Click Here to Return to Appendix A.2 Contents

APPENDIX G

Toxicity Test Statistical Analysis

Wells G and H, Woburn Massachusetts

as an approximate test (average df are used).

.s G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

Bartletts test for homogeneity of variance

Calculated B statistic = 50.38
Table Chi-square value = 20.09 (alpha = 0.01)
Table Chi-square value = 15.51 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 7.00
Used for Chi-square table value ==> df (#groups-1) = 8

Data FAIL homogeneity test at 0.01 level. Try another transformation.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

TITLE: Wells G&H Sed Tox C. Tentans Survival 12/97
?: C:ghct12.97
/SFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 9

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Art Sed	1	1.0000	1.4120
1	Art Sed	2	0.9000	1.2490
1	Art Sed	3	1.0000	1.4120
1	Art Sed	4	1.0000	1.4120
1	Art Sed	5	0.9000	1.2490
1	Art Sed	6	0.9000	1.2490
1	Art Sed	7	0.9000	1.2490
1	Art Sed	8	0.9000	1.2490
2	SD06	1	1.0000	1.4120
2	SD06	2	0.9000	1.2490
2	SD06	3	1.0000	1.4120
2	SD06	4	1.0000	1.4120
2	SD06	5	0.9000	1.2490
2	SD06	6	0.9000	1.2490
2	SD06	7	1.0000	1.4120
2	SD06	8	0.9000	1.2490
3	SD07	1	1.0000	1.4120
3	SD07	2	1.0000	1.4120
3	SD07	3	0.9000	1.2490
	SD07	4	0.9000	1.2490
	SD07	5	0.9000	1.2490
	SD07	6	1.0000	1.4120
3	SD07	7	0.8000	1.1071
3	SD07	8	0.9000	1.2490
4	SD10	1	0.8000	1.1071

4	SD10	2	0.9000	1.2490
4	SD10	3	0.9000	1.2490
4	SD10	4	1.0000	1.4120
	SD10	5	0.9000	1.2490
	SD10	6	1.0000	1.4120
	SD10	7	0.9000	1.2490
4	SD10	8	0.8000	1.1071
4	SD12	1	0.7000	0.9912
5	SD12	2	0.9000	1.2490
5	SD12	3	0.7000	0.9912
5	SD12	4	0.8000	1.1071
5	SD12	5	1.0000	1.4120
5	SD12	6	0.9000	1.2490
5	SD12	7	0.7000	0.9912
5	SD12	8	1.0000	1.4120
5	SD18	1	0.9000	1.2490
6	SD18	2	0.8000	1.1071
6	SD18	3	1.0000	1.4120
6	SD18	4	0.7000	0.9912
6	SD18	5	0.8000	1.1071
6	SD18	6	1.0000	1.4120
6	SD18	7	0.9000	1.2490
6	SD18	8	0.7000	0.9912
6	SD19	1	1.0000	1.4120
7	SD19	2	0.9000	1.2490
7	SD19	3	1.0000	1.4120
7	SD19	4	0.8000	1.1071
7	SD19	5	0.8000	1.1071
7	SD19	6	0.7000	0.9912
7	SD19	7	1.0000	1.4120
	SD19	8	0.8000	1.1071
	SD25	1	0.9000	1.2490
8	SD25	2	1.0000	1.4120
8	SD25	3	0.9000	1.2490
8	SD25	4	1.0000	1.4120
8	SD25	5	1.0000	1.4120
8	SD25	6	0.9000	1.2490
8	SD25	7	0.9000	1.2490
8	SD25	8	1.0000	1.4120
8	SDFB	1	0.0000	0.1588
9	SDFB	2	1.0000	1.4120
9	SDFB	3	0.6000	0.8861
9	SDFB	4	1.0000	1.4120
9	SDFB	5	1.0000	

	1.4120			
9	SDFB	6	1.0000	1.4120
9	SDFB	7	0.4000	0.6847
	SDFB	8	0.1000	0.3218

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Art Sed	8	1.249	1.412	1.310
2	SD06	8	1.249	1.412	1.331
3	SD07	8	1.107	1.412	1.292
4	SD10	8	1.107	1.412	1.254
5	SD12	8	0.991	1.412	1.175
6	SD18	8	0.991	1.412	1.190
7	SD19	8	0.991	1.412	1.225
8	SD25	8	1.249	1.412	1.331
9	SDFB	8	0.159	1.412	0.962

Wells G&H Sed Tox C. Tentans Survival 12/97
: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Art Sed	0.007	0.084	0.030
2	SD06	0.008	0.087	0.031
3	SD07	0.012	0.110	0.039
4	SD10	0.013	0.115	0.041
5	SD12	0.033	0.181	0.064
6	SD18	0.028	0.168	0.060
7	SD19	0.029	0.170	0.060
8	SD25	0.008	0.087	0.031
9	SDFB	0.278	0.528	0.186

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SI
1	Art Sed	1.310				
2	SD06	1.331	72.00	45.00	8.00	
3	SD07	1.292	65.50	45.00	8.00	

SD10	1.254	59.00	45.00	8.00
SD12	1.175	54.00	45.00	8.00
SD18	1.190	54.00	45.00	8.00
SD19	1.225	58.00	45.00	8.00
SD25	1.331	72.00	45.00	8.00
SDFB	0.962	62.00	45.00	8.00

Critical values use k = 8, are 1 tailed, and alpha = 0.05

lls G&H Sed Tox C. Tentans Survival 12/97
le: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

ILCOXON RANK SUM TEST W/ BONFERRONI ADJUSTMENT - Ho:Control<Treatment

ROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
	Art Sed	1.310				
1	SD06	1.331	72.00	44.00	8	
2	SD07	1.292	65.50	44.00	8	
3	SD10	1.254	59.00	44.00	8	
4	SD12	1.175	54.00	44.00	8	
5	SD18	1.190	54.00	44.00	8	
6	SD19	1.225	58.00	44.00	8	
7	SD25	1.331	72.00	44.00	8	
8	SDFB	0.962	62.00	44.00	8	
9						

itical values use k = 8, are 1 tailed, and alpha = 0.05

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.824	17.424	27.504	17.424	4.824
OBSERVED	2	26	17	27	0

Calculated Chi-Square goodness of fit test statistic = 19.9727
Table Chi-Square value (alpha = 0.01) = 13.277

Data FAIL normality test. Try another transformation.

Warning - The two homogeneity tests are sensitive to non-normal data and should not be performed.

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro-Wilks test for normality

******** Shapiro-Wilks Test is aborted ********

This test can not be performed because total number of replicates is greater than 50.

Total number of replicates = 72

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 39.11
Closest, conservative, Table H statistic = 23.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 9, df (# reps-1) = 7
Actual values ==> R (# groups) = 9, df (# avg reps-1) = 7.00

Data FAIL homogeneity test. Try another transformation.

NOTE: This test requires equal replicate sizes. If they are unequal but do not differ greatly, the Hartley test may still be used

as an approximate test (average df are used).

.s G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance

Calculated B statistic = 66.83
Table Chi-square value = 20.09 (alpha = 0.01)
Table Chi-square value = 15.51 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 7.00
Used for Chi-square table value ==> df (#groups-1) = 8

Data FAIL homogeneity test at 0.01 level. Try another transformation.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

ells G&H Sed Tox C. Tentans Survival 12/97
ile: C:ghct12.97 Transform: NO TRANSFORMATION

-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.824	17.424	27.504	17.424	4.824
OBSERVED	2	26	17	27	0

Calculated Chi-Square goodness of fit test statistic = 19.9727
Table Chi-Square value (alpha = 0.01) = 13.277

Data FAIL normality test. Try another transformation.

Warning - The two homogeneity tests are sensitive to non-normal data and should not be performed.

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

Shapiro-Wilks test for normality

******** Shapiro-Wilks Test is aborted ********

This test can not be performed because total number of replicates is greater than 50.

Total number of replicates = 72

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 68.20
Closest, conservative, Table H statistic = 23.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 9, df (# reps-1) = 7
Actual values ==> R (# groups) = 9, df (# avg reps-1) = 7.00

Data FAIL homogeneity test. Try another transformation.

NOTE: This test requires equal replicate sizes. If they are unequal but do not differ greatly, the Hartley test may still be used

E: Wells G&H Sed Tox C. Tentans Survival 12/97
C:ghct12.97
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 9

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	SD25	1	0.9000	1.2490
1	SD25	2	1.0000	1.4120
1	SD25	3	0.9000	1.2490
1	SD25	4	1.0000	1.4120
1	SD25	5	1.0000	1.4120
1	SD25	6	0.9000	1.2490
1	SD25	7	0.9000	1.2490
1	SD25	8	1.0000	1.4120
2	SD06	1	1.0000	1.4120
2	SD06	2	0.9000	1.2490
2	SD06	3	1.0000	1.4120
2	SD06	4	1.0000	1.4120
2	SD06	5	0.9000	1.2490
2	SD06	6	0.9000	1.2490
2	SD06	7	1.0000	1.4120
2	SD06	8	0.9000	1.2490
3	SD07	1	1.0000	1.4120
3	SD07	2	1.0000	1.4120
3	SD07	3	0.9000	1.2490
	SD07	4	0.9000	1.2490
	SD07	5	0.9000	1.2490
3	SD07	6	1.0000	1.4120
3	SD07	7	0.8000	1.1071
3	SD07	8	0.9000	1.2490
4	SD10	1	0.8000	1.1071
4	SD10	2	0.9000	1.2490
4	SD10	3	0.9000	1.2490
4	SD10	4	1.0000	1.4120
4	SD10	5	0.9000	1.2490
4	SD10	6	1.0000	1.4120
4	SD10	7	0.9000	1.2490
4	SD10	8	0.8000	1.1071
5	SD12	1	0.7000	0.9912
5	SD12	2	0.9000	1.2490
5	SD12	3	0.7000	0.9912
5	SD12	4	0.8000	1.1071
5	SD12	5	1.0000	1.4120
5	SD12	6	0.9000	1.2490
5	SD12	7	0.7000	0.9912
5	SD12	8	1.0000	1.4120
6	SD18	1	0.9000	1.2490
6	SD18	2	0.8000	1.1071
6	SD18	3	1.0000	1.4120
6	SD18	4	0.7000	0.9912
	SD18	5	0.8000	1.1071
	SD18	6	1.0000	1.4120
6	SD18	7	0.9000	1.2490
6	SD18	8	0.7000	0.9912
7	SD19	1	1.0000	1.4120
7	SD19	2	0.9000	1.2490

