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TABLE B-15. Estimated 8-Hour Average Concentrations of Particle-Associated 2,4,5-T at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Excavation (continued)

X Coordinate (m)	Y Coordinate (m)	8-Hour Average Concentration (g/m ³)
103.632	121.920	0.14489E-03
109.728	121.920	0.39977E-04
115.824	121.920	0.15374E-03
121.920	121.920	0.43099E-04
128.016	121.920	0.57694E-04
134.112	121.920	0.11894E-03
140.208	121.920	0.55636E-04
146.304	121.920	0.12103E-04
152.400	121.920	0.50113E-04
158.496	121.920	0.82285E-04
164.592	121.920	0.66416E-04
170.688	121.920	0.31038E-04
176.784	121.920	0.95270E-05
182.880	121.920	0.12936E-04
188.976	121.920	0.27762E-04
195.072	121.920	0.42308E-04
195.072	115.824	0.52297E-04
195.072	109.728	0.21476E-04
195.072	103.632	0.10129E-04
195.072	97.536	0.45836E-04
195.072	91.440	0.56469E-04
195.072	85.344	0.17248E-04
195.072	79.248	0.19558E-04
195.072	73.152	0.61453E-04
195.072	67.056	0.42119E-04
195.072	60.960	0.60690E-05
188.976	60.960	0.67550E-05
182.880	60.960	0.75670E-05
176.784	60.960	0.85190E-05
170.688	60.960	0.96670E-05
164.592	60.960	0.11053E-04
158.496	60.960	0.12747E-04
152.400	60.960	0.14861E-04
146.304	60.960	0.17521E-04
146.304	54.864	0.15667E-03
146.304	48.768	0.26726E-04

TABLE E-15. Estimated 8-Hour Average Concentrations of Particle-Associated 2,4,5-T at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Excavation (continued)

X Coordinate (m)	Y Coordinate (m)	8-Hour Average Concentration (g/m ³)
146.304	42.672	0.13844E-03
146.304	36.576	0.50841E-04
146.304	30.480	0.83321E-04
146.304	24.384	0.10481E-03
146.304	18.288	0.16233E-04
146.304	12.192	0.98483E-04
146.304	6.096	0.78183E-04
146.304	0.000	0.12103E-04
140.208	0.000	0.55636E-04
134.112	0.000	0.11894E-03
128.016	0.000	0.57694E-04
121.920	0.000	0.43099E-04
115.824	0.000	0.15374E-03
109.728	0.000	0.39977E-04
103.632	0.000	0.14487E-03
97.536	0.000	0.78911E-04
91.440	0.000	0.15754E-03
85.344	0.000	0.65303E-04
79.248	0.000	0.20671E-03
73.152	0.000	0.25487E-04
67.056	0.000	0.20671E-03
60.096	0.000	0.65359E-04
54.864	0.000	0.15754E-03
48.768	0.000	0.78960E-04
42.672	0.000	0.14487E-03
36.576	0.000	0.39977E-04
30.480	0.000	0.15374E-03
24.384	0.000	0.43099E-04
18.288	0.000	0.57694E-04
12.192	0.000	0.11894E-03
6.096	0.000	0.55636E-04

TABLE B-16. Estimated 1-Hour Average Concentrations of Particle-Associated TCDD at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction

X Coordinate (m)	Y Coordinate (m)	1-Hour Average Concentration (g/m ³)
0.000	0.000	0.70900E-08
0.000	6.096	0.45830E-07
0.000	12.192	0.57720E-07
0.000	18.288	0.95100E-08
0.000	24.384	0.61420E-07
0.000	30.480	0.48820E-07
0.000	36.576	0.29790E-07
0.000	42.672	0.81130E-07
0.000	48.768	0.15660E-07
0.000	54.864	0.91820E-07
0.000	60.960	0.10270E-07
0.000	67.056	0.91820E-07
0.000	73.152	0.15670E-07
0.000	79.248	0.81130E-07
0.000	85.344	0.29810E-07
0.000	91.440	0.48820E-07
0.000	97.536	0.61440E-07
0.000	103.632	0.95100E-08
0.000	109.728	0.57710E-07
0.000	115.824	0.45830E-07
0.000	121.920	0.71000E-08
6.096	121.920	0.32600E-07
12.192	121.920	0.69700E-07
18.288	121.920	0.33830E-07
24.384	121.920	0.25250E-07
30.480	121.920	0.90100E-07
36.576	121.920	0.23440E-07
42.672	121.920	0.84890E-07
48.768	121.920	0.46270E-07
54.864	121.920	0.92310E-07
60.960	121.920	0.38290E-07
67.056	121.920	0.12114E-06
73.152	121.920	0.14930E-07
79.248	121.920	0.12116E-06
85.344	121.920	0.38290E-07
91.440	121.920	0.92350E-07
97.536	121.920	0.46270E-07

TABLE E-16. Estimated 1-Hour Average Concentrations of Particle-Associated TCDD at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction (continued)

X Coordinate (m)	Y Coordinate (m)	1-Hour Average Concentration (g/m ³)
103.632	121.920	0.84920E-07
109.728	121.920	0.23430E-07
115.824	121.920	0.90110E-07
121.920	121.920	0.25260E-07
128.016	121.920	0.33810E-07
134.112	121.920	0.69710E-07
140.208	121.920	0.32610E-07
146.304	121.920	0.70900E-08
152.400	121.920	0.29370E-07
158.496	121.920	0.48230E-07
164.592	121.920	0.38920E-07
170.688	121.920	0.18190E-07
176.784	121.920	0.55900E-08
182.880	121.920	0.75800E-08
188.976	121.920	0.16270E-07
195.072	121.920	0.24800E-07
195.072	115.824	0.30650E-07
195.072	109.728	0.12580E-07
195.072	103.632	0.59300E-08
195.072	97.536	0.26860E-07
195.072	91.440	0.33090E-07
195.072	85.344	0.10110E-07
195.072	79.248	0.11460E-07
195.072	73.152	0.36010E-07
195.072	67.056	0.24690E-07
195.072	60.960	0.35600E-08
188.976	60.960	0.39600E-08
182.880	60.960	0.44300E-08
176.784	60.960	0.49900E-08
170.688	60.960	0.56600E-08
164.592	60.960	0.64800E-08
158.496	60.960	0.74700E-08
152.400	60.960	0.87100E-08
146.304	60.960	0.10270E-07
146.304	54.864	0.91820E-07
146.304	48.768	0.15660E-07

