

## APPENDIX I-4.

### Interaction Tables for the Gastrointestinal Assessment Occupation Removed from Final Model

This appendix contains exposure analyses results of interactions between covariates and dioxin after occupation has been removed from those final dioxin models (Models 2 through 6) that contained occupation. These tables are supplements to tables in Appendix I-3, which are main effects results with occupation removed from the model. Results are presented for separate strata of the covariate and include sample sizes, percent abnormal, relative risks, confidence intervals, and p-values. Chapter 7, Statistical Methods, provides further details on the analytical approaches used in the interaction analyses. The analysis model, covariate involved in the interaction, and a reference to the analysis table in Chapter 13, Gastrointestinal Assessment, are given in the heading of each subtable. A summary of the interactions described in this appendix follows.

<b>Appendix I-4 Table</b>	<b>Chapter 13 Table</b>	<b>Appendix I-3 Table</b>	<b>Dependent Variable</b>	<b>Model</b>	<b>Covariate</b>
I-4-1	13-6	I-3-2	Alcoholic Chronic Liver Disease and Cirrhosis	3	Race
I-4-2	13-9	I-3-3	Other Liver Disorders	4 5 6	Degreasng Chemical Exposure Degreasng Chemical Exposure Degreasng Chemical Exposure
I-4-3	13-12	I-3-5	AST (Continuous)	2 4 5 6	Current Alcohol Use Current Alcohol Use Current Alcohol Use Current Alcohol Use
I-4-4	13-13	I-3-6	AST (Discrete)	4 5 6	Current Alcohol Use Current Alcohol Use Current Alcohol Use
I-4-5	13-16	I-3-9	GGT (Continuous)	2	Degreasng Chemical Exposure
I-4-6	13-18	I-3-10	Alkaline Phosphatase (Continuous)	2 3 5 6	Degreasng Chemical Exposure Degreasng Chemical Exposure Race Race
I-4-7	13-23	I-3-14	LDH (Continuous)	3	Age, Race, Lifetime Alcohol History
I-4-8	13-24	I-3-15	LDH (Discrete)	3	Lifetime Alcohol History
I-4-9	13-26	I-3-17	Cholesterol (Discrete)	3	Current Alcohol Use

Appendix I-4 Table	Chapter 13 Table	Appendix I-3 Table	Dependent Variable	Model	Covariate
I-4-10	13-27	I-3-18	HDL Cholesterol (Continuous)	3 4 5 6	Current Alcohol Use, Lifetime Alcohol History Lifetime Alcohol History Lifetime Alcohol History Lifetime Alcohol History, Degreasing Chemical Exposure
I-4-11	13-29	I-3-19	Cholesterol-HDL Ratio (Continuous)	2 3	Current Alcohol Use Current Alcohol Use
I-4-12	13-31	I-3-21	Triglycerides (Continuous)	5 6	Lifetime Alcohol History Lifetime Alcohol History
I-4-13	13-33	I-3-23	Creatine Kinase (Continuous)	3	Race and Lifetime Alcohol History
I-4-14	13-34	I-3-24	Creatine Kinase (Discrete)	3	Race, Lifetime Alcohol History
I-4-15	13-36	I-3-26	Serum Amylase (Discrete)	3	Race
I-4-16	13-38	I-3-28	Serological Evidence of Prior Hepatitis B Infection	3	Age
I-4-17	13-41	I-3-30	Prealbumin (Continuous)	3 5	Industrial Chemical Exposure Degreasing Chemical Exposure
I-4-18	13-43	I-3-31	Albumin (Continuous)	4 5 6	Degreasing Chemical Exposure Degreasing Chemical Exposure Degreasing Chemical Exposure
I-4-19	13-45	I-3-32	$\alpha$ -1 Acid Glycoprotein (Continuous)	2 3 4	Lifetime Alcohol History Lifetime Alcohol History Lifetime Alcohol History
I-4-20	13-47	I-3-34	$\alpha$ -1 Antitrypsin (Continuous)	2 4 5 6	Industrial Chemical Exposure, Degreasing Chemical Exposure Degreasing Chemical Exposure Degreasing Chemical Exposure Degreasing Chemical Exposure
I-4-21	13-52	I-3-39	Apolipoprotein B (Discrete)	2	Age
I-4-22	13-54	I-3-41	C <sub>3</sub> Complement (Discrete)	4	Current Alcohol Use
I-4-23	13-57	I-3-44	Haptoglobin (Continuous)	2	Age, Lifetime Alcohol History

**Table I-4-1.**  
**Interaction Table for Alcoholic Chronic Liver Disease and Cirrhosis**  
**Occupation Removed from Final Model**

**a) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED**  
(Dioxin Category-by-Race: Tables I-3-6 and I-3-2)

Stratum	Dioxin Category	n	Percent Yes	Adjusted Relative Risk (95% C.I.) <sup>a</sup>	p-Value
Non-Black	Comparison	938	5.8		
	Background RH	334	5.7	1.05 (0.60,1.86)	0.856
	Low RH	218	4.6	0.74 (0.36,1.52)	0.409
	High RH	217	6.5	1.00 (0.51,1.93)	0.990
	Low plus High RH	435	5.5	0.87 (0.52,1.47)	0.601
Black	Comparison	49	12.2		
	Background RH	13	0.0	--	--
	Low RH	21	19.0	1.42 (0.31,6.42)	0.649
	High RH	11	0.0	--	--
	Low plus High RH	32	12.5	0.66 (0.15,3.00)	0.591

<sup>a</sup> Relative risk and confidence interval relative to Comparisons.

--: Adjusted relative risk, confidence interval, and p-value not presented due to the sparse number of abnormalities.

Note: Model 3: RH = Ranch Hand.

Comparison: Current Dioxin  $\leq$  10 ppt.

Background (Ranch Hand): Current Dioxin  $\leq$  10 ppt.

Low (Ranch Hand): Current Dioxin  $>$  10 ppt, 10 ppt  $<$  Initial Dioxin  $\leq$  143 ppt.

High (Ranch Hand): Current Dioxin  $>$  10 ppt, Initial Dioxin  $>$  143 ppt.

**Table I-4-2.**  
**Interaction Table for Other Liver Disorders**  
**Occupation Removed from Final Model**

<b>a) MODEL 4: RANCH HANDS — CURRENT DIOXIN — ADJUSTED</b> (Current Dioxin-by-Degreasing Chemical Exposure: Tables 13-9 and I-3-3)					
<b>Stratum</b>	<b>Current Dioxin Category Summary Statistics</b>			<b>Analysis Results for <math>\log_2</math> (Current Dioxin + 1)</b>	
	<b>Current Dioxin</b>	<b>n</b>	<b>Percent Yes</b>	<b>Adjusted Relative Risk (95% C.I.)<sup>a</sup></b>	<b>p-Value</b>
<b>No</b>	Low	153	20.3	1.38 (1.14,1.65)	0.001
	Medium	109	28.4		
	High	63	41.3		
<b>Yes</b>	Low	137	27.7	1.05 (0.92,1.19)	0.487
	Medium	182	30.8		
	High	227	31.3		

  

<b>b) MODEL 5: RANCH HANDS — CURRENT DIOXIN — ADJUSTED</b> (Current Dioxin-by-Degreasing Chemical Exposure: Tables 13-9 and I-3-3)					
<b>Stratum</b>	<b>Current Dioxin Category Summary Statistics</b>			<b>Analysis Results for <math>\log_2</math> (Current Dioxin + 1)</b>	
	<b>Current Dioxin</b>	<b>n</b>	<b>Percent Yes</b>	<b>Adjusted Relative Risk (95% C.I.)<sup>a</sup></b>	<b>p-Value</b>
<b>No</b>	Low	147	19.7	1.33 (1.13,1.56)	0.001
	Medium	114	28.1		
	High	64	42.2		
<b>Yes</b>	Low	147	28.6	1.05 (0.94,1.18)	0.353
	Medium	175	29.7		
	High	224	31.7		

**Table I-4-2. (Continued)**  
**Interaction Table for Other Liver Disorders**  
**Occupation Removed from Final Model**

c) MODEL 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Degreasing Chemical Exposure: Tables I-3-9 and I-3-3)				
Stratum	Current Dioxin Category Summary Statistics			Analysis Results for $\log_2$ (Current Dioxin + 1)
	Current Dioxin	n	Percent Yes	
No	Low	147	19.7	1.29 (1.09, 1.52)      0.003
	Medium	114	28.1	
	High	64	42.2	
Yes	Low	146	28.8	1.02 (0.90, 1.14)      0.773
	Medium	175	29.7	
	High	224	31.7	

<sup>a</sup> Relative risk for a twofold increase in current dioxin.