7	SD19	3	1.0000	1.4120
7	SD19	4	0.8000	1.1071
7	SD19	5	0.8000	1.1071
	SD19	6	0.7000	0.9912
	SD19	7	1.0000	1.4120
7	SD19	8	0.8000	1.1071
8	ARTSED	1	1.0000	1.4120
8	ARTSED	2	0.9000	1.2490
8	ARTSED	3	1.0000	1.4120
8	ARTSED	4	1.0000	1.4120
8	ARTSED	5	0.9000	1.2490
8	ARTSED	6	0.9000	1.2490
8	ARTSED	7	0.9000	1.2490
8	ARTSED	8	0.9000	1.2490
9	SDFB	1	0.0000	0.1588
9	SDFB	2	1.0000	1.4120
9	SDFB	3	0.6000	0.8861
9	SDFB	4	1.0000	1.4120
9	SDFB	5	1.0000	1.4120
9	SDFB	6	1.0000	1.4120
9	SDFB	7	0.4000	0.6847
9	SDFB	8	0.1000	0.3218

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SD25	8	1.249	1.412	1.331
2	SD06	8	1.249	1.412	1.331
3	SD07	8	1.107	1.412	1.292
4	SD10	8	1.107	1.412	1.254
5	SD12	8	0.991	1.412	1.175
6	SD18	8	0.991	1.412	1.190
7	SD19	8	0.991	1.412	1.225
8	ARTSED	8	1.249	1.412	1.310
9	SDFB	8	0.159	1.412	0.962

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
	SD25	0.008	0.087	0.031
	SD06	0.008	0.087	0.031
3	SD07	0.012	0.110	0.039
4	SD10	0.013	0.115	0.041
5	SD12	0.033	0.181	0.064
6	SD18	0.028	0.168	0.060

7	SD19	0.029	0.170	0.060
8	ARTSED	0.007	0.084	0.030
9	SDFB	0.278	0.528	0.186

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	SD25	1.331				
2	SD06	1.331	68.00	45.00	8.00	
3	SD07	1.292	62.00	45.00	8.00	
4	SD10	1.254	56.00	45.00	8.00	
5	SD12	1.175	52.00	45.00	8.00	
6	SD18	1.190	52.00	45.00	8.00	
7	SD19	1.225	56.00	45.00	8.00	
8	ARTSED	1.310	64.00	45.00	8.00	
9	SDFB	0.962	60.00	45.00	8.00	

Critical values use k = 8, are 1 tailed, and alpha = 0.05

's G&H Sed Tox C. Tentans Survival 12/97
:: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

WILCOXON RANK SUM TEST W/ BONFERRONI ADJUSTMENT - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	SD25	1.331				
2	SD06	1.331	68.00	44.00	8	
3	SD07	1.292	62.00	44.00	8	
4	SD10	1.254	56.00	44.00	8	
5	SD12	1.175	52.00	44.00	8	
6	SD18	1.190	52.00	44.00	8	
7	SD19	1.225	56.00	44.00	8	
8	ARTSED	1.310	64.00	44.00	8	
9	SDFB	0.962	60.00	44.00	8	

Critical values use k = 8, are 1 tailed, and alpha = 0.05

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.824	17.424	27.504	17.424	4.824
OBSERVED	2	26	17	27	0

Calculated Chi-Square goodness of fit test statistic = 19.9727
Table Chi-Square value (alpha = 0.01) = 13.277

Data FAIL normality test. Try another transformation.

Warning - The two homogeneity tests are sensitive to non-normal data and should not be performed.

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

Shapiro-Wilks test for normality

******** Shapiro-Wilks Test is aborted ********

This test can not be performed because total number of replicates is greater than 50.

Total number of replicates = 72

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 68.20
Closest, conservative, Table H statistic = 23.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 9, df (# reps-1) = 7
Actual values ==> R (# groups) = 9, df (# avg reps-1) = 7.00

Data FAIL homogeneity test. Try another transformation.

NOTE: This test requires equal replicate sizes. If they are unequal but do not differ greatly, the Hartley test may still be used

as an approximate test (average df are used).

.s G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance

Calculated B statistic = 66.83
Table Chi-square value = 20.09 (alpha = 0.01)
Table Chi-square value = 15.51 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 7.00
Used for Chi-square table value ==> df (#groups-1) = 8

Data FAIL homogeneity test at 0.01 level. Try another transformation.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

·square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.824	17.424	27.504	17.424	4.824
OBSERVED	2	26	17	27	0

Calculated Chi-Square goodness of fit test statistic = 19.9727
Table Chi-Square value (alpha = 0.01) = 13.277

Data FAIL normality test. Try another transformation.

Warning - The two homogeneity tests are sensitive to non-normal data and should not be performed.

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro-Wilks test for normality

******** Shapiro-Wilks Test is aborted ********

This test can not be performed because total number of replicates is greater than 50.

Total number of replicates = 72

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 39.11
Closest, conservative, Table H statistic = 23.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 9, df (# reps-1) = 7
Actual values ==> R (# groups) = 9, df (# avg reps-1) = 7.00

Data FAIL homogeneity test. Try another transformation.

NOTE: This test requires equal replicate sizes. If they are unequal but do not differ greatly, the Hartley test may still be used

as an approximate test (average df are used).

Ls G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

Bartletts test for homogeneity of variance

Calculated B statistic =	50.38	
Table Chi-square value =	20.09	(alpha = 0.01)
Table Chi-square value =	15.51	(alpha = 0.05)

Average df used in calculation ==>	df (avg n - 1) =	7.00
Used for Chi-square table value ==>	df (#groups-1) =	8

Data FAIL homogeneity test at 0.01 level. Try another transformation.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

E: Wells G&H Sed Tox C. Tentans Survival 12/97
C:ghct12.97
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 9

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	SDFB	1	0.0000	0.1588
1	SDFB	2	1.0000	1.4120
1	SDFB	3	0.6000	0.8861
1	SDFB	4	1.0000	1.4120
1	SDFB	5	1.0000	1.4120
1	SDFB	6	1.0000	1.4120
1	SDFB	7	0.4000	0.6847
1	SDFB	8	0.1000	0.3218
2	SD06	1	1.0000	1.4120
2	SD06	2	0.9000	1.2490
2	SD06	3	1.0000	1.4120
2	SD06	4	1.0000	1.4120
2	SD06	5	0.9000	1.2490
2	SD06	6	0.9000	1.2490
2	SD06	7	1.0000	1.4120
2	SD06	8	0.9000	1.2490
3	SD07	1	1.0000	1.4120
3	SD07	2	1.0000	1.4120
3	SD07	3	0.9000	1.2490
	SD07	4	0.9000	1.2490
	SD07	5	0.9000	1.2490
3	SD07	6	1.0000	1.4120
3	SD07	7	0.8000	1.1071
3	SD07	8	0.9000	1.2490
4	SD10	1	0.8000	1.1071
4	SD10	2	0.9000	1.2490
4	SD10	3	0.9000	1.2490
4	SD10	4	1.0000	1.4120
4	SD10	5	0.9000	1.2490
4	SD10	6	1.0000	1.4120
4	SD10	7	0.9000	1.2490
4	SD10	8	0.8000	1.1071
5	SD12	1	0.7000	0.9912
5	SD12	2	0.9000	1.2490
5	SD12	3	0.7000	0.9912
5	SD12	4	0.8000	1.1071
5	SD12	5	1.0000	1.4120
5	SD12	6	0.9000	1.2490
5	SD12	7	0.7000	0.9912
5	SD12	8	1.0000	1.4120
6	SD18	1	0.9000	1.2490
6	SD18	2	0.8000	1.1071
6	SD18	3	1.0000	1.4120
6	SD18	4	0.7000	0.9912
	SD18	5	0.8000	1.1071
	SD18	6	1.0000	1.4120
6	SD18	7	0.9000	1.2490
6	SD18	8	0.7000	0.9912
7	SD19	1	1.0000	1.4120
7	SD19	2	0.9000	1.2490

1	SDFB	1	0.0000	0.1588
1	SDFB	2	1.0000	1.4120
	SDFB	3	0.6000	0.8861
	SDFB	4	1.0000	1.4120
1	SDFB	5	1.0000	1.4120
1	SDFB	6	1.0000	1.4120
1	SDFB	7	0.4000	0.6847
1	SDFB	8	0.1000	0.3218
2	SD06	1	1.0000	1.4120
2	SD06	2	0.9000	1.2490
2	SD06	3	1.0000	1.4120
2	SD06	4	1.0000	1.4120
2	SD06	5	0.9000	1.2490
2	SD06	6	0.9000	1.2490
2	SD06	7	1.0000	1.4120
2	SD06	8	0.9000	1.2490
3	SD07	1	1.0000	1.4120
3	SD07	2	1.0000	1.4120
3	SD07	3	0.9000	1.2490
3	SD07	4	0.9000	1.2490
3	SD07	5	0.9000	1.2490
3	SD07	6	1.0000	1.4120
3	SD07	7	0.8000	1.1071
3	SD07	8	0.9000	1.2490
4	SD10	1	0.8000	1.1071
4	SD10	2	0.9000	1.2490
4	SD10	3	0.9000	1.2490
4	SD10	4	1.0000	1.4120
	SD10	5	0.9000	1.2490
	SD10	6	1.0000	1.4120
4	SD10	7	0.9000	1.2490
4	SD10	8	0.8000	1.1071
5	SD12	1	0.7000	0.9912
5	SD12	2	0.9000	1.2490
5	SD12	3	0.7000	0.9912
5	SD12	4	0.8000	1.1071
5	SD12	5	1.0000	1.4120
5	SD12	6	0.9000	1.2490
5	SD12	7	0.7000	0.9912
5	SD12	8	1.0000	1.4120
6	SD18	1	0.9000	1.2490
6	SD18	2	0.8000	1.1071
6	SD18	3	1.0000	1.4120
6	SD18	4	0.7000	0.9912
6	SD18	5	0.8000	1.1071
6	SD18	6	1.0000	1.4120
6	SD18	7	0.9000	1.2490
6	SD18	8	0.7000	0.9912
7	SD19	1	1.0000	1.4120
7	SD19	2	0.9000	1.2490
7	SD19	3	1.0000	1.4120
7	SD19	4	0.8000	1.1071
7	SD19	5	0.8000	1.1071
	SD19	6	0.7000	0.9912
	SD19	7	1.0000	1.4120
/	SD19	8	0.8000	1.1071
8	SD25	1	0.9000	1.2490
8	SD25	2	1.0000	1.4120
8	SD25	3	0.9000	1.2490

