The Model 2 unadjusted analysis of WBC count revealed a significant positive association between WBC count in its continuous form and initial dioxin (Table 15-5(c): p=0.035, slope=0.019). After covariate adjustment, the relation was nonsignificant (Table 15-5(d): p=0.414).

The mean WBC count for Ranch Hands in the high dioxin category was significantly greater than Comparisons in the Model 3 unadjusted analysis of WBC count (Table 15-5(e): p=0.029, difference of adjusted means=0.28 thousand/mm^3). Other unadjusted contrasts were nonsignificant, as well as all contrasts in the adjusted analysis (Table 15-5(e,f): p>0.32 for all other contrasts).

A significant positive association between WBC count and 1987 dioxin levels was found in the Model 4 unadjusted analysis (Table 15-5(g): p=0.013, slope=0.015). The association was nonsignificant after adjustment for covariates (Table 15-5(h): p=0.263).

15.2.2.1.4 WBC Count (Discrete)

No significant differences were found between Ranch Hands and Comparisons in Model 1 unadjusted and adjusted analyses (Table 15-6(a,b): p≥0.15 for each contrast).

Both the unadjusted and adjusted Model 2 analyses revealed a significant inverse association between initial dioxin and abnormally low WBC counts (Table 15-6(c,d): p=0.012, Est. RR=0.59; p=0.043, Adj. RR=0.61, respectively). As initial dioxin increased, the percentage of abnormally low WBC counts decreased. Analyses of the associations between initial dioxin and the percentage of participants with abnormally high WBC counts were nonsignificant (Table 15-6(c,d): p>0.39 for each analysis).

A higher percentage of abnormally low WBC counts was found among Ranch Hands in the low dioxin category relative to Comparisons (Table 15-6(e): p=0.027, Est. RR=1.82). After adjustment for covariates, this result became marginally significant (Table 15-6(f): p=0.070, Adj. RR=1.67). No other differences in the percentage of abnormal WBC counts between Ranch Hands and Comparisons were found (Table 15-6(e,f): p>0.18 for each remaining contrast).

Table 15-6. Analysis of WBC Count (Discrete)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS — UNADJUSTED

Occupational Category	Group	n	Number (%) Abnormal Low	Normal	Abnormal High	Abnormal Low vs. Normal Est. Relative Risk (95% C.I.)	p-Value	Abnormal High vs. Normal Est. Relative Risk (95% C.I.)	p-Value
All	***Ranch Hand***	***866***	***51 (5.9)***	***784 (90.5)***	***31 (3.6)***	***1.20 (0.82,1.75)***	***0.353***	***1.00 (0.63,1.60)***	***0.988***
	Comparison	***1,249***	***62 (5.0)***	***1,142 (91.4)***	***45 (3.6)***				
Officer	Ranch Hand	341	22 (6.5)	312 (91.5)	7 (2.1)	1.10 (0.62,1.95)	0.747	0.85 (0.33,2.17)	0.727
	Comparison	493	29 (5.9)	452 (91.7)	12 (2.4)				
Enlisted Flyer	Ranch Hand	151	10 (6.6)	133 (88.1)	8 (5.3)	2.14 (0.76,6.05)	0.150	1.03 (0.40,2.68)	0.954
	Comparison	187	6 (3.2)	171 (91.4)	10 (5.4)				
Enlisted Groundcrew	Ranch Hand	374	19 (5.1)	339 (90.6)	16 (4.3)	1.08 (0.59,1.97)	0.809	1.07 (0.55,2.05)	0.850
	Comparison	569	27 (4.8)	519 (91.2)	23 (4.0)				

(b) MODEL 1: RANCH HANDS VS. COMPARISONS — ADJUSTED

Occupational Category	Abnormal Low vs. Normal Adj. Relative Risk (95% C.I.)	p-Value	Abnormal High vs. Normal Adj. Relative Risk (95% C.I.)	p-Value
All	***1.18 (0.80,1.74)***	***0.415***	***0.93 (0.58,1.51)***	***0.783***
Officer	1.10 (0.62,1.96)	0.754	0.91 (0.35,2.35)	0.843
Enlisted Flyer	2.12 (0.73,6.09)	0.165	0.99 (0.37,2.68)	0.985
Enlisted Groundcrew	1.03 (0.55,1.93)	0.923	0.93 (0.47,1.82)	0.822

Table 15-6. Analysis of WBC Count (Discrete) (Continued)

(c) MODEL 2: RANCH HANDS — INITIAL DIOXIN — UNADJUSTED

Initial Dioxin Category	n	Initial Dioxin Category Summary Statistics Number (%) Abnormal Low	Normal	Abnormal High	Analysis Results for Log_2 (Initial Dioxin)[a] Abnormal Low vs. Normal Est. Relative Risk (95% C.I.)[b]	p-Value	Abnormal High vs. Normal Est. Relative Risk (95% C.I.)[b]	p-Value
Low	160	16 (10.0)	139 (86.9)	5 (3.1)	0.59 (0.39,0.89)	0.012	0.99 (0.69,1.43)	0.964
Medium	162	7 (4.3)	148 (91.4)	7 (4.3)				
High	156	3 (1.9)	147 (94.2)	6 (3.9)				

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[b] Relative risk for a twofold increase in initial dioxin.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(d) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED

n	Analysis Results for Log_2 (Initial Dioxin) Abnormal Low vs. Normal Adj. Relative Risk (95% C.I.)[a]	p-Value	Abnormal High vs. Normal Adj. Relative Risk (95% C.I.)[a]	p-Value
477	0.61 (0.38,0.99)	0.043	0.83 (0.54,1.27)	0.395

[a] Relative risk for a twofold increase in initial dioxin.

Table 15-6. Analysis of WBC Count (Discrete) (Continued)

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — UNADJUSTED

Dioxin Category	n	Number (%) Abnormal Low	Normal	Abnormal High	Abnormal Low vs. Normal Est. Relative Risk (95% C.I.)[ab]	p-Value	Abnormal High vs. Normal Est. Relative Risk (95% C.I.)[ab]	p-Value
Comparison	1,211	59 (4.9)	1,109 (91.6)	43 (3.6)				
Background RH	381	25 (6.6)	344 (90.3)	12 (3.2)	1.22 (0.75,1.99)	0.426	0.86 (0.45,1.67)	0.664
Low RH	239	20 (8.4)	212 (88.7)	7 (2.9)	1.82 (1.07,3.10)	0.027	0.86 (0.38,1.94)	0.716
High RH	239	6 (2.5)	222 (92.9)	11 (4.6)	0.56 (0.24,1.32)	0.188	1.32 (0.67,2.61)	0.420
Low plus High RH	478	26 (5.4)	434 (90.8)	18 (3.8)	1.01 (0.59,1.73)	0.963	1.07 (0.60,1.89)	0.825

[a] Relative risk and confidence interval relative to Comparisons.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.

Note: RH = Ranch Hand. Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt. Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED

Dioxin Category	n	Abnormal Low vs. Normal Adj. Relative Risk (95% C.I.)[a]	p-Value	Abnormal High vs. Normal Adj. Relative Risk (95% C.I.)[a]	p-Value
Comparison	1,210				
Background RH	380	1.16 (0.70,1.93)	0.564	0.86 (0.43,1.71)	0.660
Low RH	238	1.67 (0.96,2.91)	0.070	0.82 (0.36,1.90)	0.650
High RH	239	0.64 (0.26,1.56)	0.326	1.09 (0.53,2.24)	0.825
Low plus High RH	477	1.03 (0.59,1.81)	0.907	0.95 (0.52,1.72)	0.855

[a] Relative risk and confidence interval relative to Comparisons.

Note: RH = Ranch Hand. Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt. Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Table 15-6. Analysis of WBC Count (Discrete) (Continued)

(g) MODEL 4: RANCH HANDS — 1987 DIOXIN — UNADJUSTED

1987 Dioxin Category	n	1987 Dioxin Category Summary Statistics Number (%) Abnormal Low	Normal	Abnormal High	Analysis Results for Log_2 (1987 Dioxin + 1) Abnormal Low vs. Normal Est. Relative Risk (95% C.I.)[a]	p-Value	Abnormal High vs. Normal Est. Relative Risk (95% C.I.)[a]	p-Value
Low	288	19 (6.6)	261 (90.6)	8 (2.8)	0.78 (0.63,0.96)	0.020	0.99 (0.77,1.27)	0.957
Medium	287	24 (8.4)	254 (88.5)	9 (3.1)				
High	284	8 (2.8)	263 (92.6)	13 (4.6)				

[a] Relative risk for a twofold increase in 1987 dioxin.

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

(h) MODEL 4: RANCH HANDS — 1987 DIOXIN — ADJUSTED

n	Analysis Results for Log_2 (1987 Dioxin + 1) Abnormal Low vs. Normal Adj. Relative Risk (95% C.I.)[a]	p-Value	Abnormal High vs. Normal Adj. Relative Risk (95% C.I.)[a]	p-Value
857	0.76 (0.59,0.98)	0.032	0.93 (0.72,1.20)	0.570

[a] Relative risk for a twofold increase in 1987 dioxin.

Although the contrasts of Ranch Hands in the low dioxin category and Comparisons indicated an increased percentage of Ranch Hands with an abnormally low WBC count (8.4% vs. 4.9%), contrasts of Ranch Hands in the high dioxin category and Comparisons showed the opposite pattern. As shown in Table 15-6(e) and 15-6(f), a smaller percentage of Ranch Hands in the high dioxin category (2.5%) had an abnormally low WBC count than did Comparisons (4.9%). Because of these opposite patterns, the percentages of Ranch Hands in the low and high dioxin categories combined and Comparisons were nearly equal. Consequently, a dose-response pattern was not evident between abnormally low WBC counts and dioxin in the Model 3 analyses.

Similar to the Model 2 analysis, the Model 4 unadjusted analysis of WBC count displayed a significant inverse relation between 1987 dioxin levels and abnormally low WBC count (Table 15-6(g): p=0.020, Est. RR=0.78). The significant relation remained after adjustment for covariates (Table 15-6(h): p=0.032, Adj. RR=0.76). As 1987 dioxin increased, the percentage of abnormally low WBC counts decreased. The associations between abnormally high WBC counts and 1987 dioxin were nonsignificant (Table 15-6(g,h): p≥0.57 for the unadjusted and adjusted analyses).

15.2.2.1.5 Hemoglobin (Continuous)

No significant results were found in the Model 1 unadjusted and adjusted analyses of hemoglobin in its continuous form (Table 15-7(a,b): p>0.20 for all contrasts).

