Appendix A
Chi-square test of homogeneity for instantaneous survival between Turb-N Tag trials at Bonneville Dam.

---------- Scenario=Gate 4, Flow deflector || Treatment or Control=' Control' ----------

TABLE OF STATUS BY TESTLOT

STATUS	TESTLOT(Testlot)							
Frequency Percent Row Pct Col Pct	2	3	4	5	6	7	8	Total
ALIVE	38 13.57 14.13 95.00	39 13.93 14.50 97.50	38 13.57 14.13 95.00	40 14.29 14.87 100.00	40 14.29 14.87 100.00	37 13.21 13.75 92.50	37 13.21 13.75 92.50	269 96.07
DEAD	2 0.71 40.00 5.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	3 1.07 60.00 7.50	0 0.00 0.00 0.00	5 1.79
NOT RECOVERED	0 0.00 0.00 0.00	1 0.36 16.67 2.50	2 0.71 33.33 5.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	3 1.07 50.00 7.50	6 2.14
Total	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	280 100.00

STATISTICS FOR TABLE OF STATUS BY TESTLOT

Statistic	DF	Value	Prob
Chi-Square	12	23.786	0.022
Likelihood Ratio Chi-Square	12	24.195	0.019
Mantel-Haenszel Chi-Square	1	0.891	0.345
Fisher's Exact Test (2-Tail)			1.38E-02
Phi Coefficient		0.291	
Contingency Coefficient		0.280	
Cramer's V		0.206	

Sample Size = 280
WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Appendix A
Chi-square test of homogeneity for instantaneous survival between Turb-N Tag trials at Bonneville Dam.

---------- Scenario=Gate 4, Flow deflector || Treatment or Control=' Treatment' ----------

TABLE OF STATUS BY TESTLOT

STATUS	TESTLOT(Testlot)							
Frequency Percent Row Pct Col Pct	2	3	4	5	6	7	8	Total
ALIVE	40 14.29 14.39 100.00	40 14.29 14.39 100.00	40 14.29 14.39 100.00	40 14.29 14.39 100.00	40 14.29 14.39 100.00	38 13.57 13.67 95.00	40 14.29 14.39 100.00	278 99.29
DEAD	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.36 100.00 2.50	0 0.00 0.00 0.00	1 0.36
NOT RECOVERED	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.36 100.00 2.50	0 0.00 0.00 0.00	1 0.36
Total	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	280 100.00

STATISTICS FOR TABLE OF STATUS BY TESTLOT

Statistic	DF	Value	Prob
Chi-Square	12	12.086	0.439
Likelihood Ratio Chi-Square	12	7.871	0.795
Mantel-Haenszel Chi-Square	1	1.805	0.179
Fisher's Exact Test (2-Tail)			0.140
Phi Coefficient		0.208	
Contingency Coefficient		0.203	
Cramer's V		0.147	

Sample Size = 280
WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Appendix A
Chi-square test of homogeneity for instantaneous survival between Turb-N Tag trials at Bonneville Dam.

---------- Scenario=Gate 2, No flow deflector || Treatment or Control=' Control' ----------

TABLE OF STATUS BY TESTLOT

STATUS	TESTLOT(Testlot)							
Frequency Percent Row Pct Col Pct	2	3	4	5	6	7	8	Total
ALIVE	38 13.57 14.13 95.00	39 13.93 14.50 97.50	38 13.57 14.13 95.00	40 14.29 14.87 100.00	40 14.29 14.87 100.00	37 13.21 13.75 92.50	37 13.21 13.75 92.50	269 96.07
DEAD	2 0.71 40.00 5.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	3 1.07 60.00 7.50	0 0.00 0.00 0.00	5 1.79
NOT RECOVERED	0 0.00 0.00 0.00	1 0.36 16.67 2.50	2 0.71 33.33 5.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	3 1.07 50.00 7.50	6 2.14
Total	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	280 100.00

STATISTICS FOR TABLE OF STATUS BY TESTLOT

Statistic	DF	Value	Prob
Chi-Square	12	23.786	0.022
Likelihood Ratio Chi-Square	12	24.195	0.019
Mantel-Haenszel Chi-Square	1	0.891	0.345
Fisher's Exact Test (2-Tail)			1.38E-02
Phi Coefficient		0.291	
Contingency Coefficient		0.280	
Cramer's V		0.206	

Sample Size = 280
WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Appendix A
Chi-square test of homogeneity for instantaneous survival between Turb-N Tag trials at Bonneville Dam.

