FINAL
Volume V of VI

ECOLOGICAL ASSESSMENT REPORT, FOR OCTOBER, 1995 ECOLOGICAL ASSESSMENT OF SOLDIER CREEK TINKER AFB OKLAHOMA CITY, OKLAHOMA

CONTRACT NO. F34650-93-D-0109
ORDER 5005

Prepared for
Department of the Air Force
Tinker AFB
Oklahoma City, Oklahoma

April 1997

APPENDIX K

TOXICITY LABORATORY RESULTS
October, 1994

1 Master List- Jin [redacted]

Woodward-Clyde Consultants

Engineering & science applied to the earth & its environment

1-26

		HRD	ALK
1.	SC-EW-01-TX-000 ✓	170	180
2.	~~TX-00~~ SC-EW02-TX-001 ✓	160	180
3.	SC-EW03-TX-001 ✓	170	180
4.	SC-EE10-TX-01 ✓	220	230
5.	SC-EE06-TX-001 ✓	180	150
6.	SC-EE07-TX-001 90 ✓	90	140
7	SC-EE08-TX-001 ~~90~~ ✓	230	190
8.	SC-EE09-TX-001 ✓	230	200
9.	SC-EE02-TX-001 ✓	390	190
10.	SC-EE03-TX-001 ✓	240	200
11.	SC-EE04-TX-001 ✓	230	210
12.	SC-EE05-TX-001 ✓	190	220
13.	SC-EE01-TX-001 - missing ✓	~~200~~390	~~200~~190
14.	CC-EC01-TX-001 ✓	220	150
15	CC-EC02-TX-001 ✓	240	130

2 Gal H_2O, 2 Gal. soil

10/29

357 Riverside Drive (37064) • P.O. Box 680925 (37068-0925) • Franklin, Tennessee
(615) 790-0003 • (615) 790-0023

11/16/94
MLS

EW01	140	260
EW02	280	460
EW03	340	400
~~EW04~~ EE10	120	220
SCEE07	260	280
CCEC01	320	260
SCEE01	200	200
SCEE02	400	300
SCEE03	330	250
SCEE06	320	340
SCEE08	440	510
SC-EE05	230	210
SC-EE09	400	490
SC-EE04	260	260

Surface waters
Overlying Mud

Tinker L. variegatus start: 11/3/17 JT

	Sample ID	Replicate	D.O.	Temp.	pH	Cond.	Ammonia	Alk.	Hrd.
	Control	A	7.9	22.9	8.15	317	0	200	200
	EW03-Control	A	7.8	23.0	8.25	400	0	200	200
Test 1	EW01- 6.25	A	7.8	23.0	8.27	370	0		
	12.5	A	7.6	23.2					
	25	A	7.7	23.2					
	50	A	7.8	23.2					
	100	A	7.9	23.0	8.28	374	0	190	200
Test 2	EW02- 6.25	A	7.7	23.2	8.30	410	0		
	12.5	A	7.7	23.2					
	25	A	7.7	23.4					
	50	A	7.8	23.4					
	100	A	7.8	23.3	8.29	397	0	150	230
Test 3	EW03- 6.25	A	7.8	23.2	8.28	520	0		
	12.5	A	7.7	23.5					
	25	A	7.5	23.3					
	50	A	7.7	23.3					
	100	A	7.9	23.3	8.40	409	0	200	220
Test 4	EE10- 6.25	A	7.8	23.0	8.29	551	0		
	12.5	A	7.5	23.0					
	25	A	7.6	23.0					
	50	A	7.6	23.0					
	100	A	7.7	23.2	8.23	444	0	180	230

11/11/94 MLS

H. azteca Test 7, 8, 11, and 15 Beginning Parameters

Sample ID	Replicate	D.O.	Temp.	pH	Cond.	Ammonia	Alk.	Hrd.
Con	A	6.7	21.2	8.18	503	0.00	220	210
Test 7-6.25	~~B~~ A	6.6	21.2	8.18	506		—	—
Test 7-12.5	~~C~~ A	6.7	21.2	8.20	509		—	—
Test 7-25	~~D~~ A	5.5	21.2	8.14	515		—	—
Test 7-50	A	3.8	21.2	8.06	528		—	—
T.7 ~~6.25~~ 100	~~B~~ A	1.2	21.4	8.00	506	0.00	270	240
T. 8 - 6.25	~~C~~ A	6.3	21.7	8.23	512		—	—
T. 8 - 12.5	~~D~~ A	6.6	21.4	8.25	529		—	—
T ~~8 - 12~~ 25	A	6.7	21.3	8.26	507		—	—
T8 - 50	~~B~~ A	6.6	21.4	8.27	489		—	—
T. 8 - 100	~~C~~ A	6.6	21.6	8.32	444	0.00	220	240
T. 11 - 6.25	~~D~~ A	6.6	21.7	8.12	492		—	—
T. 11 - 12.5	~~A~~	6.6	21.1	8.16	500		—	—
T. 11 - 25	A	6.7	21.1	8.16	490		—	—
T. 11 - 50	~~A~~	5.9	21.3	8.11	486		—	—
T. 11 - 100	A	5.3	21.4	8.12	426	0.00	~~230~~	~~210~~ *HARE
T. 15 - 6.25	A	6.7	21.2	8.25	522		—	—
T. 15 - 12.5	A	6.6	20.9	8.35	510		—	—
T. 15 - 25	A	7.1	21.1	8.30	483		—	—
T. 15 - 50	A	6.9	21.4	8.33	473		—	—
T. 15 - 100	A	7.9	21.5	8.38	450	0.00	230	210

Tinker L. variegatus start 11-12 94

Sample ID	Replicate	D.O.	Temp.	pH	Cond.	Ammonia	Alk.	Hrd.
Control	A	6.8	21.5	8.11	570	ND	180	210
Test 5-	A		~~21.5~~	~~8.09~~	~~440~~			~~230~~
6.25	A	6.5	21.5	8.09	440	ND		
12.5	A	6.3						
25	A	6.0						
50	A	6.0						
100	A	6.8	21.6	7.90	460	ND	220	230
Test 6-								
6.25	A	6.8	21.3	8.07	392	ND		
12.5	A	6.0						
25	A	5.9						
50	A	6.1						
100	A	7.0	21.3	8.09	407	ND	200	230
Control	A	6.5	21.5	8.07	588	ND	220	230
Test 7-								
6.25	A	5.7	21.5	8.00	588	ND		
12.5	A	5.2						
25	A	4.1						
50	A	2.7						
100	A	1.5	21.2	7.93	572	ND	260	280
Test 8-								
6.25	A	6.6	21.3	8.08	538	ND		
12.5	A	6.0						
25	A	5.9						
50	A	6.7						
100	A	6.7	21.5	8.20	460	ND	210	230

Start: 11/14/94

BEGINNING WATER PARAMETERS - OVERLYING WATER

Sample ID	Replicate	D.O.	Temp.	pH	Cond.	Ammonia	Alk.	Hrd.
L. variegatus								
CONTROL -9,10	A	7.2	[illegible]	8.39	595	ND	210	320
Test 9 - 6.25	A	[illegible]	[illegible]	8.34	551	ND		
12.5	A	6.7	21.0					
25	A	6.9	21.2					
50	A	7.0	21.2		↗401			
100	A	6.9	21.8	~~8.32~~ mm 8.53	~~565~~ mm	ND	200	190
Test 10 - 6.25	A	6.9	21.1	8.38	567	ND		
12.5	A	6.9	21.2					
25	A	6.7	21.6					
50	A	7.1	21.4					
100	A	7.2	21.0	8.50	408	ND	210	240
Control - 11	A	6.3	21.2	8.23	484	ND	230	240
Test 11 - 6.25	A	5.6	21.1	8.16	511	ND		
12.5	A	5.7	21.4					
25	A	5.7	21.5					
50	A	5.5	21.3					
100	A	5.4	21.2	8.23	436	ND	220	260
Control 12	A	6.9	21.5	8.40	578	ND	~~200~~	270
Test 12 - 6.25	A	6.9	21.5	8.39	571	ND		
12.5	A	6.7	21.5					
25	A	7.0	21.5					
50	A	6.9	21.4					
100	A	6.7	21.2	8.37	368	ND	200	220
H. azteca								
CONTROL	A	7.1	21.1	8.45	499	ND	200	260
Test 3 - 6.25	A	7.1	21.0	8.47	474	ND		
12.5	A	7.1	21.0					
25	A	7.1	21.0					
50	A	7.0	21.0					
100	A	7.1	20.8	8.51	364	ND	200	220
Test 9 - 6.25	A	7.1	21.0	8.46	500	ND		
12.5	A	7.2	20.9					
25	A	7.1	21.0					
50	A	7.1	21.0					
100	A	7.1	21.0	8.49	391	ND	200	240
Test 10 - 6.25	A	6.9	21.2	8.44	528	ND		
12.5	A	7.2	21.1					
25	A	7.2	21.1					
50	A	7.0	21.1					
100	A	7.2	21.1	8.53	381	ND	200	220 ~~220~~ OK

L. variegatus

BEGINNING WATER PARAMETERS - OVERLYING WATER

Sample ID	Replicate	D.O.	Temp.	pH	Cond.	Ammonia	Alk.	Hrd.
CONTROL 13		6.5	22.2	8.31	514		210	230
0								
6.25		6.7	22.8	8.39	666			
12.5		6.8	22.2	8.39	739			
25		6.7	22.2	8.47	665			
50		6.7	22.2	8.43	568			mm
100		7.0	22.2	852	395		200	~~280~~ 25°C
Control 14		6.7	22.0	833	555		200	280
6.25		7.1	22.0	8.45	665			
12.5		7.1	22.0	8.43	662			
25		7.1	22.0	8.42	606			
50		7.1	22.0	8.44	658			
100		7.0	~~220~~	8.40	452		200	210
Control 15		7.1	22.5	8.43	482			
6.25		7.1	22.5	8.36	475		200	240
12.5		6.9	22.5	8.45	445			
25		6.9	22.2	8.45	439			
50		6.9	22.2	8.45	415			
100		7.0	22.2	8.50	413		190	200

Woodward-Clyde Consultants

Project Notes

Subject: TINKER

By:

Dept.:

Date:

Project Name:

Project No.:

Page No.: of

EE09

mostly silt with a few larger rocks; not enough to be rocky
brown-black in color with no distinct odor

EE10
gravel

EE06
mostly leaves and organic matter; no distinct odor

EE07
mostly leaves and organic matter; black in color with a
"tar" like odor, oily sheen

EE08
brown in color; sandy in texture

EE05
gravel
silty w/ sand & some gravel

EE01 - gravel - large rocks and sand

EE02 - gravel

EE03 - gravel

EE04 - sandy / muddy - brown

EW03 - gravel

Woodward-Clyde Consultants

Project Notes

Subject: _____

By: _____

Dept.: _____

Date: _____

Project Name: _____

Project No.: _____

Page No.: _____ of _____

~~Tee~~ EW01 — ~~clay~~ red silty clay

~~Tee~~ EW02 - red clay - thick

&

CR-EC01 - gravelly sand, some organic muck

~~Tee~~ CR-EC02 - sandy, some organic matter

TT-L
1
→ 12 < H_2O added to sediment

	tall jars	short jars
~~Con.~~	~~3~~ 6	~~4~~ 8
EW01	—	20
02	15	—
CR-EC01	75	20

TINKER OVERLYING WATER

SAMPLE ID	SULFIDE	AMMONIA
SC-EWO1	0.045	0
SC-EW02	0.02	0
SC-EW03	0.211	0
SC-EE10	0.035	0
SC-EE07	0.76	0
SC-EE08	0.288	0
SC-EE09	0.083	0
SC-EE06	0.126	0
SC-EE02	0.128	0
SC-EE03	0.126	0
SC-EE04	0.042	0
SC-EE05	0.039	0
SC-EE01	0.035	0
CC-EC01	0.135	0
CC-EC02		

Tinker AFB Test # 1 TEST START DATE Oct 28, 94

SAMPLE ID EW 01 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish		mg dry wt/fish	
cont	A	1.10403	1.1122	0.00817	9		0.91	
	B	1.11592	1.126	0.01008	10		1.01	
	C	1.12246	1.13037	0.00791	10		0.79	
	D	1.11249	1.12183	0.00934	10		0.93	
6.25%	A	1.10781	1.11717	0.00936	10		0.94	
	B	1.12714	1.13526	0.00812	10		0.81	
	C	1.12861	1.13686	0.00825	10		0.83	
	D	1.11712	1.12437	0.00725	10		0.73	
12.50%	A	1.12041	1.12942	0.00901	10		0.90	
	B	1.11452	1.1221	0.00758	9		0.84	
	C	1.10879	1.11825	0.00946	10		0.95	
	D	1.123	1.13042	0.00742	8		0.93	
25%	A	1.10183	1.11111	0.00928	9		1.03	
	B	1.116	1.12434	0.00834	10		0.83	
	C	1.12063	1.12895	0.00832	10		0.83	
	D	1.09715	1.10633	0.00918	10		0.92	
50%	A	1.11249	1.11995	0.00746	10		0.75	
	B	1.12357	1.13218	0.00861	10		0.86	
	C	1.09808	1.10531	0.00723	10		0.72	
	D	1.12491	1.13129	0.00638	9		0.71	
100%	A	1.12076	1.12829	0.00753	9		0.84	
	B	1.11817	1.12577	0.0076	10		0.76	
	C	1.1057	1.1132	0.0075	10		0.75	
	D	1.10841	1.11373	0.00532	10	ok	0.53	fish are small

Tinker AFB Test # 2 TEST START DATE Oct 28, 94

SAMPLE ID EW 02 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
6.25%	A	1.1145	1.12175	0.00725	10	0.72
	B	1.1012	1.10958	0.00838	10	0.84
	C	1.10922	1.1163	0.00708	10	0.71
	D	1.10578	1.11409	0.00831	10	0.83
12.50%	A	1.11017	1.11819	0.00802	10	0.80
	B	1.10516	1.11191	0.00675	10	0.68
	C	1.13204	1.1402	0.00816	10	0.82
	D	1.12057	1.12815	0.00758	10	0.76
25%	A	1.11197	1.1194	0.00743	10	0.74
	B	1.11357	1.12135	0.00778	10	0.78
	C	1.10778	1.1149	0.00712	8	0.89
	D	1.12253	1.12952	0.00699	10	0.70
50%	A	1.10542	1.11368	0.00826	10	0.83
	B	1.10755	1.11565	0.0081	10	0.81
	C	1.10257	1.11027	0.0077	10	0.77
	D	1.12128	1.12954	0.00826	10	0.83
100%	A	1.11235	1.12044	0.00809	10	0.81
	B	1.11426	1.12041	0.00615	10	0.61
	C	1.1171	1.1245	0.0074	10	0.74
	D	1.11547	1.12234	0.00687	10	0.69

Tinker AFB Test # 3 TEST START DATE Oct 28, 94

SAMPLE ID EW 03 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
6.25%	A	1.12364	1.13118	0.00754	10	0.75
	B	1.10199	1.10942	0.00743	10	0.74
	C	1.10835	1.11596	0.00761	10	0.76
	D	1.10994	1.11748	0.00754	10	0.75
12.50%	A	1.12049	1.12896	0.00847	10	0.85
	B	1.11928	1.12705	0.00777	10	0.78
	C	1.11278	1.11875	0.00597	10	0.60
	D	1.09755	1.10522	0.00767	10	0.77
25%	A	1.11113	1.11882	0.00769	10	0.77
	B	1.1269	1.13382	0.00692	9	0.77
	C	1.12236	1.12925	0.00689	10	0.69
	D	1.09646	1.10263	0.00617	10	0.62
50%	A	1.11611	1.12356	0.00745	9	0.83
	B	1.09503	1.10124	0.00621	10	0.62
	C	1.10594	1.11419	0.00825	10	0.83
	D	1.11918	1.12675	0.00757	10	0.76
100%	A	1.12026	1.12681	0.00655	10	0.66
	B	1.10584	1.11316	0.00732	10	0.73
	C	1.12301	1.13097	0.00796	10	0.80
	D	1.10638	1.11396	0.00758	10	0.76

Tinker AFB Test # 4 TEST START DATE Oct 28, 94

SAMPLE ID EE 10 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
6.25%	A	1.11395	1.12165	0.0077	10	0.77
	B	1.10901	1.1163	0.00729	9	0.81
	C	1.12817	1.13494	0.00677	10	0.68
	D	1.10325	1.11122	0.00797	10	0.80
12.50%	A	1.11902	1.1268	0.00778	10	0.78
	B	1.10569	1.11288	0.00719	10	0.72
	C	1.10708	1.11452	0.00744	10	0.74
	D	1.11261	1.11929	0.00668	10	0.67
25%	A	1.12001	1.12801	0.008	10	0.80
	B	1.11051	1.11749	0.00698	10	0.70
	C	1.13132	1.13912	0.0078	10	0.78
	D	1.12197	1.12861	0.00664	10	0.66
50%	A	1.11443	1.12177	0.00734	9	0.82
	B	1.11054	1.11776	0.00722	9	0.80
	C	1.11892	1.12612	0.0072	10	0.72
	D	1.11684	1.12346	0.00662	10	0.66
100%	A	1.12667	1.13263	0.00596	10	0.60
	B	1.11955	1.12296	0.00341	6	0.57
	C	1.1217	1.12729	0.00559	9	0.62
	D	1.11605	1.1214	0.00535	8	0.67

PIMEPH5.XLS

Tinker AFB Test # 5 TEST START DATE Oct 29, 94

SAMPLE ID EE 06 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish	
cont	A	1.10705	1.11496	0.00791	10	0.79	
	B	1.12657	1.13382	0.00725	10	0.72	
	C	1.10488	1.11235	0.00747	10	0.75	
	D	1.10684	1.11166	0.00482 o.k.	10	0.48	-Smaller fish
6.25%	A	1.11303	1.12224	0.00921	9	1.02	
	B	1.11595	1.12224	0.00629	9	0.70	
	C	1.12202	1.12909	0.00707	10	0.71	
	D	1.12087	1.1272	0.00633	10	0.63	
12.50%	A	1.11127	1.11827	0.007	10	0.70	
	B	1.10338	1.11011	0.00673	9	0.75	
	C	1.11188	1.11909	0.00721	9	0.80	
	D	1.12108	1.1274	0.00632	10	0.63	
25%	A	1.12174	1.12856	0.00682	10	0.68	
	B	1.11193	1.11971	0.00778	10	0.78	
	C	1.1007	1.10776	0.00706	10	0.71	
	D	1.10628	1.11268	0.0064	10	0.64	
50%	A	1.10353	1.10932	0.00579	10	0.58	
	B	1.12049	1.12555	0.00506	10	0.51	
	C	1.10836	1.11362	0.00526	9	0.58	
	D	1.12176	1.12747	0.00571	9	0.63	
100%	A	1.10626	1.11193	0.00567	9	0.63	
	B	1.11627	1.12093	0.00466	10	0.47	
	C	1.1142	1.11898	0.00478	9	0.53	
	D	1.11135	1.11783	0.00648	10	0.65	

Tinker AFB Test # 6 TEST START DATE Oct 29, 94

SAMPLE ID EE 07 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
cont	A	1.10489	1.11168	0.00679	10	0.68
	B	1.11778	1.12412	0.00634	10	0.63
	C	1.10855	1.11486	0.00631	9	0.70
	D	1.10617	1.11338	0.00721	9	0.80
6.25%	A	1.12599	1.13203	0.00604	9	0.67
	B	1.10202	1.10873	0.00671	9	0.75
	C	1.09784	1.10339	0.00555	8	0.69
	D	1.10586	1.11235	0.00649	10	0.65
12.50%	A	1.11127	1.11705	0.00578	10	0.58
	B	1.1193	1.12615	0.00685	10	0.69
	C	1.11447	1.12099	0.00652	10	0.65
	D	1.11412	1.11976	0.00564	10	0.56
25%	A	1.1194	1.12402	0.00462	8	0.58
	B	1.10359	1.11008	0.00649	8	0.81
	C	1.11399	1.12094	0.00695	10	0.70
	D	1.11643	1.12258	0.00615	10	0.61
50%	A	1.10148	1.10837	0.00689	10	0.69
	B	1.09086	1.09767	0.00681	9	0.76
	C	1.116	1.12146	0.00546	9	0.61
	D	1.10959	1.11493	0.00534	9	0.59
100%	A	1.11939	1.12609	0.0067	10	0.67
	B	1.1106	1.11637	0.00577	10	0.58
	C	1.10671	1.11246	0.00575	8	0.72
	D	1.08706	1.09292	0.00586	10	0.59

Tinker AFB Test # 7 TEST START DATE Oct 29, 94

SAMPLE ID EE 08 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
6.25%	A	1.10603	1.11348	0.00745	10	0.74
	B	1.10857	1.11391	0.00534	8	0.67
	C	1.11331	1.11964	0.00633	10	0.63
	D	1.11357	1.11508	0.00151	3	0.50
12.50%	A	1.10307	1.10945	0.00638	9	0.71
	B	1.11613	1.1216	0.00547	9	0.61
	C	1.10954	1.11544	0.0059	10	0.59
	D	1.12032	1.12592	0.0056	10	0.56
25%	A	1.11536	1.12231	0.00695	10	0.70
	B	1.10533	1.11134	0.00601	10	0.60
	C	1.09729	1.10245	0.00516	10	0.52
	D	1.11652	1.12274	0.00622	10	0.62
50%	A	1.10723	1.11434	0.00711	10	0.71
	B	1.11272	1.11729	0.00457	9	0.51
	C	1.10424	1.11064	0.0064	10	0.64
	D	1.10619	1.11172	0.00553	10	0.55
100%	A	1.11343	1.11632	0.00289	4	0.72
	B	1.11638	1.12026	0.00388	9	0.43
	C	1.10934	1.11356	0.00422	9	0.47
	D	1.11213	1.11513	0.003	8	0.37

Tinker AFB Test # 8 TEST START DATE Oct 29, 94

SAMPLE ID EE09 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
6.25%	A	1.12229	1.12933	0.00704	10	0.70
	B	1.11446	1.12225	0.00779	10	0.78
	C	1.11462	1.12227	0.00765	10	0.77
	D	1.12144	1.12676	0.00532	10	0.53
12.50%	A	1.11454	1.12144	0.0069	10	0.69
	B	1.11537	1.12132	0.00595	9	0.66
	C	1.10731	1.11499	0.00768	10	0.77
	D	1.12228	1.12809	0.00581	9	0.65
25%	A	1.10449	1.11167	0.00718	10	0.72
	B	1.10373	1.11066	0.00693	10	0.69
	C	1.09994	1.10705	0.00711	10	0.71
	D	1.10894	1.11505	0.00611	8	0.76
50%	A	1.12072	1.12732	0.0066	10	0.66
	B	1.10814	1.11505	0.00691	10	0.69
	C	1.11769	1.12389	0.0062	10	0.62
	D	1.12116	1.12703	0.00587	10	0.59
100%	A	1.10312	1.10853	0.00541	9	0.60
	B	1.12596	1.13159	0.00563	10	0.56
	C	1.10373	1.10803	0.0043	9	0.48
	D	1.11299	1.11785	0.00486	8	0.61

Tinker AFB Test # 9 TEST START DATE Oct 31, 94

SAMPLE ID SC-EE02 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
VHard cont	A	1.10584	1.11266	0.00682	9	0.76
	B	1.11502	1.12337	0.00835	10	0.84
	C	1.12549	1.13423	0.00874	11	0.79
	D	1.11155	1.11987	0.00832	10	0.83
6.25%	A	1.12711	1.13535	0.00824	10	0.82
	B	1.11097	1.11896	0.00799	10	0.80
	C	1.10699	1.11443	0.00744	10	0.74
	D	1.11946	1.12872	0.00926	10	0.93
12.50%	A	1.10144	1.10957	0.00813	10	0.81
	B	1.11537	1.12202	0.00665	10	0.67
	C	1.11996	1.12718	0.00722	10	0.72
	D	1.10821	1.11727	0.00906	11	0.82
25%	A	1.12005	1.12822	0.00817	10	0.82
	B	1.1055	1.11306	0.00756	10	0.76
	C	1.1158	1.12325	0.00745	10	0.75
	D	1.11885	1.12731	0.00846	10	0.85
50%	A	1.11012	1.11866	0.00854	10	0.85
	B	1.10986	1.11678	0.00692	10	0.69
	C	1.11643	1.12348	0.00705	10	0.71
	D	1.11656	1.12386	0.0073	9	0.81
100%	A	1.11857	1.12692	0.00835	10	0.83
	B	1.11781	1.12569	0.00788	10	0.79
	C	1.11754	1.12491	0.00737	10	0.74
	D	1.11686	1.12357	0.00671	9	0.75

Tinker AFB Test # 10 TEST START DATE Oct 31, 94

SAMPLE ID SC-EE03 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
cont	A	1.11408	1.12162	0.00754	10	0.75
	B	1.11267	1.12008	0.00741	10	0.74
	C	1.11414	1.12183	0.00769	10	0.77
	D	1.10847	1.11577	0.0073	9	0.81
6.25%	A	1.11438	1.12118	0.0068	8	0.85
	B	1.10935	1.11587	0.00652	9	0.72
	C	1.08885	1.09552	0.00667	10	0.67
	D	1.11972	1.12651	0.00679	10	0.68
12.50%	A	1.11656	1.12332	0.00676	10	0.68
	B	1.09457	1.10214	0.00757	11	0.69
	C	1.11258	1.11988	0.0073	10	0.73
	D	1.10905	1.11626	0.00721	10	0.72
25%	A	1.13125	1.13739	0.00614	10	0.61
	B	1.10948	1.11691	0.00743	10	0.74
	C	1.11954	1.12651	0.00697	9	0.77
	D	1.11743	1.12438	0.00695	10	0.70
50%	A	1.10701	1.11434	0.00733	10	0.73
	B	1.11449	1.12115	0.00666	10	0.67
	C	1.11949	1.12589	0.0064	10	0.64
	D	1.11077	1.11616	0.00539	10	0.54
100%	A	1.11551	1.12232	0.00681	10	0.68
	B	1.10585	1.113	0.00715	11	0.65
	C	1.09136	1.09805	0.00669	10	0.67
	D	1.10132	1.10855	0.00723	10	0.72

Tinker AFB Test # 11 TEST START DATE Oct 31, 94

SAMPLE ID SC-EE04 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
6.25%	A	1.12066	1.12831	0.00765	10	0.76
	B	1.12271	1.12905	0.00634	10	0.63
	C	1.11585	1.12271	0.00686	10	0.69
	D	1.10685	1.11341	0.00656	10	0.66
12.50%	A	1.11183	1.11832	0.00649	9	0.72
	B	1.09641	1.10276	0.00635	10	0.63
	C	1.11958	1.12741	0.00783	9	0.87
	D	1.09575	1.10269	0.00694	10	0.69
25%	A	1.10778	1.11466	0.00688	10	0.69
	B	1.11129	1.11773	0.00644	10	0.64
	C	1.10457	1.11182	0.00725	9	0.81
	D	1.10628	1.11216	0.00588	10	0.59
50%	A	1.12465	1.13086	0.00621	9	0.69
	B	1.12578	1.1315	0.00572	10	0.57
	C	1.10541	1.11129	0.00588	9	0.65
	D	1.11873	1.12486	0.00613	9	0.68
100%	A	1.10952	1.11509	0.00557	9	0.62
	B	1.09932	1.10442	0.0051	10	0.51
	C	1.0953	1.10099	0.00569	10	0.57
	D	1.09918	1.10491	0.00573	10	0.57

Tinker AFB Test # 12 TEST START DATE Oct 31, 94

SAMPLE ID DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
6.25%	A	1.09695	1.10211	0.00516	9	0.57
	B	1.10614	1.11233	0.00619	10	0.62
	C	1.11862	1.12555	0.00693	10	0.69
	D	1.10745	1.11325	0.0058	9	0.64
12.50%	A	1.10626	1.11231	0.00605	10	0.60
	B	1.09553	1.10201	0.00648	10	0.65
	C	1.10992	1.11671	0.00679	10	0.68
	D	1.09654	1.10322	0.00668	9	0.74
25%	A	1.11191	1.11838	0.00647	10	0.65
	B	1.11789	1.12478	0.00689	10	0.69
	C	1.12092	1.12765	0.00673	9	0.75
	D	1.09784	1.10402	0.00618	10	0.62
50%	A	1.10796	1.11449	0.00653	10	0.65
	B	1.11548	1.12186	0.00638	10	0.64
	C	1.11064	1.11666	0.00602	10	0.60
	D	1.11653	1.12354	0.00701	10	0.70
100%	A	1.10575	1.11052	0.00477	10	0.48
	B	1.11689	1.12169	0.0048	10	0.48
	C	1.11349	1.11932	0.00583	9	0.65
	D	1.11024	1.11628	0.00604	10	0.60

Tinker AFB Test # 13 TEST START DATE Nov 1, 94

SAMPLE ID SC-EE01 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
cont	A	1.11765	1.12624	0.00859	10	0.86
	B	1.11428	1.12293	0.00865	10	0.87
	C	1.11232	1.12045	0.00813	10	0.81
	D	1.10291	1.10964	0.00673	10	0.67
6.25%	A	1.11297	1.12157	0.0086	10	0.86
	B	1.10948	1.1174	0.00792	10	0.79
	C	1.12035	1.12841	0.00806	10	0.81
	D	1.11879	1.12547	0.00668	10	0.67
12.50%	A	1.12413	1.13236	0.00823	10	0.82
	B	1.12058	1.12874	0.00816	10	0.82
	C	1.1109	1.11856	0.00766	9	0.85
	D	1.11037	1.11883	0.00846	10	0.85
25%	A	1.10058	1.10931	0.00873	10	0.87
	B	1.10905	1.11609	0.00704	10	0.70
	C	1.10508	1.11279	0.00771	10	0.77
	D	1.11263	1.11806	0.00543	8	0.68
50%	A	1.1058	1.11428	0.00848	10	0.85
	B	1.10788	1.11529	0.00741	10	0.74
	C	1.11206	1.11887	0.00681	10	0.68
	D	1.10681	1.11384	0.00703	10	0.70
100%	A	1.11921	1.12581	0.0066	10	0.66
	B	1.11403	1.12072	0.00669	9	0.74
	C	1.11724	1.12334	0.0061	10	0.61
	D	1.12371	1.12984	0.00613	10	0.61

The number of surviving fish in 12.5 C and 25 D was 10, but less were found in the boat after drying

Tinker AFB Test # 14 TEST START DATE Nov 1, 94

SAMPLE ID CC-EC01 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
cont	A	1.11765	1.12624	0.00859	10	0.86
	B	1.11428	1.12293	0.00865	10	0.87
	C	1.11232	1.12045	0.00813	10	0.81
	D	1.10291	1.10964	0.00673	10	0.67
6.25%	A	1.11452	1.12139	0.00687	8	0.86
	B	1.09421	1.10193	0.00772	9	0.86
	C	1.11028	1.11916	0.00888	10	0.89
	D	1.12022	1.12771	0.00749	10	0.75
12.50%	A	1.11876	1.12793	0.00917	9	1.02
	B	1.10286	1.11167	0.00881	10	0.88
	C	1.09203	1.10101	0.00898	10	0.90
	D	1.12852	1.13538	0.00686	9	0.76
25%	A	1.12126	1.12865	0.00739	9	0.82
	B	1.09982	1.10883	0.00901	10	0.90
	C	1.11947	1.12764	0.00817	10	0.82
	D	1.11363	1.12007	0.00644	10	0.64
50%	A	1.10675	1.11512	0.00837	10	0.84
	B	1.11731	1.12536	0.00805	10	0.80
	C	1.12678	1.13463	0.00785	10	0.79
	D	1.1107	1.11801	0.00731	10	0.73
100%	A	1.12019	1.12724	0.00705	9	0.78
	B	1.10593	1.11349	0.00756	9	0.84
	C	1.09245	1.09874	0.00629	10	0.63
	D	1.11529	1.1217	0.00641	10	0.64

Tinker AFB Test # 15 TEST START DATE Nov 1, 94

SAMPLE ID CC-EC01 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
cont	A	1.11765	1.12624	0.00859	10	0.86
	B	1.11428	1.12293	0.00865	10	0.87
	C	1.11232	1.12045	0.00813	10	0.81
	D	1.10291	1.10964	0.00673	10	0.67
6.25%	A	1.11443	1.12339	0.00896	10	0.90
	B	1.12052	1.12965	0.00913	10	0.91
	C	1.12308	1.13201	0.00893	10	0.89
	D	1.11201	1.11836	0.00635	10	0.64
12.50%	A	1.11471	1.12454	0.00983	10	0.98
	B	1.11103	1.11831	0.00728	10	0.73
	C	1.09318	1.10072	0.00754	10	0.75
	D	1.09665	1.10507	0.00842	10	0.84
25%	A	1.09878	1.10697	0.00819	10	0.82
	B	1.10644	1.11425	0.00781	9	0.87
	C	1.11895	1.12755	0.0086	10	0.86
	D	1.10327	1.11089	0.00762	10	0.76
50%	A	1.12203	1.12865	0.00662	10	0.66
	B	1.10483	1.11217	0.00734	10	0.73
	C	1.11312	1.11961	0.00649	10	0.65
	D	1.09929	1.10646	0.00717	9	0.80
100%	A	1.12132	1.12725	0.00593	9	0.66
	B	1.11714	1.12335	0.00621	10	0.62
	C	1.1089	1.11508	0.00618	10	0.62
	D	1.10052	1.10674	0.00622	10	0.62

say $pH = 3$

$\therefore$ aa = ~~6.3~~ $6.3 + (-3) = 10.3$

$$10.3 = \frac{12.6}{1 + 0.903\, e^{-12.6 \cdot 0.054 \cdot meq}}$$

$$\left(\frac{12.6}{10.3}\right) = 1 + 0.903\, e^{(-0.6804\ meq)}$$

$$\left(1 - \frac{12.6}{10.3}\right) = -0.903\, e^{(-0.6804\ meq)}$$

$$\ln\left[\frac{\left(1 - \frac{12.6}{10.3}\right)}{-0.903}\right] = -0.6804\ meq$$

$$\left\{\ln\left[\frac{1 - \frac{12.6}{10.3}}{-0.903}\right]\right\} \Big/ -0.6804 = meq$$

1 N NaOH = 40 g/L or 40 mg/mL ~~Eq~~

40 mg = 1 mEq

40% soln w/v
= 400 g/L
= 400 mg/mL

$$mEq/gal * \frac{40mg}{1\,mEq} * \frac{mL}{40mg} * \frac{gal}{hr}$$

H_2SO_4 96 - 98 %

normality = 36 or 36 mEq/L

1 N = 1 eq/L ~~not mEq~~ or mEq/mL

36 N = 36 eq/L = 98% w/v 1.835 g/mL

= 36 eq/L · 1.835 kg/L = 6

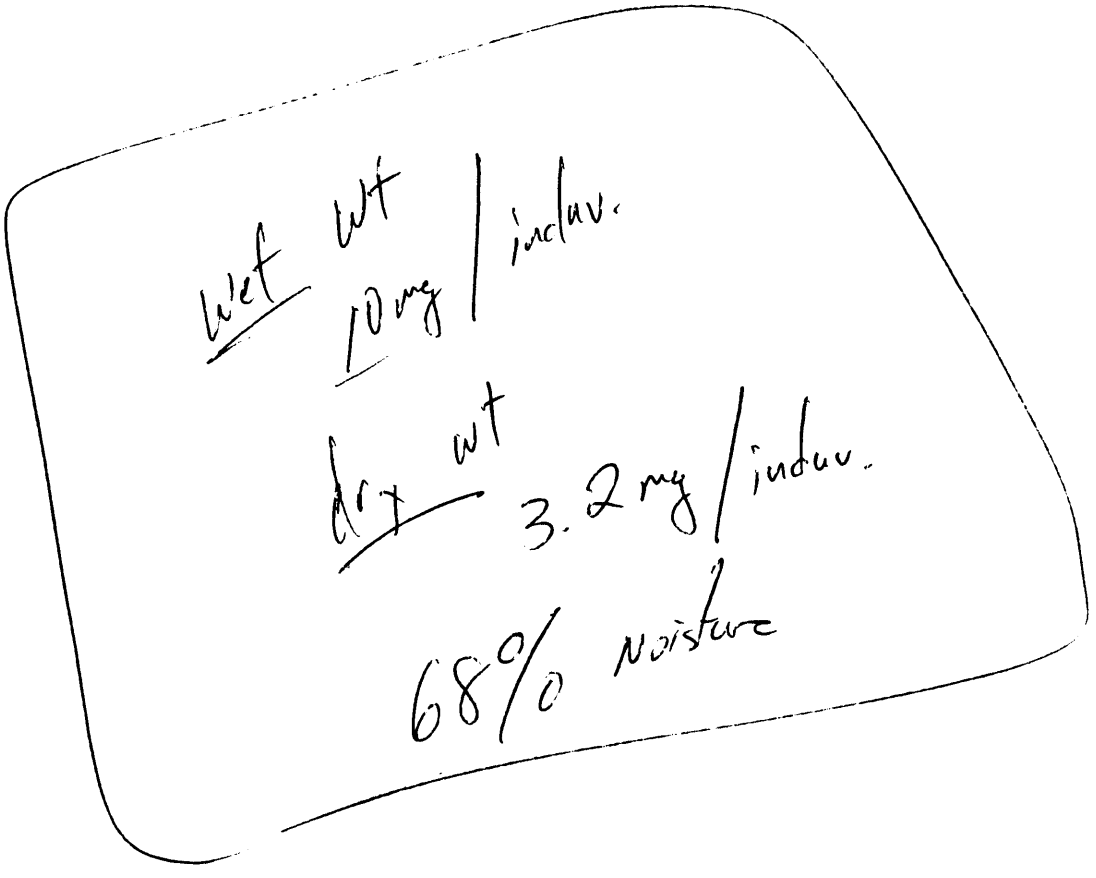
$\frac{36\ eq}{L} \cdot \frac{L}{1.835\ kg} = \frac{19.62\ eq}{kg}$

1 mL = (1.835 g · 0.98) = g H_2SO_4

mL in	N	28	x	= 50.35 g/L
	0.1N	2.8		
	0.02N	0.56		

1 eq = $\frac{1\ Eq}{L} = \frac{50.35\ g}{L}$

$\frac{36\ eq}{L}$ 36 mEq/mL mL/gal x gal/hr = mL/hr


wet wt
10 mg / indiv.
dry wt
3.2 mg / indiv.
68% moisture

12/27 - ~~Hyalella~~ Hyalella 5 organisms / jar

	Day 1	Day 2	Day 3	Day 7	Day 10
Tank - A	5	4	3	0 adults 3 young	0
B	~~5~~	5	5	2	2
Tank w/trout chow - A	5	5	5	4	3
B	5	5	5	5	5
Tank w/ YTC - A	5	3	3	0	0
B	5	4	4	1	0
Carboy - A	2	1	0		0
B	2	1	0		0
Tank - Carbon filter A	5	5	5	5	5
B	5	5	5	5	5 - 2 babies
Tank through leaves - A	5	5	5	3	3
B	5	5	5	5	5
Advent Mod. Hd. - A	5	5	5	4	3
B	5	5	5	4	2

	Day 15
aerated in Tank	12
~~Tank~~ leaves	10

Spring aerated thru leaves 6

7

Woodward-Clyde Consultants

Project Notes

Subject: _____

By: _____

Dept.: _____

Date: _____

Project Name: _____

Project No.: _____

Page No.: _____ of _____

Silt

#1 EW01

#2 EW02 - red sandy silt

#4 EE10

#5 SC-EE06

#6 SC-EE07

#7 SC-EE08 - brown stinky silty muck-sewage

#8 SC-EE09 dk brown silty muck

#11 SC-EE04 - dk brown silty muck

#12 SC-EE05 - red silty/sand

#15 CC-EC02 - red clay

10

Gravel

#3 EW03 - red sandy gravel

[redacted]

#10 SC-EE03 - rocky gravel

#9 SC-EE02 - pebbles/gravel

#13 SC-EE01 - rocky/gravel

#14 CC-EC01 - red pebbles/gravel

5 gravel

1 Control

6

215

5

75

3

78 jars

780 bugs

Day - test Group 1 - 3

9

10

13

14

Test Group 2 - 1

2 (C] - 4, 8, 16, 32, 64)

4

5 (C] 5, 10, 20, 40, 80)

6 (C] 5, 10, 20, 40, 80)

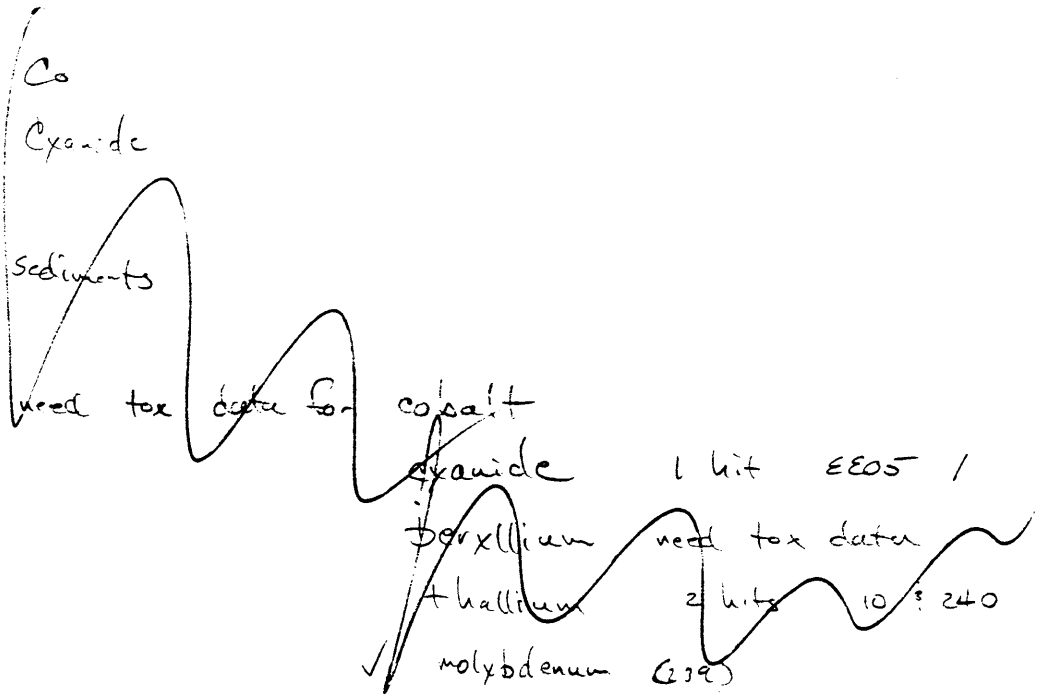
Test Group 3 - 7

8

11

12

15



EW01 – red muck, no sand indicated

EW02 – red muck, some sand

EW03 – red / sand & gravel

EE01 rocky gravel

2 pebbles & gravel

3 rocky gravel

4 dark brown silty muck

5 red silty sand

6 brown muck, no sand

7 brown muck, some sand

8 brown silty muck - sewage smell

9 dark brown silty muck

10 black with anoxic ~~odor~~ odor muck with some pebbles

EC01 red pebbles & gravel

2 red clay

T1 100	T4 12.5	T1 100	T4 25	T1 12.5
T4 50	T1 12.5	T2 64	T2 8	T4 100
T2 4	T4 25	T4 6.25	T4 6.25	T1 50
T2 64	T1 100	T1 6.25	T4 25	C
T4 100	T4 50	T1 25	T2 64	T4 6.25
T2 32	T1 25	T2 4	C	T2 16
T1 50	T1 6.25	T4 50	T4 12.5	T2 32
T1 6.25	T4 100	C	T2 8	T4 12.5
T1 25	T2 4	T2 16	T2 16	T1 12.5

T2 32	T2 8	T1 50

Jeff ~~Matt~~

Matt

Control	1, 2, 4	01 02 03	111
Test 1			
6.25	4 - 6	04 06 05	111
12.5	7 - 9	07 08 09	111
25	10 - 12	10 12 11	111
50	13 - 15	13 14 15	111
100	16 - 18	18 16 17	111
Test 2			
4	19 - 21	19 21 20	111
8	22 - 24	22 24 23	111
16	25 - 27	27 25 26	111
32	28 - 30	28 29 30	111
64	31 - 33	32 33 31	111
Test 4			
6.25	34 - 36	36 35 34	111
12.5	37 - 39	38 39 37	111
25	40 - 42	40 42 41	111
50	43 - 45	45 44 43	111
100	46 - 48	46 47 48	111

Woodward-Clyde Consultants

Project Notes

Project: _____

By: _____ Date: _____

Checked By: _____ Date: _____

Project Name: _____

Project No.: _____

Task No.: _____ File No.: _____

Sheet _____ of _____

13 100	3 6.25	3 25	13 50	15 100
15 100	3 25	15 50	14 12.5	Silt Con
Pz Con	13 25	13 100	15 50	13 50
15 25	14 25	13 100	3 12.5	15 50
13 25	3 25	14 6.25	14 6.25	3 12.5
14 25	13 50	14 6.25	3 12.5	15 25
3 6.25	13 25	14 25	15 25	Silt Con
[illegible] [illegible]	3 6.25	14 12.5	Pz Con	13 12.5
3 50	14 12.5	15 12.5	14 50	13 6.25

3 100	15 6.25	14 100	13 6.25	14 50
3 50	14 50	Pz Con	3 100	3 100
15 6.25	13 6.25	15 6.25	13 12.5	14 100
3 50	Silt Con	15 12.5	14 100	15 100
13 12.5				

13 6.25	3 100	15 6.25	14 100	13 6.25
14 50	3 50	14 50	Pz Con	3 100
3 100	15 6.25	13 6.25	15 6.25	13 12.5
14 100	3 50	Con	15 12.5	14 100
15 100	13 12.5			

T1 = T5
T2 = T6

T3 = T7
T4 = T8

SC1 =
SC2

Garfinkel

T1 25	T1 50	T2 50	T3 100	T3 100
T3 25	T2 6.25	T2 3.175	T1 12.5	T4 50
T4 25	T2 6.25	T1 50	T1 6.25	T2 3.175
T2 12.5	C	T1 12.5	T1 12.5	T2 25
C	T2 50	T4 6.25	T4 100	T1 100
T1 100	T4 25	PZ	PZ	T2 25
T3 6.25	T1 25	T3 6.25	T4 12.5	T1 25
T4 6.25	T3 12.5	C	T3 12.5	T3 50
T1 50	T4 50	T4 12.5	T2 50	T2 3.175

Simpson

T2 12.5	T1 6.25	T3 50	T3 100	T3 50
T3 12.5	PZ	T4 100	T3 25	T3 25
T2 6.25	T2 12.5	T1 6.25	T4 12.5	T4 100
T1 100	T2 25	T3 6.25	T4 50	T4 75
T4 6.25				

4 · 15 = 60
3 · 2 = 6
66

Control	1 - 3	03 01 02	1	1
PZ	4 - 6	06 05 04	1	1
Test 1				
6.25	7 - 9	09 08 07	1	1
12.5	10 - 12	11 12 10	1	1
25	13 - 15	13 14 15	1	1
50	16 - 18	17 18 16	1	1
100	19 - 21	20 21 19	1	1
Test 2				
3.175	22 24	24 23 22	1	1
6.25	25 27	27 26 25	1	1
12.5	28 30	28 30 29	1	1
25	31 33	33 31 32	1	1
50	34 36	35 34 36	1	1
Test 3				
6.25	37 39	37 38 39	1	1
12.5	40 42	42 40 41	1	1
25	43 45	44 45 46	1	1
50	46 48	48 47 46	1	1
100	49 51	49 50 51	1	1
Test 4				
6.25	52 54	52 53 54	1	1
12.5	55 57	55 56 57	1	1
25	58 60	59 60 58	1	1
50	61 63	61 62 63	1	1
100	64 66	65 66 64	1	1

JEFF

T5 50	T5 12.5	T6 6.25	T5 6.25	C
T5 12.5	T6 6.25	T6 12.5	T5 100	C
T5 25	T6 25	T5 50	T6 12.5	T6 50
T6 25	T6 6.25	T6 50	[illegible]	T6 25
T5 100	T5 100	T5 12.5	T5 6.25	T5 50
[illegible]	T5 100	[illegible]	T6 50	T5 25
T6 25	T5 6.25	C	C	T6 100
T6 100	T5 6.25	T6 12.5	T5 25	T6 100
T6 100	T5 25	[illegible]	T6 50	T5 12.5
T6 6.25	T5 50		T6 6.25	

Orpain

C		/	/	/ /
PZC		/	/	/ /
T5	6.25	/	/	/ /
	12.5	/	/	/ /
	25	/	/	/ /
	50	/	/	/ /
	100	/	/	/ /
T6	6.25	/	/	/ /
	12.5	/	/	/ /
	25	/	/	/ /
	50	/	/	/ /
	100	/	/	/ /

PZ- empty jars

Simon

Drain

T9 100	T9 25	T10 6.25	T10 50	
T9 12.5	T9 50	T10 6.25	T9 50	
T9 100	T9 25	T9 12.5	C	T9 25
C	T9 6.25	T10 12.5	C	T9 6.25
T10 25	T10 100	T9 25	T9 100	T9 50
T10 100	T10 6.25	T10 100	T10 100	PZ C
PZ C	T10 12.5	T9 6.25	T9 12.5	C
T9 50	T10 12.5	T10 6.25	T9 100	T9 6.25
T10 50	T9 12.5	T10 25	T10 50	PZ C
T10 25	T10 25	T10 50	PZ C	T10 12.5

	C				
	PZ				
T9	6.25				
	12.5				
	25				
	50				
	100				
T10	6.25				
	12.5				
	25				
	50				
	100				

SL-2 Tank 16 - tubing came off C

Garfunkel

drain

X	X	T11 12.5	T11 25	
X	X	C	T11 100	
T12 50	T11 6.25	T11 25	T11 25	T11 50
T11 12.5	T11 12.5	T11 100	C	T12 6.25
T12 25	C	T11 50	T11 6.25	T11 50
T12 50	T11 50	T12 100	T12 12.5	T11 12.5
T12 25	T12 12.5	T12 6.25	C	T12 50
T12 25	T12 6.25	T12 100	T11 6.25	T12 6.25
T12 50	T11 100	T12 100	T12 25	T11 25
T12 12.5	T11 6.25	T12 12.5	T12 100	T11 100

C				
T11				
6.25				
12.5				
25				
50				
100				
T12				
6.25				
12.5				
25				
50				
100				

Jeff

PZ	T14	T13	T14	T13
	50	12.5	6.25	25
T13	PZ	C	T14	T13
6.25			6.25	12.5
PZ	T13	T14	T14	T14
	100	12.5	100	50
T13	T14	T14	T13	T13
50	6.25	25	12.5	6.25
T14	T13	T13	T14	T13
12.5	25	100	25	50
T13	T14	T13	T13	C
100	100	25	50	
T14	C	T13	T13	T14
6.25		100	50	100
T13	PZ	T14	T14	T13
25		12.5	50	12.5
T14	T14	T13	C	T14
50	25	6.25		100
T14	T13		T14	
12.5	6.25		25	

C	1 - 4	02 04 01 03	1	1
PZ	5 - 8	05 07 06 08	1	1

Test 13

6.25	9 - 12	11 12 09 10	1	1
12.5	13 - 16	14 13 15 16	1	1
25	17 - 20	19 17 20 18	1	1
50	21 - 24	23 24 22 21	1	1
100	25 - 28	28 27 25 26	1	1

Test 14

6.25	29 - 32	30 31 29 32	1	1
12.5	33 - 36	34 35 36 33	1	1
25	37 - 40	40 39 37 38	1	1
50	41 - 44	41 42 44 43	1	1
100	45 - 48	47 45 48 46	1	1

Matt

T15	T15	T15	T15	T15
6.25	12.5	6.25	100	25
T15	T15	T15	T15	T15
50	6.25	25	100	100
T15	T15	C	T15	T15
12.5	25		12.5	50
C	T15	C	T15	T15
	6.25		100	50
T15	C	T15	T15	
12.5		25	50	

C	1 - 4	01 03 04 02		

Test 15 ~~5 - 8~~

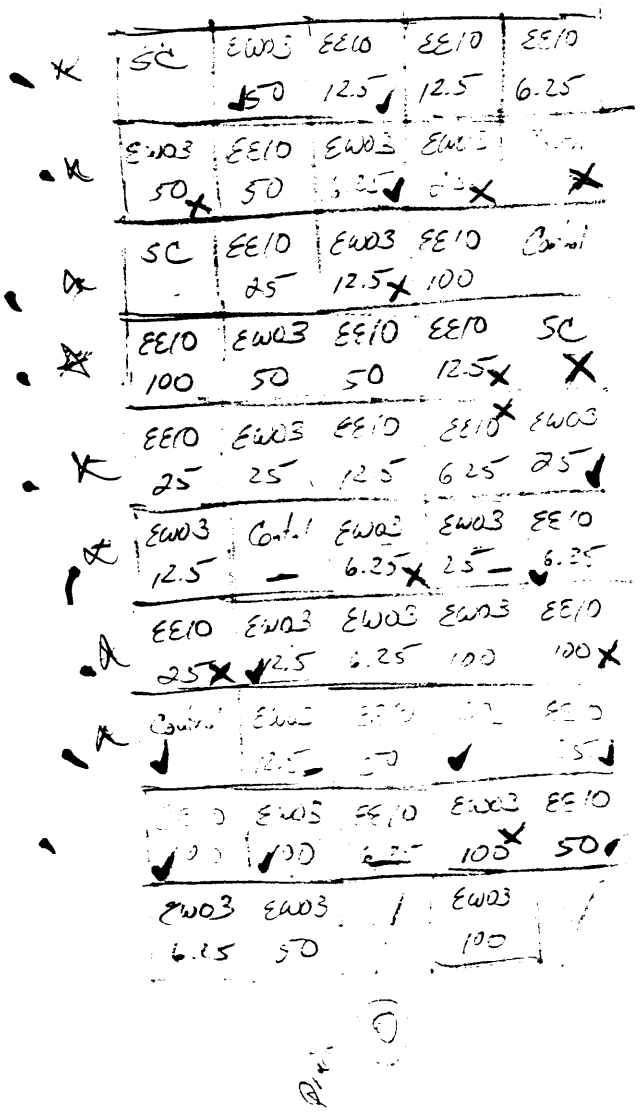
6.25	9 - 12	11 09 12 10		
12.5	13 - 16	14 16 13 15		
25	17 - 20	19 20 18 17		
50	21 - 24	24 21 23 22		
100	25 - 28	26 28 27 25		

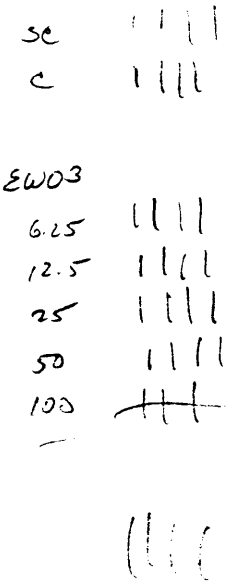
EW01 100 ✓	EW02 50 ✓	EW01 25 ✓	EW02 12.5 ✓	EW01 25
EW01 50	EW01 12.5 ✓	EW01 6.25 X	EW02 50 X	EW01 6.25 ✓
EW01 6.25	Control ✓	Control X	EW01 50	EW02 50
EW02 50	EW02 100 ✓	EW01 12.5 X	EW02 100	EW01 50 ✓
EW01 100 X	EW01 100	EW01 25 X	Control	EW02 6.25 X
EW02 6.25 ✓	EW01 6.25	EW02 6.25	EW02 100 X	EW02 12.5 X
EW01 100	EW01 12.5	EW02 12.5	EW01 12.5	EW02 12.5
EW02 100	EW02 25 X	EW01 25	EW02 25	EW01 50 X
EW02 25	EW02 6.25	EW02 25 ✓	Control	

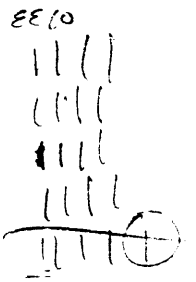
1		2	
100	||||	100	||||
50	||||	50	||||
25	||||	25	||||
12.5	||||	12.5	||||
6.25	||||	6.2	||||

control \|\|\|\|

~~untouched did not remove any jars~~


SC EW03 EE10 EE10 EE10
50 12.5 12.5 6.25
EW03 EE10 EW03
50 50 6.25
SC EE10 EW03 EE10
25 12.5 100
EE10 EW03 EE10 EE10 SC
100 50 50 12.5
EE10 EW03 EE10 EE10 EW03
25 25 12.5 6.25 25
EW03 EW03 EW03 EE10
12.5 6.25 25
EE10 EW03 EW03 EW03 EE10
25 12.5 6.25 100 100
EW03 EW03 EW03
6.25 50 100


SC
C
EW03
6.25
12.5
25
50
100


EE10

Woodward-Clyde Consultants

Engineering & science applied to the earth & its environment

Tests

5, 6, 7, 8

Garfunkel

Simon

T5 * 20	T5 * 40	T6 * 80	T7 100	T7 * 100
T7 * 25	T6 10	T6 5 *	T5 * 10	T3 * 50
T8 * 25	T6 * 10	T5 40	T5 5 *	T6 * 5
T6 1 20	SC1 *	T5 10 *	T5 10	T6 * 40
SC1	T6 * 80	T8 6.25	T8 100	T5 * 80
T5 * 80	T8 25	SC2	SC2	T6 2 40
T7 * 6.25	T5 20	T8 6.25	T8 12.5	T5 * 20
T8 * 6.25	T7 12.5	SC1	T7 12.5	T7 50 *
T5 40 *	T8 * 50	T8 * 12.5	T6 80	T6 5
T6 * 20	T5 * 5	T7 50	T7 100	T7 * 50
T7 * 12.5	SC2 *	T8 * 100	T7 25	T7 25 *
T6 10	T6 2 20	T5 5	T8 12.5	T8 * 100
T5 80	T6 3 40	T7 6.25	T8 50	T8 25 *
T8 6.25				

Tray #1

Tray #2

357 Riverside Drive (37064) • P.O. Box 680925 (37068-0925) • Franklin, Tennessee
(615) 790-0003 • (615) 790-0023

To: Dan Kennedy, WCFS, Oklahoma

From: Bill Isom

Office: Nashville

Date: November 22, 1994

Subject: Change to Amphipoda *(Hyallela)* Test

As we discussed on 11/21/94 the amphipod tests are being conducted with 2nd and 3rd instar *Hyallela azteca*, <3mm in length, rather than 1st instar as in the original protocol.