TABLE B-18. Estimated 1-Hour Average Concentrations of Particle-Associated TCDD at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction (continued)

X Coordinate (m)	Y Coordinate (m)	1-Hour Average Concentration (g/m ³)
146.304	42.672	0.81140E-07
146.304	36.576	0.29800E-07
146.304	30.480	0.48830E-07
146.304	24.384	0.61430E-07
146.304	18.288	0.95200E-08
146.304	12.192	0.57720E-07
146.304	6.096	0.45820E-07
146.304	0.000	0.70900E-08
140.208	0.000	0.32610E-07
134.112	0.000	0.69710E-07
128.016	0.000	0.33810E-07
121.920	0.000	0.25260E-07
115.824	0.000	0.90100E-07
109.728	0.000	0.23430E-07
103.632	0.000	0.84910E-07
97.536	0.000	0.46250E-07
91.440	0.000	0.92330E-07
85.344	0.000	0.38270E-07
79.248	0.000	0.12115E-06
73.152	0.000	0.14940E-07
67.056	0.000	0.12115E-06
60.096	0.000	0.38300E-07
54.864	0.000	0.92330E-07
48.768	0.000	0.46280E-07
42.672	0.000	0.84910E-07
36.576	0.000	0.23430E-07
30.480	0.000	0.90100E-07
24.384	0.000	0.25260E-07
18.288	0.000	0.33810E-07
12.192	0.000	0.69700E-07
6.096	0.000	0.32610E-07

TABLE B-17. Estimated 1-Hour Average Concentrations of Particle-Associated 2,4-D at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction

X Coordinate (m)	Y Coordinate (m)	1-Hour Average Concentration (g/m ³)
0.000	0.000	0.44300E-06
0.000	6.096	0.28640E-05
0.000	12.192	0.36070E-05
0.000	18.288	0.59400E-06
0.000	24.384	0.38390E-05
0.000	30.480	0.30510E-05
0.000	36.576	0.18620E-05
0.000	42.672	0.50710E-05
0.000	48.768	0.97900E-06
0.000	54.864	0.57390E-05
0.000	60.960	0.64200E-06
0.000	67.056	0.57390E-05
0.000	73.152	0.98000E-06
0.000	79.248	0.50710E-05
0.000	85.344	0.18630E-05
0.000	91.440	0.30510E-05
0.000	97.536	0.38400E-05
0.000	103.632	0.59400E-06
0.000	109.728	0.36070E-05
0.000	115.824	0.28640E-05
0.000	121.920	0.44400E-06
6.096	121.920	0.20370E-05
12.192	121.920	0.43570E-05
18.288	121.920	0.21140E-05
24.384	121.920	0.15780E-05
30.480	121.920	0.56310E-05
36.576	121.920	0.14630E-05
42.672	121.920	0.53060E-05
48.768	121.920	0.28920E-05
54.864	121.920	0.57700E-05
60.960	121.920	0.28930E-05
67.056	121.920	0.75710E-05
73.152	121.920	0.93300E-06
79.248	121.920	0.75720E-05
85.344	121.920	0.23930E-05
91.440	121.920	0.57720E-05
97.536	121.920	0.28920E-05

TABLE B-17. Estimated 1-Hour Average Concentrations of Particle-Associated 2,4-D at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction (continued)

X Coordinate (m)	Y Coordinate (m)	1-Hour Average Concentration (g/m ³)
103.632	121.920	0.53070E-05
109.728	121.920	0.14640E-05
115.824	121.920	0.56320E-05
121.920	121.920	0.15790E-05
128.016	121.920	0.21130E-05
134.112	121.920	0.43570E-05
140.208	121.920	0.20380E-05
146.304	121.920	0.44300E-06
152.400	121.920	0.18360E-05
158.496	121.920	0.30140E-05
164.592	121.920	0.24330E-05
170.688	121.920	0.11370E-05
176.784	121.920	0.34900E-06
182.880	121.920	0.47400E-06
188.976	121.920	0.10170E-05
195.072	121.920	0.15500E-05
195.072	115.824	0.19160E-05
195.072	109.728	0.78700E-06
195.072	103.632	0.37100E-06
195.072	97.536	0.16790E-05
195.072	91.440	0.20680E-05
195.072	85.344	0.63200E-06
195.072	79.248	0.71700E-06
195.072	73.152	0.22510E-05
195.072	67.056	0.15430E-05
195.072	60.960	0.22200E-06
188.976	60.960	0.24700E-06
182.880	60.960	0.27700E-06
176.784	60.960	0.31200E-06
170.688	60.960	0.35400E-06
164.592	60.960	0.40500E-06
158.496	60.960	0.46700E-06
152.400	60.960	0.54400E-06
146.304	60.960	0.64200E-06
146.304	54.864	0.57390E-05
146.304	48.768	0.97900E-06

TABLE B-17. Estimated 1-Hour Average Concentrations of Particle-Associated 2,4-D at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction (continued)