Note: Model 4: Low =  $\leq 8.1$  ppt; Medium =  $> 8.1\text{-}20.5$  ppt; High =  $> 20.5$  ppt.

Models 5 and 6: Low =  $\leq 46$  ppq; Medium =  $> 46\text{-}128$  ppq; High =  $> 128$  ppq.

**Table I-4-3.**  
**Interaction Table for AST (U/L)**  
**(Continuous)**  
**Occupation Removed from Final Model**

a) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED (Initial Dioxin-by-Current Alcohol Use: Tables 13-12 and I-3-5)					
Stratum	Initial Dioxin	Initial Dioxin Category Summary Statistics		Analysis Results for Log <sub>2</sub> (Initial Dioxin)	
		n	Adjusted Mean <sup>a</sup>	Adjusted Slope (Std. Error) <sup>b</sup>	p-Value
0-1 Drinks/Day	Low	129	21.99	-0.0032 (0.0138)	0.817
	Medium	134	22.78		
	High	139	22.08		
>1-4 Drinks/Day	Low	40	23.51	0.0674 (0.0294)	0.022
	Medium	29	25.98		
	High	29	28.02		
>4 Drinks/Day	Low	2	22.28	0.2664 (0.1082)	0.014
	Medium	4	31.01		
	High	2	58.97		

b) MODEL 4: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Current Alcohol Use: Tables 13-12 and I-3-5)					
Stratum	Current Dioxin	Current Dioxin Category Summary Statistics		Analysis Results for Log <sub>2</sub> (Current Dioxin + 1)	
		n	Adjusted Mean <sup>a</sup>	Adjusted Slope (Std. Error) <sup>b</sup>	p-Value
0-1 Drinks/Day	Low	224	22.17	0.0013 (0.0095)	0.890
	Medium	217	22.64		
	High	236	22.02		
>1-4 Drinks/Day	Low	56	24.29	0.0248 (0.0213)	0.244
	Medium	70	27.14		
	High	45	24.39		
>4 Drinks/Day	Low	7	20.68	0.1953 (0.0644)	0.003
	Medium	3	21.41		
	High	6	35.83		

**Table I-4-3. (Continued)**  
**Interaction Table for AST (U/L)**  
**(Continuous)**  
**Occupation Removed from Final Model**

<b>c) MODEL 5: RANCH HANDS — CURRENT DIOXIN — ADJUSTED</b> (Current Dioxin-by-Current Alcohol Use: Tables 13-12 and I-3-5)					
Current Dioxin Category Summary Statistics			Analysis Results for $\log_2$ (Current Dioxin + 1)		
Stratum	Current Dioxin	n	Adjusted Mean <sup>a</sup>	Adjusted Slope (Std. Error) <sup>b</sup>	p-Value
<b>0-1 Drinks/Day</b>	Low	227	22.05	0.0022 (0.0082)	0.783
	Medium	219	22.52		
	High	231	22.28		
<b>&gt; 1-4 Drinks/Day</b>	Low	57	24.31	0.0277 (0.0183)	0.130
	Medium	67	26.06		
	High	47	26.09		
<b>&gt; 4 Drinks/Day</b>	Low	6	20.39	0.1298 (0.0469)	0.006
	Medium	4	21.82		
	High	6	36.28		

<b>d) MODEL 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED</b> (Current Dioxin-by-Current Alcohol Use: Tables 13-12 and I-3-5)					
Current Dioxin Category Summary Statistics			Analysis Results for $\log_2$ (Current Dioxin + 1)		
Stratum	Current Dioxin	n	Adjusted Mean <sup>a</sup>	Adjusted Slope (Std. Error) <sup>b</sup>	p-Value
<b>0-1 Drinks/Day</b>	Low	226	22.20	-0.0011 (0.0088)	0.902
	Medium	219	22.57		
	High	231	22.09		
<b>&gt; 1-4 Drinks/Day</b>	Low	57	24.49	0.0234 (0.0186)	0.208
	Medium	67	26.01		
	High	47	25.84		
<b>&gt; 4 Drinks/Day</b>	Low	6	20.40	0.1279 (0.0469)	0.007
	Medium	4	21.51		
	High	6	35.80		

<sup>a</sup> Transformed from natural logarithm scale.

<sup>b</sup> Slope and standard error based on natural logarithm of AST versus  $\log_2$  dioxin.

Note: Model 2: Low = 39-98 ppt; Medium = > 98-232 ppt; High = > 232 ppt.

Model 4: Low = ≤ 8.1 ppt; Medium = > 8.1-20.5 ppt; High = > 20.5 ppt.

Models 5 and 6: Low = ≤ 46 ppq; Medium = > 46-128 ppq; High = > 128 ppq.

**Table I-4-4.**  
**Interaction Table for AST**  
**(Discrete)**  
**Occupation Removed from Final Model**

**a) MODEL 4: RANCH HANDS — CURRENT DIOXIN — ADJUSTED**  
**(Current Dioxin-by-Current Alcohol Use: Tables 13-13 and I-3-6)**

Stratum	Current Dioxin Category Summary Statistics			Analysis Results for $\log_2$ (Current Dioxin + 1)	
	Current Dioxin	n	Percent High	Adjusted Relative Risk (95% C.I.) <sup>a</sup>	p-Value
<b>0-1 Drinks/Day</b>	Low	224	0.9	0.75 (0.44,1.28)	0.288
	Medium	217	2.3		
	High	236	0.0		
<b>&gt; 1 Drinks/Day</b>	Low	63	3.2	1.25 (0.84,1.84)	0.270
	Medium	73	11.0		
	High	51	9.8		

**b) MODEL 5: RANCH HANDS — CURRENT DIOXIN — ADJUSTED**  
**(Current Dioxin-by-Current Alcohol Use: Tables 13-13 and I-3-6)**

Stratum	Current Dioxin Category Summary Statistics			Analysis Results for $\log_2$ (Current Dioxin + 1)	
	Current Dioxin	n	Percent High	Adjusted Relative Risk (95% C.I.) <sup>a</sup>	p-Value
<b>0-1 Drinks/Day</b>	Low	227	0.9	0.86 (0.57,1.30)	0.485
	Medium	219	1.4		
	High	231	0.9		
<b>&gt; 1 Drinks/Day</b>	Low	63	3.2	1.22 (0.86,1.75)	0.261
	Medium	71	9.9		
	High	53	11.3		

**Table I-4-4. (Continued)**  
**Interaction Table for AST**  
**(Discrete)**  
**Occupation Removed from Final Model**

<b>c) MODEL 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Current Alcohol Use: Tables 13-13 and I-3-6)</b>				
<b>Stratum</b>	<b>Current Dioxin Category Summary Statistics</b>			<b>Analysis Results for Log<sub>2</sub> (Current Dioxin + 1)</b>
	<b>Current Dioxin</b>	<b>n</b>	<b>Percent High</b>	
<b>0-1 Drinks/Day</b>	Low	226	0.9	0.81 (0.53,1.24)      0.333
	Medium	219	1.4	
	High	231	0.9	
<b>&gt; 1 Drinks/Day</b>	Low	63	3.2	1.15 (0.80,1.67)      0.445
	Medium	71	9.9	
	High	53	11.3	

<sup>a</sup> Relative risk for a twofold increase in current dioxin.

Note: Model 4: Low =  $\leq 8.1$  ppt; Medium =  $> 8.1\text{-}20.5$  ppt; High =  $> 20.5$  ppt.

Models 5 and 6: Low =  $\leq 46$  ppq; Medium =  $> 46\text{-}128$  ppq; High =  $> 128$  ppq.

**Table I-4-5.**  
**Interaction Table for GGT (U/L)**  
**(Continuous)**  
**Occupation Removed from Final Model**

a) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED (Initial Dioxin-by-Degreasing Chemical Exposure: Tables I-3-16 and I-3-9)					
Initial Dioxin Category Summary Statistics				Analysis Results for Log <sub>e</sub> (Initial Dioxin)	
Stratum	Initial Dioxin	n	Adjusted Mean <sup>a</sup>	Adjusted Slope (Std. Error) <sup>b</sup>	p-Value
No	Low	66	33.10	0.0806 (0.0404)	0.046
	Medium	46	35.05		
	High	31	46.38		
Yes	Low	104	34.59	-0.0144 (0.0257)	0.575
	Medium	119	37.20		
	High	136	33.36		

<sup>a</sup> Transformed from natural logarithm scale.