7	SD19	3	1.0000	1.4120
7	SD19	4	0.8000	1.1071
7	SD19	5	0.8000	1.1071
	SD19	6	0.7000	0.9912
	SD19	7	1.0000	1.4120
7	SD19	8	0.8000	1.1071
8	SD25	1	0.9000	1.2490
8	SD25	2	1.0000	1.4120
8	SD25	3	0.9000	1.2490
8	SD25	4	1.0000	1.4120
8	SD25	5	1.0000	1.4120
8	SD25	6	0.9000	1.2490
8	SD25	7	0.9000	1.2490
8	SD25	8	1.0000	1.4120
9	SDFB	1	0.0000	0.1588
9	SDFB	2	1.0000	1.4120
9	SDFB	3	0.6000	0.8861
9	SDFB	4	1.0000	1.4120
9	SDFB	5	1.0000	1.4120
9	SDFB	6	1.0000	1.4120
9	SDFB	7	0.4000	0.6847
9	SDFB	8	0.1000	0.3218

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SDFB	8	0.159	1.412	0.962
2	SD06	8	1.249	1.412	1.331
3	SD07	8	1.107	1.412	1.292
4	SD10	8	1.107	1.412	1.254
5	SD12	8	0.991	1.412	1.175
6	SD18	8	0.991	1.412	1.190
7	SD19	8	0.991	1.412	1.225
8	SD25	8	1.249	1.412	1.331
9	SDFB	8	0.159	1.412	0.962

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
	SDFB	0.278	0.528	0.186
	SD06	0.008	0.087	0.031
3	SD07	0.012	0.110	0.039
4	SD10	0.013	0.115	0.041
5	SD12	0.033	0.181	0.064
6	SD18	0.028	0.168	0.060

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.824	17.424	27.504	17.424	4.824
OBSERVED	2	24	18	28	0

Calculated Chi-Square goodness of fit test statistic = 18.6626
Table Chi-Square value (alpha = 0.01) = 13.277

Data FAIL normality test. Try another transformation.

Warning - The two homogeneity tests are sensitive to non-normal data and should not be performed.

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

Shapiro-Wilks test for normality

******** Shapiro-Wilks Test is aborted ********

This test can not be performed because total number of replicates is greater than 50.

Total number of replicates = 72

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 63.94
Closest, conservative, Table H statistic = 23.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 9, df (# reps-1) = 7
Actual values ==> R (# groups) = 9, df (# avg reps-1) = 7.00

Data FAIL homogeneity test. Try another transformation.

NOTE: This test requires equal replicate sizes. If they are unequal but do not differ greatly, the Hartley test may still be used

as an approximate test (average df are used).

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance

Calculated B statistic = 71.55
Table Chi-square value = 20.09 (alpha = 0.01)
Table Chi-square value = 15.51 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 7.00
Used for Chi-square table value ==> df (#groups-1) = 8

Data FAIL homogeneity test at 0.01 level. Try another transformation.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.824	17.424	27.504	17.424	4.824
OBSERVED	3	23	18	28	0

Calculated Chi-Square goodness of fit test statistic = 17.0016
Table Chi-Square value (alpha = 0.01) = 13.277

Data FAIL normality test. Try another transformation.

Warning - The two homogeneity tests are sensitive to non-normal data and should not be performed.

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro-Wilks test for normality

******** Shapiro-Wilks Test is aborted ********

This test can not be performed because total number of replicates is greater than 50.

Total number of replicates = 72

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 36.67
Closest, conservative, Table H statistic = 23.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 9, df (# reps-1) = 7
Actual values ==> R (# groups) = 9, df (# avg reps-1) = 7.00

Data FAIL homogeneity test. Try another transformation.

NOTE: This test requires equal replicate sizes. If they are unequal but do not differ greatly, the Hartley test may still be used as an approximate test (average df are used).

ls G&H Sed Tox C. Tentans Survival 12/97
e: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

Bartletts test for homogeneity of variance

Calculated B statistic = 56.04
Table Chi-square value = 20.09 (alpha = 0.01)
Table Chi-square value = 15.51 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 7.00
Used for Chi-square table value ==> df (#groups-1) = 8

Data FAIL homogeneity test at 0.01 level. Try another transformation.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

7	SD19	0.029	0.170	0.060
8	SD25	0.008	0.087	0.031
9	SDFB	0.278	0.528	0.186

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	SDFB	0.962				
2	SD06	1.331	76.00	45.00	8.00	
3	SD07	1.292	74.00	45.00	8.00	
4	SD10	1.254	72.00	45.00	8.00	
5	SD12	1.175	72.00	45.00	8.00	
6	SD18	1.190	72.00	45.00	8.00	
7	SD19	1.225	74.00	45.00	8.00	
8	SD25	1.331	76.00	45.00	8.00	
9	SDFB	0.962	68.00	45.00	8.00	

Critical values use k = 8, are 1 tailed, and alpha = 0.05

ls G&H Sed Tox C. Tentans Survival 12/97
e: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

WILCOXON RANK SUM TEST W/ BONFERRONI ADJUSTMENT - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	SDFB	0.962				
2	SD06	1.331	76.00	44.00	8	
3	SD07	1.292	74.00	44.00	8	
4	SD10	1.254	72.00	44.00	8	
5	SD12	1.175	72.00	44.00	8	
6	SD18	1.190	72.00	44.00	8	
7	SD19	1.225	74.00	44.00	8	
8	SD25	1.331	76.00	44.00	8	
9	SDFB	0.962	68.00	44.00	8	

Critical values use k = 8, are 1 tailed, and alpha = 0.05

'LE: Wells G&H Sed Tox C. Tentans Survival 12/97
.E: C:ghct12.97
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 9

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE

8	SD25	4	1.0000	1.4120
8	SD25	5	1.0000	1.4120
8	SD25	6	0.9000	1.2490
8	SD25	7	0.9000	1.2490
	SD25	8	1.0000	1.4120
9	SDFB	1	0.0000	0.1588
9	SDFB	2	1.0000	1.4120
9	SDFB	3	0.6000	0.8861
9	SDFB	4	1.0000	1.4120
9	SDFB	5	1.0000	1.4120
9	SDFB	6	1.0000	1.4120
9	SDFB	7	0.4000	0.6847
9	SDFB	8	0.1000	0.3218

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SDFB	8	0.159	1.412	0.962
2	SD06	8	1.249	1.412	1.331
3	SD07	8	1.107	1.412	1.292
4	SD10	8	1.107	1.412	1.254
5	SD12	8	0.991	1.412	1.175
	SD18	8	0.991	1.412	1.190
	SD19	8	0.991	1.412	1.225
8	SD25	8	1.249	1.412	1.331
9	SDFB	8	0.159	1.412	0.962

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	SDFB	0.278	0.528	0.186
2	SD06	0.008	0.087	0.031
3	SD07	0.012	0.110	0.039
4	SD10	0.013	0.115	0.041
5	SD12	0.033	0.181	0.064
6	SD18	0.028	0.168	0.060
7	SD19	0.029	0.170	0.060
8	SD25	0.008	0.087	0.031
9	SDFB	0.278	0.528	0.186

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	SDFB	0.962				
2	SD06	1.331	76.00	45.00	8.00	
3	SD07	1.292	74.00	45.00	8.00	
4	SD10	1.254	72.00	45.00	8.00	
5	SD12	1.175	72.00	45.00	8.00	
6	SD18	1.190	72.00	45.00	8.00	
7	SD19	1.225	74.00	45.00	8.00	
8	SD25	1.331	76.00	45.00	8.00	
9	SDFB	0.962	68.00	45.00	8.00	

Critical values use k = 8, are 1 tailed, and alpha = 0.05

Wells G&H Sed Tox C. Tentans Survival 12/97
File: C:ghct12.97 Transform: ARC SINE(SQUARE ROOT(Y))

WILCOXON RANK SUM TEST W/ BONFERRONI ADJUSTMENT - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	SDFB	0.962				
	SD06	1.331	76.00	44.00	8	
	SD07	1.292	74.00	44.00	8	
	SD10	1.254	72.00	44.00	8	
4	SD12	1.175	72.00	44.00	8	
5	SD18	1.190	72.00	44.00	8	
6	SD19	1.225	74.00	44.00	8	
7	SD25	1.331	76.00	44.00	8	
8	SDFB	0.962	68.00	44.00	8	
9						

Critical values use k = 8, are 1 tailed, and alpha = 0.05

E: Wells G&H Sed Tox C. tentans growth 12/97
: C:ghct12.97
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 9

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	SDFB	1	0.9200	0.9200
1	SDFB	2	1.1800	1.1800
1	SDFB	3	1.0800	1.0800
1	SDFB	4	0.8800	0.8800
1	SDFB	5	0.9700	0.9700
1	SDFB	6	1.3800	1.3800
1	SDFB	7	1.0000	1.0000
1	SDFB	8	0.0000	0.0000
2	SD06	1	0.7600	0.7600
2	SD06	2	0.6100	0.6100
2	SD06	3	0.5800	0.5800
2	SD06	4	0.7000	0.7000
2	SD06	5	0.6900	0.6900
2	SD06	6	0.6100	0.6100
2	SD06	7	0.5200	0.5200
2	SD06	8	0.6000	0.6000
3	SD07	1	0.7800	0.7800
3	SD07	2	0.9200	0.9200
3	SD07	3	0.9000	0.9000
3	SD07	4	0.9200	0.9200
3	SD07	5	0.8000	0.8000
3	SD07	6	0.9200	0.9200
3	SD07	7	0.7800	0.7800
3	SD07	8	0.5200	0.5200
4	SD10	1	0.6800	0.6800
4	SD10	2	0.6400	0.6400
4	SD10	3	0.7000	0.7000
4	SD10	4	0.5100	0.5100
4	SD10	5	0.5600	0.5600
4	SD10	6	0.5300	0.5300
4	SD10	7	0.6000	0.6000
4	SD10	8	0.6600	0.6600
5	SD12	1	0.7900	0.7900
5	SD12	2	0.5300	0.5300
5	SD12	3	0.5800	0.5800
5	SD12	4	0.7100	0.7100
5	SD12	5	0.7000	0.7000
5	SD12	6	0.7300	0.7300
5	SD12	7	0.7400	0.7400
5	SD12	8	1.1200	1.1200
6	SD18	1	0.9300	0.9300
6	SD18	2	0.8000	0.8000
6	SD18	3	0.6600	0.6600
6	SD18	4	0.8300	0.8300
6	SD18	5	0.7000	0.7000
6	SD18	6	0.8600	0.8600
6	SD18	7	0.8800	0.8800
6	SD18	8	0.9400	0.9400
7	SD19	1	0.5700	0.5700
7	SD19	2	0.6600	0.6600