X Coordinate (m)	Y Coordinate (m)	1-Hour Average Concentration (g/m ³)
146.304	42.672	0.50710E-05
146.304	36.576	0.18620E-05
146.304	30.480	0.30520E-05
146.304	24.384	0.38390E-05
146.304	18.288	0.59500E-06
146.304	12.192	0.36070E-05
146.304	6.096	0.23640E-05
146.304	0.000	0.44300E-06
140.208	0.000	0.20380E-05
134.112	0.000	0.43570E-05
128.016	0.000	0.21130E-05
121.920	0.000	0.15790E-05
115.824	0.000	0.56310E-05
109.728	0.000	0.14640E-05
103.632	0.000	0.53070E-05
97.536	0.000	0.28900E-05
91.440	0.000	0.57710E-05
85.344	0.000	0.23920E-05
79.248	0.000	0.75720E-05
73.152	0.000	0.93400E-06
67.056	0.000	0.75720E-05
60.960	0.000	0.23940E-05
54.864	0.000	0.57710E-05
48.768	0.000	0.28920E-05
42.672	0.000	0.53070E-05
36.576	0.000	0.14640E-05
30.480	0.000	0.56310E-05
24.384	0.000	0.15790E-05
18.288	0.000	0.21130E-05
12.192	0.000	0.43570E-05
6.096	0.000	0.20380E-05

TABLE B-18. Estimated 1-Hour Average Concentrations of Particle-Associated 2,4,5-T at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction

X Coordinate (m)	Y Coordinate (m)	1 Hour Average Concentration (g/m ³)
0.000	0.000	0.15960E-05
0.000	6.096	0.10312E-04
0.000	12.192	0.12987E-04
0.000	18.288	0.21400E-05
0.000	24.384	0.13820E-04
0.000	30.480	0.10985E-04
0.000	36.576	0.67030E-05
0.000	42.672	0.18254E-04
0.000	48.768	0.35230E-05
0.000	54.864	0.20659E-04
0.000	60.960	0.23110E-05
0.000	67.056	0.20659E-04
0.000	73.152	0.35260E-05
0.000	79.248	0.18254E-04
0.000	85.344	0.67070E-05
0.000	91.440	0.10985E-04
0.000	97.536	0.13824E-04
0.000	103.632	0.21400E-05
0.000	109.728	0.12985E-04
0.000	115.824	0.10312E-04
0.000	121.920	0.15970E-05
6.096	121.920	0.73340E-05
12.192	121.920	0.15684E-04
18.288	121.920	0.76110E-05
24.384	121.920	0.56800E-05
30.480	121.920	0.20273E-04
36.576	121.920	0.52750E-05
42.672	121.920	0.19100E-04
48.768	121.920	0.10411E-04
54.864	121.920	0.20770E-04
60.960	121.920	0.86160E-05
67.056	121.920	0.27256E-04
73.152	121.920	0.33590E-05
79.248	121.920	0.27261E-04
85.344	121.920	0.86160E-05
91.440	121.920	0.20778E-04
97.536	121.920	0.10411E-04

TABLE B-18. Estimated 1-Hour Average Concentrations of Particle-Associated 2,4,5-T at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction (continued)

X Coordinate (m)	Y Coordinate (m)	1 Hour Average Concentration (g/m ³)
103.632	121.920	0.19106E-04
109.723	121.920	0.52710E-05
115.824	121.920	0.20274E-04
121.920	121.920	0.56830E-05
128.016	121.920	0.76080E-05
134.112	121.920	0.15684E-04
140.203	121.920	0.73360E-05
146.304	121.920	0.15960E-05
152.400	121.920	0.66080E-05
158.496	121.920	0.10851E-04
164.592	121.920	0.87580E-05
170.688	121.920	0.40930E-05
176.784	121.920	0.12570E-05
182.880	121.920	0.17060E-05
188.976	121.920	0.36610E-05
195.072	121.920	0.55800E-05
195.072	115.824	0.68970E-05
195.072	109.728	0.28320E-05
195.072	103.632	0.13350E-05
195.072	97.536	0.60440E-05
195.072	91.440	0.74460E-05
195.072	85.344	0.22750E-05
195.072	79.248	0.25790E-05
195.072	73.152	0.81030E-05
195.072	67.056	0.55540E-05
195.072	60.960	0.80000E-06
188.976	60.960	0.89100E-06
182.880	60.960	0.99700E-06
176.784	60.960	0.11240E-05
170.688	60.960	0.12740E-05
164.592	60.960	0.14580E-05
158.496	60.960	0.16610E-05
152.400	60.960	0.19600E-05
146.304	60.960	0.23100E-05
146.304	54.864	0.20659E-04
146.304	48.763	0.35250E-05

TABLE B-18. Estimated 1-Hour Average Concentrations of Particle-Associated 2,4,5-T at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction (continued)

X Coordinate (m)	Y Coordinate (m)	1 Hour Average Concentration (g/m ³)
146.304	42.672	0.18256E-04
146.304	36.576	0.67040E-05
146.304	30.480	0.10988E-04
146.304	24.384	0.13821E-04
146.304	18.288	0.21410E-05
146.304	12.192	0.12987E-04
146.304	6.096	0.10310E-04
146.304	0.000	0.15960E-05
140.208	0.000	0.73360E-05
134.112	0.000	0.15684E-04
128.016	0.000	0.76080E-05
121.920	0.000	0.56830E-05
115.824	0.000	0.20273E-04
109.728	0.000	0.52710E-05
103.632	0.000	0.19104E-04
97.536	0.000	0.10406E-04
91.440	0.000	0.20775E-04
85.344	0.000	0.86120E-05
79.248	0.000	0.27258E-04
73.152	0.000	0.33610E-05
67.056	0.000	0.27258E-04
60.096	0.000	0.86190E-05
54.864	0.000	0.20775E-04
48.768	0.000	0.10412E-04
42.672	0.000	0.19104E-04
36.576	0.000	0.52720E-05
30.480	0.000	0.20273E-04
24.384	0.000	0.56830E-05
18.288	0.000	0.76080E-05
12.192	0.000	0.15684E-04
6.096	0.000	0.73360E-05