<sup>b</sup> Slope and standard error based on natural logarithm of GGT versus log<sub>2</sub> dioxin.

Note: Model 2: Low = 39-98 ppt; Medium = > 98-232 ppt; High = > 232 ppt.

**Table I-4-6.**  
**Interaction Table for Alkaline Phosphatase (U/L)**  
**(Continuous)**  
**Occupation Removed from Final Model**

<b>a) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED</b> <b>(Initial Dioxin-by-Degreasing Chemical Exposure: Tables 13-18 and I-3-10)</b>					
Initial Dioxin Category Summary Statistics				Analysis Results for Log <sub>2</sub> (Initial Dioxin)	
Stratum	Initial Dioxin	n	Adjusted Mean <sup>a</sup>	Adjusted Slope (Std. Error) <sup>b</sup>	p-Value
No	Low	67	66.72	0.0363 (0.0154)	0.019
	Medium	46	69.60		
	High	32	74.46		
Yes	Low	106	73.12	-0.0113 (0.0098)	0.249
	Medium	124	74.24		
	High	140	71.42		

  

<b>b) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED</b> <b>(Dioxin Category-by-Degreasing Chemical Exposure: Tables 13-18 and I-3-10)</b>					
Stratum	Dioxin Category	n	Adjusted Mean <sup>a</sup>	Difference of Adjusted Mean vs. Comparisons (95% C.I.) <sup>c</sup>	p-Value <sup>d</sup>
No	Comparison	366	68.31		
	Background RH	176	66.49	-1.81 --	0.246
	Low RH	94	67.16	-1.15 --	0.564
	High RH	51	71.40	3.10 --	0.243
	Low plus High RH	145	68.62	0.32 --	0.856
Yes	Comparison	661	67.61		
	Background RH	190	71.55	3.94 --	0.007
	Low RH	160	73.78	6.18 --	<0.001
	High RH	203	70.76	3.15 --	0.025
	Low plus High RH	363	72.08	4.47 --	<0.001

Table I-4-6. (Continued)  
 Interaction Table for Alkaline Phosphatase (U/L)  
 (Continuous)  
 Occupation Removed from Final Model

c) MODEL 5: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Race: Tables 13-18 and I-3-10)				Analysis Results for Log <sub>2</sub> (Current Dioxin + 1)	
Current Dioxin Category Summary Statistics				Analysis Results for Log <sub>2</sub> (Current Dioxin + 1)	
Stratum	Current Dioxin	n	Adjusted Mean <sup>a</sup>	Adjusted Slope (Std. Error) <sup>b</sup>	p-Value
<b>Black</b>	Low	12	59.57	0.0563 (0.0277)	0.043
	Medium	22	63.74		
	High	13	77.41		
<b>Non-Black</b>	Low	278	70.37	-0.0020 (0.0053)	0.702
	Medium	269	70.47		
	High	273	70.57		

  

d) MODEL 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Race: Tables 13-18 and I-3-10)				Analysis Results for Log <sub>2</sub> (Current Dioxin + 1)	
Current Dioxin Category Summary Statistics				Analysis Results for Log <sub>2</sub> (Current Dioxin + 1)	
Stratum	Current Dioxin	n	Adjusted Mean <sup>a</sup>	Adjusted Slope (Std. Error) <sup>b</sup>	p-Value
<b>Black</b>	Low	12	60.00	0.0536 (0.0277)	0.054
	Medium	22	64.12		
	High	13	77.40		
<b>Non-Black</b>	Low	277	70.80	-0.0054 (0.0057)	0.344
	Medium	269	70.52		
	High	273	70.01		

<sup>a</sup> Transformed from natural logarithm scale.

<sup>b</sup> Slope and standard error based on natural logarithm of alkaline phosphatase versus log<sub>2</sub> dioxin.

<sup>c</sup> Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on natural logarithm scale.

<sup>d</sup> P-value is based on difference of means on natural logarithm scale.

Note: Model 2: Low = 39-98 ppt; Medium = > 98-232 ppt; High = > 232 ppt.

Model 3: RH = Ranch Hand.

Comparison: Current Dioxin ≤ 10 ppt.

Background (Ranch Hand): Current Dioxin ≤ 10 ppt.

Low (Ranch Hand): Current Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 143 ppt.

High (Ranch Hand): Current Dioxin > 143 ppt, Initial Dioxin > 143 ppt.

Models 5 and 6: Low = ≤ 46 ppq; Medium = > 46-128 ppq; High = > 128 ppq.

**Table I-4-7.**  
**Interaction Table for LDH (U/L)**  
**(Continuous)**  
**Occupation Removed from Final Model**

**a) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED**  
(Dioxin Category-by-Age: Tables 13-23 and I-3-14)

Stratum	Dioxin Category	n	Adjusted Mean <sup>a</sup>	Difference of Adjusted Mean vs. Comparisons (95% C.I.) <sup>b</sup>	p-Value <sup>c</sup>
Born ≥ 1942	Comparison	438	145.32		
	Background RH	125	147.03	1.71 --	0.518
	Low RH	82	149.14	3.81 --	0.224
	High RH	149	147.06	1.73 --	0.481
	Low plus High RH	231	147.79	2.47 --	0.242
Born < 1942	Comparison	586	150.03		
	Background RH	237	148.40	-1.63 --	0.424
	Low RH	169	147.91	-2.12 --	0.357
	High RH	102	148.30	-1.73 --	0.542
	Low plus High RH	271	148.05	-1.97 --	0.309

**b) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY —ADJUSTED**  
(Dioxin Category-by-Race: Tables 13-23 and I-3-14)

Stratum	Dioxin Category	n	Adjusted Mean <sup>a</sup>	Difference of Adjusted Mean vs. Comparisons (95% C.I.) <sup>b</sup>	p-Value <sup>c</sup>
Black	Comparison	52	156.88		
	Background RH	15	137.17	-19.71 --	0.009
	Low RH	20	150.23	-6.66 --	0.349
	High RH	12	146.50	-10.38 --	0.225
	Low plus High RH	32	148.82	-8.06 --	0.182
Non-Black	Comparison	972	145.09		
	Background RH	347	145.48	0.39 --	0.808
	Low RH	231	145.28	0.19 --	0.919
	High RH	239	146.05	0.96 --	0.607
	Low plus High RH	470	145.67	0.58 --	0.686

**Table I-4-7. (Continued)**  
**Interaction Table for LDH (U/L)**  
**(Continuous)**  
**Occupation Removed from Final Model**

<b>c) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED</b> (Dioxin Category-by-Lifetime Alcohol History: Tables 13-23 and I-3-14)					
Stratum	Dioxin Category	n	Adjusted Mean <sup>a</sup>	Difference of Adjusted Mean vs. Comparisons (95% C.I.) <sup>b</sup>	p-Value <sup>c</sup>
<b>0 Drink-years</b>	Comparison	53	147.17		
	Background RH	20	136.21	-10.96 --	0.094
	Low RH	15	153.56	6.39 --	0.409
	High RH	24	145.40	-1.77 --	0.779
	Low plus High RH	39	148.49	1.31 --	0.810
<b>&gt;0-40 Drink-years</b>	Comparison	696	149.78		
	Background RH	258	148.45	-1.33 --	0.490
	Low RH	169	148.31	-1.47 --	0.514
	High RH	164	148.91	-0.87 --	0.706
	Low plus High RH	333	148.60	-1.17 --	0.503
<b>&gt;40 Drink-years</b>	Comparison	275	144.78		
	Background RH	84	148.68	3.90 --	0.227
	Low RH	67	146.34	1.56 --	0.656
	High RH	63	149.61	4.83 --	0.183
	Low plus High RH	130	147.92	3.13 --	0.253

<sup>a</sup> Transformed from natural logarithm scale.

<sup>b</sup> Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on natural logarithm scale.

<sup>c</sup> P-value is based on difference of means on natural logarithm scale.

Note: RH = Ranch Hand.

