   | 2 |   | 1 |   |   |   |   |   |   |
| Metaplasia, Osseous |   | 1 | 1 | 1 | 1 | 1 |   | 1 |   |   | 1 |   | 1 |   | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Harderian Gland     | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Zymbal's Gland      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**URINARY SYSTEM**

|                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kidney                               | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Accumulation, Hyaline Droplet        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Cyst                                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Fibrosis                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Infarct                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Metaplasia, Osseous                  |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Nephropathy                          | 3 | 3 | 2 | 2 | 1 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 1 | 2 | 3 | 3 | 3 | 2 |
| Artery, Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |
| Urinary Bladder                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Inflammation                         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

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Experiment Number: 60311 - 05  
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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
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 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE<br>5.0 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |        |      |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|--------|------|
|  | 0689        | 0729  | 0779  | 0775  | 0648  | 0672  | 0677  | 0677  | 0677  | 0677  | 0566  | 0666  | 0644  | 0677  | 0666  | 0677  | 0677  | 0666  | 0666  | 0677  |          | 0566  | 0666  | 0677  | 0666   | 0677 |
| ANIMAL ID                                  | 00626       | 00662 | 00662 | 00662 | 00663 | 00663 | 00663 | 00663 | 00663 | 00663 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666    | 00666 | 00666 | 00666 | 00666  |      |
| Fat, Necrosis                              |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1 1.0  |      |
| Pancreas                                   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50     |      |
| Acinus, Atrophy                            | 1           | 1     | 1     |       |       |       |       |       | 1     | 1     |       |       |       |       |       |       | 1     | 1     | 2     | 1     |          |       | 1     | 2     | 1      |      |
| Artery, Mineralization                     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 30 1.4 |      |
| Salivary Glands                            |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1 2.0  |      |
| Degeneration                               |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 50     |      |
| 2  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1 2.0  |      |
| Stomach, Forestomach                       | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50     |      |
| Hyperplasia, Squamous                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 11 1.5 |      |
| Inflammation, Chronic Active               |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1 2.0  |      |
| Ulcer                                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 2 3.0  |      |
| 3 3  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 50     |      |
| Stomach, Glandular                         | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50     |      |
| Inflammation, Chronic Active               |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1 1.0  |      |
| Ulcer                                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1 3.0  |      |
| <b>CARDIOVASCULAR SYSTEM</b>               |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |        |      |
| Heart                                      | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50     |      |
| Cardiomyopathy                             | 1           | 2     | 2     | 2     | 1     | 1     |       |       | 1     | 2     | 1     | 2     |       |       | 1     | 1     | 1     | 1     | 1     | 2     | 2        |       |       |       | 39 1.5 |      |
| Artery, Inflammation, Chronic Active       |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1 2.0  |      |
| <b>ENDOCRINE SYSTEM</b>                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |        |      |
| Adrenal Cortex                             | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50     |      |
| Accessory Adrenal Cortical Nodule          | 1           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 3 1.0  |      |
| Hyperplasia                                |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 29 1.0 |      |
| 1 1  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 50     |      |
| 1 1  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 50     |      |
| 2 1 1 1                                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 50     |      |
| 1  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 50     |      |
| 1 1 1                                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 50     |      |
| Adrenal Medulla                            | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50     |      |

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| FISCHER 344-TACONIC RATS MALE<br>5.0 mg/m3               | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |       |        |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|-------|--------|
|  | 0689        | 0729  | 0779  | 0775  | 0648  | 0667  | 0772  | 0772  | 0773  | 0773  | 0566  | 0666  | 0661  | 0490  | 0768  | 0722  | 0722  | 0669  | 0668  | 0756  |          | 0665  | 0675  | 0667  | 0675  | 0657   |
| ANIMAL ID  | 00626       | 00662 | 00662 | 00662 | 00663 | 00663 | 00663 | 00663 | 00663 | 00664 | 00665 | 00666 | 00667 | 00668 | 00669 | 00670 | 00671 | 00672 | 00673 | 00674 | 00675    | 00676 | 00677 | 00678 | 00679 |        |
| Seminal Vesicle Inflammation, Chronic Active             | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50    |        |
|  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 3     |       |       | 1 3.0 |        |
| Testes Atrophy   | +           | 4     | 2     | 2     | 4     |       |       | 4     | 3     | 2     | 4     |       | 1     | 2     |       | 4     | 4     | 2     | 4     | 4     |          | +     | 3     | 2     | 1     | 50     |
| Testes Infarct   |             | 3     |       |       |       |       |       |       | 4     |       |       |       | 2     |       |       |       |       |       | 2     |       |          |       |       |       |       | 39 2.6 |
| Testes Interstitial Cell, Hyperplasia                    | 2           |       |       |       |       |       |       |       | 4     |       |       |       | 3     |       | 1     | 2     |       |       |       |       |          |       |       | 2     |       | 12 2.7 |
|  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       | 12 1.9 |
| <b>HEMATOPOIETIC SYSTEM</b>                              |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |        |
| Bone Marrow  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | 50     |
| Lymph Node Pancreatic, Ectasia                           |             | 3     |       |       | +     |       |       |       |       |       |       |       | +     | +     |       |       |       |       |       |       |          |       |       |       |       | 9      |
| Lymph Node Renal, Ectasia                                |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       | 1 3.0  |
| Lymph Node Renal, Hemorrhage                             |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       | 1 2.0  |
| Lymph Node, Bronchial                                    | M           | +     | +     | M     | +     | M     | M     | +     | +     | +     | +     | +     | M     | M     | M     | +     | +     | M     | +     | M     | M        | M     | M     | M     | 20    |        |
| Lymph Node, Mandibular Ectasia                           | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | 48     |
| Lymph Node Hyperplasia                                   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 3     |       |       | 2 2.5  |
| Lymph Node, Mediastinal                                  | +           | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 48    |        |
| Lymph Node, Mesenteric Infiltration Cellular, Histiocyte | +           | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 49    |        |
|  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2     |       |       |          |       |       |       |       | 1 2.0  |
| Spleen Fibrosis  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50    |        |
| Spleen Hematopoietic Cell Proliferation                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2     |       |       |       |          | 2     |       | 2     |       | 4 1.5  |
|  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 2     |       | 3 1.7  |

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 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE<br>5.0 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |    |       |    |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|----|-------|----|
|  | 0689        | 0729  | 0779  | 0779  | 0660  | 0462  | 0672  | 0672  | 0672  | 0672  | 0561  | 0661  | 0661  | 0441  | 0772  | 0668  | 0779  | 0669  | 0666  | 0675  |          | 0665  | 0657  |    |       |    |
| ANIMAL ID                                  | 00626       | 00662 | 00662 | 00662 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666 | 00666    | 00666 |       |    |       |    |
| Necrosis                                   |             |       | 2     |       | 2     |       |       |       |       |       |       | 2     |       |       | 2     |       |       |       |       |       |          | 2     | 6 2.0 |    |       |    |
| Thymus                                     | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | M        | +     | +     | +  | 46    |    |
| <b>INTEGUMENTARY SYSTEM</b>                |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |    |       |    |
| Mammary Gland                              | +           | +     | M     | M     | +     | +     | M     | +     | +     | +     | M     | +     | M     | +     | M     | +     | M     | +     | +     | M     | M        | +     | M     | +  | M     | 31 |
| Skin                                       | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +  | 50    |    |
| Cyst Epithelial Inclusion                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |    | 1 3.0 |    |
| Hyperplasia, Squamous                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |    | 1 3.0 |    |
| Inflammation                               |             |       |       |       | 3     | 3     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |    | 4 3.0 |    |
| <b>MUSCULOSKELETAL SYSTEM</b>              |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |    |       |    |
| Bone                                       | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50 |       |    |
| Maxilla, Inflammation, Chronic Active      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |    | 1 1.0 |    |
| Skeletal Muscle                            |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |    | 4     |    |
| <b>NERVOUS SYSTEM</b>                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |    |       |    |
| Brain                                      | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50 |       |    |
| Compression                                |             |       |       |       |       |       | 2     | 2     |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |    | 7 2.3 |    |
| Edema                                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |    | 1 3.0 |    |
| Hemorrhage                                 |             |       |       |       |       |       |       |       | 1     |       |       |       |       |       | 3     |       |       |       |       |       |          |       |       |    | 3 2.0 |    |
| Infiltration Cellular, Mononuclear Cell    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |    | 1 1.0 |    |
| <b>RESPIRATORY SYSTEM</b>                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |    |       |    |
| Larynx                                     | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE                       | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |        |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|--------|
|   | 0689        | 0729  | 0779  | 0775  | 0648  | 0667  | 0672  | 0677  | 0677  | 0677  | 0566  | 0666  | 0464  | 0767  | 0668  | 0722  | 0779  | 0666  | 0668  | 0755  |          | 0666  | 0566   |
| 5.0 mg/m3   | ANIMAL ID   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |        |
|   | 00626       | 00662 | 00662 | 00662 | 00663 | 00663 | 00663 | 00663 | 00663 | 00663 | 00663 | 00663 | 00663 | 00663 | 00663 | 00663 | 00663 | 00663 | 00663 | 00663 | 00663    | 00663 | 00663  |
| Hyperkeratosis                                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 1 2.0  |
| Inflammation  |             |       |       |       |       |       | 1     |       |       |       |       |       | 1     |       |       |       |       |       |       |       |          |       | 16 1.1 |
| Metaplasia, Squamous                                |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 2 2.0  |
| Respiratory Epithelium, Hyperplasia                 |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 1 1.0  |
| Squamous Epithelium, Hyperplasia                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 1 1.0  |
| Lung  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 50     |
| Inflammation, Chronic Active                        | 3           | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 1     | 3     | 3     | 3     | 3     | 3     | 3        | 3     | 50 2.9 |
| Alveolar Epithelium, Hyperplasia                    | 3           | 4     | 4     | 3     | 3     | 3     | 3     | 4     | 4     | 4     | 4     | 3     | 4     | 4     | 1     | 3     | 4     | 4     | 4     |       | 3        | 4     | 49 3.6 |
| Alveolus, Proteinosis                               | 3           | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3        | 3     | 49 3.1 |
| Bronchiole, Epithelium, Hyperplasia                 | 4           | 4     | 4     | 4     | 3     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 3     | 3     | 3     | 4     | 4     | 4     | 4        | 4     | 50 3.7 |
| Nose  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 50     |
| Foreign Body  |             |       |       |       |       | X     |       |       |       |       |       |       |       |       |       |       | X     |       |       |       |          |       | 5      |
| Inflammation, Suppurative                           | 3           |       | 2     | 3     | 3     | 3     | 1     | 1     | 2     | 1     | 3     |       | 3     | 2     |       | 3     | 4     | 3     | 3     | 2     | 3        | 3     | 46 2.6 |
| Inflammation, Chronic Active                        | 3           | 1     | 3     | 3     | 3     | 3     | 1     | 2     | 2     | 2     | 3     | 1     | 3     | 2     |       | 3     | 3     | 2     | 3     | 3     | 2        | 3     | 49 2.6 |
| Thrombosis  | 1           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 2 1.5  |
| Olfactory Epithelium, Accumulation, Hyaline Droplet | 1           |       |       |       |       |       |       |       |       | 1     |       |       |       |       |       |       |       |       |       |       |          |       | 2 1.0  |
| Olfactory Epithelium, Atrophy                       |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 29 1.2 |
| Olfactory Epithelium, Hyperplasia                   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 7 1.1  |
| Olfactory Epithelium, Hyperplasia, Basal Cell       |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 13 1.0 |
| Olfactory Epithelium, Metaplasia, Respiratory       | 3           | 2     | 2     | 3     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 3     | 3     | 3     | 2     | 2     | 2     | 2     | 2     | 2     | 3        | 2     | 50 2.2 |
| Olfactory Epithelium, Necrosis                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 5 1.8  |
| Respiratory Epithelium, Hyperplasia                 | 2           | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 3     | 4     | 2     | 2     | 1     | 2        | 3     | 50 2.2 |
| Respiratory Epithelium, Metaplasia, Squamous        | 1           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 35 1.3 |
| Respiratory Epithelium, Necrosis                    | 1           |       | 2     | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 13 1.6 |
| Turbinate, Atrophy                                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 41 1.0 |
| Trachea   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 50     |
| Inflammation, Suppurative                           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS MALE | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |       |      |
|-------------------------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|-------|------|
|                               | 0689        | 0729  | 0779  | 0775  | 0668  | 0447  | 0662  | 0772  | 0772  | 0770  | 0770  | 0556  | 0666  | 0664  | 0777  | 0668  | 0772  | 0772  | 0669  | 0666  |          | 0770  | 0556  | 0666  | 0557  | 0665 |
| 5.0 mg/m3                     | 00626       | 00667 | 00668 | 00669 | 00660 | 00661 | 00662 | 00663 | 00664 | 00665 | 00666 | 00667 | 00668 | 00669 | 00670 | 00671 | 00672 | 00673 | 00674 | 00675 | 00676    | 00677 | 00678 | 00679 | 00680 | 50   |
| ANIMAL ID                     | 6626        | 6667  | 6668  | 6669  | 6660  | 6661  | 6662  | 6663  | 6664  | 6665  | 6666  | 6667  | 6668  | 6669  | 6670  | 6671  | 6672  | 6673  | 6674  | 6675  | 6676     | 6677  | 6678  | 6679  | 6680  |      |

Metaplasia, Squamous

1 1.0

**SPECIAL SENSES SYSTEM**

|                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        |
|---------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------|
| Eye                 | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Cataract            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 | 2 |   |   |   |   |   |   | 7 2.0  |
| Metaplasia, Osseous | 1 | 1 | 2 | 1 |   |   |   |   | 1 |   | 1 | 1 | 1 | 1 |   | 1 | 2 | 1 | 1 |   |   | 1 | 1 |   |   | 31 1.1 |
| Harderian Gland     | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Zymbal's Gland      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1      |

**URINARY SYSTEM**

|                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        |
|--------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------|
| Kidney                               | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Accumulation, Hyaline Droplet        |   |   |   |   |   |   |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 3.0  |
| Cyst                                 |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1      |
| Fibrosis                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 2.0  |
| Infarct                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   | 1 2.0  |
| Metaplasia, Osseous                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 2.0  |
| Nephropathy                          | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 1 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 1 | 1 | 50 2.5 |
| Artery, Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 3.0  |
| Urinary Bladder                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Inflammation                         |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 3.0  |

