

APPENDIX M-2.

Interaction Tables for the Renal Assessment

This appendix contains exposure analyses results of interactions between covariates and group or dioxin. Results are presented for each separate stratum of the covariate and include sample sizes, percent abnormal, relative risks, confidence intervals, and p-values for discrete dependent variables. Sample sizes, adjusted means, differences of adjusted means and confidence intervals or adjusted slopes and standard errors, and p-values are given for continuous dependent variables. Means are transformed back to the original scale, if necessary. Chapter 7, Statistical Methods, provides further details on the analytical approaches used in the interaction analyses. The covariate involved in the interaction and a reference to the analysis table in Chapter 17 are given in the heading of each subtable. A summary of the interactions described in this appendix follows.

Appendix M-2 Table	Chapter 17 Table	Dependent Variable	Model	Covariate
M-2-1	17-4	Kidney Stones	2	Diabetic Class
M-2-2	17-5	Urinary Protein	4 5 6	Diabetic Class Diabetic Class Diabetic Class
M-2-3	17-6	Urinary Red Blood Cell Count	3 4 5 6	Occupation Occupation Occupation Occupation
M-2-4	17-8	Serum Creatinine	1 2 3	Diabetic Class Diabetic Class Diabetic Class
M-2-5	17-9	Urine Specific Gravity	2	Age

Table M-2-1.
Interaction Table for Kidney Stones

a) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED (Initial Dioxin-by-Diabetic Class: Table 17-4)				
Stratum	Initial Dioxin Category Summary Statistics			Analysis Results for Log₂ (Initial Dioxin)
	Initial Dioxin	n	Percent Present	
Normal	Low	120	4.2	0.83 (0.50,1.39) 0.486
	Medium	117	4.3	
	High	111	2.7	
Impaired	Low	22	4.6	0.57 (0.08,4.07) 0.571
	Medium	24	0.0	
	High	28	0.0	
Diabetic	Low	32	9.4	0.01 (0.00,0.96) 0.048
	Medium	32	0.0	
	High	34	0.0	

^a Relative risk for a twofold increase in initial dioxin.

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

Table M-2-2.
Interaction Table for Urinary Protein

a) MODEL 4: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Diabetic Class: Table 17-5)				
Stratum	Current Dioxin Category Summary Statistics			Analysis Results for \log_2 (Current Dioxin + 1)
	Current Dioxin	n	Percent Present	
Normal	Low	239	3.8	0.69 (0.46,1.04) 0.076
	Medium	210	2.4	
	High	195	1.0	
Impaired	Low	27	0.0	2.17 (1.19,3.94) 0.011
	Medium	32	6.3	
	High	48	8.3	
Diabetic	Low	28	10.7	1.20 (0.86,1.68) 0.289
	Medium	57	14.0	
	High	55	10.9	

b) MODEL 5: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Diabetic Class: Table 17-5)				
Stratum	Current Dioxin Category Summary Statistics			Analysis Results for \log_2 (Current Dioxin + 1)
	Current Dioxin	n	Percent Present	
Normal	Low	250	3.6	0.78 (0.58,1.06) 0.109
	Medium	206	2.4	
	High	188	1.1	
Impaired	Low	23	0.0	1.92 (1.09,3.37) 0.024
	Medium	35	2.9	
	High	49	10.2	
Diabetic	Low	26	11.5	1.18 (0.88,1.58) 0.279
	Medium	55	10.9	
	High	59	13.6	

Table M-2-2. (Continued)
Interaction Table for Urinary Protein

c) MODEL 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Diabetic Class: Table 17-5)					
Stratum	Current Dioxin Category Summary Statistics			Analysis Results for Log₂ (Current Dioxin + 1)	
	Current Dioxin	n	Percent Present	Adjusted Relative Risk (95% C.I.)^a	p-Value
Normal	Low	249	3.6	0.78 (0.57,1.06)	0.115
	Medium	206	2.4		
	High	188	1.1		
Impaired	Low	23	0.0	1.93 (1.10,3.40)	0.022
	Medium	35	2.9		
	High	49	10.2		
Diabetic	Low	26	11.5	1.20 (0.88,1.65)	0.248
	Medium	55	10.9		
	High	59	13.6		

^a Relative risk for a twofold increase in current dioxin.