Comparison: Current Dioxin  $\leq$  10 ppt.

Background (Ranch Hand): Current Dioxin  $\leq$  10 ppt.

Low (Ranch Hand): Current Dioxin  $>$  10 ppt, 10 ppt  $<$  Initial Dioxin  $\leq$  143 ppt.

High (Ranch Hand): Current Dioxin  $>$  10 ppt, Initial Dioxin  $>$  143 ppt.

**Table I-4-8.**  
**Interaction Table for LDH**  
**(Discrete)**  
**Occupation Removed from Final Model**

<b>a) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED (Dioxin Category-by-Lifetime Alcohol History: Tables 13-24 and I-3-15)</b>					
<b>Stratum</b>	<b>Dioxin Category</b>	<b>n</b>	<b>Percent High</b>	<b>Adjusted Relative Risk (95% C.I.)<sup>a</sup></b>	<b>p-Value</b>
<b>0-40 Drink-years</b>	Comparison	749	15.5		
	Background RH	278	12.2	0.86 (0.56,1.30)	0.466
	Low RH	184	12.5	0.71 (0.44,1.16)	0.176
	High RH	188	14.9	0.92 (0.58,1.45)	0.719
	Low plus High RH	372	13.7	0.81 (0.57,1.17)	0.262
<b>&gt;40 Drink-years</b>	Comparison	275	10.2		
	Background RH	84	16.7	2.03 (1.00,4.12)	0.050
	Low RH	67	11.9	1.22 (0.52,2.85)	0.650
	High RH	63	19.0	1.80 (0.83,3.89)	0.134
	Low plus High RH	130	15.4	1.50 (0.79,2.83)	0.212

<sup>a</sup> Relative risk and confidence interval relative to Comparisons.

Note: RH = Ranch Hand.

Comparison: Current Dioxin  $\leq$  10 ppt.

Background (Ranch Hand): Current Dioxin  $\leq$  10 ppt.

Low (Ranch Hand): Current Dioxin > 10 ppt, 10 ppt < Initial Dioxin  $\leq$  143 ppt.

High (Ranch Hand): Current Dioxin > 10 ppt, Initial Dioxin > 143 ppt.

**Table I-4-9.**  
**Interaction Table for Cholesterol**  
**(Discrete)**  
**Occupation Removed from Final Model**

<b>a) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED (Dioxin Category-by-Current Alcohol Use: Tables 13-26 and I-3-17)</b>					
<b>Stratum</b>	<b>Dioxin Category</b>	<b>n</b>	<b>Percent High</b>	<b>Adjusted Relative Risk (95% C.I.)<sup>b</sup></b>	<b>p-Value</b>
<b>0-1 Drinks/Day</b>	Comparison	816	12.0		
	Background RH	284	10.9	0.91 (0.59,1.41)	0.669
	Low RH	194	10.3	0.83 (0.50,1.39)	0.481
	High RH	208	14.9	1.29 (0.83,2.01)	0.255
	Low plus High RH	402	12.7	1.06 (0.74,1.53)	0.747
<b>&gt;1-4 Drinks/Day</b>	Comparison	176	17.0		
	Background RH	74	18.9	1.14 (0.56,2.32)	0.714
	Low RH	57	31.6	2.46 (1.23,4.92)	0.011
	High RH	41	24.4	1.57 (0.69,3.58)	0.283
	Low plus High RH	98	28.6	2.05 (1.13,3.72)	0.018
<b>&gt;4 Drinks/Day</b>	Comparison	35	8.6		
	Background RH	9	55.6	12.90 (2.18,76.17)	0.005
	Low RH	3	0.0	--	--
	High RH	5	40.0	5.17 (0.59,45.36)	0.139
	Low plus High RH	8	25.0	3.11 (0.41,23.60)	0.273

<sup>a</sup> Relative risk and confidence interval relative to Comparisons.

--: Adjusted relative risk, confidence interval, and p-value not presented due to the sparse number of abnormalities.

Note: RH = Ranch Hand.

Comparison: Current Dioxin  $\leq$  10 ppt.

Background (Ranch Hand): Current Dioxin  $\leq$  10 ppt.

Low (Ranch Hand): Current Dioxin > 10 ppt, 10 ppt < Initial Dioxin  $\leq$  143 ppt.

High (Ranch Hand): Current Dioxin > 10 ppt, Initial Dioxin > 143 ppt.

**Table I-4-10.**  
**Interaction Table for HDL Cholesterol (mg/dl)**  
**(Continuous)**  
**Occupation Removed from Final Model**

**a) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED**  
**(Dioxin Category-by-Current Alcohol Use: Tables 13-27 and I-3-18)**

Stratum	Dioxin Category	n	Adjusted Mean <sup>a</sup>	Difference of Adjusted Mean vs. Comparisons (95% C.I.) <sup>b</sup>	p-Value <sup>c</sup>
0-1 Drinks/Day	Comparison	806	41.58		
	Background RH	277	42.52	0.94 --	0.182
	Low RH	190	41.00	-0.57 --	0.470
	High RH	202	39.62	-1.96 --	0.010
	Low plus High RH	392	40.28	-1.29 --	0.032
>1-4 Drinks/Day	Comparison	175	46.38		
	Background RH	73	46.27	-0.11 --	0.943
	Low RH	54	47.00	0.62 --	0.720
	High RH	39	47.53	1.15 --	0.566
	Low plus High RH	93	47.22	0.84 --	0.556
>4 Drinks/Day	Comparison	35	46.79		
	Background RH	8	50.81	4.02 --	0.379
	Low RH	3	64.95	18.16 --	0.023
	High RH	5	44.29	-2.51 --	0.635
	Low plus High RH	8	51.13	4.33 --	0.353

**Table I-4-10. (Continued)**  
**Interaction Table for HDL Cholesterol (mg/dl)**  
**(Continuous)**  
**Occupation Removed from Final Model**

<b>b) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED</b> (Dioxin Category-by-Lifetime Alcohol History: Tables I-3-27 and I-3-18)					
<b>Stratum</b>	<b>Dioxin Category</b>	<b>n</b>	<b>Adjusted Mean<sup>a</sup></b>	<b>Difference of Adjusted Mean vs. Comparisons (95% C.I.)<sup>b</sup></b>	<b>p-Value<sup>c</sup></b>
<b>0 Drink-years</b>	Comparison	53	40.09		
	Background RH	20	38.73	-1.36 --	0.580
	Low RH	15	38.72	-1.37 --	0.617
	High RH	23	41.36	1.27 --	0.598
	Low plus High RH	38	40.30	0.21 --	0.918
<b>&gt;0-40 Drink-years</b>	Comparison	690	42.47		
	Background RH	255	43.96	1.49 --	0.050
	Low RH	168	42.38	-0.10 --	0.910
	High RH	162	40.10	-2.37 --	0.006
	Low plus High RH	330	41.24	-1.23 --	0.066
<b>&gt;40 Drink-years</b>	Comparison	273	43.05		
	Background RH	83	42.99	-0.06 --	0.964
	Low RH	64	43.89	0.85 --	0.557
	High RH	61	43.00	-0.05 --	0.974
	Low plus High RH	125	43.46	0.41 --	0.716

**Table I-4-10. (Continued)**  
**Interaction Table for HDL Cholesterol (mg/dl)**  
**(Continuous)**  
**Occupation Removed from Final Model**

<b>c) MODEL 4: RANCH HANDS — CURRENT DIOXIN — ADJUSTED</b> (Current Dioxin-by-Lifetime Alcohol History: Tables 13-27 and I-3-18)			
<b>Current Dioxin Category Summary Statistics</b>			
<b>Stratum</b>	<b>Current Dioxin</b>	<b>n</b>	<b>Adjusted Mean<sup>a</sup></b>
<b>0 Drink-years</b>	Low	17	39.68
	Medium	18	40.40
	High	23	41.05
<b>&gt;0-40 Drink-years</b>	Low	202	45.39
	Medium	194	42.94
	High	189	39.76
<b>&gt;40 Drink-years</b>	Low	66	43.01
	Medium	73	42.12
	High	69	41.31