I talked to Chris Ingersoll, USFWS, Columbia, Missouri on 11/21/94 and he thought we would have better success with the 28 day test using 2nd and 3rd instar animals. Ingersoll was instrumental in developing the ASTM *Hyallela* test method being used at Tinker.

18/15/94 Ammonia

	standard 1000 mg/l		reading	
calib. ①	20000 µl	10 µl → 0.5 mg/l	46	5′
	+ 10	→ 1 mg/l	140	2′
	+ 10	→ 1.5 mg/l	210	2′

calib ②	20000 +	10 µl → 0.5 mg/l	42
	+ 10	→ 1 mg/l	130
	+ 10	→ 1.5 mg/l	210
	+ 10	→ 2 mg/l	280
	+ 20	→ 3 mg/l	440

	St. 1000 mg/l		reading
	20000 + 40 µl	⇒	310
calib ③	+ 40	→	580
	+ 40	→	840

Control day 0 (Test 12) 0

+ 20 µl standard (= 1 mg/l) 150

Control day 1 (tests 3, 9, 10) 34, 36

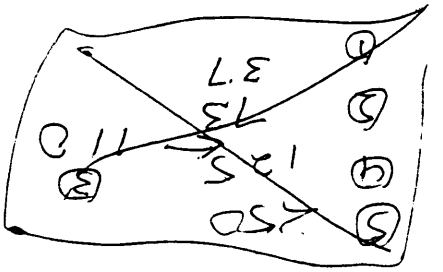
Control day 4 (tests 7, 8, 11, 15) 680

Test 8 100% day 4 28

Test 15 50% " " 9

Test 7 100% day 4 350

Test 11 100% " " 230



Day 3 - 11/15/94

Δ membrane
Air sat = 8.6
adjusted to 8.6

Jeff	Temp	DO			
control	20°C	6.2			
T5 6.25	19.8	6.1	T6 6.25	20.0	5.6
12.5	20.0	6.3	12.5	20.0	6.1
25	20.0	5.9	25	20.0	6.0
50	20.0	5.8	50	20.0	5.9
100	20.0	6.2	100	20.0	6.4

MUTT

Control	20.2	5.8				
T7 6.25	20.2	6.0	T8 6.25	20.5	5.8
12.5	20.2	6.0	12.5	20.2	5.7
25	20.2	5.9	25	20.5	6.0
50	20.2	5.9	50	20.2	6.4
100	20.5	5.7	100	20.2	6.4

Muff

Control	6.4	20.5	
EW01	6.25	6.4	20.5
	12.5	6.6	20.5
	25	6.5	20.5
	50	6.8	20.5
	100	6.7	20.5
EW02	6.25	6.6	20.5
	12.5	6.7	20.5
	25	6.3	21.0
	50	6.8	20.5
	100	6.8	20.5

DO meter
Air sat Reading = 8.3
at 23°C = 8.6
adjusted to 8.6

11/9

Jeff

Control		6.5	20.2
PZ Control		6.6	20.2
EW03	6.25	6.8	20.2
	12.5	6.6	20.2
	25	illegible	illegible
	50	illegible	illegible
	100	illegible	illegible
EE10	6.25	illegible	illegible
	12.5	6.6	illegible
	25	6.6	20.5
	50	illegible	illegible
	100	6.7	20.5

~~Ice + 25% 8.3 7.3~~

9-80
24

Tests
9, 10, 11, 12

Simon

T8	T12 6.25	PZ G	T9 100	T10 12.5
T11 25	T9 12.5	T10 50	T12 6.25	T9 6.25
T11 100	T10 50	Con	T10 100	T12 100
T10 25	T9 50	T11 50	T12 12.5	T11 25
T9 6.25	T11 100	T9 100	T10 12.5	PZ G
T10 25	T12 50	T9 25	T12 25	T11 12.5
T10 100	T9 50	T11 12.5	T11 100	T12 25
Con	T11 6.25	T10 6.25	T9 12.5	T11 6.25
T9 25	T9 100	T11 25	T12 50	T12 50
T11 50	T12 12.5	T10 25	Con	T9 50
T10 6.25	T9 6.25	T11 50	T10 50	T12 6.25
T12 25	T12 12.5	T9 12.5	T10 100	T9 25
PZ	T10 12.5	T12 100	T11 12.5	T12 100
T11 6.25	T10 6.25			

Mutt

Tests 3, 13, 4, 3, 15

Abbott

6	7	8	9
T15 100	T14 100	T3 100	T14 5
T13 12.5	T3 5	T15 6.25	T3 50
	Control (Gravel)	T13 6.25	T14 50
	T14 12.5	T15 6.25	Control (Gravel)
	T13 100	T13 12.5	T3 12.5

Costello

1	2	3	4	5	6	7	8	9
T3 6.25	T15 12.5	T3 6.25	T14 2.5	T13 25	T15 25	Control (Gravel)	T15 100	T13 100
T14 12.5	T3 6.25	T13 0	T13 50	T3 25	T14 25	T13 2.5	T3 2.5	T3 6.25
	T14 12.5	T14 0	T14 6.25	T14 6.25	T13 100	T13 0	T15 50	T3 0
T15 12.5	Control (Gravel)	T15 0	T3 12.5	T14 0	T3 12.5	T15 50	T14 12.5	T13 0
T14 0	T13 12.5	Control (Silt)	T15 0	T3 100	T15 0	T13 50	Control (Silt)	T15 100

Tests 5, 6, 7 & 8

Simon

5	6	7	8	9
T8 6.25	T5 80	T6 10	T7 12.5	T6 20
	T6 40	T6 20	Control	T5 5
	T7 6.25	T5 5	T8 100	T7 50
	T8 50	T8 12.5	T7 25	T7 100
	T8 25	T8 100	T7 25	T7 50

Garfunkel

1	2	3	4	5	6	7	8	9
T5 40	T8 6.25	T7 6.25	T5 80	Control	T6 20	T8 25	T7 25	T5 20
T8 50	T7 12.5	T5 20	T8 25	T6 80	Control	T6 10	T6 10	T5 40
T8 12.5	Control	T7 6.25	Control	T8 6.25	T5 10	T5 40	T6 5	T6 80
T6 80	T7 12.5	T8 12.5	Control	T8 100	T5 10	T5 5	T5 10	T7 100
T6 5	T7 50	T5 20	T6 40	T5 80	T6 40	T6 5	T8 50	T7 100

48-hr Ceriodaphnia dubia ACUTE TOXICITY TEST – STATIC, NONRENEWAL

G NO. 311
B NO.
)USTRY: Tinker
NTACT:
FLUENT: eW1
DES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/26/94
START TIME: 1430
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: 30 mL
TEST SOLN VOLUME/DEPTH: 20 mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	ΣD&D	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
12.5	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	4	1												
25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
50	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
100	A	5	5	5	0												
	B	5	5	4	1												
	C	5	5	4	1												
	D	5	5	4	1												
itials		MLS	MLS	MLS													
me		1130	0910	1610													

omments

LC50 >100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)		
Total Alkalinity (mg/L CaCO3 @ 4.5)		

C. dubia and

48-hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 311 & 312
JOB NO. 93F5006
INDUSTRY: Timber
CONTACT:
EFFLUENT:
NPDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/26/94
START TIME: 1630
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
Con	A	10	10	10	6	25.0	24°C	25.2	8.2		7.8	7.95		8.27	480		601
	B	10	10	10	0												
C. dubia																	
Con	A	5	5	5	0	25.0											
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	LST													
Time		1630	0900	1610													

Comments

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	180	
Total Alkalinity (mg/L CaCO3 @ 4.5)	120	

48-hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 312
LOB NO.
INDUSTRY: Tinker
CONTACT:
EFFLUENT: EW1
PDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/26/94
START TIME: 1630
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	10	10	10		25.0	24°C	25.4	8.2		7.4	8.25		8.27	477		534
	B	10	10	10													
12.5	A	10	10	10					8.3		8.0	8.25		8.27	480		511
	B	10	10	10													
25	A	10	10	10					8.5		8.0	8.17		8.31	440		548
	B	10	10	10													
50	A	10	10	10					8.5		8.0	8.01		8.39	423		514
	B	10	10	10													
100	A	10	10	10					8.6		8.1	7.83		8.51	356		440
	B	10	10	10													
Initials		LST	LST	LST													
Time		1620	0900	1410													

Comments

Ammonia: 0.00 (ND) detection limit 40 ppb

LC 50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	180	170
Total Alkalinity (mg/L CaCO3 @ 4.5)	120	180

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST NOEC > 100%

Log No. 317

JOB NO: F93506 | BEGINNING: ____ hrs; / / | PHOTOPERIOD: 16 light, 8 dark
INDUSTRY: Tinker | ENDING: ____ hrs; / / | ORGANISM SOURCE: WCC
CONTACT: | FEEDING REGIME: | TEST VESSEL CAPACITY: 30 mL
EFFLUENT: EW-01 | .05 mL yct/15 mL | TEST SOLUTION VOLUME: 15mL
NPDES PERMIT NO: Test | .05 mL algal suspension/15 mL | NO. REPLICATES: 10
PERSON CONDUCTING TEST: MLS | | DILUTION WATER:

	TIME	1500	1505	1500	1400	1600	1545	1415	1500
	OBSERVER	MLS	MLS	MLS	MLS	MLS	MLS	MLS	MLS

NUMBER OF YOUNG PRODUCED

Hard-170

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Con	1	3+broods	✓	✓	✓	6	7	3	1
	2	3+br	✓	✓	✓	3	8	7	0
	3	3+br	✓	✓	✓	5	10	0	11
	4	3+br	✓	✓	✓	5	6	0	10
	5	3+br	✓	✓	✓	4	9	0	9
	6	3+br	✓	✓	✓	3	13	0	6
	7	3+br	✓	✓	✓	5	7	0	8
	8	3+br	✓	✓	✓	6	6	3	11
	9	3+br	✓	✓	✓	4	6	0	9
	10	3+br	✓	✓	✓	4	9	0	8
			0% Mortality			$\bar{X} = 21.2$			

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
6.25	11		✓	✓	✓	4	8	0	7
	12		✓	✓	✓	5	7	0	11
	13		✓	✓	✓	6	11	8	9
	14		✓	✓	✓	5	12	6	3
	15		✓	✓	✓	6	8	0	11
	16		✓	✓	✓	5	9	0	11
	17		✓	✓	✓	4	12	0	11
	18		✓	✓	✓	7	10	4	9
	19		✓	✓	✓	5	11	0	11
	20		✓	✓	✓	2	11	0	9
			0% Mortality			$\bar{X} = 25.0$			

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
12.5	21		✓	✓	✓	5	9	0	10
	22		✓	✓	✓	5	7	10	0
	23		✓	✓	✓	5	7	10	0
	24		✓	✓	✓	5	10	10	0
	25		✓	✓	✓	6	11	0	12
	26		✓	✓	✓	6	7	0	9
	27		✓	✓	✓	4	11	10	0
	28		✓	✓	✓	6	9	0	10
	29		✓	✓	✓	2	7	12	0
	30		✓	✓	✓	4	11	12	0
			0% Mortality			$\bar{X} = 24.2$			

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F93506 | BEGINNING: 1500 hrs; 10/28/94 | Log No. _____
INDUSTRY: Tinker | ENDING: _____ hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

CONC	CHAMBER	TIME / OBSERVER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
			NUMBER OF YOUNG PRODUCED							
25%	31			✓	✓	✓	4	10	0	14
	32			✓	✓	✓	6	11	0	10
	33			✓	✓	✓	4	6	10	1
	34			✓	✓	✓	5	8	12	0
	35			✓	✓	✓	4	12	0	10
	36			✓	✓	✓	5	10	11	13
	37			✓	✓	✓	6	6	0	10
	38			✓	✓	✓	4	6	0	9
	39			✓	✓	✓	5	8	0	12
	40			✓	✓	4	3	8	2 10	16
50%	41			✓	✓	✓	5	7	0	13
	42			✓	✓	✓	6	7	11	D°
	43			✓	✓	✓	7	7	12	0
	44			✓	✓	✓	mis 4	mis 6	mis 0	13
	45			✓	✓	✓	5	8	0	11
	46			✓	✓	✓	6	10	0	11
	47			✓	✓	✓	5	7	0	8
	48			✓	✓	✓	5	12	9	1
	49			✓	✓	✓	5	9	0	12
	50			✓	✓	✓	4	8	3	14
100%	51			✓	✓	✓	5	11	0	7
	52			✓	✓	✓	5	7	6	12
	53			✓	✓	✓	2	9	0	9
	54			✓	✓	✓	5	7	0	11
	55			✓	✓	✓	2	7	7	0
	56			✓	✓	✓	6	8	0	10
	57			✓	✓	✓	4	10	9	0
	58			✓	✓	✓	4	10	0	8
	59			✓	✓	✓	4	6	8	0
	60			✓	✓	✓	4	8	0	8

Test 1

Organism: C. dubia
Sample ID: SC-EW01-TX-00
Start Date: 10/28/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	25.4	25.4	25.4	25.2	25.2	25.1	25.1	25.0	25.0	25.3	25.0	25.6	25.0	25.4		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.4	8.2	8.4	8.3	8.4	8.0	8.6	8.2	8.7	8.4	8.7	8.3	8.7	8.0		
6.25	8.5	8.2	8.4	8.3	8.4	8.1	8.6	8.2	8.7	8.4	8.8	8.3	8.7	8.0		
12.5	8.5	8.3	8.4	8.3	8.4	8.2	8.7	8.3	8.7	8.5	8.8	8.3	8.8	8.0		
25	8.1	8.3	8.6	8.4	8.4	8.2	8.7	8.4	8.7	8.5	8.8	8.4	8.8	8.0		
50	8.1	8.4	8.6	8.4	8.4	8.2	8.8	8.4	8.7	8.6	8.7	8.4	8.7	8.0		
100	8.1	8.5	8.7	8.4	8.4	8.3	8.8	8.5	8.8	8.7	8.7	8.3	8.8	8.0		

pH

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.47	8.38	8.44	8.53	8.42		8.42	8.33	7.80	8.34	7.81	7.97	8.43	6.10		
6.25	8.54	8.42	8.54	8.54	8.52	8.45	8.44	8.34	8.31	8.35	8.17	8.13	8.46	8.12		
12.5	8.53	8.43	8.55	8.56	8.51	8.45	8.44	8.39	8.35	8.36	8.31	8.24	8.45	8.14		
25	8.50	8.44	8.55	8.58	8.45	8.44	8.41	8.39	8.34	8.39	8.31	8.28	8.41	8.14		
50	8.49	8.46	8.55	8.63	8.43	8.46	8.37	8.42	8.30	8.43	8.32	8.32	8.35	8.11		
100	8.48	8.50	8.54	8.63	8.26	8.47	8.30	8.51	8.24	8.52	8.17	8.44	8.23	8.08		
						8.50										

CONDUCTIVITY

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	703	689	709	702	665	676	379	476	452	556	525	593	597	609		
6.25	682	662	666	641	630	676	438	467	435	597	473	586	565	577		
12.5	668	609	658	114	584	592	438	491	484	593	451	576	548	574		
25	600	596	590	639	570	590	400	420	482	564	468	526	525	557		
50	562	529	556	497	460	546	412	410	394	523	425	496	477	508		
100	418	391	421	430	383	405	368	340	383	461	404	400	369	456		

Test-1

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: A Start Date: 10/28/94 Sample ID: EW-01 Log #: 317

AD	ID 25	1 ✓	AD	ID 40	1 ✓	AD	ID 15	1 ✓	AD	ID 53	1 ✓		ID 58	1 ✓
2 ✓	3 ✓	4 6	2 ✓	3 4	4 3	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 4
5 11	6 0	7 12	5 8	6 10	7 16	5 8	6 0	7 11	5 9	6 0	7 9	5 10	6 0	7 8
AD	ID 60	1 ✓	AD	ID 47	1 ✓	AD	ID 32	1 ✓	AD	ID 55	1 ✓		ID 8	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 6
5 8	6 0	7 8	5 7	6 0	7 8	5 11	6 0	7 10	5 7	6 7	7 0	5 6	6 3	7 11
AD	ID 38	1 ✓	AD	ID 23	1 ✓	AD	ID 6	1 ✓	AD	ID 10	1 ✓		ID 42	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6
5 6	6 0	7 9	5 7	6 10	7 0	5 13	6 0	7 6	5 9	6 0	7 8	5 7	6 11	7 D
AD	ID 48	1 ✓	AD	ID 36	1 ✓	AD	ID 43	1 ✓	AD	ID 14	1 ✓		ID 31	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 7	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 4
5 12	6 9	7 1	5 10	6 11	7 13	5 7	6 12	7 0	5 12	6 6	7 3	5 10	6 0	7 14
AD	24	1 ✓	AD	ID 56	1 ✓	AD	ID 17	1 ✓	AD	ID 26	1 ✓		ID 3	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 5
5 10	6 10	7 0	5 8	6 0	7 10	5 12	6 0	7 11	5 7	6 0	7 9	5 10	6 0	7 11
AD	ID 39	1 ✓	AD	ID 5	1 ✓	AD	ID 51	1 ✓	AD	ID 35	1 ✓		ID 20	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 2
5 8	6 0	7 12	5 9	6 0	7 9	5 11	6 0	7 7	5 12	6 0	7 10	5 11	6 0	7 9

Comments:

Day 2 Initials MLS Time 1515

Cup ID	Sample Concentration
1–10:	Control 170
11–20:	6.25
21–30:	12.5
31–40:	25
41–50:	50
51–60:	100

Day	Initials	Time
1	MLS	1505
2	MLS	1500
3	MLS	1400
4	MLS	1600
5	MLS	1555
6	MLS	1405
7	MLS	1315

DAY 7 * Most adults carrying a brood. Most concentrations/repl looked very healthy.

Test -1

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: DEZRPEP Start Date: 10/28/94 Sample ID: EW-1 Log #: 31

AD	ID 16	1 ✓	AD	ID 7	1 ✓	AD	ID 41	1 ✓	AD	ID 49	1		ID 45	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5
5 9	6 0	7 11	5 7	6 0	7 8	5 7	6 0	7 13	5 9	6 0	7 12	5 8	6 0	7 11
AD	ID 9	1 ✓	AD	ID 33	1 ✓	AD	ID 22	1 ✓	AD	ID 59	1 ✓		ID 28	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6
5 6	6 0	7 9	5 6	6 10	7 1	5 7	6 10	7 0	5 6	6 8	7 0	5 9	6 0	7 10
AD	ID 46	1 ✓	AD	ID 37	1 ✓	AD	ID 44	1 ✓	AD	ID 11	1 ✓		ID 54	1 ✓
2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5
5 10	6 0	7 11	5 6	6 0	7 10	5 6	6 0	7 13	5 8	6 0	7 7	5 7	6 0	7 1
AD	ID 2	1 ✓	AD	ID 27	1 ✓	AD	ID 1	1 ✓	AD	ID 18	1 ✓		ID 50	1 ✓
2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 7	2 ✓	3 ✓	4 4
5 8	6 7	7 0	5 11	6 10	7 0	5 7	6 3	7 1	5 10	6 4	7 9	5 8	6 3	7 14
AD	ID 21	1 ✓	AD	ID 30	1 ✓	AD	ID 34	1 ✓	AD	ID 12	1 ✓		ID 57	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 4
5 9	6 0	7 10	5 11	6 12	7 0	5 8	6 12	7 0	5 7	6 0	7 11	5 10	6 9	7 C
AD	ID 4	1 ✓	AD	ID 13	1 ✓	AD	ID 19	1 ✓	AD	ID 29	1 ✓		ID 52	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 5
5 6	6 0	7 10	5 11	6 0	7 9	5 11	6 0	7 11	5 7	6 12	7 0	5 7	6 0	7 12

Comments:

Day Ø Initials MLS Time 1500

Cup ID	Sample Concentration	Day	Initials	Time
1–10:	Control Hardness 170	1	MLS	1505
11–20:	6.25	2	MLS	1500
21–30:	12.5	3	MLS	1400
31–40:	25	4	MLS	1600
41–50:	50	5	MLS	1545
51–60:	100	6	MLS	1415
		7	MLS	1300

Control

f93506-cd1
File: f93506-cd1 Transform: NO TRANSFORMATION

Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	3	14	26	11	6

Calculated Chi-Square goodness of fit test statistic = 2.5199
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd1
File: f93506-cd1 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 9.36
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

Total	59	1174.850

Critical F value = 2.45 (0.05,5,40)
Since F > Critical F REJECT Ho:All groups equal

f93506-cd1
File: f93506-cd1 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	21.200	21.200		
2	6.25%	25.000	25.000	-2.106	
3	12.5%	24.200	24.200	-1.663	
4	25%	27.500	27.500	-3.492	
5	50%	25.100	25.100	-2.162	
6	100%	21.300	21.300	-0.055	

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=40,5)

f93506-cd1
ile: f93506-cd1 Transform: NO TRANSFORMATION

DUNNETTS 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	Control	10			
2	6.25%	10	4.167	19.7	-3.800
3	12.5%	10	4.167	19.7	-3.000
4	25%	10	4.167	19.7	-6.300
5	50%	10	4.167	19.7	-3.900
6	100%	10	4.167	19.7	-0.100

f93506-cd1
File: f93506-cd1 Transform: NO TRANSFORMATION

i-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	3	14	26	11	6

Calculated Chi-Square goodness of fit test statistic = 2.5199
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd1
File: f93506-cd1 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 9.36
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

sed for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

TITLE: f93506-cd1
LE: f93506-cd1
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	17.0000	17.0000
1	Control	2	18.0000	18.0000
1	Control	3	26.0000	26.0000
1	Control	4	21.0000	21.0000
1	Control	5	22.0000	22.0000
1	Control	6	22.0000	22.0000
1	Control	7	20.0000	20.0000
1	Control	8	26.0000	26.0000
1	Control	9	19.0000	19.0000
1	Control	10	21.0000	21.0000
2	6.25%	1	19.0000	19.0000
2	6.25%	2	23.0000	23.0000
2	6.25%	3	26.0000	26.0000
2	6.25%	4	26.0000	26.0000
2	6.25%	5	25.0000	25.0000
2	6.25%	6	25.0000	25.0000
2	6.25%	7	27.0000	27.0000
2	6.25%	8	30.0000	30.0000
2	6.25%	9	27.0000	27.0000
2	6.25%	10	22.0000	22.0000
3	12.5%	1	24.0000	24.0000
3	12.5%	2	22.0000	22.0000
3	12.5%	3	22.0000	22.0000
3	12.5%	4	25.0000	25.0000
3	12.5%	5	29.0000	29.0000
3	12.5%	6	22.0000	22.0000
3	12.5%	7	25.0000	25.0000
3	12.5%	8	25.0000	25.0000
3	12.5%	9	21.0000	21.0000
3	12.5%	10	27.0000	27.0000
4	25%	1	28.0000	28.0000
4	25%	2	27.0000	27.0000
4	25%	3	21.0000	21.0000
4	25%	4	25.0000	25.0000
4	25%	5	26.0000	26.0000
4	25%	6	39.0000	39.0000
4	25%	7	22.0000	22.0000
4	25%	8	19.0000	19.0000
4	25%	9	25.0000	25.0000
4	25%	10	43.0000	43.0000
5	50%	1	25.0000	25.0000
5	50%	2	24.0000	24.0000
5	50%	3	26.0000	26.0000
5	50%	4	23.0000	23.0000
5	50%	5	24.0000	24.0000
5	50%	6	27.0000	27.0000
5	50%	7	20.0000	20.0000
5	50%	8	27.0000	27.0000
5	50%	9	26.0000	26.0000
5	50%	10	29.0000	29.0000

TITLE: f93506-cd1
FILE: f93506-cd1
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	17.0000	17.0000
1	Control	2	18.0000	18.0000
1	Control	3	26.0000	26.0000
1	Control	4	21.0000	21.0000
1	Control	5	22.0000	22.0000
1	Control	6	22.0000	22.0000
1	Control	7	20.0000	20.0000
1	Control	8	26.0000	26.0000
1	Control	9	19.0000	19.0000
1	Control	10	21.0000	21.0000
2	6.25%	1	19.0000	19.0000
2	6.25%	2	23.0000	23.0000
2	6.25%	3	26.0000	26.0000
2	6.25%	4	26.0000	26.0000
2	6.25%	5	25.0000	25.0000
2	6.25%	6	25.0000	25.0000
2	6.25%	7	27.0000	27.0000
2	6.25%	8	30.0000	30.0000
2	6.25%	9	27.0000	27.0000
2	6.25%	10	22.0000	22.0000
3	12.5%	1	24.0000	24.0000
3	12.5%	2	22.0000	22.0000
3	12.5%	3	22.0000	22.0000
3	12.5%	4	25.0000	25.0000
3	12.5%	5	29.0000	29.0000
3	12.5%	6	22.0000	22.0000
3	12.5%	7	25.0000	25.0000
3	12.5%	8	25.0000	25.0000
3	12.5%	9	21.0000	21.0000
3	12.5%	10	27.0000	27.0000
4	25%	1	28.0000	28.0000
4	25%	2	27.0000	27.0000
4	25%	3	21.0000	21.0000
4	25%	4	25.0000	25.0000
4	25%	5	26.0000	26.0000
4	25%	6	39.0000	39.0000
4	25%	7	22.0000	22.0000
4	25%	8	19.0000	19.0000
4	25%	9	25.0000	25.0000
4	25%	10	43.0000	43.0000
5	50%	1	25.0000	25.0000
5	50%	2	24.0000	24.0000
5	50%	3	26.0000	26.0000
5	50%	4	23.0000	23.0000
5	50%	5	24.0000	24.0000
5	50%	6	27.0000	27.0000
5	50%	7	20.0000	20.0000
5	50%	8	27.0000	27.0000
5	50%	9	26.0000	26.0000
5	50%	10	29.0000	29.0000

6	100%	1	23.0000	23.0000
6	100%	2	24.0000	24.0000
6	100%	3	20.0000	20.0000
6	100%	4	23.0000	23.0000
6	100%	5	16.0000	16.0000
6	100%	6	24.0000	24.0000
6	100%	7	23.0000	23.0000
6	100%	8	22.0000	22.0000
6	100%	9	18.0000	18.0000
6	100%	10	20.0000	20.0000

f93506-cd1
File: f93506-cd1 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	17.000	26.000	21.200
2	6.25%	10	19.000	30.000	25.000
3	12.5%	10	21.000	29.000	24.200
4	25%	10	19.000	43.000	27.500
5	50%	10	20.000	29.000	25.100
6	100%	10	16.000	24.000	21.300

f93506-cd1
File: f93506-cd1 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	9.067	3.011	0.952
2	6.25%	9.333	3.055	0.966
3	12.5%	6.400	2.530	0.800
4	25%	59.167	7.692	2.432
5	50%	6.322	2.514	0.795
6	100%	7.344	2.710	0.857

f93506-cd1
File: f93506-cd1 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	296.150	59.230	3.640
Within (Error)	54	878.700	16.272	

Total	59	1174.850

Critical F value = 2.45 (0.05,5,40)
Since F > Critical F REJECT Ho:All groups equal

f93506-cd1
File: f93506-cd1 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	21.200	21.200		
2	6.25%	25.000	25.000	-2.106	
3	12.5%	24.200	24.200	-1.663	
4	25%	27.500	27.500	-3.492	
5	50%	25.100	25.100	-2.162	
6	100%	21.300	21.300	-0.055	

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=40,5)

f93506-cd1
File: f93506-cd1 Transform: NO TRANSFORMATION

DUNNETTS 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	Control	10			
2	6.25%	10	4.167	19.7	-3.800
3	12.5%	10	4.167	19.7	-3.000
4	25%	10	4.167	19.7	-6.300
5	50%	10	4.167	19.7	-3.900
6	100%	10	4.167	19.7	-0.100

Test 1 NOEC = 50% FATHEAD MINNOW SURVIVAL AND GROWTH Log No. 318
LOEC = 100% 7-DAY CHRONIC TOXICITY TEST

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: Eco 01
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ___hrs; 10/29/94
ENDING: ___hrs; / / .
TEST
DILUTIONS:
AGE: < 24 hours
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Con	A	10	10	10	10	10	9	9	9
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
6.25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
12.5	A	10	10	10	10	10	10	10	10
	B	10	10	9	9	9	9	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	8, 2d	8	8	8
25	A	10	10	9	9	9	9	9	9
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
	TIME:	1700	1730	1700	16:55	16:30	1545	1530	14:55
	INITIAL:	MLS	LJT	LJT	RXK	RXK	mm	MLS	

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
Cont	A		1.10403	1.11220			
	B		1.11599	1.12600			
	C		1.12256	1.13037			
	D		1.11949	1.12183			
6.25	A		1.10781	1.11717			
	B		1.12714	1.13526			
	C		1.12861	1.13686			
	D		1.11712	1.12437			
12.5	A	1.12942	1.12041	1.12942			
	B	1.12210	1.11452	1.12210			
	C	1.11825	1.10879	1.11825			
	D	1.13042	1.12300	1.13042			
25	A	1.11011	1.10183	1.12829			
	B	1.12434	1.11602	1.12877			
	C	1.12895	1.12063	1.11320			
	D	1.10633	1.09715	1.11373			

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 318

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: EW-01
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ____ hrs; 10/18/94
ENDING: ____ hrs; / / .
TEST
DILUTIONS:
AGE: <24 hrs
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
50	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	9, 1d	9	9	9
100	A	10	10	10	9	9	9	9	9
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
	TIME:		1730	1730	1730	16:40	1545	1545	14:00
	INITIAL:		LJT	LJT	RXK	RXK	MM	MLS	RXK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
50	A		1.09249	1.11995			
	B		1.12357	1.13218			
	C		1.09808	1.10531			
	D		1.12491	1.13129			
100	A		1.12076	1.12829			
	B		1.11817	1.12577			
	C		1.10570	1.11320			
	D		1.10841	1.11373			

Tinker AFB Test # 1 TEST START DATE Oct 28, 94

SAMPLE ID EW 01 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish		mg dry wt/fish	
cont	A	1.10403	1.1122	0.00817	9		0.91	
	B	1.11592	1.126	0.01008	10		1.01	
	C	1.12246	1.13037	0.00791	10		0.79	
	D	1.11249	1.12183	0.00934	10		0.93	
6.25%	A	1.10781	1.11717	0.00936	10		0.94	
	B	1.12714	1.13526	0.00812	10		0.81	
	C	1.12861	1.13686	0.00825	10		0.83	
	D	1.11712	1.12437	0.00725	10		0.73	
12.50%	A	1.12041	1.12942	0.00901	10		0.90	
	B	1.11452	1.1221	0.00758	9		0.84	
	C	1.10879	1.11825	0.00946	10		0.95	
	D	1.123	1.13042	0.00742	8		0.93	
25%	A	1.10183	1.11111	0.00928	9		1.03	
	B	1.116	1.12434	0.00834	10		0.83	
	C	1.12063	1.12895	0.00832	10		0.83	
	D	1.09715	1.10633	0.00918	10		0.92	
50%	A	1.11249	1.11995	0.00746	10		0.75	
	B	1.12357	1.13218	0.00861	10		0.86	
	C	1.09808	1.10531	0.00723	10		0.72	
	D	1.12491	1.13129	0.00638	9		0.71	
100%	A	1.12076	1.12829	0.00753	9		0.84	
	B	1.11817	1.12577	0.0076	10		0.76	
	C	1.1057	1.1132	0.0075	10		0.75	
	D	1.10841	1.11373	0.00532	10	OK	0.53	fish are small

Sample ID: EW01
Start date: 10/28/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	25.4	25.4	25.4	25.2	25.2	25.1	25.1	25.0	25.0	25.3	25.0	25.4	24.9	25.2		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.4	8.2	8.7	7.9	8.4	8.2	8.6	8.3	8.6	8.0	8.6	8.2	8.6	7.8		
6.25	8.8	7.2	8.7	7.9	8.4	8.2	8.6	8.4	8.5	8.0	8.6	8.1	8.6	7.8		
12.5	8.8	7.0	8.7	7.9	8.4	8.1	8.7	8.5	8.5	8.0	8.5	8.1	8.5	7.8		
25	8.8	6.7	8.7	7.9	8.4	8.0	8.7	8.5	8.5	8.0	8.5	8.1	8.5	7.8		
50	8.8	6.8	8.8	7.9	8.5	7.9	8.8	8.3	8.5	8.0	8.5	8.0	8.5	7.8		
100	8.9	7.0	8.8	7.9	8.5	7.9	8.8	8.1	8.6	8.0	8.6	8.1	8.5	7.8		

pH

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.62	8.17	8.04	8.43	8.28	8.18	8.11	8.54	8.57	8.05	8.58	8.27	8.53	8.24		
6.25	8.64	8.17	8.10	8.40	8.34	8.16	8.17	8.57	8.64	8.18	8.60	8.29	8.62	8.25		
12.5	8.64	8.18	8.13	8.31	8.34	8.17	8.18	8.32	8.64	8.19	8.55	8.29	8.60	8.22		
25	8.62	8.17	8.14	8.35	8.32	8.17	8.17	8.39	8.56	8.20	8.49	8.29	8.55	8.25		
50	8.57	8.20	8.15	8.44	8.26	8.18	8.17	8.44	8.46	8.25	8.37	8.31	8.43	8.31		
100	8.49	8.23	8.14	8.47	8.26	8.18	8.16	8.42	8.28	8.29	8.18	8.35	8.35	8.38		

CONDUCTIVITY

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	380	427	381	372	398	367	382	401	541	550	378	353	459	418		
6.25	350	403	372	376	285	407	338	394	373	410	371	410	361	414		
12.5	373	365	375	401	346	402	326	392	369	403	369	381	362	403		
25	381	369	378	473	365	405	346	394	374	411	372	404	365	409		
50	346	365	383	406	372	399	344	392	383	425	380	423	374	420		
100	408	380	352	412	383	423	343	406	397	421	397	420	384	418		

f93506-fm1
File: f93506-fm1 Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	8	9	7	0

Calculated Chi-Square goodness of fit test statistic = 4.2910
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-fm1
File: f93506-fm1 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 7.68
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

TITLE: f93506-fm1
FILE: f93506-fm1
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.9100	0.9100
1	Control	2	1.0100	1.0100
1	Control	3	0.7900	0.7900
1	Control	4	0.9300	0.9300
2	6.25%	1	0.9400	0.9400
2	6.25%	2	0.8100	0.8100
2	6.25%	3	0.8300	0.8300
2	6.25%	4	0.7300	0.7300
3	12.5%	1	0.9000	0.9000
3	12.5%	2	0.8400	0.8400
3	12.5%	3	0.9500	0.9500
3	12.5%	4	0.9300	0.9300
4	25%	1	1.0300	1.0300
4	25%	2	0.8300	0.8300
4	25%	3	0.8300	0.8300
4	25%	4	0.9200	0.9200
5	50%	1	0.7500	0.7500
5	50%	2	0.8600	0.8600
5	50%	3	0.7200	0.7200
5	50%	4	0.7100	0.7100
6	100%	1	0.8400	0.8400
6	100%	2	0.7600	0.7600
6	100%	3	0.7500	0.7500
6	100%	4	0.5300	0.5300

f93506-fm1
File: f93506-fm1 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.790	1.010	0.910
2	6.25%	4	0.730	0.940	0.828
3	12.5%	4	0.840	0.950	0.905
4	25%	4	0.830	1.030	0.903
5	50%	4	0.710	0.860	0.760
6	100%	4	0.530	0.840	0.720

f93506-fm1
File: f93506-fm1 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.008	0.091	0.045
2	6.25%	0.007	0.087	0.043
3	12.5%	0.002	0.048	0.024
4	25%	0.009	0.095	0.048
5	50%	0.005	0.069	0.034
6	100%	0.018	0.133	0.066

f93506-fm1
File: f93506-fm1 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.136	0.027	3.375
Within (Error)	18	0.148	0.008	
Total	23	0.284		

Critical F value = 2.77 (0.05,5,18)
Since F > Critical F REJECT Ho:All groups equal

f93506-fm1
File: f93506-fm1 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.910	0.910		
2	6.25%	0.828	0.828	1.304	
3	12.5%	0.905	0.905	0.079	
4	25%	0.903	0.903	0.119	
5	50%	0.760	0.760	2.372	
6	100%	0.720	0.720	3.004	*

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-fm1
File: f93506-fm1 Transform: NO TRANSFORMATION

DUNNETTS 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	Control	4			
2	6.25%	4	0.152	16.7	0.082
3	12.5%	4	0.152	16.7	0.005
4	25%	4	0.152	16.7	0.007
5	50%	4	0.152	16.7	0.150
6	100%	4	0.152	16.7	0.190

№ 1432

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: TOX Test	REMARKS
SC-EW01-TX-000	10-25-94	1300	water	3		

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/25/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lyda Jeer	10/26/94 1100	1°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

№ 1433

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: Tot Lead	REMARKS
SC-EW01-TX000	10-25-94	1300	water	2	✓	
SC-EW01-TX0001	10-25-94	1330	soil	2	✓	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/25/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lisa Lee	10/26/94 1045	1°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

C. dubia and

48-hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 311 & 312
LAB NO. 93F5016
INDUSTRY: Timber
CONTACT:
EFFLUENT:
NPDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/26/94
START TIME: 1630
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
Con	A	10	10	10	0	25.0	24°C	25.2	8.2		7.8	7.95		8.27	480		601
	B	10	10	10	0												
C. dubia																	
Con	A	5	5	5	0	25.0											
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	LST													
Time		1130	0900	1610													

Comments

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	180	
Total Alkalinity (mg/L CaCO3 @ 4.5)	120	

48-hr Ceriodaphnia dubia ACUTE TOXICITY TEST – STATIC, NONRENEWAL

3 NO.	311	SAMPLE TYPE:		PHOTOPERIOD:	16 hrs light
3 NO.		SAMPLE TIME:		FEEDING REGIME:	None
USTRY:	Timber	ORGANISM SOURCE:	Batch #	TEST VESSEL CAPACITY:	30 mL
NTACT:		START DATE:	10/26/94	TEST SOLN VOLUME/DEPTH:	20 mL
LUENT:	EW2	START TIME:	1630	NO. ORGANISMS/CONC.:	20
DES PERMIT NO.:		DILUTION WATER:	Hard	NO. REPLICATES:	4

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	4	1												
	D	5	5	5	0												
12.5	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	4	1												
25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
50	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
100	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	MLS													
Time		1630	0910	1615													

Comments

$LC_{50} > 100\%$

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)		
Total Alkalinity (mg/L CaCO3 @ 4.5)		

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

OG NO. 312
OB NO.
NDUSTRY: Tinker
ONTACT:
FFLUENT: Eff 2
PDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/26/94
START TIME: 1630
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	10	10	10		25.0	24°C	25.4	8.3		8.0	8.34		8.27	472		485
	B	10	10	10													
12.5	A	10	10	10					8.4		8.0	8.36		8.27	447		565
	B	10	10	10													
25	A	10	10	10					8.5		8.1	8.34		8.28	445		534
	B	10	10	10													
50	A	10	10	10					8.6		8.1	8.22		8.34	435		487
	B	10	10	10													
100	A	10	10	10					8.7		8.1	8.07		8.42	333		409
	B	10	10	10													
Initials		MLS	CJT	CJT													
Time		1630	0900	1610													

Comments

Ammonia: ND (< 40 ppb)

LC_{50} > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)		160
Total Alkalinity (mg/L CaCO3 @ 4.5)		180

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

Log No. 317

JOB NO: F93506 | BEGINNING: 1600 hrs; 10/28/94 | PHOTOPERIOD: 16 light, 8 dark
INDUSTRY: Tinker | ENDING: 1330 hrs; / / | ORGANISM SOURCE: WCC
CONTACT: | FEEDING REGIME: | TEST VESSEL CAPACITY: 30 mL
EFFLUENT: EW-02 | .05 mL yct/15 mL | TEST SOLUTION VOLUME: 15mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | NO. REPLICATES: 10
PERSON CONDUCTING TEST: MLS | DILUTION WATER:

	TIME	1600	1545	1700	1420	1745	1555	1445	1330
	OBSERVER	MLS	MLS	LJT	RXK	MLS	MLS	MLS	MLS

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
~~MLS~~ Mod Con	1								25
	2								30
	3								35
	4								25
	5								28
	6								27
	7								25
	8								26
	9								20
	10								28
Con from Sample 4 data									269
6.25	11		✓	✓	✓	4	6	10	0
	12		✓	✓	✓	6	8	1 11	0
	13		✓	✓	✓	6	6	8	11
	14		✓	✓	MLS ✓	~~MLS~~ 6	~~MLS~~ 10	~~MLS~~ 9	0
	15		✓	✓	2	8	12	6	9
	16		✓	✓	✓	6	8	5	10
	17		✓	✓	✓	6	9	10	0
	18		✓	✓	✓	2	10	11	0
	19		✓	✓	✓	6	10	10	0
	20		✓	✓	✓	4	6	8	0
12.5	21		✓	✓	✓	7	15	0	10
	22		✓	✓	✓	5	9	11	0
	23		✓	✓	✓	7	8	10	0
	24		✓	✓	✓	6	10	9	0
	25		✓	✓	✓	5	7	12	0
	26		✓	✓	MLS 4	6	2	13	13
	27		✓	✓	✓	6	11	9	0
	28		✓	✓	✓	3	10	0	8
	29		✓	✓	✓	4	10	0	10
	30		✓	✓	✓	5	10	0	9

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F93506 | BEGINNING: ____hrs; / / | Log No. ____
INDUSTRY: Tinker | ENDING: ____hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

TIME
OBSERVER

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
25%	31		✓	✓	✓	7	11	12	0
	32		✓	✓	✓	4	3	11	0
	33		✓	✓	✓	6	8	12	0
	34		✓	✓	✓	6	10	10	0
	35		✓	✓	✓	5	10	12	0
	36		✓	✓	✓	7	12	13	0
	37		✓	✓	✓	7	4	10	0
	38		✓	✓	✓	6	10	0	9
	39		✓	✓	✓	5	11	10	0
	40		✓	✓	✓	5	9	0	13

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
50%	41		✓	✓	4	4	7	0	15
	42		✓	✓	✓	4	10	13	0
	43		✓	✓	✓	5	D-2	X	X
	44		✓	✓	✓	4	12	11	0
	45		✓	✓	D	X	X	X	X
	46		✓	✓	3	7	12	0	14
	47		✓	✓	✓	5	10	C	8
	48		✓	✓	✓	5	8	13 mo	0
	49		✓	✓	5	6	0	mo 16	10
	50		✓	✓	mo ✓	mo 16	9	11	0

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
100%	51		✓	✓	✓	6	10	12	0
	52		✓	✓	✓	7	10	12	0
	53		✓	✓	✓	5	13	14	0
	54		✓	✓	✓	5	8	12	0
	55		✓	✓	✓	8	9	11	0
	56		✓	✓	✓	3	7	0	8
	57		✓	✓	✓	5	12	13	0
	58		✓	✓	✓	5	9	1/9	0
	59		✓	✓	✓	6	12	14	0
	60		✓	✓	✓	8	10	9	0

Test - 2

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: H ~~X~~ ~~Ø~~ ~~Ø~~ ~~X~~ B0 Start Date: 10/28/94 Sample ID: EW-02 Log #: 31

AD	ID	1	AD	ID	1	AD	ID	1	AD	ID	1		ID	1
2	3	4	2	3	4	2	3	4	2	3	4	2	3	4
5	6	7	5	6	7	5	6	7	5	6	7	5	6	7
AD	ID 32	1 ✓	AD	ID 39	1 ✓	AD	ID 5	1 ✓	AD	ID 36	1 ✓		ID 16	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 5	4 6	2 ✓	3 2	4 8	2 ✓	3 3	4 7	2 ✓	3 4	4 6
5 10	6 13	7 0	5 0	6 16	7 10	5 12	6 6	7 9	5 12	6 0	7 14	5 2	6 13	7 13
AD	ID 31	1 ✓	AD	ID 45	1 ✓	AD	ID 26	1 ✓	AD	ID 9	1 ✓		ID 49	1 ✓
2 ✓	3 4	4 4	2 ✓	3 ✓	4 8	2 ✓	3 ✓	4 7	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 6
5 7	6 0	7 15	5 9	6 11	7 0	5 12	6 13	7 0	5 10	6 10	7 0	5 12	6 14	7 0
AD	ID 46	1 ✓	AD	ID 23	1 ✓	AD	ID 30	1 ✓	AD	ID 43	1 ✓		ID 3	1 ✓
2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 6
5 7	6 0	7 8	5 8	6 12	7 0	5 9	6 0	7 13	5 13	6 14	7 0	5 6	6 8	7 11
AD	ID 24	1 ✓	AD	ID 50	1 ✓	AD	ID 17	1 ✓	AD	ID 12	1 ✓		ID 15	1 ✓
2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 8	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5
5 10	6 10	7 0	5 10	6 9	7 0	5 11	6 9	7 0	5 9	6 11	7 0	5 7	6 12	7 0
AD	ID 6	1 ✓	AD	ID 37	1 ✓	AD	ID 28	1 ✓	AD	ID 8	1 ✓		ID 21	1 ✓
2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 7
5 8	6 5	7 10	5 10	6 0	7 8	5 10	6 0	7 9	5 10	6 11	7 0	5 11	6 12	7 0

Comments:

Cup ID	Sample Concentration	Day	Initials	Time
		Ø	MLS	1600
1–10:	6.25	1	MLS	1545
11–20:	12.5	2	LJT	1700
21–30:	25	3	[illegible]	14:35
31–40:	50	4	MLS	1745
41–50:	100	5	MLS	1615
51–60:		6	MLS	1435
		7	MLS	1345

TEST 2

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: C ~~A~~ ~~B~~ ~~C~~ ~~D~~ ~~N~~ A2 Start Date: 10/28/94 Sample ID: EW-02 Log #: 317

AD	ID	1	AD	ID	1	AD	ID	1	AD	ID	1		ID	1
2	3	4	2	3	4	2	3	4	2	3	4	2	3	4
5	6	7	5	6	7	5	6	7	5	6	7	5	6	7
AD	ID 4	1 ✓	AD	ID 22	1 ✓	AD	ID 40	1 ✓	AD	ID 34	1 ✓		ID 20	1 ✓
2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5
5 10	6 9	7 0	5 3	6 11	7 0	5 9	6 11	7 0	5 12	6 11	7 0	5 10	6 0	7 9
AD	ID 14	1 ✓	AD	ID 10	1 ✓	AD	ID 2	1 ✓	AD	ID 42	1 ✓		ID 48	1 ✓
2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 7	2 ✓	3 ✓	4 5
5 10	6 9	7 0	5 6	6 8	7 0	5 8	6 11	7 0	5 10	6 12	7 0	5 9	6 9	7 0
AD	ID 25	1 ✓	AD	ID 13	1 ✓	AD	ID 18	1 ✓	AD	ID 29	1 ✓		ID 41	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 7	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 6
5 10	6 12	7 0	5 8	6 10	7 0	5 10	6 0	7 8	5 11	6 10	7 0	5 10	6 12	7 0
AD	ID 1	1 ✓	AD	ID 27	1 ✓	AD	ID 38	1 ✓	AD	ID 11	1 ✓		ID 7	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 7	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 7	2 ✓	3 ✓	4 6
5 6	6 10	7 0	5 4	6 10	7 0	5 8	6 13	7 0	5 15	6 0	7 10	5 9	6 10	7 0
AD	ID 33	1 ✓	AD	ID 19	1 ✓	AD	ID 35	1 ✓	AD	ID 44	1 ✓		ID 47	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 4	2	3 D	4	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5
5 D	6	7	5 10	6 0	7 10	5	6	7	5 8	6 12	7 0	5 12	6 12	7 0

Comments: Day Ø Initials MLS Time 1600

Cup ID	Sample Concentration	Day	Initials	Time
1–10:	6.25 %	1	MLS	1545
11–20:	125	2	LJT	1700
21–30:	25	3	RXK	14:20
31–40:	50	4	MLS	1745
41–50:	100	5	MLS	1555
51–60:		6	MLS	1445
		7	MLS	1330

DAY 7 * ~~Many~~ MLS Most adults appeared to be carrying broods. Test looked very healthy

Test 2

Organism: C. dubia
Sample ID: SC-EW02-TX-001
Start date: 10/28/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25.4	25.4	25.4	25.2	25.2	25.1	25.1	25.1	24.8	25.5	25.0	25.6	24.9	25.4		
6.25%																
12.5%																
25%																
50%																
100%																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.4	8.2	8.4	8.3	8.4				~~8.7~~ mL							
6.25	8.4	8.5	8.5	8.3	8.5	8.3	8.5	8.5	8.6	8.5	8.6	8.3	8.6			
12.5	8.5	8.5	8.5	8.3	8.5	8.3	8.6	8.4	8.6	8.4	8.6	8.4	8.6			
25	8.6	8.5	8.6	8.4	8.5	8.3	8.6	8.4	8.6	8.4	8.6	8.3	8.6			
50	8.6	8.4	8.7	8.4	8.6	8.4	8.7	8.4	8.6	8.3	8.7	8.3	8.6			
100	8.1	8.4	8.7	8.4	8.6	8.4	8.8	8.5	8.7	8.3	8.7	8.2	8.6			