Table 15-7. Analysis of Hemoglobin (gm/dl) (Continuous)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS – UNADJUSTED

Occupational Category	Group	n	Mean	Difference of Means (95% C.I.)	p-Value
All	***Ranch Hand***	***866***	***15.32***	***0.00 (–0.09,0.09)***	***0.979***
	Comparison	***1,249***	***15.33***		
Officer	Ranch Hand	341	15.23	–0.06 (–0.20,0.08)	0.389
	Comparison	493	15.29		
Enlisted Flyer	Ranch Hand	151	15.29	–0.08 (–0.30,0.13)	0.445
	Comparison	187	15.38		
Enlisted Groundcrew	Ranch Hand	374	15.42	0.09 (–0.05,0.22)	0.206
	Comparison	569	15.34		

(b) MODEL 1: RANCH HANDS VS. COMPARISONS – ADJUSTED

Occupational Category	Group	n	Adjusted Mean	Difference of Adj. Means (95% C.I.)	p-Value
All	***Ranch Hand***	***864***	***15.05***	***–0.01 (–0.09,0.08)***	***0.883***
	Comparison	***1,248***	***15.05***		
Officer	Ranch Hand	340	15.03	–0.05 (–0.18,0.09)	0.489
	Comparison	493	15.07		
Enlisted Flyer	Ranch Hand	151	15.02	–0.09 (–0.29,0.12)	0.422
	Comparison	187	15.10		
Enlisted Groundcrew	Ranch Hand	373	15.07	0.06 (–0.07,0.19)	0.356
	Comparison	568	15.01		

Table 15-7. Analysis of Hemoglobin (gm/dl) (Continuous) (Continued)

(c) MODEL 2: RANCH HANDS – INITIAL DIOXIN – UNADJUSTED

Initial Dioxin Category Summary Statistics				Analysis Results for Log_2 (Initial Dioxin)		
Initial Dioxin	n	Mean	Adj. Mean[a]	R^2	Slope (Std. Error)	p-Value
Low	160	15.21	15.21	0.011	0.078 (0.034)	0.023
Medium	162	15.34	15.34			
High	156	15.52	15.52			

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(d) MODEL 2: RANCH HANDS – INITIAL DIOXIN – ADJUSTED

Initial Dioxin Category Summary Statistics			Analysis Results for Log_2 (Initial Dioxin)		
Initial Dioxin	n	Adj. Mean	R^2	Adj. Slope (Std. Error)	p-Value
Low	159	15.10	0.084	0.030 (0.039)	0.443
Medium	162	15.16			
High	156	15.28			

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – UNADJUSTED

Dioxin Category	n	Mean	Adj. Mean[a]	Difference of Adj. Mean vs. Comparisons (95% C.I.)	p-Value
Comparison	1,211	15.33	15.33		
Background RH	381	15.31	15.30	–0.03 (–0.14,0.09)	0.641
Low RH	239	15.26	15.26	–0.07 (–0.21,0.07)	0.319
High RH	239	15.45	15.46	0.12 (–0.01,0.26)	0.080
Low plus High RH	478	15.36	15.36	0.03 (–0.08,0.13)	0.617

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Table 15-7. Analysis of Hemoglobin (gm/dl) (Continuous) (Continued)

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED

Dioxin Category	n	Adj. Mean	Difference of Adj. Mean vs. Comparisons (95% C.I.)	p-Value
Comparison	1,210	15.06		
Background RH	380	15.04	–0.02 (–0.14,0.09)	0.679
Low RH	238	15.04	–0.02 (–0.16,0.11)	0.731
High RH	239	15.12	0.06 (–0.08,0.20)	0.379
Low plus High RH	477	15.08	0.02 (–0.08,0.12)	0.715

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(g) MODEL 4: RANCH HANDS – 1987 DIOXIN – UNADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin +1)		
1987 Dioxin	n	Mean	R^2	Slope (Std. Error)	p-Value
Low	288	15.34	0.003	0.035 (0.023)	0.133
Medium	287	15.22			
High	284	15.45			

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

(h) MODEL 4: RANCH HANDS – 1987 DIOXIN – ADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin + 1)		
1987 Dioxin	n	Adj. Mean[a]	R^2	Adjusted Slope (Std. Error)[b]	p-Value
Low	287	15.13	0.088	0.021 (0.026)	0.421
Medium	286	15.06			
High	284	15.19			

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

A significant positive association between hemoglobin and initial dioxin was found in the unadjusted Model 2 analysis (Table 15-7(c): p=0.023, slope=0.078). The association was nonsignificant after adjustment for covariates (Table 15-7(d): p=0.443).

The Model 3 unadjusted analysis revealed a marginally significant higher mean hemoglobin level for Ranch Hands in the high dioxin category than for Comparisons (Table 15-7(e): p=0.080, difference of adjusted means=0.12 gm/dl). All other unadjusted contrasts were nonsignificant (Table 15-7(e): p>0.31 for all other contrasts). The contrast between Ranch Hands in the high dioxin category and Comparisons, as well as all other adjusted analysis contrasts, was nonsignificant (Table 15-7(f): p>0.37 for all adjusted contrasts).

The unadjusted and adjusted Model 4 analyses of hemoglobin revealed no significant associations with dioxin (Table 15-7(g,h): p>0.13 for both analyses).

15.2.2.1.6 Hemoglobin (Discrete)

Model 1 and Model 3 analyses of hemoglobin in its discrete form found no significant difference between Ranch Hands and Comparisons with respect to hemoglobin abnormalities (Table 15-8(a,b,e,f): p>0.11 for each unadjusted and adjusted contrast).

The Model 2 unadjusted analysis of hemoglobin revealed a marginally significant inverse association between initial dioxin and abnormally low hemoglobin levels (Table 15-8(c): p=0.075, Est. RR=0.74). After adjustment for covariates, the association was nonsignificant (Table 15-8(d): p=0.364). The association between abnormally high hemoglobin levels and initial dioxin was nonsignificant for both unadjusted and adjusted analyses (Table 15-8(c,d): p>0.85 for both analyses).

Table 15-8. Analysis of Hemoglobin (Discrete)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS — UNADJUSTED

Occupational Category	Group	n	Number (%) Abnormal Low	Normal	Abnormal High	Abnormal Low vs. Normal Est. Relative Risk (95% C.I.)	p-Value	Abnormal High vs. Normal Est. Relative Risk (95% C.I.)	p-Value
All	***Ranch Hand***	***866***	***62 (7.2)***	***801 (92.5)***	***3 (0.4)***	***1.14 (0.81,1.61)***	***0.458***	***0.62 (0.16,2.41)***	***0.493***
	Comparison	***1,249***	***79 (6.3)***	***1,163 (93.1)***	***7 (0.6)***				
Officer	Ranch Hand	341	25 (7.3)	314 (92.1)	2 (0.6)	1.27 (0.73,2.21)	0.400	1.47 (0.21,10.49)	0.700
	Comparison	493	29 (5.9)	462 (93.7)	2 (0.4)				
Enlisted Flyer	Ranch Hand	151	16 (10.6)	134 (88.7)	1 (0.7)	1.60 (0.74,3.44)	0.230	--	0.899[a]
	Comparison	187	13 (7.0)	174 (93.1)	0 (0.0)				
Enlisted Groundcrew	Ranch Hand	374	21 (5.6)	353 (94.4)	0 (0.0)	0.85 (0.49,1.47)	0.557	--	0.171[a]
	Comparison	569	37 (6.5)	527 (92.6)	5 (0.9)				

[a] P-value determined using a chi-square test with continuity correction because of the sparse number of participants with an abnormal high hemoglobin level.

--: Results not presented because of the sparse number of participants with an abnormal high hemoglobin level.

(b) MODEL 1: RANCH HANDS VS. COMPARISONS — ADJUSTED

Occupational Category	Abnormal Low vs. Normal Adj. Relative Risk (95% C.I.)	p-Value	Abnormal High vs. Normal Adj. Relative Risk (95% C.I.)	p-Value
All	***1.15 (0.81,1.63)***	***0.433***	***0.61 (0.16,2.38)***	***0.480***
Officer	1.25 (0.72,2.19)	0.433	1.52 (0.21,10.95)	0.675
Enlisted Flyer	1.58 (0.73,3.44)	0.246	--	--
Enlisted Groundcrew	0.90 (0.51,1.58)	0.713	--	--

--: Results not presented because of the sparse number of participants with an abnormal high hemoglobin level.

Note: Results are not adjusted for race because of the sparse number of participants with an abnormal high hemoglobin level.

Table 15-8. Analysis of Hemoglobin (Discrete) (Continued)

(c) MODEL 2: RANCH HANDS — INITIAL DIOXIN — UNADJUSTED

Initial Dioxin Category	Initial Dioxin Category Summary Statistics Number (%)				Analysis Results for Log_2 (Initial Dioxin)[a] Abnormal Low vs. Normal		Abnormal High vs. Normal	
	n	Abnormal Low	Normal	Abnormal High	Est. Relative Risk (95% C.I.)[b]	p-Value	Est. Relative Risk (95% C.I.)[b]	p-Value
Low	160	13 (8.1)	147 (91.9)	0 (0.0)	0.74 (0.53,1.03)	0.075	1.16 (0.24,5.60)	0.856
Medium	162	11 (6.8)	150 (92.6)	1 (0.6)				
High	156	5 (3.2)	151 (96.8)	0 (0.0)				

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[b] Relative risk for a twofold increase in initial dioxin.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(d) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED

	Analysis Results for Log_2 (Initial Dioxin) Abnormal Low vs. Normal		Abnormal High vs. Normal	
n	Adj. Relative Risk (95% C.I.)[a]	p-Value	Adj. Relative Risk (95% C.I.)[a]	p-Value
477	0.85 (0.61,1.20)	0.364	1.04 (0.17,6.53)	0.966

[a] Relative risk for a twofold increase in initial dioxin.

Note: Results are not adjusted for occupation or race because of the sparse number of participants with an abnormal high hemoglobin level.

Table 15-8. Analysis of Hemoglobin (Discrete) (Continued)

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — UNADJUSTED

		Number (%)			Abnormal Low vs. Normal		Abnormal High vs. Normal	
Dioxin Category	n	Abnormal Low	Normal	Abnormal High	Est. Relative Risk (95% C.I.)[ab]	p-Value	Est. Relative Risk (95% C.I.)[ab]	p-Value
Comparison	1,211	74 (6.1)	1,130 (93.3)	7 (0.6)				
Background RH	381	30 (7.9)	349 (91.6)	2 (0.5)	1.35 (0.86,2.10)	0.188	1.04 (0.21,5.12)	0.958
Low RH	239	16 (6.7)	223 (93.3)	0 (0.0)	1.09 (0.62,1.90)	0.767	--	0.507[c]
High RH	239	13 (5.4)	225 (94.1)	1 (0.4)	0.86 (0.47,1.58)	0.630	0.64 (0.08,5.28)	0.677
Low plus High RH	478	29 (6.1)	448 (93.7)	1 (0.2)	0.97 (0.62,1.51)	0.887	--	0.547[c]

[a] Relative risk and confidence interval relative to Comparisons.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[c] P-value determined using a chi-square test with continuity correction because of the sparse number of participants with an abnormal high hemoglobin level.
--: Results not presented because of the sparse number of participants with an abnormal high hemoglobin level.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Table 15-8. Analysis of Hemoglobin (Discrete) (Continued)

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED

Dioxin Category	n	Abnormal Low vs. Normal: Adj. Relative Risk (95% C.I.)[a]	Abnormal Low vs. Normal: p-Value	Abnormal High vs. Normal: Adj. Relative Risk (95% C.I.)[a]	Abnormal High vs. Normal: p-Value
Comparison	1,210				
Background RH	380	1.44 (0.91,2.29)	0.118	1.01 (0.20,5.14)	0.987
Low RH	238	0.96 (0.54,1.70)	0.886	--	--
High RH	239	0.90 (0.48,1.69)	0.735	0.69 (0.08,6.00)	0.735
Low plus High RH	477	0.93 (0.59,1.47)	0.746	--	--

[a] Relative risk and confidence interval relative to Comparisons.
--: Results not presented because of the sparse number of participants with an abnormal high hemoglobin level.