\*\*\* 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  
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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>Control | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |   | ANIMAL ID | females<br>(cont...) |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|---|-----------|----------------------|
|   | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>1 | 0<br>6<br>5<br>4 | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>1 | 0<br>5<br>1<br>1 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>1 | 0<br>6<br>1<br>1 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>2 | 0<br>2<br>3<br>4 | 0<br>7<br>3<br>0 | 0<br>5<br>3<br>0 | 0<br>7<br>3<br>1 | 0<br>6<br>8<br>3 | 0<br>7<br>3<br>1 | 0<br>6<br>7<br>4 | 0<br>6<br>4<br>6 | 0<br>7<br>3<br>0 |   |           |                      |
| Adrenal Cortex                                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                |   |           |                      |
| Accessory Adrenal Cortical Nodule             |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 1                |                  |                  |                  |                  |                  |                  | 1                |   |           |                      |
| Atrophy                                       |                  |                  |                  |                  | 3                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |   |           |                      |
| Degeneration                                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 3                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |   |           |                      |
| Hemorrhage                                    |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 3                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |   |           |                      |
| Hyperplasia                                   | 2                |                  | 2                | 2                |                  | 1                |                  |                  |                  |                  |                  | 2                |                  | 1                |                  | 1                |                  | 2                | 2                | 2                |                  |                  | 1                | 1 | 1         | 1                    |
| Necrosis                                      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 2                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |   |           |                      |
| Adrenal Medulla                               | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                |   |           |                      |
| Degeneration, Cystic                          |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 3                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |   |           |                      |
| Hyperplasia                                   | 3                |                  |                  |                  |                  |                  |                  |                  |                  |                  | 3                |                  |                  |                  |                  | 1                |                  |                  |                  |                  | 1                |                  |                  |   |           |                      |
| Infiltration Cellular, Mononuclear Cell       |                  |                  |                  |                  |                  |                  |                  |                  |                  | 2                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |   |           |                      |
| Islets, Pancreatic                            | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                |   |           |                      |
| Hyperplasia                                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 1                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |   |           |                      |
| Parathyroid Gland                             | +                | +                | +                | +                | +                | +                | +                | +                | M                | M                | M                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | M                | + | +         | M                    |
| Pituitary Gland                               | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                |   |           |                      |
| Pars Distalis, Hyperplasia                    |                  | 2                |                  | 3                |                  |                  | 2                | 4                |                  | 1                |                  |                  | 3                |                  |                  |                  |                  |                  |                  | 4                |                  | 1                |                  | 3 |           |                      |
| Thyroid Gland                                 | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                |   |           |                      |
| C-cell, Hyperplasia                           |                  |                  |                  |                  |                  |                  |                  | 1                |                  |                  |                  |                  |                  |                  |                  | 3                |                  | 1                |                  |                  |                  | 1                |                  |   |           |                      |
| Follicular Cell, Hyperplasia                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |   |           |                      |

**GENERAL BODY SYSTEM**

Peritoneum +

**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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>Control | DAY ON TEST           |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | ANIMAL ID             | females<br>(cont...)  |                       |                       |                       |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|   | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>0      | 0<br>7<br>3<br>1      | 0<br>6<br>5<br>4      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>0      | 0<br>7<br>3<br>1      | 0<br>5<br>1<br>1      | 0<br>7<br>3<br>0      | 0<br>7<br>3<br>1      | 0<br>6<br>1<br>1      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>3      | 0<br>2<br>3<br>4      | 0<br>7<br>3<br>0      | 0<br>5<br>3<br>0      | 0<br>7<br>3<br>1      | 0<br>6<br>8<br>3      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>1      | 0<br>6<br>7<br>4      | 0<br>6<br>4<br>6      |                       |                       | 0<br>7<br>3<br>0      |                       |                       |
|   | 0<br>0<br>1<br>0<br>1 | 0<br>0<br>1<br>0<br>2 | 0<br>0<br>1<br>0<br>3 | 0<br>0<br>1<br>0<br>4 | 0<br>0<br>1<br>0<br>5 | 0<br>0<br>1<br>0<br>6 | 0<br>0<br>1<br>0<br>7 | 0<br>0<br>1<br>0<br>8 | 0<br>0<br>1<br>0<br>9 | 0<br>0<br>1<br>0<br>0 | 0<br>0<br>1<br>0<br>1 | 0<br>0<br>1<br>0<br>2 | 0<br>0<br>1<br>0<br>3 | 0<br>0<br>1<br>0<br>4 | 0<br>0<br>1<br>0<br>5 | 0<br>0<br>1<br>0<br>6 | 0<br>0<br>1<br>0<br>7 | 0<br>0<br>1<br>0<br>8 | 0<br>0<br>1<br>0<br>9 | 0<br>0<br>1<br>0<br>0 | 0<br>0<br>1<br>0<br>1 | 0<br>0<br>1<br>0<br>2 | 0<br>0<br>1<br>0<br>3 | 0<br>0<br>1<br>0<br>4 | 0<br>0<br>1<br>0<br>5 | 0<br>0<br>1<br>0<br>6 | 0<br>0<br>1<br>0<br>7 | 0<br>0<br>1<br>0<br>8 | 0<br>0<br>1<br>0<br>9 |

**NERVOUS SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Brain                                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Compression                             | 1 |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   | 2 |   |   | 2 | 3 | 2 |   |   | 2 |   |   |
| Infiltration Cellular, Mononuclear Cell |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**RESPIRATORY SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larynx  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Foreign Body  |   |   |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation  |   |   | 1 | 2 | 1 | 1 |   |   |   |   | 1 | 1 | 1 | 2 |   |   | 1 |   | 1 |   | 1 |   | 1 |   |   |
| Metaplasia, Squamous                                  |   |   |   |   | 1 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Lung  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Inflammation, Chronic Active                          |   | 1 | 1 |   |   |   | 1 |   |   |   |   | 1 | 1 |   |   |   |   | 1 |   | 1 |   |   |   |   |   |
| Alveolar Epithelium, Hyperplasia                      |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Interstitial, Fibrosis                                |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Mediastinum, Inflammation                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Nose  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Foreign Body  |   |   |   |   |   |   |   |   |   |   |   |   |   | X | X |   |   |   |   |   |   |   |   |   |   |
| Inflammation, Suppurative                             |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 1 |   |   |   |   |   |   |   |   |   |   |
| Inflammation, Chronic Active                          | 1 |   |   | 1 | 1 |   |   |   |   |   |   | 1 | 3 | 1 |   | 1 |   | 1 |   | 1 |   |   | 1 |   |   |
| Thrombosis  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |
| Olfactory Epithelium, Accumulation, Hyaline Droplet   |   |   |   |   |   |   |   |   |   | 3 |   | 1 |   |   | 1 | 1 |   |   |   |   |   |   | 1 |   |   |
| Olfactory Epithelium, Metaplasia, Respiratory         |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   | 1 |   |   |   |   |   |
| Respiratory Epithelium, Accumulation, Hyaline Droplet |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Respiratory Epithelium, Hyperplasia                   |   |   |   | 1 | 1 |   |   |   |   |   |   |   |   | 2 | 1 | 1 | 1 |   |   | 1 | 1 | 2 |   |   |   |

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 + .. 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>Control | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                       | ANIMAL ID | females<br>(cont...) |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------------------|-----------|----------------------|
|   | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>1 | 0<br>6<br>5<br>4 | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>1 | 0<br>5<br>3<br>1 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>1 | 0<br>6<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>2 | 0<br>7<br>3<br>3 | 0<br>2<br>3<br>4 | 0<br>7<br>3<br>0 | 0<br>5<br>3<br>0 | 0<br>7<br>3<br>1 | 0<br>6<br>3<br>3 | 0<br>7<br>3<br>1 | 0<br>6<br>7<br>4 | 0<br>6<br>4<br>6 | 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<br>0<br>1<br>0<br>1 |           |                      |

Respiratory Epithelium, Metaplasia, Squamous  
 Respiratory Epithelium, Necrosis  
 Turbinate, Atrophy  
 Turbinate, Hyperostosis

2

1

Trachea +

**SPECIAL SENSES SYSTEM**

Ear  
 Inflammation, Chronic Active

Eye +  
 Cataract 2 2  
 Metaplasia, Osseous 1 1 1 1 1 1 1

Harderian Gland +  
 Inflammation, Chronic Active 4 4

**URINARY SYSTEM**

Kidney +  
 Necrosis, Focal  
 Nephropathy 3 3 3 3 1 2 2 2 3 3 3 2 3 3 3 2 3 3 2 3 3 2 1 3

Urinary Bladder +

\* .. 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>Control | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |       |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|-------|
|   | 0731        | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  |          | 0731  | 0731  |       |       |
| ANIMAL ID                                     | 00126       | 00127 | 00128 | 00129 | 00130 | 00131 | 00132 | 00133 | 00134 | 00135 | 00136 | 00137 | 00138 | 00139 | 00140 | 00141 | 00142 | 00143 | 00144 | 00145 | 00146    | 00147 | 00148 | 00149 | 00150 |
|   | 0           | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0        | 0     | 0     | 0     | 0     |

**ALIMENTARY SYSTEM**

|                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------|
| Esophagus                    | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Intestine Large, Cecum       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Intestine Large, Colon       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Intestine Large, Rectum      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Intestine Small, Duodenum    | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 48     |
| Intestine Small, Ileum       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49     |
| Intestine Small, Jejunum     | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Liver                        | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Angiectasis                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 2.0  |
| Atrophy                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 2.0  |
| Basophilic Focus             | X | X |   | X | X |   |   |   |   |   |   | X |   | X |   |   | X |   | X |   |   |   |   |   |   | 16     |
| Clear Cell Focus             |   | X |   |   |   |   |   |   | X |   |   | X | X | X | X |   |   |   |   |   |   |   |   |   |   | 12     |
| Fatty Change                 |   |   |   |   | 2 |   |   |   | 2 | 2 | 1 |   |   |   |   |   |   | 3 |   | 1 |   |   | 2 | 2 |   | 13 1.6 |
| Hepatodiaphragmatic Nodule   |   | X |   |   |   |   |   |   |   |   |   |   | X |   |   |   |   | X |   | X |   |   |   |   |   | 6      |
| Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 2.0  |
| Mixed Cell Focus             |   |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1      |
| Necrosis                     |   | 1 |   |   |   |   |   |   |   | 1 | 1 |   |   |   |   |   |   |   |   |   |   | 3 |   |   |   | 6 1.3  |
| Regeneration                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 1.5  |
| Serosa, Thrombosis           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 2.0  |
| Mesentery                    | + |   | + |   |   |   |   |   |   |   |   | + |   |   |   |   | + | + |   | + | + |   |   |   |   | 13     |

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 + .. Tissue examined microscopically  
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Experiment Number: 60311 - 05  
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 Cobalt  
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| FISCHER 344-TACONIC RATS<br>FEMALE<br>Control | DAY ON TEST           |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | * TOTALS              |        |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------|
|   | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>1      | 0<br>6<br>9<br>1      | 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>2<br>2      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>2      | 0<br>3<br>1<br>6      | 0<br>5<br>3<br>0      | 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>2      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>1      | 0<br>6<br>7<br>4      | 0<br>7<br>3<br>0      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>1      | 0<br>6<br>6<br>3      | 0<br>6<br>9<br>8      | 0<br>7<br>3<br>1      |                       |        |
| 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>3<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 |        |
| Adrenal Cortex                                | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | 50                    |        |
| Accessory Adrenal Cortical Nodule             |                       |                       |                       |                       |                       | 1                     |                       |                       |                       |                       |                       |                       |                       |                       | 1                     |                       |                       |                       |                       |                       |                       |                       |                       |                       | 5 1.0                 |        |
| Atrophy                                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 3.0                 |        |
| Degeneration                                  |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 2                     |                       |                       |                       |                       |                       | 2                     |                       | 3 2.3                 |        |
| Hemorrhage                                    |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 3.0                 |        |
| Hyperplasia                                   |                       |                       | 2                     |                       |                       | 1                     |                       | 2                     |                       | 2                     |                       | 1                     | 1                     | 1                     |                       | 2                     |                       |                       |                       | 1                     |                       | 2                     | 3                     |                       | 3                     | 25 1.6 |
| Necrosis                                      |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 2.0  |
| Adrenal Medulla                               | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | 50                    |        |
| Degeneration, Cystic                          |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 3.0  |
| Hyperplasia                                   |                       |                       |                       |                       |                       | 4                     |                       | 1                     |                       |                       |                       |                       | 1                     | 2                     |                       |                       | 2                     |                       | 1                     |                       |                       | 1                     | 1                     |                       |                       | 12 1.8 |
| Infiltration Cellular, Mononuclear Cell       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 2.0  |
| Islets, Pancreatic                            | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | 50                    |        |
| Hyperplasia                                   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 1.0  |
| Parathyroid Gland                             | +                     | +                     | +                     | +                     | M                     | +                     | +                     | +                     | +                     | +                     | M                     | M                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | 42                    |        |
| Pituitary Gland                               | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | 50                    |        |
| Pars Distalis, Hyperplasia                    | 2                     | 3                     |                       | 2                     |                       |                       |                       |                       | 3                     | 2                     |                       | 4                     |                       |                       |                       | 4                     |                       | 2                     |                       |                       |                       | 1                     | 3                     |                       |                       | 19 2.6 |
| Thyroid Gland                                 | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | +                     | 50                    |        |
| C-cell, Hyperplasia                           | 1                     |                       |                       |                       |                       |                       |                       |                       |                       | 1                     |                       |                       |                       |                       |                       | 2                     | 1                     |                       |                       |                       |                       |                       | 1                     |                       |                       | 9 1.3  |
| Follicular Cell, Hyperplasia                  |                       |                       |                       | 1                     |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1 1.0  |

**GENERAL BODY SYSTEM**

Peritoneum 1

**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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>Control  | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | * TOTALS |      |  |
|--|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------|------|--|
|  | 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 |  |
| ANIMAL ID  | 0016        | 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 |  |
| Clitoral Gland<br>Hyperplasia<br>Inflammation, Suppurative   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | 49   | 2 2.5<br>2 1.5                                 |
| Ovary<br>Cyst<br>Inflammation, Chronic Active  | +           | +    | X    | +    | +    | X    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | X    | +    | +    | +    | +    | +    | +    | +    | +        | 50   | 5<br>1 4.0                                     |
| Uterus<br>Angiectasis<br>Cyst<br>Inflammation, Suppurative<br>Inflammation, Chronic Active<br>Necrosis<br>Endometrium, Hyperplasia, Cystic | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | 50   | 1 4.0<br>1<br>1 2.0<br>1 3.0<br>2 2.5<br>4 2.0 |