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.47	8.33	8.44	8.53	8.42						8					
6.25	8.46	8.49	8.59	8.54	8.46	8.46	8.45	8.34	8.41	8.37	8.06	8.31	8.47	8.49		
12.5	8.53	8.46	8.59	8.55	8.50	8.41	8.47	8.34	8.41	8.37	8.40	8.32	8.47	8.49		
25	8.54	8.46	8.58	8.55	8.52	8.45	8.48	8.35	8.40	8.38	8.40	8.32	8.45	8.49		
50	8.53	8.46	8.57	8.55	8.52	8.46	8.45	8.38	8.34	8.40	8.39	8.32	8.41	8.46		
100	8.51	8.46	8.57	8.59	8.26	8.47	8.39	8.44	8.27	8.44	8.42	8.38	8.38	8.51		
											~~8.47~~ mL					

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	703	657	709	702	665											
6.25	554	595	669	705	533	529	438	515	586	546	526	585	556	568		
12.5	559	616	638	710	537	572	432	498	509	546	489	556	541	554		
25	521	580	609	623	575	544	463	495	438	550	471	515	511	532		
50	546	541	496	577	506	541	415	453	443	501	469	454	452	498		
100	278	410	329	403	383	394	350	316	355	411	343	376	355	387		
											~~339~~ mm					

f93506-cd2
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	4	8	34	10	4

Calculated Chi-Square goodness of fit test statistic = 9.6913
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd2
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 9.06
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

TITLE: f93506-cd2
FILE: S:\TOXLAB\TOXSTAT\F93506-C.
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	25.0000	25.0000
1	Control	2	30.0000	30.0000
1	Control	3	35.0000	35.0000
1	Control	4	25.0000	25.0000
1	Control	5	28.0000	28.0000
1	Control	6	27.0000	27.0000
1	Control	7	25.0000	25.0000
1	Control	8	26.0000	26.0000
1	Control	9	20.0000	20.0000
1	Control	10	28.0000	28.0000
2	6.25%	1	20.0000	20.0000
2	6.25%	2	26.0000	26.0000
2	6.25%	3	31.0000	31.0000
2	6.25%	4	25.0000	25.0000
2	6.25%	5	37.0000	37.0000
2	6.25%	6	29.0000	29.0000
2	6.25%	7	25.0000	25.0000
2	6.25%	8	23.0000	23.0000
2	6.25%	9	26.0000	26.0000
2	6.25%	10	18.0000	18.0000
3	12.5%	1	32.0000	32.0000
3	12.5%	2	25.0000	25.0000
3	12.5%	3	25.0000	25.0000
3	12.5%	4	25.0000	25.0000
3	12.5%	5	24.0000	24.0000
3	12.5%	6	38.0000	38.0000
3	12.5%	7	26.0000	26.0000
3	12.5%	8	21.0000	21.0000
3	12.5%	9	24.0000	24.0000
3	12.5%	10	24.0000	24.0000
4	25%	1	30.0000	30.0000
4	25%	2	18.0000	18.0000
4	25%	3	26.0000	26.0000
4	25%	4	26.0000	26.0000
4	25%	5	27.0000	27.0000
4	25%	6	32.0000	32.0000
4	25%	7	21.0000	21.0000
4	25%	8	25.0000	25.0000
4	25%	9	26.0000	26.0000
4	25%	10	27.0000	27.0000
5	50%	1	30.0000	30.0000
5	50%	2	27.0000	27.0000
5	50%	3	7.0000	7.0000
5	50%	4	27.0000	27.0000
5	50%	5	0.0000	0.0000
5	50%	6	36.0000	36.0000
5	50%	7	23.0000	23.0000
5	50%	8	26.0000	26.0000
5	50%	9	37.0000	37.0000
5	50%	10	26.0000	26.0000

6	100%	1	28.0000	28.0000
6	100%	2	29.0000	29.0000
6	100%	3	32.0000	32.0000
[illegible]	100%	4	25.0000	25.0000
[illegible]	100%	5	28.0000	28.0000
6	100%	6	18.0000	18.0000
6	100%	7	29.0000	29.0000
6	100%	8	24.0000	24.0000
6	100%	9	32.0000	32.0000
6	100%	10	27.0000	27.0000

f93506-cd2
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	20.000	35.000	26.900
2	6.25%	10	18.000	37.000	26.000
3	12.5%	10	21.000	38.000	26.400
4	25%	10	18.000	32.000	25.800
5	50%	10	0.000	37.000	23.900
6	100%	10	18.000	32.000	27.200

f93506-cd2
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	15.211	3.900	1.233
2	6.25%	29.556	5.437	1.719
3	12.5%	24.267	4.926	1.558
4	25%	15.956	3.994	1.263
5	50%	137.878	11.742	3.713
6	100%	17.067	4.131	1.306

f93506-cd2
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	68.533	13.707	0.343
Within (Error)	54	2159.400	39.989	

Total	59	2227.933

Critical F value = 2.45 (0.05,5,40)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

f93506-cd2
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	26.900	26.900		
2	6.25%	26.000	26.000	0.318	
3	12.5%	26.400	26.400	0.177	
4	25%	25.800	25.800	0.389	
5	50%	23.900	23.900	1.061	
6	100%	27.200	27.200	-0.106	

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=40,5)

f93506-cd2
le: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

DUNNETTS 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	Control	10			
2	6.25%	10	6.533	24.3	0.900
3	12.5%	10	6.533	24.3	0.500
4	25%	10	6.533	24.3	1.100
5	50%	10	6.533	24.3	3.000
6	100%	10	6.533	24.3	-0.300

Test 2

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 218

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: EU3-02
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER:

PERSON CONDUCTING TEST:
BEGINNING: ____ hrs; 10/28/94
ENDING: ____ hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
6.25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
12.5	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	9	9	8	8	8	8
	D	10	10	10	10	10	10	10	10
50	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
	TIME:	1630	1700	1730	1720	1650	1700	1515	1510
	INITIAL:	MLS	MLS	LJT	MLS	mm	LJT	SC	R K

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
6.25	A	[illegible]	1.11197	1.11940			
	B	[illegible]	1.11357	1.12135			
	C	1.25 ←	1.10778	1.11490			
	D	[illegible]	1.12253	1.12952			
12.5	A		1.11017	1.11819			
	B		1.10516	1.11191			
	C		1.13204	1.14020			
	D		1.12053	1.12815			
25	A	[illegible]	1.11450	1.12175			
	B	[illegible]	1.10120	1.10958			
	C	6.25	1.10922	1.11630			
	D		1.10579	1.11409			
50	A		1.10542	1.11368			
	B		1.10755	1.11565			
	C		1.10257	1.11027			
	D		1.12128	1.12954			

Test 2

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 5112

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: EW-02
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER:

PERSON CONDUCTING TEST:
BEGINNING: ____ hrs; 10/28/94
ENDING: ____ hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
100	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
	TIME:	1630	1700	1700	1720	1700	1700	1535	1600
	INITIAL:	MLS	MLS	LJT	MLS	MM	LJT	SB	RxK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
100	A		1.11235	1.12044			
	B		1.11496	1.12041			
	C		1.11710	1.12450			
	D		1.11557	1.12234			

Tinker AFB Test # 2 TEST START DATE Oct 28, 94

SAMPLE ID EW 02 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
6.25%	A	1.1145	1.12175	0.00725	10	0.72
	B	1.1012	1.10958	0.00838	10	0.84
	C	1.10922	1.1163	0.00708	10	0.71
	D	1.10578	1.11409	0.00831	10	0.83
12.50%	A	1.11017	1.11819	0.00802	10	0.80
	B	1.10516	1.11191	0.00675	10	0.68
	C	1.13204	1.1402	0.00816	10	0.82
	D	1.12057	1.12815	0.00758	10	0.76
25%	A	1.11197	1.1194	0.00743	10	0.74
	B	1.11357	1.12135	0.00778	10	0.78
	C	1.10778	1.1149	0.00712	8	0.89
	D	1.12253	1.12952	0.00699	10	0.70
50%	A	1.10542	1.11368	0.00826	10	0.83
	B	1.10755	1.11565	0.0081	10	0.81
	C	1.10257	1.11027	0.0077	10	0.77
	D	1.12128	1.12954	0.00826	10	0.83
100%	A	1.11235	1.12044	0.00809	10	0.81
	B	1.11426	1.12041	0.00615	10	0.61
	C	1.1171	1.1245	0.0074	10	0.74
	D	1.11547	1.12234	0.00687	10	0.69

Sample ID: EW02
Start date: 10/25/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25.4	25.4	25.4	25.2	25.2	25.1	25.1	25	25	25.3	25.0	25.0	24.5	25.4		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.4	~~7~~	~~8.7~~	8.0	8.4			8.3	8.4	8.0	8.5	8.2	8.5	8.6		
6.25	8.3	7.3	8.8	8.0	8.4	7.5	8.6	8.3	8.5	8.0	8.5	8.2	8.5	7.9		
12.5	8.4	7.3	8.8	~~8.0~~	8.5	7.6	8.6	8.3	8.5	7.9	8.5	8.1	8.5	7.8		
25	8.4	7.3	8.8	8.0	8.5	7.5	8.7	8.3	8.5	7.8	8.5	8.1	8.5	7.8		
50	8.4	7.3	8.8	8.0	8.5	7.5	8.7	8.3	8.6	7.9	8.6	8.2	8.5	8.0		
100	8.5	7.3	8.9	8.0	8.5	7.5	8.8									

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.68	8.17	8.09	8.43	8.34	8.23	8.28	8.41	8.63	8.30	8.56	8.36	8.64	8.26		
6.25	8.65	8.21	8.10	8.40	8.35	8.23	8.26	8.41	8.63	8.37	8.58	8.35	8.64	8.25		
12.5	8.65	8.21	8.10	8.38	8.32	8.21	8.28	8.36	8.59	8.37	8.57	8.36	8.62	8.26		
25	8.61	8.23	8.12	8.31	8.31	8.20	8.26	8.36	8.53	8.28	8.40	8.36	8.56	8.26		
50	8.60	8.24	8.17	8.40	8.31	8.17	8.26	8.34	8.34	8.26	8.36	8.36	8.41	8.31		
100	8.50	8.21	8.27	8.37	8.34											

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	380	~~355~~	~~381~~	372	378	336	296	393	363	393	361	392	356	406		
6.25	371	358	369	380	379	362	319	381	359	389	365	390	354	399		
12.5	356	353	366	390	345	345	313	383	360	386	360	391	353	390		
25	327	385	365	381	339	306	307	398	359	387	437	395	352	392		
50	337	378	361	381	341	325	302	386	354	388	324	402	352	390		
100	340	363	354	380	332											

① 427 381

f93506-fm2
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	7	8	9	0

Calculated Chi-Square goodness of fit test statistic = 5.3637
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-fm2
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 10.33
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

TITLE: f93506-fm2
FILE: S:\toxlab\toxstat\f93506-f
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.9100	0.9100
1	Control	2	1.0100	1.0100
1	Control	3	0.7900	0.7900
1	Control	4	0.9300	0.9300
2	6.25%	1	0.7200	0.7200
2	6.25%	2	0.8400	0.8400
2	6.25%	3	0.7100	0.7100
2	6.25%	4	0.8300	0.8300
3	12.5%	1	0.8000	0.8000
3	12.5%	2	0.6800	0.6800
3	12.5%	3	0.8200	0.8200
3	12.5%	4	0.7600	0.7600
4	25%	1	0.7400	0.7400
4	25%	2	0.7800	0.7800
4	25%	3	0.8900	0.8900
4	25%	4	0.7000	0.7000
5	50%	1	0.8300	0.8300
5	50%	2	0.8100	0.8100
5	50%	3	0.7700	0.7700
5	50%	4	0.8300	0.8300
6	100%	1	0.8100	0.8100
6	100%	2	0.6100	0.6100
6	100%	3	0.7400	0.7400
6	100%	4	0.6900	0.6900

f93506-fm2
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.790	1.010	0.910
2	6.25%	4	0.710	0.840	0.775
3	12.5%	4	0.680	0.820	0.765
4	25%	4	0.700	0.890	0.778
5	50%	4	0.770	0.830	0.810
6	100%	4	0.610	0.810	0.712

f93506-fm2
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.008	0.091	0.045
2	6.25%	0.005	0.070	0.035
3	12.5%	0.004	0.062	0.031
4	25%	0.007	0.082	0.041
5	50%	0.001	0.028	0.014
6	100%	0.007	0.084	0.042

f93506-fm2
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.087	0.017	3.400
Within (Error)	18	0.095	0.005	
Total	23	0.182		

Critical F value = 2.77 (0.05,5,18)
Since F > Critical F REJECT Ho:All groups equal

f93506-fm2
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.910	0.910		
2	6.25%	0.775	0.775	2.700	*
3	12.5%	0.765	0.765	2.900	*
4	25%	0.778	0.778	2.650	*
5	50%	0.810	0.810	2.000	
6	100%	0.712	0.712	3.950	*

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-fm2
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

DUNNETTS 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	Control	4			
2	6.25%	4	0.120	13.2	0.135
3	12.5%	4	0.120	13.2	0.145
4	25%	4	0.120	13.2	0.132
5	50%	4	0.120	13.2	0.100
6	100%	4	0.120	13.2	0.198

EPA PROBIT ANALYSIS PROGRAM
USED FOR CALCULATING EC VALUES
Version 1.4

H. azteca #2

Conc.	Number Exposed	Number Resp.	Observed Proportion Responding	Adjusted Proportion Responding	Predicted Proportion Responding
Control	40	1	0.0250	0.0000	0.0217
6.2500	40	1	0.0250	0.0033	0.0000
12.5000	40	0	0.0000	-.0222	0.0000
25.0000	40	2	0.0500	0.0289	0.0071
50.0000	40	13	0.3250	0.3100	0.3292
100.0000	40	38	0.9500	0.9489	0.9418

Chi - Square Heterogeneity = 1.664

Mu = 1.765113
Sigma = 0.149618

Parameter	Estimate	Std. Err.	95% Confidence Limits
Intercept	-6.797491	2.194018	(-11.097767, -2.497215)
Slope	6.683705	1.225993	(4.280758, 9.086652)
Spontaneous Response Rate	0.021726	0.012193	(-0.002173, 0.045625)

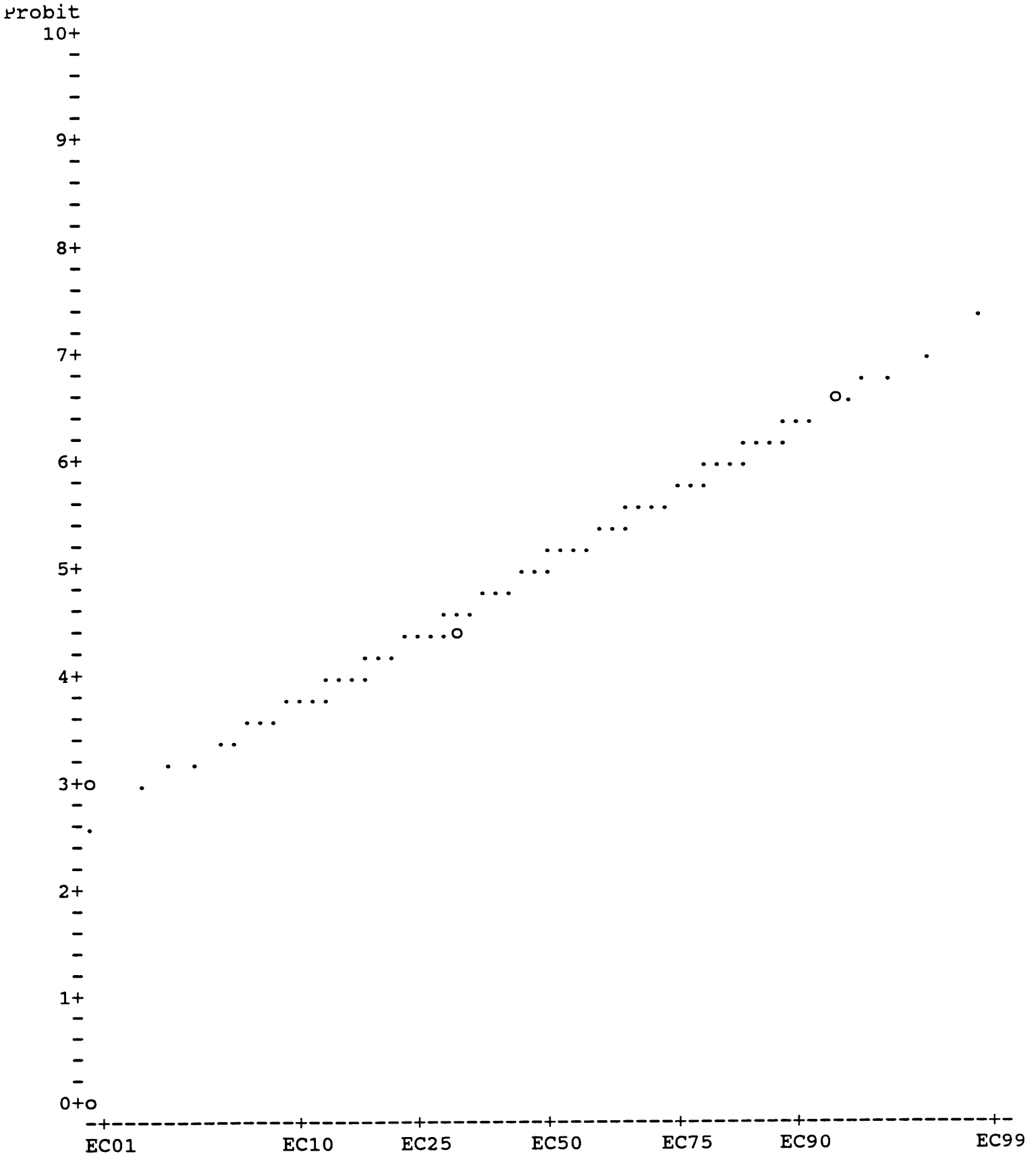
H. azteca #2

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence	Upper Limits
EC 1.00	26.1251	15.8105	33.4992
EC 5.00	33.0374	22.6325	40.1250
EC10.00	37.4423	27.3350	44.2872
EC15.00	40.7426	30.9963	47.4190
EC50.00	58.2254	50.7023	65.8261
EC85.00	83.2101	72.7248	104.2096
EC90.00	90.5446	78.0859	117.8369
EC95.00	102.6168	86.4110	141.9499
EC99.00	129.7681	103.7558	202.7022

H. azteca #2

PLOT OF ADJUSTED PROBITS AND PREDICTED REGRESSION LINE



№ 14

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
93F506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: TCL+TCT	REMARKS
SC-EW02-TX-001	10-25-94	0930	water	2		
SC-EW02-TX-001	10-25-94	1000	soil	2	✓	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	1000 10-25-94				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lisa Deel	10/26/94 1100	2.5°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

№ 1

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
93F506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: TOX Test	REMARKS
SCEW02-TX-001	10-25-94	0930	water	3	✓	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/26/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lisa Jean	10/26/94 1100	1°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

C. dubia and

48-hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

OG NO. 311 & 312
OB NO. 93F5016
NDUSTRY: Tinker
ONTACT:
FFLUENT:
PDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/24/94
START TIME: 1630
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
Con	A	10	10	10	0	25.0	24°C	25.2	8.2		7.8	7.95		8.27	480		601
	B	10	10	10	0												
C. dubia																	
Con	A	5	5	5	0	25.0											
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	LST													
Time		1130	0900	1610													

Comments

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	180	
Total Alkalinity (mg/L CaCO3 @ 4.5)	120	

48-hr Ceriodaphnia dubia ACUTE TOXICITY TEST – STATIC, NONRENEWAL

G NO. 311
B NO.
)USTRY: Tinker
NTACT:
FLUENT: EW-3
DES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE:
START TIME: 1630
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: 30 mL
TEST SOLN VOLUME/DEPTH: 20 mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	4	1												
12.5	A	5	5	5	0												
	B	5	5	3	2												
	C	5	5	5	0												
	D	5	5	5	0												
25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
50	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
100	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	MLS													
Time		1130	0915	1600													

Comments

$LC_{50} > 100\%$

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)		
Total Alkalinity (mg/L CaCO3 @ 4.5)		

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 312
LOB NO.
INDUSTRY: Tinker
CONTACT:
EFFLUENT: Ew 3
PDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/26/94
START TIME: 1630
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	10	10	10	0	25.0	24°C	25.4	8.2		8.2	8.42		8.25	493		381
	B	10	10	10	0												
12.5	A	10	10	10	0				8.5		8.2	8.42		8.26	~~497~~ 477		511
	B	10	10	10	0												
25	A	10	10	10	0				8.5		8.3	8.37		8.30	475		546
	B	10	10	10	0												
50	A	10	10	10	0				8.6		8.3	8.29		8.34	435		520
	B	10	10	10	0												
100	A	10	10	10	0				8.7		8.3	8.13		8.46	350		410
	B	10	10	10	0												
Initials		LST	LST	LST													
Time		1630	0900	1610													

Comments

LC50 7 100%

Ammonia. ND (< 40 ppb)

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)		170
Total Alkalinity (mg/L CaCO3 @ 4.5)		180

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST Test 3

JOB NO: F93506 | BEGINNING: 1620 hrs; 10/28/94 | Log No: 317
INDUSTRY: Tinker | ENDING: 1355 hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: EFF 03 | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

	TIME	1620	1615	1640	RXK	MLS	MLS	MLS	MLS
	OBSERVER	MLS	MLS	LJT	1515	1730	1555	1515	1355

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Mod Con	1								
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								
	Con from Sample 4 data								
6.25	11		✓	✓	4	1	6	14	0
	12		✓	✓	5	3	16	10	1
	13		✓	✓	4	7	8	0	12
	14		✓	✓	3	8	12	0	12
	15		✓	✓	✓	3	10	0	11
	16		✓	✓	1	9	9	0	9
	17		✓	✓	✓	7	11	0	10
	18		✓	✓	✓	3	10	9	0
	19		✓	✓	✓	6	11	9	0
	20		✓	✓	✓	4	16	9	0
12.5	21		✓	✓	✓	4	8	8	1
	22		✓	✓	4	✓	12	13	0
	23		✓	✓	3	9	0	14	12
	24		✓	✓	✓	3	8	0	8
	25		✓	✓	5	3	14	14	0
	26		✓	✓	✓	4	8	7	0
	27		✓	✓	✓	4	8	10	0
	28		✓	✓	2	7	10	0	13
	29		✓	✓	4	10	0	0	0
	30		✓	✓	2	10	D-0		

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F93506 | BEGINNING: ____hrs; / / . | Log No. ____
INDUSTRY: Timber | ENDING: ____hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

TIME
OBSERVER

CONC | CHAMBER | NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
25%	31		✓	✓	✓	5	9	10	0
	32		✓	✓	2	8	13	0	14
	33		✓	✓	✓	5	0	0	3
	34		✓	✓	~~5~~ ✓	~~5~~ 4	~~6~~ 6	~~5~~ 10	~~4~~ 0
	35		✓	✓	4	✓	12	15	0
	36		✓	✓	2	8	8	0	11
	37		✓	✓	1	6	13	1	11
	38		✓	✓	3	6	10	2	9
	39		✓	✓	✓	9	0	13	11
	40		✓	✓	2	10	9	0	11

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
50%	41		✓	✓	4	0	4	0	0
	42		✓	✓	4	4	13	0	11
	43		✓	✓	5	8	0	14	11
	44		✓	✓	5	5	0	15	14
	45		✓	✓	3	9	12	0	15
	46		✓	✓	✓	1	11	16	0
	47		✓	✓	✓	7	0	15	12
	48		✓	✓	4	8	13	0	11
	49		✓	✓	5	8	10	0	11
	50		✓	✓	3	10	13	0	11

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
100%	51		✓	✓	4	0	11	13	0
	52		✓	✓	✓	5	1	0	0
	53		✓	✓	3	✓	8	10	8
	54		✓	✓	✓	8	8	10	0
	55		✓	✓	✓	5	15	0	8
	56		✓	✓	3	7	0	18	14
	57		✓	✓	✓	4	9	10	0
	58		✓	✓	6	4	0	12	12
	59		✓	✓	3	7	10	0	15
	60		✓	✓	4	✓	10	16	0

Test - 3

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: F ~~A~~ ~~F~~ ~~X~~ ~~AX~~ 3 #6 Start Date: 10/28/94 Sample ID: EW 3 Log #: 317

AD	ID	1	AD	ID	1	AD	ID	1	AD	ID	1		ID	1
2	3	4	2	3	4	2	3	4	2	3	4	2	3	4
5	6	7	5	6	7	5	6	7	5	6	7	5	6	7
AD	ID 39	1 ✓	AD	ID 18	1 ✓	AD	ID 37	1 ✓	AD	ID 50	1 ✓		ID 28	1 ✓
2 ✓	3 5	4 8	2 ✓	3 2	4 7	2 ✓	3 ✓	4 7	2 ✓	3 4	4 ✓	2 ✓	3 3	4 6
5 10	6 0	7 11	5 10	6 0	7 13	5 0	6 15	7 12	5 10	6 16	7 0	5 10	6 2	7 9
AD	ID 22	1 ✓	AD	ID 41	1 ✓	AD	ID 6	1 ✓	AD	ID 35	1 ✓		ID 45	1 ✓
2 ✓	3 2	4 8	2 ✓	3 4	4 ✓	2 ✓	3 1	4 9	2 ✓	3 3	4 9	2 ✓	3 ✓	4 5
5 13	6 0	7 14	5 11	6 13	7 0	5 9	6 0	7 9	5 12	6 0	7 15	5 15	6 0	7 8
AD	ID 30	1 ✓	AD	ID 1	1 ✓	AD	ID 26	1 ✓	AD	ID 7	1 ✓		ID 49	1 ✓
2 ✓	3 2	4 10	2 ✓	3 4	4 1	2 ✓	3 2	4 8	2 ✓	3 ✓	4 7	2 ✓	3 3	4 7
5 9	6 0	7 11	5 6	6 14	7 0	5 8	6 0	7 11	5 11	6 0	7 10	5 10	6 0	7 15
AD	ID 12	1 ✓	AD	ID 40	1 ✓	AD	ID 48	1 ✓	AD	ID 9	1 ✓		ID 15	1 ✓
2 ✓	3 4	4 ✓	2 ✓	3 3	4 10	2 ✓	3 6	4 4	2 ✓	3 ✓	4 6	2 ✓	3 5	4 3
5 12	6 13	7 0	5 13	6 0	7 11	5 0	6 16	7 12	5 11	6 9	7 0	5 14	6 14	7 0
AD	ID 4	1 ✓	AD	ID 31	1 ✓	AD	ID 27	1 ✓	AD	ID 44	1 ✓		ID 36	1 ✓
2 ✓	3 3	4 8	2 ✓	3 4	4 ✓	2 ✓	3 1	4 6	2 ✓	3 ✓	4 8	2 ✓	3 ✓	4 1
5 12	6 0	7 12	5 MLS 4	6 0	7 0 ~~12~~ ML	5 13	6 1	7 MLS 11 ~~13~~	5 9	6 10	7 0	5 11	6 16	7 0

Comments:

Cup ID	Sample Concentration	Day	Initials	Time
		Ø	MLS	1620
1–10:	6.25	1	MLS	1615
11–20:	12.5	2	WT	1640
21–30:	25	3	RXK	15:15
31–40:	50	4	MLS	1730
41–50:	100	5	MLS	1555
51–60:		6	MLS	1515
		7	MLS	1355

Test - 3

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ~~JPHMKA~~ Z1 Start Date: 10/28/94 Sample ID: EW-3 Log #: 317

AD	ID	1	AD	ID	1	AD	ID	1	AD	ID	1		ID	1
2	3	4	2	3	4	2	3	4	2	3	4	2	3	4
5	6	7	5	6	7	5	6	7	5	6	7	5	6	7
AD	ID 46	1 ✓	AD	ID 3	1 ✓	AD	ID 17	1 ✓	AD	ID 32	1 ✓		ID 21	1 ✓
2 ✓	3 3	4 7	2 ✓	3 4	4 7	2 ✓	3 ✓	4 4	2 ✓	3 4	4 4	2 ✓	3 ✓	4 5
5 0	6 18	7 14	5 8	6 0	7 12	5 8	6 10	7 0	5 13	6 0	7 11	5 9	6 10	7 0
AD	ID 13	1 ✓	AD	ID 34	1 ✓	AD	ID 47	1 ✓	AD	ID 19	1 ✓		ID 42	1 ✓
2 ✓	3 3	4 9	2 ✓	3 5	4 5	2 ✓	3 ✓	4 4	2 ✓	3 4	4 10	2 ✓	3 ✓	4 5
5 0	6 14	7 12	5 0	6 15	7 14	5 9	6 10	7 0	5 0	6 0	7 0	5 1	6 0	7 0
AD	ID 24	1 ✓	AD	ID 14	1 ✓	AD	ID 8	1 ✓	AD	ID 2	1 ✓		ID 29	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 3	2 ✓	3 5	4 3	2 ✓	3 ✓	4 9
5 6	6 10	7 0	5 8	6 0	7 8	5 10	6 9	7 0	5 10	6 10	7 1	5 0	6 13	7 11
AD	ID 23	1 ✓	AD	ID 33	1 ✓	AD	ID 38	1 ✓	AD	ID 20	1 ✓		ID 25	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 5	4 8	2 ✓	3 4	4 8	2 ✓	3 2	4 10	2 ✓	3 4	4 ✓
5 0	6 0	7 3	5 0	6 14	7 11	5 13	6 0	7 11	5 ~~D~~ 0	6	7	5 12	6 15	7 0
AD	ID 11	1 ✓	AD	ID 43	1 ✓	AD	ID 16	1 ✓	AD	ID 10	1 ✓		ID 5	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 3	4 ✓	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 3
5 8	6 8	7 1	5 8	6 10	7 8	5 8	6 7	7 0	5 6	6 9	7 0	5 10	6 0	7 11

Comments:

Cup ID	Sample Concentration	Day Ø	Initials MLS	Time 1620
		1	MLS	1615
1–10:	625	2	LJT	1640
11–20:	125	3	RXK	14:50
21–30:	25	4	MLS	1730
31–40:	50	5	MLS	1545
41–50:	100	6	MLS	1528
51–60:		7	MLS	1355

DAY 7: Most adults are carrying broods and looked very healthy

f93506-cd3
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	5	8	28	16	3

Calculated Chi-Square goodness of fit test statistic = 4.7022
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd1
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 6.26
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

TLE: f93506-cd1
LE: S:\TOXLAB\TOXSTAT\F93506-C.
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	25.0000	25.0000
1	Control	2	30.0000	30.0000
1	Control	3	35.0000	35.0000
1	Control	4	25.0000	25.0000
1	Control	5	28.0000	28.0000
1	Control	6	27.0000	27.0000
1	Control	7	25.0000	25.0000
1	Control	8	26.0000	26.0000
1	Control	9	20.0000	20.0000
1	Control	10	28.0000	28.0000
2	6.25%	1	25.0000	25.0000
2	6.25%	2	29.0000	29.0000
2	6.25%	3	31.0000	31.0000
2	6.25%	4	35.0000	35.0000
2	6.25%	5	24.0000	24.0000
2	6.25%	6	28.0000	28.0000
2	6.25%	7	28.0000	28.0000
2	6.25%	8	22.0000	22.0000
2	6.25%	9	26.0000	26.0000
2	6.25%	10	19.0000	19.0000
3	12.5%	1	21.0000	21.0000
3	12.5%	2	29.0000	29.0000
3	12.5%	3	38.0000	38.0000
3	12.5%	4	19.0000	19.0000
3	12.5%	5	36.0000	36.0000
3	12.5%	6	19.0000	19.0000
3	12.5%	7	22.0000	22.0000
3	12.5%	8	30.0000	30.0000
3	12.5%	9	14.0000	14.0000
3	12.5%	10	12.0000	12.0000
4	25%	1	24.0000	24.0000
4	25%	2	37.0000	37.0000
4	25%	3	8.0000	8.0000
4	25%	4	20.0000	20.0000
4	25%	5	31.0000	31.0000
4	25%	6	29.0000	29.0000
4	25%	7	32.0000	32.0000
4	25%	8	30.0000	30.0000
4	25%	9	33.0000	33.0000
4	25%	10	32.0000	32.0000
5	50%	1	8.0000	8.0000
5	50%	2	32.0000	32.0000
5	50%	3	38.0000	38.0000
5	50%	4	39.0000	39.0000
5	50%	5	39.0000	39.0000
5	50%	6	28.0000	28.0000
5	50%	7	34.0000	34.0000
5	50%	8	36.0000	36.0000
5	50%	9	34.0000	34.0000
5	50%	10	37.0000	37.0000

6	100%	1	28.0000	28.0000
6	100%	2	6.0000	6.0000
6	100%	3	29.0000	29.0000
6	100%	4	27.0000	27.0000
6	100%	5	28.0000	28.0000
6	100%	6	42.0000	42.0000
6	100%	7	23.0000	23.0000
6	100%	8	38.0000	38.0000
6	100%	9	35.0000	35.0000
6	100%	10	30.0000	30.0000

f93506-cd1
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	20.000	35.000	26.900
2	6.25%	10	19.000	35.000	26.700
3	12.5%	10	12.000	38.000	24.000
4	25%	10	8.000	37.000	27.600
5	50%	10	8.000	39.000	32.500
6	100%	10	6.000	42.000	28.600

f93506-cd1
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	15.211	3.900	1.233
2	6.25%	20.900	4.572	1.446
3	12.5%	78.667	8.869	2.805
4	25%	70.044	8.369	2.647
5	50%	85.833	9.265	2.930
6	100%	95.156	9.755	3.085

f93506-cd1
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	391.883	78.377	1.286
Within (Error)	54	3292.300	60.969	

Total	59	3684.183

Critical F value = 2.45 (0.05,5,40)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

f93506-cd1
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORM

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	26.900	26.900		
2	6.25%	26.700	26.700	0.057	
3	12.5%	24.000	24.000	0.830	
4	25%	27.600	27.600	-0.200	
5	50%	32.500	32.500	-1.604	
6	100%	28.600	28.600	-0.487	

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=40,5)

f93506-cd1
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORM

DUNNETTS 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	Control	10			
2	6.25%	10	8.066	30.0	0.200
3	12.5%	10	8.066	30.0	2.900
4	25%	10	8.066	30.0	-0.700
5	50%	10	8.066	30.0	-5.600
6	100%	10	8.066	30.0	-1.700

Test 3

Organism: C. dubia
Sample ID: EW03
Start date: 10/28/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25.4	25.4	25.4	25.2	25.2	25.1	25.1	25.1	24.5	25.5	25.0	25.6	25.2	25.4		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.4	8.2	8.4	8.3	8.4				8.7					8.1		
6.25	8.3	8.2	8.4	8.3	8.5	8.0	8.6	8.2	8.5	8.5	8.6	8.4	8.6	[illegible]		
12.5	8.3	8.4	8.4	8.3	8.5	8.0	8.7	8.3	8.6	8.5	8.6	8.5	8.6	[illegible]		
25	8.4	8.4	8.4	8.4	8.6	8.2	8.7	8.3	8.6	8.6	8.6	8.3	8.6	[illegible]		
50	8.4	8.5	8.5	8.4	8.6	8.2	8.8	8.4	8.7	8.7	8.7	8.3	8.7	8.6		
100	8.5	8.5	8.7	8.4	8.6	8.3	8.8	8.4	8.7	8.7	8.6	8.3	8.6	7.9		

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.47	8.38	8.44	8.53	8.42				1500							
6.25	8.55	8.47	8.59	8.53	8.43	8.44	8.31	8.31	8.40	8.35	8.48	8.30	8.47	8.46		
12.5	8.55	8.47	8.60	8.53	8.45	8.43	8.33	8.31	8.42	8.36	8.48	8.29	8.47	8.49		
25	8.55	8.46	8.60	8.54	8.51	8.43	8.37	8.33	8.41	8.37	8.44	8.30	8.44	8.42		
50	8.51	8.47	8.57	8.54	8.51	8.45	8.37	8.34	8.43	8.40	8.34	8.32	8.39	8.44		
100	8.47	8.47	8.54	8.54	8.31	8.47	8.07	8.44	8.31	8.45	8.25	8.38	8.33	8.50		

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	703	687	709	702	665			505	464	555	551	560	557	582		
6.25	666	621	580	668	677	609	482	497	515	536	551	540	541	585		
12.5	624	645	604	646	536	574	483	494	491	534	489	542	509	539		
25	651	658	599	610	533	467	462	438	445	466	459	463	454	495		
50	531	489	460	541	481	469	426	301	468	372	367	362	351	384		
100	372	351	335	510	321	369	317									

Test 3

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 318

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: EW-03
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ___ hrs; 10/28/94
ENDING: ___ hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
6.25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	D 10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
12.5	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
50	A	10	10	10	10	9, 1d	9	9	9
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
TIME:		1645	DA 1645	1700	1830	1700		1540	12:15
INITIAL:		MLS	MLS	CJT	MLS	RXK		SJB	RKK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)	
6.25	A		1.12364	1.13118				D one fish appears to have a broken neck.
	B		1.10199	1.10942				
	C		1.10835	1.11596				
	D		1.10995	1.11748				
12.5	A		1.12049	1.12896				
	B		1.11928	1.12705				
	C		1.11278	1.11875				
	D		1.09755	1.10522				
25	A		1.11113	1.11882				
	B		1.12690	1.13332				
	C		1.12236	1.12925				
	D		1.09346	1.10263				
50	A		1.11611	1.12356				
	B		1.09503	1.10124				
	C		1.10594	1.11419				
	D		1.11918	1.12675				

Test 3

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 318

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: EW-03
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ____ hrs; 10/28/94
ENDING: ____ hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
100	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
	TIME:	~~1715~~ 1645	1645	1700	1830	1720		1570	17:00
	INITIAL:	MLS	MLS	MJ	MLS	RXK		SD	RXK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
100	A		1.12026	1.12351			
	B		1.10584	1.11316			
	C		1.12301	1.13097			
	D		1.10638	1.11396			

Tinker AFB Test # 3 TEST START DATE Oct 28, 94

SAMPLE ID EW 03 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
6.25%	A	1.12364	1.13118	0.00754	10	0.75
	B	1.10199	1.10942	0.00743	10	0.74
	C	1.10835	1.11596	0.00761	10	0.76
	D	1.10994	1.11748	0.00754	10	0.75
12.50%	A	1.12049	1.12896	0.00847	10	0.85
	B	1.11928	1.12705	0.00777	10	0.78
	C	1.11278	1.11875	0.00597	10	0.60
	D	1.09755	1.10522	0.00767	10	0.77
25%	A	1.11113	1.11882	0.00769	10	0.77
	B	1.1269	1.13382	0.00692	9	0.77
	C	1.12236	1.12925	0.00689	10	0.69
	D	1.09646	1.10263	0.00617	10	0.62
50%	A	1.11611	1.12356	0.00745	9	0.83
	B	1.09503	1.10124	0.00621	10	0.62
	C	1.10594	1.11419	0.00825	10	0.83
	D	1.11918	1.12675	0.00757	10	0.76
100%	A	1.12026	1.12681	0.00655	10	0.66
	B	1.10584	1.11316	0.00732	10	0.73
	C	1.12301	1.13097	0.00796	10	0.80
	D	1.10638	1.11396	0.00758	10	0.76

Dilution H_2O [illegible]

Organism: [illegible]
Sample ID: EW03
Start date: 10/28/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25.4	25.4	25.4	25.2	25.2	25.1	25.1	25	25	25.3	24.9	25.0	25.0	25.2		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD mls	Day 1 NEW mls	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.4	~~7.4~~	~~8.7~~													
6.25	8.3	7.5	8.8	8.0	8.5	7.2	8.6	8.5	8.6	8.0	8.6	8.2	8.6	8.0		
12.5	8.4	7.5	8.8	8.0	8.5	7.3	8.6	8.4	8.6	8.0	8.6	8.2	8.6	7.9		
25	8.4	7.5	8.8	8.0	8.5	7.3	8.7	8.4	8.6	8.0	8.6	8.2	8.6	8.0		
50	8.5	7.5	8.8	8.1	8.6	7.4	8.7	8.2	8.6	8.0	8.6	8.1	8.6	8.0		
100	8.6	7.5	8.9	8.1	8.6	7.4	8.7	8.3	8.7	8.0	8.7	8.1	8.6	8.0		

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW mls	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.68		~~8.07~~													
6.25	8.66	8.25	8.07	8.44	8.49	8.17	7.84	8.37	8.64	8.29	8.58	8.34	8.66	8.39		
12.5	8.66	8.24	8.14	8.43	8.37	8.18	7.95	8.36	8.65	8.29	8.58	8.31	8.65	8.29		
25	8.65	8.24	8.12	8.40	8.35	8.18	7.98	8.37	8.63	8.30	8.54	8.33	8.62	8.31		
50	8.61	8.24	8.13	8.42	8.31	8.19	8.01	8.36	8.61	8.29	8.50	8.33	8.54	8.30		
100	8.58	8.23	8.29	8.41	8.31	8.15	8.07	8.31	8.44	8.26	8.35	8.50	8.36	8.15		

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW mls	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW mls	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	330		~~381~~				~~36~~									
6.25	348	375	362	344	384	379	361	383	363	389	363	383	355	385		
12.5	354	374	363	378	360	351	353	385	363	388	360	384	353	381		
25	335	373	362	377	342	382	330	379	362	386	357	385	353	378		
50	330	370	360	377	356	344	325	375	359	385	358	391	357	382		
100	324	360	352	361	321	347	317	375	355	380	354	370	345	382		

f93506-fm3
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	6	10	8	0

Calculated Chi-Square goodness of fit test statistic = 4.1251
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-fm3
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 169.00
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

TITLE: f93506-fm3
FILE: S:\toxlab\toxstat\f93506-f
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.9100	0.9100
1	Control	2	1.0100	1.0100
1	Control	3	0.7900	0.7900
1	Control	4	0.9300	0.9300
2	6.25%	1	0.7500	0.7500
2	6.25%	2	0.7400	0.7400
2	6.25%	3	0.7600	0.7600
2	6.25%	4	0.7500	0.7500
3	12.5%	1	0.8500	0.8500
3	12.5%	2	0.7800	0.7800
3	12.5%	3	0.6000	0.6000
3	12.5%	4	0.7700	0.7700
4	25%	1	0.7700	0.7700
4	25%	2	0.7700	0.7700
4	25%	3	0.6900	0.6900
4	25%	4	0.6200	0.6200
5	50%	1	0.8300	0.8300
5	50%	2	0.6200	0.6200
5	50%	3	0.8300	0.8300
5	50%	4	0.7600	0.7600
6	100%	1	0.6600	0.6600
6	100%	2	0.7300	0.7300
6	100%	3	0.8000	0.8000
6	100%	4	0.7600	0.7600

f93506-fm3
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.790	1.010	0.910
2	6.25%	4	0.740	0.760	0.750
3	12.5%	4	0.600	0.850	0.750
4	25%	4	0.620	0.770	0.712
5	50%	4	0.620	0.830	0.760
6	100%	4	0.660	0.800	0.738

f93506-fm3
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.008	0.091	0.045
2	6.25%	0.000	0.008	0.004
3	12.5%	0.011	0.106	0.053
4	25%	0.005	0.072	0.036
5	50%	0.010	0.099	0.049
6	100%	0.003	0.059	0.030

f93506-fm3
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.099	0.020	3.333
Within (Error)	18	0.114	0.006	
Total	23	0.214		

Critical F value = 2.77 (0.05,5,18)
Since F > Critical F REJECT Ho:All groups equal

f93506-fm3
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.910	0.910		
2	6.25%	0.750	0.750	2.921	*
3	12.5%	0.750	0.750	2.921	*
4	25%	0.712	0.712	3.606	*
5	50%	0.760	0.760	2.739	*
6	100%	0.738	0.738	3.149	*

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-fm3
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

DUNNETTS 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	Control	4			
2	6.25%	4	0.132	14.5	0.160
3	12.5%	4	0.132	14.5	0.160
4	25%	4	0.132	14.5	0.198
5	50%	4	0.132	14.5	0.150
6	100%	4	0.132	14.5	0.172

№ 1 5

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

ANALYSES REQUIRED: 10+ Lab

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	REMARKS
SC-EW03-TX001	10-25-94	0845	water	3	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/25/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Luis Jeu	10/26/94 1045	1.5°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

№ 1 4

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: for TCX	REMARKS
SC-EW03-TX-001	10-25-94	0845	water	2	✓	
SC-EW03-TX-001	10-25-94	0900	soil	2	✓	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10-25-94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
			10/26/94 1100	2.5°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

C. dubia +

319

320

48-hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 320
JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: Control
NPDES PERMIT NO.:

SAMPLE TYPE: Control
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/29
START TIME: 1700
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
P. promelas	A	10	10	10	0	25.4		25.2	8.3		8.2	8.45		8.24	644		647
Control	B	10	10	10	0												
C. dubia																	
Control	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	MLS													
Time		1100	1230	1650													

Comments

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)		
Total Alkalinity (mg/L CaCO3 @ 4.5)		

48-hr Ceriodaphnia dubia ACUTE TOXICITY TEST – STATIC, NONRENEWAL

3 NO.	319	SAMPLE TYPE:		PHOTOPERIOD:	16 hrs light
3 NO.		SAMPLE TIME:		FEEDING REGIME:	None
USTRY:		ORGANISM SOURCE:	Batch #	TEST VESSEL CAPACITY:	30 mL
NTACT:		START DATE:	10/29/94	TEST SOLN VOLUME/DEPTH:	20 mL
LUENT:	SC-EE01-TX-001	START TIME:	1630	NO. ORGANISMS/CONC.:	20
DES PERMIT NO.:		DILUTION WATER:	Hard	NO. REPLICATES:	4

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
12.5	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
.25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
50	A	5	5	5	0												
	B	5	4	2	3												
	C	5	0	0	5												
	D	5	1	0	5												
100	A	5	3	2	3												
	B	5	0	–	5												
	C	5	0	–	5												
	D	5	0	–	5												
itials		1630	1230	MLS													
me		MLS	MLS	1530													

omments

LC50 = 45.55 % S/K

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	220	200
Total Alkalinity (mg/L CaCO3 @ 4.5)	130	200

TRIMMED SPEARMAN-KARBER METHOD. MONTANA STATE UNIV

FOR REFERENCE, CITE:
HAMILTON, M.A., R.C. RUSSO, AND R.V. THURSTON, 1977.
TRIMMED SPEARMAN-KARBER METHOD FOR ESTIMATING MEDIAN
LETHAL CONCENTRATIONS IN TOXICITY BIOASSAYS.
ENVIRON. SCI. TECHNOL. 11(7): 714-719;
CORRECTION 12(4):417 (1978).