<b>d) MODEL 5: RANCH HANDS — CURRENT DIOXIN — ADJUSTED</b> (Current Dioxin-by-Lifetime Alcohol History: Tables 13-27 and I-3-18)			
<b>Current Dioxin Category Summary Statistics</b>			
<b>Stratum</b>	<b>Current Dioxin</b>	<b>n</b>	<b>Adjusted Mean<sup>a</sup></b>
<b>0 Drink-years</b>	Low	18	40.71
	Medium	14	38.93
	High	26	41.06
<b>&gt;0-40 Drink-years</b>	Low	206	45.67
	Medium	199	42.47
	High	180	39.69
<b>&gt;40 Drink-years</b>	Low	66	43.66
	Medium	74	42.38
	High	68	40.27

**Table I-4-10. (Continued)**  
**Interaction Table for HDL Cholesterol (mg/dl)**  
**(Continuous)**  
**Occupation Removed from Final Model**

<b>e) MODEL 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED</b> <b>(Current Dioxin-by-Lifetime Alcohol History: Tables 13-27 and I-3-18)</b>					
<b>Current Dioxin Category Summary Statistics</b>				<b>Analysis Results for Log<sub>2</sub> (Current Dioxin + 1)</b>	
<b>Stratum</b>	<b>Current Dioxin</b>	<b>n</b>	<b>Adjusted Mean<sup>a</sup></b>	<b>Adjusted Slope (Std. Error)<sup>d</sup></b>	<b>p-Value</b>
<b>0 Drink-years</b>	Low	18	39.48	0.0044 (0.0170)	0.795
	Medium	14	38.31		
	High	26	41.59		
<b>&gt;0-40 Drink-years</b>	Low	205	44.79	-0.0268 (0.0068)	<0.001
	Medium	199	42.26		
	High	180	40.25		
<b>&gt;40 Drink-years</b>	Low	66	42.61	0.0002 (0.0098)	0.982
	Medium	74	41.93		
	High	68	40.83		

**Table I-4-10. (Continued)**  
**Interaction Table for HDL Cholesterol (mg/dl)**  
**(Continuous)**  
**Occupation Removed from Final Model**

<b>f) MODEL 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Degreasing Chemical Exposure: Tables 13-27 and I-3-18)</b>					
Current Dioxin Category Summary Statistics				Analysis Results for Log <sub>2</sub> (Current Dioxin + 1)	
Stratum	Current Dioxin	n	Adjusted Mean <sup>a</sup>	Adjusted Slope (Std. Error) <sup>d</sup>	p-Value
No	Low	143	45.08	-0.0347 (0.0091)	<0.001
	Medium	114	41.68		
	High	57	38.92		
Yes	Low	146	42.71	-0.0072 (0.0067)	0.285
	Medium	173	42.02		
	High	217	40.80		

<sup>a</sup> Transformed from natural logarithm scale.

<sup>b</sup> Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on natural logarithm scale.

<sup>c</sup> P-value is based on difference of means on natural logarithm scale.

<sup>d</sup> Slope and standard error based on natural logarithm of HDL cholesterol versus log<sub>2</sub> dioxin.

Note: Model 3: RH = Ranch Hand.

Comparison: Current Dioxin ≤ 10 ppt.

Background (Ranch Hand): Current Dioxin ≤ 10 ppt.

Low (Ranch Hand): Current Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 143 ppt.

High (Ranch Hand): Current Dioxin > 10 ppt, Initial Dioxin > 143 ppt.

Model 4: Low = ≤ 8.1 ppt; Medium = > 8.1-20.5 ppt; High = > 20.5 ppt.

Models 5 and 6: Low = ≤ 46 ppq; Medium = > 46-128 ppq; High = > 128 ppq.

**Table I-4-11.**  
**Interaction Table for Cholesterol-HDL Ratio**  
**(Continuous)**  
**Occupation Removed from Final Model**

a) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED (Initial Dioxin-by-Current Alcohol Use: Tables 13-29 and I-3-19)				Analysis Results for Log <sub>2</sub> (Initial Dioxin)	
Initial Dioxin Category Summary Statistics				Analysis Results for Log <sub>2</sub> (Initial Dioxin)	
Stratum	Initial Dioxin	n	Adjusted Mean <sup>a</sup>	Adjusted Slope (Std. Error) <sup>b</sup>	p-Value
0-1 Drinks/Day	Low	128	5.30	0.0181 (0.0108)	0.094
	Medium	130	5.38		
	High	134	5.50		
>1-4 Drinks/Day	Low	39	4.64	0.0427 (0.0224)	0.057
	Medium	27	4.96		
	High	27	4.89		
>4 Drinks/Day	Low	2	3.77	0.1833 (0.0815)	0.025
	Medium	4	5.68		
	High	2	6.91		

**Table I-4-11. (Continued)**  
**Interaction Table for Cholesterol-HDL Ratio**  
**(Continuous)**  
**Occupation Removed from Final Model**

<b>b) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED</b> (Dioxin Category-by-Current Alcohol Use: Tables 13-29 and I-3-19)					
<b>Stratum</b>	<b>Dioxin Category</b>	<b>n</b>	<b>Adjusted Mean<sup>a</sup></b>	<b>Difference of Adjusted Mean vs. Comparisons (95% C.I.)<sup>c</sup></b>	<b>p-Value<sup>d</sup></b>
<b>0-1 Drinks/Day</b>	Comparison	808	5.17		
	Background RH	281	5.02	-0.15 --	0.123
	Low RH	192	5.21	0.04 --	0.744
	High RH	205	5.51	0.34 --	0.003
	Low plus High RH	397	5.36	0.19 --	0.032
<b>&gt;1-4 Drinks/Day</b>	Comparison	175	4.75		
	Background RH	73	4.78	0.03 --	0.883
	Low RH	55	4.80	0.05 --	0.812
	High RH	39	4.72	-0.03 --	0.901
	Low plus High RH	94	4.77	0.02 --	0.922
<b>&gt;4 Drinks/Day</b>	Comparison	35	4.77		
	Background RH	9	4.90	0.13 --	0.791
	Low RH	3	3.40	-1.37 --	0.041
	High RH	5	5.21	0.44 --	0.500
	Low plus High RH	8	4.44	-0.33 --	0.507

<sup>a</sup> Transformed from natural logarithm scale.

<sup>b</sup> Slope and standard error based on natural logarithm of cholesterol-HDL ratio versus  $\log_2$  dioxin.

<sup>c</sup> Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on natural logarithm scale.

<sup>d</sup> P-value is based on difference of means on natural logarithm scale.

Note: Model 2: Low = 39-98 ppt; Medium = > 98-232 ppt; High = > 232 ppt.

Model 3: RH = Ranch Hand.

Comparison: Current Dioxin  $\leq$  10 ppt.

Background (Ranch Hand): Current Dioxin  $\leq$  10 ppt.

Low (Ranch Hand): Current Dioxin > 10 ppt, 10 ppt < Initial Dioxin  $\leq$  143 ppt.

High (Ranch Hand): Current Dioxin > 10 ppt, Initial Dioxin > 143 ppt.

**Table I-4-12.**  
**Interaction Table for Triglycerides (mg/dl)**  
**(Continuous)**  
**Occupation Removed from Final Model**

<b>a) MODEL 5: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Lifetime Alcohol History: Tables 13-31 and I-3-21)</b>					
<b>Stratum</b>	<b>Current Dioxin Category Summary Statistics</b>			<b>Analysis Results for <math>\log_2</math> (Current Dioxin + 1)</b>	
	<b>Current Dioxin</b>	<b>n</b>	<b>Adjusted Mean<sup>a</sup></b>	<b>Adjusted Slope (Std. Error)<sup>b</sup></b>	<b>p-Value</b>
<b>0 Drink-years</b>	Low	18	111.89	0.1317 (0.0366)	<0.001
	Medium	14	109.29		
	High	27	183.07		
<b>&gt; 0-40 Drink-years</b>	Low	206	109.11	0.0937 (0.0142)	<0.001
	Medium	201	131.00		
	High	184	154.44		
<b>&gt; 40 Drink-years</b>	Low	66	106.28	0.0862 (0.0213)	<0.001
	Medium	75	127.69		
	High	73	165.76		

<b>b) MODEL 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Lifetime Alcohol History: Tables 13-31 and I-3-21)</b>					
<b>Stratum</b>	<b>Current Dioxin Category Summary Statistics</b>			<b>Analysis Results for <math>\log_2</math> (Current Dioxin + 1)</b>	
	<b>Current Dioxin</b>	<b>n</b>	<b>Adjusted Mean<sup>a</sup></b>	<b>Adjusted Slope (Std. Error)<sup>b</sup></b>	<b>p-Value</b>
<b>0 Drink-years</b>	Low	18	146.01	0.0448 (0.0301)	0.136
	Medium	14	126.05		
	High	27	161.74		
<b>&gt; 0-40 Drink-years</b>	Low	205	129.36	0.0198 (0.0118)	0.095
	Medium	201	137.07		
	High	184	137.38		
<b>&gt; 40 Drink-years</b>	Low	66	128.71	0.0137 (0.0177)	0.440
	Medium	75	137.76		
	High	73	145.76		

<sup>a</sup> Transformed from natural logarithm scale.