---------- Scenario=Gate 2, No flow deflector || Treatment or Control=' Treatment' ----------

TABLE OF STATUS BY TESTLOT

STATUS	TESTLOT(Testlot)							
Frequency Percent Row Pct Col Pct	2	3	4	5	6	7	8	Total
ALIVE	38 13.57 14.13 95.00	36 12.86 13.38 90.00	39 13.93 14.50 97.50	40 14.29 14.87 100.00	39 13.93 14.50 97.50	39 13.93 14.50 97.50	38 13.57 14.13 95.00	269 96.07
DEAD	2 0.71 20.00 5.00	3 1.07 30.00 7.50	1 0.36 10.00 2.50	0 0.00 0.00 0.00	1 0.36 10.00 2.50	1 0.36 10.00 2.50	2 0.71 20.00 5.00	10 3.57
NOT RECOVERED	0 0.00 0.00 0.00	1 0.36 100.00 2.50	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.36
Total	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	280 100.00

STATISTICS FOR TABLE OF STATUS BY TESTLOT

Statistic	DF	Value	Prob
Chi-Square	12	10.253	0.594
Likelihood Ratio Chi-Square	12	9.150	0.690
Mantel-Haenszel Chi-Square	1	1.182	0.277
Fisher's Exact Test (2-Tail)			0.597
Phi Coefficient		0.191	
Contingency Coefficient		0.188	
Cramer's V		0.135	

Sample Size = 280
WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Appendix A
Chi-square test of homogeneity for 48 hour survival between Turb-N Tag trials at Bonneville Dam.

---------- Scenario=Gate 4, Flow deflector || Treatment or Control=' Control' ----------

TABLE OF STATUS BY TESTLOT

STATUS	TESTLOT(Testlot)							
Frequency Percent Row Pct Col Pct	2	3	4	5	6	7	8	Total
ALIVE	38 13.57 14.23 95.00	39 13.93 14.61 97.50	38 13.57 14.23 95.00	40 14.29 14.98 100.00	39 13.93 14.61 97.50	36 12.86 13.48 90.00	37 13.21 13.86 92.50	267 95.36
DEAD	2 0.71 28.57 5.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.36 14.29 2.50	4 1.43 57.14 10.00	0 0.00 0.00 0.00	7 2.50
NOT RECOVERED	0 0.00 0.00 0.00	1 0.36 16.67 2.50	2 0.71 33.33 5.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	3 1.07 50.00 7.50	6 2.14
Total	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	280 100.00

STATISTICS FOR TABLE OF STATUS BY TESTLOT

Statistic	DF	Value	Prob
Chi-Square	12	24.618	0.017
Likelihood Ratio Chi-Square	12	25.363	0.013
Mantel-Haenszel Chi-Square	1	1.417	0.234
Fisher's Exact Test (2-Tail)			1.20E-02
Phi Coefficient		0.297	
Contingency Coefficient		0.284	
Cramer's V		0.210	

Sample Size = 280
WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Appendix A
Chi-square test of homogeneity for 48 hour survival between Turb-N Tag trials at Bonneville Dam.