Note: RH = Ranch Hand. Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt. Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Results are not adjusted for race because of the sparse number of participants with an abnormal high hemoglobin level.

(g) MODEL 4: RANCH HANDS — 1987 DIOXIN — UNADJUSTED

1987 Dioxin Category	n	1987 Dioxin Category Summary Statistics Number (%): Abnormal Low	Normal	Abnormal High	Analysis Results for Log_2 (1987 Dioxin + 1): Abnormal Low vs. Normal: Est. Relative Risk (95% C.I.)[a]	p-Value	Abnormal High vs. Normal: Est. Relative Risk (95% C.I.)[a]	p-Value
Low	288	21 (7.3)	265 (92.0)	2 (0.7)	0.82 (0.68,1.00)	0.049	0.47 (0.20,1.14)	0.096
Medium	287	23 (8.0)	264 (92.0)	0 (0.0)				
High	284	15 (5.3)	268 (94.4)	1 (0.4)				

[a] Relative risk for a twofold increase in 1987 dioxin.

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

Table 15-8. Analysis of Hemoglobin (Discrete) (Continued)

(h) MODEL 4: RANCH HANDS — 1987 DIOXIN — ADJUSTED				
	Analysis Results for Log_2 (1987 Dioxin + 1)			
	Abnormal Low vs. Normal		Abnormal High vs. Normal	
n	Adj. Relative Risk (95% C.I.)[a]	p-Value	Adj. Relative Risk (95% C.I.)[a]	p-Value
857	0.84 (0.68,1.04)	0.108	0.52 (0.22,1.23)	0.135

[a] Relative risk for a twofold increase in 1987 dioxin.

Note: Results are not adjusted for occupation or race because of the sparse number of participants with an abnormal high hemoglobin level.

The Model 4 unadjusted analysis revealed a significant inverse association between abnormally low hemoglobin levels and 1987 dioxin levels (Table 15-8(g): p=0.049, Est. RR=0.82). In addition, a marginally significant inverse association between abnormally high hemoglobin levels and 1987 dioxin levels was found in the unadjusted analysis (Table 15-8(g): p=0.096, Est. RR=0.47). After adjustment for covariates, the association became nonsignificant (p>0.10 for each analysis).

15.2.2.1.7 Hematocrit (Continuous)

The Model 2 analysis of hematocrit in its continuous form revealed a significant positive association between hemoglobin and initial dioxin (Table 15-9(c): p=0.021, slope=0.241). After adjustment for covariates, the relation was nonsignificant (Table 15-9(d): p=0.443). All other analyses were nonsignificant (Table 15-9(a–h): p>0.14 for all other analyses).

Table 15-9. Analysis of Hematocrit (percent) (Continuous)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS – UNADJUSTED

Occupational Category	Group	n	Mean	Difference of Means (95% C.I.)	p-Value
All	***Ranch Hand***	***866***	***45.56***	***–0.04 (–0.31,0.24)***	***0.798***
	Comparison	***1,249***	***45.59***		
Officer	Ranch Hand	341	45.24	–0.24 (–0.67,0.19)	0.274
	Comparison	493	45.48		
Enlisted Flyer	Ranch Hand	151	45.49	–0.23 (–0.90,0.44)	0.504
	Comparison	187	45.72		
Enlisted Groundcrew	Ranch Hand	374	45.88	0.22 (–0.18,0.63)	0.279
	Comparison	569	45.65		

(b) MODEL 1: RANCH HANDS VS. COMPARISONS – ADJUSTED

Occupational Category	Group	n	Adjusted Mean	Difference of Adj. Means (95% C.I.)	p-Value
All	***Ranch Hand***	***864***	***44.99***	***–0.06 (–0.32,0.21)***	***0.681***
	Comparison	***1,248***	***45.05***		
Officer	Ranch Hand	340	44.90	–0.21 (–0.63,0.21)	0.326
	Comparison	493	45.11		
Enlisted Flyer	Ranch Hand	151	44.92	–0.24 (–0.88,0.41)	0.477
	Comparison	187	45.16		
Enlisted Groundcrew	Ranch Hand	373	45.08	0.15 (–0.25,0.55)	0.457
	Comparison	568	44.93		

Table 15-9. Analysis of Hematocrit (percent) (Continuous) (Continued)

(c) MODEL 2: RANCH HANDS – INITIAL DIOXIN – UNADJUSTED

Initial Dioxin Category Summary Statistics				Analysis Results for Log_2 (Initial Dioxin)		
Initial Dioxin	n	Mean	Adj. Mean[a]	R^2	Slope (Std. Error)	p-Value
Low	160	45.17	45.17	0.011	0.241 (0.104)	0.021
Medium	162	45.58	45.58			
High	156	46.08	46.09			

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(d) MODEL 2: RANCH HANDS – INITIAL DIOXIN – ADJUSTED

Initial Dioxin Category Summary Statistics			Analysis Results for Log_2 (Initial Dioxin)		
Initial Dioxin	n	Adj. Mean	R^2	Adj. Slope (Std. Error)	p-Value
Low	159	45.06	0.068	0.091 (0.119)	0.443
Medium	162	45.26			
High	156	45.57			

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – UNADJUSTED

Dioxin Category	n	Mean	Adj. Mean[a]	Difference of Adj. Mean vs. Comparisons (95% C.I.)	p-Value
Comparison	1,211	45.61	45.61		
Background RH	381	45.57	45.56	–0.06 (–0.41,0.30)	0.756
Low RH	239	45.30	45.30	–0.31 (–0.74,0.12)	0.153
High RH	239	45.92	45.93	0.32 (–0.11,0.75)	0.147
Low plus High RH	478	45.61	45.61	0.00 (–0.32,0.33)	0.987

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Table 15-9. Analysis of Hematocrit (percent) (Continuous) (Continued)

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED

Dioxin Category	n	Adj. Mean	Difference of Adj. Mean vs. Comparisons (95% C.I.)	p-Value
Comparison	1,210	45.08		
Background RH	380	45.04	–0.04 (–0.39,0.32)	0.839
Low RH	238	44.87	–0.21 (–0.63,0.20)	0.318
High RH	239	45.22	0.14 (–0.29,0.56)	0.534
Low plus High RH	477	45.04	–0.04 (–0.36,0.28)	0.817

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(g) MODEL 4: RANCH HANDS – 1987 DIOXIN – UNADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin +1)		
1987 Dioxin	n	Mean	R^2	Slope (Std. Error)	p-Value
Low	288	45.68	0.001	0.077 (0.071)	0.278
Medium	287	45.20			
High	284	45.89			

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

(h) MODEL 4: RANCH HANDS – 1987 DIOXIN – ADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin + 1)		
1987 Dioxin	n	Adj. Mean[a]	R^2	Adjusted Slope (Std. Error)[b]	p-Value
Low	287	45.40	0.075	0.029 (0.079)	0.712
Medium	286	45.01			
High	284	45.42			

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

15.2.2.1.8 Hematocrit (Discrete)

Analyses of hematocrit in its discrete form revealed no significant differences for Models 1 through 4 (Table 15-10(a–h): p>0.24 for each analysis performed).

Table 15-10. Analysis of Hematocrit (Discrete)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS — UNADJUSTED

Occupational Category	Group	n	Number (%) Abnormal Low	Normal	Abnormal High	Abnormal Low vs. Normal Est. Relative Risk (95% C.I.)	p-Value	Abnormal High vs. Normal Est. Relative Risk (95% C.I.)	p-Value
All	***Ranch Hand***	***866***	***21 (2.4)***	***844 (97.5)***	***1 (0.1)***	***1.04 (0.59,1.84)***	***0.886***	***0.29 (0.03,2.47)***	***0.256***
	Comparison	***1,249***	***29 (2.3)***	***1,215 (97.3)***	***5 (0.4)***				
Officer	Ranch Hand	341	8 (2.4)	333 (97.7)	0 (0.0)	0.96 (0.39,2.37)	0.928	--	0.647[a]
	Comparison	493	12 (2.4)	479 (97.2)	2 (0.4)				
Enlisted Flyer	Ranch Hand	151	6 (4.0)	144 (95.4)	1 (0.7)	1.91 (0.53,6.88)	0.325	--	0.907[a]
	Comparison	187	4 (2.1)	183 (97.9)	0 (0.0)				
Enlisted Groundcrew	Ranch Hand	374	7 (1.9)	367 (98.1)	0 (0.0)	0.81 (0.32,2.05)	0.659	--	0.413[a]
	Comparison	569	13 (2.3)	553 (97.2)	3 (0.5)				

[a] P-value determined using a chi-square test with continuity correction because of the sparse number of participants with an abnormal high hematocrit level.

--: Results not presented because of the sparse number of participants with an abnormal high hematocrit level.

Table 15-10. Analysis of Hematocrit (Discrete) (Continued)

(b) MODEL 1: RANCH HANDS VS. COMPARISONS — ADJUSTED

Occupational Category	Abnormal Low vs. Normal		Abnormal High vs. Normal	
	Adj. Relative Risk (95% C.I.)	p-Value	Adj. Relative Risk (95% C.I.)	p-Value
All	***1.04 (0.59,1.85)***	***0.886***	***0.28 (0.03,2.40)***	***0.245***
Officer	0.95 (0.38,2.36)	0.908	--	--
Enlisted Flyer	1.84 (0.51,6.72)	0.353	--	--
Enlisted Groundcrew	0.85 (0.33,2.18)	0.739	--	--

--: Results not presented because of the sparse number of participants with an abnormal high hematocrit level.

Note: Results are not adjusted for race because of the sparse number of participants with an abnormal high hematocrit level.

(c) MODEL 2: RANCH HANDS — INITIAL DIOXIN — UNADJUSTED

Initial Dioxin Category Summary Statistics Number (%)					Analysis Results for Log_2 (Initial Dioxin)[a]			
					Abnormal Low vs. Normal		Abnormal High vs. Normal	
Initial Dioxin Category	n	Abnormal Low	Normal	Abnormal High	Est. Relative Risk (95% C.I.)[b]	p-Value	Est. Relative Risk (95% C.I.)[b]	p-Value
Low	160	3 (1.9)	157 (98.1)	0 (0.0)	0.95 (0.58,1.57)	0.840	1.17 (0.24,5.66)	0.841
Medium	162	5 (3.1)	156 (96.3)	1 (0.6)				
High	156	2 (1.3)	154 (98.7)	0 (0.0)				

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[b] Relative risk for a twofold increase in initial dioxin.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

Table 15-10. Analysis of Hematocrit (Discrete) (Continued)

(d) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED

	Analysis Results for Log_2 (Initial Dioxin)			
	Abnormal Low vs. Normal		Abnormal High vs. Normal	
n	Adj. Relative Risk (95% C.I.)[a]	p-Value	Adj. Relative Risk (95% C.I.)[a]	p-Value
477	1.10 (0.66,1.85)	0.714	1.07 (0.17,6.61)	0.942

[a] Relative risk for a twofold increase in initial dioxin.