Note: 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 M-2-3.
Interaction Table for Urinary Red Blood Cell Count

a) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED (Dioxin Category-by-Occupation: Table 17-6)					
Stratum	Dioxin Category	n	Percent Abnormal	Adjusted Relative Risk (95% C.I.)	p-Value
Officer	Comparison	409	1.0		
	Background RH	236	0.9	0.89 (0.16,4.89)	0.889
	Low RH	103	4.9	4.92 (1.28,18.83)	0.020
	High RH	9	22.2	28.11 (4.34,181.98)	<0.001
Enlisted Flyer	Comparison	173	1.7		
	Background RH	40	5.0	3.18 (0.50,20.11)	0.219
	Low RH	55	0.0	--	--
	High RH	54	3.7	2.25 (0.36,13.99)	0.385
Enlisted Groundcrew	Comparison	480	2.9		
	Background RH	98	4.1	1.30 (0.41,4.14)	0.658
	Low RH	101	1.0	0.29 (0.04,2.25)	0.236
	High RH	196	5.6	2.25 (0.99,5.13)	0.054
	Low plus High RH	297	4.0	1.44 (0.65,3.18)	0.364

b) MODEL 4: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Occupation: Table 17-6)			
Current Dioxin Category Summary Statistics			Analysis Results for Log₂ (Current Dioxin + 1)
Stratum	Current Dioxin	n	Adjusted Relative Risk (95% C.I.)^a
Officer	Low	193	0.5
	Medium	141	4.3
	High	14	14.3
Enlisted Flyer	Low	31	3.2
	Medium	57	1.8
	High	61	3.3
Enlisted Groundcrew	Low	71	4.2
	Medium	101	3.0
	High	223	4.5

Table M-2-3. (Continued)
Interaction Table for Urinary Red Blood Cell Count

c) MODEL 5: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Occupation: Table 17-6)					
Current Dioxin Category Summary Statistics				Analysis Results for Log ₂ (Current Dioxin + 1)	
Stratum	Current Dioxin	n	Percent Abnormal	Adjusted Relative Risk (95% C.I.) ^a	p-Value
Officer	Low	192	0.5	2.80 (1.34,5.83)	0.006
	Medium	136	4.4		
	High	20	10.0		
Enlisted Flyer	Low	33	3.0	1.12 (0.54,2.32)	0.754
	Medium	56	1.8		
	High	60	3.3		
Enlisted Groundcrew	Low	75	4.0	0.96 (0.73,1.26)	0.780
	Medium	104	2.9		
	High	216	4.6		

d) MODEL 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Occupation: Table 17-6)					
Current Dioxin Category Summary Statistics				Analysis Results for Log ₂ (Current Dioxin + 1)	
Stratum	Current Dioxin	n	Percent Abnormal	Adjusted Relative Risk (95% C.I.) ^a	p-Value
Officer	Low	192	0.5	3.13 (1.37,7.12)	0.007
	Medium	136	4.4		
	High	20	10.0		
Enlisted Flyer	Low	32	3.1	1.15 (0.53,2.49)	0.716
	Medium	56	1.8		
	High	60	3.3		
Enlisted Groundcrew	Low	75	4.0	0.99 (0.74,1.31)	0.923
	Medium	104	2.9		
	High	216	4.6		

^a Relative risk for a twofold increase in current dioxin.

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 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 M-2-4.
Interaction Table for Serum Creatinine (mg/dl)