7	SD19	3	0.6200	0.6200
7	SD19	4	0.5400	0.5400
7	SD19	5	0.6600	0.6600
	SD19	6	0.9600	0.9600
	SD19	7	0.5800	0.5800
7	SD19	8	0.6400	0.6400
8	SD25	1	1.0700	1.0700
8	SD25	2	0.9800	0.9800
8	SD25	3	1.1600	1.1600
8	SD25	4	0.7500	0.7500
8	SD25	5	1.3000	1.3000
8	SD25	6	1.3200	1.3200
8	SD25	7	0.7700	0.7700
8	SD25	8	1.0300	1.0300
9	ARTSED	1	0.3300	0.3300
9	ARTSED	2	0.3900	0.3900
9	ARTSED	3	0.3400	0.3400
9	ARTSED	4	0.4900	0.4900
9	ARTSED	5	0.6200	0.6200
9	ARTSED	6	0.6400	0.6400
9	ARTSED	7	0.5300	0.5300
9	ARTSED	8	0.6100	0.6100

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SDFB	8	0.000	1.380	0.926
2	SD06	8	0.520	0.760	0.634
3	SD07	8	0.520	0.920	0.818
4	SD10	8	0.510	0.700	0.610
5	SD12	8	0.530	1.120	0.738
6	SD18	8	0.660	0.940	0.825
7	SD19	8	0.540	0.960	0.654
8	SD25	8	0.750	1.320	1.048
9	ARTSED	8	0.330	0.640	0.494

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
	SDFB	0.166	0.407	0.144
	SD06	0.006	0.077	0.027
3	SD07	0.019	0.136	0.048
4	SD10	0.005	0.071	0.025
5	SD12	0.031	0.177	0.063
6	SD18	0.010	0.101	0.036

7	SD19	0.017	0.131	0.046
8	SD25	0.046	0.214	0.076
9	ARTSED	0.016	0.127	0.045

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	SDFB	0.926				
2	SD06	0.634	44.00	45.00	8.00	*
3	SD07	0.818	49.50	45.00	8.00	
4	SD10	0.610	44.00	45.00	8.00	*
5	SD12	0.738	49.00	45.00	8.00	
6	SD18	0.825	48.50	45.00	8.00	
7	SD19	0.654	46.00	45.00	8.00	
8	SD25	1.048	72.00	45.00	8.00	
9	ARTSED	0.494	44.00	45.00	8.00	*

Critical values use k = 8, are 1 tailed, and alpha = 0.05

ls G&H Sed Tox C. tentans growth 12/97
e: C:ghct12.97 Transform: NO TRANSFORM

WILCOXON RANK SUM TEST W/ BONFERRONI ADJUSTMENT - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	SDFB	0.926				
2	SD06	0.634	44.00	44.00	8	*
3	SD07	0.818	49.50	44.00	8	
4	SD10	0.610	44.00	44.00	8	*
5	SD12	0.738	49.00	44.00	8	
6	SD18	0.825	48.50	44.00	8	
7	SD19	0.654	46.00	44.00	8	
8	SD25	1.048	72.00	44.00	8	
9	ARTSED	0.494	44.00	44.00	8	*

Critical values use k = 8, are 1 tailed, and alpha = 0.05

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.824	17.424	27.504	17.424	4.824
OBSERVED	3	16	30	20	3

Calculated Chi-Square goodness of fit test statistic = 2.1031
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

Shapiro-Wilks test for normality

******** Shapiro-Wilks Test is aborted ********

's test can not be performed because total number of replicates greater than 50.

Total number of replicates = 72

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 32.81
Closest, conservative, Table H statistic = 23.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 9, df (# reps-1) = 7
Actual values ==> R (# groups) = 9, df (# avg reps-1) = 7.00

Data FAIL homogeneity test. Try another transformation.

TE: This test requires equal replicate sizes. If they are unequal but do not differ greatly, the Hartley test may still be used as an approximate test (average df are used).

E: Wells G&H Sed Tox C. tentans growth 12/97
C:ghct12.97
TRANSFORM: SQUARE ROOT(Y) NUMBER OF GROUPS: 9

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	SD25	1	1.0700	1.0344
1	SD25	2	0.9800	0.9899
1	SD25	3	1.1600	1.0770
1	SD25	4	0.7500	0.8660
1	SD25	5	1.3000	1.1402
1	SD25	6	1.3200	1.1489
1	SD25	7	0.7700	0.8775
1	SD25	8	1.0300	1.0149
2	SD06	1	0.7600	0.8718
2	SD06	2	0.6100	0.7810
2	SD06	3	0.5800	0.7616
2	SD06	4	0.7000	0.8367
2	SD06	5	0.6900	0.8307
2	SD06	6	0.6100	0.7810
2	SD06	7	0.5200	0.7211
2	SD06	8	0.6000	0.7746
3	SD07	1	0.7800	0.8832
3	SD07	2	0.9200	0.9592
3	SD07	3	0.9000	0.9487
3	SD07	4	0.9200	0.9592
3	SD07	5	0.8000	0.8944
3	SD07	6	0.9200	0.9592
3	SD07	7	0.7800	0.8832
3	SD07	8	0.5200	0.7211
4	SD10	1	0.6800	0.8246
4	SD10	2	0.6400	0.8000
4	SD10	3	0.7000	0.8367
4	SD10	4	0.5100	0.7141
4	SD10	5	0.5600	0.7483
4	SD10	6	0.5300	0.7280
4	SD10	7	0.6000	0.7746
4	SD10	8	0.6600	0.8124
5	SD12	1	0.7900	0.8888
5	SD12	2	0.5300	0.7280
5	SD12	3	0.5800	0.7616
5	SD12	4	0.7100	0.8426
5	SD12	5	0.7000	0.8367
5	SD12	6	0.7300	0.8544
5	SD12	7	0.7400	0.8602
5	SD12	8	1.1200	1.0583
6	SD18	1	0.9300	0.9644
6	SD18	2	0.8000	0.8944
6	SD18	3	0.6600	0.8124
6	SD18	4	0.8300	0.9110
6	SD18	5	0.7000	0.8367
6	SD18	6	0.8600	0.9274
6	SD18	7	0.8800	0.9381
6	SD18	8	0.9400	0.9695
7	SD19	1	0.5700	0.7550
7	SD19	2	0.6600	0.8124

7	SD19	3	0.6200	0.7874
7	SD19	4	0.5400	0.7348
7	SD19	5	0.6600	0.8124
	SD19	6	0.9600	0.9798
	SD19	7	0.5800	0.7616
7	SD19	8	0.6400	0.8000
8	ARTSED	1	0.3300	0.5745
8	ARTSED	2	0.3900	0.6245
8	ARTSED	3	0.3400	0.5831
8	ARTSED	4	0.4900	0.7000
8	ARTSED	5	0.6200	0.7874
8	ARTSED	6	0.6400	0.8000
8	ARTSED	7	0.5300	0.7280
8	ARTSED	8	0.6100	0.7810
9	SDFB	1	0.0000	0.0000
9	SDFB	2	0.9200	0.9592
9	SDFB	3	1.1800	1.0863
9	SDFB	4	1.0800	1.0392
9	SDFB	5	0.8800	0.9381
9	SDFB	6	0.9700	0.9849
9	SDFB	7	1.3800	1.1747
9	SDFB	8	1.0000	1.0000

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SD25	8	0.866	1.149	1.019
2	SD06	8	0.721	0.872	0.795
3	SD07	8	0.721	0.959	0.901
4	SD10	8	0.714	0.837	0.780
5	SD12	8	0.728	1.058	0.854
6	SD18	8	0.812	0.970	0.907
7	SD19	8	0.735	0.980	0.805
8	ARTSED	8	0.574	0.800	0.697
9	SDFB	8	0.000	1.175	0.898

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
	SD25	0.011	0.107	0.038
	SD06	0.002	0.048	0.017
	SD07	0.006	0.081	0.028
3	SD10	0.002	0.046	0.016
4	SD12	0.010	0.098	0.035
5	SD18	0.003	0.057	0.020
6				

7	SD19	0.006	0.076	0.027
8	ARTSED	0.009	0.093	0.033
9	SDFB	0.137	0.371	0.131

'ells G&H Sed Tox C. tentans growth 12/97
'ile: C:ghct12.97 Transform: SQUARE ROOT(Y)

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	8	0.559	0.070	3.333
Within (Error)	63	1.308	0.021	
Total	71	1.867		

Critical F value = 2.10 (0.05,8,60)
Since F > Critical F REJECT Ho:All groups equal

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	SD25	1.019	1.048		
2	SD06	0.795	0.634	3.089	*
3	SD07	0.901	0.818	1.623	
4	SD10	0.780	0.610	3.295	*
5	SD12	0.854	0.738	2.274	
6	SD18	0.907	0.825	1.544	
7	SD19	0.805	0.654	2.942	*
8	ARTSED	0.697	0.494	4.434	*
9	SDFB	0.898	0.926	1.667	

Dunnett table value = 2.44 (1 Tailed Value, P=0.05, df=60,8)

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

UP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	SD25	8			
2	SD06	8	0.177	16.9	0.414
3	SD07	8	0.177	16.9	0.230