TABLE B-19. Estimated 8-Hour Average Concentrations of Particle-Associated TCDD at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction

X Coordinate (m)	Y Coordinate (m)	8-Hour Average Concentration (g/m ³)
0.000	0.000	0.49630E-08
0.000	6.096	0.32081E-07
0.000	12.192	0.40404E-07
0.000	18.288	0.66570E-08
0.000	24.384	0.42994E-07
0.000	30.480	0.34174E-07
0.000	36.576	0.20853E-07
0.000	42.672	0.56791E-07
0.000	48.768	0.10962E-07
0.000	54.864	0.64274E-07
0.000	60.960	0.71890E-08
0.000	67.056	0.64274E-07
0.000	73.152	0.10969E-07
0.000	79.248	0.56791E-07
0.000	85.344	0.20867E-07
0.000	91.440	0.34174E-07
0.000	97.536	0.43008E-07
0.000	103.632	0.66570E-08
0.000	109.728	0.40397E-07
0.000	115.824	0.32081E-07
0.000	121.920	0.49700E-08
6.096	121.920	0.22820E-07
12.192	121.920	0.48790E-07
18.288	121.920	0.23681E-07
24.384	121.920	0.17675E-07
30.480	121.920	0.63070E-07
36.576	121.920	0.16408E-07
42.672	121.920	0.59423E-07
48.768	121.920	0.32389E-07
54.864	121.920	0.64617E-07
60.960	121.920	0.26803E-07
67.056	121.920	0.84798E-07
73.152	121.920	0.10451E-07
79.248	121.920	0.84812E-07
85.344	121.920	0.26803E-07
91.440	121.920	0.64645E-07
97.536	121.920	0.32389E-07

TABLE B-19. Estimated 8-Hour Average Concentrations of Particle-Associated TCDD at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction (continued)

X Coordinate (m)	Y Coordinate (m)	8-Hour Average Concentration (g/m ³)
103.632	121.920	0.59444E-07
109.728	121.920	0.16401E-07
115.824	121.920	0.63077E-07
121.920	121.920	0.17682E-07
128.016	121.920	0.23667E-07
134.112	121.920	0.48797E-07
140.208	121.920	0.22827E-07
146.304	121.920	0.49630E-08
152.400	121.920	0.20559E-07
158.496	121.920	0.33761E-07
164.592	121.920	0.27244E-07
170.688	121.920	0.12733E-07
176.784	121.920	0.39130E-08
182.880	121.920	0.53060E-08
188.976	121.920	0.11389E-07
195.072	121.920	0.17360E-07
195.072	115.824	0.21455E-07
195.072	109.728	0.88060E-08
195.072	103.632	0.41510E-08
195.072	97.536	0.18802E-07
195.072	91.440	0.23163E-07
195.072	85.344	0.70770E-08
195.072	79.248	0.80220E-08
195.072	73.152	0.25207E-07
195.072	67.056	0.17283E-07
195.072	60.960	0.24920E-08
188.976	60.960	0.27720E-08
182.880	60.960	0.31010E-08
176.784	60.960	0.34930E-08
170.688	60.960	0.39620E-08
164.592	60.960	0.45360E-08
158.496	60.960	0.52290E-08
152.400	60.960	0.60970E-08
146.304	60.960	0.71890E-08
146.304	54.864	0.64274E-07
146.304	48.768	0.10962E-07

TABLE B-19. Estimated 8-Hour Average Concentrations of Particle-Associated TCDD at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction (continued)

X Coordinate (m)	Y Coordinate (m)	8-Hour Average Concentration (g/m ³)
146.304	42.672	0.56798E-07
146.304	36.576	0.20860E-07
146.304	30.480	0.34181E-07
146.304	24.384	0.43001E-07
146.304	18.288	0.65640E-08
146.304	12.192	0.40404E-07
146.304	6.096	0.32074E-07
146.304	0.000	0.49630E-08
140.208	0.000	0.22827E-07
134.112	0.000	0.48797E-07
128.016	0.000	0.23667E-07
121.920	0.000	0.17682E-07
115.824	0.000	0.63070E-07
109.728	0.000	0.16401E-07
103.632	0.000	0.59437E-07
97.536	0.000	0.32375E-07
91.440	0.000	0.64631E-07
85.344	0.000	0.26789E-07
79.248	0.000	0.84805E-07
73.152	0.000	0.10458E-07
67.056	0.000	0.84805E-07
60.096	0.000	0.26810E-07
54.864	0.000	0.64631E-07
48.768	0.000	0.32396E-07
42.672	0.000	0.59437E-07
36.576	0.000	0.16401E-07
30.480	0.000	0.63070E-07
24.384	0.000	0.17682E-07
18.288	0.000	0.23667E-07
12.192	0.000	0.48790E-07
6.096	0.000	0.22827E-07

TABLE B-20. Estimated 8-Hour Average Concentrations of Particle-Associated 2,4-D at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction

X Coordinate (m)	Y Coordinate (m)	8-Hour Average Concentration (g/m ³)
0.000	0.000	0.31010E-06
0.000	6.096	0.20048E-05
0.000	12.192	0.25249E-05
0.000	18.288	0.41580E-06
0.000	24.384	0.26873E-05
0.000	30.480	0.21357E-05
0.000	36.576	0.13034E-05
0.000	42.672	0.35497E-05
0.000	48.768	0.68530E-06
0.000	54.864	0.40173E-05
0.000	60.960	0.44940E-06
0.000	67.056	0.40173E-05
0.000	73.152	0.68600E-06
0.000	79.248	0.35497E-05
0.000	85.344	0.13041E-05
0.000	91.440	0.21357E-05
0.000	97.536	0.26880E-05
0.000	103.632	0.41580E-06
0.000	109.728	0.25249E-05
0.000	115.824	0.20048E-05
0.000	121.920	0.31080E-06
6.096	121.920	0.14259E-05
12.192	121.920	0.30499E-05
18.288	121.920	0.14798E-05
24.384	121.920	0.11046E-05
30.480	121.920	0.39417E-05
36.576	121.920	0.10255E-05
42.672	121.920	0.37142E-05
48.768	121.920	0.20244E-05
54.864	121.920	0.40390E-05
60.960	121.920	0.16751E-05
67.056	121.920	0.52997E-05
73.152	121.920	0.65310E-06
79.248	121.920	0.53004E-05
85.344	121.920	0.16751E-05
91.440	121.920	0.40404E-05
97.536	121.920	0.20244E-05