<sup>b</sup> Slope and standard error based on natural logarithm of triglycerides versus  $\log_2$  dioxin.

Note: Low =  $\leq 46$  ppq; Medium =  $> 46$ -128 ppq; High =  $> 128$  ppq.

**Table I-4-13.**  
**Interaction Table for Creatine Kinase (U/L)**  
**(Continuous)**  
**Occupation Removed from Final Model**

<b>a) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED (Dioxin Category-by-Race and Lifetime Alcohol History: Tables 13-33 and I-3-23)</b>					
<b>Stratum</b>	<b>Dioxin Category</b>	<b>n</b>	<b>Adjusted Mean<sup>a</sup></b>	<b>Difference of Adjusted Mean vs. Comparisons (95% C.I.)<sup>b</sup></b>	<b>p-Value<sup>c</sup></b>
<b>Black, 0 Drink-years</b>	Comparison	5	263.14		
	Background RH	2	244.73	-18.41 --	0.865
	Low RH	1	75.10	-188.04 --	0.025
	High RH	2	125.96	-137.18 --	0.085
<b>Black, &gt;0-40 Drink-years</b>	Comparison	38	286.51		
	Background RH	11	187.49	-99.02 --	0.016
	Low RH	11	184.79	-101.72 --	0.012
	High RH	6	177.94	-108.57 --	0.034
<b>Black, &gt;40 Drink-years</b>	Comparison	9	224.07		
	Background RH	2	110.38	-113.69 --	0.077
	Low RH	8	279.55	55.48 --	0.373
	High RH	4	333.76	109.69 --	0.195
<b>Non-Black, 0 Drink-years</b>	Comparison	48	119.68		
	Background RH	18	104.43	-15.25 --	0.335
	Low RH	14	124.26	4.58 --	0.809
	High RH	22	149.08	29.40 --	0.095
<b>Non-Black, &gt;0-40 Drink-years</b>	Comparison	36	138.89	19.21 --	0.187
	Background RH	247	127.70	2.32 --	0.634
	Low RH	158	126.93	1.55 --	0.787
	High RH	158	124.50	-0.88 --	0.878
<b>Non-Black, &gt;40 Drink-years</b>	Comparison	316	125.71	0.33 --	0.941
	Background RH	82	124.74	7.69 --	0.325
	Low RH	59	110.59	-6.46 --	0.440
	High RH	59	118.36	1.31 --	0.880
	Low plus High RH	118	114.41	-2.64 --	0.687

<sup>a</sup> Transformed from natural logarithm scale.

<sup>b</sup> Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on natural logarithm scale.

<sup>c</sup> P-value is based on difference of means on natural logarithm scale.

Note: RH = Ranch Hand.

Comparison: Current Dioxin ≤ 10 ppt.

Background (Ranch Hand): Current Dioxin ≤ 10 ppt.

Low (Ranch Hand): Current Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 143 ppt.

High (Ranch Hand): Current Dioxin > 10 ppt, Initial Dioxin > 143 ppt.

**Table I-4-14.**  
**Interaction Table for Creatine Kinase**  
**(Discrete)**  
**Occupation Removed from Final Model**

**a) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED**  
(Dioxin Category-by-Race: Tables 13-34 and I-3-24)

Stratum	Dioxin Category	n	Percent High	Adjusted Relative Risk (95% C.I.) <sup>a</sup>	p-Value
Non-Black	Comparison	973	10.6		
	Background RH	347	12.1	1.35 (0.91,2.00)	0.137
	Low RH	231	9.5	0.83 (0.51,1.37)	0.473
	High RH	239	15.1	1.33 (0.87,2.03)	0.185
	Low plus High RH	470	12.3	1.08 (0.76,1.54)	0.651
Black	Comparison	52	67.3		
	Background RH	15	26.7	0.17 (0.04,0.67)	0.011
	Low RH	20	55.0	0.63 (0.21,1.92)	0.414
	High RH	12	33.3	0.19 (0.04,0.84)	0.028
	Low plus High RH	32	46.9	0.41 (0.16,1.08)	0.071

**b) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED**  
(Dioxin Category-by-Lifetime Alcohol History: Tables 13-34 and I-3-24)

Stratum	Dioxin Category	n	Percent High	Adjusted Relative Risk (95% C.I.) <sup>a</sup>	p-Value
0 Drink-years	Comparison	53	15.1		
	Background RH	20	10.0	0.78 (0.14,4.49)	0.784
	Low RH	15	13.3	1.19 (0.21,6.82)	0.841
	High RH	24	25.0	2.13 (0.60,7.53)	0.240
	Low plus High RH	39	20.5	1.77 (0.56,5.55)	0.327
> 0-40 Drink-years	Comparison	696	13.9		
	Background RH	258	13.6	1.14 (0.74,1.78)	0.549
	Low RH	169	10.7	0.65 (0.37,1.15)	0.138
	High RH	164	14.6	1.04 (0.63,1.73)	0.876
	Low plus High RH	333	12.6	0.84 (0.56,1.26)	0.392
> 40 Drink-years	Comparison	276	12.0		
	Background RH	84	10.7	1.11 (0.49,2.50)	0.810
	Low RH	67	19.4	1.34 (0.60,2.98)	0.473
	High RH	63	15.9	0.98 (0.41,2.34)	0.960
	Low plus High RH	130	17.7	1.16 (0.61,2.21)	0.653

<sup>a</sup> Relative risk and confidence interval relative to Comparisons.

Note: RH = Ranch Hand.

Comparison: Current Dioxin  $\leq$  10 ppt.

Background (Ranch Hand): Current Dioxin  $\leq$  10 ppt.

Low (Ranch Hand): Current Dioxin  $>$  10 ppt, 10 ppt  $<$  Initial Dioxin  $\leq$  143 ppt.

High (Ranch Hand): Current Dioxin  $>$  10 ppt, Initial Dioxin  $>$  143 ppt.

**Table I-4-15.**  
**Interaction Table for Serum Amylase**  
**(Discrete)**  
**Occupation Removed from Final Model**

<b>a) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED</b> (Dioxin Category-by-Race: Tables 13-36 and I-3-26)					
<b>Stratum</b>	<b>Dioxin Category</b>	<b>n</b>	<b>Percent High</b>	<b>Adjusted Relative Risk (95% C.I.)<sup>a</sup></b>	<b>p-Value</b>
<b>Non-Black</b>	Comparison	990	7.2		
	Background RH	354	6.2	0.75 (0.45,1.24)	0.263
	Low RH	236	6.4	0.87 (0.49,1.57)	0.652
	High RH	246	2.4	0.38 (0.16,0.89)	0.026
	Low plus High RH	482	4.4	0.63 (0.38,1.05)	0.078
<b>Black</b>	Comparison	53	20.8		
	Background RH	15	20.0	0.89 (0.21,3.80)	0.870
	Low RH	21	14.3	0.56 (0.14,2.29)	0.418
	High RH	12	50.0	4.13 (1.08,15.79)	0.038
	Low plus High RH	33	27.3	1.36 (0.48,3.82)	0.561

<sup>a</sup> Relative risk and confidence interval relative to Comparisons.

Note: RH = Ranch Hand.

Comparison: Current Dioxin  $\leq$  10 ppt.

Background (Ranch Hand): Current Dioxin  $\leq$  10 ppt.

Low (Ranch Hand): Current Dioxin  $>$  10 ppt, 10 ppt  $<$  Initial Dioxin  $\leq$  143 ppt.

High (Ranch Hand): Current Dioxin  $>$  10 ppt, Initial Dioxin  $>$  143 ppt.