4	SD10	8	0.177	16.9	0.438
5	SD12	8	0.177	16.9	0.310
6	SD18	8	0.177	16.9	0.222
	SD19	8	0.177	16.9	0.394
	ARTSED	8	0.177	16.9	0.554
9	SDFB	8	0.177	16.9	0.121

ells G&H Sed Tox C. tentans growth 12/97
ile: C:ghct12.97 Transform: SQUARE ROOT(Y)

ANOVA TABLE

OURCE	DF	SS	MS	F
etween	8	0.559	0.070	3.333
ithin (Error)	63	1.308	0.021	
otal	71	1.867		

Critical F value = 2.10 (0.05,8,60)
Since F > Critical F REJECT Ho:All groups equal

.s G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	SD25	1.019	1.048		
2	SD06	0.795	0.634	3.089	*
3	SD07	0.901	0.818	1.623	
4	SD10	0.780	0.610	3.295	*
5	SD12	0.854	0.738	2.274	
6	SD18	0.907	0.825	1.544	
7	SD19	0.805	0.654	2.942	*
8	ARTSED	0.697	0.494	4.434	*
9	SDFB	0.898	0.926	1.667	

Bonferroni T table value = 2.58 (1 Tailed Value, P=0.05, df=60,8)

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL

1	SD25	8			
2	SD06	8	0.187	17.8	0.414
3	SD07	8	0.187	17.8	0.230
	SD10	8	0.187	17.8	0.438
	SD12	8	0.187	17.8	0.310
6	SD18	8	0.187	17.8	0.222
7	SD19	8	0.187	17.8	0.394
8	ARTSED	8	0.187	17.8	0.554
9	SDFB	8	0.187	17.8	0.121

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	SD25	1.019				
2	SD06	0.795	37.00	45.00	8.00	*
3	SD07	0.901	50.00	45.00	8.00	
4	SD10	0.780	36.00	45.00	8.00	*
5	SD12	0.854	43.00	45.00	8.00	*
6	SD18	0.907	48.00	45.00	8.00	
7	SD19	0.805	38.00	45.00	8.00	*
8	ARTSED	0.697	36.00	45.00	8.00	*
	SDFB	0.898	64.00	45.00	8.00	

Critical values use k = 8, are 1 tailed, and alpha = 0.05

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

WILCOXON RANK SUM TEST W/ BONFERRONI ADJUSTMENT - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	SD25	1.019				
2	SD06	0.795	37.00	44.00	8	*
3	SD07	0.901	50.00	44.00	8	
4	SD10	0.780	36.00	44.00	8	*
5	SD12	0.854	43.00	44.00	8	*
6	SD18	0.907	48.00	44.00	8	
7	SD19	0.805	38.00	44.00	8	*
8	ARTSED	0.697	36.00	44.00	8	*
9	SDFB	0.898	64.00	44.00	8	

Critical values use k = 8, are 1 tailed, and alpha = 0.05

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

·square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.824	17.424	27.504	17.424	4.824
OBSERVED	3	16	30	20	3

Calculated Chi-Square goodness of fit test statistic = 2.1031
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

Shapiro-Wilks test for normality

******** Shapiro-Wilks Test is aborted ********

; test can not be performed because total number of replicates
greater than 50.

Total number of replicates = 72

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 32.81
Closest, conservative, Table H statistic = 23.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 9, df (# reps-1) = 7
Actual values ==> R (# groups) = 9, df (# avg reps-1) = 7.00

Data FAIL homogeneity test. Try another transformation.

E: This test requires equal replicate sizes. If they are unequal but do not differ greatly, the Hartley test may still be used as an approximate test (average df are used).

ells G&H Sed Tox C. tentans growth 12/97
ile: C:ghct12.97 Transform: NO TRANSFORMATION

:letts test for homogeneity of variance

:alculated B statistic =	35.70	
Table Chi-square value =	20.09	(alpha = 0.01)
Table Chi-square value =	15.51	(alpha = 0.05)

Average df used in calculation ==>	df (avg n - 1) =	7.00
Used for Chi-square table value ==>	df (#groups-1) =	8

Data FAIL homogeneity test at 0.01 level. Try another transformation.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

E: Wells G&H Sed Tox C. tentans growth 12/97
: C:ghct12.97
ANSFORM: SQUARE ROOT(Y) NUMBER OF GROUPS: 9

P	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	SD25	1	1.0700	1.0344
1	SD25	2	0.9800	0.9899
1	SD25	3	1.1600	1.0770
1	SD25	4	0.7500	0.8660
1	SD25	5	1.3000	1.1402
1	SD25	6	1.3200	1.1489
1	SD25	7	0.7700	0.8775
1	SD25	8	1.0300	1.0149
2	SD06	1	0.7600	0.8718
2	SD06	2	0.6100	0.7810
2	SD06	3	0.5800	0.7616
2	SD06	4	0.7000	0.8367
2	SD06	5	0.6900	0.8307
2	SD06	6	0.6100	0.7810
2	SD06	7	0.5200	0.7211
2	SD06	8	0.6000	0.7746
3	SD07	1	0.7800	0.8832
3	SD07	2	0.9200	0.9592
3	SD07	3	0.9000	0.9487
3	SD07	4	0.9200	0.9592
3	SD07	5	0.8000	0.8944
3	SD07	6	0.9200	0.9592
3	SD07	7	0.7800	0.8832
3	SD07	8	0.5200	0.7211
4	SD10	1	0.6800	0.8246
4	SD10	2	0.6400	0.8000
4	SD10	3	0.7000	0.8367
4	SD10	4	0.5100	0.7141
4	SD10	5	0.5600	0.7483
4	SD10	6	0.5300	0.7280
4	SD10	7	0.6000	0.7746
4	SD10	8	0.6600	0.8124
5	SD12	1	0.7900	0.8888
5	SD12	2	0.5300	0.7280
5	SD12	3	0.5800	0.7616
5	SD12	4	0.7100	0.8426
5	SD12	5	0.7000	0.8367
5	SD12	6	0.7300	0.8544
5	SD12	7	0.7400	0.8602
5	SD12	8	1.1200	1.0583
6	SD18	1	0.9300	0.9644
6	SD18	2	0.8000	0.8944
6	SD18	3	0.6600	0.8124
6	SD18	4	0.8300	0.9110
6	SD18	5	0.7000	0.8367
6	SD18	6	0.8600	0.9274
6	SD18	7	0.8800	0.9381
6	SD18	8	0.9400	0.9695
7	SD19	1	0.5700	0.7550
7	SD19	2	0.6600	0.8124

7	SD19	3	0.6200	0.7874
7	SD19	4	0.5400	0.7348
7	SD19	5	0.6600	0.8124
	SD19	6	0.9600	0.9798
	SD19	7	0.5800	0.7616
7	SD19	8	0.6400	0.8000
8	ARTSED	1	0.3300	0.5745
8	ARTSED	2	0.3900	0.6245
8	ARTSED	3	0.3400	0.5831
8	ARTSED	4	0.4900	0.7000
8	ARTSED	5	0.6200	0.7874
8	ARTSED	6	0.6400	0.8000
8	ARTSED	7	0.5300	0.7280
8	ARTSED	8	0.6100	0.7810
9	SDFB	1	0.0000	0.0000
9	SDFB	2	0.9200	0.9592
9	SDFB	3	1.1800	1.0863
9	SDFB	4	1.0800	1.0392
9	SDFB	5	0.8800	0.9381
9	SDFB	6	0.9700	0.9849
9	SDFB	7	1.3800	1.1747
9	SDFB	8	1.0000	1.0000

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SD25	8	0.866	1.149	1.019
2	SD06	8	0.721	0.872	0.795
3	SD07	8	0.721	0.959	0.901
4	SD10	8	0.714	0.837	0.780
5	SD12	8	0.728	1.058	0.854
6	SD18	8	0.812	0.970	0.907
7	SD19	8	0.735	0.980	0.805
8	ARTSED	8	0.574	0.800	0.697
9	SDFB	8	0.000	1.175	0.898

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
	SD25	0.011	0.107	0.038
	SD06	0.002	0.048	0.017
3	SD07	0.006	0.081	0.028
4	SD10	0.002	0.046	0.016
5	SD12	0.010	0.098	0.035
6	SD18	0.003	0.057	0.020

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	SD25	8	1.048	1.019	1.019
2	SD06	8	0.634	0.795	0.848
3	SD07	8	0.818	0.901	0.848
4	SD10	8	0.610	0.780	0.847
5	SD12	8	0.738	0.854	0.847
6	SD18	8	0.825	0.907	0.847
7	SD19	8	0.654	0.805	0.805
8	ARTSED	8	0.494	0.697	0.798
9	SDFB	8	0.926	0.898	0.798

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
SD25	1.019				
SD06	0.848	2.369	*	1.67	k= 1, v=63
SD07	0.848	2.369	*	1.75	k= 2, v=63
SD10	0.847	2.384	*	1.77	k= 3, v=63
SD12	0.847	2.384	*	1.78	k= 4, v=63
SD18	0.847	2.384	*	1.79	k= 5, v=63
SD19	0.805	2.958	*	1.79	k= 6, v=63
ARTSED	0.798	3.068	*	1.80	k= 7, v=63
SDFB	0.798	3.068	*	1.80	k= 8, v=63

s = 0.144
Note: df used for table values are approximate when v > 20.