Note: Results are not adjusted for race or occupation because of the sparse number of participants with an abnormal high hematocrit level.

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — UNADJUSTED

		Number (%)			Abnormal Low vs. Normal		Abnormal High vs. Normal	
Dioxin Category	n	Abnormal Low	Normal	Abnormal High	Est. Relative Risk (95% C.I.)[ab]	p-Value	Est. Relative Risk (95% C.I.)[ab]	p-Value
Comparison	1,211	27 (2.2)	1,179 (97.4)	5 (0.4)				
Background RH	381	8 (2.1)	373 (97.9)	0 (0.0)	0.97 (0.43,2.16)	0.933	--	0.464[c]
Low RH	239	5 (2.1)	234 (97.9)	0 (0.0)	0.93 (0.35,2.43)	0.875	--	0.695[c]
High RH	239	5 (2.1)	233 (97.5)	1 (0.4)	0.91 (0.35,2.40)	0.850	0.91 (0.10,7.96)	0.931
Low plus High RH	478	10 (2.1)	467 (97.7)	1 (0.2)	0.92 (0.44,1.92)	0.820	--	0.856[c]

[a] Relative risk and confidence interval relative to Comparisons.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[c] P-value determined using a chi-square test with continuity correction because of the sparse number of participants with an abnormal high hematocrit level
--: Results not presented because of the sparse number of participants with an abnormal high hematocrit level.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Table 15-10. Analysis of Hematocrit (Discrete) (Continued)

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED

Dioxin Category	n	Abnormal Low vs. Normal: Adj. Relative Risk (95% C.I.)[a]	Abnormal Low vs. Normal: p-Value	Abnormal High vs. Normal: Adj. Relative Risk (95% C.I.)[a]	Abnormal High vs. Normal: p-Value
Comparison	1,210				
Background RH	380	1.00 (0.44,2.28)	0.998	--	--
Low RH	238	0.78 (0.29,2.07)	0.615	--	--
High RH	239	1.01 (0.37,2.77)	0.980	0.98 (0.10,9.53)	0.986
Low plus High RH	477	0.89 (0.42,1.89)	0.757	--	--

[a] Relative risk and confidence interval relative to Comparisons.
--: Results not presented because of the sparse number of participants with an abnormal high hematocrit level.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Results are not adjusted for race because of the sparse number of participants with an abnormal high hematocrit level.

(g) MODEL 4: RANCH HANDS — 1987 DIOXIN — UNADJUSTED

1987 Dioxin Category	n	1987 Dioxin Category Summary Statistics: Number (%) Abnormal Low	Normal	Abnormal High	Analysis Results for Log_2 (1987 Dioxin + 1): Abnormal Low vs. Normal: Est. Relative Risk (95% C.I.)[a]	p-Value	Abnormal High vs. Normal: Est. Relative Risk (95% C.I.)[a]	p-Value
Low	288	7 (2.4)	281 (97.6)	0 (0.0)	0.91 (0.65,1.26)	0.568	1.41 (0.43,4.63)	0.573
Medium	287	4 (1.4)	283 (98.6)	0 (0.0)				
High	284	7 (2.5)	276 (97.2)	1 (0.4)				

[a] Relative risk for a twofold increase in 1987 dioxin.

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

Table 15-10. Analysis of Hematocrit (Discrete) (Continued)

(h) MODEL 4: RANCH HANDS — 1987 DIOXIN — ADJUSTED				
	Analysis Results for Log_2 (1987 Dioxin + 1)			
	Abnormal Low vs. Normal		Abnormal High vs. Normal	
n	Adj. Relative Risk (95% C.I.)[a]	p-Value	Adj. Relative Risk (95% C.I.)[a]	p-Value
857	0.97 (0.67,1.42)	0.894	1.44 (0.38,5.40)	0.588

[a] Relative risk for a twofold increase in 1987 dioxin.

Note: Results not adjusted for race or occupation because of the sparse number of participants with an abnormal high hematocrit level.

15.2.2.1.9 Platelet Count (Continuous)

When Ranch Hands and Comparisons were examined across all occupations, the difference in mean platelet count between the groups was nonsignificant in both unadjusted and adjusted analyses (Table 15-11(a,b): $p \geq 0.15$ in both analyses). In both the unadjusted and adjusted analyses, significant differences in mean platelet counts were found between Ranch Hands and Comparisons within each occupational stratum (Table 15-11(a,b): $p \leq 0.014$ for all occupational strata in both unadjusted and adjusted analyses). Mean platelet counts were higher among Comparisons than among Ranch Hands for the officer stratum and higher among Ranch Hands than among Comparisons for the enlisted flyer and enlisted groundcrew strata.

Table 15-11. Analysis of Platelet Count (thousand/mm^3) (Continuous)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS – UNADJUSTED

Occupational Category	Group	n	Mean[a]	Difference of Means (95% C.I.)[b]	p-Value[c]
All	***Ranch Hand***	***862***	***207.0***	***3.1 --***	***0.150***
	Comparison	***1,243***	***203.9***		
Officer	Ranch Hand	338	196.6	–8.5 --	0.012
	Comparison	490	205.1		
Enlisted Flyer	Ranch Hand	151	213.8	14.9 --	0.005
	Comparison	185	198.8		
Enlisted Groundcrew	Ranch Hand	373	213.9	9.3 --	0.004
	Comparison	568	204.6		

[a] Transformed from square root scale.
[b] Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on square root scale.
[c] P-value is based on difference of means on square root scale.

(b) MODEL 1: RANCH HANDS VS. COMPARISONS – ADJUSTED

Occupational Category	Group	n	Adjusted Mean[a]	Difference of Adj. Means (95% C.I.)[b]	p-Value[c]
All	***Ranch Hand***	***860***	***205.8***	***2.9 --***	***0.172***
	Comparison	***1,242***	***203.0***		
Officer	Ranch Hand	337	199.1	–8.2 --	0.014
	Comparison	490	207.3		
Enlisted Flyer	Ranch Hand	151	213.3	15.6 --	0.003
	Comparison	185	197.7		
Enlisted Groundcrew	Ranch Hand	372	208.9	8.1 --	0.011
	Comparison	567	200.8		

[a] Transformed from square root scale.
[b] Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on square root scale.
[c] P-value is based on difference of means on square root scale.

Table 15-11. Analysis of Platelet Count (thousand/mm^3) (Continuous) (Continued)

(c) MODEL 2: RANCH HANDS – INITIAL DIOXIN – UNADJUSTED

Initial Dioxin Category Summary Statistics				Analysis Results for Log_2 (Initial Dioxin)[b]		
Initial Dioxin	n	Mean[a]	Adj. Mean[ab]	R^2	Slope (Std. Error)[c]	p-Value
Low	159	204.2	203.8	0.016	0.145 (0.057)	0.012
Medium	162	208.0	207.9			
High	155	217.8	218.2			

[a] Transformed from square root scale.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[c] Slope and standard error based on square root of platelet count versus log_2 (initial dioxin).

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(d) MODEL 2: RANCH HANDS – INITIAL DIOXIN – ADJUSTED

Initial Dioxin Category Summary Statistics			Analysis Results for Log_2 (Initial Dioxin)		
Initial Dioxin	n	Adj. Mean[a]	R^2	Adj. Slope (Std. Error)[b]	p-Value
Low	158	207.5	0.090	0.073 (0.065)	0.262
Medium	162	207.6			
High	155	214.7			

[a] Transformed from square root scale.
[b] Slope and standard error based on square root of platelet count versus log_2 (initial dioxin).

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – UNADJUSTED

Dioxin Category	n	Mean[a]	Adj. Mean[ab]	Difference of Adj. Mean vs. Comparisons (95% C.I.)[c]	p-Value[d]
Comparison	1,205	204.5	204.6		
Background RH	379	203.6	202.1	–2.5 --	0.374
Low RH	238	204.2	204.6	–0.1 --	0.987
High RH	238	215.7	217.2	12.6 --	<0.001
Low plus High RH	476	209.9	210.8	6.2 --	0.017

[a] Transformed from square root scale.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[c] Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on square root scale.
[d] P-value is based on difference of means on square root scale.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Table 15-11. Analysis of Platelet Count (thousand/mm^3) (Continuous) (Continued)

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED

Dioxin Category	n	Adj. Mean[a]	Difference of Adj. Mean vs. Comparisons (95% C.I.)[b]	p-Value[c]
Comparison	1,204	204.2		
Background RH	378	202.3	–1.9 --	0.509
Low RH	237	204.4	0.2 --	0.959
High RH	238	214.8	10.6 --	0.002
Low plus High RH	475	209.6	5.4 --	0.038

[a] Transformed from square root scale.
[b] Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on square root scale.
[c] P-value is based on difference of means on square root scale.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(g) MODEL 4: RANCH HANDS – 1987 DIOXIN – UNADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin +1)[b]		
1987 Dioxin	n	Mean[a]	R^2	Slope (Std. Error)[b]	p-Value
Low	288	203.1	0.009	0.109 (0.039)	0.005
Medium	284	203.9			
High	283	214.5			

[a] Transformed from square root scale.
[b] Slope and standard error based on square root of platelet count versus log_2 (1987 dioxin + 1).

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

(h) MODEL 4: RANCH HANDS – 1987 DIOXIN – ADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin + 1)		
1987 Dioxin	n	Adj. Mean[a]	R^2	Adjusted Slope (Std. Error)[b]	p-Value
Low	287	205.1	0.066	0.049 (0.044)	0.264
Medium	283	204.7			
High	283	209.1			

[a] Transformed from square root scale.
[b] Slope and standard error based on square root of platelet count versus log_2 (1987 dioxin + 1).

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

The Model 2 unadjusted analysis of platelet count in its continuous form revealed a significant positive association with initial dioxin (Table 15-11(c): p=0.012, slope=0.145). After adjustment for the effects of covariates, the association was nonsignificant (Table 15-11(d): p=0.262).

Unadjusted and adjusted Model 3 analyses of mean platelet count levels were significantly greater for Ranch Hands in the high dioxin category than for Comparisons (Table 15-11(e,f): difference of adjusted means=12.6 thousand/mm^3, p<0.001, for the unadjusted analysis; difference of adjusted means=10.6 thousand/mm^3, p=0.002, for the adjusted analysis). Mean platelet counts also were significantly greater for Ranch Hands in the low and high dioxin categories combined than for Comparisons (Table 15-11(e,f): difference of adjusted means=6.2 thousand/mm^3, p=0.017, for the unadjusted analysis; difference of adjusted means=5.4 thousand/mm^3, p=0.038, for the adjusted analysis). Although the mean difference increased as dioxin levels increased, other contrasts of Ranch Hands and Comparisons were nonsignificant (Table 15-11(e,f): p>0.37 for all remaining contrasts).