**HEMATOPOIETIC SYSTEM**

|                                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |       |       |
|------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-------|-------|
| Bone Marrow                        | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |       |       |
| Lymph Node<br>Renal, Ectasia       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 4     | 1 2.0 |
| Lymph Node, Bronchial              | + | + | M | + | + | M | M | M | + | + | + | M | M | M | + | + | + | M | + | + | M | M | M | + | M | 26 |       |       |
| Lymph Node, Mandibular<br>Atrophy  | + | + | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 48 | 1 3.0 |       |
| Lymph Node, Mediastinal<br>Atrophy | + | + | M | M | + | M | + | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + | + | 42 | 1 2.0 |       |

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 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>Control                                    | DAY ON TEST   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | * TOTALS              |                         |
|--|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-------------------------|
|  | 0<br>7<br>3<br>1  | 0<br>7<br>3<br>1      | 0<br>6<br>9<br>1      | 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>2<br>2      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>2      | 0<br>3<br>1<br>6      | 0<br>5<br>3<br>0      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>0      | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>1      | 0<br>6<br>7<br>4      | 0<br>7<br>3<br>0      | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>1      | 0<br>6<br>6<br>3      | 0<br>6<br>9<br>8      | 0<br>7<br>3<br>1      |                       |                         |
| 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>3<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>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 |                         |
| Ectasia  |   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 3                     | 1 3.0                   |
| Lymph Node, Mesenteric<br>Infiltration Cellular, Histiocyte                      | +   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 50                    | 1 2.0                   |
| Spleen<br>Hematopoietic Cell Proliferation<br>Infiltration Cellular, Histiocyte  | +   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 50                    | 2 1.5<br>1 2.0          |
| Thymus   | + M + + + M + |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 47                    |                         |
| <b>INTEGUMENTARY SYSTEM</b>  |   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                         |
| Mammary Gland<br>Galactocele<br>Hyperplasia                                      | +   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 50                    | 1 3.0<br>3 2.3          |
| Skin<br>Cyst Epithelial Inclusion<br>Hyperkeratosis<br>Hyperplasia, Squamous     | +   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 50                    | 1 1.0<br>1 4.0<br>1 3.0 |
| <b>MUSCULOSKELETAL SYSTEM</b>  |   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                         |
| Bone<br>Fracture<br>Femur, Hyperostosis<br>Maxilla, Inflammation, Chronic Active | +   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 50                    | 1 2.0<br>4 2.0<br>2 2.5 |
| Skeletal Muscle  |   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | 1                     |                         |

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Experiment Number: 60311 - 05  
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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
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 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>Control | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |       |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|-------|
|   | 0731        | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  | 0731  |          | 0731  | 0731  |       |       |
| ANIMAL ID                                     | 00126       | 00127 | 00128 | 00129 | 00130 | 00131 | 00132 | 00133 | 00134 | 00135 | 00136 | 00137 | 00138 | 00139 | 00140 | 00141 | 00142 | 00143 | 00144 | 00145 | 00146    | 00147 | 00148 | 00149 | 00150 |
|   | 0           | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0        | 0     | 0     | 0     | 0     |

**NERVOUS SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------|
| Brain                                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Compression                             |   |   | 1 |   |   |   | 2 | 2 |   |   |   | 2 | 1 | 1 |   |   |   |   | 3 | 2 |   | 1 |   |   | 16 1.8 |
| Infiltration Cellular, Mononuclear Cell |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 2.0  |

**RESPIRATORY SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        |        |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------|--------|
| Larynx  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +      | 50     |
| Foreign Body  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        | 1      |
| Inflammation  |   | 1 | 1 | 1 | 2 | 1 |   |   | 1 |   |   |   |   | 2 |   |   | 1 |   |   |   |   | 2 | 1 |        | 22 1.2 |
| Metaplasia, Squamous                                  |   | 1 |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        | 4 1.0  |
| Lung  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +      | 50     |
| Inflammation, Chronic Active                          | 1 | 1 |   | 1 | 1 |   | 1 | 1 |   |   | 1 | 1 |   | 1 |   |   |   |   | 1 | 1 |   |   | 1 |        | 20 1.0 |
| Alveolar Epithelium, Hyperplasia                      | 1 | 1 |   |   | 1 |   | 2 |   |   |   |   |   |   | 1 |   | 1 |   |   |   |   |   |   | 1 |        | 9 1.1  |
| Interstitial, Fibrosis                                |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        | 1 2.0  |
| Mediastinum, Inflammation                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |        | 1 2.0  |
| Nose  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +      | 50     |
| Foreign Body  |   |   |   | X |   |   | X |   |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |        | 5      |
| Inflammation, Suppurative                             |   |   |   | 1 |   |   | 1 |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   | 2      | 6 1.2  |
| Inflammation, Chronic Active                          |   | 1 | 2 | 2 | 1 |   | 2 |   |   |   | 1 | 1 |   | 1 |   | 1 |   |   | 1 | 1 | 1 |   | 2 | 22 1.3 |        |
| Thrombosis  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        | 1 2.0  |
| Olfactory Epithelium, Accumulation, Hyaline Droplet   | 3 |   |   |   | 1 |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   | 8 1.5  |        |
| Olfactory Epithelium, Metaplasia, Respiratory         |   |   |   |   | 1 | 1 |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   | 1 |        | 6 1.0  |
| Respiratory Epithelium, Accumulation, Hyaline Droplet |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        | 1 2.0  |
| Respiratory Epithelium, Hyperplasia                   |   |   |   | 1 |   |   | 1 |   |   |   | 1 | 1 |   |   |   |   |   |   | 1 |   |   |   | 2 |        | 15 1.2 |

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 + .. Tissue examined microscopically  
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 I .. Insufficient tissue  
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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
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 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>Control | DAY ON TEST |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | * TOTALS |   |   |           |              |              |            |
|---|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------|---|---|-----------|--------------|--------------|------------|
|   | 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 |           |              |              |            |
|   | 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 |           |              |              |            |
|   | 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 |           |              |              |            |
|   | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0        | 0 | 0 |           |              |              |            |
|   | 0           | 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 |           |              |              |            |
|   | 2           | 2 | 2 | 2 | 2 | 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 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7        | 8 | 9 |           |              |              |            |
|   |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |   |   | <b>50</b> |              |              |            |
| Respiratory Epithelium, Metaplasia, Squamous  |             |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |   |   | 1         | <b>2 1.0</b> |              |            |
| Respiratory Epithelium, Necrosis              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |   |   | 3         | <b>1 3.0</b> |              |            |
| Turbinate, Atrophy                            |             |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |   |   |           | <b>1 1.0</b> |              |            |
| Turbinate, Hyperostosis                       |             |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |   |   |           | <b>3 2.0</b> |              |            |
| Trachea                                       |             |   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +        | + | + | <b>50</b> |              |              |            |
| <b>SPECIAL SENSES SYSTEM</b>                  |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |   |   |           |              |              |            |
| Ear   |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |   |   |           |              |              |            |
| Inflammation, Chronic Active                  |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |   |   |           | 4            | <b>4 2.0</b> |            |
| Eye   |             |   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +        | + | + | <b>50</b> |              |              |            |
| Cataract                                      |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |   |   |           | <b>8 2.5</b> |              |            |
| Metaplasia, Osseous                           |             |   | 1 | 1 | 1 |   | 1 |   | 1 | 1 |   |   | 2 | 1 |   | 2 | 1 |   |   |   | 1 |   | 1        | 1 | 1 | <b>24</b> | <b>1.1</b>   |              |            |
| Harderian Gland                               |             |   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +        | + | + | <b>50</b> |              |              |            |
| Inflammation, Chronic Active                  |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |   |   | 2         | <b>3 3.3</b> |              |            |
| <b>URINARY SYSTEM</b>                         |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |   |   |           |              |              |            |
| Kidney  |             |   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +        | + | + | <b>50</b> |              |              |            |
| Necrosis, Focal                               |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |   |   | 1         | <b>1 1.0</b> |              |            |
| Nephropathy                                   |             |   | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 1 | 4 |   | 3 | 3 | 3 | 4 | 3 | 2 | 2 | 3 | 1 | 3 | 3        | 3 | 2 | 3         | 3            | <b>48</b>    | <b>2.6</b> |
| Urinary Bladder                               |             |   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +        | + | + | <b>50</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  
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 1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
 2) Mild 4) Marked







Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>1.25 mg/m3 | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | females<br>(cont...) |      |      |
|--|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|----------------------|------|------|
|  | 0691        | 0624 | 0716 | 0590 | 0731 | 0770 | 0666 | 0666 | 0677 | 0677 | 0777 | 0777 | 0777 | 0777 | 0777 | 0593 | 0551 | 0733 | 0688 | 0733 | 0677 | 0676 | 0731 | 0677 |           |                      | 0733 | 0733 |
|  | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 0                    | 0    | 0    |
|  | 0           | 0    | 0    | 0    | 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    |
|  | 0           | 0    | 0    | 0    | 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    |

Necrosis

|                                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Uterus                           | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Inflammation, Suppurative        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation, Chronic Active     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |
| Endometrium, Hyperplasia, Cystic |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |

**HEMATOPOIETIC SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bone Marrow   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Lymph Node  | + |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | + |
| Deep Cervical, Infiltration Cellular Iliac, Ectasia | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Lymph Node, Bronchial                               | M | + | + | + | M | + | + | M | M | M | M | M | M | M | + | + | + | M | M | + | M | + | M | M | + |   |   |   |
| Lymph Node, Mandibular                              | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Fibrosis  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Necrosis  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Lymph Node, Mediastinal Ectasia                     | + | + | + | + | + | M | + | M | + | + | + | + | + | + | + | + | + | M | + | M | + | + | + | + | + | + | + |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Lymph Node, Mesenteric Ectasia                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
|   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Spleen  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Fibrosis  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hematopoietic Cell Proliferation                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

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 Cobalt  
 CAS Number: 7440-48-4

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 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>1.25 mg/m3 | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | females<br>(cont...) |
|--|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|----------------------|
|  | 0691        | 0692 | 0693 | 0694 | 0695 | 0696 | 0697 | 0698 | 0699 | 0690 | 0691 | 0692 | 0693 | 0694 | 0695 | 0696 | 0697 | 0698 | 0699 | 0690 |           |                      |
|  | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0030      |                      |
|  | 6           | 6    | 7    | 5    | 7    | 7    | 6    | 6    | 6    | 7    | 7    | 7    | 7    | 7    | 5    | 5    | 7    | 6    | 7    | 6    | 0031      |                      |
|  | 9           | 2    | 1    | 9    | 3    | 3    | 4    | 4    | 8    | 3    | 3    | 3    | 3    | 3    | 9    | 1    | 3    | 8    | 3    | 0032 |           |                      |
|  | 1           | 4    | 6    | 0    | 1    | 0    | 6    | 1    | 1    | 1    | 1    | 1    | 1    | 2    | 3    | 6    | 2    | 6    | 0    | 0033 |           |                      |
|  | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0034 |           |                      |
|  | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0035 |           |                      |
|  | 3           | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 3    | 0036 |           |                      |
|  | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 2    | 0037 |           |                      |
|  | 1           | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0038 |           |                      |

Trachea +

**SPECIAL SENSES SYSTEM**

Ear  
 Inflammation, Chronic Active +  
 3

Eye  
 Cataract +  
 Hemorrhage 2 1 4 3 1  
 Metaplasia, Osseous 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2  
 Cornea, Inflammation, Chronic Active 2

Harderian Gland  
 Atrophy +

Zymbal's Gland +

**URINARY SYSTEM**

Kidney  
 Cyst +  
 Infarct 3  
 Nephropathy 1 3 1 3 3 2 1 3 3 2 3 3 3 1 2 2 3 1 3 1 3 3 1  
 Renal Tubule, Hyperplasia 4

Urinary Bladder +

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 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue  
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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
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| FISCHER 344-TACONIC RATS<br>FEMALE<br>1.25 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|
|  | 0708        | 0709  | 0710  | 0711  | 0712  | 0713  | 0714  | 0715  | 0716  | 0717  | 0718  | 0719  | 0720  | 0721  | 0722  | 0723  | 0724  | 0725  | 0726  | 0727  | 0728  | 0729  | 0730  | 0731  |          |
| ANIMAL ID  | 00326       | 00327 | 00328 | 00329 | 00330 | 00331 | 00332 | 00333 | 00334 | 00335 | 00336 | 00337 | 00338 | 00339 | 00340 | 00341 | 00342 | 00343 | 00344 | 00345 | 00346 | 00347 | 00348 | 00349 | 00350    |
|  | 0           | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0        |

**ALIMENTARY SYSTEM**

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |             |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------------|
| Esophagus  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50          |
| Intestine Large, Cecum   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50          |
| Intestine Large, Colon<br>Mucosa, Hyperplasia                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50<br>2 2.0 |
| Intestine Large, Rectum  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50          |
| Intestine Small, Duodenum<br>Infiltration Cellular, Chronic Active | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50<br>1 1.0 |
| Intestine Small, Ileum   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50          |
| Intestine Small, Jejunum   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50          |
| Liver  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50          |
| Angiectasis  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 1.0       |
| Basophilic Focus   |   |   |   | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 20          |
| Clear Cell Focus   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 6           |
| Eosinophilic Focus   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1           |
| Fatty Change   | 3 |   |   |   |   |   | 1 |   |   |   |   | 1 |   |   | 2 |   |   |   |   |   |   | 2 | 2 | 3 | 9 1.8       |
| Fibrosis   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 1.0       |
| Hepatodiaphragmatic Nodule   |   |   |   | X |   |   |   | X |   |   |   |   |   | X |   |   |   |   |   |   | X |   |   |   | 11          |
| Mixed Cell Focus   |   |   |   |   |   |   |   |   |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   | 4           |
| Necrosis   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 1.3       |
| Regeneration   |   |   |   |   |   |   |   |   |   |   |   | 4 |   |   |   |   |   |   |   |   |   |   | 1 |   | 3 3.0       |