TABLE B-20. Estimated 8-Hour Average Concentrations of Particle-Associated 2,4-D at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction (continued)

X Coordinate (m)	Y Coordinate (m)	8-Hour Average Concentration (g/m ³)
103.632	121.920	0.37149E-05
109.728	121.920	0.10248E-05
115.824	121.920	0.39424E-05
121.920	121.920	0.11053E-05
128.016	121.920	0.14791E-05
134.112	121.920	0.30499E-05
140.208	121.920	0.14266E-05
146.304	121.920	0.31010E-06
152.400	121.920	0.12852E-05
158.496	121.920	0.21098E-05
164.592	121.920	0.17031E-05
170.688	121.920	0.79590E-06
176.784	121.920	0.24430E-06
182.880	121.920	0.33180E-06
188.976	121.920	0.71190E-06
195.072	121.920	0.10850E-05
195.072	115.824	0.13412E-05
195.072	109.728	0.55030E-06
195.072	103.632	0.25970E-06
195.072	97.536	0.11753E-05
195.072	91.440	0.14476E-05
195.072	35.344	0.44240E-06
195.072	79.248	0.50190E-06
195.072	73.152	0.15757E-05
195.072	67.056	0.10801E-05
195.072	60.960	0.15540E-06
188.976	60.960	0.17290E-06
182.880	60.960	0.19390E-06
176.784	60.960	0.21840E-06
170.688	60.960	0.24780E-06
164.592	60.960	0.28350E-06
158.496	60.960	0.32690E-06
152.400	60.960	0.38080E-06
146.304	60.960	0.44940E-06
146.304	54.864	0.40173E-05
146.304	48.768	0.68830E-06

TABLE B-20. Estimated 8-Hour Average Concentrations of Particle-Associated 2,4-D at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction (continued)

X Coordinate (m)	Y Coordinate (m)	8-Hour Average Concentration (g/m ³)
146.304	42.672	0.35497E-05
146.304	36.576	0.13034E-05
146.304	30.480	0.21364E-05
146.304	24.384	0.26873E-05
146.304	18.288	0.41650E-06
146.304	12.192	0.25249E-05
146.304	6.096	0.20048E-05
146.304	0.000	0.31010E-06
140.208	0.000	0.14266E-05
134.112	0.000	0.30499E-05
128.016	0.000	0.14791E-05
121.920	0.000	0.11053E-05
115.824	0.000	0.39417E-05
109.728	0.000	0.10248E-05
103.632	0.000	0.37149E-05
97.536	0.000	0.20230E-05
91.440	0.000	0.40397E-05
85.344	0.000	0.16744E-05
79.248	0.000	0.53004E-05
73.152	0.000	0.65380E-06
67.056	0.000	0.53004E-05
60.096	0.000	0.16758E-05
54.964	0.000	0.40397E-05
48.768	0.000	0.20244E-05
42.672	0.000	0.37149E-05
36.576	0.000	0.10248E-05
30.480	0.000	0.39417E-05
24.384	0.000	0.11053E-05
18.288	0.000	0.14791E-05
12.192	0.000	0.30499E-05
6.096	0.000	0.14266E-05

TABLE B-21. Estimated 8-Hour Average Concentrations of Particle-Associated 2,4,5-T at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction

X Coordinate (m)	Y Coordinate (m)	8-Hour Average Concentration (g/m ³)
0.000	0.000	0.11172E-05
0.000	6.096	0.72184E-05
0.000	12.192	0.90909E-05
0.000	18.288	0.14980E-05
0.000	24.384	0.96740E-05
0.000	30.480	0.76895E-05
0.000	36.576	0.46921E-05
0.000	42.672	0.12779E-04
0.000	48.768	0.24661E-05
0.000	54.864	0.14461E-04
0.000	60.960	0.16177E-05
0.000	67.056	0.14461E-04
0.000	73.152	0.24682E-05
0.000	79.248	0.12778E-04
0.000	85.344	6.46949E-05
0.000	91.440	0.76895E-05
0.000	97.536	0.96768E-05
0.000	103.632	0.14980E-05
0.000	109.728	0.90895E-05
0.000	115.824	0.72184E-05
0.000	121.920	0.11179E-05
6.096	121.920	0.51338E-05
12.192	121.920	0.10979E-04
18.288	121.920	0.53277E-05
24.384	121.920	0.39760E-05
30.480	121.920	0.14191E-04
36.576	121.920	0.36925E-05
42.672	121.920	0.13370E-04
48.768	121.920	0.72377E-05
54.864	121.920	0.14539E-04
60.960	121.920	0.60312E-05
67.056	121.920	0.19079E-04
73.152	121.920	0.23513E-05
79.248	121.920	0.19083E-04
85.344	121.920	0.60312E-05
91.440	121.920	0.14545E-04
97.536	121.920	0.72377E-05

TABLE B-21. Estimated 8-Hour Average Concentrations of Particle-Associated 2,4,5-T at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction (continued)