**Table I-4-16.**  
**Interaction Table for Serological Evidence of Prior Hepatitis B Infection**  
**Occupation Removed from Final Model**

<b>a) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED (Dioxin Category-by-Age: Tables I-3-38 and I-3-28)</b>					
<b>Stratum</b>	<b>Dioxin Category</b>	<b>n</b>	<b>Percent Yes</b>	<b>Adjusted Relative Risk (95% C.I.)<sup>a</sup></b>	<b>p-Value</b>
<b>Born ≥ 1942</b>	Comparison	448	13.4		
	Background RH	126	12.7	1.02 (0.56,1.87)	0.936
	Low RH	84	9.5	0.62 (0.28,1.36)	0.228
	High RH	150	10.7	0.75 (0.42,1.36)	0.347
	Low plus High RH	234	10.3	0.70 (0.42,1.16)	0.169
<b>Born &lt; 1942</b>	Comparison	597	16.2		
	Background RH	241	7.9	0.47 (0.28,0.79)	0.004
	Low RH	170	10.0	0.56 (0.32,0.98)	0.040
	High RH	103	16.5	0.90 (0.51,1.60)	0.717
	Low plus High RH	273	12.5	0.69 (0.45,1.06)	0.087

<sup>a</sup> Relative risk and confidence interval relative to Comparisons.

Note: RH = Ranch Hand.

Comparison: Current Dioxin ≤ 10 ppt.

Background (Ranch Hand): Current Dioxin ≤ 10 ppt.

Low (Ranch Hand): Current Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 143 ppt.

High (Ranch Hand): Current Dioxin > 10 ppt, Initial Dioxin > 143 ppt.

**Table I-4-17.**  
**Interaction Table for Prealbumin (mg/dl)**  
**(Continuous)**  
**Occupation Removed from Final Model**

**a) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED**  
**(Dioxin Category-by-Industrial Chemical Exposure: Tables 13-41 and I-3-30)**

Stratum	Dioxin Category	n	Adjusted	Difference of Adjusted	p-Value
			Mean	Mean vs. Comparisons (95% C.I.)	
No	Comparison	416	27.83		
	Background RH	186	28.00	0.18 (-0.58,0.93)	0.649
	Low RH	104	27.09	-0.74 (-1.68,0.20)	0.124
	High RH	78	28.60	0.77 (-0.29,1.84)	0.154
	Low plus High RH	182	27.74	-0.09 (-0.85,0.67)	0.818
Yes	Comparison	609	27.61		
	Background RH	176	27.33	-0.29 (-1.03,0.45)	0.445
	Low RH	147	28.27	0.66 (-0.13,1.45)	0.102
	High RH	173	27.26	-0.36 (-1.10,0.38)	0.345
	Low plus High RH	320	27.72	0.11 (-0.48,0.70)	0.718

**b) MODEL 5: RANCH HANDS — CURRENT DIOXIN — ADJUSTED**  
**(Current Dioxin-by-Degreasing Chemical Exposure: Tables 13-41 and I-3-30)**

Stratum	Current Dioxin Category Summary Statistics			Analysis Results for Log <sub>2</sub> (Current Dioxin + 1)	
	Current Dioxin	n	Adjusted Mean	Adjusted Slope (Std. Error)	p-Value
No	Low	143	28.47	-0.2247 (0.1565)	0.152
	Medium	115	27.98		
	High	61	27.26		
Yes	Low	147	27.15	0.2714 (0.1129)	0.016
	Medium	175	27.66		
	High	223	27.76		

Note: Model 3: RH = Ranch Hand.

Comparison: Current Dioxin  $\leq$  10 ppt.

Background (Ranch Hand): Current Dioxin  $\leq$  10 ppt.

Low (Ranch Hand): Current Dioxin > 10 ppt, 10 ppt < Initial Dioxin  $\leq$  143 ppt.

High (Ranch Hand): Current Dioxin > 143 ppt, Initial Dioxin > 143 ppt.

Model 5: Low =  $\leq$  46 ppq; Medium = > 46-128 ppq; High = > 128 ppq.

**Table I-4-18.**  
**Interaction Table for Albumin (mg/dl)**  
**(Continuous)**  
**Occupation Removed from Final Model**

<b>a) MODEL 4: RANCH HANDS — CURRENT DIOXIN — ADJUSTED</b> <b>(Current Dioxin-by-Degreasing Chemical Exposure: Tables 13-43 and I-3-31)</b>					
Current Dioxin Category Summary Statistics				Analysis Results for $\log_2$ (Current Dioxin + 1)	
Stratum	Current Dioxin	n	Adjusted Mean	Adjusted Slope (Std. Error)	p-Value
No	Low	149	3,976.42	-28.0882 (12.6389)	0.027
	Medium	111	3,865.48		
	High	62	3,914.30		
Yes	Low	140	3,876.74	10.6904 (8.8036)	0.225
	Medium	184	3,881.46		
	High	229	3,912.70		

  

<b>b) MODEL 5: RANCH HANDS — CURRENT DIOXIN — ADJUSTED</b> <b>(Current Dioxin-by-Degreasing Chemical Exposure: Tables 13-43 and I-3-31)</b>					
Current Dioxin Category Summary Statistics				Analysis Results for $\log_2$ (Current Dioxin + 1)	
Stratum	Current Dioxin	n	Adjusted Mean	Adjusted Slope (Std. Error)	p-Value
No	Low	143	3,966.79	-21.0426 (10.5686)	0.047
	Medium	117	3,901.05		
	High	62	3,884.48		
Yes	Low	149	3,881.25	12.4533 (7.6139)	0.102
	Medium	178	3,872.58		
	High	226	3,917.80		

**Table I-4-18. (Continued)**  
**Interaction Table for Albumin (mg/dl)**  
**(Continuous)**  
**Occupation Removed from Final Model**

c) MODEL 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Degreasing Chemical Exposure: Tables I-3-43 and I-3-31)				Analysis Results for $\log_2$ (Current Dioxin + 1)	
Stratum	Current Dioxin Category Summary Statistics			Adjusted Slope (Std. Error)	
	Current Dioxin	n	Adjusted Mean	p-Value	
No	Low	143	3,980.04	-25.4589 (10.8169)	0.019
	Medium	117	3,904.59		
	High	62	3,877.27		
Yes	Low	148	3,891.56	8.0073 (8.0903)	0.323
	Medium	178	3,876.48		
	High	226	3,909.75		

Note: Model 4: Low =  $\leq 8.1$  ppt; Medium =  $> 8.1\text{-}20.5$  ppt; High =  $> 20.5$  ppt.  
 Models 5 and 6: Low =  $\leq 46$  ppq; Medium =  $> 46\text{-}128$  ppq; High =  $> 128$  ppq.

**Table I-4-19.**  
**Interaction Table for  $\alpha$ -1 Acid Glycoprotein (mg/dl)**  
**(Continuous)**  
**Occupation Removed from Final Model**

a) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED (Initial Dioxin-by-Lifetime Alcohol History: Tables 13-45 and I-3-32)			
Initial Dioxin Category Summary Statistics			Analysis Results for $\log_2$ (Initial Dioxin)
Stratum	Initial Dioxin	n	Adjusted Mean <sup>a</sup>
<b>0 Drink-years</b>	Low	10	55.88
	Medium	12	57.44
	High	17	56.29
<b>&gt;0-40 Drink-years</b>	Low	119	53.04
	Medium	107	56.15
	High	107	54.78
<b>&gt;40 Drink-years</b>	Low	41	57.45
	Medium	46	54.55
	High	43	56.29

  

b) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED (Dioxin Category-by-Lifetime Alcohol History: Tables 13-45 and I-3-32)					
Stratum	Dioxin Category	n	Adjusted Mean <sup>a</sup>	Difference of Adjusted Mean vs. Comparisons (95% C.I.) <sup>c</sup>	p-Value <sup>d</sup>
<b>0 Drink-years</b>	Comparison	53	51.70		
	Background RH	20	50.78	-0.93--	0.753
	Low RH	15	59.02	7.32--	0.038
	High RH	24	55.96	4.26--	0.140
	Low plus High RH	39	57.12	5.41--	0.030
<b>&gt;0-40 Drink-years</b>	Comparison	696	54.34		
	Background RH	258	53.24	-1.09--	0.207
	Low RH	169	54.50	0.17--	0.872
	High RH	164	55.94	1.61--	0.128
	Low plus High RH	333	55.21	0.87--	0.278
<b>&gt;40 Drink-years</b>	Comparison	276	55.35		
	Background RH	84	54.56	-0.79--	0.597
	Low RH	67	56.64	1.29--	0.439
	High RH	63	54.70	-0.65--	0.702
	Low plus High RH	130	55.69	0.34--	0.791