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 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
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 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>1.25 mg/m3                                       | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |   |   |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|---|---|
|  | 0708        | 0588  | 0677  | 0766  | 0777  | 0777  | 0777  | 0777  | 0777  | 0777  | 0575  | 0777  | 0777  | 0777  | 0777  | 0474  | 0776  | 0777  | 0575  | 0777  |          | 0676  | 0777  | 0676  | 0777                                    |   |
| ANIMAL ID  | 00326       | 00337 | 00338 | 00339 | 00340 | 00341 | 00342 | 00343 | 00344 | 00345 | 00346 | 00347 | 00348 | 00349 | 00350 | 00351 | 00352 | 00353 | 00354 | 00355 | 00356    | 00357 | 00358 | 00359 |   |   |
| Mesentery Fibrosis Fat, Necrosis   | +           |       |       |       |       |       |       | +     |       | +     |       |       |       |       | +     |       |       | +     |       | +     |          |       |       |       | 15<br>1 1.0<br>14 1.1                   |   |
| Pancreas Basophilic Focus Acinus, Atrophy  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50<br>1<br>23 1.2                       |   |
| Salivary Glands Duct, Hyperplasia  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50<br>1 2.0                             |   |
| Stomach, Forestomach Fibrosis Hyperplasia, Squamous Inflammation, Chronic Active Ulcer | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50<br>1 1.0<br>10 2.4<br>1 4.0<br>5 2.6 |   |
| Stomach, Glandular Ulcer   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50<br>3 1.7                             |   |
| <b>CARDIOVASCULAR SYSTEM</b>   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |   |   |
| Blood Vessel   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |   | 1 |
| Heart Cardiomyopathy Thrombosis  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50<br>34 1.5<br>4 2.5                   |   |
| <b>ENDOCRINE SYSTEM</b>  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |   |   |

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 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>1.25 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |  |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|--|
|  | 0708        | 0598  | 0697  | 0732  | 0674  | 0772  | 0772  | 0772  | 0772  | 0772  | 0577  | 0777  | 0777  | 0777  | 0777  | 0472  | 0773  | 0676  | 0777  | 0577  | 0777  | 0676  | 0777  |       |          |       |  |
| ANIMAL ID  | 00326       | 00337 | 00338 | 00339 | 00340 | 00341 | 00342 | 00343 | 00344 | 00345 | 00346 | 00347 | 00348 | 00349 | 00350 | 00351 | 00352 | 00353 | 00354 | 00355 | 00356 | 00357 | 00358 |       |          |       |  |
| Necrosis   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2     | 1 2.0 |          |       |  |
| Uterus   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50    |          |       |  |
| Inflammation, Suppurative                        |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1     | 1 1.0    |       |  |
| Inflammation, Chronic Active                     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1     | 2 1.5    |       |  |
| Endometrium, Hyperplasia, Cystic                 |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2 2.0    |       |  |
| <b>HEMATOPOIETIC SYSTEM</b>                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |  |
| Bone Marrow                                      | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50    |          |       |  |
| Lymph Node                                       |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 3        |       |  |
| Deep Cervical, Infiltration Cellular             |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 1.0    |       |  |
| Iliac, Ectasia                                   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 4.0    |       |  |
| Lymph Node, Bronchial                            | +           | +     | +     | M     | M     | M     | M     | M     | +     | M     | +     | M     | +     | M     | M     | M     | +     | M     | M     | M     | M     | M     | M     | 18    |          |       |  |
| Lymph Node, Mandibular                           | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | M     | M     | +     | +     | +        | 48    |  |
| Fibrosis   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 1 1.0 |  |
| Necrosis   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 1 1.0 |  |
| Lymph Node, Mediastinal                          | +           | +     | +     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +     | +     | +     | 43       |       |  |
| Ectasia  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | M     |          | 1 2.0 |  |
| Lymph Node, Mesenteric                           | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50       |       |  |
| Ectasia  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 1 2.0 |  |
| Spleen   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50       |       |  |
| Fibrosis   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1     |          | 1 1.0 |  |
| Hematopoietic Cell Proliferation                 |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 5 1.4 |  |

\* .. 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>1.25 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |        |  |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|--------|--|
|  | 0708        | 0588  | 0677  | 0766  | 0777  | 0777  | 0777  | 0777  | 0777  | 0777  | 0575  | 0777  | 0777  | 0777  | 0777  | 0474  | 0777  | 0676  | 0777  | 0575  |          | 0777  | 0777  | 0676  | 0777   |  |
| ANIMAL ID  | 00326       | 00337 | 00338 | 00339 | 00340 | 00341 | 00342 | 00343 | 00344 | 00345 | 00346 | 00347 | 00348 | 00349 | 00350 | 00351 | 00352 | 00353 | 00354 | 00355 | 00356    | 00357 | 00358 | 00359 |        |  |
| Necrosis   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1 1.0  |  |
| Thymus   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | M     | M     | +     | +     | +     | +        | +     | +     | +     | 46     |  |
| Thrombosis                                       |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1 2.0  |  |
| <b>INTEGUMENTARY SYSTEM</b>                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |        |  |
| Mammary Gland                                    | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50     |  |
| Galactocoele                                     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1 1.0  |  |
| Hyperplasia                                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2     |       |       |       |       |          |       |       |       | 2 2.0  |  |
| Inflammation, Chronic Active                     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 3     |       |       |       |       |          |       |       |       | 1 3.0  |  |
| Skin   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50    |        |  |
| Cyst Epithelial Inclusion                        |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 2     |       | 1 2.0  |  |
| Hyperplasia, Squamous                            |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 3     | 1 3.0  |  |
| Inflammation                                     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1 2.0  |  |
| Subcutaneous Tissue, Inflammation                |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 4     |       |       |       |       |          |       |       |       | 1 4.0  |  |
| <b>MUSCULOSKELETAL SYSTEM</b>                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |        |  |
| Bone   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50    |        |  |
| Femur, Hyperostosis                              |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 3     | 2 3.0  |  |
| Skeletal Muscle                                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1      |  |
| <b>NERVOUS SYSTEM</b>                            |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |        |  |
| Brain  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50    |        |  |
| Compression                                      | 2           |       | 2     |       |       |       | 3     |       |       |       |       | 2     |       |       | 2     |       |       |       |       |       |          |       | 1     | 2     | 14 1.8 |  |
| Hemorrhage                                       |             |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 2 2.0  |  |

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|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|
|  | 0708        | 0598  | 0697  | 0732  | 0674  | 0772  | 0772  | 0772  | 0772  | 0772  | 0577  | 0777  | 0777  | 0777  | 0777  | 0472  | 0773  | 0676  | 0777  | 0577  |          | 0777  | 0676  |
| ANIMAL ID  | 00326       | 00337 | 00338 | 00333 | 00333 | 00333 | 00333 | 00333 | 00333 | 00333 | 00333 | 00333 | 00333 | 00333 | 00333 | 00333 | 00333 | 00333 | 00333 | 00333 | 00333    | 00333 | 00333 |
|  | 0           | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0        | 0     | 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     |
|  | 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 SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |        |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------|
| Larynx  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Foreign Body  |   |   | X |   |   |   |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3      |
| Inflammation  | 1 |   | 2 |   | 2 | 1 |   | 1 |   | 1 | 2 |   | 1 | 2 |   |   | 1 |   | 2 | 1 | 2 |   | 1 | 23 1.5 |
| Metaplasia, Squamous                                |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   | 4 1.0  |
| Respiratory Epithelium, Hyperplasia                 |   |   | 2 |   | 1 |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   | 4 1.3  |
| Lung  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Inflammation, Chronic Active                        | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 50 3.0 |
| Alveolar Epithelium, Hyperplasia                    | 4 | 3 | 3 | 4 | 3 | 3 | 1 | 4 | 4 | 1 | 4 | 4 | 4 | 4 | 3 | 2 | 3 | 2 | 4 | 4 | 4 | 1 | 4 | 49 2.8 |
| Alveolar Epithelium, Metaplasia, Squamous           |   |   |   | 4 |   |   |   |   |   | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 3.5  |
| Alveolus, Proteinosis                               | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 1 | 3 | 50 2.7 |
| Bronchiole, Epithelium, Hyperplasia                 | 1 | 1 | 2 | 2 | 1 | 3 | 1 | 1 | 2 | 1 | 2 | 3 | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 47 1.5 |
| Nose  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50     |
| Foreign Body  |   |   |   |   |   |   |   |   |   |   |   | X |   |   |   |   |   |   |   |   |   |   |   | 3      |
| Inflammation, Suppurative                           |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   | 2 |   |   |   |   | 4 1.3  |
| Inflammation, Chronic Active                        | 1 | 1 |   | 1 |   | 1 | 1 | 1 | 1 |   |   | 1 | 1 | 1 | 1 |   | 1 |   | 1 | 3 | 1 | 1 | 1 | 42 1.1 |
| Thrombosis  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |   |   |   | 4 2.8  |
| Olfactory Epithelium, Accumulation, Hyaline Droplet |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 1.0  |
| Olfactory Epithelium, Atrophy                       |   |   |   |   |   |   |   |   |   | 1 |   |   | 1 | 1 |   | 1 | 1 | 1 |   | 1 |   |   | 1 | 22 1.1 |
| Olfactory Epithelium, Metaplasia, Respiratory       |   |   |   | 1 | 2 |   |   |   | 1 |   |   | 1 |   | 2 |   |   | 1 | 2 | 1 |   |   |   | 1 | 18 1.3 |
| Olfactory Epithelium, Necrosis                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   | 2 1.5  |
| Respiratory Epithelium, Hyperplasia                 |   | 1 | 1 | 1 |   | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |   | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 43 1.0 |
| Respiratory Epithelium, Necrosis                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   |   |   | 1 2.0  |
| Turbinate, Atrophy                                  | 1 | 1 | 1 | 1 | 1 | 1 |   | 1 | 1 |   |   | 1 | 1 | 1 | 1 | 1 |   | 1 | 1 |   | 1 | 1 | 1 | 38 1.0 |
| Turbinate, Hyperostosis                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |   |   |   |   |   |   |   | 2 2.0  |