X Coordinate (m)	Y Coordinate (m)	8-Hour Average Concentration (g/m ³)
103.632	121.920	0.13374E-04
109.728	121.920	0.36897E-03
115.824	121.920	0.14192E-04
121.920	121.920	0.39781E-05
128.016	121.920	0.53256E-05
134.112	121.920	0.10979E-04
140.208	121.920	0.51352E-05
146.304	121.920	0.11172E-05
152.400	121.920	0.46256E-05
158.496	121.920	0.75957E-05
164.592	121.920	0.61306E-05
170.688	121.920	0.28651E-05
176.784	121.920	0.87990E-06
182.880	121.920	0.11942E-05
188.976	121.920	0.25627E-05
195.072	121.920	0.39060E-05
195.072	115.824	0.48279E-05
195.072	109.728	0.19824E-05
195.072	103.632	0.93450E-06
195.072	97.536	0.42308E-05
195.072	91.440	0.52122E-05
195.072	85.344	0.15925E-05
195.072	79.248	0.18053E-05
195.072	73.152	0.56721E-05
195.072	67.056	0.38878E-05
195.072	60.960	0.56000E-06
188.976	60.960	0.62370E-06
182.880	60.960	0.69790E-06
176.784	60.960	0.78680E-06
170.688	60.960	0.89180E-06
164.592	60.960	0.10206E-03
158.496	60.960	0.11767E-05
152.400	60.960	0.13720E-05
146.304	60.960	0.16170E-05
146.304	54.864	0.14461E-04
146.304	48.768	0.24675E-05

TABLE B-21. Estimated 8-Hour Average Concentrations of Particle-Associated 2,4,5-T at Receptor Locations (x, y Coordinates) Around the Perimeter of the Herbicide Orange Site During Cement Cover Construction (continued)

X Coordinate (m)	Y Coordinate (m)	8-Hour Average Concentration (g/m ³)
146.304	42.672	0.12779E-04
146.304	36.576	0.46928E-05
146.304	30.480	0.76916E-05
146.304	24.384	0.96747E-05
146.304	18.288	0.14987E-05
146.304	12.192	0.90909E-05
146.304	6.096	0.72170E-05
146.304	0.000	0.11172E-05
140.208	0.000	0.51352E-05
134.112	0.000	0.10979E-04
128.016	0.000	0.53256E-05
121.920	0.000	0.39781E-05
115.824	0.000	0.14191E-04
109.728	0.000	0.36897E-05
103.632	0.000	0.13373E-04
97.536	0.000	0.72842E-05
91.440	0.000	0.14543E-04
85.344	0.000	0.60284E-05
79.248	0.000	0.19081E-04
73.152	0.000	0.23527E-05
67.056	0.000	0.19081E-04
60.096	0.000	0.60333E-05
54.864	0.000	0.14543E-04
48.768	0.000	0.72884E-05
42.672	0.000	0.13373E-04
36.576	0.000	0.36904E-05
30.480	0.000	0.14191E-04
24.384	0.000	0.39781E-05
18.288	0.000	0.53256E-05
12.192	0.000	0.10979E-04
6.096	0.000	0.51352E-05

Appendix C

November 13, 1990

Captain Alan Holck
AFOEHL/EHT
Brooks Air Force Base, TX 78235-5501

Dear Captain Holck:

Enclosed please find a trip report for the Johnston Island site visit conducted on October 10-11, 1990. Please note the questions and needs expressed at the end of the report. This information is important to the successful completion of the project. Some of the information (e.g., location of fish sampling stations 4 and 6) will be easily obtained by us in a phone conversation with Roger DiRosa of FWS.

Yours truly,



Scott R. Baker, Ph.D.
Deputy Director

Attachment

Trip Report for Visit to Johnston Island

October 10-11, 1990

Background for the Trip and its Objectives

The RiskFocus Division of Versar is conducting a baseline risk assessment for the Occupational and Environmental Hygiene Laboratory for the Herbicide Orange (HO) storage site at Johnston Island. This risk assessment is part of the site investigation/remediation process related to EPA's regulations on the cleanup of hazardous waste and is being performed in the context of DoD's Installation Restoration Program. A major objective of the risk assessment is to determine the potential for human exposure to contaminants at the HO storage site (using the existing information on site characterization) and the potential human health risk that is the consequence of exposure. In this regard, the site was visited as part of the "investigation" phase of the study, during which several points of information to support the objectives of the study were identified and obtained (to the extent possible). The information to be obtained during the site visit included the following:

- The nature of morbidity (related to the known health effects of HO) among long-term residents of the island, particularly those who participated in the HO leak containment, dedrumming, and drum crushing operations;
- The sampling strategy used by personnel of the Fish and Wildlife Service to determine the levels of dioxin, 2,4,-D and 2,4,5,-T in water, sediments, and biota;

- The need for and possible arrangement for additional sampling and monitoring;
- The relation of site to other activities on the island that might present confounding factors on the risk from exposure to the HO site (e.g., potential for exposure to dioxin from the JACADS operation as it impacts the dioxin risk potential from exposure to the HO site);
- Background information on the potential for contamination of seawater with dioxin at the HO site (e.g., design and construction of the seawall surrounding the site), and
- Based on the physical layout of the island, activities of its residents, and prevailing meteorology, preliminary impressions about the potential for exposure to contaminants at the HO site.

The knowledge gained from the site visit in relation to these points of information is presented in the following descriptions. Recommendations for additional data collection activities, based on site-visit observations and the objectives of the baseline risk assessment, are presented in text in context with specific observations that are being made.

The Nature of Morbidity Among Long-term Residents of the Island

In accordance with the objectives of the study, it is important to determine if current long-term residents on the island are at risk from exposure to contaminants at the HO site. This includes, in particular, residents who participated in the HO removal activities in 1977 and who are still on the island (estimated to be 16 individuals). It does not include residents who are on the island for short durations

(one year or less) because short-term exposure to low levels of potential contaminants at the HO site are not presumed to result in a health risk from a toxicological perspective. It also does not include residents who have resided on the island in the past and who are not currently residing there. Current and future exposure for these latter individuals is presumed to be zero; therefore, their attendant current and future risk is presumed to be zero.