DATE: 10-29-94 TEST NUMBER: 319 DURATION: 48 HOUR
CHEMICAL: 13 SPECIES: C. DUBIA

RAW DATA:

CONCENTRATION(%)	6.25	12.50	25.00	50.00	100.00
NUMBER EXPOSED:	20	20	20	20	20
MORTALITIES:	0	0	0	13	18
SPEARMAN-KARBER TRIM:		10.00%			

SPEARMAN-KARBER ESTIMATES: LC50: 45.55
95% LOWER CONFIDENCE: 37.45
95% UPPER CONFIDENCE: 55.40

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 320
JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: SC-EE01-TX-001
NPDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/29/94
START TIME: 1300
DILUTION WATER: ~~Spring~~ Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	10	10	10	0	25.4		25.2	8.5		8.2	8.45		8.24	633		697
	B	10	10	10	0												
12.5	A	10	10	10	0				8.5		8.2	8.48		8.24	608		681
	B	10	10	10	0												
25	A	10	10	10	0				8.6		8.2	8.47		8.27	578		647
	B	10	10	10	0												
50	A	10	10	10	0				8.6		8.0	8.45		8.27	522		580
	B	10	10	10	0												
100	A	10	10	10	0				8.7		8.1	8.39		8.33	408		358
	B	10	10	10	0												
Initials		MLS	MLS	MLS													
Time		1300	1300	1100													

Comments

Ammonia: ND (<40 ppb) LC50 >100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	~~220~~ ~~200~~	200
Total Alkalinity (mg/L CaCO3 @ 4.5)	~~230~~ 130	200

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

Test 13

NOEC < 3.625%

JOB NO: P93506
INDUSTRY: Tinker
~~CONTACT: Test 13~~
EFFLUENT: SC-EFF1
NPDES PERMIT NO:
PERSON CONDUCTING TEST:

BEGINNING: 1530 hrs; 11/1/94
ENDING: 1055 hrs; 11/8/94
FEEDING REGIME:
.05 mL yct/15 mL
.05 mL algal suspension/15 mL

Log No. 325
PHOTOPERIOD: 16 light, 8 dark
ORGANISM SOURCE: WCC
TEST VESSEL CAPACITY: 30 mL
TEST SOLUTION VOLUME: 15mL
NO. REPLICATES:
DILUTION WATER:

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
	TIME	1530	1335	1300	1540	1515	1345	1720	1655
	OBSERVER	WT	WT	WT	MLS	MLS	MLS	WT	WT
Med Ctrl	1		✓	✓	5	0	10	8	0
	2		✓	✓	1	0	7	8	0
	3		✓	✓	4	1	6	7	10
	4		✓	✓	3	0	8	7	7
	5		✓	✓	1	0	3	0	10
	6		✓	✓	✓	0	0	8	9
	7		✓	✓	4	0	2	8	3
	8		✓	✓	✓	2	6	6	3
	9		✓	✓	4	0	0	10	3
	10		✓	✓	3	3	0	7	2
		START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
3.625	11		✓	✓	2	2	0	6	5
	12		✓	✓	4	0	8	0	3
	13		✓	✓	1 DAS	MS 1	0	6	MS 3
	14		✓	✓	4	0	7	0	4
	15		✓	✓	4	0	0	7	0
	16		✓	✓	4	1	7	0	3
	17		✓	✓	✓	0	6	0	3
	18		✓	✓	4	6	0	0	2
	19		✓	✓	4	1	5	0	0
	20		✓	✓	2	0	8	0	0
		START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
6.25	21		✓	✓	3	0	0	7	0
	22		✓	✓	✓	0	5	0	0
	23		✓	✓	✓	✓	0	10	2
	24		✓	✓	✓	0	6	4	2
	25		✓	✓	✓	0	4	0	3
	26		✓	✓	2	0	8	7	0
	27		✓	✓	3	2	8	0	0
	28		✓	✓	2	1	0	5	0
	29		✓	✓	4	0	0	7	0
	30		✓	✓	0	0	2	0	0

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
PERSON CONDUCTING TEST:

BEGINNING: _____ hrs; / / .
ENDING: _____ hrs; / /
FEEDING REGIME:
.05 mL yct/15 mL
.05 mL algal suspension/15 mL

Log No. _____
PHOTOPERIOD: 16 light, 8 dark
ORGANISM SOURCE: WCC
TEST VESSEL CAPACITY: 30 mL
TEST SOLUTION VOLUME: 15mL
NO. REPLICATES:
DILUTION WATER:

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
	TIME								
	OBSERVER								
12.5	31		✓	✓	3	1	0	7	0
	32		✓	✓	2	6	9	0	3
	33		✓	✓	4	7	0	7	0
	34		✓	✓	5	0	0	9	0
	35		✓	✓	2	0	0	5	1
	36		✓	✓	1	0	0	7	2
	37		✓	✓	✓	0	0	5	2
	38		✓	✓	✓	0	4	0	2
	39		✓	✓	✓	0	D-3	X	X
	40		✓	✓	2	0	0	6	0
25	41		✓	✓	✓	0	6	0	4
	42		✓	✓	✓	0	D5	X	X
	43		✓	✓	✓	1	8	3	0
	44		✓	✓	2	3	9	0	0
	45		✓	✓	4	0	~~M~~ 6	9 ~~M~~	0
	46		✓	✓	4	1	9	0	5
	47		✓	✓	2	0	7	0	0
	48		✓	✓	4	1	9	0	0
	49		✓	✓	4	0	7	0	2
	50		✓	✓	2	0	5	0	0
50	51		✓	✓	2	0	0	10	0
	52		✓	✓	✓	0	2	0	0
	53		✓	✓	✓	0	5	0	8
	54		✓	✓	✓	✓	1	0	0
	55		✓	✓	2 3	1	5	0	1
	56		✓	✓	2	2	7	0	0
	57		✓	✓	✓	0	2	7	0
	58		✓	✓	0	2	0	0	2
	59		✓	✓	4	0	0	D-9	X
	60		✓	✓	2	0	7	7	0

Test 13

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ~~V~~ ~~J~~ ~~E~~ F ~~D~~ ~~M~~ ~~O~~ Start Date: 11-1-94 Sample ID: SC [illegible] Log #: 3[illegible]

AD	ID 33	1 ✓	AD	ID 11	1 ✓	AD	ID [illegible]	1 ✓	AD	ID 48	1 ✓		ID 9	1 ✓
2 ✓	3 4	4 7	2 ✓	3 2	4 2	2 ✓	3 2	4 1	2 ✓	3 4	4 1	2 ✓	3 4	4 0
5 0	6 7	7 0	5 0	6 6	7 5	5 0	6 5	7 0	5 9	6 0	7 0	5 0	6 10	7 3
AD	ID 29	1 ✓	AD	ID 1	1 ✓	AD	ID 47	1 ✓	AD	ID 30	1 ✓		ID 27	1 ✓
2 ✓	3 4	4 0	2 ✓	3 5	4 0	2 ✓	3 2	4 0	2 ✓	3 0	4 0	2 ✓	3 3	4 2
5 0	6 7	7 0	5 10	6 8	7 0	5 7	6 0	7 0	5 2	6 0	7 0	5 8	6 0	7 0
AD	ID 10	1 ✓	AD	ID 31	1 ✓	AD	ID 50	1 ✓	AD	ID 2	1 ✓		ID 15	1 ✓
2 ✓	3 3	4 3	2 ✓	3 3	4 1	2 ✓	3 2	4 0	2 ✓	3 1	4 0	2 ✓	3 4	4 0
5 0	6 7	7 2	5 0	6 7	7 0	5 5	6 0	7 0	5 7	6 8	7 0	5 0	6 7	7 0
AD	ID 51	1 ✓	AD	ID 49	1 ✓	AD	ID 32	1 ✓	AD	ID 12	1 ✓		ID 46	1 ✓
2 ✓	3 2	4 0	2 ✓	3 4	4 0	2 ✓	3 2	4 6	2 ✓	3 4	4 0	2 ✓	3 4	4 1
5 0	6 10	7 0	5 7	6 0	7 2	5 9	6 0	7 3	5 8	6 0	7 3	5 9	6 0	7 5
AD	ID 45	1 ✓	AD	ID 3	1 ✓	AD	ID 13	1 ✓	AD	ID 35	1 ✓		ID 60	1 ✓
2 ✓	3 4	4 0	2 ✓	3 4	4 1	2 ✓	3 1	4 1	2 ✓	3 2	4 0	2 ✓	3 2	4 0
5 6	6 9	7 0	5 6	6 7	7 10	5 0	6 6	7 3	5 0	6 5	7 1	5 7	6 7	7 0
AD	ID 59	1 ✓	AD	ID 14	1 ✓	AD	ID 34	1 ✓	AD	ID 4	1 ✓		ID 20	1 ✓
2 ✓	3 4	4 0	2 ✓	3 4	4 0	2 ✓	3 5	4 0	2 ✓	3 3	4 0	2 ✓	3 2	4 0
5 0	6 9 D	7	5 7	6 0	7 4	5 0	6 9	7 0	5 8	6 7	7 7	5 8	6 7	7 0

Comments:

Cup ID	Sample Concentration	Day 0	Initials LJT	Time 1530
1–10:	Control	1	LJT	1335
11–20:	3.625	2	LJT	1300
21–30:	6.25	3	MLS	1530
31–40:	12.5	4	MLS	1510
41–50:	25	5	MLS	1330
51–60:	50	6	LJT	1720
		7	LJT	1655

Test 13

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ~~D~~ ~~TR~~ ~~K~~ ~~Z~~ ~~F~~ ~~Y~~ 10 Start Date: 11-1-94 Sample ID: SC EEC1 Log #: [illegible]

AD	ID 16	1 ✓	AD	ID 36	1 ✓	AD	ID 5	1 ✓	AD	ID 23	1 ✓		ID 41	1 ✓
2 ✓	3 4	4 1	2 ✓	3 1	4 0	2 ✓	3 1	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0
5 7	6 0	7 3	5 0	6 7	7 2	5 3	6 0	7 10	5 0	6 10	7 2	5 6	6 0	7 4
AD	ID 52	1 ✓	AD	ID 24	1 ✓	AD	ID 17	1 ✓	AD	ID 58	1 ✓		ID 6	1 ✓
2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 1 ~~X~~ MAP	4 2	2 ✓	3 ✓	4 0
5 2	6 0	7 0	5 6	6 4	7 2	5 6	6 0	7 3	5 0	6 0	7 2	5 0	6 8	7 9
AD	ID 57	1 ✓	AD	ID 43	1 ✓	AD	ID 42	1 ✓	AD	ID 37	1 ✓		ID 53	1 ✓
2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 1	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0
5 2	6 7	7 0	5 8	6 3	7 0	5 D 5	6	7	5 0	6 5	7 2	5 5	6 0	7 3
AD	ID 7	1 ✓	AD	ID 38	1 ✓	AD	ID 22	1 ✓	AD	ID 18	1 ✓		ID 25	1 ✓
2 ✓	3 4	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 4	4 6	2 ✓	3 ✓	4 0
5 2	6 8	7 3	5 4	6 0	7 2	5 5	6 0	7 0	5 0	6 0	7 2	5 4	6 0	7 3
AD	ID 44	1 ✓	AD	ID 19	1 ✓	AD	ID 56	1 ✓	AD	ID 8	1 ✓		ID 39	1 ✓
2 ✓	3 2	4 3	2 ✓	3 4	4 1	2 ✓	3 2	4 2	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 0
5 9	6 0	7 0	5 5	6 0	7 0	5 7	6 0	7 0	5 6	6 6	7 3	5 D 3	6	7
AD	ID 54	1 ✓	AD	ID 55	1 ✓	AD	ID 21	1 ✓	AD	ID 40	1 ✓		ID 20	1 ✓
2 ✓	3 ✓	4 ✓	2 ✓	3 3	4 1	2 ✓	3 3	4 0	2 ✓	3 2	4 0	2 ✓	3 2	4 0
5 1	6 0	7 0	5 5	6 0	7 1	5 0	6 7	7 0	5 0	6 6	7 0	5 8	6 0	7 0

Comments:

Cup ID	Sample Concentration	Day 0	Initials LJT	Time 1530
		1	LJT	1335
1–10:	[illegible]	2	LJT	1300
11–20:	3.[illegible]25	3	MLS	1540
21–30:	[illegible].25	4	MLS	1515
31–40:	12.5	5	MLS	1345
41–50:	25	6	LJT	1720
51–60:	50	7	LJT	1655

Sample ID: SC-EE01
Start date: 11/1/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25	24.5	24.0	24.7	24.5	25.8	25.0	25.5	25.2	25.5	25.4	25.0	25.0	25.3		
3.125																
6.25																
12.5																
25																
50																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.6	8.5	8.4	8.4	8.5	8.1	8.2	7.7	8.5	8.9	8.4	8.2	8.4	8.30		
3.125	8.5	8.4	8.7	8.4	8.5	8.2	8.3	7.6	8.3	8.2	8.4	8.2	8.4	8.38		
6.25	8.5	8.4	8.5	8.3	8.5	8.2	8.3	7.8	8.3	8.3	8.5	8.3	8.4	8.3		
12.5	8.5	8.4	8.5	8.3	8.5	8.2	8.5	7.8	8.3	8.4	8.5	8.2	8.5	8.3		
25	8.6	8.4	8.5	8.3	8.5	8.10	8.4	7.6	8.4	8.2	8.6	8.3	8.5	8.2		
50	8.6	8.4	8.6	8.3	8.5	8.2	8.6	7.6	8.5	8.2	8.6		8.5			

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.54	8.07	8.71	8.48	8.48	8.32	8.05	8.29	8.50	8.39	8.44	8.30	8.56	8.37		
3.125	8.52	8.14	8.51	8.48	8.49	8.25	8.41	8.26	8.49	8.38	8.43	8.31	8.56	8.35		
6.25	8.52	8.14	8.53	8.51	8.50	8.21	8.43	8.27	8.47	8.37	8.42	8.31	8.55	8.31		
12.5	8.53	8.16	8.52	8.51	8.49	8.21	8.43	8.29	8.46	8.36	8.43	8.34	8.58	8.36		
25	8.51	8.14	8.52	8.58	8.49	8.20	8.41	8.29	8.44	8.39	8.43	8.38	8.58	8.39		
50	8.47	8.14	8.52	8.58	8.46	8.28	8.35	8.40	8.42	8.44	Spill	8.46	8.59	8.42		

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	648	649	728	6068	6.75	6087	698	592	587	592	5608	649	635	623		
3.125	606	650	668	5906	722	6086	535	597	572	597	525	516	772	799		
6.25	576	712	660	5916	685	10 11	423	593	569	583	577	575	785	797		
12.5	931	633	617	5884	648	6052	525	594	555	523	5605	571	765	769		
25	544	691	562	592	622	10510	538	5600	533	548	545	513	718	662		
50	502	567	543	539	538	5912	483	504	462	497	487	496	619	613		

f93506-cd13
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	3	18	19	17	3

Calculated Chi-Square goodness of fit test statistic = 2.4457
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd13
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 4.82
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

TITLE: f93506-cd13
LE: S:\TOXLAB\TOXSTAT\F93506-C.
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	23.0000	23.0000
1	Control	2	16.0000	16.0000
1	Control	3	28.0000	28.0000
1	Control	4	25.0000	25.0000
1	Control	5	14.0000	14.0000
1	Control	6	17.0000	17.0000
1	Control	7	15.0000	15.0000
1	Control	8	17.0000	17.0000
1	Control	9	17.0000	17.0000
1	Control	10	15.0000	15.0000
2	3.625%	1	15.0000	15.0000
2	3.625%	2	15.0000	15.0000
2	3.625%	3	11.0000	11.0000
2	3.625%	4	15.0000	15.0000
2	3.625%	5	11.0000	11.0000
2	3.625%	6	15.0000	15.0000
2	3.625%	7	9.0000	9.0000
2	3.625%	8	12.0000	12.0000
2	3.625%	9	10.0000	10.0000
2	3.625%	10	10.0000	10.0000
3	6.25%	1	10.0000	10.0000
3	6.25%	2	5.0000	5.0000
3	6.25%	3	12.0000	12.0000
3	6.25%	4	12.0000	12.0000
3	6.25%	5	7.0000	7.0000
3	6.25%	6	17.0000	17.0000
3	6.25%	7	13.0000	13.0000
3	6.25%	8	8.0000	8.0000
3	6.25%	9	11.0000	11.0000
3	6.25%	10	2.0000	2.0000
4	12.5%	1	11.0000	11.0000
4	12.5%	2	20.0000	20.0000
4	12.5%	3	18.0000	18.0000
4	12.5%	4	14.0000	14.0000
4	12.5%	5	8.0000	8.0000
4	12.5%	6	10.0000	10.0000
4	12.5%	7	7.0000	7.0000
4	12.5%	8	6.0000	6.0000
4	12.5%	9	3.0000	3.0000
4	12.5%	10	8.0000	8.0000
5	25%	1	10.0000	10.0000
5	25%	2	5.0000	5.0000
5	25%	3	12.0000	12.0000
5	25%	4	14.0000	14.0000
5	25%	5	19.0000	19.0000
5	25%	6	19.0000	19.0000
5	25%	7	9.0000	9.0000
5	25%	8	14.0000	14.0000
5	25%	9	13.0000	13.0000
5	25%	10	7.0000	7.0000

6	50%	1	12.0000	12.0000
6	50%	2	2.0000	2.0000
6	50%	3	13.0000	13.0000
6	50%	4	1.0000	1.0000
6	50%	5	10.0000	10.0000
6	50%	6	11.0000	11.0000
6	50%	7	9.0000	9.0000
6	50%	8	4.0000	4.0000
6	50%	9	13.0000	13.0000
6	50%	10	16.0000	16.0000

f93506-cd13
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	14.000	28.000	18.700
2	3.625%	10	9.000	15.000	12.300
3	6.25%	10	2.000	17.000	9.700
4	12.5%	10	3.000	20.000	10.500
5	25%	10	5.000	19.000	12.200
6	50%	10	1.000	16.000	9.100

f93506-cd13
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	23.344	4.832	1.528
2	3.625%	6.011	2.452	0.775
3	6.25%	18.678	4.322	1.367
4	12.5%	28.944	5.380	1.701
5	25%	21.511	4.638	1.467
6	50%	25.878	5.087	1.609

f93506-cd13
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	609.283	121.857	5.879
Within (Error)	54	1119.300	20.728	

Total	59	1728.583

Critical F value = 2.45 (0.05,5,40)
Since F > Critical F REJECT Ho:All groups equal

f93506-cd13
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	18.700	18.700		
2	3.625%	12.300	12.300	3.143	*
3	6.25%	9.700	9.700	4.420	*
4	12.5%	10.500	10.500	4.027	*
5	25%	12.200	12.200	3.192	*
6	50%	9.100	9.100	4.715	*

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=40,5)

f93506-cd13
le: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

DUNNETTS 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	Control	10			
2	3.625%	10	4.703	25.2	6.400
3	6.25%	10	4.703	25.2	9.000
4	12.5%	10	4.703	25.2	8.200
5	25%	10	4.703	25.2	6.500
6	50%	10	4.703	25.2	9.600

Test 13

FATHEAD MINNOW SURVIVAL AND GROWTH
7–DAY CHRONIC TOXICITY TEST

Log No. 346

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
SAMPLE TYPE: SC - EEC1
DILUTION WATER:

PERSON CONDUCTING TEST:
BEGINNING: ____hrs; 11/1/94
ENDING: ____hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Control	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
6.25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
12.5	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10	←
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
								11/7/94	11/8/94
	TIME:	1800	1530	1430	1330	1400	1450	18:30	11:40
	INITIAL:	LJT	LJT	mm	mm	mm	MAR	RXK	RXK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
Cont	A	1.12632	1.11765	1.12624			
	B		1.11428	1.12293			
	C		1.11232	1.12045			
	D		1.10291	1.10964			
6.25	A	1.12173	1.11297	1.12157			
	B		1.10948	1.11740			
	C		1.12035	1.12841			
	D		1.11879	1.12547			
12.5	A	1.13244	1.12413	1.13236			
	B		1.12058	1.12874			
	C		1.11070	1.11856		9?	
	D		1.11037	1.11893			
25	A	1.10941	1.10058	1.10931			
	B		1.10905	1.11609			
	C		1.10508	1.11279			
	D		1.11263	1.11806		8	

Cream

TEST 10

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 526

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
SAMPLE TYPE: SC-EFF
DILUTION WATER:

PERSON CONDUCTING TEST:
BEGINNING: ____hrs; 11/1/94
ENDING: ____hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
50	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
100	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	9	9	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
	TIME:	1800	1830	1430	1330	1400	1450	18:45	11:30
	INITIAL:	LJT	LJT	mm	mm	mm	WAK	RXK	RXK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
50	A	1.11427	1.10580	1.11428			
	B		1.10788	1.11529			
	C		1.11206	1.11887			
	D		1.10681	1.11384			
100	A	1.12578	1.11921	1.12581			
	B		1.11403	1.12072			
	C		1.11724	1.12334			
	D		1.12371	1.12984			

Tinker AFB Test # 13 TEST START DATE Nov 1, 94

SAMPLE ID SC-EE01 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
cont	A	1.11765	1.12624	0.00859	10	0.86
	B	1.11428	1.12293	0.00865	10	0.87
	C	1.11232	1.12045	0.00813	10	0.81
	D	1.10291	1.10964	0.00673	10	0.67
6.25%	A	1.11297	1.12157	0.0086	10	0.86
	B	1.10948	1.1174	0.00792	10	0.79
	C	1.12035	1.12841	0.00806	10	0.81
	D	1.11879	1.12547	0.00668	10	0.67
12.50%	A	1.12413	1.13236	0.00823	10	0.82
	B	1.12058	1.12874	0.00816	10	0.82
	C	1.1109	1.11856	0.00766	9	0.85
	D	1.11037	1.11883	0.00846	10	0.85
25%	A	1.10058	1.10931	0.00873	10	0.87
	B	1.10905	1.11609	0.00704	10	0.70
	C	1.10508	1.11279	0.00771	10	0.77
	D	1.11263	1.11806	0.00543	8	0.68
50%	A	1.1058	1.11428	0.00848	10	0.85
	B	1.10788	1.11529	0.00741	10	0.74
	C	1.11206	1.11887	0.00681	10	0.68
	D	1.10681	1.11384	0.00703	10	0.70
100%	A	1.11921	1.12581	0.0066	10	0.66
	B	1.11403	1.12072	0.00669	9	0.74
	C	1.11724	1.12334	0.0061	10	0.61
	D	1.12371	1.12984	0.00613	10	0.61

The number of surviving fish in 12.5 C and 25 D was 10, but less were found in the boat after drying

P. promelas
SC-EE01
11/1/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	25	25.5	25.0	24.5	24.2	24.2	25.3	25.3	25.2	25.2	24.9	25.0	25.0	25.3		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.7	7.7	8.6	8.4	8.6	8.1	8.3	6.4	8.5	7.6	8.5	7.7	8.4	8.0		
6.25	8.6	7.7	8.6	8.3	8.6	8.1	8.2	6.4	8.4	7.5	8.4	7.7	8.4	7.9		
12.5	8.6	7.7	8.6	8.3	8.6	8.0	8.2	6.5	8.4	7.5	8.4	7.6	8.4	7.9		
25	8.6	7.6	8.6	8.3	8.6	8.0	8.2	6.5	8.4	7.4	8.4	7.6	8.3	7.9		
50	8.6	7.6	8.6	8.3	8.6	8.0	8.3	6.5	8.5	7.4	8.5	7.6	8.3	7.8		
100	8.7	7.8	8.6	8.5	8.6	8.0	8.4	6.5	8.6	7.2	8.5	7.5	8.3	7.7		

pH

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.10	8.46	8.60	8.50	8.60	8.31	8.17	8.19	8.56	8.32	8.58	8.32	8.62	8.42		
6.25	8.13	8.45	8.59	8.49	8.61	8.31	8.32	8.22	8.56	8.32	8.57	8.31	8.61	8.43		
12.5	8.07	8.46	8.59	8.47	8.59	8.31	8.32	8.23	8.56	8.32	8.56	8.33	8.63	8.40		
25	8.08	8.46	8.58	8.48	8.57	8.26	8.34	8.23	8.54	8.36	8.55	8.33	8.61	8.42		
50	8.09	8.49	8.57	8.50	8.57	8.10	8.25	8.27	8.50	8.30	8.54	8.30	8.62	8.43		
100	8.14	8.44	8.54	8.52	8.48	7.71	8.31	8.33	8.44	8.31	8.51	8.31	8.61	8.49		

CONDUCTIVITY

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	381	407	414	404	411	378	381	416	358	411	367	403	366	284		
6.25	363	405	375	404	357	375	374	407	362	398	375	406	375	416		
12.5	364	411	376	412	358	371	370	416	362	404	371	402	378	423		
25	368	405	377	417	362	405	374	416	368	404	372	403	374	428		
50	379	420	383	433	390	395	380	424	376	411	376	408	374	433		
100	405	441	400	450	398	387	396	445	399	420	342	427	389	437		

f93506-fm13
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	10	6	8	0

Calculated Chi-Square goodness of fit test statistic = 8.1636
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-fm13
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 28.31
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

TITLE: f93506-fm13
ILE: S:\toxlab\toxstat\f93506-f
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.8600	0.8600
1	Control	2	0.8700	0.8700
1	Control	3	0.8100	0.8100
1	Control	4	0.6700	0.6700
2	6.25%	1	0.8600	0.8600
2	6.25%	2	0.7900	0.7900
2	6.25%	3	0.8100	0.8100
2	6.25%	4	0.6700	0.6700
3	12.5%	1	0.8200	0.8200
3	12.5%	2	0.8200	0.8200
3	12.5%	3	0.8500	0.8500
3	12.5%	4	0.8500	0.8500
4	25%	1	0.8700	0.8700
4	25%	2	0.7000	0.7000
4	25%	3	0.7700	0.7700
4	25%	4	0.6800	0.6800
5	50%	1	0.8500	0.8500
5	50%	2	0.7400	0.7400
5	50%	3	0.6800	0.6800
5	50%	4	0.7000	0.7000
6	100%	1	0.6600	0.6600
6	100%	2	0.7400	0.7400
6	100%	3	0.6100	0.6100
6	100%	4	0.6000	0.6000

f93506-fm13
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.670	0.870	0.803
2	6.25%	4	0.670	0.860	0.783
3	12.5%	4	0.820	0.850	0.835
4	25%	4	0.680	0.870	0.755
5	50%	4	0.680	0.850	0.743
6	100%	4	0.600	0.740	0.653

f93506-fm13
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.008	0.092	0.046
2	6.25%	0.006	0.081	0.040
3	12.5%	0.000	0.017	0.009
4	25%	0.007	0.086	0.043
5	50%	0.006	0.076	0.038
6	100%	0.004	0.064	0.032

f93506-fm13
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.079	0.016	3.200
Within (Error)	18	0.098	0.005	
Total	23	0.177		

Critical F value = 2.77 (0.05,5,18)
Since F > Critical F REJECT Ho:All groups equal

f93506-fm13
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.803	0.803		
2	6.25%	0.783	0.783	0.400	
3	12.5%	0.835	0.835	-0.650	
4	25%	0.755	0.755	0.950	
5	50%	0.743	0.743	1.200	
6	100%	0.653	0.653	3.000	*

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-fm13
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

DUNNETTS 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	Control	4			
2	6.25%	4	0.120	15.0	0.020
3	12.5%	4	0.120	15.0	-0.033
4	25%	4	0.120	15.0	0.048
5	50%	4	0.120	15.0	0.060
6	100%	4	0.120	15.0	0.150

№ 14

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: Tox Test	REMARKS
SC-EE01TX001	10-28-94	1400	water	3	✓	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/28/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
			10/29/94 0920	2°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

№ 14

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature) [signature]

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

ANALYSES REQUIRED: TOX Test

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	TOX Test						REMARKS
SC-EE01 TX 001	10/28/94	1400	water	2	✓						
SC-EE01-TX-001	10/28/94	1430	soil	✓							

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
[signature]	10/28/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Liza Teer	10/31/94 0900	6°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 316/315
JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: Controls
NPDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/28/94
START TIME: 1600
DILUTION WATER: FM-Spring (C.dubia Hard-very Hard Distilled)

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC. (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
Con Spring	A	10	10	10	0	25.4		25.2	8.4		8.2	8.62		8.63	380		~~458~~ 409
	B	10	10	10	0												
Con Very Hard	A	10	10	9	1				8.6		8.3	8.63		8.60	1143		1191
	B	10	10	10	0												
C. dubia																	
Con Hard	A	5	5	5	0				8.5		7.8	8.50		8.50	613		722
	B	5	5	5	0												
	C	5	4	4	1												
	D	5	5	5	0												
Con Very Hard	A	5	5	5	0				8.6		8.0	8.63		8.43	1143		1008
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	MLS													
Time		1600	1515	1600													

Comments

	Spring	Hard Dist.	Very Hard Dist
Hardness	200	220	390
Alk:	220	130	240

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	170	~~1135~~ 170
Total Alkalinity (mg/L CaCO3 @ 4.5)	120	time

48-hr Ceriodaphnia dubia ACUTE TOXICITY TEST - STATIC, NONRENEWAL

I NO. 315
NO.
JSTRY:
ITACT:
LUENT: EE2
)ES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/28/94
START TIME: 1530
DILUTION WATER: Very Hard Distilled

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: 30 mL
TEST SOLN VOLUME/DEPTH: 20 mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 4

ONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (SU) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	5	5	5	0	25.4		25.2	8.5		8.2	8.50		8.58	~~615~~ 1173		1133
	B	5	5	2	3												
	C	5	5	5	0												
	D	5	5	5	0												
12.5	A	5	4	1	4				8.7		8.1	8.62		8.62	1173		1098
	B	5	4	4	1												
	C	5	3	1	4												
	D	5	3	3	2												
25	A	5	0	-	5				8.6		8.1	8.63		8.62	1146		1030
	B	5	0	-	5												
	C	5	2	0	5												
	D	5	4	1	4												
50	A	5	0	-	5				8.7		8.1	8.62		8.60	1101		775
	B	5	0	-	5												
	C	5	0	-	5												
	D	5	0	-	5												
100	A	5	0	-	5				8.7		8.0	8.57		8.56	861		828
	B	5	0	-	5												
	C	5	0	-	5												
	D	5	0	-	5												
tials		MLS	MLS	MLS													
me		1530	1515	1220													

omments

LC50 = 11.1%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	390	390
Total Alkalinity	210	180

Test 9

Tinker C. dubia Acute - Sample EE02

Conc.	Number Exposed	Number Resp.	Observed Proportion Responding	Adjusted Proportion Responding	Predicted Proportion Responding
6.2500	20	3	0.1500	0.1500	0.1323
12.5000	20	11	0.5500	0.5500	0.5873
25.0000	20	19	0.9500	0.9500	0.9402
50.0000	20	20	1.0000	1.0000	0.9981
100.0000	20	20	1.0000	1.0000	1.0000

Chi - Square Heterogeneity = 0.242

Mu = 1.047232
Sigma = 0.225307

Parameter	Estimate	Std. Err.	95% Confidence Limits
Intercept	0.351978	0.957849	(-1.525406, 2.229362)
Slope	4.438386	0.874837	(2.723706, 6.153066)

Theoretical Spontaneous Response Rate = 0.0000

use
10%
5
2.5
1.25
0.625

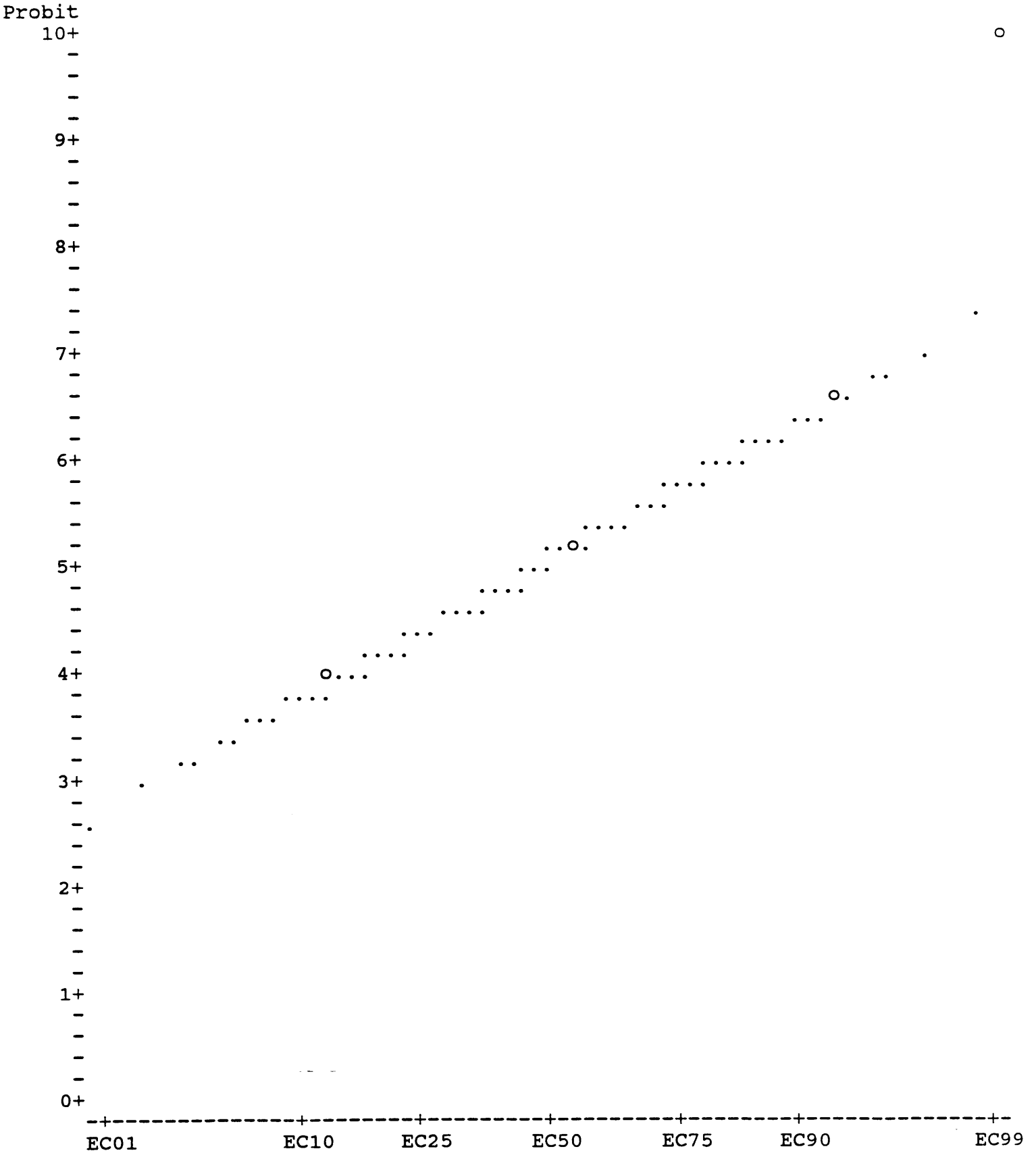
Tinker C. dubia Acute - Sample EE02

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
EC 1.00	3.3350	1.4475	4.9331
EC 5.00	4.7492	2.5398	6.4545
EC10.00	5.7343	3.4124	7.4823
EC15.00	6.5121	4.1522	8.2925
EC50.00	11.1489	8.8766	13.7298
EC85.00	19.0871	15.2675	28.2547
EC90.00	21.6763	16.9768	34.2671
EC95.00	26.1722	19.7410	45.8977
EC99.00	37.2704	25.9047	80.2967

Tinker C. dubia Acute - Sample EE02

PLOT OF ADJUSTED PROBITS AND PREDICTED REGRESSION LINE



48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 3116
JOB NO.
INDUSTRY: Tinker
CONTACT:
EFFLUENT: EE2
NPDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/28/94
START TIME: 1600
DILUTION WATER: V. Hand

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
Con	A	10	10	10	0	25.4	2 on Con		See Sheet			8.50	on Con		~~1173~~ See Sheet		
V Hand	B	10	10	10	0												
6.25	A	10	10	10	0				8.7		8.4	8.62		8.63	~~1146~~		
	B	10	10	10	0										1173		1198
12.5	A	10	10	10	0				8.6		8.4	8.63		8.64	~~1107~~		1191
	B	10	10	10	0										1146		
25	A	10	10	10	0				8.7		8.4	8.62		8.63	~~1064~~		1084
	B	10	10	10	0										1101		
50	A	10	10	10	0				8.7		8.3	8.57		8.59	1016		1030
	B	10	10	10	0												
100	A	10	10	9	0				8.7		8.4	8.51		8.59	861		880
	B	10	8	8	0												
Initials		MM	MC	MLS													
Time		1600	1500	1400													

Comments

Ammonia: <40 ppb LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	390 ~~405~~	390
Total Alkalinity (mg/L CaCO3 @ 4.5)	240 ~~250~~	190

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

Failed - Redo
LOG 327

Log No. 323

JOB NO. F93506
INDUSTRY: Tinker
CONTACT: Test 9
EFFLUENT: SC-EE02
NPDES PERMIT NO:
PERSON CONDUCTING TEST:

BEGINNING: ____ hrs; / /
ENDING: ____ hrs; / /
FEEDING REGIME:
.05 mL yct/15 mL
.05 mL algal suspension/15 mL

PHOTOPERIOD: 16 light, 8 dark
ORGANISM SOURCE: WCC
TEST VESSEL CAPACITY: 30 mL
TEST SOLUTION VOLUME: 15mL
NO. REPLICATES: 10
DILUTION WATER:

CONC	TIME / OBSERVER / CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7

NUMBER OF YOUNG PRODUCED

VHard-390

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Con	1		✓	✓	4	0	0	0	
	2		✓	✓	✓	0	0	0	
	3		✓	✓	✓	0	6	0	
	4		✓	✓	✓	0	mls 0	4	
	5		✓	✓	✓	0	0	0	
	6		✓	✓	✓	0	0	7	
	7		✓	✓	2	0	7	0	10
	8		✓	✓	✓	0	0	5	
	9		✓	✓	✓	0	0	0	
	10		✓	✓	✓	0	0	6	

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
6.25	11		✓	✓	4	0	0	7	
	12		✓	✓	✓	2	9	0	
	13		✓	✓	✓	1	7	0	
	14		✓	✓	✓	0	0	7	
	15		✓	✓	✓	✓	✓	10	
	16		✓	✓	✓	0	0	D 7	
	17		✓	✓	✓	0	6	0	
	18		✓	✓	✓	0	0	2	
	19		✓	✓	✓	0	0	D 6	
	20		✓	✓	✓	1	0	0	

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
12.5	21		✓	✓	✓	0	D		
	22		✓	D					
	23		✓	✓	mls 4	0	0	0	
	24		✓	✓	✓	2	0	0	
	25		✓	✓	✓	0	6	0	
	26		✓	✓	4	0	0	4	
	27		✓	✓	✓	D			
	28		✓	✓	✓	0	0	D	
	29		✓	✓	✓	0	9	0	
	30		✓	✓	✓	0	0	0	

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F93506 | BEGINNING: ____hrs; / / | Log No: 323
INDUSTRY: Tinker | ENDING: ____hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: Testa | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: SCEE02 | .05 mL ycl/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
	TIME								
	OBSERVER								
25%	31		✓	✓	3	0	0	0	
	32		✓	✓	✓	0	8	0	
	33		✓	✓	2	0	0	0	
	34		✓	✓	M/S 2	0	8	0	
	35		✓	✓	✓	0	2	0	
	36		✓	✓	✓	0	0	6	
	37		✓	✓	✓	0	D		
	38		✓	✓	2	0	0	4	
	39		✓	✓	✓	0	0	0	
	40		✓	✓	✓	0	0	0	
50%	41		✓	✓	✓	D			
	42		✓	✓	✓	0	D		
	43		✓	✓	✓	0	0	0	
	44		✓	✓	2	0	0	D0	
	45		✓	✓	✓	0	0	8	
	46		✓	✓	✓	0	0	0	
	47		✓	✓	✓	0	0	0	
	48		✓	✓	2	0	0	0	
	49		✓	✓	✓	0	0	0	
	50		D						
100%	51		✓	✓	✓	5	0	0	
	52		✓	✓	✓	0	0	0	
	53		✓	✓	✓	D			
	54		✓	✓	✓	0	0	5	
	55		✓	✓	D				
	56		✓	✓	✓	0	0	D3	
	57		✓	✓	4	0	0	0	
	58		✓	✓	✓	0	0	0	
	59		✓	✓	D4				
	60		✓	✓	✓	1	0	0	

Test 9

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: V ~~I~~ ~~J~~ Ø ~~II~~ I ~~#2~~ Start Date: 10/31/94 Sample ID: SC-8802 Log #: 3.2

AD	ID 20	1 ✓	AD	ID 39	1 ✓	AD	ID 44	1 ✓	AD	ID 40	1 ✓		ID 5	1 ✓
2 ✓	3 ✓	4 1	2 ✓	3 ✓	4 0	2 ✓	3 2	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0
5 0	6 0	7 0	5 0	6 0	7 9	5 0	6 D0	7	5 0	6 0	7 0	5 0	6 0	7 0
AD	ID 1	1 ✓	AD	ID 56	1 ✓	AD	ID 22	1 ✓	AD	ID 18	1 ✓		ID 58	1 ✓
2 ✓	3 4	4 0	2 ✓	3 ✓	4 0	2 D	3	4	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0
5 0	6 0	7 12	5 0	6 D3	7	5	6	7	5 0	6 2	7 0	5 0	6 0	7 12
AD	ID 57	1 ✓	AD	ID 23	1 ✓	AD	ID 38	1 ✓	AD	ID 3	1 ✓		ID 25	1 ✓
2 ✓	3 4	4 0	2 ✓	3 4	4 0	2 ✓	3 2	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0
5 0	6 0	7 0	5 0	6 0	7 0	5 0	6 4	7 6	5 6	6 0	7 9	5 6	6 0	7 0
AD	ID 43	1 ✓	AD	ID 2	1 ✓	AD	ID 17	1 ✓	AD	ID 55	1 ✓		ID 19	1 ✓
2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 D	4	2 ✓	3 ✓	4 0
5 0	6 0	7 9	5 0	6 0	7	5 6	6 0	7 10	5	6	7	5 0	6 D6	7
AD	ID 21	1 ✓	AD	ID 37	1 ✓	AD	ID 54	1 ✓	AD	ID 42	1 ✓		ID 60	1 ✓
2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 1
5 D	6	7	5 D	6	7	5 0	6 5	7 D0	5 D	6	7	5 0	6 0	7 11
AD	ID 41	1 ✓	AD	ID 16	1 ✓	AD	ID 24	1 ✓	AD	ID 36	1 ✓		ID 4	1 ✓
2 ✓	3 ✓	4 D	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0
5	6	7	5 0	6 7D	7	5 0	6 0	7 0	5 0	6 6	7 8	5 0	6 4	7 0

Comments:

Cup ID	Sample Concentration	Day Ø	Initials LJT	Time 1400
1–10:	Control (HRD. 390)	1	MLS	1515
11–20:	0.625%	2	LJT	1545
21–30:	1.25%	3	LJT	1740
31–40:	2.5%	4	MLS	1530
41–50:	5%	5	MLS	1400
51–60:	10%	6	MLS	1430
		7		

Test 9

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: D ~~B A S U~~ V Start Date: 10/31/94 Sample ID: SC-EE02 Log #: 3.2

AD ID 14 1 ✓	AD ID 31 1 ✓	AD ID 52 1 ✓	AD ID 9 1 ✓	ID 30 1 ✓
2 ✓ 3 ✓ 4 0	2 ✓ 3 2 4 0	2 ✓ 3 ✓ 4 0	2 ✓ 3 ✓ 4 0	2 ✓ 3 ✓ 4 0
5 0 6 7 7 10	5 0 6 0 7 0	5 0 6 0 7 0	5 0 6 0 7 0	5 0 6 0 7 0
AD ID 6 1 ✓	AD ID 28 1 ✓	AD ID 15 1 ✓	AD ID 47 1 ✓	ID 35 1 ✓
2 ✓ 3 ✓ 4 0	2 ✓ 3 ✓ 4 0	2 ✓ 3 ✓ 4 0	2 ✓ 3 ✓ 4 0	2 ✓ 3 ✓ 4 0
5 0 6 7 7 0	5 0 6 D 0 7	5 0 6 10 7 12	5 0 6 0 7 0	5 2 6 0 7 0
AD ID 46 1 ✓	AD ID 51 1 ✓	AD ID 34 1 ✓	AD ID 49 1 ✓	ID 10 1 ✓
2 ✓ 3 ✓ 4 0	2 ✓ 3 ✓ 4 5	2 ✓ 3 2 4 0	2 ✓ 3 ✓ 4 0	2 ✓ 3 ✓ 4
5 0 6 0 7 0	5 0 6 0 7 0	5 8 6 0 7 10	5 0 6 0 7 0	5 0 6 6 7
AD ID 27 1 ✓	AD ID 45 1 ✓	AD ID 8 1 ✓	AD ID 13 1 ✓	ID 53 1
2 ✓ 3 ✓ 4 D	2 ✓ 3 ✓ 4 0	2 ✓ 3 ✓ 4 0	2 ✓ 3 ✓ 4 1	2 ✓ 3 ✓ 4 D
5 6 7	5 0 6 8 7 0	5 0 6 5 7 0	5 7 6 0 7 0	5 6 7
AD ID 32 1 ✓	AD ID 11 1 ✓	AD ID 33 1 ✓	AD ID 59 1 ✓	ID 48 1 ✓
2 ✓ 3 ✓ 4 0	2 ✓ 3 4 4 0	2 ✓ 3 2 4 0	2 ✓ 3 D 4	2 ✓ 3 2 4 0
5 8 6 0 7 0	5 0 6 7 7 0	5 0 6 0 7 0	5 6 7	5 0 6 0 7
AD ID 7 1 ✓	AD ID 26 1 ✓	AD ID 12 1 ✓	AD ID 50 D	ID 29 1 ✓
2 ✓ 3 2 4 0	2 ✓ 3 4 4 0	2 ✓ 3 ✓ 4 2	2 ✓ 3 4	2 ✓ 3 ✓ 4 0
5 7 6 0 7 10	5 0 6 4 7 0	5 9 6 0 7 0	5 6 7	5 9 6 0 7 0

Comments:

Day 0 Initials LJT Time 1600

Cup ID	Sample Concentration
1–10:	Control (HRD: 390)
11–20:	0.625
21–30:	1.25
31–40:	2.5
41–50:	5
51–60:	10

Day	Initials	Time
1	MLS	1527
2	LJT	1545
3	LJT	1740
4	MLS	1540
5	MLS	1410
6	MLS	1430
7		

Organism: C. dubia
Sample ID: SC-E002
Start date: 10/31/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25.1	25	25	25.3	25	25.0	24.9	25.3	25.0	25.0	25.2	25.16	25.2	25.0		
0.625																
1.25																
2.5																
5																
10																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.3	8.5	8.7	8.5	8.7	8.4	8.7	8.0	8.5	7.8	8.0	8.0	8.5	8.0		
0.625	8.3	8.4	8.6	8.3	8.6	8.4	8.7	8.2	8.5	7.9	8.2	7.9	8.5	8.0		
1.25	8.2	8.6	8.6	8.4	8.6	8.4	8.6	8.3	8.5	7.9	8.3	8.0	8.5	8.1		
2.5	8.5	8.5	8.7	8.4	8.7	8.3	8.6	8.2	8.5	7.9	8.2	8.0	8.5	8.1		
5	8.5	8.5	8.7	8.4	8.5	8.3	8.6	8.3	8.5	7.9	9.3	8.1	8.5	8.1		
10	8.5	8.5	8.7	8.4	8.5	8.3	8.6	8.0	8.5	7.8	8.3	8.1	8.5	8.1		

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.69	8.56	8.56	8.58	8.29	8.35	8.56	8.46	8.58	8.37	8.39	8.29	8.34	8.19		
0.625	8.62	8.55	8.49	8.60	8.53	8.35	8.41	8.48	8.55	8.36	8.42	8.35	8.37	8.21		
1.25	8.61	8.56	8.49	8.59	8.55	8.39	8.52	8.47	8.49	8.36	8.43	8.35	8.41	8.22		
2.5	8.62	8.56	8.51	8.60	8.56	8.40	8.56	8.56	8.54	8.35	8.45	8.36	8.42	8.22		
5	8.63	8.55	8.52	8.60	8.57	8.39	8.57	8.47	8.53	8.35	8.44	8.36	8.44	8.24		
10	8.61	8.55	8.49	8.61	8.58	8.37	8.56	8.49	8.52	8.37	8.44	8.37	8.45	8.23		

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	1158	1202	1137	993	990	898	856	891	729	724	672	679	660	694		
0.625	1129	1188	1142	1074	774	844	840	859	694	690	663	668	662	715		
1.25	1136	1073	1141	1099	869	913	791	866	702	700	673	671	673	714		
2.5	1134	1199	1136	1089	856	847	837	864	693	699	676	685	678	731		
5.0	1127	1154	1126	1184	861	899	836	871	692	709	677	686	684	734		
10.0	1076	1143	1120	1179	800	875	839	883	699	715	669	697	691	736		

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

NOEC = 10.0%

in Mod. Hd.

JOB NO: F93506
INDUSTRY: Tinker
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
PERSON CONDUCTING TEST:

BEGINNING: 1530 hrs; 11/7/
ENDING: 1720 hrs; / /
FEEDING REGIME:
.05 mL yct/15 mL
.05 mL algal suspension/15 mL

Log No: 324
PHOTOPERIOD: 16 light, 8 dark
ORGANISM SOURCE: WCC
TEST VESSEL CAPACITY: 30 mL
TEST SOLUTION VOLUME: 15mL
NO. REPLICATES: 10
DILUTION WATER:

CONC	CHAMBER	TIME	1830	1440	1600	1610	1815	1325	1830	1720
		OBSERVER	LJT	LJT	LJT	LJT	MAR	LJT	LJT	MLS
			NUMBER OF YOUNG PRODUCED							
			START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Mod Hd										
Con	1			✓	✓	✓	2	0	8	8
	2			✓	✓	✓	3	5	4	10
	3			✓	✓	✓	✓	6	6	3
	4			✓	✓	✓	3	4	8	11
	5			✓	✓	3	✓	6	5	7
	6			✓	✓	✓	✓	5	3	3
	7			✓	✓	3	✓	8	8	5
	8			✓	✓	✓	1	8	3	6
	9			✓	✓	✓	✓	3	0	8
	10			✓	✓	✓	✓	7	6	0
0.625%			START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
~~MLS~~	11			✓	✓	D	X	X	X	X
	12			✓	✓	✓	1	1	11	10
	13			✓	✓	✓	✓	1	8	4
	14			✓	✓	✓	✓	0	0	0
	15			✓	✓	✓	✓	0	9	14
	16			✓	✓	✓	3	8	6	4
	17			✓	✓	✓	✓	5	6	4
	18			✓	✓	✓	4	8	6	5
	19			✓	✓	✓	1	0	7	1
	20			✓	✓	✓	✓	9	5	3
1.25%			START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
~~MLS~~	21			✓	✓	4	✓	D		
	22			✓	✓	✓	1	7	3	2
	23			✓	✓	✓	2	5	6	4
	24			✓	✓	✓	✓	3	6	6
	25			✓	✓	✓	✓	0	4	9
	26			✓	✓	✓	1	7	8	0
	27			✓	✓	✓	2	0	7	9
	28			✓	✓	✓	4	7	5	7
	29			✓	✓	✓	✓	8	0	12
	30			✓	✓	4	✓	7	8	5

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F93506 | BEGINNING: ____ hrs; / / . | Log No. ____
INDUSTRY: Tinker | ENDING: ____ hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: | .05 mL ycf/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

TIME
OBSERVER

CONC | CHAMBER | NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
2.5%	31		✓	✓	✓	✓	D-4	X	X
~~2.5%~~	32		✓	✓	✓	✓	0	4	0
	33		✓	✓	✓	3	15	3	0
	34		✓	✓	✓	1	0	8	13
	35		✓	✓	3	✓	6	5	7
	36		✓	✓	✓	✓	0	11	11
	37		✓	✓	✓	4	0	2	9
	38		✓	✓	✓	✓	1	8	5
	39		✓	✓	2	1	5	8	2
	40		✓	✓	2	✓	8	9	5
5.0%	41		✓	✓	✓	✓	5	7	5
~~5.0%~~	42		✓	✓	4	✓	5	8	0
	43		✓	✓	✓	✓	4	7	0
	44		✓	✓	✓	1	1	6	15
	45		✓	✓	✓	4	0	6	11
	46		✓	✓	✓	✓	0	0	0
	47		✓	✓	✓	1	8	D-12	X
	48		✓	✓	✓	4	7	7	2
	49		✓	✓	✓	4	1	7	0
	50		✓	✓	✓	7	0	10	12
10.0%	51		✓	✓	✓	✓	0	0	0
~~10.0%~~	52		✓	✓	✓	3	0	6	0
	53		✓	✓	✓	✓	0	8	10
	54		✓	✓	✓	4	7	9	3
	55		✓	✓	✓	2	D-9	X	X
	56		✓	✓	2	✓	9	D-10	
	57		✓	✓	✓	2	8	6	4
	58		✓	✓	✓	1	5	5	3
	59		✓	✓	2	✓	1	6	4
	60		✓	✓	✓	5	0	13	12

Test 7 (redo-mod. [illegible])

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ~~ZAKQRQ~~ Start Date: 11/1/94 Sample ID: SC 8802 Log #: [illegible]

AD	ID 31	1 ✓	AD	ID 9	1 ✓	AD	ID 50	1 ✓	AD	ID 13	1 ✓		ID 24	1 ✓
2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 7 MAR	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓
5 4 D	6	7	5 3	6 0	7 8	5 0	6 10	7 12	5 1	6 8	7 4	5 3	6 6	7 [illegible]
AD	ID 49	1 ✓	AD	ID 51	1 ✓	AD	ID 44	1 ✓	AD	ID 34	1 ✓		ID 55	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 1	2 ✓	3 ✓	4 1	2 ✓	3 ✓	4 2
5 1	6 7	7 0	5 0	6 0	7 0	5 1	6 6	7 15	5 0	6 8	7 13	5 9 D	6	7
AD	ID 12	1 ✓	AD	ID 56	1 ✓	AD	ID 60	1 ✓	AD	ID 8	1 ✓		ID 57	1 ✓
2 ✓	3 ✓	4 1	2 ✓	3 2	4 ✓	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 1	2 ✓	3 ✓	4 2
5 1	6 11	7 10	5 9	6 10 D	7	5 0	6 13	7 12	5 8	6 3	7 6	5 8	6 6	7 4
AD	ID 7	1 ✓	AD	ID 23	1 ✓	AD	ID 54	1 ✓	AD	ID 30	1 ✓		ID 33	1 ✓
2 ✓	3 3	4 ✓	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 4	2 ✓	3 4	4 ✓	2 ✓	3 ✓	4 3
5 8	6 8	7 5	5 5	6 6	7 4	5 7	6 9	7 3	5 7	6 8	7 5	5 1 + 2	6 3	7 ✓
AD	ID 43	1 ✓	AD	ID 14	1 ✓	AD	ID 48	1 ✓	AD	ID 53	1 ✓		ID 25	1 ✓
2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓
5 4	6 7	7 0	5 0	6 0	7 0	5 7	6 7	7 2	5 0	6 8	7 10	5 0	6 4	7 9
AD	ID 26	1 ✓	AD	ID 32	1 ✓	AD	ID 10	1 ✓	AD	ID 52	1 ✓		ID 11	1 ✓
2 ✓	3 ✓	4 1	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 3	2 ✓	3 D	4
5 7	6 8	7 0	5 0	6 4	7 0	5 7	6 6	7 0	5 0	6 6	7 0	5	6	7

Comments:

Cup ID	Sample Concentration	Day ∅	Initials LJT	Time 1830
1–10:	Control	1	LJT	1440
11–20:	0.625%	2	LJT	1600
21–30:	1.25%	3	LJT	1610
31–40:	2.5%	4	MAR	1815
41–50:	5.0%	5	LJT	1325
51–60:	10.0%	6	LJT	1830
		7	MLS	1715

Test 4 [illegible]

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ~~A~~ ~~M~~ ~~K~~ ~~M~~ ~~G~~ M Start Date: 11/7/94 Sample ID: [illegible] Log #: 32[illegible]

AD	ID 19	1 ✓	2 ✓	3 ✓	4 1	5 0	6 7	7 1	AD	ID 29	1 ✓	2 ✓	3 ✓	4 L	5 8	6 0	7 12	AD	ID 38	1 ✓	2 ✓	3 ✓	4 L	5 1	6 8	7 5	AD	ID 47	1 ✓	2 ✓	3 ✓	4 1	5 8	6 12 D	7		ID 3	1 ✓	2 ✓	3 ✓	4 L	5 6	6 6	7 3
AD	ID 1	1 ✓	2 ✓	3 ✓	4 2	5 0	6 8	7 8	AD	ID 41	1 ✓	2 ✓	3 ✓	4 L	5 5	6 7	7 5	AD	ID 27	1 ✓	2 ✓	3 ✓	4 2	5 0	6 7	7 9	AD	ID 18	1 ✓	2 ✓	3 ✓	4 4	5 8	6 6	7 5		ID 40	1 ✓	2 ✓	3 2	4 ✓	5 8	6 9	7 5
AD	ID 17	1 ✓	2 ✓	3 ✓	4 L	5 5	6 6	7 4	AD	ID 35	1 ✓	2 ✓	3 3	4 L	5 6	6 5	7 7	AD	ID 2	1 ✓	2 ✓	3 ✓	4 3	5 5	6 4	7 10	AD	ID 39	1 ✓	2 ✓	3 2	4 1	5 5	6 8	7 2		ID 21	1 ✓	2 ✓	3 4	4 ✓	5 D	6	7
AD	ID 22	1 ✓	2 ✓	3 ✓	4 1	5 7	6 3	7 2	AD	ID 59	1 ✓	2 ✓	3 2	4 L	5 1	6 6	7 4	AD	ID 16	1 ✓	2 ✓	3 ✓	4 3	5 8	6 6	7 4	AD	ID 58	1 ✓	2 ✓	3 ✓	4 1	5 5	6 5	7 3		ID 6	1 ✓	2 ✓	3 ✓	4 L	5 5	6 3	7 3
AD	ID 45	1 ✓	2 ✓	3 ✓	4 4	5 0	6 6	7 11	AD	ID 4	1 ✓	2 ✓	3 ✓	4 3	5 4	6 8	7 11	AD	ID 46	1 ✓	2 ✓	3 ✓	4 L	5 0	6 0	7 0	AD	ID 36	1 ✓	2 ✓	3 ✓	4 L	5 0	6 11	7 11		ID 42	1 ✓	2 ✓	3 4	4 L	5 5	6 8	7 0
AD	ID 15	1 ✓	2 ✓	3 ✓	4 L	5 0	6 9	7 14	AD	ID 37	1 ✓	2 ✓	3 ✓	4 4	5 0	6 2	7 9	AD	ID 28	1 ✓	2 ✓	3 ✓	4 4	5 7	6 5	7 7	AD	ID 5	1 ✓	2 ✓	3 3	4 V	5 6	6 5	7 7		ID 20	1 ✓	2 ✓	3 ✓	4 L	5 9	6 5	7 3

Comments:

Cup ID	Sample Concentration	Day ∅	Initials LJT	Time 1830
		1	LJT	1440
1–10:	Control	2	LJT	1600
11–20:	0.625%	3	LJT	1610
21–30:	1.25%	4	MAR	1815
31–40:	2.5%	5	LJT	1325
41–50:	5.0%	6	LJT	1830
51–60:	10.0%	7	MLS	1720

test

C. dubia
SC-EE02
11/7/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25.0	25.3	25.3	25.1	25.1	25.2	25.2	25.4	25.4	25.0	25.0	25.2	25.2	25.0	25.0	
0.625																
1.25																
2.5																
5																
10																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.4	8.2	8.3	8.2	8.4	8.2	8.2	8.2	8.4	8.5	8.4	8.4	8.5	8.6		
0.625	8.4	8.2	8.4	8.1	8.3	8.1	8.3	8.2	8.4	8.4	8.5	8.4	8.5	8.5		
1.25	8.4	8.3	8.4	8.2	8.3	8.1	8.3	8.3	8.5	8.4	8.5	8.2	8.5	8.5		
2.5	8.4	8.3	8.3	8.2	8.4	8.1	8.3	8.3	8.5	8.4	8.6	8.2	8.6	8.4		
5	8.4	8.2	8.3	8.1	8.4	8.1	8.2	8.2	8.5	8.7	8.6	8.1	8.5	8.4		
10	8.4	8.3	8.3	8.1	8.4	8.1	8.2	8.2	8.5	8.7	8.6	8.2	8.5	8.4		