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| FISCHER 344-TACONIC RATS<br>FEMALE<br>2.5 mg/m3 | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | females<br>(cont...) |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     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|   | 0730        | 0732 | 0737 | 0739 | 0768 | 0773 | 0776 | 0783 | 0785 | 0788 | 0791 | 0793 | 0797 | 0798 | 0799 | 0803 | 0805 | 0807 | 0808 | 0811 |           |                      | 0812 | 0813 | 0816 | 0817 | 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 | 1001 | 1002 | 1003 | 1004 | 1005 | 1006 | 1007 | 1008 | 1009 | 1010 | 1011 | 1012 | 1013 | 1014 | 1015 | 1016 | 1017 | 1018 | 1019 | 1020 | 1021 | 1022 | 1023 | 1024 | 1025 | 1026 | 1027 | 1028 | 1029 | 1030 | 1031 | 1032 | 1033 | 1034 | 1035 | 1036 | 1037 | 1038 | 1039 | 1040 | 1041 | 1042 | 1043 | 1044 | 1045 | 1046 | 1047 | 1048 | 1049 | 1050 | 1051 | 1052 | 1053 | 1054 | 1055 | 1056 | 1057 | 1058 | 1059 | 1060 | 1061 | 1062 | 1063 | 1064 | 1065 | 1066 | 1067 | 1068 | 1069 | 1070 | 1071 | 1072 | 1073 | 1074 | 1075 | 1076 | 1077 | 1078 | 1079 | 1080 | 1081 | 1082 | 1083 | 1084 | 1085 | 1086 | 1087 | 1088 | 1089 | 1090 | 1091 | 1092 | 1093 | 1094 | 1095 | 1096 | 1097 | 1098 | 1099 | 1100 | 1101 | 1102 | 1103 | 1104 | 1105 | 1106 | 1107 | 1108 | 1109 | 1110 | 1111 | 1112 | 1113 | 1114 | 1115 | 1116 | 1117 | 1118 | 1119 | 1120 | 1121 | 1122 | 1123 | 1124 | 1125 | 1126 | 1127 | 1128 | 1129 | 1130 | 1131 | 1132 | 1133 | 1134 | 1135 | 1136 | 1137 | 1138 | 1139 | 1140 | 1141 | 1142 | 1143 | 1144 | 1145 | 1146 | 1147 | 1148 | 1149 | 1150 | 1151 | 1152 | 1153 | 1154 | 1155 | 1156 | 1157 | 1158 | 1159 | 1160 | 1161 | 1162 | 1163 | 1164 | 1165 | 1166 | 1167 | 1168 | 1169 | 1170 | 1171 | 1172 | 1173 | 1174 | 1175 | 1176 | 1177 | 1178 | 1179 | 1180 | 1181 | 1182 | 1183 | 1184 | 1185 | 1186 | 1187 | 1188 | 1189 | 1190 | 1191 | 1192 | 1193 | 1194 | 1195 | 1196 | 1197 | 1198 | 1199 | 1200 | 1201 | 1202 | 1203 | 1204 | 1205 | 1206 | 1207 | 1208 | 1209 | 1210 | 1211 | 1212 | 1213 | 1214 | 1215 | 1216 | 1217 | 1218 | 1219 | 1220 | 1221 | 1222 | 1223 | 1224 | 1225 | 1226 | 1227 | 1228 | 1229 | 1230 | 1231 | 1232 | 1233 | 1234 | 1235 | 1236 | 1237 | 1238 | 1239 | 1240 | 1241 | 1242 | 1243 | 1244 | 1245 | 1246 | 1247 | 1248 | 1249 | 1250 | 1251 | 1252 | 1253 | 1254 | 1255 | 1256 | 1257 | 1258 | 1259 | 1260 | 1261 | 1262 | 1263 | 1264 | 1265 | 1266 | 1267 | 1268 | 1269 | 1270 | 1271 | 1272 | 1273 | 1274 | 1275 | 1276 | 1277 | 1278 | 1279 | 1280 | 1281 | 1282 | 1283 | 1284 | 1285 | 1286 | 1287 | 1288 | 1289 | 1290 | 1291 | 1292 | 1293 | 1294 | 1295 | 1296 | 1297 | 1298 | 1299 | 1300 | 1301 | 1302 | 1303 | 1304 | 1305 | 1306 | 1307 | 1308 | 1309 | 1310 | 1311 | 1312 | 1313 | 1314 | 1315 | 1316 | 1317 | 1318 | 1319 | 1320 | 1321 | 1322 | 1323 | 1324 | 1325 | 1326 | 1327 | 1328 | 1329 | 1330 | 1331 | 1332 | 1333 | 1334 | 1335 | 1336 | 1337 | 1338 | 1339 | 1340 | 1341 | 1342 | 1343 | 1344 | 1345 | 1346 | 1347 | 1348 | 1349 | 1350 | 1351 | 1352 | 1353 | 1354 | 1355 | 1356 | 1357 | 1358 | 1359 | 1360 | 1361 | 1362 | 1363 | 1364 | 1365 | 1366 | 1367 | 1368 | 1369 | 1370 | 1371 | 1372 | 1373 | 1374 | 1375 | 1376 | 1377 | 1378 | 1379 | 1380 | 1381 | 1382 | 1383 | 1384 | 1385 | 1386 | 1387 | 1388 | 1389 | 1390 | 1391 | 1392 | 1393 | 1394 | 1395 | 1396 | 1397 | 1398 | 1399 | 1400 | 1401 | 1402 | 1403 | 1404 | 1405 | 1406 | 1407 | 1408 | 1409 | 1410 | 1411 | 1412 | 1413 | 1414 | 1415 | 1416 | 1417 | 1418 | 1419 | 1420 | 1421 | 1422 | 1423 | 1424 | 1425 | 1426 | 1427 | 1428 | 1429 | 1430 | 1431 | 1432 | 1433 | 1434 | 1435 | 1436 | 1437 | 1438 | 1439 | 1440 | 1441 | 1442 | 1443 | 1444 | 1445 | 1446 | 1447 | 1448 | 1449 | 1450 | 1451 | 1452 | 1453 | 1454 | 1455 | 1456 | 1457 | 1458 | 1459 | 1460 | 1461 | 1462 | 1463 | 1464 | 1465 | 1466 | 1467 | 1468 | 1469 | 1470 | 1471 | 1472 | 1473 | 1474 | 1475 | 1476 | 1477 | 1478 | 1479 | 1480 | 1481 | 1482 | 1483 | 1484 | 1485 | 1486 | 1487 | 1488 | 1489 | 1490 | 1491 | 1492 | 1493 | 1494 | 1495 | 1496 | 1497 | 1498 | 1499 | 1500 | 1501 | 1502 | 1503 | 1504 | 1505 | 1506 | 1507 | 1508 | 1509 | 1510 | 1511 | 1512 | 1513 | 1514 | 1515 | 1516 | 1517 | 1518 | 1519 | 1520 | 1521 | 1522 | 1523 | 1524 | 1525 | 1526 | 1527 | 1528 | 1529 | 1530 | 1531 | 1532 | 1533 | 1534 | 1535 | 1536 | 1537 | 1538 | 1539 | 1540 | 1541 | 1542 | 1543 | 1544 | 1545 | 1546 | 1547 | 1548 | 1549 | 1550 | 1551 | 1552 | 1553 | 1554 | 1555 | 1556 | 1557 | 1558 | 1559 | 1560 | 1561 | 1562 | 1563 | 1564 | 1565 | 1566 | 1567 | 1568 | 1569 | 1570 | 1571 | 1572 | 1573 | 1574 | 1575 | 1576 | 1577 | 1578 | 1579 | 1580 | 1581 | 1582 | 1583 | 1584 | 1585 | 1586 | 1587 | 1588 | 1589 | 1590 | 1591 | 1592 | 1593 | 1594 | 1595 | 1596 | 1597 | 1598 | 1599 | 1600 | 1601 | 1602 | 1603 | 1604 | 1605 | 1606 | 1607 | 1608 | 1609 | 1610 | 1611 | 1612 | 1613 | 1614 | 1615 | 1616 | 1617 | 1618 | 1619 | 1620 | 1621 | 1622 | 1623 | 1624 | 1625 | 1626 | 1627 | 1628 | 1629 | 1630 | 1631 | 1632 | 1633 | 1634 | 1635 | 1636 | 1637 | 1638 | 1639 | 1640 | 1641 | 1642 | 1643 | 1644 | 1645 | 1646 | 1647 | 1648 | 1649 | 1650 | 1651 | 1652 | 1653 | 1654 | 1655 | 1656 | 1657 | 1658 | 1659 | 1660 | 1661 | 1662 | 1663 | 1664 | 1665 | 1666 | 1667 | 1668 | 1669 | 1670 | 1671 | 1672 | 1673 | 1674 | 1675 | 1676 | 1677 | 1678 | 1679 | 1680 | 1681 | 1682 | 1683 | 1684 | 1685 | 1686 | 1687 | 1688 | 1689 | 1690 | 1691 | 1692 | 1693 | 1694 | 1695 | 1696 | 1697 | 1698 | 1699 | 1700 | 1701 | 1702 | 1703 | 1704 | 1705 | 1706 | 1707 | 1708 | 1709 | 1710 | 1711 | 1712 | 1713 | 1714 | 1715 | 1716 | 1717 | 1718 | 1719 | 1720 | 1721 | 1722 | 1723 | 1724 | 1725 | 1726 | 1727 | 1728 | 1729 | 1730 | 1731 | 1732 | 1733 | 1734 | 1735 | 1736 | 1737 | 1738 | 1739 | 1740 | 1741 | 1742 | 1743 | 1744 | 1745 | 1746 | 1747 | 1748 | 1749 | 1750 | 1751 | 1752 | 1753 | 1754 | 1755 | 1756 | 1757 | 1758 | 1759 | 1760 | 1761 | 1762 | 1763 | 1764 | 1765 | 1766 | 1767 | 1768 | 1769 | 1770 | 1771 | 1772 | 1773 | 1774 | 1775 | 1776 | 1777 | 1778 | 1779 | 1780 | 1781 | 1782 | 1783 | 1784 | 1785 | 1786 | 1787 | 1788 | 1789 | 1790 | 1791 | 1792 | 1793 | 1794 | 1795 | 1796 | 1797 | 1798 | 1799 | 1800 | 1801 | 1802 | 1803 | 1804 | 1805 | 1806 | 1807 | 1808 | 1809 | 1810 | 1811 | 1812 | 1813 | 1814 | 1815 | 1816 | 1817 | 1818 | 1819 | 1820 | 1821 | 1822 | 1823 | 1824 | 1825 | 1826 | 1827 | 1828 | 1829 | 1830 | 1831 | 1832 | 1833 | 1834 | 1835 | 1836 | 1837 | 1838 | 1839 | 1840 | 1841 | 1842 | 1843 | 1844 | 1845 | 1846 | 1847 | 1848 | 1849 | 1850 | 1851 | 1852 | 1853 | 1854 | 1855 | 1856 | 1857 | 1858 | 1859 | 1860 | 1861 | 1862 | 1863 | 1864 | 1865 | 1866 | 1867 | 1868 | 1869 | 1870 | 1871 | 1872 | 1873 | 1874 | 1875 | 1876 | 1877 | 1878 | 1879 | 1880 | 1881 | 1882 | 1883 | 1884 | 1885 | 1886 | 1887 | 1888 | 1889 | 1890 | 1891 | 1892 | 1893 | 1894 | 1895 | 1896 | 1897 | 1898 | 1899 | 1900 | 1901 | 1902 | 1903 | 1904 | 1905 | 1906 | 1907 | 1908 | 1909 | 1910 | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 | 1937 | 1938 | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 | 2072 | 2073 | 2074 | 2075 | 2076 | 2077 | 2078 | 2079 | 2080 | 2081 | 2082 | 2083 | 2084 | 2085 | 2086 | 2087 | 2088 | 2089 | 2090 | 2091 | 2092 | 2093 | 2094 | 2095 | 2096 | 2097 | 2098 | 2099 | 2100 | 2101 | 2102 | 2103 | 2104 | 2105 | 2106 | 2107 | 2108 | 2109 | 2110 | 2111 | 2112 | 2113 | 2114 | 2115 | 2116 | 2117 | 2118 | 2119 | 2120 | 2121 | 2122 | 2123 | 2124 | 2125 |

Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>2.5 mg/m3 | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | females<br>(cont...) |
|---|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|----------------------|
|   | 0730        | 0732 | 0737 | 0739 | 0768 | 0767 | 0776 | 0773 | 0766 | 0766 | 0722 | 0755 | 0777 | 0777 | 0777 | 0777 | 0766 | 0755 | 0777 | 0777 | 0777 | 0766 | 0766 | 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    | 00501     |                      |
| Bile Duct, Cyst                                 |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Mesentery                                       |             |      |      |      | +    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Fat, Necrosis                                   |             |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Pancreas  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |      |           |                      |
| Acinus, Atrophy                                 | 1           | 1    | 1    |      |      |      | 1    |      | 1    | 1    |      | 1    | 1    |      |      |      |      |      |      | 1    |      |      |      |      |           |                      |
| Acinus, Hyperplasia                             |             |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |           |                      |
| Salivary Glands                                 | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |      |           |                      |
| Atrophy   |             |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |           |                      |
| Inflammation, Chronic Active                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Stomach, Forestomach                            | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |      |           |                      |
| Edema   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Erosion   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Hyperplasia, Squamous                           |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 4         |                      |
| Inflammation, Chronic Active                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 3         |                      |
| Ulcer   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Stomach, Glandular                              | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    |      |           |                      |
| Erosion   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Thrombosis                                      |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1         |                      |
| Ulcer   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Tongue  |             |      |      |      | +    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Tooth   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
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| FISCHER 344-TACONIC RATS<br>FEMALE<br>2.5 mg/m3 | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | females<br>(cont...) |      |
|---|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|----------------------|------|
|   | 0730        | 0732 | 0737 | 0738 | 0739 | 0760 | 0766 | 0767 | 0771 | 0776 | 0781 | 0783 | 0788 | 0791 | 0793 | 0797 | 0798 | 0799 | 0800 | 0802 | 0803 | 0806 | 0807 | 0808 |           |                      | 0809 |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00501                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00502                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00503                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00504                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00505                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00506                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00507                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00508                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00509                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00510                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00511                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00512                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00513                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00514                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00515                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00516                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00517                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00518                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00519                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00520                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00521                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00522                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00523                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00524                |      |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 00525                |      |

**CARDIOVASCULAR SYSTEM**

|                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Heart                                | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Cardiomyopathy                       | 2 | 2 | 1 | 2 |   | 1 | 1 | 1 |   | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 |   | 1 | 2 | 1 | 1 | 2 |
| Thrombosis                           |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |   |   |
| Artery, Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**ENDOCRINE SYSTEM**

|                                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Adrenal Cortex                    | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Accessory Adrenal Cortical Nodule |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 1 |   |
| Atrophy                           |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 4 |   |   |   |   |   |   |   |   |   |   |
| Degeneration                      |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hyperplasia                       | 2 | 2 |   | 1 |   | 1 | 2 | 1 |   |   |   |   | 1 | 2 | 1 |   | 2 | 1 |   | 1 |   |   |   | 3 |   |
| Necrosis                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |   |   |   |
| Adrenal Medulla                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Hyperplasia                       |   |   | 3 | 2 |   |   |   |   |   | 1 |   | 1 | 2 |   | 4 |   | 4 |   |   | 1 |   | 4 | 3 |   |   |
| Islets, Pancreatic                | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Parathyroid Gland                 | + | + | + | M | M | + | + | M | + | M | + | + | + | M | + | + | + | + | + | M | + | M | + | + | + |
| Pituitary Gland                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | M | + | + | + | + | + | + | + | + |
| Angiectasis                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Pars Distalis, Hyperplasia        | 2 |   | 2 |   |   |   |   | 4 |   |   |   |   |   | 2 | 2 |   |   |   | 1 |   |   |   | 1 | 1 |   |
| Thyroid Gland                     | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| C-cell, Hyperplasia               |   |   |   |   |   | 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: 60311 - 05  
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 CAS Number: 7440-48-4

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| FISCHER 344-TACONIC RATS<br>FEMALE<br>2.5 mg/m3 | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | females<br>(cont...) |      |      |
|---|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|----------------------|------|------|
|   | 0730        | 0732 | 0737 | 0731 | 0739 | 0738 | 0733 | 0735 | 0736 | 0731 | 0738 | 0739 | 0738 | 0733 | 0730 | 0737 | 0736 | 0735 | 0737 | 0737 |           |                      | 0737 | 0736 |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 0                    | 0    | 0    |
|   | 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    | 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    |
| Lymph Node, Mediastinal                         | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         | +                    | +    | M    |
| Lymph Node, Mesenteric                          | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         | +                    | +    | +    |
| Spleen  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         | +                    | +    | +    |
| Fibrosis  |             |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      | 2    |      | 2    |      |      |           | 1                    |      |      |
| Hematopoietic Cell Proliferation                |             |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      | 2    |      |
| Hemorrhage                                      |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           | 2                    |      |      |
| Thymus  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         | +                    | +    | +    |
| <b>INTEGUMENTARY SYSTEM</b>                     |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |      |      |
| Mammary Gland                                   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         | +                    | +    | +    |
| Galactocele                                     |             |      |      |      |      |      |      |      | 1    |      |      |      |      |      | 2    |      |      |      |      |      |           |                      |      |      |
| Hyperplasia                                     |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      | 1    |      |
| Skin  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         | +                    | +    | +    |
| Inflammation                                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |      |      |
| <b>MUSCULOSKELETAL SYSTEM</b>                   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |      |      |
| Bone  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         | +                    | +    | +    |
| Femur, Hyperostosis                             |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 3    |      |      |      |           | 3                    |      |      |
| <b>NERVOUS SYSTEM</b>                           |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |      |      |
| Brain   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +         | +                    | +    | +    |
| Compression                                     |             |      |      | 2    | 2    | 1    |      | 2    |      | 3    | 2    | 2    |      |      |      | 4    |      |      |      |      |           |                      |      |      |
| Necrosis  |             |      |      |      |      |      |      |      |      | 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>2.5 mg/m3 | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID | females<br>(cont...) |                  |                  |                  |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|----------------------|------------------|------------------|------------------|
|   | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>2 | 0<br>6<br>7<br>7 | 0<br>7<br>3<br>1 | 0<br>6<br>8<br>0 | 0<br>6<br>3<br>7 | 0<br>7<br>1<br>2 | 0<br>7<br>3<br>5 | 0<br>6<br>8<br>3 | 0<br>6<br>1<br>8 | 0<br>6<br>3<br>1 | 0<br>2<br>8<br>9 | 0<br>5<br>3<br>7 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>0 | 0<br>6<br>3<br>0 | 0<br>5<br>2<br>3 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>0 | 0<br>6<br>3<br>1 |           |                      | 0<br>6<br>1<br>1 | 0<br>6<br>6<br>8 | 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                | 00501            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00502            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00503            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00504            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00505            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00506            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00507            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00508            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00509            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00510            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00511            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00512            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00513            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00514            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00515            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00516            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00517            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00518            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00519            |                  |
|   | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0         | 0                    | 0                | 00520            |                  |