The staff of the medical unit indicated that limb injuries (sprains, bruises) constitute most of the health complaints on the island. Dr. Patrick, a physician currently assigned to JI, estimated that fewer than 50% of the residents smoke, although he did not have enumerative statistics on smoking incidence. He also observed that, to his knowledge, few residents have clinically diagnosed allergies (respiratory, dermal, and other immunologic responses from plants, food, dust, pollen, and in particular chemical exposure). In part, this may be the result of the relatively pollution-free atmosphere over the island, the lack of extensive pollen-bearing plant life on the island, and the relatively constant winds that promote high air exchange around the atoll. Three or four cases of breast cancer have occurred over the years, in addition to one melanoma (which was present prior to residence on the island but which metastasized while on the island), and one case of lung cancer in a smoker. Any hematological workups that were needed were done at the Straub Clinic on Oahu.

As a matter of due course, a more aggressive occupational medicine program should be instituted on the island, including medical monitoring, to determine if the island's hazards, including the HO site, are impacting the health of its long-term civilian residents.

Sixteen (16) individuals who are still on the island worked at the HO site. A list of these individuals was provided. Their medical histories should be examined for HO-related illnesses.

Sampling Strategy Used to Determine the Levels of HO Constituents in Water, Sediments, and Biota

Because the island is a National Wildlife Refuge, personnel of the U.S. Fish and Wildlife Service were present to manage the animal life on land and in the surrounding waters. Their activities center around identification, enumeration, and further characterization of biota in the island environment, and in assisting Federal departments in the sampling and analysis of biological and environmental samples for evidence of chemical contamination. In that context, the FWS staff were drawing fish and sediment samples to support the JACADS monitoring program for dioxin. Samples of fish and sediment are being drawn on a semiannual basis from the area surrounding the HO site. Although a degree of order and record keeping are maintained by FWS staff in their sampling regimen, there is no scientifically-based, systematic collection scheme (i.e., sampling method, frequency, location, and fish-type) in place with an objective of monitoring the potential migration and bioaccumulation of contaminants in the aquatic environment. Sampling parameters are left to the discretion of FWS staff. Reports of tissue and sediment analyses being conducted by Radian Corporation have been made available. The most recent analytical results were provided by FWS staff during the site visit. FWS staff are embarking on a sample collection and monitoring program to support the JACADS activity. This will be centered on the coral reef downrange of the HO site and presents a potential for collaboration with sampling needs for the HO site investigation (see below).

Need for and Possible Arrangement for Additional Sampling and Monitoring

A potential protocol for future aquatic sampling was discussed at length with FWS staff on the island. The stated objective is to determine the possible link between HO site contamination, sediment/water/fish contamination, and human consumption of contaminated fish (by catching them off the west wharf near the HO

site). The sampling plan should be responsive to this objective and was conceived as presented below for further consideration:

The physical layout of the area consists of, on land, the HO site and west wharf, and, in water, a seawall, reef, and intermediate area between the seawall and reef. To draw links between the HO site and the potential human consumption of contaminated fish caught at the fishing wharf, samples should be taken at the following locations:

- *Snails (a representative of filter feeders) and sediment (to determine if HO site contaminants are leaching from site to sediment or seawater) immediately off the HO site;*
- *Goat fish (representative of an intermediate aquatic trophic level) and sediment in the intermediate area off the HO site;*
- *Herbivores and predatory fish (representative of a higher trophic level) and sediment at the reef off the HO site;*
- *Sediment at the reef off the fishing wharf;*
- *Sediment at the intermediate area off the fishing wharf;*
- *Sediment at the seawall off the fishing wharf; and*
- *Fish that are caught by individuals fishing off the wharf.*

There is some question as to whether or not fish migrate between waters off the wharf area and waters off the HO site, and whether fish at the reef come inland as potential catch. The fish tagging and tracking effort that would be required to

address this issue is a costly and labor-intensive undertaking. The above plan circumvents the need for such an elaborate activity by drawing links between HO site contamination and actual catch.

Dr. Phillip LaBelle of the Woods Hole Oceanographic Institute will be embarking on a sampling regimen related to the JACADS operation to monitor the existence of furans, dioxins, and PCB's in sediments and fish at the reef and west camera stand. This presents an opportunity for the Air Force to collaborate on any need for further sampling with that being conducted by Dr. LaBelle for the Aberdeen Proving Ground. The JACADS monitoring program will begin shortly so that timely decisions on the need for additional sampling related to the HO site are needed. It is anticipated that, as long as stack monitors at the JACADS incinerators do not detect these chemicals at the stack, no JACADS-related chemicals will appear in biota off the west end of the island.

Well-placed locations for drawing *a few* water samples should be ascertained. As a substitute for taking extensive water samples, it may be sufficient to place current meters in the water to gain additional knowledge of present-day current patterns. This, in combination with existing empirical information on currents in the Atoll in general, may provide information on the potential role of currents in the distribution of HO site contaminants and further information on the land/water/fish/sediment interfaces.

There is a need to get as accurate information as possible on consumption (frequency and quantity) of fish caught off the west end of the island, as well as the dioxin levels in those fish.

With regard to air monitoring, there is a distinct aroma of formulation constituents in the area of the transformer west of the HO site. Based on dioxin levels at selected locations within the site as determined in the 1966 soil characterization

study, it is plausible that dioxin and other HO formulation ingredients (2,4-D, 2,4,5-T, emulsifiers, pH buffers, detergents, stabilizers, etc.) as cocontaminants may be volatilizing from the site. Since fire-training, burn-pit, and possibly other activities occur in this downwind area, the air as a potential source of personnel exposure to HO-site derived chemicals should be monitored for 2,4,-D and 2,4,5-T and in particular 2,3,7,8-dioxin that may be volatilizing from the HO site. Tomato plant bioassays provide only crude estimates of the presence of dioxin according to the severity of epinastic growth. This bioassay is not sufficient for human exposure estimation.