---------- Scenario=Gate 4, Flow deflector || Treatment or Control=' Treatment' ----------

TABLE OF STATUS BY TESTLOT

STATUS	TESTLOT(Testlot)							
Frequency Percent Row Pct Col Pct	2	3	4	5	6	7	8	Total
ALIVE	40 14.29 14.49 100.00	40 14.29 14.49 100.00	40 14.29 14.49 100.00	40 14.29 14.49 100.00	38 13.57 13.77 95.00	38 13.57 13.77 95.00	40 14.29 14.49 100.00	276 98.57
DEAD	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 0.71 66.67 5.00	1 0.36 33.33 2.50	0 0.00 0.00 0.00	3 1.07
NOT RECOVERED	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.36 100.00 2.50	0 0.00 0.00 0.00	1 0.36
Total	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	280 100.00

STATISTICS FOR TABLE OF STATUS BY TESTLOT

Statistic	DF	Value	Prob
Chi-Square	12	14.812	0.252
Likelihood Ratio Chi-Square	12	11.894	0.454
Mantel-Haenszel Chi-Square	1	2.307	0.129
Fisher's Exact Test (2-Tail)			0.120
Phi Coefficient		0.230	
Contingency Coefficient		0.224	
Cramer's V		0.163	

Sample Size = 280
WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Appendix A
Chi-square test of homogeneity for 48 hour survival between Turb-N Tag trials at Bonneville Dam.

---------- Scenario=Gate 2, No flow deflector || Treatment or Control=' Control' ----------

TABLE OF STATUS BY TESTLOT

STATUS	TESTLOT(Testlot)							
Frequency Percent Row Pct Col Pct	2	3	4	5	6	7	8	Total
ALIVE	38 13.57 14.23 95.00	39 13.93 14.61 97.50	38 13.57 14.23 95.00	40 14.29 14.98 100.00	39 13.93 14.61 97.50	36 12.86 13.48 90.00	37 13.21 13.86 92.50	267 95.36
DEAD	2 0.71 28.57 5.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.36 14.29 2.50	4 1.43 57.14 10.00	0 0.00 0.00 0.00	7 2.50
NOT RECOVERED	0 0.00 0.00 0.00	1 0.36 16.67 2.50	2 0.71 33.33 5.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	3 1.07 50.00 7.50	6 2.14
Total	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	280 100.00

STATISTICS FOR TABLE OF STATUS BY TESTLOT

Statistic	DF	Value	Prob
Chi-Square	12	24.618	0.017
Likelihood Ratio Chi-Square	12	25.363	0.013
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Fisher's Exact Test (2-Tail)			1.20E-02
Phi Coefficient		0.297	
Contingency Coefficient		0.284	
Cramer's V		0.210	

Sample Size = 280
WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Appendix A
Chi-square test of homogeneity for 48 hour survival between Turb-N Tag trials at Bonneville Dam.

---------- Scenario=Gate 2, No flow deflector || Treatment or Control=' Treatment' ----------

TABLE OF STATUS BY TESTLOT

STATUS	TESTLOT(Testlot)							
Frequency Percent Row Pct Col Pct	2	3	4	5	6	7	8	Total
ALIVE	38 13.57 14.13 95.00	36 12.86 13.38 90.00	39 13.93 14.50 97.50	40 14.29 14.87 100.00	39 13.93 14.50 97.50	39 13.93 14.50 97.50	38 13.57 14.13 95.00	269 96.07
DEAD	2 0.71 20.00 5.00	3 1.07 30.00 7.50	1 0.36 10.00 2.50	0 0.00 0.00 0.00	1 0.36 10.00 2.50	1 0.36 10.00 2.50	2 0.71 20.00 5.00	10 3.57
NOT RECOVERED	0 0.00 0.00 0.00	1 0.36 100.00 2.50	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.36
Total	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	40 14.29	280 100.00

STATISTICS FOR TABLE OF STATUS BY TESTLOT

Statistic	DF	Value	Prob
Chi-Square	12	10.253	0.594
Likelihood Ratio Chi-Square	12	9.150	0.690
Mantel-Haenszel Chi-Square	1	1.182	0.277
Fisher's Exact Test (2-Tail)			0.597
Phi Coefficient		0.191	
Contingency Coefficient		0.188	
Cramer's V		0.135	