**RESPIRATORY SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larynx  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Foreign Body                                  |   | X | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |   |
| Inflammation                                  |   | 2 | 2 | 2 |   | 1 |   |   |   | 1 |   |   |   |   |   |   |   |   |   | 1 | 2 | 2 |   |
| Metaplasia, Squamous                          |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Lung  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Inflammation, Chronic Active                  | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Alveolar Epithelium, Hyperplasia              | 3 | 4 | 1 | 2 | 2 | 4 | 4 | 2 | 1 | 1 | 1 | 4 | 3 | 4 | 4 | 1 | 3 | 4 | 3 | 4 | 4 | 3 | 2 |
| Alveolar Epithelium, Metaplasia, Squamous     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |
| Alveolus, Proteinosis                         | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 1 |
| Bronchiole, Epithelium, Hyperplasia           | 2 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 1 |   | 1 | 2 | 3 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 1 | 1 |
| Nose  | + | + | + | + | I | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Inflammation                                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Inflammation, Suppurative                     | 1 |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |
| Inflammation, Chronic Active                  | 1 | 1 | 1 | 1 |   |   | 1 | 4 | 1 |   |   | 1 | 1 | 1 | 1 |   | 1 | 1 | 1 | 1 | 1 | 2 |   |
| Thrombosis                                    |   |   |   |   |   |   |   |   | 2 |   |   |   |   |   |   |   | 1 |   |   |   |   | 1 |   |
| Olfactory Epithelium, Atrophy                 | 1 | 1 |   | 1 |   | 1 | 1 | 1 |   |   |   | 1 | 1 |   | 1 |   | 1 |   | 1 |   | 1 | 1 |   |
| Olfactory Epithelium, Hyperplasia             |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   | 1 |   |   |   |   | 1 |   |
| Olfactory Epithelium, Hyperplasia, Basal Cell |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Olfactory Epithelium, Metaplasia, Respiratory |   |   |   | 1 |   |   |   |   | 2 |   |   | 1 | 1 |   |   |   | 1 |   | 1 |   |   | 2 |   |
| Respiratory Epithelium, Hyperplasia           | 1 | 1 | 1 | 1 |   | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |   |
| Respiratory Epithelium, Metaplasia, Squamous  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Respiratory Epithelium, Necrosis              |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Turbinate, Atrophy                            |   |   |   | 1 |   | 1 | 1 |   | 1 |   |   | 1 |   |   |   |   |   | 1 |   | 1 |   | 1 |   |
| Turbinate, Hyperostosis                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |   |   | 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>2.5 mg/m3 | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | females<br>(cont...) |      |      |      |
|---|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|----------------------|------|------|------|
|   | 0730        | 0733 | 0737 | 0739 | 0768 | 0767 | 0766 | 0772 | 0771 | 0766 | 0766 | 0722 | 0755 | 0777 | 0777 | 0777 | 0777 | 0766 | 0755 | 0777 |           |                      | 0777 | 0777 | 0766 |
|   | 0           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0         | 0                    | 0    | 0    | 0    |
|   | 0           | 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    | 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    |

Trachea +

**SPECIAL SENSES SYSTEM**

|                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eye                 | + | + | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Cataract            |   |   |   | 4 |   |   |   |   |   |   |   | 2 | 1 |   |   |   |   |   |   |   |   | 1 |   | 1 |
| Metaplasia, Osseous | 1 | 1 |   | 1 | 1 |   |   | 1 | 1 |   |   |   | 1 |   | 1 |   |   |   |   |   | 1 | 1 |   | 1 |
| Harderian Gland     | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Hyperplasia         |   |   |   |   | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**URINARY SYSTEM**

|                        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kidney                 | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Mineralization         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |
| Nephropathy            | 3 | 3 | 1 | 3 | 2 | 4 | 2 | 2 | 1 | 1 | 2 | 3 | 1 | 3 | 3 | 3 | 2 | 1 | 2 |   | 3 | 3 | 1 | 3 |
| Renal Tubule, Necrosis |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Urinary Bladder        | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
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 X .. Lesion present  
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Experiment Number: 60311 - 05  
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 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>2.5 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |     |     |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-----|-----|
|   | 0591        | 0590  | 0731  | 0734  | 0589  | 0654  | 0177  | 0773  | 0771  | 0563  | 0675  | 0772  | 0773  | 0773  | 0773  | 0672  | 0773  | 0773  | 0590  | 0678  | 0771  | 0773  | 0675  | 0772  |          |     |     |
| 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 |          |     |     |
|   | 0           | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 49       |     |     |
|   | 0           | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 49       | 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     | 49       |     |     |
|   | 0           | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 50       |     |     |
|   | 0           | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 50       |     |     |
|   | 0           | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 48       |     |     |
|   | 0           | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 47       | 1   | 1.0 |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 1   | 3.0 |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 1   | 4.0 |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 1   | 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     | 50       |     |     |
|   |             |       | X     |       |       | X     |       |       | X     |       |       |       | X     | X     |       | X     | X     | X     |       |       |       | X     | X     |       | 22       |     |     |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 3        |     |     |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | X     | X     |       | 2        |     |     |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 6        | 2.0 |     |
|   |             |       | X     |       | X     |       | X     |       |       |       |       | X     | X     |       |       |       |       | X     |       |       |       |       |       |       | 12       |     |     |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2        |     |     |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2        | 2.0 |     |
|   |             |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 5        | 2.4 |     |

\* .. 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>2.5 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |      |   |    |        |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|------|---|----|--------|
|   | 0591        | 0590  | 0731  | 0754  | 0758  | 0764  | 0771  | 0777  | 0777  | 0777  | 0777  | 0777  | 0777  | 0777  | 0777  | 0777  | 0777  | 0777  | 0777  | 0777  |          | 0777 |   |    |        |
| ANIMAL ID                                       | 00526       | 00557 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555    |      |   |    |        |
| Bile Duct, Cyst                                 |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      | X | 1  |        |
| Mesentery                                       | +           | +     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 8      |
| Fat, Necrosis                                   | 1           | 1     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 8 1.0  |
| Pancreas  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +    | + | 50 |        |
| Acinus, Atrophy                                 | 1           |       |       |       | 1     | 1     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 27 1.2 |
| Acinus, Hyperplasia                             |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 1 1.0  |
| Salivary Glands                                 | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +    | + | 50 |        |
| Atrophy   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 1 1.0  |
| Inflammation, Chronic Active                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 1 3.0  |
| Stomach, Forestomach                            | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +    | + | 50 |        |
| Edema   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 1 3.0  |
| Erosion   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 1 2.0  |
| Hyperplasia, Squamous                           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 2 3.0  |
| Inflammation, Chronic Active                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 1 3.0  |
| Ulcer   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 2 2.5  |
| Stomach, Glandular                              | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +    | + | 50 |        |
| Erosion   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 1 2.0  |
| Thrombosis                                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 1 1.0  |
| Ulcer   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 1 3.0  |
| Tongue  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 1      |
| Tooth   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 2      |
| Inflammation, Chronic Active                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |   |    | 2 2.5  |

\* .. 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>2.5 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|
|   | 0591        | 0590  | 0731  | 0734  | 0589  | 0654  | 0177  | 0771  | 0773  | 0565  | 0672  | 0773  | 0773  | 0773  | 0773  | 0672  | 0773  | 0773  | 0590  | 0678  |          | 0771  | 0773  | 0675  |
| 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 |
|   | 0           | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0        | 0     | 0     | 0     |
|   | 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     |
|   | 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     |

**CARDIOVASCULAR SYSTEM**

|                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |         |
|--------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|---------|
| Heart                                | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |         |
| Cardiomyopathy                       | 1 | 1 | 1 |   |   | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 |   | 2 | 3 | 2 | 1 | 1 |   | 2 | 1  | 42 1.4  |
| Thrombosis                           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 2 2.5   |
| Artery, Inflammation, Chronic Active |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 3 1 3.0 |

**ENDOCRINE SYSTEM**

|                                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |       |        |        |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-------|--------|--------|
| Adrenal Cortex                    | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |       |        |        |
| Accessory Adrenal Cortical Nodule |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 3 1.0 |        |        |
| Atrophy                           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 4.0 |        |        |
| Degeneration                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 3 2.3 |        |        |
| Hyperplasia                       |   |   | 1 | 3 |   |   |   |   |   | 1 | 1 | 2 | 1 | 1 |   | 2 | 2 | 2 | 1 |   |   |   | 1 | 1  | 1     | 28 1.5 |        |
| Necrosis                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |       | 1 3.0  |        |
| Adrenal Medulla                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |       |        |        |
| Hyperplasia                       |   |   | 2 |   | 1 | 2 | 4 |   | 1 | 1 | 1 | 1 |   |   |   |   | 4 | 4 | 3 | 4 | 2 |   | 1 | 4  | 2     | 1      | 27 2.3 |
| Islets, Pancreatic                | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | 50    |        |        |
| Parathyroid Gland                 | + | + | + | + | M | M | + | + | + | + | M | + | + | + | + | + | + | M | + | + | M | + | + | +  | 38    |        |        |
| Pituitary Gland                   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | 49    |        |        |
| Angiectasis                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    | 1 2.0 |        |        |
| Pars Distalis, Hyperplasia        |   |   | 1 |   | 1 | 2 |   |   |   |   |   |   | 1 | 3 | 4 |   |   |   |   | 3 |   | 1 |   | 1  | 2     | 18 1.9 |        |
| Thyroid Gland                     | + | + | + | + | + | M | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +  | 49    |        |        |
| C-cell, Hyperplasia               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |       | 8 1.6  |        |

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Experiment Number: 60311 - 05  
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 Cobalt  
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| FISCHER 344-TACONIC RATS<br>FEMALE<br>2.5 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |       |       |       |        |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|-------|-------|-------|--------|
|   | 0591        | 0590  | 0731  | 0734  | 0589  | 0654  | 0177  | 0773  | 0771  | 0563  | 0675  | 0772  | 0773  | 0773  | 0773  | 0672  | 0733  | 0733  | 0590  | 0681  |          | 0773  | 0771  | 0675  | 0739  | 0733  | 0675  | 0739   |
| 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 | 00550 | 00551 | 00552 | 00553  |
| Lymph Node, Mediastinal                         | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | M     | +     | +        | +     | +     | +     | +     | +     | +     | 48     |
| Lymph Node, Mesenteric                          | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50     |
| Spleen  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50     |
| Fibrosis  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       | 1     | 5 1.4  |
| Hematopoietic Cell Proliferation                |             |       |       |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       | 3 1.7  |
| Hemorrhage                                      |             |       |       | 2     |       |       |       |       |       |       |       |       |       | 3     |       |       |       |       |       |       |          |       |       |       |       |       |       | 3 2.3  |
| Thymus  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +     | +        | +     | M     | M     | +     | M     | 46    |        |
| <b>INTEGUMENTARY SYSTEM</b>                     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |        |
| Mammary Gland                                   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50     |
| Galactocele                                     | 3           |       | 3     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       | 4 2.3  |
| Hyperplasia                                     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       | 1 1.0  |
| Skin  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50     |
| Inflammation                                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       | 1 3.0  |
| <b>MUSCULOSKELETAL SYSTEM</b>                   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |        |
| Bone  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50     |
| Femur, Hyperostosis                             |             |       |       |       |       |       |       |       |       |       |       |       |       |       | 3     |       |       |       |       |       |          |       |       |       |       |       | 3     | 5 3.0  |
| <b>NERVOUS SYSTEM</b>                           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |        |
| Brain   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50     |
| Compression                                     | 2           |       |       |       |       |       |       |       |       |       |       | 2     | 2     |       | 3     |       |       |       |       |       |          |       |       |       |       |       |       | 14 2.2 |
| Necrosis  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       | 1 3.0  |

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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

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 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>2.5 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |    |     |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|----|-----|
|   | 0591        | 0590  | 0731  | 0734  | 0589  | 0654  | 0177  | 0773  | 0771  | 0563  | 0675  | 0772  | 0773  | 0772  | 0672  | 0773  | 0773  | 0590  | 0668  | 0771  |          | 0771  | 0665  | 0773  |    |     |
| 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 |    |     |
|   | 0           | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0        | 0     | 0     | 0     | 50 |     |
|   | 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  |     |
|   | 5           | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5        | 5     | 5     | 5     | 14 | 1.6 |
|   | 2           | 2     | 2     | 2     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4        | 4     | 4     | 5     | 3  | 1.0 |
|   | 6           | 7     | 8     | 9     | 0     | 1     | 2     | 3     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 0     | 1     | 2     | 3     | 4     | 5        | 6     | 7     | 8     |    |     |