Activities on the Island as Potential Confounders to Risks from the HO Site

There is a potential for a confounding effect presented by two possible carcinogen-generating sources on the island other than the HO site:

- The JACADS facility is located upwind of the HO site and activities west of the site. The potential for dioxin release from JACADS is unknown. For purposes of the baseline risk assessment related to the HO site, it will be assumed that the potential for JACADS to pose a confounding influence in air or water media is negligible. Nevertheless, should there be airborne dioxin, furan, or other carcinogenic releases from the JACADS incinerators and dioxin releases from the HO site, any concentrations at locations west of the HO site would have to be apportioned between the two sources by air dispersion modeling (requiring knowledge of the source term). The reliability of results presented by modeling may be questionable enough to warrant additional monitoring. Currently, monitoring for dioxin related to the JACADS operation is being conducted only at the stack; downrange (Hi-Vol) samplers are monitoring for criteria pollutants and not for organics.

- The current fire training area is located immediately downrange of the HO site. Since this is a combustion operation (probably fueled by a petroleum-based product), there is a possibility that the area is contaminated with PAH's (i.e., carcinogens) including benzopyrenes and dioxin. Soil analyses of this area as presented in the 1986 soil characterization study reveal levels of 15 and 24 ppb in the fire training area. This may impact health risks associated with the HO site through both air and water media in ways that are difficult to predict with existing data.

Potential for Contamination of Seawater with Chemicals at the HO Site

Some aquatic and sediment samples have contained dioxin to varying degrees. If continuing monitoring of sediments and fish reveals contamination, particularly if the levels that are not diminishing with time, the possibility that the HO site as a source of dioxin in water must be explored. The seawall risers surrounding the HO site are lined with an impervious tough material near to the top of the seawall as it adjoins the ground of the HO site. There are two potential sources of migration of contaminants at the site to the surrounding aquatic environment:

- Backwash of contaminated soil over the seawall on those rare meteorological occasions when seawater is able to climb over the wall;
- Possible confluence between the groundwater aquifer under the site with the sea. The groundwater aquifer under the HO site has not been characterized. To ascertain if groundwater is a potential source of fugitive escape, the following prudent protocol should be conducted:
 - At hot cells on the HO site, bore holes into the water table;

- If groundwater is contaminated, characterize both the aquifer and the contaminant plume;
- Determine if the plume is (or is predicted to) reach the seawater;
- Determine the frequency of topsoil being washed out to sea;
- Estimate wind erosion and sea deposition of topsoil from the site; and
- Determine levels of dioxin in sediments and biota (see above: Need for and Possible Arrangement for Additional Sampling and Monitoring).

Preliminary impressions about the potential for exposure to contaminants at the HO site based on the physical layout of the island, activities of its residents, and prevailing meteorological features

Because the HO site is at the western edge of the island in the presence of prevailing easterly winds, there is not much potential for exposure via the air. There is also not much potential for confounding effects from the JACADS facility due to design and safety features of that facility; any JACADS releases will be acute episodic with health consequences (if any) that are different from those posed by HO-site contaminants. The fire training area poses a more plausible source of confounding synergistic or potentiative exposure because of its proximity to the HO site (i.e., the possibility that personnel working around the fire training area might receive exposures from the HO site) and the probable similarity in mode of action of contaminants from the HO site and the fire training area. The health status of islanders is a complete unknown (smoking histories, morbidity). As a result it will be difficult to select likely sensitive individuals. In accordance with HHEM procedures, risk will be determined for the MEI (most exposed individual) and MEAP (most exposed actual person). Considering the air and water as transport media for HO-derived dioxin and other HO-site contaminants (i.e., the only potential sources of

exposure), water poses a greater risk because of fish contamination and human consumption.

Followup Information Needed

In order to conduct a thorough analysis for the baseline risk assessment, we would like to obtain answers to the following questions:

- *What is the formulation composition of HO (chemicals and % wt)?* This will help us determine the range of contaminants present at the site. Presumably the maker (Dow Chemical) of HO would have this information. It may be more readily available in Air Force files than by starting with a cold call to Dow.
- *How much time (frequency and time interval per occurrence) do people spend downwind of the HO site (at the burn pit and the fire training area)?* Someone (who?) on JI would have to provide estimates.
- *Where would we be able to obtain automated meteorological data (data tape or disk) for the island?*
- *Who designed the seawall?* We would like to find out the principle of seawall operation, water dynamics through the seawall, and the likelihood of leakage of water through it.
- *Can you help us locate Colonel Nay (?) at Tyndall AFB?* He was the base engineer during the time of the HO removal operation. He may be able to provide information on the location of specific operations (e.g., burning of dunnage, use of ash for fill).

- *Can you help us obtain a copy of JACADS EIS Second Supplemental for Storage and Ultimate Disposal of the European Chemicals (first and/or second versions)?*

- *What are stations 4 and 6 identifying locations from which fish are being sampled?*

- *Can you please furnish the following documents cited in the Holmes and Narver Preliminary Assessment of Johnston Atoll (October 1983):*
 - *Channell, R.E.. and T.L. Stoddart, April 1984, Herbicide Orange Monitoring Program: Interim Report, January 1980-December 1982, ESL-TR-83-56, ESL, AFESC, Tyndall AFB, Florida.*

 - *Rhodes, 2 Lt., Albert N., January 2, 1985, Johnston Island Fish Samples, Letter to USAF OEHL/EC.*

 - *Casanova, J.N., January 1986, JI Survey Sampling and Analysis Project, EG&G/Idaho, Inc., Idaho Falls, Idaho.*

 - *Casanova, J.N., March 1986, Johnston Island Survey Sampling and Analysis Project Addendum I, EG&G/Idaho, Inc., Idaho Falls, Idaho.*