Sample Size = 280
WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

BONNEVILLE, GATE 4, FLOW DEFLECTOR, INSTANTANEOUS

```
==================================================
RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)
          estim. std.err.
S =       0.9768 (0.0064)   Control group survival
Pa =      1.0      N/A      Live recovery probability*
Pd =      1.0      N/A      Dead recovery probability*
Tau =     1.0      N/A      Spillgate survival*
1-Tau =   1.0      N/A      Spillgate mortality*

* --  Because of contraints in the data set, this probability is assumed
      equal to 1.0; not estimated.

 log-likelihood : -61.766762

Variance-Covariance matrix for estimated probabilities:
0.00004

Profile likelihood intervals:
            Spillgate survival   Spillgate mortality
90 percent: (0.9934, 1.0000)     (0.0000, 0.0066)
95 percent: (0.9907, 1.0000)     (0.0000, 0.0093)
99 percent: (0.9845, 1.0000)     (0.0000, 0.0155)

==================================================
RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

          estim. std.err.
S =       0.9768 (0.0064)   Control group survival
Pa = Pd   1.0      N/A      Recovery probability*
Tau =     1.0      N/A      Spillgate survival*
1-Tau =   1.0      N/A      Spillgate mortality*

* --  Because of contraints in the data set, this probability is assumed
      equal to 1.0; not estimated.

 log-likelihood : -61.766762

Variance-Covariance matrix for estimated probabilities:
0.00004

Profile likelihood intervals:
            Spillgate survival   Spillgate mortality
90 percent: (0.9934, 1.0000)     (0.0000, 0.0066)
95 percent: (0.9907, 1.0000)     (0.0000, 0.0093)
99 percent: (0.9845, 1.0000)     (0.0000, 0.0155)

==================================================

Likelihood ratio statistic for equality of recovery probabilities:
       0.000000
Compare with quantiles of the chi-squared distribution with 1 d.f.:
  For significance level 0.10:  2.706
  For significance level 0.05:  3.841
  For significance level 0.01:  6.635
```

BONNEVILLE, GATE 4, FLOW DEFLECTOR, 48 HR

```
==================================================
RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)
          estim. std.err.
S =       0.9731 (0.0068)   Control group survival
Pa =      1.0     N/A       Live recovery probability*
Pd =      1.0     N/A       Dead recovery probability*
Tau =     1.0     N/A       Spillgate survival*
1-Tau =   1.0     N/A       Spillgate mortality*

* --  Because of contraints in the data set, this probability is assumed
      equal to 1.0; not estimated.

 log-likelihood : -69.041187

Variance-Covariance matrix for estimated probabilities:
0.00005

Profile likelihood intervals:
            Spillgate survival   Spillgate mortality
90 percent: (0.9909, 1.0000)     (0.0000, 0.0091)
95 percent: (0.9875, 1.0000)     (0.0000, 0.0125)
99 percent: (0.9799, 1.0000)     (0.0000, 0.0201)

==================================================
RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

          estim. std.err.
S =       0.9731 (0.0068)   Control group survival
Pa = Pd   0.9964 (0.0025)   Recovery probability
Tau =     1.0     N/A       Spillgate survival*
1-Tau =   1.0     N/A       Spillgate mortality*

* --  Because of contraints in the data set, this probability is assumed
      equal to 1.0; not estimated.

 log-likelihood : -82.307191

Variance-Covariance matrix for estimated probabilities:
0.00005  0.00000
0.00000  0.00001

Profile likelihood intervals:
            Spillgate survival   Spillgate mortality
90 percent: (0.9909, 1.0000)     (0.0000, 0.0091)
95 percent: (0.9875, 1.0000)     (0.0000, 0.0125)
99 percent: (0.9799, 1.0000)     (0.0000, 0.0201)

==================================================

Likelihood ratio statistic for equality of recovery probabilities:
       26.532007
Compare with quantiles of the chi-squared distribution with 1 d.f.:
  For significance level 0.10:  2.706
  For significance level 0.05:  3.841
  For significance level 0.01:  6.635
```

```
BONNEVILLE, GATE 2, NO FLOW DEFLECTOR, INSTANTANEOUS

==================================================
RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)
          estim. std.err.
S =       0.9607 (0.0082)   Control group survival
Pa =      1.0      N/A      Live recovery probability*
Pd =      1.0      N/A      Dead recovery probability*
Tau =     1.0      N/A      Spillgate survival*
1-Tau =   1.0      N/A      Spillgate mortality*

* --  Because of contraints in the data set, this probability is assumed
      equal to 1.0; not estimated.

 log-likelihood : -92.773760

Variance-Covariance matrix for estimated probabilities:
0.00007

Profile likelihood intervals:
            Spillgate survival   Spillgate mortality
90 percent: (0.9715, 1.0000)     (0.0000, 0.0285)
95 percent: (0.9657, 1.0000)     (0.0000, 0.0343)
99 percent: (0.9541, 1.0000)     (0.0000, 0.0459)

==================================================
RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

          estim. std.err.
S =       0.9607 (0.0082)   Control group survival
Pa = Pd   1.0      N/A      Recovery probability*
Tau =     1.0      N/A      Spillgate survival*
1-Tau =   1.0      N/A      Spillgate mortality*

* --  Because of contraints in the data set, this probability is assumed
      equal to 1.0; not estimated.

 log-likelihood : -92.773760

Variance-Covariance matrix for estimated probabilities:
0.00007

Profile likelihood intervals:
            Spillgate survival   Spillgate mortality
90 percent: (0.9715, 1.0000)     (0.0000, 0.0285)
95 percent: (0.9657, 1.0000)     (0.0000, 0.0343)
99 percent: (0.9541, 1.0000)     (0.0000, 0.0459)

==================================================

Likelihood ratio statistic for equality of recovery probabilities:
       0.000000
Compare with quantiles of the chi-squared distribution with 1 d.f.:
  For significance level 0.10:  2.706
  For significance level 0.05:  3.841
  For significance level 0.01:  6.635
```