**Table I-4-19. (Continued)**  
**Interaction Table for  $\alpha$ -1 Acid Glycoprotein (mg/dl)**  
**(Continuous)**  
**Occupation Removed from Final Model**

c) MODEL 4: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Lifetime Alcohol History: Tables I-3-45 and I-3-32)					
Stratum	Current Dioxin Category Summary Statistics			Analysis Results for $\log_2$ (Current Dioxin + 1)	
	Current Dioxin	n	Adjusted Mean <sup>a</sup>	Adjusted Slope (Std. Error) <sup>b</sup>	p-Value
<b>0 Drink-years</b>	Low	17	51.23	0.0168 (0.0170)	0.322
	Medium	18	56.60		
	High	24	57.18		
<b>&gt; 0-40 Drink-years</b>	Low	204	53.58	0.0064 (0.0063)	0.309
	Medium	195	54.02		
	High	192	55.73		
<b>&gt; 40 Drink-years</b>	Low	66	54.65	0.0025 (0.0100)	0.799
	Medium	77	55.97		
	High	71	55.08		

<sup>a</sup> Transformed from natural logarithm scale.

<sup>b</sup> Slope and standard error based on natural logarithm of  $\alpha$ -1 acid glycoprotein versus  $\log_2$  dioxin.

<sup>c</sup> Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on natural logarithm scale.

<sup>d</sup> P-value is based on difference of means on natural logarithm scale.

Note: Model 2: Low = 39-98 ppt; Medium = > 98-232 ppt; High = > 232 ppt.

Model 3: RH = Ranch Hand.

Comparison: Current Dioxin  $\leq$  10 ppt.

Background (Ranch Hand): Current Dioxin  $\leq$  10 ppt.

Low (Ranch Hand): Current Dioxin > 10 ppt, 10 ppt < Initial Dioxin  $\leq$  143 ppt.

High (Ranch Hand): Current Dioxin > 10 ppt, Initial Dioxin > 143 ppt.

Model 4: Low =  $\leq$  8.1 ppt; Medium = > 8.1-20.5 ppt; High = > 20.5 ppt.

**Table I-4-20.**  
**Interaction Table for  $\alpha$ -1 Antitrypsin (mg/dl)**  
**(Continuous)**  
**Occupation Removed from Final Model**

<b>a) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED</b> <b>(Initial Dioxin-by-Industrial Chemical Exposure: Tables 13-47 and I-3-34)</b>					
<b>Initial Dioxin Category Summary Statistics</b>				<b>Analysis Results for <math>\log_2</math> (Initial Dioxin)</b>	
<b>Stratum</b>	<b>Initial Dioxin</b>	<b>n</b>	<b>Adjusted Mean</b>	<b>Adjusted Slope (Std. Error)</b>	<b>p-Value</b>
<b>No</b>	Low	72	143.48	-1.0188 (1.5935)	0.523
	Medium	60	154.10		
	High	50	140.62		
<b>Yes</b>	Low	98	143.43	2.0810 (1.1085)	0.061
	Medium	105	144.62		
	High	117	149.71		

<b>b) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED</b> <b>(Initial Dioxin-by-Degreasing Chemical Exposure: Tables 13-47 and I-3-34)</b>					
<b>Initial Dioxin Category Summary Statistics</b>				<b>Analysis Results for <math>\log_2</math> (Initial Dioxin)</b>	
<b>Stratum</b>	<b>Initial Dioxin</b>	<b>n</b>	<b>Adjusted Mean</b>	<b>Adjusted Slope (Std. Error)</b>	<b>p-Value</b>
<b>No</b>	Low	66	138.39	4.1101 (1.6990)	0.016
	Medium	46	148.91		
	High	31	149.28		
<b>Yes</b>	Low	104	147.05	-0.0363 (1.0784)	0.973
	Medium	119	148.71		
	High	136	147.82		

**Table I-4-20. (Continued)**  
**Interaction Table for  $\alpha$ -1 Antitrypsin (mg/dl)**  
**(Continuous)**  
**Occupation Removed from Final Model**

**c) MODEL 4: RANCH HANDS — CURRENT DIOXIN — ADJUSTED**  
**(Current Dioxin-by-Degreasing Chemical Exposure: Tables 13-47 and I-3-34)**

Current Dioxin Category Summary Statistics				Analysis Results for $\log_2$ (Current Dioxin + 1)	
Stratum	Current Dioxin	n	Adjusted Mean	Adjusted Slope (Std. Error)	p-Value
No	Low	149	144.46	1.4114 (1.1474)	0.219
	Medium	109	140.79		
	High	61	149.24		
Yes	Low	138	154.57	-1.7627 (0.7890)	0.026
	Medium	181	149.93		
	High	226	148.29		

**d) MODEL 5: RANCH HANDS — CURRENT DIOXIN — ADJUSTED**  
**(Current Dioxin-by-Degreasing Chemical Exposure: Tables 13-47 and I-3-34)**

Current Dioxin Category Summary Statistics				Analysis Results for $\log_2$ (Current Dioxin + 1)	
Stratum	Current Dioxin	n	Adjusted Mean	Adjusted Slope (Std. Error)	p-Value
No	Low	143	144.94	0.7667 (0.9628)	0.426
	Medium	115	140.06		
	High	61	151.17		
Yes	Low	147	155.23	-1.9640 (0.6813)	0.004
	Medium	175	148.49		
	High	223	149.44		

**Table I-4-20. (Continued)**  
**Interaction Table for  $\alpha$ -1 Antitrypsin (mg/dl)**  
**(Continuous)**  
**Occupation Removed from Final Model**

e) MODEL 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Degreasing Chemical Exposure: Tables I-3-47 and I-3-34)					
<b>Stratum</b>	<b>Current Dioxin Category Summary Statistics</b>			<b>Analysis Results for <math>\log_2</math> (Current Dioxin + 1)</b>	
	<b>Current Dioxin</b>	<b>n</b>	<b>Adjusted Mean</b>	<b>Adjusted Slope (Std. Error)</b>	<b>p-Value</b>
<b>No</b>	Low	143	144.06	1.0147 (0.9845)	0.303
	Medium	115	139.84		
	High	61	151.65		
<b>Yes</b>	Low	146	154.11	-1.4311 (0.7216)	0.048
	Medium	175	148.30		
	High	223	150.00		

Note: Model 2: Low = 39.98 ppt; Medium = > 98-232 ppt; High = > 232 ppt.

Model 3: RH = Ranch Hand.

Comparison: Current Dioxin  $\leq$  10 ppt.

Background (Ranch Hand): Current Dioxin  $\leq$  10 ppt.

Low (Ranch Hand): Current Dioxin  $>$  10 ppt, 10 ppt  $<$  Initial Dioxin  $\leq$  143 ppt.

High (Ranch Hand): Current Dioxin  $>$  10 ppt, Initial Dioxin  $>$  143 ppt.

Model 4: Low =  $\leq$  8.1 ppt; Medium = > 8.1-20.5 ppt; High = > 20.5 ppt.

Models 5 and 6: Low =  $\leq$  46 ppq; Medium = > 46-128 ppq; High = > 128 ppq.

**Table I-4-21.**  
**Interaction Table for Apolipoprotein B**  
**(Discrete)**

<b>a) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED</b> <b>(Initial Dioxin-by-Age: Tables I-3-52 and I-3-39)</b>				
<b>Stratum</b>	<b>Initial Dioxin Category Summary Statistics</b>			<b>Analysis Results for Log<sub>2</sub> (Initial Dioxin)</b>
	<b>Initial Dioxin</b>	<b>n</b>	<b>Percent High</b>	
<b>Born ≥ 1942</b>	Low	54	77.8	0.93 (0.75,1.15)      0.506
	Medium	70	72.9	
	High	112	70.5	
<b>Born &lt; 1942</b>	Low	119	73.1	1.60 (1.18,2.16)      0.002
	Medium	100	77.0	
	High	60	86.7	

<sup>a</sup> Relative risk for a twofold increase in initial dioxin.

Note: Low = 39-98 ppt; Medium = >98-232 ppt; High = >232 ppt.