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD (new)	Day 4 NEW (old)	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.31	8.17	8.29	7.90	8.35	8.17	8.2	8.33	8.03	7.96	7.86	7.96	7.86	7.58		
0.625	8.32	8.16	8.36	8.15	8.36	8.14	8.34	8.35	[illegible]	7.92	8.00	7.90	7.91	7.87		
1.25	8.32	8.13	8.38	8.21	8.37	8.11	8.35	8.32	8.00	7.91	8.08	7.91	8.01	7.91		
2.5	8.32	8.14	8.39	8.27	8.38	8.13	8.41	8.37	1.95	7.92	8.10	7.93	8.09	8.02		
5	8.36	8.14	8.39	8.33	8.39	8.12	8.42	8.36	7.95	7.91	8.15	7.91	8.21	8.02		
10	8.37	8.16	8.40	8.29	8.41	8.15	8.43	8.38	7.96	7.94	8.16	7.98	8.23	8.04		

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD (new)	Day 4 NEW (old)	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	333	363	398	433	432	530	538	351	400	397	430	445	444	408		
0.625	381	411	377	410	392	454	450	342	447	390	352	372	414	379		
1.25	356	396	377	413	385	444	435	345	410	396	352	391	387	352		
2.5	396	383	354	408	390	430	438	353	416	376	359	379	376	360		
5	416	414	364	427	426	475	447	367	441	338	369	391	371	378		
10	432	445	457	456	461	480	467	394	454	428	399	372	392	431		

① 433

① 8.00
② 429
③ 434

f93506-cd9
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	7	11	22	18	2

Calculated Chi-Square goodness of fit test statistic = 4.9484
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd9
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 2.80
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

TITLE: f93506-cd9
FILE: S:\TOXLAB\TOXSTAT\F93506-C.
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	18.0000	18.0000
1	Control	2	22.0000	22.0000
1	Control	3	15.0000	15.0000
1	Control	4	26.0000	26.0000
1	Control	5	21.0000	21.0000
1	Control	6	11.0000	11.0000
1	Control	7	24.0000	24.0000
1	Control	8	18.0000	18.0000
1	Control	9	11.0000	11.0000
1	Control	10	13.0000	13.0000
2	0.625%	1	0.0000	0.0000
2	0.625%	2	23.0000	23.0000
2	0.625%	3	13.0000	13.0000
2	0.625%	4	0.0000	0.0000
2	0.625%	5	23.0000	23.0000
2	0.625%	6	21.0000	21.0000
2	0.625%	7	15.0000	15.0000
2	0.625%	8	23.0000	23.0000
2	0.625%	9	9.0000	9.0000
2	0.625%	10	17.0000	17.0000
3	1.25%	1	4.0000	4.0000
3	1.25%	2	13.0000	13.0000
3	1.25%	3	17.0000	17.0000
3	1.25%	4	15.0000	15.0000
3	1.25%	5	13.0000	13.0000
3	1.25%	6	16.0000	16.0000
3	1.25%	7	18.0000	18.0000
3	1.25%	8	23.0000	23.0000
3	1.25%	9	20.0000	20.0000
3	1.25%	10	24.0000	24.0000
4	2.5%	1	4.0000	4.0000
4	2.5%	2	4.0000	4.0000
4	2.5%	3	12.0000	12.0000
4	2.5%	4	22.0000	22.0000
4	2.5%	5	21.0000	21.0000
4	2.5%	6	22.0000	22.0000
4	2.5%	7	15.0000	15.0000
4	2.5%	8	14.0000	14.0000
4	2.5%	9	18.0000	18.0000
4	2.5%	10	24.0000	24.0000
5	5.0%	1	17.0000	17.0000
5	5.0%	2	17.0000	17.0000
5	5.0%	3	11.0000	11.0000
5	5.0%	4	23.0000	23.0000
5	5.0%	5	21.0000	21.0000
5	5.0%	6	0.0000	0.0000
5	5.0%	7	21.0000	21.0000
5	5.0%	8	20.0000	20.0000
5	5.0%	9	12.0000	12.0000
5	5.0%	10	29.0000	29.0000

6	10.0%	1	0.0000	0.0000
6	10.0%	2	9.0000	9.0000
6	10.0%	3	18.0000	18.0000
	10.0%	4	23.0000	23.0000
	10.0%	5	11.0000	11.0000
6	10.0%	6	21.0000	21.0000
6	10.0%	7	20.0000	20.0000
6	10.0%	8	14.0000	14.0000
6	10.0%	9	13.0000	13.0000
6	10.0%	10	30.0000	30.0000

f93506-cd9
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SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	11.000	26.000	17.900
2	0.625%	10	0.000	23.000	14.400
3	1.25%	10	4.000	24.000	16.300
4	2.5%	10	4.000	24.000	15.600
5	5.0%	10	0.000	29.000	17.100
6	10.0%	10	0.000	30.000	15.900

f93506-cd9
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	28.544	5.343	1.690
2	0.625%	79.822	8.934	2.825
3	1.25%	32.900	5.736	1.814
4	2.5%	52.489	7.245	2.291
5	5.0%	63.433	7.965	2.519
6	10.0%	70.322	8.386	2.652

f93506-cd9
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ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	74.000	14.800	0.271
Within (Error)	54	2947.600	54.585	

Total	59	3021.600

Critical F value = 2.45 (0.05,5,40)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

f93506-cd9
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DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	17.900	17.900		
2	0.625%	14.400	14.400	1.059	
3	1.25%	16.300	16.300	0.484	
4	2.5%	15.600	15.600	0.696	
5	5.0%	17.100	17.100	0.242	
6	10.0%	15.900	15.900	0.605	

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=40,5)

f93506-cd9
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DUNNETTS 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	Control	10			
2	0.625%	10	7.632	42.6	3.500
3	1.25%	10	7.632	42.6	1.600
4	2.5%	10	7.632	42.6	2.300
5	5.0%	10	7.632	42.6	0.800
6	10.0%	10	7.632	42.6	2.000

Test 4

FATHEAD MINNOW SURVIVAL AND GROWTH
7–DAY CHRONIC TOXICITY TEST

Log No. 324

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: SC-EE02
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Very Hard (390)

PERSON CONDUCTING TEST:
BEGINNING: ____hrs; 10/31/94
ENDING: ____hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: ~~3~~ 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	
Control	A	10	10	10	9	9	9	9/9	9	1 tiny
	B	10	10	10	10	10	10	10/10	10	
	C	10	10	10	10	10	10	10/10	11	
	D	10	10	10	10	10	10	10/10	10	
6.25	A	10	10	10	10	10	10	10/10	10	
	B	10	10	10	10	10	10	10/10	10	
	C	10	10	10	10	10	10	10/10	10	
	D	10	10	10	10	10	10	10/10	10	
12.5	A	10	10	10	10	10	10	10/10	10	
	B	10	10	10	10	10	10	10/10	10	2 tiny
	C	10	10	10	10	10	10	10/10	10	
	D	10	9	8	8	8	8	11/11	11	
25	A	10	10	10	10	10	10	10/10	10	
	B	10	10	10	10	10	10	10/10	10	
	C	10	10	10	10	10	10	10/10	10	
	D	10	10	10	10	10	10	10/10	10	
								Sun	11/7/94	
TIME:			MM	1715	1800	1620	1620	1220 / 15:20	13:30	
INITIAL:			1820	LJT	LJT	MM	TNT	SJB / Rxk	RXK	

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
Cont	A		1.10584	1.11266			
	B		1.11502	1.12337			
	C		1.12549	1.13423			
	D		1.11155	1.11987			
6.25	A		1.12711	1.13535			
	B		1.11097	1.11896			
	C		1.10699	1.11443			
	D		1.11946	1.12872			
12.5	A		1.10144	1.10957			
	B		1.11537	1.12202			
	C		1.11996	1.12718			
	D		1.10821	1.11727			
25	A		1.12005	1.12822			
	B		1.10550	1.11306			
	C		1.11580	1.12325			
	D		1.11885	1.12731			

orange

1251 1

FATHEAD MINNOW SURVIVAL AND GROWTH 7-DAY CHRONIC TOXICITY TEST

Log No. 324

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: SC-EEC2
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Moon Hard 39C

PERSON CONDUCTING TEST:
BEGINNING: ___ hrs; / / .
ENDING: ___ hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
50	A	10	10	10	10	10	10	10/10	10
	B	10	10	10	10	10	10	10/10	10
	C	10	10	10	10	10	10	10/10	10
	D	10	9	9	9	9	9	9/9	9
100	A	10	10	10	10	10	10	10/10	10
	B	10	10	10	10	10	10	10/10	10
	C	10	10	10	10	10	10	10/10	10
	D	10	10	10	9	9	9	9/9	9
	TIME:		1830	1715	1800		1640	1235	1520
	INITIAL:		MM	LJT	LJT		TNT	SJB/RXK	RXK

Sun

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
50	A		1.11012	1.11866			
	B		1.10986	1.11678			
	C		1.11643	1.12348			
	D		1.11656	1.12386			
100	A		1.11857	1.12692			
	B		1.11781	1.12569			
	C		1.11754	1.12491			
	D		1.11686	1.12357			

Tinker AFB Test # 9 TEST START DATE Oct 31, 94

SAMPLE ID SC-EE02 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
VHard cont	A	1.10584	1.11266	0.00682	9	0.76
	B	1.11502	1.12337	0.00835	10	0.84
	C	1.12549	1.13423	0.00874	11	0.79
	D	1.11155	1.11987	0.00832	10	0.83
6.25%	A	1.12711	1.13535	0.00824	10	0.82
	B	1.11097	1.11896	0.00799	10	0.80
	C	1.10699	1.11443	0.00744	10	0.74
	D	1.11946	1.12872	0.00926	10	0.93
12.50%	A	1.10144	1.10957	0.00813	10	0.81
	B	1.11537	1.12202	0.00665	10	0.67
	C	1.11996	1.12718	0.00722	10	0.72
	D	1.10821	1.11727	0.00906	11	0.82
25%	A	1.12005	1.12822	0.00817	10	0.82
	B	1.1055	1.11306	0.00756	10	0.76
	C	1.1158	1.12325	0.00745	10	0.75
	D	1.11885	1.12731	0.00846	10	0.85
50%	A	1.11012	1.11866	0.00854	10	0.85
	B	1.10986	1.11678	0.00692	10	0.69
	C	1.11643	1.12348	0.00705	10	0.71
	D	1.11656	1.12386	0.0073	9	0.81
100%	A	1.11857	1.12692	0.00835	10	0.83
	B	1.11781	1.12569	0.00788	10	0.79
	C	1.11754	1.12491	0.00737	10	0.74
	D	1.11686	1.12357	0.00671	9	0.75

Sample ID: EE02
Start date: 10/31/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	25.1	25.0	25.0	25.3	24.8	25.3	24.8	25.0	25.3	25.3	25.2	25.6	25.2	*		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.4	8.5	8.7	7.7	8.7	8.2	8.7	8.0	8.4	7.8	8.4	7.1	8.4	*		
6.25	8.4	8.4	8.7	7.7	8.7	8.3	8.7	8.2	8.5	7.7	8.3	7.0	8.5	*		
12.5	8.5	8.5	8.7	7.8	8.7	8.3	8.7	7.9	8.5	7.8	8.5	6.9	8.5	*		
25	8.6	8.4	8.6	7.8	8.7	8.3	8.7	8.0	8.5	7.9	8.5	6.9	8.7	*		
50	8.5	8.5	8.7	7.8	8.6	8.3	8.7	8.0	8.6	7.8	8.5	6.9	8.7	*		
100	8.6	8.6	8.7	7.7	8.7	8.3	8.7	8.1	8.1	7.8	8.6	6.9	8.7	*		
					8.7											

pH

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.63	8.56	8.44	8.40	8.48	8.44	8.54	8.36	8.50	8.28	8.51	8.06	8.38	*		
6.25	8.61	8.55	8.42	8.36	8.50	8.44	8.48	8.27	8.53	8.24	8.50	8.02	8.41	*		
12.5	8.61	8.56	8.44	8.37	8.50	8.39	8.55	8.32	8.50	8.26	8.49	8.03	8.42	*		
25	8.63	8.56	8.43	8.38	8.52	8.42	8.54	8.32	8.55	8.28	8.48	8.06	8.42	*		
50	8.61	8.55	8.43	8.31	8.47	8.41	8.50	8.35	8.45	8.31	8.44	8.07	8.38	*		
100	8.58	8.55	8.39	8.30	8.43	8.38	8.40	8.35	8.39	8.36	8.38	8.27	8.41	*		

CONDUCTIVITY

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	1000	1202	1134	1155	807	1058	854	942	685	759	675	769	607	*		
6.25	979	1188	1114	1140	810	983	842	941	656	768	676	769	684	*		
12.5	1032	1061	1078	1125	828	848	844	922	702	795	691	779	646	*		
25	920	1187	1050	1015	750	1007	842	910	723	801	707	792	712	*		
50	829	1165	976	902	833	849	845	910	701	813	713	837	719	*		
100	743	1166	829	884	817	944	840	817	829	856	818	881	765	*		

* - old parameters were not measured, sample was discarded before parameters were measured.

f93506-fm9
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	9	5	10	0

Calculated Chi-Square goodness of fit test statistic = 9.8908
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-fm9
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 4.60
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

TITLE: f93506-fm9
FILE: S:\toxlab\toxstat\f93506-f
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.7600	0.7600
1	Control	2	0.8400	0.8400
1	Control	3	0.7900	0.7900
1	Control	4	0.8300	0.8300
2	6.25%	1	0.8200	0.8200
2	6.25%	2	0.8000	0.8000
2	6.25%	3	0.7400	0.7400
2	6.25%	4	0.9300	0.9300
3	12.5%	1	0.8100	0.8100
3	12.5%	2	0.6700	0.6700
3	12.5%	3	0.7200	0.7200
3	12.5%	4	0.8200	0.8200
4	25%	1	0.8200	0.8200
4	25%	2	0.7600	0.7600
4	25%	3	0.7500	0.7500
4	25%	4	0.8500	0.8500
5	50%	1	0.8500	0.8500
5	50%	2	0.6900	0.6900
5	50%	3	0.7100	0.7100
5	50%	4	0.8100	0.8100
6	100%	1	0.8300	0.8300
6	100%	2	0.7900	0.7900
6	100%	3	0.7400	0.7400
6	100%	4	0.7500	0.7500

f93506-fm9
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.760	0.840	0.805
2	6.25%	4	0.740	0.930	0.823
3	12.5%	4	0.670	0.820	0.755
4	25%	4	0.750	0.850	0.795
5	50%	4	0.690	0.850	0.765
6	100%	4	0.740	0.830	0.778

93506-fm9
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.001	0.037	0.018
2	6.25%	0.006	0.079	0.040
3	12.5%	0.005	0.072	0.036
4	25%	0.002	0.048	0.024
5	50%	0.006	0.077	0.039
6	100%	0.002	0.041	0.021

f93506-fm9
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.013	0.003	0.750
Within (Error)	18	0.069	0.004	
Total	23	0.082		

Critical F value = 2.77 (0.05,5,18)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

f93506-fm9
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.805	0.805		
2	6.25%	0.823	0.823	-0.391	
3	12.5%	0.755	0.755	1.118	
4	25%	0.795	0.795	0.224	
5	50%	0.765	0.765	0.894	
6	100%	0.778	0.778	0.615	

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-fm9
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

DUNNETTS 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	Control	4			
2	6.25%	4	0.108	13.4	-0.017
3	12.5%	4	0.108	13.4	0.050
4	25%	4	0.108	13.4	0.010
5	50%	4	0.108	13.4	0.040
6	100%	4	0.108	13.4	0.028

№ 1 3

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
93F506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: TOX TCLP	REMARKS
SCEE02TX001	10-27-94	1430	water	3	—	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
[signature]	10/27/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lyda Deer	10/28/94 0930	3 °C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

№ 1 of 1

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: Total Lead	REMARKS
~~EE02~~						
SCEE02TX001	10-27-94	1515	soil	2	✓	
SCEE02TX001	10-27-94	1430	water	2	—	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/27/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lyn Deer	10/28/94 0930	2.5°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 3160/315
JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: Controls
NPDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/28/94
START TIME: 1600
DILUTION WATER: FM-Spring (C.dubia Hard-very Hard Distilled)

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
Con	A	10	10	10	0	25.4		25.2	8.4		8.2	8.62		8.63	380		~~488~~ 409
Spring	B	10	10	10	0												
Con	A	10	10	9	1				8.6		8.3	8.63		8.60	1143		1191
very Hard	B	10	10	10	0												
C.dubia																	
Con	A	5	5	5	0				8.5		7.8	8.50		8.50	613		722
Hard	B	5	5	5	0												
	C	5	4	4	1												
	D	5	5	5	0												
Con	A	5	5	5	0				8.6		8.0	8.63		8.43	1143		1008
very Hard	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	MLS													
Time		1600	1515	1200													

Comments

	Spring	Hard Dist.	Very Hard Dilut
Hardness	200	220	390
Alk:	280	130	240

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	170	~~170~~ MLS
Total Alkalinity	124	L

48-hr Ceriodaphnia dubia ACUTE TOXICITY TEST – STATIC, NONRENEWAL

ɜ NO. 315	SAMPLE TYPE:	PHOTOPERIOD:	16 hrs light
ɜ NO.	SAMPLE TIME:	FEEDING REGIME:	None
USTRY:	ORGANISM SOURCE: Batch #	TEST VESSEL CAPACITY:	30 mL
NTACT:	START DATE: 10/28/94	TEST SOLN VOLUME/DEPTH:	20 mL
LUENT: EE3	START TIME: 1530	NO. ORGANISMS/CONC.:	20
DES PERMIT NO.:	DILUTION WATER: Hand Distilled	NO. REPLICATES:	4

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (SU) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	5	5	5	0	25.4		25.2	8.7		8.0	8.53		8.49	674		655
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
12.5	A	5	5	5	0				8.7		8.0	8.53		8.51	660		694
	B	5	5	5	0												
	C	5	5	4	1												
	D	5	5	5	0												
25	A	5	4	3	2				8.8		8.0	8.53		8.52	638		626
	B	5	5	4	1												
	C	5	5	5	0												
	D	5	3	3	2												
50	A	5	2	1	4				8.8		8.0	8.52		8.55	613		648
	B	5	4	4	1												
	C	5	0	–	5												
	D	5	2	1	4												
100	A	5	0	–	5				8.8		8.0	8.51		8.61	580		635
	B	5	2	0	5												
	C	5	1	0	5												
	D	5	0	–	5												
itials		MLS	MLS	MLS													
me		1530	1515	1215													

Comments

LC50 = 34.9

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	220	240
Total Alkalinity		

Test 10

EPA PROBIT ANALYSIS PROGRAM
USED FOR CALCULATING EC VALUES
Version 1.4

Tinker C. dubia Acute - Sample EE03

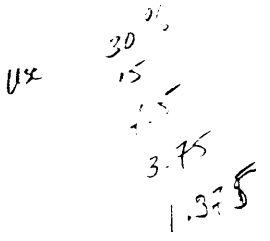
Conc.	Number Exposed	Number Resp.	Observed Proportion Responding	Adjusted Proportion Responding	Predicted Proportion Responding
6.2500	20	0	0.0000	0.0000	0.0007
12.5000	20	1	0.0500	0.0500	0.0287
25.0000	20	5	0.2500	0.2500	0.2683
50.0000	20	14	0.7000	0.7000	0.7465
100.0000	20	20	1.0000	1.0000	0.9741

Chi - Square Heterogeneity = 1.132

Mu = 1.543133
Sigma = 0.234897

Parameter	Estimate	Std. Err.	95% Confidence Limits
Intercept	-1.569408	1.159892	(-3.842796, 0.703979)
Slope	4.257189	0.743597	(2.799739, 5.714640)

Theoretical Spontaneous Response Rate = 0.0000



Tinker C. dubia Acute - Sample EE03

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence	Upper Limits
EC 1.00	9.9241	4.9535	14.2714
EC 5.00	14.3467	8.5357	19.0879
EC10.00	17.4618	11.3485	22.4077
EC15.00	19.9382	13.7038	25.0599
EC50.00	34.9247	28.2567	43.2748
EC85.00	61.1758	48.5402	89.6997
EC90.00	69.8516	54.2578	108.3722
EC95.00	85.0187	63.6628	144.1550
EC99.00	122.9060	85.1076	248.5221

Tinker C. dubia Acute - Sample EE03

PLOT OF ADJUSTED PROBITS AND PREDICTED REGRESSION LINE

48-hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 316 | SAMPLE TYPE: | PHOTOPERIOD: 16 hrs light
JOB NO. | SAMPLE TIME: | FEEDING REGIME: None
INDUSTRY: Tinker | ORGANISM SOURCE: Batch # | TEST VESSEL CAPACITY: ~~1000~~ mL 266
CONTACT: | START DATE: 10/28/94 | TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
EFFLUENT: EE 03 | START TIME: 1600 | NO. ORGANISMS/CONC.: 20
NPDES PERMIT NO.: | DILUTION WATER: ~~Hard Spring~~ | NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	10	10	10	0	25.4			8.7		8.4	8.53		8.59	~~477~~ 419		407
	B	10	10	10	0												
12.5	A	10	10	10	0				8.7		8.4	8.58		8.59	~~407~~ 403		415
	B	10	10	10	0												
25	A	10	10	10	0				8.7		8.4	8.58		8.60	~~438~~ 415		436
	B	10	10	10	0												
50	A	10	10	10	0				8.8		8.4	~~8.52~~ 8.55		8.60	~~475~~ 460		494
	B	10	10	10	0												
100	A	10	10	9	1				8.8		8.4	8.51		8.61	580		595
	B	10	10	9	1												
Initials		MM	MS														
Time		1600	1520														

Comments

Ammonia: ND (<40ppb) LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	200 ~~170~~	240
Total Alkalinity (mg/L CaCO3 @ 4.5)	230 ~~220~~	205

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

Run to 8 dap

Log No. 323

JOB NO. F93506 | BEGINNING: 1615 hrs; 10/31/94 | PHOTOPERIOD: 16 light, 8 dark
INDUSTRY: Tinker | ENDING: 1630 hrs; 11/8/94 | ORGANISM SOURCE: WCC
CONTACT: Test 10 | FEEDING REGIME: | TEST VESSEL CAPACITY: 30 mL
EFFLUENT: SCEE03 | .05 mL yct/15 mL | TEST SOLUTION VOLUME: 15mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | NO. REPLICATES: 10
PERSON CONDUCTING TEST: | | DILUTION WATER:

	TIME	1615	1535	1530	1550	1550	1610	1639	1430/1635
	OBSERVER	LJT	MLS	LJT	LJT	MLS	MLS	MLS	MLS/LJT
CONC	CHAMBER	NUMBER OF YOUNG PRODUCED							
		START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7/8
Hard-220 Con	1		✓	✓	✓	0	3	7	7/3
	2	✓	✓	✓	✓	2	4½	3	8/2
	3		✓	✓	✓	3	0	0	11/9
	4		✓	✓	✓	2	2	8	4/4
	5		✓	✓	✓	0	3	5	5/0
	6		✓	✓	✓	0	1	0	9/10
	7		✓	✓	✓	4	2	0	7/9
	8		✓	✓	2	0	2	9	0/4
	9		✓	✓	✓	3	0	3	6/6
	10		✓	✓	✓	0	3	0	7/11
		START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
1.375% MLS 10.25	11		✓	✓	✓	0	0	0	6/3
	12		✓	✓	✓	1	0	7	0/0
	13		✓	✓	✓	0	2	7	1/2
	14		✓	✓	✓	0	2	2	6/0
	15		✓	✓	✓	0	2	6	4/3
	16		✓	✓	✓	2	0	9	0/0
	17		✓	✓	✓	2	0	8	0/0
	18		✓	✓	✓	1	0	0	3/2
	19		✓	✓	2	0	4	10	0/0
	20		✓	✓	✓	0	2	3	5/1
		START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
3.75% MLS 12.5	21		✓	✓	✓	0	3	7	9/0
	22		✓	✓	✓	0	0	6	1/0
	23		✓	✓	✓	2	0	0	0/0
	24		✓	✓	✓	4	3	0	0/0
	25		✓	✓	✓	2	0	0	0/0
	26		✓	✓	✓	0	0	6	0/0
	27		✓	✓	✓	0	0	0	5/0
	28		✓	✓	✓	0	2	7	4/0
	29		✓	✓	✓	1	1	0	10/0
	30		✓	✓	2	0	0	9	0/0

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F93506 | BEGINNING: ____hrs; / / | Log No. 323
INDUSTRY: Tinker | ENDING: ____hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: Test 10 | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: SC-EE03 | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

TIME
OBSERVER

CONC | CHAMBER | NUMBER OF YOUNG PRODUCED

7.5% (MLS ~~25%~~)

CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
31		✓	✓	✓	0	0	5	0/3
32		✓	✓	✓	0	0	0	0/0
33		✓	✓	✓	0	0	0	7/9
34		✓	✓	✓	0	0	6	0/2
35		✓	✓	✓	0	0	5	0/0
36		✓	✓	✓	2	0	0	7/0
37		✓	✓	3	0	2	8	0/0
38		✓	✓	✓	3	2	9	0/0
39		✓	✓	✓	0	3	7	8/0
40		✓	✓	2	0	2	8	D-

15% (MLS ~~50%~~)

CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
41		✓	✓	✓	1	0	5	10/9
42		✓	✓	✓	2	3	9	0/10
43		✓	✓	2	0	0	5	1/1
44		✓	✓	✓	2	0	0	11/10
45		✓	✓	✓	2	0	0	12/10
46		✓	✓	✓	2	0	0	9/0
47		✓	✓	✓	0	3	5	1/0
48		✓	✓	✓	0	2	0	0/11
49		✓	✓	✓	0	2	6	9/2
50		✓	✓	✓	2	1	9	5/5

30% (MLS ~~100%~~)

CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
51		✓	✓	4	0	1	7	12/1
52		✓	✓	✓	2	0	4	6/D
53		✓	✓	✓	1	0	3	0/4
54		✓	✓	✓	3	0	8	11/10
55		✓	✓	✓	0	2	6	10/2
56		✓	✓	✓	1	4	7	0/12
57		✓	✓	4	0	1/2	10	D-
58		✓	✓	✓	3	4	7	0/12
59		✓	✓	✓	0	3	6	7/0
60		✓	✓	✓	2	0	6	9/1

Test 10

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: A T Z A M K K D4 Start Date: 10/31/94 Sample ID: SC-EEC3 Log #: 32

AD	ID 42	1 ✓	AD	ID 59	1 ✓	AD	ID 47	1 ✓	AD	ID 20	1 ✓		ID 5	1 ✓
2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0
5 3	6 9	7 0/10	5 3	6 6	7 7/0	5 3	6 5	7 1/0	5 2	6 3	7 5/1	5 3	6 5	7 5/0
AD	ID 2	1 ✓	AD	ID 19	1 ✓	AD	ID 41	1 ✓	AD	ID 24	1 ✓		ID 40	1 ✓
2 ✓	3 ✓	4 2	2 ✓	3 2	4 0	2 ✓	3 ✓	4 1	2 ✓	3 ✓	4 4	2 ✓	3 2	4 0
5 4 2	6 3	7 8/2	5 4	6 10	7 0/0	5 0	6 5	7 10/9	5 3	6 0	7 0/0	5 2	6 8	7 D
AD	ID 23	1 ✓	AD	ID 39	1 ✓	AD	ID 1	1 ✓	AD	ID 58	1 ✓		ID 46	1 ✓
2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 2
5 0	6 0	7 0/0	5 3	6 7	7 8/0	5 3	6 7	7 7/3	5 4	6 7	7 0/12	5 0	6 0	7 9/0
AD	ID 18	1 ✓	AD	ID 43	1 ✓	AD	ID 57	1 ✓	AD	ID 38	1 ✓		ID 25	1 ✓
2 ✓	3 ✓	4 1	2 ✓	3 2	4 0	2 ✓	3 4	4 0	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 2
5 0	6 0	7 3/2	5 0	6 5	7 1/1	5 1/2	6 10	7 D	5 2	6 9	7 0/0	5 0	6 0	7 0/0
AD	ID 22	1 ✓	AD	ID 37	1 ✓	AD	ID 44	1 ✓	AD	ID 3	1 ✓		ID 17	1 ✓
2 ✓	3 ✓	4 0	2 ✓	3 2	4 0	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 2
5 0	6 6	7 1/0	5 2	6 8	7 0/0	5 0	6 0	7 11/10	5 0	6 6	7 11/9	5 0	6 8	7 0/0
AD	ID 4	1 ✓	AD	ID 16	1 ✓	AD	ID 21	1 ✓	AD	ID 36	1 ✓		ID 45	1 ✓
2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 2
5 2	6 8	7 4/4	5 0	6 9	7 0/0	5 3	6 7	7 9/0	5 0	6 0	7 7/0	5 0	6 0	7 12/0

Comments:

Cup ID	Sample Concentration
1–10:	Control (HRD-22C)
11–20:	1.375%
21–30:	3.75%
31–40:	7.5%
41–50:	15%
51–60:	30%

Day	Initials	Time
1	MLS	1535
2	LJT	1530
3	LJT	1550
4	MLS	1550
5	MLS	1610
6	MLS	1639
7	MLS	1430
8	LJT	1630

test 10

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: HKMDXCS Start Date: 10/31/94 Sample ID: SC-ECC3 Log #: 325

AD	ID 11	1 ✓	AD	ID 52	1 ✓	AD	ID 30	1 ✓	AD	ID 34	1 ✓		ID 56	1 ✓
2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 2	2 ✓	3 2	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 1
5 0	6 0	7 6/3	5 0	6 4	7 6/0	5 0	6 9	7 0/0	5 0	6 6	7 0/2	5 4	6 7	7 0/1
AD	ID 51	1 ✓	AD	ID 29	1 ✓	AD	ID 55	1 ✓	AD	ID 10	1 ✓		ID 50	1 ✓
2 ✓	3 4	4 0	2 ✓	3 ✓	4 1	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 2
5 1	6 7	7 12/11	5 1	6 0	7 10/0	5 2	6 6	7 10/2	5 3	6 0	7 7/11	5 1	6 9	7 5/5
AD	ID 6	1 ✓	AD	ID 49	1 ✓	AD	ID 15	1 ✓	AD	ID 54	1 ✓		ID 13	1 ✓
2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 0
5 1	6 0	7 9/10	5 2	6 6	7 3/9	5 2	6 6	7 6/3	5 0	6 8	7 11/10	5 2	6 7	7 1/1
AD	ID 27	1 ✓	AD	ID 31	1 ✓	AD	ID 7	1 ✓	AD	ID 26	1 ✓		ID 33	1 ✓
2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0
5 0	6 0	7 5/0	5 0	6 5	7 0/3	5 2	6 0	7 7/9	5 0	6 6	7 0/0	5 0	6 0	7 7/7
AD	ID 35	1 ✓	AD	ID 12	1 ✓	AD	ID 48	1 ✓	AD	ID 53	1 ✓		ID 8	1 ✓
2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 1	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 1	2 ✓	3 2	4 0
5 0	6 5	7 0/0	5 0	6 7	7 0/0	5 2	6 0	7 6/11	5 0	6 2	7 0/4	5 2	6 9	7 0/4
AD	ID 9	1 ✓	AD	ID ~~55~~ 60	1 ✓	AD	ID 32	1 ✓	AD	ID 28	1 ✓		ID 14	1 ✓
2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0
5 0	6 3	7 6/6	5 0	6 6	7 9/1	5 0	6 0	7 0/0	5 2	6 7	7 4/0	5 2	6 2	7 6/6

Comments:

Day 0 Initials LJT Time 1615

Cup ID	Sample Concentration
1–10:	Control
11–20:	1.375
21–30:	3.75
31–40:	7.5
41–50:	15
51–60:	30

1	MLS	1535
2	LJT	1535
3	LJT	1550
4	MLS	1600
5	MLS	1620
6	MLS	1640
7	MLS	1420
8	LJT	1630

Organism: C. dubia
Sample ID: SC-EE03
Start date: 10/31/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	25.1	25	25	25.3	25	25.4	25.0	25.3	25.0	25.2	25.2	25.4	25.5	25.4	25.4	25.3
1.875																
3.75																
7.5																
15																
30																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.5	8.3	8.7	8.6	8.7	8.2	8.6	8.10	8.4	7.7	8.3	7.9	8.6	8.0	8.5	8.2
1.875	8.1	8.4	8.6	8.5	8.6	8.2	8.6	8.3	8.4	7.7	8.3	7.9	8.6	8.0	8.5	8.0
3.75	8.5	8.4	8.6	8.5	8.6	8.3	8.6	8.2	8.5	7.7	8.2	7.8	8.6	8.1	8.5	8.1
7.5	8.5	8.4	8.6	8.5	8.6	8.3	8.6	8.2	8.2	7.1	8.3	7.9	8.6	8.1	8.5	8.1
15	8.5	8.4	8.6	8.4	8.6	8.3	8.6	8.2	8.3	7.8	8.3	8.1	8.7	8.1	8.5	8.1
30	8.5	8.4	8.6	8.4	8.6	8.3	8.6	8.2	8.4	7.8	8.3	8.0	8.7	8.1	8.5	8.1

pH

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.65	8.48	8.52	8.45	8.55	8.41	8.53	8.39	8.51	8.36	8.50	8.35	8.49	8.46	8.55	8.35
1.875	8.57	8.36	8.49	8.44	8.53	8.45	8.43	8.36	8.51	8.33	8.47	8.31	8.40	8.46	8.52	8.29
3.75	8.53	8.31	8.49	8.44	8.53	8.44	8.48	8.34	8.51	8.31	8.48	8.31	8.40	8.41	8.51	8.26
7.5	8.54	8.39	8.49	8.44	8.54	8.46	8.50	8.37	8.51	8.33	8.46	8.33	8.41	8.43	8.51	8.27
15	8.54	8.37	8.52	8.45	8.54	8.46	8.50	8.37	8.49	8.31	8.49	8.35	8.41	8.43	8.49	8.30
30	8.54	8.39	8.48	8.45	8.49	8.49	8.49	8.40	8.46	8.30	8.48	8.37	8.40	8.47	8.48	8.33

CONDUCTIVITY

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	380	420	605	650	699	688	670	681	591	582	558	606	601	610	591	654
1.875	599	646	626	682	665	688	653	661	595	526	518	602	554	601	580	673
3.75	588	577	626	656	667	682	649	668	602	550	522	609	593	611	598	680
7.5	555	452	628	650	664	677	648	664	513	499	534	604	596	606	605	678
15	578	472	623	656	656	674	648	665	587	598	580	609	587	605	599	670
30	592	564	615	655	640	680	628	644	576	603	573	602	599	599	602	633

f93506-cd10
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	3	14	22	18	3

Calculated Chi-Square goodness of fit test statistic = 1.4072
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd10
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Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 6.70
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

ITLE: f93506-cd10
ILE: S:\TOXLAB\TOXSTAT\F93506-C.
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	20.0000	20.0000
1	Control	2	21.0000	21.0000
1	Control	3	22.0000	22.0000
1	Control	4	20.0000	20.0000
1	Control	5	13.0000	13.0000
1	Control	6	20.0000	20.0000
1	Control	7	22.0000	22.0000
1	Control	8	17.0000	17.0000
1	Control	9	18.0000	18.0000
1	Control	10	21.0000	21.0000
2	1.375%	1	9.0000	9.0000
2	1.375%	2	8.0000	8.0000
2	1.375%	3	12.0000	12.0000
2	1.375%	4	10.0000	10.0000
2	1.375%	5	17.0000	17.0000
2	1.375%	6	11.0000	11.0000
2	1.375%	7	10.0000	10.0000
2	1.375%	8	6.0000	6.0000
2	1.375%	9	16.0000	16.0000
2	1.375%	10	11.0000	11.0000
3	3.75%	1	19.0000	19.0000
3	3.75%	2	7.0000	7.0000
3	3.75%	3	2.0000	2.0000
3	3.75%	4	7.0000	7.0000
3	3.75%	5	2.0000	2.0000
3	3.75%	6	6.0000	6.0000
3	3.75%	7	5.0000	5.0000
3	3.75%	8	13.0000	13.0000
3	3.75%	9	12.0000	12.0000
3	3.75%	10	11.0000	11.0000
4	7.5%	1	8.0000	8.0000
4	7.5%	2	0.0000	0.0000
4	7.5%	3	16.0000	16.0000
4	7.5%	4	8.0000	8.0000
4	7.5%	5	5.0000	5.0000
4	7.5%	6	9.0000	9.0000
4	7.5%	7	12.0000	12.0000
4	7.5%	8	14.0000	14.0000
4	7.5%	9	18.0000	18.0000
4	7.5%	10	12.0000	12.0000
5	15%	1	25.0000	25.0000
5	15%	2	24.0000	24.0000
5	15%	3	9.0000	9.0000
5	15%	4	23.0000	23.0000
5	15%	5	24.0000	24.0000
5	15%	6	11.0000	11.0000
5	15%	7	9.0000	9.0000
5	15%	8	19.0000	19.0000
5	15%	9	19.0000	19.0000
5	15%	10	22.0000	22.0000

6	30%	1	25.0000	25.0000
6	30%	2	12.0000	12.0000
6	30%	3	7.0000	7.0000
6	30%	4	31.0000	31.0000
6	30%	5	20.0000	20.0000
6	30%	6	24.0000	24.0000
6	30%	7	17.0000	17.0000
6	30%	8	26.0000	26.0000
6	30%	9	16.0000	16.0000
6	30%	10	18.0000	18.0000

f93506-cd10
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	13.000	22.000	19.400
2	1.375%	10	6.000	17.000	11.000
3	3.75%	10	2.000	19.000	8.400
4	7.5%	10	0.000	18.000	10.200
5	15%	10	9.000	25.000	18.500
6	30%	10	7.000	31.000	19.600

f93506-cd10
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	7.600	2.757	0.872
2	1.375%	11.333	3.367	1.065
3	3.75%	28.489	5.337	1.688
4	7.5%	28.622	5.350	1.692
5	15%	41.389	6.433	2.034
6	30%	50.933	7.137	2.257

f93506-cd10
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	1339.683	267.937	9.548
Within (Error)	54	1515.300	28.061	

Total	59	2854.983

Critical F value = 2.45 (0.05,5,40)
Since F > Critical F REJECT Ho:All groups equal

f93506-cd10
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DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	19.400	19.400		
2	1.375%	11.000	11.000	3.546	*
3	3.75%	8.400	8.400	4.643	*
4	7.5%	10.200	10.200	3.883	*
5	15%	18.500	18.500	0.380	
6	30%	19.600	19.600	-0.084	

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=40,5)

f93506-cd10
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DUNNETTS 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	Control	10			
2	1.375%	10	5.472	28.2	8.400
3	3.75%	10	5.472	28.2	11.000
4	7.5%	10	5.472	28.2	9.200
5	15%	10	5.472	28.2	0.900
6	30%	10	5.472	28.2	-0.200

test 10

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 324

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: SC-EEC3
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ___hrs; / / .
ENDING: ___hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Control	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	9	9	9
6.25	A	10	10	10	10	8	8	8	8
	B	10	10	#9	mm 9	9	9	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
12.5	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	11	11
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	9	9	9	9	9
	D	10			10	10	10	10	10
	TIME:		18:30	1245	1615	1600	1250	1400	14:30
	INITIAL:		RXK	mm	SJB	mm	SJB	mm	RXK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
Cont	A		1.11408	1.12162			
	B		1.11267	1.12008			
	C		1.11414	1.12183			
	D		1.10847	1.11572			
6.25	A		1.11438	1.12418			
	B		1.10935	1.11587			
	C		1.08815	1.09552			
	D		1.11972	1.12651			
25	A		1.13125	1.13739			
	B		1.10948	1.11691			
	C		1.11954	1.12651			
	D		1.11713	1.12438			
12.5	A		1.11656	1.12332			
	B		1.09457	1.10214			
	C		1.11458	1.11988			
	D		1.10905	1.11626			

Test 10

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 324

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: SC-EE03
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ___ hrs; / / .
ENDING: ___ hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
50	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
~~25~~	D	10	10	10	10	10	10	10	10
100	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	11
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
	TIME:		18:50	1745	1615	1600	1250		14:10
	INITIAL:		RxK	mm	SS	mm	SS		RXK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
50	A		1.10701	1.11434			
	B		1.11449	1.12115			
	C		1.11949	1.12589			
	D		1.11077	1.11616			
100	A		1.11551	1.12232			
	B		1.10585	1.11300			
	C		1.09136	1.09805			
	D		1.10132	1.10855			

Cream pg 2 of

Tinker AFB Test # 10 TEST START DATE Oct 31, 94

SAMPLE ID SC-EE03 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
cont	A	1.11408	1.12162	0.00754	10	0.75
	B	1.11267	1.12008	0.00741	10	0.74
	C	1.11414	1.12183	0.00769	10	0.77
	D	1.10847	1.11577	0.0073	9	0.81
6.25%	A	1.11438	1.12118	0.0068	8	0.85
	B	1.10935	1.11587	0.00652	9	0.72
	C	1.08885	1.09552	0.00667	10	0.67
	D	1.11972	1.12651	0.00679	10	0.68
12.50%	A	1.11656	1.12332	0.00676	10	0.68
	B	1.09457	1.10214	0.00757	11	0.69
	C	1.11258	1.11988	0.0073	10	0.73
	D	1.10905	1.11626	0.00721	10	0.72
25%	A	1.13125	1.13739	0.00614	10	0.61
	B	1.10948	1.11691	0.00743	10	0.74
	C	1.11954	1.12651	0.00697	9	0.77
	D	1.11743	1.12438	0.00695	10	0.70
50%	A	1.10701	1.11434	0.00733	10	0.73
	B	1.11449	1.12115	0.00666	10	0.67
	C	1.11949	1.12589	0.0064	10	0.64
	D	1.11077	1.11616	0.00539	10	0.54
100%	A	1.11551	1.12232	0.00681	10	0.68
	B	1.10585	1.113	0.00715	11	0.65
	C	1.09136	1.09805	0.00669	10	0.67
	D	1.10132	1.10855	0.00723	10	0.72

Organism: I. prometas
Sample: SC-EC03
Start: 10/31/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	25.1	25	25	25.2	25.1	25.3	24.8	25.0	25.3	25.7	25.2	25.6	25.2	*		
6.25														*		
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.5	8.0	8.6	7.7	8.7	8.2	8.6	7.9	8.1	7.8	9.4	7.8	8.5	*		
6.25	8.5	7.9	8.6	7.8	8.7	8.2	8.6	7.7	8.0	7.8	8.3	7.7	8.5	*		
12.5	8.5	7.8	8.6	7.8	8.7	8.0	8.6	7.8	8.0	7.7	8.4	7.7	8.6	*		
25	8.6	7.9	8.6	7.7	8.6	8.0	8.6	7.8	8.1	7.6	8.5	7.6	8.6	*		
50	8.6	8.0	8.6	7.8	8.6	8.0	8.6	7.5	8.2	7.6	8.6	7.6	8.6	*		
100	8.7	8.0	8.6	7.8	8.6	8.0	8.6	7.8	9.0	7.6	8.6	7.6	8.6	*		
													8.6			

pH

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.67	8.48	8.54	8.32	8.58	8.45	8.60	8.30	8.63	8.32	8.58	8.30	8.61	*		
6.25	8.64	8.40	8.55	8.28	8.57	8.43	8.54	8.36	8.31	8.29	8.56	8.33	8.53	*		
12.5	8.56	8.40	8.67	8.28	8.56	8.44	8.56	8.31	8.32	8.32	8.56	8.31	8.57	*		
25	8.51	8.39	8.62	8.31	8.57	8.43	8.55	8.31	8.25	8.34	8.54	8.39	8.54	*		
50	8.51	8.40	8.56	8.33	8.49	8.40	8.51	8.33	8.31	8.34	8.53	8.31	8.51	*		
100	8.49	8.39	8.44	8.33	8.44	8.42	8.42	8.36	8.35	8.37	8.42	8.35	8.43	*		
												8.34				
												8.35				

8.37 8.36 8.37

CONDUCTIVITY

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	349	406	642	372	388	412	320	401	378	372	382	356	356	*		
6.25	565	577	417	370	322	436	321	421	370	405	395	388	361	*		
12.5	555	592	390	385	356	444	385	433	390	420	385	390	389	*		
25	373	593	407	402	409	409	408	445	415	3-1	406	409	410	*		
50	461	655	416	453	453	472	460	485	459	491	462	598	459	*		
100	469	627	553	598	541	601	560	537	531	594	555	603	541	*		

432 419 423 436 489 581

* - old parameters were not measured - sample was discarded before parameters were measured.

f93506-fm10
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	9	7	8	0

Calculated Chi-Square goodness of fit test statistic = 6.3102
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-fm10
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 12.12
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

ITTLE: f93506-fm10
ILE: S:\toxlab\toxstat\f93506-f
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.7500	0.7500
1	Control	2	0.7400	0.7400
1	Control	3	0.7700	0.7700
1	Control	4	0.8100	0.8100
2	6.25%	1	0.8500	0.8500
2	6.25%	2	0.7200	0.7200
2	6.25%	3	0.6700	0.6700
2	6.25%	4	0.6800	0.6800
3	12.5%	1	0.6800	0.6800
3	12.5%	2	0.6900	0.6900
3	12.5%	3	0.7300	0.7300
3	12.5%	4	0.7200	0.7200
4	25%	1	0.6100	0.6100
4	25%	2	0.7400	0.7400
4	25%	3	0.7700	0.7700
4	25%	4	0.7000	0.7000
5	50%	1	0.7300	0.7300
5	50%	2	0.6700	0.6700
5	50%	3	0.6400	0.6400
5	50%	4	0.5400	0.5400
6	100%	1	0.6800	0.6800
6	100%	2	0.6500	0.6500
6	100%	3	0.6700	0.6700
6	100%	4	0.7200	0.7200

f93506-fm10
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.740	0.810	0.768
2	6.25%	4	0.670	0.850	0.730
3	12.5%	4	0.680	0.730	0.705
4	25%	4	0.610	0.770	0.705
5	50%	4	0.540	0.730	0.645
6	100%	4	0.650	0.720	0.680

.93506-fm10
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.001	0.031	0.015
2	6.25%	0.007	0.083	0.041
3	12.5%	0.001	0.024	0.012
4	25%	0.005	0.070	0.035
5	50%	0.006	0.079	0.040
6	100%	0.001	0.029	0.015

f93506-fm10
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.035	0.007	2.333
Within (Error)	18	0.061	0.003	
Total	23	0.096		

Critical F value = 2.77 (0.05,5,18)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

f93506-fm10
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.768	0.768		
2	6.25%	0.730	0.730	0.968	
3	12.5%	0.705	0.705	1.614	
4	25%	0.705	0.705	1.614	
5	50%	0.645	0.645	3.163	*
6	100%	0.680	0.680	2.259	

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-fm10
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

DUNNETTS 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	Control	4			
2	6.25%	4	0.093	12.2	0.038
3	12.5%	4	0.093	12.2	0.063
4	25%	4	0.093	12.2	0.063
5	50%	4	0.093	12.2	0.123
6	100%	4	0.093	12.2	0.088

№ 14.5

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature) [signature]

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

ANALYSES REQUIRED: Tox Test

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	Tox Test						REMARKS
SC EE03 TX001	10-27-94	1130	water	3							

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
[signature]	10/27/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Liza Teer	10/28/94 0930	1 °C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

№ 14.3

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: TOX TOC	REMARKS
SCEE03TX001	10-27-94	1130	water	2	✓	
SCEE03TX002	10-27-94	1230	soil	2	✓	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/27/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lisa Iser	10/28/94 0930	3.5°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 3160/315
JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: Controls
NPDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/28/94
START TIME: 1600
DILUTION WATER: FM-Spring (C.dubia Hard-very Hard Distilled)

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
Con	A	10	10	10	0	25.4		25.2	8.4		8.2	8.62		8.63	380		~~488~~ 409
Spring	B	10	10	10	0												
Con	A	10	10	9	1				8.6		8.3	8.63		8.60	1143		1191
very Hard	B	10	10	10	0												
C. dubia																	
Con	A	5	5	5	0				8.5		7.8	8.50		8.50	613		722
Hard	B	5	5	5	0												
	C	5	4	4	1												
	D	5	5	5	0												
Con	A	5	5	5	0				8.6		8.0	8.63		8.43	1143		1008
very Hard	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	MLS													
Time		1600	1515	1200													

Comments

	Spring	Hard Dist.	Very Hard Dup
Hardness	200	220	390
Alk:	220	130	240

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	170	~~MLS 170~~
Total Alkalinity (mg/L CaCO3 @ 4.5)	~~120~~	~~MLS~~

48-hr Ceriodaphnia dubia ACUTE TOXICITY TEST – STATIC, NONRENEWAL

G NO. 315
B NO.
)USTRY:
NTACT:
FLUENT: EE4
DES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/28/94
START TIME: 1530
DILUTION WATER: Hard Distilled

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: 30 mL
TEST SOLN VOLUME/DEPTH: 20 mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	5	5	4	1	25.4		25.2	8.8		8.0	8.54		8.46	644		705
	B	5	5	5	0												
	C	5	5	4	1												
	D	5	5	5	0												
12.5	A	5	5	5	0				8.8		8.0	8.52		8.51	645		691
	B	5	~~4~~ 5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
25	A	5	5	5	0				8.8		8.1	8.52		8.53	625		666
	B	5	4	4	1												
	C	5	4	4	1												
	D	5	5	5	0												
50	A	5	4	3	2				8.9		8.0	8.52		8.55	578		620
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
100	A	5	5	4	1				8.9		8.0	8.50		8.62	518		527
	B	5	5	4	1												
	C	5	5	5	0												
	D	5	5	4	1												
Initials		MLS	MLS	MLS													
Time		1530	1530	1130													

Comments

LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	220	230
Total Alkalinity		

48-hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. B116
JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: EE04
NPDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/28/94
START TIME: 1600
DILUTION WATER: Spring

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	10	10	10	0	25.4			8.8		8.4	8.64		8.57	~~644~~ 400		399
	B	10	10	10	0												
12.5	A	10	10	10	0				8.8		8.3	~~8.52~~ 8.55		8.58	~~445~~ 386		405
	B	10	10	10	0												
25	A	10	10	10	0				8.9		8.4	8.58		8.59	~~425~~ 403		425
	B	10	10	10	0												
50	A	10	10	10	0				8.9		8.5	8.58		8.61	~~518~~ 436		461
	B	10	10	10	0												
100	A	10	10	10	0				8.9		8.5	8.50		8.61	508		524
	B	10	10	10	0												
Initials		MM	MS														
Time		1610	1530														

Comments

Ammonia: ND (<40 ppb) LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	200	230
Total Alkalinity (mg/L CaCO3 @ 4.5)	230	210

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST Test 11

NOEC 710%

JOB NO: F93506 | BEGINNING: 1515 hrs; 10/31/94 | Log No: 323
INDUSTRY: Tinker | ENDING: 1650 hrs; 11/8/94 | PHOTOPERIOD: 16 light, 8 dark
CONTACT: Test 11 | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: SC-EE04 | .05 mL ycf/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

NUMBER OF YOUNG PRODUCED

CONC	TIME / OBSERVER / CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
~~MCS~~	Hd-230								
Con	1								
	2								
	3		✓	✓	0	2 ~~0~~ mcs	0	0	
	4								
	5								
	6								
	7								
	8								
	9								
	10								
		Control data from test 10							
6.25	11		✓	✓	0	2	5	0	12/10
	12		✓	✓	0	0	0	10	12/8
	13		✓	✓	0	1	0	0	8/9
	14		✓	✓	4	0	5	8	9/0
	15		✓	✓	0	3	0	6	5/5
	16		✓	✓	3	2	0	10	7/0
	17		✓	✓	2	0	0	0	8/13
	18		✓	✓	✓	0	0	0	12/12
	19		✓	✓	0	0	0	7	7/5
	20		✓	✓	2	0	0	6	4/10
12.5	21		✓	✓	0	0 mcs	0 mcs	10	10/0
	22		✓	✓	0	1	0	0	12/12
	23		✓	✓	4	0	4	10	12/0
	24		✓	✓	0	4	0	5	0/10
	25		✓	✓	0	0	0	0	10/13
	26		✓	✓	0	0	0	2	11/7
	27		✓	✓	0	2	0	1	9/12
	28		✓	✓	0	0	0	5	4/0
	29		✓	✓	0	0	0	0	8/12
	30		✓	✓	4	6	5	9	8/0

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F93506 | BEGINNING: ____ hrs; / / . | Log No. ____
INDUSTRY: Tinker | ENDING: ____ hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