BONNEVILLE, GATE 2, NO FLOW DEFLECTOR, 48 HRS

```
==================================================
RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)
          estim. std.err.
S =       0.9571 (0.0086)   Control group survival
Pa =      1.0      N/A      Live recovery probability*
Pd =      1.0      N/A      Dead recovery probability*
Tau =     1.0      N/A      Spillgate survival*
1-Tau =   1.0      N/A      Spillgate mortality*

* --  Because of contraints in the data set, this probability is assumed
      equal to 1.0; not estimated.

 log-likelihood : -99.075397

Variance-Covariance matrix for estimated probabilities:
0.00007

Profile likelihood intervals:
            Spillgate survival   Spillgate mortality
90 percent: (0.9768, 1.0000)     (0.0000, 0.0232)
95 percent: (0.9710, 1.0000)     (0.0000, 0.0290)
99 percent: (0.9593, 1.0000)     (0.0000, 0.0407)

==================================================
RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

          estim. std.err.
S =       0.9571 (0.0086)   Control group survival
Pa = Pd   1.0      N/A      Recovery probability*
Tau =     1.0      N/A      Spillgate survival*
1-Tau =   1.0      N/A      Spillgate mortality*

* --  Because of contraints in the data set, this probability is assumed
      equal to 1.0; not estimated.

 log-likelihood : -99.075397

Variance-Covariance matrix for estimated probabilities:
0.00007

Profile likelihood intervals:
            Spillgate survival   Spillgate mortality
90 percent: (0.9768, 1.0000)     (0.0000, 0.0232)
95 percent: (0.9710, 1.0000)     (0.0000, 0.0290)
99 percent: (0.9593, 1.0000)     (0.0000, 0.0407)

==================================================

Likelihood ratio statistic for equality of recovery probabilities:
       0.000000
Compare with quantiles of the chi-squared distribution with 1 d.f.:
  For significance level 0.10:  2.706
  For significance level 0.05:  3.841
  For significance level 0.01:  6.635
```