a) MODEL 1: RANCH HANDS VS. COMPARISONS — ADJUSTED (Group-by-Diabetic Class: Table 17-8)						
Stratum	Occupational Category	Group	n	Adjusted Mean ^a	Difference of Adjusted Means (95% C.I.) ^b	p-Value ^c
<i>Normal</i>	<i>All</i>	<i>Ranch Hand</i>	688	1.0068	-0.0131 --	0.111
		<i>Comparison</i>	965	1.0199		
<i>Impaired</i>	<i>All</i>	<i>Ranch Hand</i>	119	1.0390	0.0333 --	0.113
		<i>Comparison</i>	132	1.0057		
<i>Diabetic</i>	<i>All</i>	<i>Ranch Hand</i>	144	0.9982	0.0402 --	0.024
		<i>Comparison</i>	182	0.9579		
<i>Normal</i>	Officer	<i>Ranch Hand</i>	271	1.0198	-0.0081 --	0.537
		<i>Comparison</i>	399	1.0279		
	Enlisted Flyer	<i>Ranch Hand</i>	116	1.0006	-0.0091 --	0.656
		<i>Comparison</i>	139	1.0097		
	Enlisted Groundcrew	<i>Ranch Hand</i>	301	1.0011	-0.0191 --	0.123
		<i>Comparison</i>	427	1.0201		
<i>Impaired</i>	Officer	<i>Ranch Hand</i>	39	1.0422	0.0120 --	0.746
		<i>Comparison</i>	45	1.0302		
	Enlisted Flyer	<i>Ranch Hand</i>	21	0.9849	0.0133 --	0.774
		<i>Comparison</i>	27	0.9716		
	Enlisted Groundcrew	<i>Ranch Hand</i>	59	1.0794	0.0575 --	0.066
		<i>Comparison</i>	60	1.0219		
<i>Diabetic</i>	Officer	<i>Ranch Hand</i>	57	0.9787	0.0413 --	0.155
		<i>Comparison</i>	58	0.9374		
	Enlisted Flyer	<i>Ranch Hand</i>	25	0.9860	0.0485 --	0.233
		<i>Comparison</i>	36	0.9376		
	Enlisted Groundcrew	<i>Ranch Hand</i>	62	1.0331	0.0363 --	0.184
		<i>Comparison</i>	88	0.9967		

Table M-2-4. (Continued)
Interaction Table for Serum Creatinine (mg/dl)

b) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED (Dioxin Category-by-Diabetic Class: Table 17-8)				
Stratum	Initial Dioxin Category Summary Statistics		Analysis Results for \log_2 (Initial Dioxin) Adjusted Slope (Std. Error) ^d	
	Initial Dioxin	n	Adjusted Mean ^a	
Normal	Low	120	1.0323	-0.0184 (0.0086) 0.032
	Medium	117	0.9822	
	High	111	0.9749	
Impaired	Low	22	0.9863	0.0373 (0.0176) 0.035
	Medium	24	0.9970	
	High	28	1.1184	
Diabetic	Low	32	1.0488	-0.0113 (0.0145) 0.439
	Medium	32	0.9784	
	High	34	0.9632	

c) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED (Dioxin Category-by-Diabetic Class: Table 17-8)					
Stratum	Dioxin Category	n	Adjusted Mean ^a	Difference of Adjusted Mean vs. Comparisons (95% C.I.) ^b	p-Value ^c
Normal	Comparison	802	1.0163		
	Background RH	298	0.9963	-0.0200 --	0.080
	Low RH	176	1.0301	0.0137 --	0.326
	High RH	172	0.9866	-0.0297 --	0.037
	Low plus High RH	348	1.0111	-0.0053 --	0.502
Impaired	Comparison	109	0.9946		
	Background RH	33	1.0216	0.0271 --	0.423
	Low RH	33	0.9602	-0.0344 --	0.281
	High RH	41	1.0737	0.0791 --	0.014
	Low plus High RH	74	1.0231	0.0285 --	0.329
Diabetic	Comparison	151	0.9472		
	Background RH	42	0.9872	0.0400 --	0.158
	Low RH	51	1.0051	0.0579 --	0.028
	High RH	47	0.9642	0.0169 --	0.526
	Low plus High RH	98	0.9862	0.0390 --	0.065

^a Transformed from natural logarithm scale.

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

^c P-value is based on difference of means on natural logarithm scale.

^d Slope and standard error based on natural logarithm of serum creatinine versus \log_2 (initial dioxin).

Note: RH = Ranch Hand.

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

Model 3: 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 M-2-5.
Interaction Table for Urine Specific Gravity

a) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED (Initial Dioxin-by-Age: Table 17-9)					
Stratum	Initial Dioxin Category Summary Statistics			Analysis Results for \log_2 (Initial Dioxin)	
	Initial Dioxin	n	Adjusted Mean	Adjusted Slope (Std. Error)	p-Value
Born \geq 1942	Low	54	1.0191	-0.0002 (0.0003)	0.535
	Medium	72	1.0194		
	High	111	1.0183		
Born < 1942	Low	119	1.0178	0.0009 (0.0004)	0.012
	Medium	101	1.0188		
	High	61	1.0203		

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