TIME
OBSERVER

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
		NUMBER OF YOUNG PRODUCED							
25%	31		✓	✓	0	2	5	0	10/10
	32		✓	✓	4	0	0	8	12/0
	33		✓	✓	0	1	0	0	9/10
	34		✓	✓	✓	2	5	0	12/12
	35		✓	✓	5	0	0	12	13/0
	36		✓	✓	2	1	6	9	9/0
	37		✓	✓	3	0	0	9	11/0
	38		✓	✓	0	4	0	8	4/9
	39		✓	✓	3	0	9	9	9/0
	40		✓	✓	0	0	0	9	8/0
50%	41		✓	✓	0	6	0	12	16/6
	42		✓	✓	3	0	8	10	5/1
	43		✓	✓	0	6	0	8	16/9
	44		✓	✓	0	4	6	1	9/12
	45		✓	✓	0	6	0	6	12/11
	46		✓	✓	5	0	6	10	12/0
	47		✓	✓	0	6	0	9	10/10
	48		✓	✓	0	3	4	0	10/12
	49		✓	✓	0	6	0	0	11/14
	50		✓	✓	0	5	4	2	12/11
100%	51		✓	✓	0	3	7	0	11/17
	52		✓	✓	4	0	8	8	9/3
	53		✓	✓	0	6	6	1	11/13
	54		✓	✓	0	0	3	4	7/3
	55		✓	✓	0	5	0	10	14/10
	56		✓	✓	4	0	5	11	16/1
	57		✓	✓	0	5	7	0	11/17
	58		✓	✓	1	7	0	7	12/10
	59		✓	✓	2	6	0	11	14/12
	60		✓	✓	0	5	8	8	0/12

Test 11

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ~~CX Z1 ZX GX~~ U Start Date: 10/31/94 Sample ID: SC-EC04 Log #: 32

AD	ID	1	AD	ID	1	AD	ID	1	AD	ID	1		ID	1
2	3	4	2	3	4	2	3	4	2	3	4	2	3	4
5	6	7	5	6	7	5	6	7	5	6	7	5	6	7
AD	ID 20	1 ✓	AD	ID 37	1 ✓	AD	ID 8	1 ✓	AD	ID 13	1 ✓		ID 38	1 ✓
2 ✓	3 4	4 6	2 ✓	3 0	4 6	2 ✓	3 0	4 0	2 ✓	3 4	4 0	2 ✓	3 0	4 3
5 5	6 9	7 8/0	5 0	6 9	7 10/10	5 0	6 0	7 12/12	5 4	6 10	7 12/0	5 4	6 0	7 10/1
AD	ID 7	1 ✓	AD	ID 21	1 ✓	AD	ID 47	1 ✓	AD	ID 30	1 ✓		ID 48	1 ✓
2 ✓	3 2	4 0	2 ✓	3 0	4 2	2 ✓	3 0	4 5	2 ✓	3 0	4 0	2 ✓	3 1	4 7
5 0	6 0	7 8/13	5 5	6 0	7 10/10	5 7	6 0	7 11/7	5 0	6 9	7 8/0	5 0	6 7	7 12/1
AD	ID 44	1 ✓	AD	ID 12	1 ✓	AD	ID 29	1 ✓	AD	ID 32	1 ✓		ID 19	1 ✓
2 ✓	3 0	4 0	2 ✓	3 0	4 1	2 ✓	3 3	4 0	2 ✓	3 3	4 0	2 ✓	3 0	4 0
5 3	6 4	7 7/~~9~~ 13 LJT	5 0	6 0	7 12/12	5 9	6 9	7 9/0	5 8	6 10	7 8/1	5 0	6 0	7 3/1
AD	ID 28	1 ✓	AD	ID 45	1 ✓	AD	ID 46	1 ✓	AD	ID 9	1 ✓		ID 33	1 ✓
2 ✓	3 0	4 4	2 ✓	3 0	4 5	2 ✓	3 4	4 0	2 ✓	3 0	4 0	2 ✓	3 0	4 6
5 0	6 8	7 14/9	5 0	6 10	7 14/10	5 5	6 11	7 10/1	5 0	6 7	7 7/5	5 0	6 8	7 16/9
AD	ID 36	1 ✓	AD	ID 11	1 ✓	AD	ID 31	1 ✓	AD	ID 49	1 ✓		ID 10	1 ✓
2 ✓	3 5	4 0	2 ✓	3 0	4 0	2 ✓	3 0	4 6	2 ✓	3 2	6	2 ✓	3 2	4 0
5 6	6 10	7 12/0	5 0	6 10	7 11/0	5 0	6 12	7 16/6	5 0	6 11	7 14/12	5 0	6 6	7 4/11

Comments:

Cup ID	Sample Concentration	Day	Initials	Time
		Ø	LJT	1545
1–10:	6.25	1	MLS	1540
11–20:	12.5	2	LJT	1500
21–30:	25	3	LJT	1415
31–40:	50	4	MLS	1605
41–50:	100	5	MAR	1515
51–60:		6	MAR	12135
		7	MLS	1328
		8	LJT	1650

test 11

Run 8 days

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: F ~~A 6 D T X S T E~~ R Start Date: 12/31/94 Sample ID: SC-~~PEC~~4 Log #: 8-5

AD	ID	1	AD	ID	1	AD	ID	1	AD	ID	1		ID	1
2	3	4	2	3	4	2	3	4	2	3	4	2	3	4
5	6	7	5	6	7	5	6	7	5	6	7	5	6	7
AD	ID 3	1 ✓	AD	ID 15	1 ✓	AD	ID 42	1 ✓	AD	ID 14	1 ✓		ID 22	1 ✓
2 ✓	3 0	4 1	2 ✓	3 0	4 0	2 ✓	3 4	4 0	2 ✓	3 0	4 4	2 ✓	3 4	4 0
5 0	6 0	7 8/9	5 0	6 0	7 10/13	5 8	6 8	7 9/3	5 0	6 5	7 0/10	5 0	6 8	7 12/C
AD	ID 27	1 ✓	AD	ID 50	1 ✓	AD	ID 4	1 ✓	AD	ID 25	1 ✓		ID 41	1 ✓
2 ✓	3 3	4 0	2 ✓	3 0	4 5	2 ✓	3 4	4 0	2 ✓	3 5	4 0	2 ✓	3 0	4 3
5 0	6 9	7 11/C	5 8	6 8	7 0/12	5 5	6 8	7 9/0	5 C	6 12	7 13/0	5 7	6 0	7 11/17
AD	ID 16	1 ✓	AD	ID 39	1 ✓	AD	ID 2	1 ✓	AD	ID 18	1 ✓		ID 6	1 ✓
2 ✓	3 0	4 0	2 ✓	3 0	4 6	2 ✓	3 0	4 0	2 ✓	3 0	4 0	2 ✓	3 3	4 2
5 0	6 8	7 11/7	5 0	6 0	7 11/14	5 0	6 10	7 12/8	5 0	6 5	7 9/0	5 0	6 10	7 7/C
AD	ID 24	1 ✓	AD	ID 43	1 ✓	AD	ID 40	1 ✓	AD	ID 26	1 ✓		ID 35	1 ✓
2 ✓	3 0	4 2	2 ✓	3 0	4 6	2 ✓	3 0	4 5	2 ✓	3 2	4 1	2 ✓	3 0	4 6
5 5	6 0	7 12/12	5 C	6 1	7 11/13	5 4	6 2	7 12/11	5 C	6 9	7 9/0	5 0	6 C	7 12/11
AD	ID 1	1 ✓	AD	ID 17	1 ✓	AD	ID 23	1 ✓	AD	ID 5	1 ✓		ID 34	1 ✓
2 ✓	3 0	4 2	2 ✓	3 0	4 2	2 ✓	3 0	4 1	2 ✓	3 0	4 3	2 ✓	3 0	4 4
5 5	6 C	7 12/10	5 0	6 1	7 9/12	5 0	6 0	7 9/12	5 0	6 C	7 5/5	5 C	6 1	7 9/12

Comments:

Cup ID	Sample Concentration
1–10:	6.25
11–20:	12.5
21–30:	25
31–40:	50
41–50:	100
51–60:	

Day	Initials	Time
0	LJT	1545
1	MLS	1540
2	LJT	1500
3	LJT	1415
4	MLS	1610
5	MAR	15:15
6	MAR	12:35
7	MLS	1315
8	LJT	1650

Organism: C. dubia
Sample ID: SC-EC04
Start date: 10/31/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25.1	25.0	25.0	25.3	25	25.5	25.1	25.3	25.0	25.1	25.2	25.2	25.3	25.4	25.4	25.3
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.5	8.2	8.5	8.4	8.5	8.4	8.5	8.1	8.5	7.9	8.4	8.2	8.4	8.0	8.5	8.0
6.25	8.5	8.3	8.5	8.4	8.5	8.4	8.5	8.1	8.5	7.8	8.4	8.2	8.4	8.0	8.5	8.0
12.5	8.5	8.3	8.5	8.4	8.5	8.4	8.5	8.2	8.5	7.8	8.5	8.2	8.5	8.1	8.4	8.0
25	8.5	8.3	8.5	8.4	8.5	8.4	8.5	8.2	8.5	7.8	8.5	8.2	8.5	8.2	8.4	8.0
50	8.6	8.3	8.5	8.4	8.5	8.4	8.5	8.1	8.7	7.8	8.7	8	8.2	8.1	8.16	8.0
100																

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.52	8.39	8.51	8.48	8.52	8.42	8.52	8.52	8.50	8.32	~~8.50~~ 8.46	8.21	8.43	8.35	8.50	8.31
6.25	8.53	8.43	8.44	8.47	8.52	8.43	8.52	8.60	8.41	8.24	8.46	8.29	8.42	8.37	8.50	8.32
12.5	8.53	8.43	8.49	8.49	8.51	8.45	8.52	8.51	8.41	8.33	8.44	8.33	8.42	8.36	8.51	8.37
25	8.55	8.40	8.46	8.53	8.47	8.48	8.50	8.54	8.46	8.44	8.41	8.38	8.42	8.36	8.52	8.42
50	8.58	8.45	8.43	8.60	8.41	8.54	8.45	8.59	8.42	8.54	8.35	8.48	8.40	8.35	8.50	8.53
100																

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	512	401	623	683	657	607	653	595	590	604	~~578~~ 578	589	586	588	555	623
6.25	582	393	614	655	593	606	639	597	580	601	579	528	561	580	557	624
12.5	524	409	600	615	635	620	613	582	575	622	561	567	565	576	548	583
25	493	443	574	549	589	591	578	587	591	615	533	550	548	576	540	560
50	413	505	569	504	564	505	501	504	493	503	493	486	495	570	510	521
100																

f93506-cd11
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	4	13	25	14	4

Calculated Chi-Square goodness of fit test statistic = 0.3667
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd11
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 7.29
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

TITLE: f93506-cd11
ILE: S:\TOXLAB\TOXSTAT\F93506-C.
RANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	20.0000	20.0000
1	Control	2	21.0000	21.0000
1	Control	3	22.0000	22.0000
1	Control	4	20.0000	20.0000
1	Control	5	13.0000	13.0000
1	Control	6	20.0000	20.0000
1	Control	7	22.0000	22.0000
1	Control	8	17.0000	17.0000
1	Control	9	18.0000	18.0000
1	Control	10	21.0000	21.0000
2	6.25%	1	29.0000	29.0000
2	6.25%	2	30.0000	30.0000
2	6.25%	3	18.0000	18.0000
2	6.25%	4	26.0000	26.0000
2	6.25%	5	19.0000	19.0000
2	6.25%	6	22.0000	22.0000
2	6.25%	7	23.0000	23.0000
2	6.25%	8	24.0000	24.0000
2	6.25%	9	19.0000	19.0000
2	6.25%	10	22.0000	22.0000
3	12.5%	1	21.0000	21.0000
3	12.5%	2	25.0000	25.0000
3	12.5%	3	30.0000	30.0000
3	12.5%	4	19.0000	19.0000
3	12.5%	5	23.0000	23.0000
3	12.5%	6	26.0000	26.0000
3	12.5%	7	24.0000	24.0000
3	12.5%	8	14.0000	14.0000
3	12.5%	9	20.0000	20.0000
3	12.5%	10	32.0000	32.0000
4	25%	1	27.0000	27.0000
4	25%	2	24.0000	24.0000
4	25%	3	20.0000	20.0000
4	25%	4	31.0000	31.0000
4	25%	5	30.0000	30.0000
4	25%	6	27.0000	27.0000
4	25%	7	23.0000	23.0000
4	25%	8	37.0000	37.0000
4	25%	9	30.0000	30.0000
4	25%	10	17.0000	17.0000
5	50%	1	40.0000	40.0000
5	50%	2	30.0000	30.0000
5	50%	3	39.0000	39.0000
5	50%	4	32.0000	32.0000
5	50%	5	35.0000	35.0000
5	50%	6	33.0000	33.0000
5	50%	7	35.0000	35.0000
5	50%	8	29.0000	29.0000
5	50%	9	31.0000	31.0000
5	50%	10	34.0000	34.0000

6	100%	1	38.0000	38.0000
6	100%	2	32.0000	32.0000
6	100%	3	37.0000	37.0000
6	100%	4	17.0000	17.0000
6	100%	5	39.0000	39.0000
6	100%	6	31.0000	31.0000
6	100%	7	30.0000	30.0000
6	100%	8	37.0000	37.0000
6	100%	9	45.0000	45.0000
6	100%	10	33.0000	33.0000

f93506-cd11
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	13.000	22.000	19.400
2	6.25%	10	18.000	30.000	23.200
3	12.5%	10	14.000	32.000	23.400
4	25%	10	17.000	37.000	26.600
5	50%	10	29.000	40.000	33.800
6	100%	10	17.000	45.000	33.900

f93506-cd11
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	7.600	2.757	0.872
2	6.25%	17.067	4.131	1.306
3	12.5%	28.044	5.296	1.675
4	25%	34.044	5.835	1.845
5	50%	13.067	3.615	1.143
6	100%	55.433	7.445	2.354

f93506-cd11
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	1786.883	357.377	13.811
Within (Error)	54	1397.300	25.876	

Total	59	3184.183

Critical F value = 2.45 (0.05,5,40)
Since F > Critical F REJECT Ho:All groups equal

f93506-cd11
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	19.400	19.400		
2	6.25%	23.200	23.200	-1.670	
3	12.5%	23.400	23.400	-1.758	
4	25%	26.600	26.600	-3.165	
5	50%	33.800	33.800	-6.330	
6	100%	33.900	33.900	-6.374	

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=40,5)

f93506-cd11
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

DUNNETTS 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	Control	10			
2	6.25%	10	5.255	27.1	-3.800
3	12.5%	10	5.255	27.1	-4.000
4	25%	10	5.255	27.1	-7.200
5	50%	10	5.255	27.1	-14.400
6	100%	10	5.255	27.1	-14.500

test 11

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 324

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: SC-EEC4
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ____ hrs; 10/31/94
ENDING: ____ hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	
6.25	A	10	10	10	10	9		10	10	
	B	10	10	10	10	10		10	10	
	C	10	10	10	10	10		10	10	
	D	10	10	10	10	10		10	10	
12.5	A	10	10	10	10	9		9	9	
	B	10	10	10	10	10		10	10	
	C	10	9	9	9	9		9	9	
	D	10	10	10	10	10		10	10	
25	A	10	10	10	10	10		10	10	
	B	10	10	10	10	10		10	10	
	C	10	10	10	10	9		9	9	
	D	10	10	10	10	10		10	10	1 tiny
50	A	10	10	10	10	9		9	9	
	B	10	10	10	10	10		10	10	
	C	10	10	9	9	9		9	9	1 tiny
	D	10	10	10	10	9		9	9	
	TIME:	1800	1900	MLS	1700	1315		15:40	16:10	
	INITIAL:	LJT	LJT	1830	min	SR		RXK	RXK	

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
6.25	A		1.12066	1.12831			
	B		1.12271	1.12905			
	C		1.11585	1.12271			
	D		1.10685	1.11341			
12.5	A		1.11183	1.11832			
	B		1.09641	1.10276			
	C		1.11958	1.12741			
	D		1.09575	1.10269			
25	A		1.10778	1.11466			
	B		1.11129	1.11773			
	C		1.10457	1.11182			
	D		1.10028	1.11216			
50	A		1.12415	1.13086			
	B		1.12578	1.13150			
	C		1.12541	1.11129			
	D		1.11873	1.12486			

Test 11

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 324

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: SC-E804
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ____hrs; 10/31/94.
ENDING: ____hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	
100	A	10	10	10	10	9		9	9	
	B	10	10	10	10	10		10	10	
	C	10	10	10	10	10		10	10	
	D	10	10	10	10	10		10	10	1 fish
									11/7/94	
	TIME:	1800	1800	1830	1700	1415		16:00	16:00	
	INITIAL:	CJT	CJT	MLS	min	SB		RXK	RXK	

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
100	A		1.10952	1.11509			
	B		1.09932	1.10442			
	C		1.09530	1.10099			
	D		1.09918	1.10491			

brown pin LN

Tinker AFB Test # 11 TEST START DATE Oct 31, 94

SAMPLE ID SC-EE04 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
6.25%	A	1.12066	1.12831	0.00765	10	0.76
	B	1.12271	1.12905	0.00634	10	0.63
	C	1.11585	1.12271	0.00686	10	0.69
	D	1.10685	1.11341	0.00656	10	0.66
12.50%	A	1.11183	1.11832	0.00649	9	0.72
	B	1.09641	1.10276	0.00635	10	0.63
	C	1.11958	1.12741	0.00783	9	0.87
	D	1.09575	1.10269	0.00694	10	0.69
25%	A	1.10778	1.11466	0.00688	10	0.69
	B	1.11129	1.11773	0.00644	10	0.64
	C	1.10457	1.11182	0.00725	9	0.81
	D	1.10628	1.11216	0.00588	10	0.59
50%	A	1.12465	1.13086	0.00621	9	0.69
	B	1.12578	1.1315	0.00572	10	0.57
	C	1.10541	1.11129	0.00588	9	0.65
	D	1.11873	1.12486	0.00613	9	0.68
100%	A	1.10952	1.11509	0.00557	9	0.62
	B	1.09932	1.10442	0.0051	10	0.51
	C	1.0953	1.10099	0.00569	10	0.57
	D	1.09918	1.10491	0.00573	10	0.57

Organism: P. promelas
Sample: SC-EE04
Start: 10/31/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25.1	25	25	25.3	24.9	25.3	24.8	25.0	25.3	25.3	25.2	25.6	25.4	25.0		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.7	7.8	8.6	7.7	8.4		8.5	7.8	8.3	7.6	8.5	7.2	8.5	7.6		
6.25	8.4	7.7	8.6	7.7	8.5	8.0	8.5	7.7	8.3	7.5	8.5	7.1	8.6	7.5		
12.5	8.5	7.9	8.6	7.7	8.5	8.1	8.5	7.6	8.2	7.5	8.5	7.1	8.6	7.6		
25	8.5	8.3	8.6	7.3	8.5	8.1	8.5	7.6	8.2	7.5	8.5	7.1	8.6	7.6		
50	8.6	8.2	8.6	7.3	8.5	8.1	8.5	7.6	8.9	7.5	8.6	7.0	8.6	7.6		
100																

pH

CONCENTRATION	Start (RL)	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	~~7.89~~						8.60	8.31	8.33	8.27	8.57	~~8.66~~	8.53	8.44		
6.25	7.54	8.38	8.67	8.30	8.57							~~8.54~~	8.54	8.45		
12.5	8.66	8.29	8.70	8.33	8.56	8.41	8.62	8.29	8.27	8.30	8.56	~~8.46~~	8.51	8.46		
25	8.65	8.41	8.65	8.28	8.55	8.40	8.61	8.35	8.28	8.32	8.53	~~8.44~~	8.47	8.46		
50	7.69	8.43	8.61	8.26	8.50	8.40	8.55	8.31	8.31	8.34	8.50	~~8.54~~	8.46			
100	8.60	8.51	8.37	8.31	~~8.42~~	8.44	8.51	8.39	8.38	8.35	8.43	8.18				
												8.22				

CONDUCTIVITY

CONCENTRATION	Start (RL)	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	~~345~~					~~349~~	370	406	375	349	375	~~600~~	388	395		
6.25	330	651	~~334~~	409	379	~~402~~	374	405	383	366	379	~~601~~	382	370		
12.5	379	595	378	414	382	403	393	415	385	417	395	~~572~~	376	408		
25	361	561	336	428	344	423	427	444	426	408	423	~~515~~	401	431		
50	424	587	361	461	428	456	459	495	~~482~~	401	490	~~503~~	490			
100	486	521	493	523	495											

424
416
425
455
524

f93506-11
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	7	10	7	0

Calculated Chi-Square goodness of fit test statistic = 3.7808
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-11
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 10.88
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

TITLE: f93506-11
ILE: S:\toxlab\toxstat\f93506-f
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.7500	0.7500
1	Control	2	0.7400	0.7400
1	Control	3	0.7700	0.7700
1	Control	4	0.8100	0.8100
2	6.25%	1	0.7600	0.7600
2	6.25%	2	0.6300	0.6300
2	6.25%	3	0.6900	0.6900
2	6.25%	4	0.6600	0.6600
3	12.5%	1	0.7200	0.7200
3	12.5%	2	0.6300	0.6300
3	12.5%	3	0.8700	0.8700
3	12.5%	4	0.6900	0.6900
4	25%	1	0.6900	0.6900
4	25%	2	0.6400	0.6400
4	25%	3	0.8100	0.8100
4	25%	4	0.5900	0.5900
5	50%	1	0.6900	0.6900
5	50%	2	0.5700	0.5700
5	50%	3	0.6500	0.6500
5	50%	4	0.6800	0.6800
6	100%	1	0.6200	0.6200
6	100%	2	0.5100	0.5100
6	100%	3	0.5700	0.5700
6	100%	4	0.5700	0.5700

f93506-11
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.740	0.810	0.768
2	6.25%	4	0.630	0.760	0.685
3	12.5%	4	0.630	0.870	0.727
4	25%	4	0.590	0.810	0.682
5	50%	4	0.570	0.690	0.648
6	100%	4	0.510	0.620	0.568

f93506-11
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.001	0.031	0.015
2	6.25%	0.003	0.056	0.028
3	12.5%	0.010	0.102	0.051
4	25%	0.009	0.094	0.047
5	50%	0.003	0.054	0.027
6	100%	0.002	0.045	0.022

f93506-11
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.095	0.019	3.800
Within (Error)	18	0.085	0.005	
Total	23	0.180		

Critical F value = 2.77 (0.05,5,18)
Since F > Critical F REJECT Ho:All groups equal

f93506-11
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.768	0.768		
2	6.25%	0.685	0.685	1.650	
3	12.5%	0.727	0.727	0.800	
4	25%	0.682	0.682	1.700	
5	50%	0.648	0.648	2.400	
6	100%	0.568	0.568	4.000	*

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-11
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

DUNNETTS 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	Control	4			
2	6.25%	4	0.120	15.7	0.083
3	12.5%	4	0.120	15.7	0.040
4	25%	4	0.120	15.7	0.085
5	50%	4	0.120	15.7	0.120
6	100%	4	0.120	15.7	0.200

№ 14 J

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: TOX TOX	REMARKS
SCEE04TX001	10-27-94	1000	water	2	4	
SCE04TX001	"	1030	Soil	2	4	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/27/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lisa Deer	10/28/94 0930	4°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

№ 14 9

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

ANALYSES REQUIRED: TOX TCL

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	REMARKS
SCEE04TX001	10-27-94	1000	water	3	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/27/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Liza Deer	10/28/94 0930	2 °C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

48-hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 3160/315
JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: Controls
NPDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/28/94
START TIME: 1600
DILUTION WATER: FM-Spring (C.dubia Hard-very Hard Distilled)

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
Con	A	10	10	10	0	25.4		25.2	8.4		8.2	8.62		8.63	380		~~488~~ CJT
Spring	B	10	10	10	0												409
Con	A	10	10	9	1				8.6		8.3	8.63		8.60	1143		1191
very Hard	B	10	10	10	0												
C. dubia																	
Con	A	5	5	5	0				8.5		7.8	8.50		8.50	613		722
Hard	B	5	5	5	0												
	C	5	4	4	1												
	D	5	5	5	0												
Con	A	5	5	5	0				8.6		8.0	8.63		8.43	1143		1008
very Hard	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	MLS													
Time		1600	1515	1200													

Comments

Ha Ineso

	Spring	Hard Dist.	very Hard Dist
	200	220	210
	220	130	140

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	470	~~458~~ 470

48–hr Ceriodaphnia dubia ACUTE TOXICITY TEST – STATIC, NONRENEWAL

G NO. 315
B NO.
)USTRY:
NTACT:
FLUENT: EES
DES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/28/94
START TIME: 1530
DILUTION WATER: Hard Distilled

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: 30 mL
TEST SOLN VOLUME/DEPTH: 20 mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	5	5	5	0	25.4		25.2	8.9		8.0	8.55		8.50	652		695
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
12.5	A	5	5	5	0				8.9		8.0	8.53		8.52	632		688
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	4	1												
25	A	5	5	5	0				8.9		8.0	8.53		8.55	597		642
	B	5	5	4	1												
	C	5	5	2	3												
	D	5	5	4	1												
50	A	5	4	3	2				8.9		8.0	8.53		8.57	517		590
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
100	A	5	5	5	0				8.9		8.0	8.53		8.63	418		433
	B	5	5	4	1												
	C	5	5	5	0												
	D	5	5	4	1												
itials		MLS	MLS	MLS													
me		1530	1530	1240													

omments

LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness		

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 316 | SAMPLE TYPE: | PHOTOPERIOD: 16 hrs light
JOB NO. | SAMPLE TIME: | FEEDING REGIME: None
INDUSTRY: | ORGANISM SOURCE: Batch # | TEST VESSEL CAPACITY: ~~1000~~ mL 266
CONTACT: | START DATE: 10/28/94 | TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
EFFLUENT: EES | START TIME: 1600 | NO. ORGANISMS/CONC.: 20
NPDES PERMIT NO.: | DILUTION WATER: Spring | NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	10	10	10	0	25.4			8.9		8.5	8.55		8.61	~~400~~ 385		402
	B	10	10	10	0												
12.5	A	10	10	10	0				8.9		8.5	8.58		8.63	~~402~~ 385		400
	B	10	10	10	0												
25	A	10	10	10	0				8.9		8.5	8.58		8.61	~~377~~ 385		377
	B	10	10	10	0												
50	A	10	10	10	0				8.9		8.5	8.58		8.61	~~417~~ 391		403
	B	10	10	10	0												
100	A	10	10	10	0				8.9		8.5	8.58		8.63	~~418~~ 368		375
	B	10	10	10	0												
Initials		MM	MS														
Time		1610	1530														

Comments

Ammonia: <40 ppb LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	300 ~~170~~	70

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST Test 12

NOEC 7 100%

JOB NO: F93506 BEGINNING: 1620 hrs; 10/31/94 Log No: 322

INDUSTRY: Tanker ENDING: 1710 hrs; / /

CONTACT: Test 12 FEEDING REGIME:

EFFLUENT: SS-EE05 .05 mL yct/15 mL

NPDES PERMIT NO: .05 mL algal suspension/15 mL

PERSON CONDUCTING TEST:

PHOTOPERIOD: 16 light, 8 dark

ORGANISM SOURCE: WCC

TEST VESSEL CAPACITY: 30 mL

TEST SOLUTION VOLUME: 15mL

NO. REPLICATES: 10

DILUTION WATER:

	TIME	1620	1815	1600	1430	1620	1630	1400	1710
	OBSERVER	LJT	MLS	LJT	LJT	MLS	MLS	MLS	MLS

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
~~MCS~~	Hd-190								
Con	1		✓	✓	4	0	3	0	9
	2		✓	✓	0	0	14	0	8 3
	3		✓	✓	0	0	6	0	8
	4	3br	✓	✓	0	3	5	0	9
	5		✓	✓	0	0	4	0	5 7
	6		✓	✓	2	0	5	0	9
	7		✓	✓	0	0	0	8	11
	8		✓	✓	2	0	0	11	8
	9		✓	✓	2	0	1	0	10
	10		✓	✓	4	0	3	0	9
6.25	11		✓	✓	0	0	4	7	9
	12		✓	✓	0	0	0	0	9
	13		✓	✓	0	0	6	0	10
	14		✓	✓	0	2	5	0	8
	15		✓	✓	0	0	3	8	9
	16		✓	✓	4	0	0	12	12
	17		✓	✓	0	D	X	X	X
	18		✓	✓	0	0	5	0	9
	19		✓	✓	✓	✓	10	0	7
	20		✓	✓	✓	0	0	0	9
12.5	21		✓	✓	0	0	0	8	14
	22		✓	✓	0	0	7	8	10
	23		✓	✓	✓	0	9	0	6
	24		✓	✓	4	0	2	10	7
	25		✓	✓	✓	0	5	10	10
	26		✓	✓	0	0	6	0	9
	27		✓	✓	0	0	5	0	7
	28		✓	✓	0	0	7	9	9
	29		✓	✓	0	2	7	0	11
	30		✓	✓	0	4	8	0	11

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F43506 | BEGINNING: ____ hrs; / / | Log No. ____
INDUSTRY: Tinker | ENDING: ____ hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

TIME
OBSERVER

CONC | CHAMBER | NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
25%	31		✓	✓	4	0	6	12	8
	32		✓	✓	2	3	10	0	9
	33		✓	✓	0	0	4	0	11
	34		✓	✓	0	5	0	7	11
	35		✓	✓	0	2	4	3	11
	36		✓	✓	3	1	0	12	8
	37		✓	✓	0	4	8	5	0
	38		✓	✓	✓	0	6	7	8
	39		✓	✓	2	0	6	8	8
	40		✓	✓	0	2	6	0	12

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
50%	41		✓	✓	0	2	6	0	9
	42		✓	✓	0	6	0	9	14
	43		✓	✓	4	0	6	13	5
	44		✓	✓	3	1	0	12	8
	45		✓	✓	0	7	0	12	10
	46		✓	✓	0	0	8	14	8
	47		✓	✓	0	0	9	0	7
	48		✓	✓	0	4	0	7	12
	49		✓	✓	0	0	1	11	10
	50		✓	✓	0	4	8	8	0

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
100%	51		✓	✓	0	4	4	0	10
	52		✓	✓	4	6	1	16	10
	53		✓	✓	0	4	3	0	11
	54		✓	✓	0	0	6	15	10
	55		✓	✓	0	4	10	7	7
	56		✓	✓	✓	0	8	12	8
	57		✓	✓	0	5	0	11	9
	58		✓	✓	0	1	8	12	8
	59		✓	✓	0	5	0	9	9
	60		✓	✓	0	0	6	11	7

lest 12

EE05

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ~~Z~~ ~~X~~ ~~B~~ ~~Ø~~ ~~ST~~ ~~Q~~ H Start Date: 10/31/94 Sample ID: SC ~~EEC4~~ LJT Log #: 323

AD	ID 22	1 ✓	AD	ID 32	1 ✓	AD	ID 46	1 ✓	AD	ID 58	1 ✓		ID 18	1
2 ✓	3 0	4 0	2 ✓	3 2	4 3	2 ✓	3 4	4 0	2 ✓	3 0	4 1	2 ✓	3 0	4 0
5 7	6 8	7 10	5 10	6 0	7 9	5 8	6 14	7 8	5 8	6 12	7 8	5 5	6 0	7 9
AD	ID 1	1 ✓	AD	ID 17	1 ✓	AD	ID 57	1 ✓	AD	ID 37	1 ✓		ID 48	1 ✓
2 ✓	3 4	4 0	2 ✓	3 0	4 D	2 ✓	3 0	4 5	2 ✓	3 0	4 4	2 ✓	3 0	4 4
5 3	6 0	7 9	5	6	7	5 0	6 11	7 2 9	5 8	6 5	7 0	5 6	6 7	7 12
AD	ID 33	1 ✓	AD	ID 2	1 ✓	AD	ID 47	1 ✓	AD	ID 23	1 ✓		ID 19	1 ✓
2 ✓	3 0	4 0	2 ✓	3 0	4 0	2 ✓	3 0	4 0	2 ✓	3 0	4 0	2 ✓	3 0	4 0
5 4	6 0	7 11	5 14	6 0	7 3	5 9	6 0	7 7	5 9	6 0	7 6	5 10	6 0	7 7
AD	ID 38	1 ✓	AD	ID 20	1 ✓	AD	ID 56	1 ✓	AD	ID 9	1 ✓		ID 59	1 ✓
2 ✓	3 0	4 0	2 ✓	3 0	4 0	2 ✓	3 0	4 0	2 ✓	3 2	4 0	2 ✓	3 0	4
5 6	6 7	7 8	5 0	6 0	7 9	5 8	6 12	7 8	5 1	6 0	7 10	5 0	6 9	7 9
AD	ID 10	1 ✓	AD	ID 45	1 ✓	AD	ID 34	1 ✓	AD	ID 55	1 ✓		ID 3	1 ✓
2 ✓	3 4	4 0	2 ✓	3 0	4 7	2 ✓	3 0	4 5	2 ✓	3 0	4 4	2 ✓	3 0	4 0
5 3	6 0	7 9	5 0	6 12	7 10	5 0	6 7	7 11	5 10	6 7	7 ~~7~~	5 6	6 0	7 8
AD	ID 21	1 ✓	AD	ID 35	1 ✓	AD	ID 16	1 ✓	AD	ID 44	1 ✓		ID 36	1 ✓
2 ✓	3 0	4 0	2 ✓	3 0	4 2	2 ✓	3 4	4 0	2 ✓	3 0	4 4	2 ✓	3 3	4 1
5 0	6 8	7 14	5 4	6 3	7 11	5 0	6 12	7 12	5 4	6 6	7	5 0	6 12	7 8

Comments:

Cup ID	Sample Concentration	Day ~~1~~	Initials LJT	Time 1620
1–10:	Control	1	MLS	1815
11–20:	6.25	2	LJT	1600
21–30:	12.5	3	LJT	1430
31–40:	25	4	MLS	1620
41–50:	50	5	MLS	1630
51–60:	100	6	MLS	1400
		7	MLS	1710

lcst 12

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

EE05

Grid Letter: ~~F~~ ~~1/80~~ ~~J~~ ~~H~~ ~~E~~ 3r Start Date: 10/31 Sample ID: SC-~~EE04~~ LJT Log #: 323

AD	ID	1	2	3	4	5	6	7
	31	✓	✓	4	0	6	12	8
	14	✓	✓	0	2	5	0	8
	27	✓	✓	0	0	5	0	7
	6	✓	✓	2	0	5	0	9
	60		✓	0	0	6	11	7
	7	✓	✓	0	0	0	8	11
	49	✓	✓	0	0	1	11	10
	42	✓	✓	0	6	0	9	14
	51	✓	✓	0	4	4	0	10
	43	✓	✓	4	0	6	13	5
	50	✓	✓	0	4	8	8	0
	30	✓	✓	0	4	8	0	11
	13	✓	✓	0	0	6	0	10
	8	✓	✓	2	0	0	11	8
	24	✓	✓	4	0	2	10	7
	11	✓	✓	0	0	4	7	9
	54	✓	✓	0	0	6	15	10
	52	✓	✓	4	6	1	16	10
	15	✓	✓	0	0	3	8	9
	40	✓	✓	0		6	0	12
	41	✓	✓	0	2	6	0	9
	28	✓	✓	0	0	7	9	9
	5	✓	✓	0	0	4	0	~~12~~ 5 7
	25	✓	✓	0	0	5	10	10
	29	✓	✓	0	2	7	0	11
	4	✓	✓	0	3	5	0	9
	39	✓	✓	2	0	6	8	8
	26	✓	✓	0	0	6	0	9
	53	✓	✓	0	4	3	0	11
	12	✓	✓	0	0	0	0	9

Comments:

Cup ID	Sample Concentration	Day ∅	Initials LJT	Time 1620
1–10:	Control	1	MLS	1820
11–20:	6.25	2	LJT	1600
21–30:	12.5	3	LJT	1430
31–40:	25	4	MLS	1630
41–50:	50	5	MLS	1640
51–60:	100	6	MLS	1410
		7	MLS	1700

Organism: C. dubia
Sample #: EE05
Start date: 10/31/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	25.1	25.0	25.0	25.3	25	25.3	25.0	25.3	25.0	25.5	25.2	25.1	25.2			
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.4	8.0	8.6	8.5	8.6	8.2	8.6	8.1	8.1	7.8	8.2	8.2	8.4	8.0		
6.25	8.3	7.9	8.6	8.5	8.6	8.2	8.6	8.1	8.6	7.8	8.3	8.3	8.4	8.1		
12.5	8.4	7.9	8.6	8.5	8.6	8.2	8.6	8.1	8.7	7.8	8.4	8.2	8.4	8.1		
25	8.4	7.9	8.6	8.5	8.6	8.3	8.6	8.2	8.1	7.7	8.5	8.2	8.5	8.1		
50	8.5	7.9	8.6	8.6	8.6	8.3	8.6	8.2	8.7	7.8	8.5	8.2	8.6	8.2		
100	8.5	8.0	8.6	8.6	8.6	8.3	8.6	8.2	9.0	7.8	8.6	8.3	8.6	8.2		

pH

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.51		8.55	8.45		8.48	8.53	8.33	8.14	8.22	8.41	8.34	8.45	8.32		
6.25	8.48	8.44	8.56	8.44	8.45	8.37	8.52	8.31	8.15	8.23	8.37	8.27	8.33	8.30	8.30	
12.5	8.47	8.42	8.49	8.42	8.41	8.38	8.52	8.27	8.14	8.22	8.31	8.25	8.36	8.30		
25	8.48	8.42	8.49	8.39	8.45	8.40	8.50	8.33	8.14	8.24	8.38	8.24	8.36	8.37		
50	8.52	8.44	8.46	8.41	8.44	8.46	8.47	8.38	8.14	8.38	8.40	8.36	8.41	8.46		
100	8.53	8.41	8.48	8.45	8.39	8.55	8.44	8.47	8.31	8.24	8.35	8.39	8.43	8.60		
									8.44 TB							

CONDUCTIVITY

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	480		533	560		557	544	582	425	435	420	442	434	463		
6.25	475	375	529	478	560	511	594	549	425	425	417	421	420	436		
12.5	450	376	453	514	549	562	588	571	417	406	414	435	420	443		
25	464	380	465	535	488	538	527	542	410	417	408	422	413	427		
50	443	387	421	466	448	492	467	490	408	408	386	400	407	421		
100	356	405	408	500	406	362	402	407	392	410	388	420	392	405		

f93506-cd12
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	5	11	24	15	5

Calculated Chi-Square goodness of fit test statistic = 1.3979
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd12
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 11.22
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

TITLE: f93506-cd12
FILE: S:\TOXLAB\TOXSTAT\F93506-C.
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	16.0000	16.0000
1	Control	2	17.0000	17.0000
1	Control	3	14.0000	14.0000
1	Control	4	17.0000	17.0000
1	Control	5	16.0000	16.0000
1	Control	6	16.0000	16.0000
1	Control	7	19.0000	19.0000
1	Control	8	21.0000	21.0000
1	Control	9	13.0000	13.0000
1	Control	10	16.0000	16.0000
2	6.25%	1	20.0000	20.0000
2	6.25%	2	9.0000	9.0000
2	6.25%	3	16.0000	16.0000
2	6.25%	4	15.0000	15.0000
2	6.25%	5	20.0000	20.0000
2	6.25%	6	28.0000	28.0000
2	6.25%	7	0.0000	0.0000
2	6.25%	8	14.0000	14.0000
2	6.25%	9	17.0000	17.0000
2	6.25%	10	9.0000	9.0000
3	12.5%	1	22.0000	22.0000
3	12.5%	2	25.0000	25.0000
3	12.5%	3	15.0000	15.0000
3	12.5%	4	23.0000	23.0000
3	12.5%	5	25.0000	25.0000
3	12.5%	6	15.0000	15.0000
3	12.5%	7	12.0000	12.0000
3	12.5%	8	25.0000	25.0000
3	12.5%	9	20.0000	20.0000
3	12.5%	10	23.0000	23.0000
4	25%	1	30.0000	30.0000
4	25%	2	24.0000	24.0000
4	25%	3	15.0000	15.0000
4	25%	4	23.0000	23.0000
4	25%	5	20.0000	20.0000
4	25%	6	24.0000	24.0000
4	25%	7	17.0000	17.0000
4	25%	8	21.0000	21.0000
4	25%	9	24.0000	24.0000
4	25%	10	20.0000	20.0000
5	50%	1	17.0000	17.0000
5	50%	2	29.0000	29.0000
5	50%	3	28.0000	28.0000
5	50%	4	24.0000	24.0000
5	50%	5	29.0000	29.0000
5	50%	6	37.0000	37.0000
5	50%	7	14.0000	14.0000
5	50%	8	23.0000	23.0000
5	50%	9	22.0000	22.0000
5	50%	10	20.0000	20.0000

6	100%	1	18.0000	18.0000
6	100%	2	37.0000	37.0000
6	100%	3	18.0000	18.0000
6	100%	4	31.0000	31.0000
6	100%	5	28.0000	28.0000
6	100%	6	28.0000	28.0000
6	100%	7	27.0000	27.0000
6	100%	8	29.0000	29.0000
6	100%	9	23.0000	23.0000
6	100%	10	24.0000	24.0000

f93506-cd12
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	13.000	21.000	16.500
2	6.25%	10	0.000	28.000	14.800
3	12.5%	10	12.000	25.000	20.500
4	25%	10	15.000	30.000	21.800
5	50%	10	14.000	37.000	24.300
6	100%	10	18.000	37.000	26.300

f93506-cd12
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	5.167	2.273	0.719
2	6.25%	57.956	7.613	2.407
3	12.5%	23.167	4.813	1.522
4	25%	17.733	4.211	1.332
5	50%	44.900	6.701	2.119
6	100%	33.789	5.813	1.838

f93506-cd12
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	980.200	196.040	6.438
Within (Error)	54	1644.400	30.452	

Total	59	2624.600

Critical F value = 2.45 (0.05,5,40)
Since F > Critical F REJECT Ho:All groups equal

f93506-cd12
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	16.500	16.500		
2	6.25%	14.800	14.800	0.689	
3	12.5%	20.500	20.500	-1.621	
4	25%	21.800	21.800	-2.148	
5	50%	24.300	24.300	-3.161	
6	100%	26.300	26.300	-3.971	

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=40,5)

f93506-cd12
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

DUNNETTS 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	Control	10			
2	6.25%	10	5.701	34.6	1.700
3	12.5%	10	5.701	34.6	-4.000
4	25%	10	5.701	34.6	-5.300
5	50%	10	5.701	34.6	-7.800
6	100%	10	5.701	34.6	-9.800

test 12

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 524

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ___hrs; / / .
ENDING: ___hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	
6.25	A	10	10	10	10	9	9	9	9	1 Tiny
	B	10	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10 sd	10	10	
	D	10	10	10	10	10	9	9	9	
12.5	A	10	10	10	10	10	10 sd	10	10	
	B	10	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10 sd	10	10	
	D	10	10	10	10	10	10	9	9	
25	A	10	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	10	
	C	10	10	10	10	10	9	9	9	
	D	10	10	10	10	10	10	10	10	
50	A	10	10	10	10	10	10 sd	10	10	
	B	10	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10 sd	10	10	
	D	10	10	10	10	10	10 sd	10	10	1 Tiny
									11/7/94	
	TIME:		1900	18:10	1700	1720	1345	1440	15:20	
	INITIAL:		mm	RxK	mm	JT	SB	mm	RxK	

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
6.25	A		1.09695	1.10211			
	B		1.10614	1.11233			
	C		1.11862	1.12555			
	D		1.10745	1.11325			
12.5	A		1.10626	1.11231			
	B		1.09553	1.10201			
	C		1.10992	1.11671			
	D		1.09654	1.10322			
25	A		1.11191	1.11828			
	B		1.11789	1.12478			
	C		1.12092	1.12765			
	D		1.09784	1.10402			
50	A		1.10796	1.11449			
	B		1.11548	1.12200			
	C		1.11264	1.11666			
	D		1.11653	1.12354			

Test 12

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 024

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ___hrs; / / .
ENDING: ___hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	
100	A	10	10	10	10	10	8/10	10	10	
	B	10	10	10	10	10	10	10	10	1 tiny
	C	10	10	10	10	10	10	9	9	
	D	10	10	10	10	10	10	10	10	
	TIME:		1900	18.35	1755	1712	1342	1440	15:15	
	INITIAL:		MM	RXK	TMT	TMT	SJB	MM	RXK	

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
100	A		1.10575	1.11052			
	B		1.11689	1.12169			
	C		1.11349	1.11932			
	D		1.11024	1.11628			

white

Tinker AFB Test # 12 TEST START DATE Oct 31, 94

SAMPLE ID DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
6.25%	A	1.09695	1.10211	0.00516	9	0.57
	B	1.10614	1.11233	0.00619	10	0.62
	C	1.11862	1.12555	0.00693	10	0.69
	D	1.10745	1.11325	0.0058	9	0.64
12.50%	A	1.10626	1.11231	0.00605	10	0.60
	B	1.09553	1.10201	0.00648	10	0.65
	C	1.10992	1.11671	0.00679	10	0.68
	D	1.09654	1.10322	0.00668	9	0.74
25%	A	1.11191	1.11838	0.00647	10	0.65
	B	1.11789	1.12478	0.00689	10	0.69
	C	1.12092	1.12765	0.00673	9	0.75
	D	1.09784	1.10402	0.00618	10	0.62
50%	A	1.10796	1.11449	0.00653	10	0.65
	B	1.11548	1.12186	0.00638	10	0.64
	C	1.11064	1.11666	0.00602	10	0.60
	D	1.11653	1.12354	0.00701	10	0.70
100%	A	1.10575	1.11052	0.00477	10	0.48
	B	1.11689	1.12169	0.0048	10	0.48
	C	1.11349	1.11932	0.00583	9	0.65
	D	1.11024	1.11628	0.00604	10	0.60

Organism: Pimpinelas
Sample: 2005
Start: 10/31/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25.1	25	25	25.2	24.9	25.3	24.8	25.0	25.3	25.3	25.2	25.4	25.4	25.0		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control									8.2 TH	50						
6.25	8.4	8.0	8.6	7.2	8.6	7.9	8.6	7.5	8.1	6.9	8.6	7.6	8.6	7.6		
12.5	8.4	7.9	8.6	7.2	8.6	7.9	8.6	7.6	8.1	6.9	8.5	7.6	8.6	7.6		
25	8.6	7.9	8.6	7.3	8.6	7.9	8.6	7.6	8.1	7.0	8.3	7.7	8.6	7.6		
50	8.5	7.7	8.6	7.3	8.6	7.9	8.6	7.6	8.4	7.1	8.4	7.6	8.5	7.6		
100	8.6	7.8	8.6	7.3	8.5	7.9	8.6	7.6	8.8	7.9	8.5	7.6	8.6	7.6		

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control																
6.25	8.68	8.30	8.69	8.20	8.57	8.39	8.66	8.2[illegible]	8.21	8.19	8.58	8.22	8.56	8.45		
12.5	8.65	8.27	8.69	8.24	8.58	8.43	8.65	8.29	8.33	8.25	8.57	8.23	8.54	8.45		
25	8.65	8.29	8.64	8.23	8.56	8.41	8.61	8.31	8.25	8.29	8.54	8.22	8.54	8.45		
50	8.64	8.33	8.57	8.26	8.52	8.43	8.53	8.31	8.35	8.26	8.51	8.24	8.56	8.43		
100	8.55	8.39	8.37	8.23	8.45	8.45	8.51	8.28	8.41	8.28	8.41	8.38	8.47	8.46		
												8.34				
												8.31				

8.37
8.38
8.36

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	352	368	3													
6.25	337	461	368	406	374	386	362	385	351	306	365	435	373	387		
12.5	290	445	362	395	342	396	359	385	368	388	363	426	369	385		
25	342	434	333	395	374	407	369	391	371	394	366	420	373	393		
50	343	429	330	401	384	427	380	401	372	378	374	417	376	403		
100	351	398	374	423	402	485	390	451	391	435	389	408	394	418		

387
380
384
393
408

f93506-fm12
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	8	9	7	0

Calculated Chi-Square goodness of fit test statistic = 4.2910
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-fm12
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 7.75
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

TITLE: f93506-fm12
FILE: S:\toxlab\toxstat\f93506-f
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.7500	0.7500
1	Control	2	0.7400	0.7400
1	Control	3	0.7700	0.7700
1	Control	4	0.8100	0.8100
2	6.25%	1	0.5700	0.5700
2	6.25%	2	0.6200	0.6200
2	6.25%	3	0.6900	0.6900
2	6.25%	4	0.6400	0.6400
3	12.5%	1	0.6000	0.6000
3	12.5%	2	0.6500	0.6500
3	12.5%	3	0.6800	0.6800
3	12.5%	4	0.7400	0.7400
4	25%	1	0.6500	0.6500
4	25%	2	0.6900	0.6900
4	25%	3	0.7500	0.7500
4	25%	4	0.6200	0.6200
5	50%	1	0.6500	0.6500
5	50%	2	0.6400	0.6400
5	50%	3	0.6000	0.6000
5	50%	4	0.7000	0.7000
6	100%	1	0.4800	0.4800
6	100%	2	0.4800	0.4800
6	100%	3	0.6500	0.6500
6	100%	4	0.6000	0.6000

f93506-fm12
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.740	0.810	0.768
2	6.25%	4	0.570	0.690	0.630
3	12.5%	4	0.600	0.740	0.668
4	25%	4	0.620	0.750	0.677
5	50%	4	0.600	0.700	0.648
6	100%	4	0.480	0.650	0.553

f93506-fm12
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.001	0.031	0.015
2	6.25%	0.002	0.050	0.025
3	12.5%	0.003	0.059	0.029
4	25%	0.003	0.056	0.028
5	50%	0.002	0.041	0.021
6	100%	0.007	0.086	0.043

f93506-fm12
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.098	0.020	6.667
Within (Error)	18	0.057	0.003	
Total	23	0.155		

Critical F value = 2.77 (0.05,5,18)
Since F > Critical F REJECT Ho:All groups equal

f93506-fm12
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.768	0.768		
2	6.25%	0.630	0.630	3.550	*
3	12.5%	0.668	0.668	2.582	*
4	25%	0.677	0.677	2.324	
5	50%	0.648	0.648	3.098	*
6	100%	0.553	0.553	5.551	*

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-fm12
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

DUNNETTS 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	Control	4			
2	6.25%	4	0.093	12.2	0.138
3	12.5%	4	0.093	12.2	0.100
4	25%	4	0.093	12.2	0.090
5	50%	4	0.093	12.2	0.120
6	100%	4	0.093	12.2	0.215

CHAIN OF CUSTODY RECORD 2774675363

№ 1...1

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: TOX Lab	REMARKS
SCEE05TX001	10-27-94	0900	water	2	X	
SCEE05TX001	10-27-94	0930	soil	2	X	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/27/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lyza Deer	10/28/94 0930	1 °C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

№ 1. 2

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: TOX TOC	REMARKS
SC EE05 TX001	10-27-94	0900	water	3	✓	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/27/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lisa Jew	10/28/94 0930	2°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

GRID L

C dubia

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

313
314

G NO.
B NO.
)USTRY:
)NTACT:
FLUENT: Control
'DES PERMIT NO.:

SAMPLE TYPE: Control
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/27/94
START TIME: 1530, 1600
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
Con	A	10	10	10		25.5		25.4	8.7		8.4	7.86		8.28	463		427
	B	10	10	10													
C dubia																	
Con	A	5	5	5	0												
	B	5	4	4	1												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		LOT	LOT	MLS													
Time		1600	1610	1235													

Comments

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	180	
Total Alkalinity	120	

48-hr Ceriodaphnia dubia ACUTE TOXICITY TEST – STATIC, NONRENEWAL

ɜ NO.	313	SAMPLE TYPE:		PHOTOPERIOD:	16 hrs light
ɜ NO.		SAMPLE TIME:		FEEDING REGIME:	None
USTRY:	Tinker	ORGANISM SOURCE:	Batch #	TEST VESSEL CAPACITY:	30 mL
NTACT:		START DATE:	10/27/94	TEST SOLN VOLUME/DEPTH:	20 mL
LUENT:	SC-EE06-TX-001	START TIME:	1530	NO. ORGANISMS/CONC.:	20
DES PERMIT NO.:		DILUTION WATER:	Hard	NO. REPLICATES:	4

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (°C) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	5	5	5	0	25.5											
	B	5	5	5	0												
	C	5	4	4	1												
	D	5	5	5	0												
12.5	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
50	A	5	5	5	0												
	B	5	4	4	1												
	C	5	5	5	0												
	D	5	5	5	0												
100	A	5	5	4	1												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
tials		LCM	MLS	MLS													
ne		1315	1130	1245													

omments

LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)		
Total Alkalinity		

5

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 314
JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: SC-EEU6-TX-001
NPDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/27/94
START TIME: 1600
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	10	10	10	0	25.5		25.4	8.1		8.4	8.26		8.30	484		490
	B	10	10	10	0												
12.5	A	10	10	10	0				8.8		8.4	8.30		8.30	504		488
	B	10	10	10	0												
25	A	10	10	10	0				8.7		8.4	8.30		8.31	479		478
	B	10	10	10	0												
50	A	10	10	10	0				8.8		8.4	8.30		8.33	410		483
	B	10	10	10	0												
100	A	10	10	10	0				9.4 aerated		8.5	8.07		8.44	334		433
	B	10	10	10	0												
Initials		LJT	LJT	MLS													
Time		1600	1600	1230													

Comments

Ammonia: ND (< 40 ppb) LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	180	180
Total Alkalinity (mg/L CaCO3 @ 4.5)	120	150

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST — Test 5

JOB NO: F93506 | BEGINNING: 1600 hrs; 10/29/94 | Log No: 3-21
INDUSTRY: Tinker | ENDING: 1240 hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: 3C-EE06 | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER: Hard-170