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	SD25	1.019				
2	SD06	0.795	37.00	45.00	8.00	*
3	SD07	0.901	50.00	45.00	8.00	
4	SD10	0.780	36.00	45.00	8.00	*
	SD12	0.854	43.00	45.00	8.00	*
	SD18	0.907	48.00	45.00	8.00	
7	SD19	0.805	38.00	45.00	8.00	*
8	ARTSED	0.697	36.00	45.00	8.00	*
9	SDFB	0.898	64.00	45.00	8.00	

Critical values use k = 8, are 1 tailed, and alpha = 0.05

.ls G&H Sed Tox C. tentans growth 12/97
ile: C:ghct12.97 Transform: SQUARE ROOT(Y)

ILCOXON RANK SUM TEST W/ BONFERRONI ADJUSTMENT - Ho:Control<Treatment

ROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	SD25	1.019				
2	SD06	0.795	37.00	44.00	8	*
3	SD07	0.901	50.00	44.00	8	
4	SD10	0.780	36.00	44.00	8	*
5	SD12	0.854	43.00	44.00	8	*
6	SD18	0.907	48.00	44.00	8	
7	SD19	0.805	38.00	44.00	8	*
8	ARTSED	0.697	36.00	44.00	8	*
9	SDFB	0.898	64.00	44.00	8	

Critical values use k = 8, are 1 tailed, and alpha = 0.05

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

KRUSKAL-WALLIS ANOVA BY RANKS - TABLE 1 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	RANK SUM
1	SD25	1.019	1.048	484.000
2	SD06	0.795	0.634	194.500
3	SD07	0.901	0.818	363.500
4	SD10	0.780	0.610	170.500
5	SD12	0.854	0.738	291.500
6	SD18	0.907	0.825	380.000
7	SD19	0.805	0.654	210.500
8	ARTSED	0.697	0.494	94.500
9	SDFB	0.898	0.926	439.000

Calculated H Value = 39.692 Critical H Value Table = 15.510
Since Calc H > Crit H REJECT Ho:All groups are equal.

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

DUNNS MULTIPLE COMPARISON - KRUSKAL-WALLIS - TABLE 2 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	ORIGINAL MEAN	GROUP 0 8	0 4	0 2	0 7	0 5	0 9	0 3	0 6	0 1
8	ARTSED	0.697	0.494	\								

1	SD25	8			
2	SD06	8	0.187	17.8	0.414
3	SD07	8	0.187	17.8	0.230
	SD10	8	0.187	17.8	0.438
	SD12	8	0.187	17.8	0.310
6	SD18	8	0.187	17.8	0.222
7	SD19	8	0.187	17.8	0.394
8	ARTSED	8	0.187	17.8	0.554
9	SDFB	8	0.187	17.8	0.121

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	8	0.559	0.070	3.333
Within (Error)	63	1.308	0.021	
Total	71	1.867		

Critical F value = 2.10 (0.05,8,60)
Since F > Critical F REJECT Ho:All groups equal

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

TUKEY method of multiple comparisons

GROUP	IDENTIFICATION	TRANSFORMED MEAN	ORIGINAL MEAN	GROUP 8	4	2	7	5	9	3	6	1
8	ARTSED	0.697	0.494	\								
4	SD10	0.780	0.610	.	\							
2	SD06	0.795	0.634	.	.	\						
7	SD19	0.805	0.654	.	.	.	\					
5	SD12	0.854	0.738	.	.	.	.	\				
9	SDFB	0.898	0.926	.	.	.	.	.	\			
3	SD07	0.901	0.818	.	.	.	.	.	.	\		
6	SD18	0.907	0.825	.	.	.	.	.	.	.	\	
1	SD25	1.019	1.048	*	*	.	.	.	.	.	.	\

* = significant difference (p=0.05) . = no significant difference
Tukey value (9,63) = 4.55 s = 0.021

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

4	SD10	8	0.177	16.9	0.438
5	SD12	8	0.177	16.9	0.310
-	SD18	8	0.177	16.9	0.222
	SD19	8	0.177	16.9	0.394
	ARTSED	8	0.177	16.9	0.554
-	SDFB	8	0.177	16.9	0.121
9					

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	8	0.559	0.070	3.333
Within (Error)	63	1.308	0.021	
Total	71	1.867		

Critical F value = 2.10 (0.05,8,60)
Since F > Critical F REJECT Ho:All groups equal

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	SD25	1.019	1.048		
2	SD06	0.795	0.634	3.089	*
3	SD07	0.901	0.818	1.623	
4	SD10	0.780	0.610	3.295	*
5	SD12	0.854	0.738	2.274	
6	SD18	0.907	0.825	1.544	
7	SD19	0.805	0.654	2.942	*
8	ARTSED	0.697	0.494	4.434	*
9	SDFB	0.898	0.926	1.667	

Bonferroni T table value = 2.58 (1 Tailed Value, P=0.05, df=60,8)

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL

7	SD19	0.006	0.076	0.027
8	ARTSED	0.009	0.093	0.033
9	SDFB	0.137	0.371	0.131

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	8	0.559	0.070	3.333
Within (Error)	63	1.308	0.021	
Total	71	1.867		

Critical F value = 2.10 (0.05,8,60)
Since F > Critical F REJECT Ho:All groups equal

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	SD25	1.019	1.048		
2	SD06	0.795	0.634	3.089	*
3	SD07	0.901	0.818	1.623	
4	SD10	0.780	0.610	3.295	*
5	SD12	0.854	0.738	2.274	
6	SD18	0.907	0.825	1.544	
7	SD19	0.805	0.654	2.942	*
8	ARTSED	0.697	0.494	4.434	*
9	SDFB	0.898	0.926	1.667	

Dunnett table value = 2.44 (1 Tailed Value, P=0.05, df=60,8)

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

UP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	SD25	8			
2	SD06	8	0.177	16.9	0.414
3	SD07	8	0.177	16.9	0.230

LE: Wells G&H Sed Tox C. tentans growth 12/97
E: C:ghct12.97
TRANSFORM: SQUARE ROOT(Y) NUMBER OF GROUPS: 9

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	ARTSED	1	0.3300	0.5745
1	ARTSED	2	0.3900	0.6245
1	ARTSED	3	0.3400	0.5831
1	ARTSED	4	49.0000	7.0000
1	ARTSED	5	0.6200	0.7874
1	ARTSED	6	0.6400	0.8000
1	ARTSED	7	0.5300	0.7280
1	ARTSED	8	0.6100	0.7810
2	SD06	1	0.7600	0.8718
2	SD06	2	0.6100	0.7810
2	SD06	3	0.5800	0.7616
2	SD06	4	0.7000	0.8367
2	SD06	5	0.6900	0.8307
2	SD06	6	0.6100	0.7810
2	SD06	7	0.5200	0.7211
2	SD06	8	0.6000	0.7746
3	SD07	1	0.7800	0.8832
3	SD07	2	0.9200	0.9592
3	SD07	3	0.9000	0.9487
	SD07	4	0.9200	0.9592
	SD07	5	0.8000	0.8944
3	SD07	6	0.9200	0.9592
3	SD07	7	0.7800	0.8832
3	SD07	8	0.5200	0.7211
4	SD10	1	0.6800	0.8246
4	SD10	2	0.6400	0.8000
4	SD10	3	0.7000	0.8367
4	SD10	4	0.5100	0.7141
4	SD10	5	0.5600	0.7483
4	SD10	6	0.5300	0.7280
4	SD10	7	0.6000	0.7746
4	SD10	8	0.6600	0.8124
5	SD12	1	0.7900	0.8888
5	SD12	2	0.5300	0.7280
5	SD12	3	0.5800	0.7616
5	SD12	4	0.7100	0.8426
5	SD12	5	0.7000	0.8367
5	SD12	6	0.7300	0.8544
5	SD12	7	0.7400	0.8602
5	SD12	8	1.1200	1.0583
6	SD18	1	0.9300	0.9644
6	SD18	2	0.8000	0.8944
6	SD18	3	0.6600	0.8124
6	SD18	4	0.8300	0.9110
	SD18	5	0.7000	0.8367
	SD18	6	0.8600	0.9274
6	SD18	7	0.8800	0.9381
6	SD18	8	0.9400	0.9695
7	SD19	1	0.5700	0.7550
7	SD19	2	0.6600	0.8124

7	SD19	3	0.6200	0.7874
7	SD19	4	0.5400	0.7348
7	SD19	5	0.6600	0.8124
	SD19	6	0.9600	0.9798
	SD19	7	0.5800	0.7616
7	SD19	8	0.6400	0.8000
8	SD25	1	1.0700	1.0344
8	SD25	2	0.9800	0.9899
8	SD25	3	1.1600	1.0770
8	SD25	4	0.7500	0.8660
8	SD25	5	1.3000	1.1402
8	SD25	6	1.3200	1.1489
8	SD25	7	0.7700	0.8775
8	SD25	8	1.0300	1.0149
9	SDFB	1	0.0000	0.0000
9	SDFB	2	0.9200	0.9592
9	SDFB	3	1.1800	1.0863
9	SDFB	4	1.0800	1.0392
9	SDFB	5	0.8800	0.9381
9	SDFB	6	0.9700	0.9849
9	SDFB	7	1.3800	1.1747
9	SDFB	8	1.0000	1.0000

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	ARTSED	8	0.574	7.000	1.485
2	SD06	8	0.721	0.872	0.795
3	SD07	8	0.721	0.959	0.901
4	SD10	8	0.714	0.837	0.780
5	SD12	8	0.728	1.058	0.854
6	SD18	8	0.812	0.970	0.907
7	SD19	8	0.735	0.980	0.805
8	SD25	8	0.866	1.149	1.019
9	SDFB	8	0.000	1.175	0.898

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
	ARTSED	4.975	2.230	0.789
	SD06	0.002	0.048	0.017
3	SD07	0.006	0.081	0.028
4	SD10	0.002	0.046	0.016
5	SD12	0.010	0.098	0.035
6	SD18	0.003	0.057	0.020

7	SD19	0.006	0.076	0.027
8	SD25	0.011	0.107	0.038
9	SDFB	0.137	0.371	0.131

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	ARTSED	1.485				
2	SD06	0.795	77.00	45.00	8.00	
3	SD07	0.901	88.00	45.00	8.00	
4	SD10	0.780	78.00	45.00	8.00	
5	SD12	0.854	85.50	45.00	8.00	
6	SD18	0.907	92.00	45.00	8.00	
7	SD19	0.805	81.00	45.00	8.00	
8	SD25	1.019	92.00	45.00	8.00	
9	SDFB	0.898	85.00	45.00	8.00	

Critical values use k = 8, are 1 tailed, and alpha = 0.05

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

WILCOXON RANK SUM TEST W/ BONFERRONI ADJUSTMENT - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	ARTSED	1.485				
2	SD06	0.795	77.00	44.00	8	
3	SD07	0.901	88.00	44.00	8	
4	SD10	0.780	78.00	44.00	8	
5	SD12	0.854	85.50	44.00	8	
6	SD18	0.907	92.00	44.00	8	
7	SD19	0.805	81.00	44.00	8	
8	SD25	1.019	92.00	44.00	8	
9	SDFB	0.898	85.00	44.00	8	

Critical values use k = 8, are 1 tailed, and alpha = 0.05

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance

Calculated B statistic =	35.70	
Table Chi-square value =	20.09	(alpha = 0.01)
Table Chi-square value =	15.51	(alpha = 0.05)

Average df used in calculation ==>	df (avg n - 1) =	7.00
Used for Chi-square table value ==>	df (#groups-1) =	8

Data FAIL homogeneity test at 0.01 level. Try another transformation.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.824	17.424	27.504	17.424	4.824
OBSERVED	4	12	35	17	4

Calculated Chi-Square goodness of fit test statistic = 4.0233
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

Shapiro-Wilks test for normality

******** Shapiro-Wilks Test is aborted ********

test can not be performed because total number of replicates greater than 50.