**RESPIRATORY SYSTEM**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     |     |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-----|-----|
| Larynx  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |     |     |
| Foreign Body                                  |   |   |   |   | X |   |   |   | X |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   | 6  |     |     |
| Inflammation                                  |   |   |   |   | 2 |   |   |   | 1 |   | 2 | 1 | 2 |   |   |   |   |   |   |   |   |   |   | 1 | 14 | 1.6 |     |
| Metaplasia, Squamous                          |   |   |   |   | 1 |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   | 3  | 1.0 |     |
| Lung  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50 |     |     |
| Inflammation, Chronic Active                  | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 50 | 2.9 |     |
| Alveolar Epithelium, Hyperplasia              | 2 | 1 | 4 | 2 | 2 | 3 | 1 | 4 | 4 | 1 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 4 | 4 | 3 | 4 | 3 | 3 | 2 | 4  | 50  | 2.7 |
| Alveolar Epithelium, Metaplasia, Squamous     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1  | 3.0 |     |
| Alveolus, Proteinosis                         | 1 | 2 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 2  | 50  | 2.7 |
| Bronchiole, Epithelium, Hyperplasia           |   | 1 | 3 | 1 |   | 3 |   | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 1 | 3 | 3 | 3 | 2 | 3 | 1 | 2 | 3 | 2  | 46  | 2.1 |
| Nose  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49 |     |     |
| Inflammation                                  |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   | 1  | 1.0 |     |
| Inflammation, Suppurative                     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   | 4  | 1.0 |     |
| Inflammation, Chronic Active                  | 1 |   | 1 |   | 1 |   |   | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 |   | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 39 | 1.1 |     |
| Thrombosis                                    |   | 1 |   |   | 4 |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   | 1 | 6  | 1.7 |     |
| Olfactory Epithelium, Atrophy                 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |   | 1 | 1 | 1 | 1 |   | 1 | 1 |   | 1 | 1 |   |   | 1 |   | 1 | 1 | 34 | 1.0 |     |
| Olfactory Epithelium, Hyperplasia             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   | 3  | 1.0 |     |
| Olfactory Epithelium, Hyperplasia, Basal Cell |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1  | 1.0 |     |
| Olfactory Epithelium, Metaplasia, Respiratory |   | 1 | 1 |   |   | 1 | 1 | 1 |   |   | 1 |   |   | 1 |   | 1 | 1 | 1 | 1 | 1 |   | 2 |   | 1 | 1  | 24  | 1.2 |
| Respiratory Epithelium, Hyperplasia           | 1 | 1 | 1 | 1 | 1 | 1 |   | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 48 | 1.0 |     |
| Respiratory Epithelium, Metaplasia, Squamous  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   | 1 | 3  | 1.0 |     |
| Respiratory Epithelium, Necrosis              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1  | 1.0 |     |
| Turbinate, Atrophy                            | 1 |   | 1 | 1 | 1 |   | 1 | 1 | 1 | 1 | 1 |   | 1 |   |   |   | 1 | 1 | 1 |   | 1 | 1 |   | 1 | 27 | 1.0 |     |
| Turbinate, Hyperostosis                       |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   | 4 |   |   |   |   |   | 1 |   | 5  | 1.8 |     |

\* .. 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>2.5 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |       |       |       |      |     |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|-------|-------|-------|------|-----|
|   | 0591        | 0590  | 0731  | 0734  | 0589  | 0654  | 0177  | 0773  | 0771  | 0553  | 0665  | 0772  | 0773  | 0773  | 0773  | 0662  | 0733  | 0733  | 0590  | 0668  |          | 0771  | 0771  | 0665  | 0773  | 0667  | 0775  | 0772 |     |
| ANIMAL ID                                       | 00526       | 00557 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 | 00555    | 00555 | 00555 | 00555 | 00555 | 00555 | 00555 |      |     |
| Trachea   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50   |     |
| <b>SPECIAL SENSES SYSTEM</b>                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |      |     |
| Eye   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 49   |     |
| Cataract  | 3           |       |       |       | 3     |       |       |       |       |       |       | 1     | 2     |       |       |       | 2     |       |       |       |          |       |       |       |       | 4     | 11    | 2.2  |     |
| Metaplasia, Osseous                             |             | 1     | 1     |       |       |       |       | 1     | 1     |       | 1     | 1     | 1     | 1     |       | 1     |       | 1     | 1     |       |          |       |       |       | 1     |       | 26    | 1.0  |     |
| Harderian Gland                                 | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50   |     |
| Hyperplasia                                     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       | 1    | 2.0 |
| <b>URINARY SYSTEM</b>                           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |      |     |
| Kidney  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50   |     |
| Mineralization                                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       | 1    | 1.0 |
| Nephropathy                                     | 1           | 1     | 3     | 2     | 1     | 3     |       | 3     | 3     | 1     | 2     | 2     | 3     | 2     | 2     | 2     | 3     | 1     | 1     | 1     | 2        | 1     | 1     | 1     | 2     |       | 47    | 2.0  |     |
| Renal Tubule, Necrosis                          |             |       |       | 3     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       | 1    | 3.0 |
| Urinary Bladder                                 | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>5.0 mg/m3 | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID | females<br>(cont...) |  |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|----------------------|--|
|   | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>1 | 0<br>4<br>7<br>8 | 0<br>7<br>3<br>0 | 0<br>4<br>7<br>3 | 0<br>6<br>0<br>5 | 0<br>7<br>2<br>5 | 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>6<br>9<br>1 | 0<br>7<br>1<br>2 | 0<br>5<br>3<br>0 | 0<br>5<br>0<br>6 | 0<br>7<br>3<br>2 | 0<br>6<br>4<br>6 | 0<br>7<br>3<br>2 | 0<br>4<br>8<br>9 | 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>2 |           |                      |  |
| Thymus  | +                | +                | +                | +                | +                | +                | M                | +                | +                | +                | M                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         |                      |  |
| <b>INTEGUMENTARY SYSTEM</b>                     |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |  |
| Mammary Gland                                   | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    |  |
| Galactoceles                                    | 3                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |  |
| Hyperplasia                                     |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 2                |                  |                  |                  |                  | 3                |                  | 1                |                  |                  |                  |           |                      |  |
| Skin  | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    |  |
| Hyperplasia, Squamous                           |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |  |
| Ulcer   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           | 3                    |  |
| <b>MUSCULOSKELETAL SYSTEM</b>                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |  |
| Bone  | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    |  |
| Femur, Hyperostosis                             |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 1                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |  |
| Maxilla, Inflammation, Chronic Active           |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           | 2                    |  |
| Skeletal Muscle                                 |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |  |
| <b>NERVOUS SYSTEM</b>                           |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |  |
| Brain   | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    |  |
| Compression                                     | 2                |                  |                  |                  |                  |                  |                  | 2                | 2                |                  | 2                |                  | 2                | 2                |                  | 3                |                  | 2                |                  |                  |                  |                  |                  |                  |           | 2                    |  |
| Hemorrhage                                      |                  |                  |                  |                  | 1                |                  |                  |                  |                  |                  |                  |                  |                  |                  | 2                |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |  |
| <b>RESPIRATORY SYSTEM</b>                       |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |  |
| Larynx  | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    |  |
| Foreign Body                                    |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           | 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>5.0 mg/m3 | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID | females<br>(cont...) |                  |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|----------------------|------------------|
|   | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>0 | 0<br>7<br>3<br>1 | 0<br>4<br>7<br>8 | 0<br>7<br>3<br>0 | 0<br>4<br>7<br>3 | 0<br>6<br>7<br>0 | 0<br>7<br>2<br>5 | 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>6<br>9<br>1 | 0<br>7<br>5<br>2 | 0<br>5<br>3<br>0 | 0<br>7<br>3<br>6 | 0<br>6<br>4<br>2 | 0<br>7<br>3<br>2 | 0<br>4<br>8<br>9 | 0<br>7<br>3<br>2 |           |                      | 0<br>7<br>3<br>1 |
| Inflammation                                    |                  |                  | 2                |                  | 2                |                  | 1                |                  |                  |                  |                  | 2                | 2                |                  |                  |                  | 1                |                  | 1                |                  |           |                      |                  |
| Metaplasia, Squamous                            |                  | 1                |                  |                  |                  |                  | 1                |                  |                  |                  |                  |                  | 1                |                  |                  |                  | 1                |                  |                  |                  |           |                      |                  |
| Respiratory Epithelium, Hyperplasia             |                  | 1                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |
| Lung  | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                |
| Hemorrhage                                      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |
| Inflammation, Suppurative                       |                  |                  |                  |                  |                  |                  |                  | 3                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |
| Inflammation, Chronic Active                    | 3                | 3                | 3                | 3                | 3                | 2                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 2                | 3                | 2                | 3                | 3                | 3                | 3                | 3         | 3                    | 3                |
| Necrosis  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |
| Pigmentation                                    |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |
| Alveolar Epithelium, Hyperplasia                | 4                | 4                | 4                | 4                |                  | 1                | 3                | 3                | 3                | 4                | 3                | 4                | 4                | 4                | 2                | 1                | 4                | 2                | 4                | 3                | 4         | 4                    | 3                |
| Alveolus, Proteinosis                           | 3                | 3                | 3                | 3                | 3                | 1                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 1                | 3                | 3                | 3                | 3                | 3                | 4         | 4                    | 3                |
| Bronchiole, Epithelium, Hyperplasia             | 3                | 4                | 4                | 4                | 4                | 3                | 4                | 4                | 4                | 4                | 4                | 4                | 4                | 4                |                  | 4                | 3                | 4                | 4                | 4                | 4         | 4                    | 4                |
| Nose  | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                |
| Inflammation, Suppurative                       | 2                | 2                | 3                |                  | 3                |                  | 1                | 3                | 2                | 3                | 3                | 3                | 3                | 3                | 3                |                  | 2                | 2                | 2                | 1                | 2         | 2                    | 2                |
| Inflammation, Chronic Active                    | 2                | 2                | 2                | 1                | 3                | 1                | 1                | 3                | 2                | 3                | 3                | 3                | 3                | 3                | 1                | 1                | 2                | 2                | 2                | 3                | 2         | 2                    | 3                |
| Thrombosis                                      |                  |                  |                  |                  |                  |                  | 1                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |
| Olfactory Epithelium, Atrophy                   |                  | 2                |                  | 1                |                  | 1                |                  |                  |                  | 1                | 2                | 2                |                  | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1         | 1                    | 1                |
| Olfactory Epithelium, Hyperplasia               |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | 1                | 1                |                  |                  |                  |                  | 1                |                  |                  |                  | 1         |                      |                  |
| Olfactory Epithelium, Hyperplasia, Basal Cell   |                  |                  | 1                |                  | 1                |                  | 1                | 1                |                  |                  |                  | 1                |                  |                  |                  |                  | 1                |                  | 1                |                  |           |                      |                  |
| Olfactory Epithelium, Metaplasia, Respiratory   | 2                | 2                | 2                | 3                | 3                | 2                | 2                | 3                | 3                | 3                | 2                | 3                | 2                |                  |                  | 2                | 3                | 2                | 3                | 2                |           | 1                    | 2                |
| Olfactory Epithelium, Necrosis                  |                  |                  |                  |                  |                  |                  |                  | 3                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |
| Respiratory Epithelium, Hyperplasia             | 2                | 2                | 2                | 1                | 2                | 2                | 2                | 2                | 2                | 2                | 2                | 2                | 2                | 2                | 2                | 2                | 2                | 2                | 2                | 2                | 2         | 2                    | 2                |
| Respiratory Epithelium, Metaplasia, Squamous    | 3                | 2                | 3                | 1                |                  | 2                | 1                | 2                | 1                | 3                | 3                | 3                | 2                | 2                | 2                | 2                | 1                | 2                | 2                | 2                | 2         | 1                    | 2                |
| Respiratory Epithelium, Necrosis                | 1                |                  | 3                |                  | 1                |                  |                  | 3                |                  |                  | 1                | 1                |                  | 1                |                  |                  |                  |                  | 2                |                  | 1         | 1                    |                  |
| Turbinates, Atrophy                             | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                |                  | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                |                  | 1         | 1                    | 1                |
| Turbinates, Hyperostosis                        |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |

\* .. Total animals with tissue examined microscopically; Total animals with lesion and mean severity grade  
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1-4 .. Lesion qualified as:  
 1) Minimal 3) Moderate  
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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>5.0 mg/m3 | DAY ON TEST           |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       | ANIMAL ID             | females<br>(cont...)  |                       |                       |                       |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|   | 0<br>7<br>3<br>1      | 0<br>7<br>3<br>0      | 0<br>7<br>3<br>1      | 0<br>4<br>7<br>8      | 0<br>7<br>3<br>0      | 0<br>4<br>7<br>3      | 0<br>6<br>7<br>0      | 0<br>7<br>2<br>5      | 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>6<br>9<br>1      | 0<br>7<br>1<br>2      | 0<br>5<br>3<br>0      | 0<br>5<br>0<br>6      | 0<br>7<br>3<br>2      | 0<br>6<br>4<br>6      | 0<br>7<br>3<br>2      | 0<br>4<br>8<br>9      |                       |                       | 0<br>7<br>3<br>2      | 0<br>7<br>3<br>1      | 0<br>7<br>3<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>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>1<br>0 | 0<br>0<br>7<br>1<br>1 | 0<br>0<br>7<br>1<br>2 | 0<br>0<br>7<br>1<br>3 | 0<br>0<br>7<br>1<br>4 | 0<br>0<br>7<br>1<br>5 | 0<br>0<br>7<br>1<br>6 | 0<br>0<br>7<br>1<br>7 | 0<br>0<br>7<br>1<br>8 | 0<br>0<br>7<br>1<br>9 | 0<br>0<br>7<br>2<br>0 | 0<br>0<br>7<br>2<br>1 | 0<br>0<br>7<br>2<br>2 | 0<br>0<br>7<br>2<br>3 | 0<br>0<br>7<br>2<br>4 | 0<br>0<br>7<br>2<br>5 |

Trachea +

**SPECIAL SENSES SYSTEM**

|   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Ear<br>Inflammation, Chronic Active             |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eye   | +     |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cataract  |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Metaplasia, Osseous                             | 1   | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Harderian Gland<br>Inflammation, Chronic Active | + |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**URINARY SYSTEM**

|                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|--|--|--|--|
| Kidney<br>Cyst  | + |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |
| Infarct         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |
| Nephropathy     | 3   | 3 | 1 | 1 | 3 | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 3 | 3 | 2 |  |  |  |  |  |  |
| Urinary Bladder | + |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |

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 + .. Tissue examined microscopically  
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 Route: RESPIRATORY EXPOSURE WHOLE BODY  
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P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
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 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>5.0 mg/m3 | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | * TOTALS |      |      |
|---|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------|------|------|
|   | 0674        | 0673 | 0641 | 0673 | 0673 | 0659 | 0673 | 0663 | 0666 | 0666 | 0674 | 0657 | 0673 | 0667 | 0673 | 0667 | 0657 | 0676 | 0677 | 0677 |          | 0677 | 0667 |
| ANIMAL ID                                       | 0076        | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077     | 0077 | 0077 |
| Pancreas  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | +    | 50   |
| Acinus, Atrophy                                 |             | 2    |      | 1    |      | 1    | 2    |      | 1    |      | 1    |      |      | 2    | 1    | 1    | 2    | 1    |      | 1    | 2        | 1    | 1    |
| Salivary Glands                                 | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | +    | 50   |
| Stomach, Forestomach                            | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | +    | 50   |
| Edema   |             |      |      |      |      |      |      |      |      |      | 2    |      |      |      |      |      |      |      |      |      |          |      | 1    |
| Hyperplasia, Squamous                           |             |      |      |      |      |      |      |      |      |      |      |      | 2    |      |      |      |      |      |      |      |          |      | 3    |
| Ulcer   |             |      |      |      |      |      |      |      |      |      |      |      |      |      | 4    |      |      |      |      |      |          |      | 2    |
| Stomach, Glandular                              | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | +    | 50   |
| Inflammation, Suppurative                       |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1        |      | 1    |
| Necrosis  |             | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      | 1    |
| Ulcer   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      | 1    |
| Tooth   |             |      |      |      |      |      |      |      | +    |      |      |      |      |      |      |      |      |      |      |      | +        |      | 2    |
| Inflammation, Chronic Active                    |             |      |      |      |      |      |      |      | 2    |      |      |      |      |      |      |      |      |      |      |      | 3        |      | 2    |
| <b>CARDIOVASCULAR SYSTEM</b>                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |
| Heart   | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | +    | 50   |
| Cardiomyopathy                                  |             |      | 1    | 2    | 1    |      | 1    | 2    | 1    | 1    | 2    |      | 1    | 1    | 1    | 1    | 1    | 2    | 3    | 3    | 1        | 1    | 1    |
| Pericardium, Hyperplasia                        |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      | 35   |
| <b>ENDOCRINE SYSTEM</b>                         |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |          |      |      |
| Adrenal Cortex                                  | +           | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +    | +        | +    | 50   |
| Accessory Adrenal Cortical Nodule               |             |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |          |      | 4    |
| Degeneration                                    |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 3    | 3    |          |      | 3    |
| Hyperplasia                                     | 4           |      | 1    | 3    | 3    |      | 1    | 2    |      |      |      |      | 3    | 4    | 2    | 1    | 3    |      |      | 1    | 3        | 1    | 28   |

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 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
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| FISCHER 344-TACONIC RATS<br>FEMALE<br>5.0 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |        |              |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|--------|--------------|
|   | 0674        | 0673  | 0471  | 0772  | 0771  | 0570  | 0770  | 0664  | 0666  | 0668  | 0771  | 0579  | 0773  | 0670  | 0677  | 0771  | 0579  | 0677  | 0673  | 0773  |          | 0771  | 0677   | 0676         |
| ANIMAL ID                                       | 00726       | 00772 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777    | 00777 | 00777  | 00777        |
| Necrosis  | 2           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2 2.0    |       |        |              |
| Adrenal Medulla<br>Hyperplasia                  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +      | 50<br>10 2.8 |
| Islets, Pancreatic<br>Hyperplasia               | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +      | 50<br>1 3.0  |
| Parathyroid Gland                               | M           | +     | +     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +        | +     | +      | 45           |
| Pituitary Gland<br>Angiectasis                  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +      | 50<br>2 3.5  |
| Cyst<br>Pars Distalis, Hyperplasia              | 3           |       | 2     |       |       | 2     | 1     |       |       |       |       |       | 1     |       | 3     | 1     | 1     |       |       |       |          | 4     | 19 1.9 |              |
| Thyroid Gland<br>Hemorrhage                     | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +      | 50<br>1 1.0  |
| C-cell, Hyperplasia                             |             |       |       |       |       |       |       | 1     | 2     |       |       |       |       |       |       |       |       |       |       |       |          | 4     | 6 1.7  |              |
| <b>GENERAL BODY SYSTEM</b>                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |        |              |
| NONE  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |        |              |
| <b>GENITAL SYSTEM</b>                           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |        |              |
| Clitoral Gland<br>Cyst                          | +           | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +        | +     | +      | 46<br>1      |
| Inflammation, Suppurative                       | 2           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 2.0    |       |        |              |
| Inflammation, Chronic Active                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2 2.5    |       |        |              |
| Ovary   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +      | 50           |

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| FISCHER 344-TACONIC RATS<br>FEMALE<br>5.0 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |       |       |       |       |       |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|-------|-------|-------|-------|-------|
|   | 0674        | 0673  | 0471  | 0772  | 0771  | 0570  | 0770  | 0664  | 0668  | 0661  | 0771  | 0579  | 0773  | 0677  | 0673  | 0772  | 0579  | 0677  | 0676  | 0773  |          | 0777  | 0676  | 0777  | 0773  | 0773  | 0171  | 0272  | 0677  |
| ANIMAL ID                                       | 00726       | 00772 | 00778 | 00779 | 00773 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777    | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 |       |
| Cyst  |             |       |       |       |       |       | X     |       |       |       | X     |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       | 5     |
| Uterus  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | +     | 50    |
| Inflammation, Chronic Active                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       | 1 3.0 |
| Endometrium, Hyperplasia, Cystic                |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       | 4 1.5 |
| <b>HEMATOPOIETIC SYSTEM</b>                     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       |       |
| Bone Marrow                                     | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50    |       |
| Fibrosis  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       | 1 1.0 |
| Lymph Node                                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       | 5     |
| Iliac, Ectasia                                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       | 1 3.0 |
| Inguinal, Fibrosis                              |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       | 1 2.0 |
| Lymph Node, Bronchial                           | M           | +     | +     | +     | +     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M     | M        | M     | M     | M     | M     | M     | M     | 17    |       |
| Lymph Node, Mandibular                          | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | M     | 47    |
| Lymph Node, Mediastinal                         | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | +     | 48    |
| Hyperplasia                                     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       | 1 1.0 |
| Infiltration Cellular, Histiocyte               |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       | 1 2.0 |
| Lymph Node, Mesenteric                          | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50    |       |
| Fibrosis  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       | 1 2.0 |
| Spleen  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50    |       |
| Fibrosis  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       | 3 2.3 |
| Hematopoietic Cell Proliferation                |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       | 2 1.5 |
| Necrosis  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       | 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: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>5.0 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |      |  |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|------|--|
|   | 0674        | 0673  | 0641  | 0673  | 0673  | 0659  | 0673  | 0663  | 0663  | 0671  | 0657  | 0673  | 0667  | 0673  | 0667  | 0673  | 0667  | 0673  | 0667  | 0673  | 0667  | 0673  | 0667  | 0673  |          | 0667 |  |
| ANIMAL ID                                       | 00726       | 00772 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777    |      |  |
| Thymus  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 47       |      |  |
| <b>INTEGUMENTARY SYSTEM</b>                     |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |  |
| Mammary Gland                                   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50       |      |  |
| Galactoceles                                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 3.0    |      |  |
| Hyperplasia                                     |             |       |       |       |       |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 5 1.8    |      |  |
| Skin  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50       |      |  |
| Hyperplasia, Squamous                           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2 2.5    |      |  |
| Ulcer   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 3.0    |      |  |
| <b>MUSCULOSKELETAL SYSTEM</b>                   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |  |
| Bone  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50       |      |  |
| Femur, Hyperostosis                             |             |       |       |       |       |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2 1.5    |      |  |
| Maxilla, Inflammation, Chronic Active           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1 2.0    |      |  |
| Skeletal Muscle                                 | +           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1        |      |  |
| <b>NERVOUS SYSTEM</b>                           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |  |
| Brain   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50       |      |  |
| Compression                                     |             |       |       |       |       |       |       |       | 2     |       |       | 2     | 1     |       |       | 2     |       |       |       | 3     | 2     |       |       |       | 17 2.0   |      |  |
| Hemorrhage                                      |             |       |       |       |       |       |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 3 1.7    |      |  |
| <b>RESPIRATORY SYSTEM</b>                       |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |      |  |
| Larynx  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | 50       |      |  |
| Foreign Body                                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 2        |      |  |

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 BLANK .. Not examined microscopically  
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Experiment Number: 60311 - 05  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: RATS/F344/N Tac

**P09: NON-NEOPLASTIC LESIONS BY INDIVIDUAL ANIMAL**  
 Cobalt  
 CAS Number: 7440-48-4

Date Report Requested: 01/18/2012  
 Time Report Requested: 14:48:12  
 First Dose M/F: 05/08/06 / 05/08/06  
 Lab: BNW

| FISCHER 344-TACONIC RATS<br>FEMALE<br>5.0 mg/m3             | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |      |     |     |     |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|------|-----|-----|-----|
|   | 0674        | 0673  | 0641  | 0673  | 0673  | 0659  | 0673  | 0663  | 0666  | 0671  | 0675  | 0677  | 0666  | 0677  | 0677  | 0657  | 0676  | 0677  | 0677  | 0677  |          | 0667  | 0676  | 0677 |     |     |     |
| ANIMAL ID   | 00726       | 00772 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777    | 00777 | 00777 |      |     |     |     |
| Inflammation  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 13   | 1.5 |     |     |
| Metaplasia, Squamous<br>Respiratory Epithelium, Hyperplasia |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 5    | 1.0 |     |     |
| Lung  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50   |     |     |     |
| Hemorrhage  |             |       |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 1    | 2.0 |     |     |
| Inflammation, Suppurative<br>Inflammation, Chronic Active   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 50   | 2.9 |     |     |
| Necrosis  |             |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 1    | 2.0 |     |     |
| Pigmentation  |             |       |       |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | 1    | 2.0 |     |     |
| Alveolar Epithelium, Hyperplasia                            | 4           | 3     | 2     | 4     | 3     | 3     | 3     | 4     | 3     | 4     | 4     | 2     | 4     | 4     | 4     | 4     | 3     | 3     | 3     | 4     | 4        | 4     | 3     | 3    | 49  | 3.4 |     |
| Alveolus, Proteinosis                                       | 3           | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 2     | 3     | 3     | 3     | 3     | 2     | 3     | 3     | 3     | 3     | 3        | 3     | 3     | 2    | 50  | 2.9 |     |
| Bronchiole, Epithelium, Hyperplasia                         | 4           | 3     | 4     | 4     | 4     | 3     | 4     | 4     | 3     | 4     | 4     |       | 3     | 4     | 4     | 4     | 4     | 4     | 3     | 4     | 3        | 4     | 4     | 1    | 48  | 3.8 |     |
| Nose  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | 50   |     |     |     |
| Inflammation, Suppurative                                   | 1           |       | 1     | 2     | 2     |       | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 3     | 3     |       | 2     | 2     | 2     | 2        | 3     | 1     | 1    | 42  | 2.2 |     |
| Inflammation, Chronic Active                                | 3           | 1     | 2     | 2     | 2     | 1     | 3     | 1     | 3     | 3     | 3     | 3     | 3     | 3     | 3     | 2     | 3     | 2     | 3     | 3     | 3        | 4     | 2     | 2    | 50  | 2.4 |     |
| Thrombosis  |             | 3     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | 2     |      | 3   | 2.0 |     |
| Olfactory Epithelium, Atrophy                               | 2           | 1     | 2     | 1     |       | 1     |       |       | 1     | 1     | 1     | 1     |       |       | 1     | 2     | 1     |       |       | 1     | 1        | 1     | 1     | 1    | 35  | 1.2 |     |
| Olfactory Epithelium, Hyperplasia                           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 1     |       |          |       |       |      | 5   | 1.0 |     |
| Olfactory Epithelium, Hyperplasia, Basal Cell               | 1           |       | 1     |       | 1     | 1     |       |       |       |       |       |       | 1     |       |       |       |       |       | 1     | 1     |          | 1     | 1     |      | 19  | 1.0 |     |
| Olfactory Epithelium, Metaplasia, Respiratory               | 3           | 2     | 2     | 1     | 2     | 1     | 1     | 2     | 1     | 3     | 2     | 1     | 3     | 2     | 4     | 2     | 2     | 2     | 1     | 3     | 3        | 3     | 2     | 1    | 2   | 47  | 2.1 |
| Olfactory Epithelium, Necrosis                              |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |      | 1   | 3.0 |     |
| Respiratory Epithelium, Hyperplasia                         | 2           | 2     | 2     | 2     |       | 2     | 3     | 2     | 2     | 2     | 2     | 2     | 3     | 2     | 3     | 2     | 2     | 2     | 2     | 3     | 3        | 2     | 3     | 2    | 3   | 49  | 2.1 |
| Respiratory Epithelium, Metaplasia, Squamous                | 2           |       |       | 3     | 3     |       | 3     | 2     | 2     | 1     |       | 2     | 2     | 1     | 3     | 2     | 1     | 1     | 2     | 3     | 2        | 2     | 2     | 1    | 2   | 45  | 2.0 |
| Respiratory Epithelium, Necrosis                            |             |       |       | 1     |       |       |       |       |       |       |       |       | 2     |       |       |       |       |       |       | 2     | 1        |       |       |      | 15  | 1.6 |     |
| Turbinate, Atrophy  |             | 1     | 1     | 1     | 1     | 1     |       | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     |       | 1     | 1        | 1     | 1     | 1    | 1   | 45  | 1.0 |
| Turbinate, Hyperostosis                                     |             |       |       |       |       | 1     |       | 2     |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |      | 2   | 1.5 |     |

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Experiment Number: 60311 - 05  
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 Cobalt  
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| FISCHER 344-TACONIC RATS<br>FEMALE<br>5.0 mg/m3 | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |       |       |       |       |                      |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|-------|-------|-------|-------|----------------------|
|   | 0674        | 0673  | 0641  | 0673  | 0673  | 0659  | 0673  | 0663  | 0663  | 0671  | 0657  | 0673  | 0667  | 0673  | 0667  | 0657  | 0673  | 0667  | 0673  | 0667  |          | 0673  | 0667  | 0673  | 0667  | 0673  | 0667  | 0673  | 0667                 |
| ANIMAL ID                                       | 00726       | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777    | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 | 00777 |                      |
| Trachea   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | +     | 50                   |
| <b>SPECIAL SENSES SYSTEM</b>                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       |                      |
| Ear<br>Inflammation, Chronic Active             |             |       |       |       |       | +     | +     |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       | 3     | 3 2.3                |
| Eye<br>Cataract<br>Metaplasia, Osseous          | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50    | 3 1.3<br>13 1.1      |
| Harderian Gland<br>Inflammation, Chronic Active | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50    | 2 2.0                |
| <b>URINARY SYSTEM</b>                           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |       |       |       |                      |
| Kidney<br>Cyst<br>Infarct<br>Nephropathy        | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50    | 1<br>2 1.5<br>48 2.1 |
| Urinary Bladder                                 | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | +     | +     | 50    |                      |

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

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