	TIME	1600	1600	1630	1240	1320	1300	1420	1240
	OBSERVER	LJT	LJT	MLS	MLS	MLS	MLS	MLS	MLS

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Hard (170)									
Con	1		✓	✓	✓	4	3	6	6
	2		✓	✓	✓	4	7	10	0
	3		✓	✓	✓	6	1	5	6
	4		✓	✓	✓	3	0	7	9
	5		✓	✓	✓	5	7	11	0
	6		✓	✓	3	3	0	11	0
	7		✓	✓	✓	2	6	5	9
	8		✓	✓	✓	6	7	9	3
	9		✓	✓	✓	2	6	8	10
	10		✓	✓	✓	7	0	9	8
6.25	11		✓	✓	✓	0	2	5	0
	12		✓	✓	✓	5	9	4	0
	13		✓	✓	✓	5	0	14	0
	14		✓	✓	D	~~X~~	~~X~~	~~X~~	~~X~~
	15		✓	✓	✓	3	8	11	7
	16		✓	✓	✓	2	7	10	0
	17		✓	✓	3	0	0	12	15
	18		✓	✓	✓	3	8	11	0
	19		✓	✓	✓	4	10	14	0
	20		✓	✓	✓	4	8	10	7
12.5	21		✓	✓	✓	3	5	9	10
	22		✓	✓	✓	6	11	15	11
	23		✓	✓	✓	4	10	14	0
	24		✓	✓	✓	4	9	12	0
	25		✓	✓	✓	4	10	13	0
	26		✓	✓	✓	5	8	D-13	
	27		✓	✓	2	6	0	12	16
	28		✓	✓	2	0	9	14	0
	29		✓	✓	✓	5	9	11	0
	30		✓	✓	✓	2	4	8	D-0

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F93506 | BEGINNING: ____ hrs; / / . | Log No. ____
INDUSTRY: Tinker | ENDING: ____ hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

TIME
OBSERVER

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
25%	31		✓	✓	✓	2	10	13	0
	32		✓	✓	✓	5	9	12	0
	33		✓	✓	✓	6	9	1	18
	34		✓	✓	✓	5	9	12	0
	35		✓	✓	✓	4	6	14	0
	36		✓	✓	✓	4	8	12	0
	37		✓	✓	✓	4	11	16	0
	38		✓	✓	✓	8	0	9	16
	39		✓	✓	✓	4	9	13	0
	40		✓	✓	✓	5	7	15	0
50%	41		✓	D	X	X	X	X	X
	42		✓	✓	✓	4	8/2	16	0
	43		✓	✓	✓	5	8	14	0
	44		✓	✓	✓	6	5	0	6
	45		✓	✓	✓	7	8	17	0
	46		✓	✓	✓	6	0	12	22
	47		✓	✓	✓	3	9	20	16
	48		✓	✓	✓	5	11	16	5
	49		✓	✓	✓	5	8	14	0
	50		✓	✓	✓	6	9	16	0
100%	51		✓	✓	5	0	12	19	13
	52		✓	✓	✓	6	10	16	15
	53		✓	✓	✓	4	8	16	0
	54		✓	✓	5	0	11	19	14
	55		✓	✓	✓	4	7	12	0
	56		✓	✓	✓	5	10	18	0
	57		✓	✓	✓	4	8	12	0
	58		✓	✓	✓	6	6	0	14
	59		✓	✓	✓	7	0	9	17
	60		✓	✓	✓	7	11	16	0

f93506-cd5
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	3	14	24	17	2

Calculated Chi-Square goodness of fit test statistic = 1.7669
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd5
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 18.99
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

TITLE: f93506-cd5
FILE: S:\TOXLAB\TOXSTAT\F93506-C.
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	19.0000	19.0000
1	Control	2	21.0000	21.0000
1	Control	3	18.0000	18.0000
1	Control	4	19.0000	19.0000
1	Control	5	23.0000	23.0000
1	Control	6	17.0000	17.0000
1	Control	7	22.0000	22.0000
1	Control	8	25.0000	25.0000
1	Control	9	26.0000	26.0000
1	Control	10	24.0000	24.0000
2	6.25%	1	7.0000	7.0000
2	6.25%	2	18.0000	18.0000
2	6.25%	3	19.0000	19.0000
2	6.25%	4	0.0000	0.0000
2	6.25%	5	29.0000	29.0000
2	6.25%	6	19.0000	19.0000
2	6.25%	7	30.0000	30.0000
2	6.25%	8	22.0000	22.0000
2	6.25%	9	28.0000	28.0000
2	6.25%	10	29.0000	29.0000
3	12.5%	1	27.0000	27.0000
3	12.5%	2	43.0000	43.0000
3	12.5%	3	28.0000	28.0000
3	12.5%	4	25.0000	25.0000
3	12.5%	5	27.0000	27.0000
3	12.5%	6	26.0000	26.0000
3	12.5%	7	36.0000	36.0000
3	12.5%	8	25.0000	25.0000
3	12.5%	9	25.0000	25.0000
3	12.5%	10	14.0000	14.0000
4	25%	1	25.0000	25.0000
4	25%	2	26.0000	26.0000
4	25%	3	34.0000	34.0000
4	25%	4	26.0000	26.0000
4	25%	5	24.0000	24.0000
4	25%	6	24.0000	24.0000
4	25%	7	31.0000	31.0000
4	25%	8	33.0000	33.0000
4	25%	9	26.0000	26.0000
4	25%	10	27.0000	27.0000
5	50%	1	0.0000	0.0000
5	50%	2	30.0000	30.0000
5	50%	3	27.0000	27.0000
5	50%	4	17.0000	17.0000
5	50%	5	32.0000	32.0000
5	50%	6	40.0000	40.0000
5	50%	7	48.0000	48.0000
5	50%	8	37.0000	37.0000
5	50%	9	19.0000	19.0000
5	50%	10	31.0000	31.0000

6	100%	1	49.0000	49.0000
6	100%	2	47.0000	47.0000
6	100%	3	28.0000	28.0000
6	100%	4	49.0000	49.0000
6	100%	5	23.0000	23.0000
6	100%	6	33.0000	33.0000
6	100%	7	24.0000	24.0000
6	100%	8	26.0000	26.0000
6	100%	9	33.0000	33.0000
6	100%	10	34.0000	34.0000

f93506-cd5
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	17.000	26.000	21.400
2	6.25%	10	0.000	30.000	20.100
3	12.5%	10	14.000	43.000	27.600
4	25%	10	24.000	34.000	27.600
5	50%	10	0.000	48.000	28.100
6	100%	10	23.000	49.000	34.600

f93506-cd5
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	9.600	3.098	0.980
2	6.25%	100.544	10.027	3.171
3	12.5%	57.378	7.575	2.395
4	25%	13.600	3.688	1.166
5	50%	182.322	13.503	4.270
6	100%	104.267	10.211	3.229

f93506-cd5
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORM

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

ROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	Control	21.400				
2	6.25%	20.100	108.00	75.00	10.00	
3	12.5%	27.600	140.00	75.00	10.00	

4	25%	27.600	147.00	75.00	10.00
5	50%	28.100	128.50	75.00	10.00
6	100%	34.600	148.50	75.00	10.00

Critical values use k = 5, are 1 tailed, and alpha = 0.05

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ~~LJT BMC~~ Start Date: 10/29 Sample ID: [illegible] Log #: 321

AD	ID 39	1 ✓	AD	ID 3	1 ✓	AD	ID 25	1 ✓	AD	ID 19	1 ✓		ID 50	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6
5 9	6 13	7 0	5 1	6 5	7 6	5 10	6 13	7 0	5 10	6 14	7 0	5 9	6 16	7 C
AD	ID 18	1 ✓	AD	ID 48	1 ✓	AD	ID 38	1 ✓	AD	ID 29	1 ✓		ID 49	1 ✓
2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 8	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5
5 8	6 11	7 0	5 11	6 16	7 5	5 0	6 9	7 16	5 9	6 11	7 0	5 0	6 14	7 0
AD	ID 37	1 ✓	AD	ID 24	1 ✓	AD	ID 2	1 ✓	AD	ID 35	1 ✓		ID 16	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 2
5 11	6 16	7 0	5 9	6 12	7 0	5 7	6 10	7 0	5 6	6 14	7 0	5 7	6 10	7 0
AD	ID 28	1 ✓	AD	ID 15	1 ✓	AD	ID 51	1 ✓	AD	ID 47	1 ✓		ID 26	1 ✓
2 ✓	3 2	4 0	2 ✓	3 ✓	4 3	2 ✓	3 5	4 0	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 5
5 9	6 14	7 0	5 8	6 11	7 7	5 12	6 19	7 13	5 9	6 20	7 16	5 8	6 D 13	7
AD	ID 1	1 ✓	AD	ID 36	1 ✓	AD	ID 40	1 ✓	AD	ID 17	1 ✓		ID 4	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5	2 ✓	3 3	4 0	2 ✓	3 ✓	4 3
5 3	6 6	7 6	5 8	6 12	7 0	5 7	6 15	7 0	5 0	6 12	7 15	5 0	6 7	7 9
AD	ID 12	1 ✓	AD	ID 27	1 ✓	AD	ID 5	1 ✓	AD	ID 34	1 ✓		ID 52	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 2	4 6	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 6
5 9	6 4	7 0	5 0	6 12	7 16	5 7	6 11	7 0	5 9	6 12	7 0	5 10	6 16	7 15

Comments:

Cup ID	Sample Concentration
1–10:	Control - 170
11–20:	6.25
21–30:	12.5
31–40:	25
41–50:	50
51–60:	100

Day	Initials	Time
1	LJT	1600
2	MLS	1630
3	MLS	1240
4	MLS	1320
5	MLS	1300
6	MLS	1420
7	MLS	1240

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ~~I W K O U D~~ J Start Date: 10/29 Sample ID: SC-EE06-TX 001 Log #: 3

AD	ID 20	1 ✓	AD	ID 56	1 ✓	AD	ID 46	1 ✓	AD	ID 57	1 ✓		ID 10	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 7
5 8	6 10	7 7	5 10	6 18	7 0	5 0	6 12	7 22	5 8	6 12	7 0	5 0	6 9	7 8
AD	ID 43	1 ✓	AD	ID 32	1 ✓	AD	ID 9	1 ✓	AD	ID 23	1 ✓		ID 45	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 7
5 8	6 14	7 0	5 9	6 12	7 0	5 6	6 8	7 10	5 10	6 14	7 0	5 8	6 17	7 0
AD	ID 7	1 ✓	AD	ID 14	1 ✓	AD	ID 55	1 ✓	AD	ID 58	1 ✓		ID 31	1 ✓
2 ✓	3 ✓	4 2	2 ✓	3 D	4	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 2
5 6	6 5	7 9	5	6	7	5 7	6 12	7 0	5 6	6 0	7 14 ~~15~~	5 10	6 13	7 0
AD	ID 22	1 ✓	AD	ID 33	1 ✓	AD	ID 54	1 ✓	AD	ID 13	1 ✓		ID 44	1 ✓
2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 6	2 ✓	3 5	4 0	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 6
5 11	6 15	7 11	5 9	6 1	7 18	5 11	6 19	7 14	5 0	6 14	7 0	5 5	6 0	7 16
AD	ID 42	1 ✓	AD	ID 53	1 ✓	AD	ID 6	1 ✓	AD	ID 59	1 ✓		ID 60	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 4	2 ✓	3 3	4 3	2 ✓	3 ✓	4 7	2 ✓	3 ✓	4 7
5 8 2	6 16	7 0	5 8	6 16	7 0	5 0	6 11	7 0	5 0	6 9	7 17	5 11	6 16	7 0
AD	ID 11	1 ✓	AD	ID 30	1 ✓	AD	ID 41	1 ✓	AD	ID 21	1 ✓		ID 8	1 ✓
2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 2	2 D	3	4	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 6
5 2	6 5	7 0	5 4	6 8	7 D	5	6	7	5 5	6 9	7 10	5 7	6 9	7 3

Comments:

Cup ID	Sample Concentration	Day	Initials	Time
		0	LJT	1600
1–10:	Control (Hrd-170)	1	LJT	1600
11–20:	6.25	2	MLS	1645
21–30:	12.5	3	MLS	1245
31–40:	25	4	MLS	1330
41–50:	50	5	MLS	1240
51–60:	100	6	MLS	1430
		7	MLS	1245

Organism: C. dubia
Dilution H_2O: Hrd-170
Start date: 10/29

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25.4	25.4	25.4	25.2	25.2	25.0	25 C	25.3	25.0	25.10	25.1	25.0	25.2	25.4		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.3	8.3	8.5	8.4	8.0	8.2	8.4	8.4	8.4	8.2	8.5	8.0	8.5	7.8		
6.25	8.3	8.3	8.5	8.3	8.2	8.4	8.4	8.4	8.5	8.2	8.5	8.0	8.6	7.8		
12.5	8.4	8.3	8.5	8.4	8.2	8.5	8.4	8.3	8.5	8.3	8.5	8.3	8.6	7.9		
25	8.4	8.4	8.6	8.4	8.2	8.2	8.3	8.4	8.5	8.1	8.5	8.4	8.5	7.9		
50	8.4	8.4	8.6	8.4	8.3	8.1	8.3	8.4	8.5	8.1	8.5	8.1	8.3	8.0		
100	8.5	8.4	8.6	8.4	8.3	8.2	8.4	8.4	8.4	8.2	8.5	8.0	8.2	8.0		

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.53	8.55	8.43	8.44	8.45	8.48	8.40	8.33	8.09	8.35	8.34	8.42	8.31	8.25		
6.25	8.54	8.56	8.51	8.43	8.46	8.47	8.41	8.37	8.44	8.36	8.45	8.41	8.38	8.25		
12.5	8.53	8.55	8.52	8.42	8.46	8.50	8.44	8.38	8.45	8.38	8.55	8.39	8.38	8.20		
25	8.53	8.55	8.55	8.41	8.46	8.52	8.45	8.41	8.46	8.42	8.42	8.44	8.36	8.22		
50	8.52	8.51	8.53	8.43	8.51	8.54	8.45	8.43	8.45	8.46	8.44	8.45	8.33	8.42		
100	8.51	8.52	8.52	8.49	8.54	8.62	8.44	8.46	8.42	8.51	8.45	8.52	8.36	8.53		

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	663	515	662	655	530	596	525	521	732	585	674	605	444	424		
6.25	647	623	616	626	506	473	489	513	572	571	580	583	420	527		
12.5	611	604	603	609	499	460	494	516	558	539	399	504	412	515		
25	556	610	601	607	486	496	478	525	503	498	522	520	410	384		
50	523	551	483	543	456	433	452	495	494	498	483	492	410	402		
100	373	392	373	390	405	395	404	490	467	397	486	416	385	378		

FATHEAD MINNOW SURVIVAL AND GROWTH
7–DAY CHRONIC TOXICITY TEST

Log No. 242

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: EE06
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ____hrs; 7/19/94
ENDING: ____hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Control	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
6.25	A	10	10	10	10	9	9	9	9
	B	10	10	10	10	9	9	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	mis-9 10	10	10	10
12.5	A	10	10	10	10	10	10	10	10
	B	10	10	10	9	9	9	9	9
	D→C	10	10	→10	10	10	9→	10 9	→ 9 10
25	A	10	10	10	10	mis-9 10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
12.5	D	10	10	10	10	10	10	10	(10)
	TIME:	1700	1745	1905	1740	1710	1520	1410	12:25
	INITIAL:	LJT	LJT	RKK	LJT	MLS	LJT	THT	RKK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
Cont	A		1.10705	1.11496			
	B		1.12657	1.13382			
	C		1.10488	1.11235			
	D		1.10684	1.11166			
6.25	A		1.11303	1.11920			
	B		1.11595	1.12229			
	C		1.12202	1.12909			
	D		1.12084	1.12720			
12.5	A		1.11124	1.11627			
	B		1.10338	1.11011			
	C		1.11188	1.11909			
	D		1.12108	1.12240			
25	A		1.12174	1.12856			
	B		1.11193	1.11971			
	C		1.10370	1.10776			
	D		1.12623	1.13268			

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FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 32a

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: EZ06
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER:

PERSON CONDUCTING TEST:
BEGINNING: ____hrs; / / .
ENDING: ____hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
50	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	9	9	9	9
100	D	10	10	9	9	9	9	9	9
	A	10	10	10	9	9	9	9	9
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	9	9	9
	D	10	10	10	10	10	10	10	10
	TIME:		1720	19:30	1740	1710	1520	1530	12:10
	INITIAL:	LJT	LJT	RXK	LJT	MLS	LJT	LJT	RXK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)	
50	A		1.10353	1.10932				
	B		1.12049	1.12555				
	C		1.10836	1.11362				
	D		1.12176	1.12747				
100	A	1.10626	X.08706	1.11193				
	B	1.11627	1.09671	1.12093				
	C	1.11420	1.09610	1.11898				1.11388
	D	1.12135	1.09733	1.11783				1.11422

Tinker AFB Test # 5 TEST START DATE Oct 29, 94

SAMPLE ID EE 06 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish	
cont	A	1.10705	1.11496	0.00791	10	0.79	
	B	1.12657	1.13382	0.00725	10	0.72	
	C	1.10488	1.11235	0.00747	10	0.75	
	D	1.10684	1.11166	0.00482	10	0.48	-Smaller fish
6.25%	A	1.11303	1.12224	0.00921	9	1.02	
	B	1.11595	1.12224	0.00629	9	0.70	
	C	1.12202	1.12909	0.00707	10	0.71	
	D	1.12087	1.1272	0.00633	10	0.63	
12.50%	A	1.11127	1.11827	0.007	10	0.70	
	B	1.10338	1.11011	0.00673	9	0.75	
	C	1.11188	1.11909	0.00721	9	0.80	
	D	1.12108	1.1274	0.00632	10	0.63	
25%	A	1.12174	1.12856	0.00682	10	0.68	
	B	1.11193	1.11971	0.00778	10	0.78	
	C	1.1007	1.10776	0.00706	10	0.71	
	D	1.10628	1.11268	0.0064	10	0.64	
50%	A	1.10353	1.10932	0.00579	10	0.58	
	B	1.12049	1.12555	0.00506	10	0.51	
	C	1.10836	1.11362	0.00526	9	0.58	
	D	1.12176	1.12747	0.00571	9	0.63	
100%	A	1.10626	1.11193	0.00567	9	0.63	
	B	1.11627	1.12093	0.00466	10	0.47	
	C	1.1142	1.11898	0.00478	9	0.53	
	D	1.11135	1.11783	0.00648	10	0.65	

f93506-fm5
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	6	11	7	0

Calculated Chi-Square goodness of fit test statistic = 3.8331
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-fm5
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 12.40
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

TITLE: f93506-fm5
FILE: S:\toxlab\toxstat\f93506-f
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.7900	0.7900
1	Control	2	0.7200	0.7200
1	Control	3	0.7500	0.7500
1	Control	4	0.4800	0.4800
2	6.25%	1	1.0200	1.0200
2	6.25%	2	0.7000	0.7000
2	6.25%	3	0.7100	0.7100
2	6.25%	4	0.6300	0.6300
3	12.5%	1	0.7000	0.7000
3	12.5%	2	0.7500	0.7500
3	12.5%	3	0.8000	0.8000
3	12.5%	4	0.6300	0.6300
4	25%	1	0.6800	0.6800
4	25%	2	0.7800	0.7800
4	25%	3	0.7100	0.7100
4	25%	4	0.6400	0.6400
5	50%	1	0.5800	0.5800
5	50%	2	0.5100	0.5100
5	50%	3	0.5800	0.5800
5	50%	4	0.6300	0.6300
6	100%	1	0.6300	0.6300
6	100%	2	0.4700	0.4700
6	100%	3	0.5300	0.5300
6	100%	4	0.6500	0.6500

f93506-fm5
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.480	0.790	0.685
2	6.25%	4	0.630	1.020	0.765
3	12.5%	4	0.630	0.800	0.720
4	25%	4	0.640	0.780	0.703
5	50%	4	0.510	0.630	0.575
6	100%	4	0.470	0.650	0.570

3506-fm5
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.019	0.140	0.070
2	6.25%	0.030	0.174	0.087
3	12.5%	0.005	0.073	0.036
4	25%	0.003	0.059	0.030
5	50%	0.002	0.049	0.025
6	100%	0.007	0.085	0.042

f93506-fm5
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.127	0.025	2.273
Within (Error)	18	0.204	0.011	
Total	23	0.331		

Critical F value = 2.77 (0.05,5,18)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

f93506-fm5
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.685	0.685		
2	6.25%	0.765	0.765	-1.079	
3	12.5%	0.720	0.720	-0.472	
4	25%	0.703	0.703	-0.236	
5	50%	0.575	0.575	1.483	
6	100%	0.570	0.570	1.551	

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-fm5
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

DUNNETTS 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	Control	4			
2	6.25%	4	0.179	26.1	-0.080
3	12.5%	4	0.179	26.1	-0.035
4	25%	4	0.179	26.1	-0.017
5	50%	4	0.179	26.1	0.110
6	100%	4	0.179	26.1	0.115

Organism: P. promelas
Sample ID: EE06
Start Date: 10/29

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	25.4	25.4	25.4	25.2	25.1	25.0	25.0	25.3	25.0	25.0	24.5	25.3	25.0	25.2		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.5	8.2	8.4	8.2	8.4	8.2	8.5	8.4	8.5	7.9	8.5	8.4	8.1	7.4		
6.25	8.5	8.2	8.4	7.3	8.5	8.4	8.5	8.3	8.5	8.0	8.5	8.5	8.1	7.3		
12.5	8.6	8.2	8.4	8.6	8.5	8.5	8.6	8.3	8.5	8.0	8.5	8.4	8.2	7.3		
25	8.5	8.2	8.5	8.4	8.6	8.2	8.5	8.2	8.5	8.1	8.5	8.4	8.4	7.3		
50	8.6	8.1	8.5	8.2	8.6	8.1	8.6	8.1	8.5	8.1	8.5	8.3	8.1	7.3		
100	8.6	8.1	8.5	7.8	8.7	8.2	8.6	8.1	8.6	8.1	8.5	8.3	8.1	7.5		

pH

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.37	8.49	8.11	8.18	8.47	8.47	8.65	8.38	8.39	8.32	8.57	8.36	8.33	8.22		
6.25	8.37	8.45	8.27	8.14	8.45	8.33	8.63	8.27	8.52	8.34	8.57	8.31	8.23	8.24		
12.5	8.33	8.43	8.29	8.09	8.46	8.32	8.63	8.24	8.54	8.35	8.57	8.35	8.28	8.25		
25	8.35	8.45	8.30	8.08	8.57	8.32	8.61	8.27	8.57	8.36	8.54	8.31	8.26	8.27		
50	8.37	8.43	8.36	8.15	8.51	8.36	8.61	8.27	8.55	8.38	8.50	8.35	8.28	8.33		
100	8.31	8.41	8.35	8.19	8.52	8.36	8.46	8.27	8.42	8.36	8.46	8.31	8.21	8.32		

CONDUCTIVITY

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	371	371	383	426	355	519	387	487	492	391	415	424	406	399		
6.25	363	374	357	373	366	388	369	405	366	372	372	406	361	392		
12.5	362	378	358	368	367	400	370	401	368	370	336	398	370	379		
25	351	368	357	384	335	407	347	404	363	395	388	356	371	397		
50	333	365	357	379	375	418	383	409	373	379	378	402	372	401		
100	363	323	358	382	396	403	399	418	399	412	397	422	385	416		

MLS MLS MLS

H. azteca #5

Conc.	Number Exposed	Number Resp.	Observed Proportion Responding	Adjusted Proportion Responding	Predicted Proportion Responding
Control	40	1	0.0250	0.0000	0.0252
6.2500	40	4	0.1000	0.0768	0.0834
12.5000	40	8	0.2000	0.1793	0.1560
25.0000	40	11	0.2750	0.2563	0.2612
50.0000	40	15	0.3750	0.3589	0.3943
100.0000	40	23	0.5750	0.5640	0.5412

Chi - Square Heterogeneity = 0.442

Mu = 1.916230
Sigma = 0.810308

Parameter	Estimate	Std. Err.	95% Confidence Limits	
Intercept	2.635181	0.441606	(1.769633,	3.500730)
Slope	1.234099	0.279051	(0.687158,	1.781040)
Spontaneous Response Rate	0.025168	0.024578	(-0.023005,	0.073340)

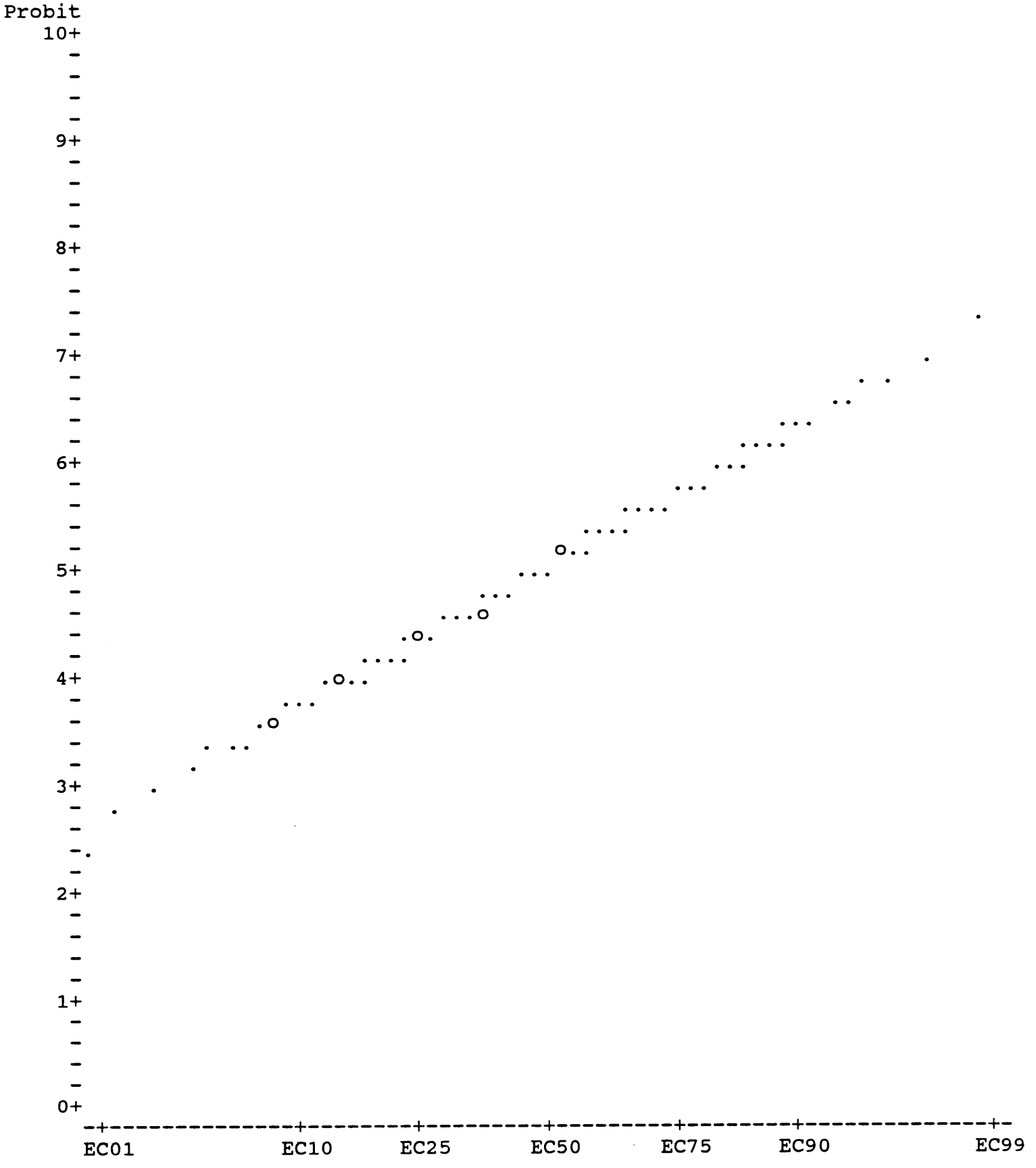
H. azteca #5

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence	Upper Limits
EC 1.00	1.0745	0.0583	3.4298
EC 5.00	3.8314	0.5543	8.5323
EC10.00	7.5464	1.8117	14.1051
EC15.00	11.9242	3.9633	20.1333
EC50.00	82.4576	52.3317	187.6544
EC85.00	570.2078	231.2993	5225.1201
EC90.00	900.9915	321.0342	11755.0449
EC95.00	1774.6194	519.4291	39258.1410
EC99.00	6327.7461	1270.5562	379898.4400

H. azteca #5

PLOT OF ADJUSTED PROBITS AND PREDICTED REGRESSION LINE



№ 1437

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: 10 TCLP	REMARKS
SC-FE06-TX-001	10-26-94	1400	water	2	✓	
SC-FE06-TX-001	10-26-94	1420	soil	2	✓	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/26/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lyza Jeer	10/27/94 0920	3°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

№ 1436

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: 10x Test	REMARKS
SC-EE06-TX-001	10-26-94	1400	water	3	✓	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
[signature]	10/26/94 1400				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		[signature]	10/27/94 0920	0.5°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

GRID L

C. dubia ←

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

313

LOG NO. 314
LOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: Control
PDES PERMIT NO.:

SAMPLE TYPE: Control
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/27/94
START TIME: 1530, 1600
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
Con	A	10	10	10		25.5		25.4	8.7		8.4	7.86		8.28	463		427
	B	10	10	10													
C. dubia																	
Con	A	5	5	5	0												
	B	5	4	4	1												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		LST	LST	MLS													
Time		1600	1610	1235													

Comments

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	180	
Total Alkalinity (mg/L CaCO3 @ 4.5)	120	

48–hr Ceriodaphnia dubia ACUTE TOXICITY TEST – STATIC, NONRENEWAL

3 NO. 313	SAMPLE TYPE:	PHOTOPERIOD:	16 hrs light
3 NO.	SAMPLE TIME:	FEEDING REGIME:	None
USTRY:	ORGANISM SOURCE: Batch #	TEST VESSEL CAPACITY:	30 mL
NTACT:	START DATE: 10/27/94	TEST SOLN VOLUME/DEPTH:	20 mL
FLUENT: SC-EEC7-TX-001	START TIME: 1530	NO. ORGANISMS/CONC.:	20
DES PERMIT NO.:	DILUTION WATER: Mod Hd	NO. REPLICATES:	4

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (SU) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	5	5	5	0	25.5		25.4									
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
12.5	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
50	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
100	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MS	MS	MS													
Time		1530	1535	1250													

Comments

LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)		
Total Alkalinity		

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 314
JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: SC-EE07-7X-CX1
NPDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/27/94
START TIME: 1600
DILUTION WATER: MOD HD

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	10	10	10	0	25.5			8.2		8.2	8.07		8.19	251		352
	B	10	10	10	0												
12.5	A	10	10	10	0				8.6		8.3	8.02		8.17	282		247
	B	10	10	10	0												
25	A	10	10	10	0				8.5		8.3	7.99		8.19	278		270
	B	10	10	10	0												
50	A	10	10	10	0				8.6		8.4	7.94		8.26	268		334
	B	10	10	10	0												
100	A	10	10	10	0				8.9		8.5	7.87		8.34	256		346
	B	10	10	10	0												
Initials		LST	LST														
Time		1600	1600														

Comments

Ammonia: ND (<40 ppb) LC50 >100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	80	90
Total Alkalinity (mg/L CaCO3 @ 4.5)	60	140

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST Test 6

JOB NO: F93506 | BEGINNING: 1530 hrs; 10/24/ . | Log No: 221
INDUSTRY: Tinker | ENDING: ____ hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: EE07 | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

	TIME	1530	1600	1655	1308	1350	1305	1430	1300
	OBSERVER	MLS	LJT	MLS	MLS	MLS	MLS	MLS	MLS

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Mod Con	1		✓	✓	✓	2	6	4	6
	2		✓	✓	✓	3	4	8	5
	3		✓	✓	✓	4	4	8	9
	4		✓	✓	✓	5	7	7	1
	5		✓	✓	✓	5	2	12	0
	6		✓	✓	✓	4	6	9	0
	7		✓	✓	✓	4	1/3	11	0
	8		✓	✓	4	4	5	4	9
	9		✓	✓	3	3	8	4	0
	10		✓	✓	✓	5	0	9	8

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
6.25	11		✓	✓	2	0	7	15	10
	12		✓	✓	✓	4	8	11	0
	13		✓	✓	✓	5	4	12	9
	14		✓	✓	2	3	7	14	11
	15		✓	✓	✓	5	4	11	0
	16		✓	✓	✓	4	0	8	11
	17		✓	✓	3	0	6	14	14
	18		✓	✓	✓	4	8	8	0
	19		✓	✓	✓	5	7	0	9
	20		✓	✓	✓	3	8	9	0

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
12.5	21		✓	✓	✓	6	0	8	14
	22		✓	✓	✓	4	7	10	0
	23		✓	✓	✓	5	9	12	0
	24		✓	✓	4	0	7	12	0
	25		✓	✓	2	7	0	10	13
	26		✓	✓		3	6	12	0
	27		✓	✓	✓	4	6	15	0
	28		✓	✓	2	0	8	13	15
	29		✓	✓	✓	4	6	12	0
	30		✓	✓	✓	3	4	7	0

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F93506 | BEGINNING: ____ hrs; / / | Log No: ____
INDUSTRY: Tinker | ENDING: ____ hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

TIME
OBSERVER

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
25%	31		✓	✓	4	0	7	14	16
	32		✓	✓	✓	6	0	17	17
	33		✓	✓	✓	0	8	16	0
	34		✓	✓	✓	2	5	14	8
	35		✓	✓	✓	3	8	13	0
	36		✓	✓	✓	5	7	11	0
	37		✓	✓	✓	3	9	15	0
	38		✓	✓	✓	5	7	12	0
	39		✓	✓	✓	4	6	13	0
	40		✓	✓	✓	4	6	13	0
50%	41		✓	✓	✓	6	9	15	0
	42		✓	✓	✓	4	10	13	0
	43		✓	✓	✓	6	9	15	0
	44		✓	✓	✓	5	9	0	16
	45		✓	✓	✓	4	9	13	0
	46		✓	✓	✓	0	7	14	13
	47		✓	✓	2	0	9	18	0
	48		✓	✓	✓	0	6	16	9
	49		✓	✓	✓	5	9	15	0
	50		✓	✓	3	0	10	18	12
100%	51		✓	✓	✓	0	9	16	15
	52		✓	✓	✓	5	6/5	14	14
	53		✓	✓	3	0	8	15	14
	54		D	X	X	X	X	X	X
	55		✓	✓	✓	4	3/7	14	12
	56		✓	✓	✓	3	8	12	0
	57		✓	✓	✓	5	11	14	1
	58		✓	✓	✓	5	10	18	0
	59		✓	✓	✓	2	12	0	17
	60		D	X	X	X	X	X	X

f93506-cd6
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	3	17	24	11	5

Calculated Chi-Square goodness of fit test statistic = 1.8255
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd6
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 32.09
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

TITLE: f93506-cd6
FILE: S:\TOXLAB\TOXSTAT\F93506-C.
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	18.0000	18.0000
1	Control	2	20.0000	20.0000
1	Control	3	25.0000	25.0000
1	Control	4	20.0000	20.0000
1	Control	5	19.0000	19.0000
1	Control	6	19.0000	19.0000
1	Control	7	19.0000	19.0000
1	Control	8	26.0000	26.0000
1	Control	9	18.0000	18.0000
1	Control	10	22.0000	22.0000
2	6.25%	1	34.0000	34.0000
2	6.25%	2	23.0000	23.0000
2	6.25%	3	30.0000	30.0000
2	6.25%	4	37.0000	37.0000
2	6.25%	5	20.0000	20.0000
2	6.25%	6	23.0000	23.0000
2	6.25%	7	37.0000	37.0000
2	6.25%	8	20.0000	20.0000
2	6.25%	9	21.0000	21.0000
2	6.25%	10	20.0000	20.0000
3	12.5%	1	28.0000	28.0000
3	12.5%	2	21.0000	21.0000
3	12.5%	3	26.0000	26.0000
3	12.5%	4	23.0000	23.0000
3	12.5%	5	32.0000	32.0000
3	12.5%	6	21.0000	21.0000
3	12.5%	7	35.0000	35.0000
3	12.5%	8	38.0000	38.0000
3	12.5%	9	22.0000	22.0000
3	12.5%	10	14.0000	14.0000
4	25%	1	41.0000	41.0000
4	25%	2	30.0000	30.0000
4	25%	3	24.0000	24.0000
4	25%	4	29.0000	29.0000
4	25%	5	24.0000	24.0000
4	25%	6	23.0000	23.0000
4	25%	7	27.0000	27.0000
4	25%	8	24.0000	24.0000
4	25%	9	23.0000	23.0000
4	25%	10	23.0000	23.0000
5	50%	1	30.0000	30.0000
5	50%	2	27.0000	27.0000
5	50%	3	30.0000	30.0000
5	50%	4	30.0000	30.0000
5	50%	5	26.0000	26.0000
5	50%	6	34.0000	34.0000
5	50%	7	29.0000	29.0000
5	50%	8	31.0000	31.0000
5	50%	9	29.0000	29.0000
5	50%	10	43.0000	43.0000

6	100%	1	40.0000	40.0000
6	100%	2	44.0000	44.0000
6	100%	3	40.0000	40.0000
6	100%	4	0.0000	0.0000
6	100%	5	40.0000	40.0000
6	100%	6	23.0000	23.0000
6	100%	7	31.0000	31.0000
6	100%	8	33.0000	33.0000
6	100%	9	31.0000	31.0000
6	100%	10	0.0000	0.0000

f93506-cd6
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	18.000	26.000	20.600
2	6.25%	10	20.000	37.000	26.500
3	12.5%	10	14.000	38.000	26.000
4	25%	10	23.000	41.000	26.800
5	50%	10	26.000	43.000	30.900
6	100%	10	0.000	44.000	28.200

f93506-cd6
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	8.044	2.836	0.897
2	6.25%	52.278	7.230	2.286
3	12.5%	53.778	7.333	2.319
4	25%	31.511	5.613	1.775
5	50%	22.767	4.771	1.509
6	100%	258.178	16.068	5.081

f93506-cd6
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	Control	20.600				
2	6.25%	26.500	136.00	75.00	10.00	
3	12.5%	26.000	134.00	75.00	10.00	

4	25%	26.800	143.00	75.00	10.00
5	50%	30.900	154.50	75.00	10.00
6	100%	28.200	133.00	75.00	10.00

Critical values use k = 5, are 1 tailed, and alpha = 0.05

lest 4

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: T ~~Z~~ ~~Z~~ ~~X~~ ~~W~~ ~~X~~ R Start Date: 10/29 Sample ID: EEO7 Log #: 32

AD	ID 5	1 ✓	AD	ID 8	1 ✓	AD	ID 59	1 ✓	AD	ID 24	1 ✓		ID 48	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 2	2 ✓	3 4	4 0	2 ✓	3 ✓	4 0
5 2	6 12	7 0	5 8	6 8	7 0	5 12	6 0	7 17	5 7	6 12	7 0	5 6	6 16	7 9
AD	ID 44	1 ✓	AD	ID 38	1 ✓	AD	ID 43	1 ✓	AD	ID 30	1 ✓		ID 13	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 5
5 9	6 0	7 16	5 7	6 12	7 0	5 9	6 15	7 0	5 4	6 7	7 0	5 4	6 12	7 9
AD	ID 53	1 ✓	AD	ID 14	1 ✓	AD	ID 9	1 ✓	AD	ID 54	1 ~~D~~		ID 56	1 ✓
2 ✓	3 3	4 0	2 ✓	3 2	4 3	2 ✓	3 3	4 3	2 MLS ~~5~~	3	4	2 ✓	3 ✓	4 3
5 8	6 15	7 14	5 7	6 14	7 11	5 8	6 4	7 0	5	6	7	5 8	6 12	7 0
AD	ID 19	1 ✓	AD	ID 49	1 ✓	AD	ID 2	1 ✓	AD	ID 47	1 ✓		ID 25	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 3	2 ✓	3 2	4 0	2 ✓	3 2	4 7
5 7	6 0	7 9	5 9	6 15	7 0	5 4	6 8	7 5	5 9	6 18	7 0	5 0	6 10	7 13
AD	ID 39	1 ✓	AD	ID 31	1 ✓	AD	ID 7	1 ✓	AD	ID 22	1 ✓		ID 4	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 4	4 0	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5
5 6	6 13	7 0	5 7	6 14	7 16	5 13	6 11	7 0	5 7	6 10	7 0	5 7	6 7	7 1
AD	ID 8	1 ✓	AD	ID 27	1 ✓	AD	ID 17	1 ✓	AD	ID 29	1 ✓		ID 35	1 ✓
2 ✓	3 4	4 4	2 ✓	3 ✓	4 4	2 ✓	3 3	4 0	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 3
5 5	6 4	7 9	5 6	6 15	7 0	5 6	6 14	7 14	5 6	6 12	7 0	5 8	6 13	7 0

Comments:

Cup ID	Sample Concentration	Day	Initials	Time
		Ø	MLS	1530
1–10:	Mod Hard (90)	1	LJT	1600
11–20:	6.25	2	MLS	1655
21–30:	12.5	3	MLS	1308
31–40:	25	4	MLS	1350
41–50:	50	5	MLS	1305
51–60:	100	6	MLS	1430
		7	MLS	1300

Test 6

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: M Ø Z Ø R Z Ω Start Date: 10/29 Sample ID: EE07 Log #: 32

AD	ID 37	1 ✓	AD	ID 45	1 ✓	AD	ID 50	1 ✓	AD	ID 34	1 ✓		ID 52	1 ✓
2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 4	2 ✓	3 3	4 0	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 5
5 9	6 15	7 0	5 9	6 13	7 0	5 10	6 18	7 12	5 5	6 14	7 8	5 6 5	6 14	7 14
AD	ID 42	1 ✓	AD	ID 57	1 ✓	AD	ID 6	1 ✓	AD	ID 20	1 ✓		ID 55	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 4
5 10	6 13	7 0	5 11	6 14	7 1	5 6	6 9	7 0	5 8	6 9	7 0	5 3 7	6 14	7 12
AD	ID 3	1 ✓	AD	ID 12	1 ✓	AD	ID 36	1 ✓	AD	ID 11	1 ✓		ID 40	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5	2 ✓	3 2	4 0	2 ✓	3 ✓	4 4
5 4	6 8	7 9	5 8	6 11	7 0	5 7	6 11	7 0	5 7	6 15	7 10	5 6	6 13	7 0
AD	ID 21	1 ✓	AD	ID 1	1 ✓	AD	ID 26	1 ✓	AD	ID 15	1 ✓		ID 60	1 D
2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 5	2	3	4
5 0	6 8	7 14	5 6	6 4	7 6	5 6	6 12	7 0	5 4	6 11	7 0	5	6	7
AD	ID 10	1 ✓	AD	ID 32	1 ✓	AD	ID 46	1 ✓	AD	ID 23	1 ✓		ID 28	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 5	2 ✓	3 2	4 0
5 0	6 9	7 8	5 0	6 7	7 17	5 7	6 14	7 13	5 9	6 12	7 0	5 8	6 13	7 15
AD	ID 33	1 ✓	AD	ID 51	1 ✓	AD	ID 58	1 ✓	AD	ID 41	1 ✓		ID 16	1 ✓
2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 4
5 8	6 16	7 0	5 9	6 16	7 15	5 10	6 18	7 0	5 9	6 15	7 0	5 0	6 8	7 11

Comments:

Cup ID	Sample Concentration	Day	Initials	Time
		Ø	MLS	1530
		1	LJT	1600
1–10:	Mod Hard Control	2	MLS	1655
11–20:	6.25	3	MLS	1259
21–30:	12.5	4	MLS	1340
31–40:	25	5	MLS	1320
41–50:	50	6	MLS	1435
51–60:	100	7	MLS	1310

Organism: C. dubia
Sample ID: EE07
Start Date: 10/29

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	25.4	25.4	25.4	25.2	25.2	25.0	25.0	25.3	25.0	25.6	25.0	25.0	25.2	25.4		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.3	8.3	8.5	8.3	8.2	8.4	8.4	8.5	8.6	8.2	8.5	8.1	8.7	8.1		
6.25	8.4	8.3	8.6	8.3	8.2	8.4	8.4	8.3	8.5	8.3	8.5	8.1	8.7	8.1		
12.5	8.3	8.3	8.6	8.4	8.4	8.5	8.4	8.3	8.6	8.2	8.5	8.1	8.7	8.1		
25	8.4	8.5	8.6	8.4	8.4	8.6	8.5	8.4	8.6	8.2	8.6	8.2	8.7	8.1		
50	8.4	8.3	8.6	8.4	8.4	8.4	8.5	8.4	8.6	8.2	8.6	8.2	8.7	8.1		
100	8.4	8.4	8.6	8.4	8.5	8.4	8.6	8.4	8.5	8.2	8.6	8.2	10	8.1		

pH

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	7.09	8.39	8.43	8.23	8.37	8.51	8.45	8.54	8.42	8.28	8.50	8.24	8.37	8.22		
6.25	8.30	8.36	8.36	8.21	8.34	8.42	8.41	8.34	8.38	8.24	8.44	8.22	8.38	8.29		
12.5	8.28	8.35	8.36	8.20	8.30	8.43	8.38	8.32	8.36	8.27	8.41	8.22	8.38	8.26		
25	8.31	8.39	8.36	8.22	8.30	8.40	8.34	8.32	8.34	8.27	8.33	8.21	8.33	8.25		
50	8.34	8.39	8.34	8.27	8.32	8.46	8.29	8.32	8.31	8.30	8.30	8.21	8.18	8.29		
100	8.47	8.49	8.32	8.33	8.37	8.55	8.22	8.38	8.28	8.35	8.31	8.36	8.09	8.4		

CONDUCTIVITY

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	345	338	321	294	314	282	354	372	387	372	351	347	347	371		
6.25	297	322	303	311	289	291	350	320	365	386	347	373	339	350		
12.5	290	325	294	318	268	288	348	305	352	362	343	348	333	372		
25	304	271	297	315	301	283	328	308	343	346	332	342	336	335		
50	263	309	275	307	296	308	312	274	299	321	318	313	313	351		
100	281	295	266	284	286	290	289	308	300	297	289	301	279	246		

ICST 4

FATHEAD MINNOW SURVIVAL AND GROWTH 7–DAY CHRONIC TOXICITY TEST

Log No. 322

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: ECT
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Mod. Hd.

PERSON CONDUCTING TEST:
BEGINNING: ____ hrs; 9/5/94
ENDING: ____ hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Control	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	9
	D	10	10	10	10	9	9	9	9
6.25	A	10	10	10	10	9	9	9	9
	B	10	10	10	10	9	9	9	9
	C	10	10	10	10	8	8	8	8
	D	10	10	10	10	10	10	10	10
12.5	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
25	A	10	10	10	10	MLS 9	8	8	8
	B	10	10	10	10	10	8	8	8
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
TIME:			1800	1800	12:45	1750	1600	1525	1315
INITIAL:		LJT	LJT	LJT	RxK	MLS	LJT	TH	RxK

GROWTH RESULTS

CONC (%)	REP ID	Sample ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
Cnt	A	6.25 A	1.12599	1.13203			
	B	B	1.10202	1.10873			
	C	C	1.09781	1.10339			
	D	D	1.10586	1.11235			
6.25	A	Cnt A	1.10489	1.11168			
	B	B	1.11778	1.12412			
	C	C	1.10855	1.11484			
	D	D	1.10617	1.11338			
12.5	A		1.11127	1.11705			
	B		1.11930	1.12615			
	C		1.11417	1.12099			
	D		1.11472	1.11976			
25	A		1.11940	1.12402			
	B		1.10359	1.11008			
	C		1.11399	1.12094			
	D		1.11643	1.12258			

Test 6

FATHEAD MINNOW SURVIVAL AND GROWTH
7–DAY CHRONIC TOXICITY TEST

Log No. 522

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: EE07
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Mod. Hd.