Total number of replicates = 72

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 2365.14
Closest, conservative, Table H statistic = 23.0 (alpha = 0.01)

Used for Table H ==>	R (# groups) =	9,	df (# reps-1) =	7
Actual values ==>	R (# groups) =	9,	df (# avg reps-1) =	7.00

Data FAIL homogeneity test. Try another transformation.

E: This test requires equal replicate sizes. If they are unequal but do not differ greatly, the Hartley test may still be used as an approximate test (average df are used).

Wells G&H Sed Tox C. tentans growth 12/97
File: C:ghct12.97 Transform: SQUARE ROOT(Y)

Bartletts test for homogeneity of variance

Calculated B statistic = 216.94
Table Chi-square value = 20.09 (alpha = 0.01)
Table Chi-square value = 15.51 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 7.00
Used for Chi-square table value ==> df (#groups-1) = 8

Data FAIL homogeneity test at 0.01 level. Try another transformation.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

Bartletts test for homogeneity of variance

Calculated B statistic = 13.89
Table Chi-square value = 20.09 (alpha = 0.01)
Table Chi-square value = 15.51 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 7.00
Used for Chi-square table value ==> df (#groups-1) = 8

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

TITLE: Wells G&H Sed Tox H. Azteca Survival
FILE: C:\ghha.tox
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 9

	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	SD25	1	1.0000	1.4120
1	SD25	2	1.0000	1.4120
1	SD25	3	1.0000	1.4120
1	SD25	4	1.0000	1.4120
1	SD25	5	1.0000	1.4120
1	SD25	6	0.8000	1.1071
1	SD25	7	1.0000	1.4120
1	SD25	8	1.0000	1.4120
2	SD06	1	1.0000	1.4120
2	SD06	2	0.9000	1.2490
2	SD06	3	1.0000	1.4120
2	SD06	4	0.9000	1.2490
2	SD06	5	1.0000	1.4120
2	SD06	6	1.0000	1.4120
2	SD06	7	0.9000	1.2490
2	SD06	8	1.0000	1.4120
3	SD07	1	1.0000	1.4120
3	SD07	2	0.7000	0.9912
3	SD07	3	0.7000	0.9912
3	SD07	4	1.0000	1.4120
3	SD07	5	0.8000	1.1071
3	SD07	6	1.0000	1.4120
	SD07	7	0.8000	1.1071
	SD07	8	0.7000	0.9912
	SD10	1	0.9000	1.2490
4	SD10	2	0.9000	1.2490
4	SD10	3	1.0000	1.4120
4	SD10	4	1.0000	1.4120

4	SD10	5	0.9000	1.2490
4	SD10	6	0.8000	1.1071
4	SD10	7	0.8000	1.1071
	SD10	8	0.8000	1.1071
	SD12	1	1.0000	1.4120
5	SD12	2	0.9000	1.2490
5	SD12	3	1.0000	1.4120
5	SD12	4	0.6000	0.8861
5	SD12	5	0.9000	1.2490
5	SD12	6	1.0000	1.4120
5	SD12	7	0.9000	1.2490
5	SD12	8	0.8000	1.1071
6	SD18	1	0.3000	0.5796
6	SD18	2	0.4000	0.6847
6	SD18	3	1.0000	1.4120
6	SD18	4	0.9000	1.2490
6	SD18	5	0.8000	1.1071
6	SD18	6	0.9000	1.2490
6	SD18	7	0.7000	0.9912
6	SD18	8	0.9000	1.2490
7	SD19	1	1.0000	1.4120
7	SD19	2	1.0000	1.4120
7	SD19	3	1.0000	1.4120
7	SD19	4	0.9000	1.2490
7	SD19	5	1.0000	1.4120
7	SD19	6	0.8000	1.1071
7	SD19	7	0.8000	1.1071
7	SD19	8	0.8000	1.1071
8	Artsed	1	0.8000	1.1071
	Artsed	2	0.7000	0.9912
	Artsed	3	0.9000	1.2490
8	Artsed	4	0.5000	0.7854
8	Artsed	5	0.6000	0.8861
8	Artsed	6	0.9000	1.2490
8	Artsed	7	0.8000	1.1071
8	Artsed	8	0.9000	1.2490
9	SDFB	1	0.9000	1.2490
9	SDFB	2	1.0000	1.4120
9	SDFB	3	1.0000	1.4120
9	SDFB	4	0.6000	0.8861
9	SDFB	5	1.0000	1.4120
9	SDFB	6	1.0000	1.4120
9	SDFB	7	0.9000	1.2490
9	SDFB	8	0.9000	1.2490

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
	SD25	8	1.107	1.412	1.374
2	SD06	8	1.249	1.412	1.351
3	SD07	8	0.991	1.412	1.178
4	SD10	8	1.107	1.412	1.237
5	SD12	8	0.886	1.412	1.247

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

·square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.824	17.424	27.504	17.424	4.824
OBSERVED	5	15	24	28	0

Calculated Chi-Square goodness of fit test statistic = 12.0335
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro-Wilks test for normality

******** Shapiro-Wilks Test is aborted ********

s test can not be performed because total number of replicates greater than 50.

Total number of replicates = 72

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 12.24
Closest, conservative, Table H statistic = 23.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 9, df (# reps-1) =
Actual values ==> R (# groups) = 9, df (# avg reps-1) =

Data PASS homogeneity test. Continue analysis.

E: This test requires equal replicate sizes. If they are unequal but do not differ greatly, the Hartley test may still be used as an approximate test (average df are used).

6	SD18	8	0.580	1.412	1.065
7	SD19	8	1.107	1.412	1.277
8	Artsed	8	0.785	1.249	1.078
	SDFB	8	0.886	1.412	1.285

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	SD25	0.012	0.108	0.038
2	SD06	0.007	0.084	0.030
3	SD07	0.040	0.200	0.071
4	SD10	0.016	0.127	0.045
5	SD12	0.033	0.182	0.064
6	SD18	0.087	0.295	0.104
7	SD19	0.023	0.151	0.053
8	Artsed	0.031	0.177	0.063
9	SDFB	0.033	0.180	0.064

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	SD25	1.374				
2	SD06	1.351	61.50	45.00	8.00	
3	SD07	1.178	50.50	45.00	8.00	
4	SD10	1.237	49.50	45.00	8.00	
5	SD12	1.247	53.00	45.00	8.00	
6	SD18	1.065	44.00	45.00	8.00	*
7	SD19	1.277	56.50	45.00	8.00	
8	Artsed	1.078	40.00	45.00	8.00	*
9	SDFB	1.285	57.00	45.00	8.00	

Critical values use k = 8, are 1 tailed, and alpha = 0.05

SD25	5	1.0000	1.4120
SD25	6	0.8000	1.1071
SD25	7	1.0000	1.4120
SD25	8	1.0000	1.4120
SDFB	1	0.9000	1.2490
SDFB	2	1.0000	1.4120
SDFB	3	1.0000	1.4120
SDFB	4	0.6000	0.8861
SDFB	5	1.0000	1.4120
SDFB	6	1.0000	1.4120
SDFB	7	0.9000	1.2490
SDFB	8	0.9000	1.2490

ells G&H Sed Tox H. Azteca Survival
ile: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

RP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SDFB	8	0.886	1.412	1.285
2	SD06	8	1.249	1.412	1.351
3	SD07	8	0.991	1.412	1.178
4	SD10	8	1.107	1.412	1.237
5	SD12	8	0.886	1.412	1.247
6	SD18	8	0.580	1.412	1.065
	SD19	8	1.107	1.412	1.277
	SD25	8	1.107	1.412	1.374
	SDFB	8	0.886	1.412	1.285

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	SDFB	0.033	0.180	0.064
2	SD06	0.007	0.084	0.030
3	SD07	0.040	0.200	0.071
4	SD10	0.016	0.127	0.045
5	SD12	0.033	0.182	0.064
6	SD18	0.087	0.295	0.104
7	SD19	0.023	0.151	0.053
8	SD25	0.012	0.108	0.038
9	SDFB	0.033	0.180	0.064

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

1	SDFB	1	0.9000	1.2490
1	SDFB	2	1.0000	1.4120
1	SDFB	3	1.0000	1.4120
	SDFB	4	0.6000	0.8861
	SDFB	5	1.0000	1.4120
1	SDFB	6	1.0000	1.4120
1	SDFB	7	0.9000	1.2490
1	SDFB	8	0.9000	1.2490
2	SD06	1	1.0000	1.4120
2	SD06	2	0.9000	1.2490
2	SD06	3	1.0000	1.4120
2	SD06	4	0.9000	1.2490
2	SD06	5	1.0000	1.4120
2	SD06	6	1.0000	1.4120
2	SD06	7	0.9000	1.2490
2	SD06	8	1.0000	1.4120
3	SD07	1	1.0000	1.4120
3	SD07	2	0.7000	0.9912
3	SD07	3	0.7000	0.9912
3	SD07	4	1.0000	1.4120
3	SD07	5	0.8000	1.1071
3	SD07	6	1.0000	1.4120
3	SD07	7	0.8000	1.1071
3	SD07	8	0.7000	0.9912
4	SD10	1	0.9000	1.2490
4	SD10	2	0.9000	1.2490
4	SD10	3	1.0000	1.4120
4	SD10	4	1.0000	1.4120
4	SD10	5	0.9000	1.2490
	SD10	6	0.8000	1.1071
	SD10	7	0.8000	1.1071
4	SD10	8	0.8000	1.1071
5	SD12	1	1.0000	1.4120
5	SD12	2	0.9000	1.2490
5	SD12	3	1.0000	1.4120
5	SD12	4	0.6000	0.8861
5	SD12	5	0.9000	1.2490
5	SD12	6	1.0000	1.4120
5	SD12	7	0.9000	1.2490
5	SD12	8	0.8000	1.1071
6	SD18	1	0.3000	0.5796
6	SD18	2	0.4000	0.6847
6	SD18	3	1.0000	1.4120
6	SD18	4	0.9000	1.2490
6	SD18	5	0.8000	1.1071
6	SD18	6	0.9000	1.2490
6	SD18	7	0.7000	0.9912
6	SD18	8	0.9000	1.2490
7	SD19	1	1.0000	1.4120
7	SD19	2	1.0000	1.4120
7	SD19	3	1.0000	1.4120
7	SD19	4	0.9000	1.2490
7	SD19	5	1.0000	1.4120
7	SD19	6	0.8000	1.1071
	SD19	7	0.8000	1.1071
	SD19	8	0.8000	1.1071
8	SD25	1	1.0000	1.4120
8	SD25	2	1.0000	1.4120
8	SD25	3	1.0000	1.4120
8	SD25	4	1.0000	1.4120

Total number of replicates = 72

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 12.24
Closest, conservative, Table H statistic = 23.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 9, df (# reps-1) = 7
Actual values ==> R (# groups) = 9, df (# avg reps-1) = 7.00

Data PASS homogeneity test. Continue analysis.