Similar to the Model 2 analysis, the Model 4 unadjusted analysis of platelet count in its continuous form revealed a significant positive association with the 1987 dioxin levels (Table 15-11(g): p=0.005, slope=0.109). The relation was nonsignificant after adjustment for covariates (Table 15-11(h): p=0.264).

15.2.2.1.10 Platelet Count (Discrete)

A significant difference in the percentage of participants with abnormally low platelet counts was observed between Ranch Hand and Comparison officers in both the unadjusted and adjusted analyses (Table 15-12(a,b): p=0.021, Est. RR=2.65; p=0.022, Adj. RR=2.64, respectively). A significant difference in the percentage of participants with abnormally low platelet counts also was found for enlisted flyers (Table 15-12(a,b): p=0.032, Est. RR=0.11; p=0.029, Adj. RR=0.10, for the unadjusted and adjusted analyses, respectively). More Ranch Hand than Comparison officers had abnormally low platelet counts, (4.7% vs. 1.8%), whereas more Comparison than Ranch Hand enlisted flyers exhibited abnormally low platelet counts (6.0 vs. 0.7%). Contrasts of all Ranch Hands versus all Comparisons, as well as Ranch Hand versus Comparison enlisted groundcrew, were nonsignificant (Table 15-12(a,b): p>0.11 for all contrasts).

No significant associations were seen between abnormal platelet counts and initial dioxin in the Model 2 analyses (p>0.15 for all analyses). The Model 3 contrasts of Ranch Hands in the high dioxin category with Comparisons revealed marginally significant differences, with a higher percentage of Comparisons having abnormal platelet counts (Table 15-12(e,f): p=0.067, Est. RR=0.26; p=0.068, Adj. RR=0.26, for the unadjusted and adjusted analyses, respectively). This same pattern was observed when Ranch Hands in the low and high categories combined were contrasted with Comparisons (Table 15-12(e,f): p=0.090, Est. RR=0.47; p=0.078, Adj. RR=0.45, for the unadjusted and adjusted analyses, respectively). All other Model 3 contrasts were nonsignificant (Table 15-12(e,f): p>0.21 for all remaining contrasts).

A significant association between 1987 dioxin levels and abnormally low platelet count measures was found in the Model 4 unadjusted analysis of platelet count (Table 15-12(g): p=0.028, Est. RR=0.70). These results were nonsignificant after adjustment for covariates (Table 15-12(h): p=0.135). Other analyses of abnormal platelet counts with 1987 dioxin were nonsignificant (Table 15-12(g,h): p>0.61 for all other analyses).

Table 15-12. Analysis of Platelet Count (Discrete)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS — UNADJUSTED

Occupational Category	Group	n	Number (%) Abnormal Low	Normal	Abnormal High	Abnormal Low vs. Normal Est. Relative Risk (95% C.I.)	p-Value	Abnormal High vs. Normal Est. Relative Risk (95% C.I.)	p-Value
All	***Ranch Hand***	***862***	***23 (2.7)***	***835 (96.9)***	***4 (0.5)***	***0.85 (0.50,1.43)***	***0.533***	***1.15 (0.31,4.29)***	***0.837***
	Comparison	***1,243***	***39 (3.1)***	***1,199 (96.5)***	***5 (0.4)***				
Officer	Ranch Hand	338	16 (4.7)	321 (95.0)	1 (0.3)	2.65 (1.16,6.06)	0.021	0.50 (0.05,4.79)	0.545
	Comparison	490	9 (1.8)	478 (97.6)	3 (0.6)				
Enlisted Flyer	Ranch Hand	151	1 (0.7)	149 (98.7)	1 (0.7)	0.11 (0.01,0.83)	0.032	1.16 (0.07,18.72)	0.916
	Comparison	185	11 (6.0)	173 (93.5)	1 (0.5)				
Enlisted Groundcrew	Ranch Hand	373	6 (1.6)	365 (97.9)	2 (0.5)	0.47 (0.19,1.20)	0.115	3.00 (0.27,33.23)	0.370
	Comparison	568	19 (3.4)	548 (96.5)	1 (0.2)				

(b) MODEL 1: RANCH HANDS VS. COMPARISONS — ADJUSTED

Occupational Category	Abnormal Low vs. Normal Adj. Relative Risk (95% C.I.)	p-Value	Abnormal High vs. Normal Adj. Relative Risk (95% C.I.)	p-Value
All	***0.84 (0.50,1.42)***	***0.509***	***1.13 (0.30,4.27)***	***0.853***
Officer	2.64 (1.15,6.05)	0.022	0.55 (0.06,5.37)	0.606
Enlisted Flyer	0.10 (0.01,0.79)	0.029	1.18 (0.07,19.42)	0.906
Enlisted Groundcrew	0.48 (0.19,1.23)	0.127	2.61 (0.23,29.36)	0.437

Table 15-12. Analysis of Platelet Count (Discrete) (Continued)

(c) MODEL 2: RANCH HANDS — INITIAL DIOXIN — UNADJUSTED

Initial Dioxin Category	Initial Dioxin Category Summary Statistics Number (%)				Analysis Results for Log_2 (Initial Dioxin)[a] Abnormal Low vs. Normal		Abnormal High vs. Normal	
	n	Abnormal Low	Normal	Abnormal High	Est. Relative Risk (95% C.I.)[b]	p-Value	Est. Relative Risk (95% C.I.)[b]	p-Value
Low	159	3 (1.9)	156 (98.1)	0 (0.0)	0.63 (0.33,1.19)	0.152	1.28 (0.49,3.36)	0.616
Medium	162	4 (2.5)	157 (96.9)	1 (0.6)				
High	155	1 (0.7)	153 (98.7)	1 (0.7)				

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[b] Relative risk for a twofold increase in initial dioxin.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(d) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED

	Analysis Results for Log_2 (Initial Dioxin) Abnormal Low vs. Normal		Abnormal High vs. Normal	
n	Adj. Relative Risk (95% C.I.)[a]	p-Value	Adj. Relative Risk (95% C.I.)[a]	p-Value
475	0.69 (0.35,1.37)	0.290	0.67 (0.16,2.88)	0.590

[a] Relative risk for a twofold increase in initial dioxin.

Note: Results are not adjusted for occupation and race because of the sparse number of participants with an abnormal high platelet count.

Table 15-12. Analysis of Platelet Count (Discrete) (Continued)

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — UNADJUSTED

		Number (%)			Abnormal Low vs. Normal		Abnormal High vs. Normal	
Dioxin Category	n	Abnormal Low	Normal	Abnormal High	Est. Relative Risk (95% C.I.)[ab]	p-Value	Est. Relative Risk (95% C.I.)[ab]	p-Value
Comparison	1,205	35 (2.9)	1,165 (96.7)	5 (0.4)				
Background RH	379	14 (3.7)	363 (95.8)	2 (0.5)	1.40 (0.74,2.66)	0.299	1.02 (0.19,5.30)	0.984
Low RH	238	6 (2.5)	232 (97.5)	0 (0.0)	0.84 (0.35,2.03)	0.702	--	0.693[c]
High RH	238	2 (0.8)	234 (98.3)	2.(0.8)	0.26 (0.06,1.10)	0.067	2.61 (0.49,13.84)	0.261
Low plus High RH	476	8 (1.7)	466 (97.9)	2 (0.4)	0.47 (0.20,1.13)	0.090	--	0.999[c]

[a] Relative risk and confidence interval relative to Comparisons.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[c] P-value determined using a chi-square test with continuity correction because of the sparse number of participants with an abnormal high platelet count.
--: Results not presented because of the sparse number of participants with an abnormal high platelet count.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Table 15-12. Analysis of Platelet Count (Discrete) (Continued)

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED

Dioxin Category	n	Abnormal Low vs. Normal: Adj. Relative Risk (95% C.I.)[a]	Abnormal Low vs. Normal: p-Value	Abnormal High vs. Normal: Adj. Relative Risk (95% C.I.)[a]	Abnormal High vs. Normal: p-Value
Comparison	1,204				
Background RH	378	1.40 (0.73,2.70)	0.310	0.86 (0.16,4.61)	0.858
Low RH	237	0.79 (0.33,1.92)	0.604	--	--
High RH	238	0.26 (0.06,1.11)	0.068	3.37 (0.50,22.63)	0.211
Low plus High RH	475	0.45 (0.19,1.09)	0.078	--	--

[a] Relative risk and confidence interval relative to Comparisons.
--: Results not presented because of the sparse number of participants with an abnormal high platelet count.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(g) MODEL 4: RANCH HANDS — 1987 DIOXIN — UNADJUSTED

1987 Dioxin Category	n	1987 Dioxin Category Summary Statistics: Number (%) Abnormal Low	Normal	Abnormal High	Analysis Results for Log_2 (1987 Dioxin + 1): Abnormal Low vs. Normal: Est. Relative Risk (95% C.I.)[a]	p-Value	Abnormal High vs. Normal: Est. Relative Risk (95% C.I.)[a]	p-Value
Low	288	10 (3.5)	276 (95.8)	2 (0.7)	0.70 (0.50,0.96)	0.028	0.95 (0.48,1.88)	0.879
Medium	284	8 (2.8)	276 (97.2)	0 (0.0)				
High	283	4 (1.4)	277 (97.9)	2 (0.7)				

[a] Relative risk for a twofold increase in 1987 dioxin.

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

Table 15-12. Analysis of Platelet Count (Discrete) (Continued)

(h) MODEL 4: RANCH HANDS — 1987 DIOXIN — ADJUSTED				
	Analysis Results for Log_2 (1987 Dioxin + 1)			
	Abnormal Low vs. Normal		Abnormal High vs. Normal	
n	Adj. Relative Risk (95% C.I.)[a]	p-Value	Adj. Relative Risk (95% C.I.)[a]	p-Value
853	0.73 (0.49,1.10)	0.135	0.84 (0.43,1.64)	0.619

[a] Relative risk for a twofold increase in 1987 dioxin.

Note: Results are not adjusted for race because of the sparse number of participants with an abnormal high platelet count.

15.2.2.1.11 Prothrombin Time (Continuous)

All results from analyses of prothrombin time in its continuous form were nonsignificant for Models 1 through 4 (Table 15-13: $p \geq 0.22$ for all analyses).

Table 15-13. Analysis of Prothrombin Time (seconds) (Continuous)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS – UNADJUSTED

Occupational Category	Group	n	Mean[a]	Difference of Means (95% C.I.)[b]	p-Value[c]
All	***Ranch Hand***	***688***	***10.48***	***–0.01 --***	***0.870***
	Comparison	***1,016***	***10.49***		
Officer	Ranch Hand	265	10.54	0.02 --	0.720
	Comparison	402	10.52		
Enlisted Flyer	Ranch Hand	114	10.46	–0.03 --	0.748
	Comparison	157	10.49		
Enlisted Groundcrew	Ranch Hand	309	10.45	–0.02 --	0.714
	Comparison	457	10.47		

[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.

(b) MODEL 1: RANCH HANDS VS. COMPARISONS – ADJUSTED

Occupational Category	Group	n	Adjusted Mean[a]	Difference of Adj. Means (95% C.I.)[b]	p-Value[c]
All	***Ranch Hand***	***687***	***10.49***	***–0.01 --***	***0.873***
	Comparison	***1,015***	***10.50***		
Officer	Ranch Hand	265	10.52	0.02 --	0.765
	Comparison	402	10.50		
Enlisted Flyer	Ranch Hand	114	10.45	–0.03 --	0.718
	Comparison	157	10.48		
Enlisted Groundcrew	Ranch Hand	308	10.50	–0.02 --	0.762
	Comparison	456	10.51		

[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.

Table 15-13. Analysis of Prothrombin Time (seconds) (Continuous) (Continued)

(c) MODEL 2: RANCH HANDS – INITIAL DIOXIN – UNADJUSTED

Initial Dioxin Category Summary Statistics				Analysis Results for Log_2 (Initial Dioxin)[b]		
Initial Dioxin	n	Mean[a]	Adj. Mean[ab]	R^2	Slope (Std. Error)[c]	p-Value
Low	119	10.47	10.48	0.004	–0.001 (0.003)	0.572
Medium	128	10.46	10.46			
High	128	10.45	10.44			

[a] Transformed from natural logarithm scale.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[c] Slope and standard error based on natural logarithm of prothrombin time versus log_2 (initial dioxin).

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(d) MODEL 2: RANCH HANDS – INITIAL DIOXIN – ADJUSTED

Initial Dioxin Category Summary Statistics			Analysis Results for Log_2 (Initial Dioxin)		
Initial Dioxin	n	Adj. Mean[a]	R^2	Adj. Slope (Std. Error)[b]	p-Value
Low	119	10.48	0.036	0.000 (0.003)	0.956
Medium	128	10.50			
High	128	10.51			

[a] Transformed from natural logarithm scale.
[b] Slope and standard error based on natural logarithm of prothrombin time versus log_2 (initial dioxin).

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – UNADJUSTED

Dioxin Category	n	Mean[a]	Adj. Mean[ab]	Difference of Adj. Mean vs. Comparisons (95% C.I.)[c]	p-Value[d]
Comparison	987	10.49	10.49		
Background RH	309	10.52	10.53	0.04 --	0.476
Low RH	182	10.47	10.46	–0.03 --	0.667
High RH	193	10.45	10.44	–0.05 --	0.411
Low plus High RH	375	10.46	10.45	–0.04 --	0.409

[a] Transformed from natural logarithm scale.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[c] Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on natural logarithm scale.
[d] P-value is based on difference of means on natural logarithm scale.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Table 15-13. Analysis of Prothrombin Time (seconds) (Continuous) (Continued)

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED

Dioxin Category	n	Adj. Mean[a]	Difference of Adj. Mean vs. Comparisons (95% C.I.)[b]	p-Value[c]
Comparison	986	10.50		
Background RH	308	10.52	0.02 --	0.695
Low RH	182	10.46	–0.04 --	0.521
High RH	193	10.49	–0.01 --	0.823
Low plus High RH	375	10.47	–0.03 --	0.575

[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.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(g) MODEL 4: RANCH HANDS – 1987 DIOXIN – UNADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin +1)		
1987 Dioxin	n	Mean[a]	R^2	Slope (Std. Error)[b]	p-Value
Low	235	10.51	0.002	–0.002 (0.002)	0.220
Medium	218	10.50			
High	231	10.45			

[a] Transformed from natural logarithm scale.
[b] Slope and standard error based on natural logarithm of prothrombin time versus log_2 (1987 dioxin + 1).

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

(h) MODEL 4: RANCH HANDS – 1987 DIOXIN – ADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin + 1)		
1987 Dioxin	n	Adj. Mean[a]	R^2	Adjusted Slope (Std. Error)[b]	p-Value
Low	234	10.50	0.016	–0.001 (0.002)	0.685
Medium	218	10.50			
High	231	10.50			

[a] Transformed from natural logarithm scale.
[b] Slope and standard error based on natural logarithm of prothrombin time versus log_2 (1987 dioxin + 1).

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

15.2.2.1.12 Prothrombin Time (Discrete)

All results from analyses of prothrombin time in its discrete form were nonsignificant for Models 1 through 4 (Table 15-14: p>0.29 for all analyses).

Table 15-14. Analysis of Prothrombin Time (Discrete)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS -- UNADJUSTED

Occupational Category	Group	n	Number (%) High	Est. Relative Risk (95% C.I.)	p-Value
All	***Ranch Hand***	***688***	***10 (1.5)***	***1.14 (0.50,2.61)***	***0.761***
	Comparison	***1,016***	***13 (1.3)***		
Officer	Ranch Hand	265	6 (2.3)	1.31 (0.43,3.93)	0.634
	Comparison	402	7 (1.7)		
Enlisted Flyer	Ranch Hand	114	0 (0.0)	--	0.999[a]
	Comparison	157	1 (0.6)		
Enlisted Groundcrew	Ranch Hand	309	4 (1.3)	1.19 (0.32,4.45)	0.801
	Comparison	457	5 (1.1)		

[a] P-value determined using a chi-square test with continuity correction because of the sparse number of participants with a high prothrombin time.
--: Results not presented because of the sparse number of participants with a high prothrombin time.

(b) MODEL 1: RANCH HANDS VS. COMPARISONS -- ADJUSTED

Occupational Category	Adjusted Relative Risk (95% C.I.)	p-Value
All	***1.13 (0.49,2.60)***	***0.781***
Officer	1.29 (0.43,3.91)	0.650
Enlisted Flyer	--	--
Enlisted Groundcrew	1.15 (0.30,4.35)	0.838

--: Results not presented because of the sparse number of participants with a high prothrombin time.

(c) MODEL 2: RANCH HANDS – INITIAL DIOXIN – UNADJUSTED

Initial Dioxin Category Summary Statistics			Analysis Results for Log_2 (Initial Dioxin)[a]	
Initial Dioxin	n	Number (%) High	Estimated Relative Risk (95% C.I.)[b]	p-Value
Low	119	2 (1.7)	0.66 (0.28,1.58)	0.315
Medium	128	1 (0.8)		
High	128	1 (0.8)		

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[b] Relative risk for a twofold increase in initial dioxin.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

Table 15-14. Analysis of Prothrombin Time (Discrete) (Continued)

(d) MODEL 2: RANCH HANDS – INITIAL DIOXIN – ADJUSTED

Analysis Results for Log_2 (Initial Dioxin)		
n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
375	0.72 (0.28,1.85)	0.470

[a] Relative risk for a twofold increase in initial dioxin.

Note: Results are not adjusted for occupation and current cigarette smoking because of the sparse number of participants with a high prothrombin time.

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – UNADJUSTED

Dioxin Category	n	Number (%) High	Est. Relative Risk (95% C.I.)[ab]	p-Value
Comparison	987	13 (1.3)		
Background RH	309	6 (1.9)	1.64 (0.61,4.37)	0.327
Low RH	182	3 (1.7)	1.17 (0.33,4.19)	0.807
High RH	193	1 (0.5)	0.34 (0.04,2.62)	0.297
Low plus High RH	375	4 (1.1)	0.62 (0.17,2.23)	0.461

[a] Relative risk and confidence interval relative to Comparisons.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED

Dioxin Category	n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
Comparison	986		
Background RH	308	1.41 (0.52,3.85)	0.501
Low RH	182	1.01 (0.28,3.71)	0.984
High RH	193	0.49 (0.06,3.96)	0.502
Low plus High RH	375	0.70 (0.19,2.57)	0.586

[a] Relative risk and confidence interval relative to Comparisons.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Table 15-14. Analysis of Prothrombin Time (Discrete) (Continued)

(g) MODEL 4: RANCH HANDS – 1987 DIOXIN – UNADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin + 1)	
1987 Dioxin	n	Number (%) High	Estimated Relative Risk (95% C.I.)[a]	p-Value
Low	235	3 (1.3)	0.86 (0.55,1.34)	0.498
Medium	218	6 (2.8)		
High	231	1 (0.4)		

[a] Relative risk for a twofold increase in 1987 dioxin.

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

(h) MODEL 4: RANCH HANDS – 1987 DIOXIN – ADJUSTED

Analysis Results for Log_2 (1987 Dioxin + 1)		
n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
683	0.86 (0.54, 1.38)	0.526

[a] Relative risk for a twofold increase in 1987 dioxin.

Note: Results are not adjusted for occupation because of the sparse number of participants with a high prothrombin time.

15.2.2.1.13 RBC Morphology

The Model 3 unadjusted analysis revealed a marginally significant difference in RBC morphology between Ranch Hands in the low dioxin category and Comparisons (Table 15-15(e): p=0.051, Est. RR=1.63). After adjustment for covariates, the result was nonsignificant (Table 15-15(f): p=0.206). All results from other analyses of RBC morphology also were nonsignificant (Table 15-15(a–h): p>0.19 for all other analyses).

Table 15-15. Analysis of RBC Morphology

(a) MODEL 1: RANCH HANDS VS. COMPARISONS – UNADJUSTED

Occupational Category	Group	n	Number (%) Abnormal	Est. Relative Risk (95% C.I.)	p-Value
All	***Ranch Hand***	***866***	***64 (7.4)***	***1.18 (0.84,1.66)***	***0.339***
	Comparison	***1,249***	***79 (6.3)***		
Officer	Ranch Hand	341	20 (5.9)	1.03 (0.57,1.87)	0.910
	Comparison	493	28 (5.7)		
Enlisted Flyer	Ranch Hand	151	15 (9.9)	1.10 (0.53,2.29)	0.793
	Comparison	187	17 (9.1)		
Enlisted Groundcrew	Ranch Hand	374	29 (7.8)	1.32 (0.79,2.21)	0.286
	Comparison	569	34 (6.0)		

Table 15-15. Analysis of RBC Morphology (Continued)

(b) MODEL 1: RANCH HANDS VS. COMPARISONS – ADJUSTED

Occupational Category	Adjusted Relative Risk (95% C.I.)	p-Value
All	*1.16 (0.82,1.64)*	*0.400*
Officer	1.03 (0.57,1.87)	0.923
Enlisted Flyer	1.09 (0.52,2.30)	0.814
Enlisted Groundcrew	1.31 (0.78,2.22)	0.307

(c) MODEL 2: RANCH HANDS – INITIAL DIOXIN – UNADJUSTED

Initial Dioxin Category Summary Statistics			Analysis Results for Log_2 (Initial Dioxin)[a]	
Initial Dioxin	n	Number (%) Abnormal	Estimated Relative Risk (95% C.I.)[b]	p-Value
Low	160	14 (8.8)	0.94 (0.73,1.21)	0.622
Medium	162	16 (9.9)		
High	156	9 (5.8)		

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[b] Relative risk for a twofold increase in initial dioxin.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(d) MODEL 2: RANCH HANDS – INITIAL DIOXIN – ADJUSTED

Analysis Results for Log_2 (Initial Dioxin)		
n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
477	1.02 (0.76,1.38)	0.878

[a] Relative risk for a twofold increase in initial dioxin.