NOTE: This test requires equal replicate sizes. If they are unequal
but do not differ greatly, the Hartley test may still be used
as an approximate test (average df are used).

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

Bartletts test for homogeneity of variance

Calculated B statistic = 13.89
Table Chi-square value = 20.09 (alpha = 0.01)
Table Chi-square value = 15.51 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 7.00
Used for Chi-square table value ==> df (#groups-1) = 8

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is
used to calculate the B statistic (see above).

TITLE: Wells G&H Sed Tox H. Azteca Survival
FILE: C:\ghha.tox
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 9

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE

as an approximate test (average df are used).

.s G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance

Calculated B statistic = 22.96
Table Chi-square value = 20.09 (alpha = 0.01)
Table Chi-square value = 15.51 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 7.00
Used for Chi-square table value ==> df (#groups-1) = 8

Data FAIL homogeneity test at 0.01 level. Try another transformation.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.824	17.424	27.504	17.424	4.824
OBSERVED	5	14	24	29	0

Calculated Chi-Square goodness of fit test statistic = 13.6404
Table Chi-Square value (alpha = 0.01) = 13.277

Data FAIL normality test. Try another transformation.

Warning - The two homogeneity tests are sensitive to non-normal data and should not be performed.

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro-Wilks test for normality

******** Shapiro-Wilks Test is aborted ********

This test can not be performed because total number of replicates is greater than 50.

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: NO TRANSFORMATION

-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.824	17.424	27.504	17.424	4.824
OBSERVED	5	14	24	29	0

Calculated Chi-Square goodness of fit test statistic = 13.6404
Table Chi-Square value (alpha = 0.01) = 13.277

Data FAIL normality test. Try another transformation.

Warning - The two homogeneity tests are sensitive to non-normal data and should not be performed.

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: NO TRANSFORMATION

Shapiro-Wilks test for normality

******** Shapiro-Wilks Test is aborted ********

This test can not be performed because total number of replicates is greater than 50.

Total number of replicates = 72

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 24.47
Closest, conservative, Table H statistic = 23.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 9, df (# reps-1) = 7
Actual values ==> R (# groups) = 9, df (# avg reps-1) = 7.00

Data FAIL homogeneity test. Try another transformation.

NOTE: This test requires equal replicate sizes. If they are unequal but do not differ greatly, the Hartley test may still be used

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

UP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	SDFB	1.285				
2	SD06	1.351	73.50	45.00	8.00	
3	SD07	1.178	59.00	45.00	8.00	
4	SD10	1.237	58.50	45.00	8.00	
5	SD12	1.247	63.00	45.00	8.00	
6	SD18	1.065	51.50	45.00	8.00	
7	SD19	1.277	65.50	45.00	8.00	
8	SD25	1.374	79.00	45.00	8.00	
9	SDFB	1.285	68.00	45.00	8.00	

Critical values use k = 8, are 1 tailed, and alpha = 0.05

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

letts test for homogeneity of variance

Calculated B statistic = 13.89
Table Chi-square value = 20.09 (alpha = 0.01)
Table Chi-square value = 15.51 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 7.00
Used for Chi-square table value ==> df (#groups-1) = 8

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

TITLE: Wells G&H Sed Tox H. Azteca Survival
FILE: C:\ghha.tox
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 9

	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Art Sed	1	0.8000	1.1071
1	Art Sed	2	0.7000	0.9912
1	Art Sed	3	0.9000	1.2490
1	Art Sed	4	0.5000	0.7854
1	Art Sed	5	0.6000	0.8861
1	Art Sed	6	0.9000	1.2490
1	Art Sed	7	0.8000	1.1071
1	Art Sed	8	0.9000	1.2490
2	SD06	1	1.0000	1.4120
2	SD06	2	0.9000	1.2490
2	SD06	3	1.0000	1.4120
2	SD06	4	0.9000	1.2490
2	SD06	5	1.0000	1.4120
2	SD06	6	1.0000	1.4120
2	SD06	7	0.9000	1.2490
2	SD06	8	1.0000	1.4120
3	SD07	1	1.0000	1.4120
3	SD07	2	0.7000	0.9912
3	SD07	3	0.7000	0.9912
3	SD07	4	1.0000	1.4120
3	SD07	5	0.8000	1.1071
3	SD07	6	1.0000	1.4120
	SD07	7	0.8000	1.1071
	SD07	8	0.7000	0.9912
	SD10	1	0.9000	1.2490
4	SD10	2	0.9000	1.2490
4	SD10	3	1.0000	1.4120
4	SD10	4	1.0000	1.4120

	SD10	5	0.9000	1.2490
	SD10	6	0.8000	1.1071
	SD10	7	0.8000	1.1071
	SD10	8	0.8000	1.1071
	SD12	1	1.0000	1.4120
	SD12	2	0.9000	1.2490
	SD12	3	1.0000	1.4120
5	SD12	4	0.6000	0.8861
5	SD12	5	0.9000	1.2490
5	SD12	6	1.0000	1.4120
5	SD12	7	0.9000	1.2490
5	SD12	8	0.8000	1.1071
5	SD18	1	0.3000	0.5796
6	SD18	2	0.4000	0.6847
6	SD18	3	1.0000	1.4120
6	SD18	4	0.9000	1.2490
6	SD18	5	0.8000	1.1071
6	SD18	6	0.9000	1.2490
6	SD18	7	0.7000	0.9912
6	SD18	8	0.9000	1.2490
6	SD19	1	1.0000	1.4120
7	SD19	2	1.0000	1.4120
7	SD19	3	1.0000	1.4120
7	SD19	4	0.9000	1.2490
7	SD19	5	1.0000	1.4120
7	SD19	6	0.8000	1.1071
7	SD19	7	0.8000	1.1071
7	SD19	8	0.8000	1.1071
7	SD25	1	1.0000	1.4120
8	SD25	2	1.0000	1.4120
	SD25	3	1.0000	1.4120
	SD25	4	1.0000	1.4120
8	SD25	5	1.0000	1.4120
8	SD25	6	0.8000	1.1071
8	SD25	7	1.0000	1.4120
8	SD25	8	1.0000	1.4120
8	SDFB	1	0.9000	1.2490
9	SDFB	2	1.0000	1.4120
9	SDFB	3	1.0000	1.4120
9	SDFB	4	0.6000	0.8861
9	SDFB	5	1.0000	1.4120
9	SDFB	6	1.0000	1.4120
9	SDFB	7	0.9000	1.2490
9	SDFB	8	0.9000	1.2490
9				

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
	Art Sed	8	0.785	1.249	1.078
2	SD06	8	1.249	1.412	1.351
3	SD07	8	0.991	1.412	1.178
4	SD10	8	1.107	1.412	1.237
5	SD12	8	0.886	1.412	1.247

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.824	17.424	27.504	17.424	4.824
OBSERVED	5	15	24	28	0

Calculated Chi-Square goodness of fit test statistic = 12.0335
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro-Wilks test for normality

******** Shapiro-Wilks Test is aborted ********

s test can not be performed because total number of replicates greater than 50.

Total number of replicates = 72

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 12.24
Closest, conservative, Table H statistic = 23.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 9, df (# reps-1) = 7
Actual values ==> R (# groups) = 9, df (# avg reps-1) = 7.00

Data PASS homogeneity test. Continue analysis.

E: This test requires equal replicate sizes. If they are unequal but do not differ greatly, the Hartley test may still be used as an approximate test (average df are used).

6	SD18	8	0.580	1.412	1.065
7	SD19	8	1.107	1.412	1.277
8	SD25	8	1.107	1.412	1.374
	SDFB	8	0.886	1.412	1.285

Wells G&H Sed Tox H. Azteca Survival
File: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Art Sed	0.031	0.177	0.063
2	SD06	0.007	0.084	0.030
3	SD07	0.040	0.200	0.071
4	SD10	0.016	0.127	0.045
5	SD12	0.033	0.182	0.064
6	SD18	0.087	0.295	0.104
7	SD19	0.023	0.151	0.053
8	SD25	0.012	0.108	0.038
9	SDFB	0.033	0.180	0.064

ls G&H Sed Tox H. Azteca Survival
e: C:\ghha.tox Transform: ARC SINE(SQUARE ROOT(Y))

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	Art Sed	1.078				
2	SD06	1.351	95.50	45.00	8.00	
3	SD07	1.178	75.50	45.00	8.00	
4	SD10	1.237	83.50	45.00	8.00	
5	SD12	1.247	85.00	45.00	8.00	
6	SD18	1.065	70.00	45.00	8.00	
7	SD19	1.277	86.50	45.00	8.00	
8	SD25	1.374	96.00	45.00	8.00	
9	SDFB	1.285	89.00	45.00	8.00	

Critical values use k = 8, are 1 tailed, and alpha = 0.05