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – UNADJUSTED

Dioxin Category	n	Number (%) Abnormal	Est. Relative Risk (95% C.I.)[ab]	p-Value
Comparison	1,211	73 (6.0)		
Background RH	381	24 (6.3)	1.12 (0.69,1.81)	0.639
Low RH	239	23 (9.6)	1.63 (1.00,2.67)	0.051
High RH	239	16 (6.7)	1.05 (0.60,1.85)	0.862
Low plus High RH	478	39 (8.2)	1.31 (0.87,1.98)	0.196

[a] Relative risk and confidence interval relative to Comparisons.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Table 15-15. Analysis of RBC Morphology (Continued)

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED

Dioxin Category	n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
Comparison	1,210		
Background RH	380	1.18 (0.72,1.93)	0.517
Low RH	238	1.39 (0.84,2.30)	0.206
High RH	239	1.08 (0.60,1.94)	0.800
Low plus High RH	477	1.22 (0.80,1.86)	0.352

[a] Relative risk and confidence interval relative to Comparisons.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(g) MODEL 4: RANCH HANDS – 1987 DIOXIN – UNADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin + 1)	
1987 Dioxin	n	Number (%) Abnormal	Estimated Relative Risk (95% C.I.)[a]	p-Value
Low	288	20 (6.9)	1.03 (0.87,1.23)	0.698
Medium	287	25 (8.7)		
High	284	18 (6.3)		

[a] Relative risk for a twofold increase in 1987 dioxin.

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

(h) MODEL 4: RANCH HANDS – 1987 DIOXIN – ADJUSTED

Analysis Results for Log_2 (1987 Dioxin + 1)		
n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
857	1.02 (0.84,1.25)	0.822

[a] Relative risk for a twofold increase in 1987 dioxin.

15.2.2.1.14 Absolute Neutrophils (Segs)

All Model 1 and 2 results from the analyses of absolute neutrophils (segs) were nonsignificant (Table 15-16(a–d): p>0.11 for each analysis).

Table 15-16. Analysis of Absolute Neutrophils (segs) (thousand/mm^3)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS – UNADJUSTED

Occupational Category	Group	n	Mean[a]	Difference of Means (95% C.I.)[b]	p-Value[c]
All	***Ranch Hand***	***866***	***3.84***	***0.03 --***	***0.612***
	Comparison	***1,249***	***3.81***		
Officer	Ranch Hand	341	3.59	–0.02 --	0.804
	Comparison	493	3.61		
Enlisted Flyer	Ranch Hand	151	3.92	–0.02 --	0.885
	Comparison	187	3.95		
Enlisted Groundcrew	Ranch Hand	374	4.06	0.10 --	0.263
	Comparison	569	3.95		

[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.

(b) MODEL 1: RANCH HANDS VS. COMPARISONS – ADJUSTED

Occupational Category	Group	n	Adjusted Mean[a]	Difference of Adj. Means (95% C.I.)[b]	p-Value[c]
All	***Ranch Hand***	***864***	***3.46***	***0.01 --***	***0.774***
	Comparison	***1,248***	***3.45***		
Officer	Ranch Hand	340	3.26	–0.02 --	0.808
	Comparison	493	3.28		
Enlisted Flyer	Ranch Hand	151	3.44	–0.03 --	0.804
	Comparison	187	3.47		
Enlisted Groundcrew	Ranch Hand	373	3.68	0.06 --	0.416
	Comparison	568	3.61		

[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.

(c) MODEL 2: RANCH HANDS – INITIAL DIOXIN – UNADJUSTED

Initial Dioxin Category Summary Statistics				Analysis Results for Log_2 (Initial Dioxin)[b]		
Initial Dioxin	n	Mean[a]	Adj. Mean[ab]	R^2	Slope (Std. Error)[c]	p-Value
Low	160	3.77	3.78	0.015	0.019 (0.012)	0.115
Medium	162	4.00	4.00			
High	156	4.02	4.00			

[a] Transformed from natural logarithm scale.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[c] Slope and standard error based on natural logarithm of absolute neutrophils (segs) versus log_2 (initial dioxin).

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

Table 15-16. Analysis of Absolute Neutrophils (segs) (thousand/mm^3) (Continued)

(d) MODEL 2: RANCH HANDS – INITIAL DIOXIN – ADJUSTED

Initial Dioxin Category Summary Statistics			Analysis Results for Log_2 (Initial Dioxin)		
Initial Dioxin	n	Adj. Mean[a]	R^2	Adj. Slope (Std. Error)[b]	p-Value
Low	159	3.37	0.198	0.000 (0.012)	0.988
Medium	162	3.43			
High	156	3.38			

[a] Transformed from natural logarithm scale.
[b] Slope and standard error based on natural logarithm of absolute neutrophils (segs) versus log_2 (initial dioxin).

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – UNADJUSTED

Dioxin Category	n	Mean[a]	Adj. Mean[ab]	Difference of Adj. Mean vs. Comparisons (95% C.I.)[c]	p-Value[d]
Comparison	1,211	3.82	3.81		
Background RH	381	3.73	3.75	–0.06 --	0.430
Low RH	239	3.81	3.80	–0.01 --	0.906
High RH	239	4.05	4.03	0.22 --	0.028
Low plus High RH	478	3.93	3.91	0.10 --	0.172

[a] Transformed from natural logarithm scale.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[c] Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on natural logarithm scale.
[d] P-value is based on difference of means on natural logarithm scale.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Table 15-16. Analysis of Absolute Neutrophils (segs) (thousand/mm³) (Continued)

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED

Dioxin Category	n	Adj. Mean[a]	Difference of Adj. Mean vs. Comparisons (95% C.I.)[b]	p-Value[c]
Comparison	1,210	3.45		
Background RH	380	3.45	0.00 --	0.961
Low RH	238	3.44	–0.01 --	0.854
High RH	239	3.50	0.05 --	0.551
Low plus High RH	477	3.47	0.02 --	0.780

[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.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(g) MODEL 4: RANCH HANDS – 1987 DIOXIN – UNADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin +1)[b]		
1987 Dioxin	n	Mean[a]	R^2	Adjusted Slope (Std. Error)[b]	p-Value
Low	288	3.70	0.007	0.020 (0.008)	0.017
Medium	287	3.79			
High	284	4.04			

[a] Transformed from natural logarithm scale.
[b] Slope and standard error based on natural logarithm of absolute neutrophils (segs) versus log_2 (1987 dioxin + 1).

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

(h) MODEL 4: RANCH HANDS – 1987 DIOXIN – ADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin + 1)		
1987 Dioxin	n	Adj. Mean[a]	R^2	Adjusted Slope (Std. Error)[b]	p-Value
Low	287	3.39	0.196	0.006 (0.008)	0.455
Medium	286	3.42			
High	284	3.50			

[a] Transformed from natural logarithm scale.
[b] Slope and standard error based on natural logarithm of absolute neutrophils (segs) versus log_2 (1987 dioxin + 1).

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

The Model 3 unadjusted analysis revealed a significantly higher absolute neutrophil mean for Ranch Hands in the high dioxin category than for Comparisons (Table 15-16(e): p=0.028, difference of adjusted means=0.22 thousand/mm^3). After adjustment for covariates, the difference was nonsignificant (Table 15-16(f): p=0.551). All other Model 3 analyses also were nonsignificant (Table 15-16(e,f): p>0.17 for remaining Model 3 analyses).

A significant positive association between 1987 dioxin levels and absolute neutrophils was revealed from the Model 4 unadjusted analysis (Table 15-16(g): p=0.017, slope=0.020). The association became nonsignificant after adjustment for covariate effects (Table 15-16(h): p=0.455).

15.2.2.1.15 Absolute Neutrophils (Bands) (Nonzero Measurements)

For participants who had a positive number of absolute neutrophils (bands), the unadjusted and adjusted Model 1 analyses revealed a marginally significant difference in absolute neutrophil means between Ranch Hand and Comparison enlisted groundcrew (Table 15-17(a,b): difference of means=0.021 thousand/mm^3, p=0.089; difference of adjusted means=0.016 thousand/mm^3, p=0.099, respectively). The Ranch Hand absolute neutrophil mean was greater than the Comparison mean. All other Model 1 contrasts were nonsignificant (Table 15-17(a,b): p>0.12 for each remaining contrast).

Table 15-17. Analysis of Absolute Neutrophils (bands) (thousand/mm^3) (Nonzero Measurements)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS – UNADJUSTED

Occupational Category	Group	n	Mean[a]	Difference of Means (95% C.I.)[b]	p-Value[c]
All	***Ranch Hand***	***720***	***0.201***	***0.012 --***	***0.123***
	Comparison	***1,037***	***0.189***		
Officer	Ranch Hand	294	0.194	0.014 --	0.250
	Comparison	406	0.180		
Enlisted Flyer	Ranch Hand	115	0.190	–0.014 --	0.478
	Comparison	160	0.204		
Enlisted Groundcrew	Ranch Hand	311	0.213	0.021 --	0.089
	Comparison	471	0.193		

[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.

Table 15-17. Analysis of Absolute Neutrophils (bands) (thousand/mm^3) (Nonzero Measurements) (Continued)

(b) MODEL 1: RANCH HANDS VS. COMPARISONS – ADJUSTED

Occupational Category	Group	n	Adjusted Mean[a]	Difference of Adj. Means (95% C.I.)[b]	p-Value[c]
All	*Ranch Hand*	*718*	*0.159*	*0.009* --	*0.126*
	Comparison	*1,036*	*0.150*		
Officer	Ranch Hand	293	0.152	0.011 --	0.221
	Comparison	406	0.141		
Enlisted Flyer	Ranch Hand	115	0.143	–0.013 --	0.389
	Comparison	160	0.156		
Enlisted Groundcrew	Ranch Hand	310	0.177	0.016 --	0.099
	Comparison	470	0.161		

[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.

(c) MODEL 2: RANCH HANDS – INITIAL DIOXIN – UNADJUSTED

Initial Dioxin Category Summary Statistics				Analysis Results for Log_2 (Initial Dioxin)[b]		
Initial Dioxin	n	Mean[a]	Adj. Mean[ab]	R^2	Slope (Std. Error)[c]	p-Value
Low	131	0.194	0.195	0.004	–0.031 (0.032)	0.343
Medium	132	0.249	0.250			
High	134	0.195	0.194			

[a] Transformed from natural logarithm scale.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[c] Slope and standard error based on natural logarithm of absolute neutrophils (bands) versus log_2 (initial dioxin).

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(d) MODEL 2: RANCH HANDS – INITIAL DIOXIN – ADJUSTED

Initial Dioxin Category Summary Statistics			Analysis Results for Log_2 (Initial Dioxin)		
Initial Dioxin	n	Adj. Mean[a]	R^2	Adj. Slope (Std. Error)[b]	p-Value
Low	130	0.146	0.117	–0.075 (0.036)	0.040
Medium	132	0.174			
High	134	0.132			

[a] Transformed from natural logarithm scale.
[b] Slope and standard error based on natural logarithm of absolute neutrophils (bands) versus log_2 (initial dioxin).

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

Table 15-17. Analysis of Absolute Neutrophils (bands) (thousand/mm^3) (Nonzero Measurements) (Continued)

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – UNADJUSTED

Dioxin Category	n	Mean[a]	Adj. Mean[ab]	Difference of Adj. Mean vs. Comparisons (95% C.I.)[c]	p-Value[d]
Comparison	1,002	0.189	0.189		
Background RH	316	0.189	0.191	0.002 --	0.783
Low RH	196	0.212	0.211	0.022 --	0.079
High RH	201	0.211	0.209	0.020 --	0.113
Low plus High RH	397	0.211	0.210	0.021 --	0.029

[a] Transformed from natural logarithm scale.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[c] Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on natural logarithm scale.
[d] P-value is based on difference of means on natural logarithm scale.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED

Dioxin Category	n	Adj. Mean[a]	Difference of Adj. Mean vs. Comparisons (95% C.I.)[b]	p-Value[c]
Comparison	1,001	0.148		
Background RH	315	0.150	0.002 --	0.750
Low RH	195	0.165	0.017 --	0.076
High RH	201	0.161	0.013 --	0.166
Low plus High RH	396	0.163	0.015 --	0.038

[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.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Table 15-17. Analysis of Absolute Neutrophils (bands) (thousand/mm³) (Nonzero Measurements) (Continued)

(g) MODEL 4: RANCH HANDS – 1987 DIOXIN – UNADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin +1)[b]		
1987 Dioxin	n	Mean[a]	R^2	Slope (Std. Error)[b]	p-Value
Low	241	0.184	0.001	0.015 (0.021)	0.482
Medium	233	0.204			
High	239	0.217			

[a] Transformed from natural logarithm scale.
[b] Slope and standard error based on natural logarithm of absolute neutrophils (bands) versus log_2 (1987 dioxin + 1).

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

(h) MODEL 4: RANCH HANDS – 1987 DIOXIN – ADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin + 1)		
1987 Dioxin	n	Adj. Mean[a]	R^2	Adjusted Slope (Std. Error)[b]	p-Value
Low	240	0.136	0.076	0.011 (0.024)	0.657
Medium	232	0.154			
High	239	0.164			

[a] Transformed from natural logarithm scale.
[b] Slope and standard error based on natural logarithm of absolute neutrophils (bands) versus log_2 (1987 dioxin + 1).

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

A significant negative association between initial dioxin and absolute neutrophils (bands) was found in the Model 2 adjusted analysis (Table 15-17(d): p=0.040, adjusted slope=–0.075). Results were nonsignificant in the unadjusted analysis (Table 15-17(c): p=0.343).

The Model 3 contrast of Ranch Hands in the low dioxin category with Comparisons revealed a marginally significant difference of means, indicating a higher absolute neutrophil mean among Ranch Hands than Comparisons (Table 15(e,f): difference of adjusted means=0.022 thousand/mm³, p=0.079; difference of adjusted means=0.017 thousand/mm³, p=0.076, for the unadjusted and adjusted analyses, respectively). Similarly, the mean difference between Ranch Hands in the low and high dioxin categories combined and Comparisons was significant (Table 15-17(e,f): p=0.029, difference of adjusted means=0.021 thousand/mm³; p=0.038, difference of adjusted means=0.015 thousand/mm³, for the unadjusted and adjusted analyses, respectively). All other Model 3 contrasts and each analysis performed from Model 4 were nonsignificant (Table 15-17(e-h): p>0.11 for each remaining contrast).

15.2.2.1.16 Absolute Neutrophils (Bands) (Zero versus Nonzero)

Unadjusted and adjusted Model 1 analyses of the percentage of participants with no absolute neutrophils revealed a significant difference between Ranch Hand and Comparison enlisted flyers (Table 15-18(a,b): p=0.029, Est. RR=1.86; p=0.026, Adj. RR=1.88, for the unadjusted and adjusted analyses, respectively). A greater percentage of Ranch Hand than Comparison enlisted flyers had no absolute neutrophils (23.8% vs. 14.4%). All other Model 1 results and all results from the analyses of Models 2 through 4 were nonsignificant (Table 15-18(a–h): p>0.13 for all remaining analyses).

Table 15-18. Analysis of Absolute Neutrophils (bands) (Zero vs. Nonzero)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS – UNADJUSTED

Occupational Category	Group	n	Number (%) Zero	Est. Relative Risk (95% C.I.)	p-Value
All	***Ranch Hand***	***866***	***146 (16.9)***	***0.99 (0.79,1.25)***	***0.945***
	Comparison	***1,249***	***212 (17.0)***		
Officer	Ranch Hand	341	47 (13.8)	0.75 (0.51,1.10)	0.136
	Comparison	493	87 (17.7)		
Enlisted Flyer	Ranch Hand	151	36 (23.8)	1.86 (1.07,3.23)	0.029
	Comparison	187	27 (14.4)		
Enlisted Groundcrew	Ranch Hand	374	63 (16.8)	0.97 (0.69,1.38)	0.880
	Comparison	569	98 (17.2)		

(b) MODEL 1: RANCH HANDS VS. COMPARISONS – ADJUSTED

Occupational Category	Adjusted Relative Risk (95% C.I.)	p-Value
All	***0.99 (0.79,1.25)***	***0.956***
Officer	0.74 (0.51,1.09)	0.134
Enlisted Flyer	1.88 (1.08,3.27)	0.026
Enlisted Groundcrew	0.98 (0.69,1.39)	0.918

(c) MODEL 2: RANCH HANDS – INITIAL DIOXIN – UNADJUSTED

Initial Dioxin Category Summary Statistics			Analysis Results for Log_2 (Initial Dioxin)[a]	
Initial Dioxin	n	Number (%) Zero	Estimated Relative Risk (95% C.I.)[b]	p-Value
Low	160	29 (18.1)	0.92 (0.76,1.11)	0.381
Medium	162	30 (18.5)		
High	156	22 (14.1)		

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[b] Relative risk for a twofold increase in initial dioxin.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(d) MODEL 2: RANCH HANDS – INITIAL DIOXIN – ADJUSTED

Analysis Results for Log_2 (Initial Dioxin)		
n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
477	0.87 (0.70,1.09)	0.214

[a] Relative risk for a twofold increase in initial dioxin.

Table 15-18. Analysis of Absolute Neutrophils (bands) (Zero vs. Nonzero) (Continued)

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – UNADJUSTED

Dioxin Category	n	Number (%) Zero	Est. Relative Risk (95% C.I.)[ab]	p-Value
Comparison	1,211	209 (17.3)		
Background RH	381	65 (17.1)	0.98 (0.72,1.34)	0.908
Low RH	239	43 (18.0)	1.05 (0.73,1.51)	0.781
High RH	239	38 (15.9)	0.91 (0.62,1.33)	0.625
Low plus High RH	478	81 (17.0)	0.98 (0.74,1.30)	0.881

[a] Relative risk and confidence interval relative to Comparisons.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED

Dioxin Category	n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
Comparison	1,210		
Background RH	380	1.02 (0.75,1.40)	0.897
Low RH	238	1.03 (0.72,1.49)	0.859
High RH	239	0.88 (0.59,1.30)	0.515
Low plus High RH	477	0.95 (0.72,1.27)	0.741

[a] Relative risk and confidence interval relative to Comparisons.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(g) MODEL 4: RANCH HANDS – 1987 DIOXIN – UNADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin + 1)	
1987 Dioxin	n	Number (%) Zero	Estimated Relative Risk (95% C.I.)[a]	p-Value
Low	288	47 (16.3)	0.99 (0.88,1.12)	0.905
Medium	287	54 (18.8)		
High	284	45 (15.9)		

[a] Relative risk for a twofold increase in 1987 dioxin.

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

Table 15-18. Analysis of Absolute Neutrophils (bands) (Zero vs. Nonzero) (Continued)

(h) MODEL 4: RANCH HANDS – 1987 DIOXIN – ADJUSTED		
	Analysis Results for Log_2 (1987 Dioxin + 1)	
n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
857	0.92 (0.80,1.06)	0.264

[a] Relative risk for a twofold increase in 1987 dioxin.

15.2.2.1.17 Absolute Lymphocytes

The unadjusted and adjusted Model 2 analyses of absolute lymphocytes revealed a marginally significant positive association between absolute lymphocytes and initial dioxin (Table 15-19(c,d): p=0.063, slope=0.023; p=0.087, adjusted slope=0.024, for the unadjusted and adjusted analyses, respectively). Both analyses showed an increase in absolute lymphocyte levels for increasing initial dioxin levels. Results from each of the analyses of Models 1, 3, and 4 were nonsignificant (Table 15-19(a,b, and e–h): p>0.23 for all analyses).

Table 15-19. Analysis of Absolute Lymphocytes (thousand/mm^3)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS – UNADJUSTED					
Occupational Category	Group	n	Mean[a]	Difference of Means (95% C.I.)[b]	p-Value[c]
All	***Ranch Hand***	***866***	***1.76***	***0.00 --***	***0.920***
	Comparison	***1,249***	***1.75***		
Officer	Ranch Hand	341	1.70	0.04 --	0.392
	Comparison	493	1.67		
Enlisted Flyer	Ranch Hand	151	1.71	–0.08 --	0.248
	Comparison	187	1.79		
Enlisted Groundcrew	Ranch Hand	374	1.83	0.01 --	0.891
	Comparison	569	1.82		

[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.

Table 15-19. Analysis of Absolute Lymphocytes (thousand/mm^3) (Continued)

(b) MODEL 1: RANCH HANDS VS. COMPARISONS – ADJUSTED

Occupational Category	Group	n	Adjusted Mean[a]	Difference of Adj. Means (95% C.I.)[b]	p-Value[c]
All	***Ranch Hand***	***864***	***1.79***	***0.00 --***	***0.964***
	Comparison	***1,248***	***1.79***		
Officer	Ranch Hand	340	1.80	0.05 --	0.259
	Comparison	493	1.75		
Enlisted Flyer	Ranch Hand	151	1.74	–0.08 --	0.236
	Comparison	187	1.82		
Enlisted Groundcrew	Ranch Hand	373	1.82	–0.01 --	0.781
	Comparison	568	1.83		

[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.

(c) MODEL 2: RANCH HANDS – INITIAL DIOXIN – UNADJUSTED

Initial Dioxin Category Summary Statistics				Analysis Results for Log_2 (Initial Dioxin)[b]		
Initial Dioxin	n	Mean[a]	Adj. Mean[ab]	R^2	Slope (Std. Error)[c]	p-Value
Low	160	1.68	1.69	0.021	0.023 (0.012)	0.063
Medium	162	1.75	1.75			
High	156	1.83	1.82			

[a] Transformed from natural logarithm scale.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[c] Slope and standard error based on natural logarithm of absolute lymphocytes versus log_2 (initial dioxin).

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(d) MODEL 2: RANCH HANDS – INITIAL DIOXIN – ADJUSTED

Initial Dioxin Category Summary Statistics			Analysis Results for Log_2 (Initial Dioxin)		
Initial Dioxin	n	Adj. Mean[a]	R^2	Adj. Slope (Std. Error)[b]	p-Value
Low	159	1.76	0.064	0.024 (0.014)	0.087
Medium	162	1.81			
High	156	1.88			

[a] Transformed from natural logarithm scale.
[b] Slope and standard error based on natural logarithm of absolute lymphocytes versus log_2 (initial dioxin).

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.