PERSON CONDUCTING TEST:
BEGINNING: ____hrs; 10/27/94
ENDING: ____hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
50	A	10	10	10	10	10	10	10	10
	B	10	9	9	9	9	9	9	9
	C	10	10	10	10	9	9	9	9
	D	10	10	10	10	9	9	9	9
100	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	9	8	8	8
	D	10	10	10	10	10	10	10	10
	TIME:		1800	1800	1805	MLS	1600	1535	1300
	INITIAL:	LJT	LJT	LJT	RXK	1750	LJT	HT	RXK

GROWTH RESULTS

CONC (%)	REP ID	~~Boat ID~~ Tare #	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)	
50	A		1.10148	1.10837	~7			1.10146
	B		1.09085	1.09767	~7			
	C		1.11100	1.12146	~5			
	D		1.10959	1.11493	~5			
100	A	1.11939	1.10626	1.12609				1.11908
	B	1.11060	1.11627	1.11637				
	C	1.10671	1.11420	1.11246				
	D	1.08706	1.11135	1.09292				

Tinker AFB Test # 6 TEST START DATE Oct 29, 94

SAMPLE ID EE 07 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
cont	A	1.10489	1.11168	0.00679	10	0.68
	B	1.11778	1.12412	0.00634	10	0.63
	C	1.10855	1.11486	0.00631	9	0.70
	D	1.10617	1.11338	0.00721	9	0.80
6.25%	A	1.12599	1.13203	0.00604	9	0.67
	B	1.10202	1.10873	0.00671	9	0.75
	C	1.09784	1.10339	0.00555	8	0.69
	D	1.10586	1.11235	0.00649	10	0.65
12.50%	A	1.11127	1.11705	0.00578	10	0.58
	B	1.1193	1.12615	0.00685	10	0.69
	C	1.11447	1.12099	0.00652	10	0.65
	D	1.11412	1.11976	0.00564	10	0.56
25%	A	1.1194	1.12402	0.00462	8	0.58
	B	1.10359	1.11008	0.00649	8	0.81
	C	1.11399	1.12094	0.00695	10	0.70
	D	1.11643	1.12258	0.00615	10	0.61
50%	A	1.10148	1.10837	0.00689	10	0.69
	B	1.09086	1.09767	0.00681	9	0.76
	C	1.116	1.12146	0.00546	9	0.61
	D	1.10959	1.11493	0.00534	9	0.59
100%	A	1.11939	1.12609	0.0067	10	0.67
	B	1.1106	1.11637	0.00577	10	0.58
	C	1.10671	1.11246	0.00575	8	0.72
	D	1.08706	1.09292	0.00586	10	0.59

Test #

Organism: P. promelas
Sample ID: EE07
Start date: 10/29

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	25.4	25.4	25.4	25.1	25.0	25.0	26.0	25.3	24.8	25.1	25.0	25.3	25.0	25.2		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.3	7.9	8.5	7.5	8.5	8.0	8.4	7.5	8.6	8.0	8.5	7.7	8.7	7.5		
6.25	8.3	7.9	8.5	7.5	8.6	8.2	8.4	7.5	8.5	8.0	8.5	7.7	8.7	7.4		
12.5	8.4	7.9	8.6	7.6	8.6	8.2	8.4	7.5	8.6	8.0	8.5	7.7	8.7	7.4		
25	8.4	7.9	8.6	7.4	8.6	8.1	8.5	7.4	8.6	8.0	8.6	7.7	8.7	7.6		
50	8.4	7.9	8.6	7.3	8.6	8.12	8.5	7.5	8.6	8.1	8.6	7.7	8.7	7.5		
100	8.5	7.9	8.6	7.4	8.6	8.0	8.6	7.5	8.6	8.1	8.6	7.7	8.7	7.4		

pH

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.29	8.17	8.43	8.05		8.01	8.45	7.95	8.42	8.17	8.50	8.15	8.31	8.02		
6.25	8.30	8.06	8.36	8.02	8.47	8.07	8.41	7.89	8.38	8.09	8.44	8.07	8.32	8.03		
12.5	8.30	8.15	8.36	7.86	8.47	8.04	8.38	7.89	8.36	8.10	8.41	8.03	8.32	8.10		
25	8.31	8.09	8.36	7.87	8.47	7.97	8.29	7.93	8.34	8.09	8.33	8.07	8.33	8.03		
50	8.31	8.14	8.34	7.94	8.48	8.01	8.42	7.93	8.31	8.09	8.36	8.08	8.28	8.05		
100	8.40	8.26	8.32	7.97	8.49	8.00	8.40	8.01	8.28	8.16	8.31	8.13	8.04	8.04		

CONDUCTIVITY

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	311	296	321	325		327	354	350	387	307	351	311	311	311		
6.25	311	301	303	363	350	341	350	359	365	330	347	318	339	362		
12.5	301	309	294	327	444	332	342	362	352	321	343	310	333	364		
25	298	306	297	323	453	330	328	349	343	317	332	303	330	336		
50	281	272	275	343	501	318	312	333	299	326	319	311	312	337		
100	276	284	266	279	966	307	289	311	306	309	289	282	279	304		

f93506-fm6
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	10	8	6	0

Calculated Chi-Square goodness of fit test statistic = 6.3968
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-fm6
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 5.73
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

TITLE: f93506-fm6
ILE: S:\toxlab\toxstat\f93506-f
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	ModHd Control	1	0.6800	0.6800
1	ModHd Control	2	0.6300	0.6300
1	ModHd Control	3	0.7000	0.7000
1	ModHd Control	4	0.8000	0.8000
2	6.25%	1	0.6700	0.6700
2	6.25%	2	0.7500	0.7500
2	6.25%	3	0.6900	0.6900
2	6.25%	4	0.6500	0.6500
3	12.5%	1	0.5800	0.5800
3	12.5%	2	0.6900	0.6900
3	12.5%	3	0.6500	0.6500
3	12.5%	4	0.5600	0.5600
4	25%	1	0.5800	0.5800
4	25%	2	0.8100	0.8100
4	25%	3	0.7000	0.7000
4	25%	4	0.6100	0.6100
5	50%	1	0.6900	0.6900
5	50%	2	0.7600	0.7600
5	50%	3	0.6100	0.6100
5	50%	4	0.5900	0.5900
6	100%	1	0.6700	0.6700
6	100%	2	0.5800	0.5800
6	100%	3	0.7200	0.7200
6	100%	4	0.5900	0.5900

f93506-fm6
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	ModHd Control	4	0.630	0.800	0.703
2	6.25%	4	0.650	0.750	0.690
3	12.5%	4	0.560	0.690	0.620
4	25%	4	0.580	0.810	0.675
5	50%	4	0.590	0.760	0.663
6	100%	4	0.580	0.720	0.640

93506-fm6
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	ModHd Control	0.005	0.071	0.036
2	6.25%	0.002	0.043	0.022
3	12.5%	0.004	0.061	0.030
4	25%	0.011	0.103	0.052
5	50%	0.006	0.078	0.039
6	100%	0.004	0.067	0.033

f93506-fm6
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.019	0.004	0.800
Within (Error)	18	0.096	0.005	
Total	23	0.115		

Critical F value = 2.77 (0.05,5,18)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

f93506-fm6
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	ModHd Control	0.703	0.703		
2	6.25%	0.690	0.690	0.250	
3	12.5%	0.620	0.620	1.650	
4	25%	0.675	0.675	0.550	
5	50%	0.663	0.663	0.800	
6	100%	0.640	0.640	1.250	

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-fm6
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

DUNNETTS 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	ModHd Control	4			
2	6.25%	4	0.120	17.2	0.012
3	12.5%	4	0.120	17.2	0.083
4	25%	4	0.120	17.2	0.028
5	50%	4	0.120	17.2	0.040
6	100%	4	0.120	17.2	0.063

EPA PROBIT ANALYSIS PROGRAM
USED FOR CALCULATING EC VALUES
Version 1.4

H. azteca #6

Conc.	Number Exposed	Number Resp.	Observed Proportion Responding	Adjusted Proportion Responding	Predicted Proportion Responding
Control	40	1	0.0250	0.0000	0.0252
6.2500	40	0	0.0000	-.0259	0.0000
12.5000	40	3	0.0750	0.0511	0.0000
25.0000	40	0	0.0000	-.0259	0.0010
50.0000	40	5	0.1250	0.1024	0.0981
100.0000	40	28	0.7000	0.6922	0.6943

Chi - Square Heterogeneity = 6.154

Mu = 1.915050
Sigma = 0.167163

Parameter	Estimate	Std. Err.	95% Confidence Limits
Intercept	-6.456177	2.388820	(-11.138264, -1.774089)
Slope	5.982182	1.252407	(3.527464, 8.436899)
Spontaneous Response Rate	0.025201	0.012556	(0.000592, 0.049810)

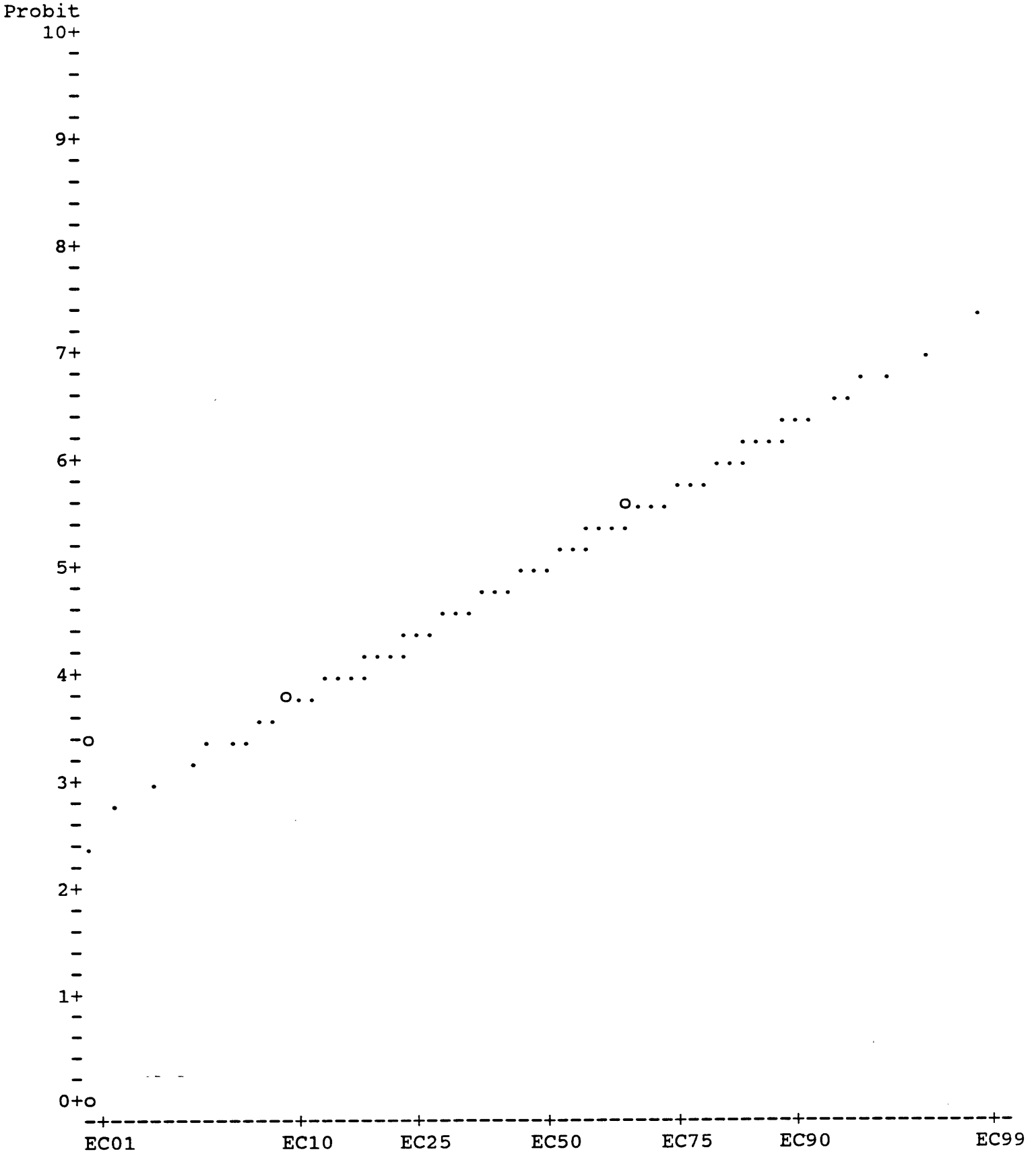
H. azteca #6

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper Limits
EC 1.00	33.5876	17.8187	44.3966
EC 5.00	43.6600	27.5410	53.9736
EC10.00	50.2127	34.6170	60.1068
EC15.00	55.1826	40.2880	64.8055
EC50.00	82.2337	71.3089	95.5640
EC85.00	122.5456	103.5848	171.7086
EC90.00	134.6748	111.5683	200.0425
EC95.00	154.8876	124.1334	251.6673
EC99.00	201.3360	150.7875	389.2993

H. azteca #6

PLOT OF ADJUSTED PROBITS AND PREDICTED REGRESSION LINE



№ 1..58

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
93F506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: TO-14	REMARKS
SCEE07-TX400	10-26-94	1130	water	3	—	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/26/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
			10/27/94 0920	2.5°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

№ 1 of 1

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker

SAMPLERS: (Signature)

ANALYSES REQUIRED: TOX TCL

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	REMARKS
SC-EE07TX001	10-26-94	1130	water	2	✓
SC EE07-TX001	"	1200	Soil	2	✓

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/26/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lyja Jeer	10/27/94 0920	1.5°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

DL

C. dubia –

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

313
)G NO. 314
)B NO.
DUSTRY:
)NTACT:
FLUENT: Control
)DES PERMIT NO.:

SAMPLE TYPE: Control
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/27/94
START TIME: 1530, 1600
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
Con	A	10	10	10		25.5		25.4	8.7		8.4	7.86		8.28	463		427
	B	10	10	10													
C. dubia																	
Con	A	5	5	5	0												
	B	5	4	4	1												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		LJT	LJT	MLS													
Time		1600	1610	1235													

Comments

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	180	
Total Alkalinity (mg/L CaCO3 @ 4.5)	120	

GRID U

48-hr Ceriodaphnia dubia ACUTE TOXICITY TEST – STATIC, NONRENEWAL

NO. 313
NO.
JSTRY:
ITACT:
LUENT: SC-EE08-TX-001
ES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/27/94
START TIME: 1530
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: 30 mL
TEST SOLN VOLUME/DEPTH: 20 mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 4

ONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
25	A	5	5	5	0	25.5											
	B	5	5	4	1												
	C	5	5	5	0												
	D	5	5	5	0												
12.5	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
50	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
100	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		DT	MS	MS													
Time		1530	1640	1230													

Comments

LC50 >100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)		
Total Alkalinity		

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO.	314	SAMPLE TYPE:		PHOTOPERIOD:	16 hrs light
JOB NO.		SAMPLE TIME:		FEEDING REGIME:	None
INDUSTRY:		ORGANISM SOURCE:	Batch #	TEST VESSEL CAPACITY:	~~1000~~ mL 266
CONTACT:		START DATE:	10/27/94	TEST SOLN VOLUME/DEPTH:	250 ~~500~~ mL
EFFLUENT:	SC-ECOS TX-001	START TIME:	1600	NO. ORGANISMS/CONC.:	20
NPDES PERMIT NO.:		DILUTION WATER:	Hard	NO. REPLICATES:	2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	10	10	10	0	25.5			8.8		8.5	8.52		8.29	491		591
	B	10	10	10	0												
12.5	a	10	10	10	0				8.8		8.4	8.30		8.29	603		673
	B	10	10	10	0												
25	A	10	10	10	0				8.8		8.4	8.16		8.30	662		648
	B	10	10	10	0												
50	a	10	10	10	0				8.9		8.5	8.00		8.35	772		763
	B	10	10	10	0												
100	a	10	10	10	0				9.0		8.6	7.78		8.43	1027		1172
	B	10	10	10	0												
Initials		LJT	LJT	MLS													
Time		1600	1620	1130													

Comments

Ammonia: ND (<40ppb) LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	180	230
Total Alkalinity (mg/L CaCO3 @ 4.5)	120	190

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST Test 7

NOEC ≥ 100%

JOB NO: F93506 | BEGINNING: 1615 hrs; 10/29 | Log No. 3041
INDUSTRY: Tinker | ENDING: 1400 hrs; 11/ 1 | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: EE08 | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

	TIME	1615	1600	1710	1328	1500	1410	1500	1400
	OBSERVER	MLS	LJT	MLS	MLS	MLS	MLS	MLS	MLS
CONC	CHAMBER	NUMBER OF YOUNG PRODUCED							
		START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
VHard-220									
Con	1		✓	✓	✓	3	9	5	0
	2		✓	✓	✓	3	2	12	0
	3		✓	✓	✓	2	9	6	8
	4		✓	✓	✓	2	10	6	4
	5		✓	✓	✓	4	0	11	0
	6		✓	✓	2	3	9	6	0
	7		✓	✓	✓	3	7	0	7
	8		✓	✓	2	0	6	10	0
	9		✓	✓	✓	2	5	6	5
	10		✓	✓	✓	2	0	11	7
6.25	11		✓	✓	✓	5	9	13	0
	12		✓	✓	✓	2	D		
	13		✓	✓	✓	6	9	13	0
	14		✓	✓	3	0	9	14	11
	15		✓	✓	✓	6	9	14	0
	16		✓	✓	✓	6	9	16	0
	17		✓	✓	1	8	5	12	14
	18		✓	✓	✓	6	8	9	17
	19		✓	✓	✓	4	6 3	15	0
	20		✓	✓	✓	4	9	15	0
12.5	21		✓	✓	✓	6	0	14	4
	22		✓	✓	✓	5	11	13	0
	23		✓	✓	1	3	8	13	0
	24		✓	✓	✓	6	9	14	0
	25		✓	✓	✓	4	8	0	14
	26		✓	✓	✓	5	8	17	0
	27		✓	✓	✓	5	7	12	0
	28		✓	✓	3	0	8	12	12
	29		✓	✓	✓	6	10	14	0
	30		✓	✓	✓	6	10	15	0

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F03506 | BEGINNING: _____ hrs; / / | Log No: _____
INDUSTRY: Tinker | ENDING: _____ hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: | .05 mL yc/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

TIME
OBSERVER

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
25%	31		D						X D
	32		✓	✓	✓	0	6	13	14
	33		✓	✓	✓	5	8	12	0
	34		✓	✓	✓	3	7	D-5	/
	35		✓	✓	✓	3	10	14	0
	36		✓	✓	4	0	7	15	11
	37		✓	✓	✓	2	7	14	0
	38		✓	✓	✓	3	6	10	0
	39		✓	✓	✓	4	9	12	0
	40		✓	✓	✓	6	8 4	19	0
50%	41		✓	✓	✓	4	8	16	0
	42		✓	✓	2	0	9	15	17
	43		✓	✓	✓	4	5	16	0
	44		✓	✓	✓	4	6 8	14	0
	45		✓	✓	3	1	6	13	13
	46		✓	✓	✓	6	0	12	18
	47		✓	✓	✓	4	8	11	0
	48		✓	✓	✓	3	7	13	0
	49		✓	✓	✓	2	6	10	0
	50		✓	✓	✓	4	10	12	0
100%	51		✓	✓	✓	7	0	8	11
	52		✓	✓	✓	5	8	11	0
	53		✓	✓	✓	3	5	6	0
	54		✓	✓	✓	0	4	11	0
	55		✓	✓	✓	6	6	8	15
	56		✓	✓	✓	4	7	7	0
	57		✓	✓	✓	0	6	9	0
	58		✓	✓	✓	1	2	11	0
	59		✓	✓	✓	6	6	6	1
	60		✓	✓	✓	3	7	13	5

Test 7

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ~~Y Q Q W M Z~~ Start Date: 10/29/94 Sample ID: EE08 Log #: 32

AD	ID 49	1 ✓	AD	ID 21	1 ✓	AD	ID 42	1 ✓	AD	ID 10	1 ✓		ID 57	1 ✓
2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 6	2 ✓	3 2	4 0	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 0
5 6	6 10	7 0	5 0	6 14	7 4	5 9	6 15	7 17	5 0	6 11	7 7	5 6	6 9	7 0
AD	ID 54	1 ✓	AD	ID 25	1 ✓	AD	ID 55	1 ✓	AD	ID 18	1 ✓		ID 30	1 ✓
2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 6
5 4	6 11	7 0	5 8	6 0	7 14	5 0	6 8	7 15	5 8	6 9	7 17	5 10	6 15	7 0
AD	ID 12	1 ✓	AD	ID 37	1 ✓	AD	ID 3	1 ✓	AD	ID 45	1 ✓		ID 9	1 ✓
2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 2	2 ✓	3 3	4 1	2 ✓	3 ✓	4 2
5 D	6	7	5 7	6 14	7 0	5 9	6 6	7 8	5 6	6 13	7 13	5 5	6 6	7 5
AD	ID 48	1 ✓	AD	ID 20	1 ✓	AD	ID 51	1 ✓	AD	ID 23	1 ✓		ID 36	1 ✓
2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 7	2 ✓	3 1	4 3	2 ✓	3 4	4 0
5 7	6 13	7 0	5 9	6 15	7 0	5 0	6 8	7 11	5 8	6 13	7 0	5 7	6 15	7 1
AD	ID 22	1 ✓	AD	ID 6	1 ✓	AD	ID 27	1 ✓	AD	ID 41	1 ✓		ID 17	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 2	4 3	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 4	2 ✓	3 1	4 8
5 11	6 13	7 0	5 9	6 6	7 0	5 7	6 12	7 0	5 8	6 16	7 0	5 5	6 12	7 1
AD	ID 38	1 ✓	AD	ID 29	1 ✓	AD	ID 11	1 ✓	AD	ID 33	1 ✓		ID 2	1 ✓
2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 3
5 6	6 10	7 0	5 10	6 14	7 0	5 9	6 13	7 0	5 8	6 12	7 0	5 2	6 12	7 0

Comments:

Cup ID	Sample Concentration	Day	Initials	Time
		Ø	MLS	1615
		1	LJT	1600
1–10:	very hard Con - 220	2	MLS	1659
11–20:	6.25	3	MLS	1315
21–30:	12.5	4	MLS	1510
31–40:	25	5	MLS	1420
41–50:	50	6	MLS	1450
51–60:	100	7	MLS	1335

Test 7

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ~~C~~ ~~A~~ ~~E~~ ~~M~~ P 7 Start Date: 10/29/94 Sample ID: EE08 Log #: 32

AD	ID 4	1 ✓	AD	ID 34	1 ✓	AD	ID 31	1 ✓	AD	ID 60	1 ✓		ID 46	1 ✓
2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 3	2	3	4	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 6
5 10	6 6	7 4	5 7	* 6 (5)	7	5	6	7	5 7	6 13	7 5	5 0	6 12	7 18
AD	ID 43	1 ✓	AD	ID 16	1 ✓	AD	ID 28	1 ✓	AD	ID 7	1 ✓		ID 26	1 ✓
2 ✓	3 ✓	4 4	2	3 ✓	4 6	2 ✓	3 3	4 0	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 5
5 5	6 16	7 0	5 9	6 16	7 0	5 8	6 12	7 12	5 7	6 0	7 7	5 8	6 17	7 0
AD	ID 50	1 ✓	AD	ID 1	1 ✓	AD	ID 44	1 ✓	AD	ID 39	1 ✓		ID 15	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6
5 10	6 12	7 0	5 9	6 5	7 0	5 6 8	6 14	7 0	5 9	6 12	7 0	5 9	6 14	7 0
AD	ID 19	1 ✓	AD	ID 13	1 ✓	AD	ID 53	1 ✓	AD	ID 56	1 ✓		ID 58	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 1
5 6 3	6 15	7 0	5 9	6 13	7 0	5 5	6 6	7 0	5 7	6 7	7 0	5 2	6 11	7 0
AD	ID 8	1 ✓	AD	ID 5	1 ✓	AD	ID 24	1 ✓	AD	ID 14	1 ✓		ID 59	1 ✓
2 ✓	3 2	4 0	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6	2 ✓	3 3	4 0	2 ✓	3 ✓	4 6
5 6	6 10	7 0	5 0	6 11	7 0	5 9	6 14	7 0	5 9	6 14	7 11	5 6	6 6	7 1
AD	ID 52	1 ✓	AD	ID 32	1 ✓	AD	ID 35	1 ✓	AD	ID 47	1 ✓		ID 40	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6
5 8	6 11	7 0	5 6	6 13	7 14	5 10	6 14	7 0	5 8	6 11	7 0	5 8 4	6 19	7 0

Comments:

Cup ID	Sample Concentration	Day	Initials	Time
		1	LJT	1600
1–10:	Very Hard control - 220	2	MLS	1710
11–20:	6.25%	3	MLS	1328
21–30:	12.5%	4	MLS	1500
31–40:	25%	5	MLS	1410
41–50:	50%	6	MLS	1500
51–60:	100%	7	MLS	1400

* (5) : 5 dead neonates

Test 7 (rd 220)

Log # 321
Organism: C. dubia
Sample ID: EE08
Start date: 10/29

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	25.4	25.4	25.4	25.1	25.0	25.0	25.0	25.3	.25	25.6	25.6	25.0	25.2	25.4		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.4	8.3	8.4	8.3	8.5	8.3	8.5	8.4	8.7	8.3	8.7	8.10	8.4	8.1		
6.25	8.4	8.2	8.4	8.3	8.4	8.4	8.4	8.4	8.6	8.3	8.7	8.10	8.4	8.1		
12.5	8.4	8.3	8.4	8.4	8.4	8.4	8.5	8.4	8.5	8.4	8.6	8.10	8.4	8.1		
.25	8.4	8.3	8.5	8.4	8.5	8.3	8.5	8.4	8.5	8.4	8.5	8.10	8.4	8.1		
50	8.5	8.4	8.5	8.4	8.5	8.3	8.6	8.5	8.5	8.4	8.5	8.10	8.5	8.0		
100	8.5	8.4	8.5	8.4	8.5	8.2	8.6	8.4	8.5	8.4	8.5	8.7	8.0	8.0		

pH

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.52	8.52	8.48	8.41	8.51	8.59	8.52	8.42	8.53	8.39	8.54	8.39	8.46	8.49		
6.25	8.53	8.54	8.51	8.39	8.50	8.59	8.52	8.45	8.53	8.39	8.53	8.40	8.44	8.51		
12.5	8.53	8.55	8.51	8.43	8.49	8.62	8.50	8.45	8.52	8.39	8.50	8.42	8.39	8.35		
25	8.50	8.54	8.48	8.42	8.50	8.60	8.47	8.46	8.47	8.42	8.46	8.42	8.33	8.39		
50	8.47	8.55	8.43	8.45	8.49	8.62	8.35	8.46	8.43	8.43	8.34	8.43	8.16	8.43		
100	8.44	8.60	8.31	8.49	8.45	8.63	8.26	8.47	8.32	8.45	8.27	8.49	7.95	8.50		

CONDUCTIVITY

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	608	615	525	626	625	564	612	628	655	650	663	626	599	524		
6.25	672	652	612	663	655	618	575	678	673	687	709	611	615	599		
12.5	701	730	615	650	681	654	625	699	705	722	724	624	610	661		
25	754	781	730	765	736	704	732	724	738	768	785	778	701	596		
50	819	915	854	855	825	746	829	859	835	843	869	824	825	832		
100	1133	1102	993	1110	1029	1055	1055	1046	1035	1049	1053	1069	1033	1040		

f93506-cd7
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Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	2	17	25	12	4

Calculated Chi-Square goodness of fit test statistic = 2.0648
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd7
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 14.47
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

TLE: f93506-cd7
ILE: S:\TOXLAB\TOXSTAT\F93506-C.
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	17.0000	17.0000
1	Control	2	17.0000	17.0000
1	Control	3	25.0000	25.0000
1	Control	4	22.0000	22.0000
1	Control	5	15.0000	15.0000
1	Control	6	20.0000	20.0000
1	Control	7	17.0000	17.0000
1	Control	8	18.0000	18.0000
1	Control	9	18.0000	18.0000
1	Control	10	20.0000	20.0000
2	6.25%	1	27.0000	27.0000
2	6.25%	2	2.0000	2.0000
2	6.25%	3	28.0000	28.0000
2	6.25%	4	37.0000	37.0000
2	6.25%	5	29.0000	29.0000
2	6.25%	6	31.0000	31.0000
2	6.25%	7	40.0000	40.0000
2	6.25%	8	40.0000	40.0000
2	6.25%	9	28.0000	28.0000
2	6.25%	10	28.0000	28.0000
3	12.5%	1	24.0000	24.0000
3	12.5%	2	29.0000	29.0000
3	12.5%	3	25.0000	25.0000
3	12.5%	4	29.0000	29.0000
3	12.5%	5	26.0000	26.0000
3	12.5%	6	30.0000	30.0000
3	12.5%	7	24.0000	24.0000
3	12.5%	8	35.0000	35.0000
3	12.5%	9	30.0000	30.0000
3	12.5%	10	31.0000	31.0000
4	25%	1	0.0000	0.0000
4	25%	2	33.0000	33.0000
4	25%	3	25.0000	25.0000
4	25%	4	15.0000	15.0000
4	25%	5	27.0000	27.0000
4	25%	6	37.0000	37.0000
4	25%	7	23.0000	23.0000
4	25%	8	19.0000	19.0000
4	25%	9	25.0000	25.0000
4	25%	10	37.0000	37.0000
5	50%	1	28.0000	28.0000
5	50%	2	43.0000	43.0000
5	50%	3	25.0000	25.0000
5	50%	4	32.0000	32.0000
5	50%	5	36.0000	36.0000
5	50%	6	36.0000	36.0000
5	50%	7	23.0000	23.0000
5	50%	8	23.0000	23.0000
5	50%	9	18.0000	18.0000
5	50%	10	26.0000	26.0000

6	100%	1	26.0000	26.0000
6	100%	2	24.0000	24.0000
6	100%	3	14.0000	14.0000
	100%	4	15.0000	15.0000
6	100%	5	39.0000	39.0000
6	100%	6	18.0000	18.0000
6	100%	7	15.0000	15.0000
6	100%	8	14.0000	14.0000
6	100%	9	19.0000	19.0000
6	100%	10	28.0000	28.0000

f93506-cd7
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	15.000	25.000	18.900
2	6.25%	10	2.000	40.000	29.000
3	12.5%	10	24.000	35.000	28.300
4	25%	10	0.000	37.000	24.100
5	50%	10	18.000	43.000	29.000
6	100%	10	14.000	39.000	21.200

f93506-cd7
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	8.544	2.923	0.924
2	6.25%	116.222	10.781	3.409
3	12.5%	12.456	3.529	1.116
4	25%	123.656	11.120	3.516
5	50%	58.000	7.616	2.408
6	100%	65.511	8.094	2.560

f93506-cd7
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	Control	18.900				
2	6.25%	29.000	145.00	75.00	10.00	
3	12.5%	28.300	152.50	75.00	10.00	

4	25%	24.100	129.50	75.00	10.00
5	50%	29.000	147.50	75.00	10.00
6	100%	21.200	106.00	75.00	10.00

Critical values use k = 5, are 1 tailed, and alpha = 0.05

Test 7

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 322

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: EE08
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ____hrs; 10/19/94
ENDING: ____hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
6.25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	9	9	8, 1 out*
	C	10	10	10	10	10	10	10	10 RK
	D	10	10	10	6	3	3	3	3
12.5	A	10	10	10	10	10	9	9	9
	B	10	10	10	10	10	9	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
50	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	9	9	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
			~~LJT~~ LJT						
	TIME:			2005	1735	1230	1610	1500	14:50
	INITIAL:	LJT	LJT	MLS	mm	mm	MLS	mm	RXK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
6.25	A		1.10603	1.11348			
	B		1.10857	1.11391			
	C		1.11331	1.11964			
	D		1.11357	1.11508		3	
12.5	A		1.10307	1.10945			
	B		1.11613	1.12160			
	C		1.10954	1.11544			
	D		1.12032	1.12592			
25	A		1.11563	1.12231			
	B		1.10533	1.11134			
	C		1.09729	1.10245			
	D		1.11652	1.12274			
50	A		1.10723	1.11434			
	B		1.11272	1.11729			
	C		1.10424	1.11064			
	D		1.10699	1.11172			

* 1 fish stranded and dried on external wall of cup

- Tare

Test 1

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. ____

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER:

PERSON CONDUCTING TEST:
BEGINNING: ____hrs; / / .
ENDING: ____hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
100	A	10	10	8	8	8	6	4	4
	B	10	9	9	9	9	9	9	9
	C	10	10	10	10	10	10	9	9
	D	10	10	10	10	10	9	8	8
	TIME:	1900	1800	2005	1735	1700	1655	1500	14:40
	INITIAL:	LJT	LJT	MLS	mm	mm	LJT	mm	RXK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
100	A		1.11343	1.11632			
	B		1.11638	1.12026			
	C		1.10934	1.11356			
	D		1.11243	1.11513			

Tinker AFB Test # 7 TEST START DATE Oct 29, 94

SAMPLE ID EE 08 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
6.25%	A	1.10603	1.11348	0.00745	10	0.74
	B	1.10857	1.11391	0.00534	8	0.67
	C	1.11331	1.11964	0.00633	10	0.63
	D	1.11357	1.11508	0.00151	3	0.50
12.50%	A	1.10307	1.10945	0.00638	9	0.71
	B	1.11613	1.1216	0.00547	9	0.61
	C	1.10954	1.11544	0.0059	10	0.59
	D	1.12032	1.12592	0.0056	10	0.56
25%	A	1.11536	1.12231	0.00695	10	0.70
	B	1.10533	1.11134	0.00601	10	0.60
	C	1.09729	1.10245	0.00516	10	0.52
	D	1.11652	1.12274	0.00622	10	0.62
50%	A	1.10723	1.11434	0.00711	10	0.71
	B	1.11272	1.11729	0.00457	9	0.51
	C	1.10424	1.11064	0.0064	10	0.64
	D	1.10619	1.11172	0.00553	10	0.55
100%	A	1.11343	1.11632	0.00289	4	0.72
	B	1.11638	1.12026	0.00388	9	0.43
	C	1.10934	1.11356	0.00422	9	0.47
	D	1.11213	1.11513	0.003	8	0.37

Organism: P promelas
Sample ID: EE08
Start date: 10/29

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	25.4					25.0	25.0	25.3	24.9	25.2	25.0	25.4	25.0	25.2		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.5															
6.25	8.5	7.9	8.3	6.9	2.5	8.0	6.6	8.7	8.5	8.1	8.5	7.1	8.2	7.2		
12.5	8.5	8.0	8.4	6.9	8.5	7.8	8.5	8.1	8.5	8.1	8.5	8.0	8.1	7.3		
25	8.5	8.0	8.4	6.6	2.3	7.8	5.8	8.2	8.5	8.1	8.5	8.0	8.1	7.4		
50	8.6	8.0	8.5	6.7	2.6	7.8	8.5	8.8	8.5	8.0	8.5	8.1	8.2	7.5		
100	8.6	8.0	8.5	6.8	2.6	7.8	8.6	8.8	8.6	8.0	8.5	8.0	8.9	7.5		

pH

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.39															
6.25	8.33	8.45	8.31	8.08	8.11	8.21	8.13	8.30	8.35	8.31	8.41	8.33	8.20	8.24		
12.5	8.32	8.43	8.27	8.09	8.11	8.25	8.69	8.33	8.53	8.34	8.54	8.31	8.32	8.21		
25	8.32	8.44	8.27	8.05	8.42	8.28	8.62	8.28	8.49	8.34	8.53	8.35	8.21	8.28		
50	8.32	8.45	8.27	8.10	8.44	8.27	8.36	8.26	8.44	8.34	8.39	8.30	8.16	8.26		
100	8.35	8.46	0.25	8.13	7.39	8.29	8.25	8.31	8.32	8.34	8.31	8.31	8.06	8.29		

CONDUCTIVITY

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control																
6.25	389	359	361	424	350	424	364	409	402	428	414	459	439	416		
12.5	430	418	448	423	444	433	441	444	442	440	453	501	451	461		
25	521	545	494	534	453	494	530	524	544	497	533	538	533	521		
50	686	724	715	748	501	716	688	661	671	639	707	693	671	739		
100	1117	1105	1005	858	1016	975	1048	1033	1041	1033	1035	1080	1095	1089		

f93506-fm7
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	7	11	6	0

Calculated Chi-Square goodness of fit test statistic = 3.8331
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-fm7
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 5.61
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

'ITLE: f93506-fm7
FILE: S:\toxlab\toxstat\f93506-f
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.7900	0.7900
1	Control	2	0.7200	0.7200
1	Control	3	0.7500	0.7500
1	Control	4	0.4800	0.4800
2	6.25%	1	0.7400	0.7400
2	6.25%	2	0.6700	0.6700
2	6.25%	3	0.6300	0.6300
2	6.25%	4	0.5000	0.5000
3	12.5%	1	0.7100	0.7100
3	12.5%	2	0.6100	0.6100
3	12.5%	3	0.5900	0.5900
3	12.5%	4	0.5600	0.5600
4	25%	1	0.7000	0.7000
4	25%	2	0.6000	0.6000
4	25%	3	0.5200	0.5200
4	25%	4	0.6200	0.6200
5	50%	1	0.7100	0.7100
5	50%	2	0.5100	0.5100
5	50%	3	0.6400	0.6400
5	50%	4	0.5500	0.5500
6	100%	1	0.7200	0.7200
6	100%	2	0.4300	0.4300
6	100%	3	0.4700	0.4700
6	100%	4	0.3700	0.3700

f93506-fm7
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.480	0.790	0.685
2	6.25%	4	0.500	0.740	0.635
3	12.5%	4	0.560	0.710	0.618
4	25%	4	0.520	0.700	0.610
5	50%	4	0.510	0.710	0.603
6	100%	4	0.370	0.720	0.497

f93506-fm7
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.019	0.140	0.070
2	6.25%	0.010	0.101	0.050
3	12.5%	0.004	0.065	0.032
4	25%	0.005	0.074	0.037
5	50%	0.008	0.090	0.045
6	100%	0.024	0.154	0.077

f93506-fm7
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.076	0.015	1.250
Within (Error)	18	0.213	0.012	
Total	23	0.289		

Critical F value = 2.77 (0.05,5,18)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

f93506-fm7
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.685	0.685		
2	6.25%	0.635	0.635	0.645	
3	12.5%	0.618	0.618	0.871	
4	25%	0.610	0.610	0.968	
5	50%	0.603	0.603	1.065	
6	100%	0.497	0.497	2.421	*

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-fm7
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

DUNNETTS 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	Control	4			
2	6.25%	4	0.187	27.3	0.050
3	12.5%	4	0.187	27.3	0.068
4	25%	4	0.187	27.3	0.075
5	50%	4	0.187	27.3	0.082
6	100%	4	0.187	27.3	0.188

№ 1 0

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature) Don Spencer

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: TOX	TOC					REMARKS
SC-EE08 TX-09	10-26-94	1030	water	2	✓	✓					
SC-EE08-TX-001	"	1100	soil	2	✓	✓					

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
Don Spencer	10/26/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lyn Seer	10/27/94 0920	1.0°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

№ 1 .1

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

ANALYSES REQUIRED: TOX (8X)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	REMARKS
SCEE08 TX09	10-26-94	1030	water	3	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/26/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lyn Jen	10/27/94 0920	1.5°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

GRID L

C. dubia

48-hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

OG NO.	313 314	SAMPLE TYPE:	Control	PHOTOPERIOD:	16 hrs light
OB NO.		SAMPLE TIME:		FEEDING REGIME:	None
NDUSTRY:		ORGANISM SOURCE:	Batch #	TEST VESSEL CAPACITY:	~~1000~~ mL 266
ONTACT:		START DATE:	10/27/94	TEST SOLN VOLUME/DEPTH:	250 ~~500~~ mL
FFLUENT:	Control	START TIME:	1530, 1600	NO. ORGANISMS/CONC.:	20
PDES PERMIT NO.:		DILUTION WATER:	Hard	NO. REPLICATES:	2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
Con	A	10	10	10		25.5		25.4	8.7		8.4	7.86		8.28	463		427
	B	10	10	10													
C. dubia																	
Con	A	5	5	5	0												
	B	5	4	4	1												
	C	5	5	5	0												
	D	5	5	5	0												
nitials		LJT	LJT	MLS													
Time		1600	1610	1235													

Comments

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	180	

GRID R

48-hr Ceriodaphnia dubia ACUTE TOXICITY TEST – STATIC, NONRENEWAL

G NO.	313	SAMPLE TYPE:		PHOTOPERIOD:	16 hrs light
B NO.		SAMPLE TIME:		FEEDING REGIME:	None
)USTRY:		ORGANISM SOURCE:	Batch #	TEST VESSEL CAPACITY:	30 mL
NTACT:		START DATE:	10/27/94	TEST SOLN VOLUME/DEPTH:	20 mL
FLUENT:	SC EECR-TX-001	START TIME:	1530	NO. ORGANISMS/CONC.:	20
DES PERMIT NO.:		DILUTION WATER:	Hard	NO. REPLICATES:	4

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (SU) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	5	5	5	0	25.5											
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
12.5	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
50	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
100	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MS	MS	MS													
Time		1530	1645	1245													

Comments

LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)		
Total Alkalinity		

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 314
JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: SC-2ELA TX CX1
NPDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/27/94
START TIME: 1600
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	a	10	10	10	0	25.5		25.4	8.8		8.4	8.30		8.34	611		612
	B	10	10	10	0												
12.5	a	10	10	10	0				8.7		8.5	8.29		8.36	613		631
	B	10	10	10	0												
25	a	10	10	10	0				8.7		8.5	8.15		8.31	692		763
	B	10	10	10	0												
50	a	10	10	10	0				8.8		8.5	7.96		8.34	825		910
	B	10	10	10	0												
100	a	10	10	10	0				8.8		8.5	7.72		8.38	1070		1164
	B	10	~~9~~ 10	9	1												
Initials		CJT	CJT	MB													
Time		1600	1620	1230													

Comments

Ammonia ND (< 40 ppb) LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	180	230
Total Alkalinity (mg/L CaCO3 @ 4.5)	120	200

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST Test 8

NOEC >100%

Log No. 321

JOB NO. F93506
INDUSTRY: Tinker
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
PERSON CONDUCTING TEST:

BEGINNING: 1600 hrs; 10/29
ENDING: 1430 hrs; / /
FEEDING REGIME:
.05 mL yct/15 mL
.05 mL algal suspension/15 mL

PHOTOPERIOD: 16 light, 8 dark
ORGANISM SOURCE: WCC
TEST VESSEL CAPACITY: 30 mL
TEST SOLUTION VOLUME: 15mL
NO. REPLICATES: 10
DILUTION WATER:

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
	TIME								
	OBSERVER								
		NUMBER OF YOUNG PRODUCED							
V Hard -220									
Con	1								
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								

		START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
6.25	11		✓	✓	✓	2	9	12	0
	12		✓	✓	✓	3	11	12	0
	13		✓	✓	2	5	8	14	0
	14		✓	✓	✓	4	9	11	0
	15		✓	✓	1	2	10	12	0
	16		✓	✓	✓	2	6	10	7
	17		✓	✓	✓	5	10	14	0
	18		✓	✓	✓	4	8	13	0
	19		✓	✓	✓	4	10	12	0
	20		✓	✓	✓	6	8	0	13

		START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
12.5	21		✓	✓	✓	4	9	12	0
	22		✓	✓	✓	0	5	12	11
	23		✓	✓	✓	5	7	13	0
	24		✓	✓	3	0	13	16	5
	25		✓	✓	✓	3	9	10	0
	26		✓	✓	✓	4	8	0	16
	27		✓	✓	✓	3	9	18	11
	28		✓	✓	✓	D-5	X	X	X
	29		✓	✓	✓	0	1	9	8
	30		✓	✓	✓	3	7	13	0

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F93506 | BEGINNING: ____hrs; / / | Log No: ____
INDUSTRY: Tinker | ENDING: ____hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
	TIME								
	OBSERVER								
25%	31		✓	✓	5	0	9	13	0
	32		✓	✓	✓	4	7	14	0
	33		✓	✓	✓	6	0	12	15
	34		✓	✓	✓	3	11	15	0
	35		✓	✓	✓	5	10	12	0
	36		✓	✓	✓	0	9	15	7
	37		✓	✓	✓	5	7	0	13
	38		✓	✓	✓	6	7	14	0
	39		✓	✓	✓	4	10	14	0
	40		✓	✓	5	0	8	13	0
50%	41		✓	✓	✓	5	9	13	3
	42		✓	✓	1	0	7	10	5
	43		✓	✓	2	0	3	10	1
	44		✓	✓	✓	5	0	11	10
	45		✓	✓	4	0	8	16	15
	46		✓	✓	✓	6	11	12	0
	47		✓	✓	✓	5	8	12	4
	48		✓	✓	✓	4	7	14	0
	49		✓	✓	✓	0	6	14	8
	50		✓	✓	✓	5	8	16	1
100%	51		✓	✓	✓	5	4	10	0
	52		✓	✓	✓	3	6	7	6
	53		✓	~	✓	4	3	13	3
	54		✓	✓	2	0	7	11	2
	55		✓	✓	✓	4	9	15	0
	56		✓	✓	✓	4	8	11	4
	57		✓	✓	✓	4	5	12	0
	58		✓	✓	✓	1	5	6	1
	59		✓	✓	✓	3	3	10	0
	60		✓	✓	✓	4	9	9	3

(8)

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ~~9 GAK BZ 7 2 3~~ Start Date: 10/29/91 Sample ID: SC-EE09-TX-101 Log #: 321

AD	ID	1	AD	ID	1	AD	ID	1	AD	ID	1		ID	1
2	3	4	2	3	4	2	3	4	2	3	4	2	3	4
5	6	7	5	6	7	5	6	7	5	6	7	5	6	7
AD	ID 6	1 ✓	AD	ID 11	1 ✓	AD	ID 33	1 ✓	AD	ID 26	1 ✓		ID 44	1 ✓
2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 4	2 ✓	3 2	4 0	2 ✓	3 ✓	4 0	2 ✓	3 2	4 0
5 6	6 10	7 7	5 9	6 12	7 0	5 3	6 10	7 1	5 9	6 15	7 7	5 7	6 11	7 2
AD	ID 25	1 ✓	AD	ID 34	1 ✓	AD	ID 43	1 ✓	AD	ID 10	1 ✓		ID 47	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 4
5 10	6 12	7 0	5 0	6 11	7 10	5 3	6 13	7 3	5 8	6 0	7 13	5 5	6 12	7 0
AD	ID 13	1 ✓	AD	ID 7	1 ✓	AD	ID 14	1 ✓	AD	ID 27	1 ✓		ID 46	1 ✓
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 3	4 0	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 4
5 7	6 13	7 0	5 10	6 14	7 0	5 13	6 16	7 5	5 7	6 0	7 13	5 8	6 11	7 4
AD	ID 24	1 ✓	AD	ID 42	1 ✓	AD	ID 40	1 ✓	AD	ID 8	1 ✓		ID 41	1 ✓
2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5
5 11	6 15	7 0	5 6	6 7	7 0	5 8	6 16	7 1	5 8	6 13	7 0	5 4	6 10	7 0
AD	ID 9	1 ✓	AD	ID 12	1 ✓	AD	ID 45	1 ✓	AD	ID 39	1 ✓		ID 28	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 6
5 10	6 12	7 0	5 5	6 12	7 11	5 9	6 15	7 0	5 6	6 14	7 8	5 7	6 14	7 0

Comments:

Cup ID	Sample Concentration	Day	Initials LJT	Time 1600
1–10:	6.25	1	LJT	1600
11–20:	12.5	2	MLS	1526
21–30:	25	3	MLS	1345
31–40:	50	4	MLS	1520
41–50:	100	5	LJT	1445
51–60:		6	MLS	1525
		7	MAR	14:30

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ASL 9 AB 7 A 5 Start Date: 10/29/94 Sample ID: SC-EE09-TX-001 Log #: 35

AD	ID	1	AD	ID	1	AD	ID	1	AD	ID	1		ID	1
2	3	4	2	3	4	2	3	4	2	3	4	2	3	4
5	6	7	5	6	7	5	6	7	5	6	7	5	6	7
AD	ID 4	1 ✓	AD	ID 21	1 ✓	AD	ID 16	1 ✓	AD	ID 32	1 ✓		ID 3	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 5	4 0	2 ✓	3 ✓	4 4	2 ✓	3 1	4 0	2 ✓	3 2	4 5
5 9	6 11	7 0	5 9	6 13	7 0	5 8	6 0	7 16	5 7	6 10	7 5	5 8	6 14	7 0
AD	ID 38	1 ✓	AD	ID 19	1 ✓	AD	ID 48	1 ✓	AD	ID 20	1 ✓		ID 49	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 1	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 3
5 7	6 14	7 0	5 1	6 9	7 8	5 5	6 6	7 1	5 7	6 13	7 0	5 3	6 10	7 0
AD	ID 23	1 ✓	AD	ID 31	1 ✓	AD	ID 2	1 ✓	AD	ID 17	1 ✓		ID 30	1 ✓
2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 3	2 ✓	3 5	4 0
5 0	6 12	7 15	5 9	6 13	7 3	5 11	6 12	7 0	5 9	6 18	7 11	5 8	6 13	7 0
AD	ID 15	1 ✓	AD	ID 35	1 ✓	AD	ID 29	1 ✓	AD	ID 50	1 ✓		ID 37	1 ✓
2 ✓	3 ✓	4 3 ~~0~~ MLS	2 ✓	3 4	4 0 MLS	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5
5 9	6 10	7 0	5 8	6 16	7 15	5 10	6 14	7 0	5 9	6 9	7 3	5 8	6 12	7 4
AD	ID 1	1 ✓	AD	ID 22	1 ✓	AD	ID 36	1 ✓	AD	ID 5	1 ✓		ID 18	1 ✓
2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6	2 ✓	3 1	4 2	2 ✓	3 ✓	4 D 5
5 9	6 12	7 0	5 7	6 14	7 0	5 11	6 12	7 0	5 10	6 12	7 0	5	6	7

Comments: Day 0 Initials LJT Time 1600

Cup ID	Sample Concentration	Day	Initials	Time
1–10:	6.25	1	LJT	1600
11–20:	12.5	2	MLS	1521
21–30:	25	3	MLS	1338
31–40:	50	4	MLS	1530
41–50:	100	5	LJT	1445
51–60:		6	MLS	1515
		7	MAR	14:30

Test 8 (Hrd 220)

Log # 32
Organism: C. dubia
Sample ID: EC09
Start date: 10/29

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	25.4	25.4	25.4	25.2	25.2	25.0	25.0	25.3	25	25.3	25.0	25.0	25.2	25.4		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.4	8.3	8.5			8.6	8.5	8.4	8.6	8.7	8.6	8.6	8.5	8.0		
6.25	8.4	8.3	8.5	8.4	8.5	8.5	8.6	8.4	8.5	8.2	8.6	8.4	8.4	8.0		
12.5	8.5	8.4	8.5	8.4	8.5	8.5	8.6	8.3	8.4	8.1	8.7	8.4	8.4	8.0		
25	8.5	8.4	8.5	8.4	8.5	8.5	8.6	8.3	8.4	8.0	8.7	8.4	8.1	7.9		
50	8.6	8.4	8.5	8.4	8.5	8.4	8.6	8.3	8.3	8.0	8.7	8.4	8.0	7.8		
100	8.6	8.5	8.5	8.4	8.5											

pH

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.52	8.52	8.49			8.60	8.47	8.37	8.52	8.41	8.51	8.43	8.38	8.35		
6.25	8.52	8.54	8.50	8.46	8.51	8.57	8.49	8.41	8.52	8.42	8.49	8.44	8.26	8.32		
12.5	8.50	8.57	8.50	8.45	8.50	8.59	8.42	8.42	8.50	8.41	8.41	8.44	8.28	8.34		
25	8.47	8.59	8.47	8.46	8.49	8.63	8.37	8.45	8.48	8.42	8.29	8.40	8.17	8.39		
50	8.47	8.56	8.41	8.45	8.48	8.62	8.29	8.45	8.36	8.45	8.18	8.45	7.91	8.45		
100	8.42	8.56	8.40	8.49	8.44											

CONDUCTIVITY

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	608	645	525	680	698	654	677	662	722	740	720	727	639	565		
6.25	674	735	648	685	712	721	703	719	732	749	735	751	675	684		
12.5	720	811	627	728	719	797	792	761	804	825	817	214	746	761		
25	780	951	677	843	909	851	923	599	936	940	905	949	838	904		
50	916	750	896	1213	1180	1116	1221	1112	1223	1210	1104	1220	1166	1205		
100	1193	768	1155													

f93506-cd8
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	3	13	31	7	6

Calculated Chi-Square goodness of fit test statistic = 8.1363
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd8
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 25.20
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

TITLE: f93506-cd8
ILE: S:\TOXLAB\TOXSTAT\F93506-C.
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	17.0000	17.0000
1	Control	2	17.0000	17.0000
1	Control	3	25.0000	25.0000
1	Control	4	22.0000	22.0000
1	Control	5	15.0000	15.0000
1	Control	6	20.0000	20.0000
1	Control	7	17.0000	17.0000
1	Control	8	18.0000	18.0000
1	Control	9	18.0000	18.0000
1	Control	10	20.0000	20.0000
2	6.25%	1	23.0000	23.0000
2	6.25%	2	26.0000	26.0000
2	6.25%	3	29.0000	29.0000
2	6.25%	4	24.0000	24.0000
2	6.25%	5	25.0000	25.0000
2	6.25%	6	25.0000	25.0000
2	6.25%	7	29.0000	29.0000
2	6.25%	8	25.0000	25.0000
2	6.25%	9	26.0000	26.0000
2	6.25%	10	27.0000	27.0000
3	12.5%	1	25.0000	25.0000
3	12.5%	2	28.0000	28.0000
3	12.5%	3	25.0000	25.0000
3	12.5%	4	37.0000	37.0000
3	12.5%	5	22.0000	22.0000
3	12.5%	6	28.0000	28.0000
3	12.5%	7	41.0000	41.0000
3	12.5%	8	5.0000	5.0000
3	12.5%	9	18.0000	18.0000
3	12.5%	10	23.0000	23.0000
4	25%	1	27.0000	27.0000
4	25%	2	25.0000	25.0000
4	25%	3	33.0000	33.0000
4	25%	4	29.0000	29.0000
4	25%	5	27.0000	27.0000
4	25%	6	31.0000	31.0000
4	25%	7	25.0000	25.0000
4	25%	8	27.0000	27.0000
4	25%	9	28.0000	28.0000
4	25%	10	26.0000	26.0000
5	50%	1	30.0000	30.0000
5	50%	2	23.0000	23.0000
5	50%	3	16.0000	16.0000
5	50%	4	26.0000	26.0000
5	50%	5	43.0000	43.0000
5	50%	6	29.0000	29.0000
5	50%	7	29.0000	29.0000
5	50%	8	25.0000	25.0000
5	50%	9	28.0000	28.0000
5	50%	10	30.0000	30.0000

6	100%	1	19.0000	19.0000
6	100%	2	16.0000	16.0000
6	100%	3	23.0000	23.0000
6	100%	4	22.0000	22.0000
6	100%	5	28.0000	28.0000
6	100%	6	27.0000	27.0000
6	100%	7	21.0000	21.0000
6	100%	8	13.0000	13.0000
6	100%	9	16.0000	16.0000
6	100%	10	25.0000	25.0000

f93506-cd8
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	15.000	25.000	18.900
2	6.25%	10	23.000	29.000	25.900
3	12.5%	10	5.000	41.000	25.200
4	25%	10	25.000	33.000	27.800
5	50%	10	16.000	43.000	27.900
6	100%	10	13.000	28.000	21.000

f93506-cd8
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	8.544	2.923	0.924
2	6.25%	3.878	1.969	0.623
3	12.5%	97.733	9.886	3.126
4	25%	6.622	2.573	0.814
5	50%	46.322	6.806	2.152
6	100%	24.889	4.989	1.578

f93506-cd8
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

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

ROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	Control	18.900				
2	6.25%	25.900	151.50	75.00	10.00	
3	12.5%	25.200	136.50	75.00	10.00	

4	25%	27.800	154.00	75.00	10.00
5	50%	27.900	144.50	75.00	10.00
6	100%	21.000	118.00	75.00	10.00

Critical values use k = 5, are 1 tailed, and alpha = 0.05

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 564

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: ~~EEC8~~ EEC9
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ____hrs; 9/19/94
ENDING: ____hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
6.25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
12.5	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	9	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	9	9	9
25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	9	9	8	8	8	8
50	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
	TIME:		1830	2030	1730	1715	1620	1600	11:20
	INITIAL:	LJT	LJT	MLS	LJT	LJT	LJT	mm	RXK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
6.25	A		1.12224	1.12933			
	B		1.11446	1.12225			
	C		1.11462	1.12227			
	D		1.12144	1.12676			
12.5	A		1.11454	1.12144			
	B		1.11537	1.12232			
	C		1.10731	1.11499			
	D		1.12229	1.12307			
25	A		1.10449	1.11167			
	B		1.10373	1.11566			
	C		1.09994	1.10705			
	D		1.10294	1.11505			
50	A		1.12072	1.12732			
	B		1.10814	1.11505			
	C		1.11769	1.12389			
	D		1.12116	1.12703			

Test 0

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 322

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: EE09
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ____hrs; 10/29/94
ENDING: ____hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
100	A	10	9	9	9	9	9	9	9
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	9	9	9	9
	D	10	10	8	8	8	8	8	8
	TIME:		1832	2030	1730	1715	1620	1600	11:10
	INITIAL:	LJT	LJT	MLS	LJT	LJT	LJT	min	RXK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
100	A		1.10312	1.10853			
	B		1.12596	1.13154			
	C		1.10373	1.10903			
	D		1.11299	1.11785			

Tinker AFB Test # 8 TEST START DATE Oct 29, 94

SAMPLE ID EE09 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
6.25%	A	1.12229	1.12933	0.00704	10	0.70
	B	1.11446	1.12225	0.00779	10	0.78
	C	1.11462	1.12227	0.00765	10	0.77
	D	1.12144	1.12676	0.00532	10	0.53
12.50%	A	1.11454	1.12144	0.0069	10	0.69
	B	1.11537	1.12132	0.00595	9	0.66
	C	1.10731	1.11499	0.00768	10	0.77
	D	1.12228	1.12809	0.00581	9	0.65
25%	A	1.10449	1.11167	0.00718	10	0.72
	B	1.10373	1.11066	0.00693	10	0.69
	C	1.09994	1.10705	0.00711	10	0.71
	D	1.10894	1.11505	0.00611	8	0.76
50%	A	1.12072	1.12732	0.0066	10	0.66
	B	1.10814	1.11505	0.00691	10	0.69
	C	1.11769	1.12389	0.0062	10	0.62
	D	1.12116	1.12703	0.00587	10	0.59
100%	A	1.10312	1.10853	0.00541	9	0.60
	B	1.12596	1.13159	0.00563	10	0.56
	C	1.10373	1.10803	0.0043	9	0.48
	D	1.11299	1.11785	0.00486	8	0.61

Organism: P. promelas
Sample ID: EE09
Start Date: 10/29

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25.4	25.4	25.4	25.1	25.0	25.0	25.0	25.3	24.8	25.2	25.0	25.4	25.0	25.2		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.5	8.0	8.5	7.4	8.3	7.9	8.4	7.8	8.5	8.1	8.5	6.0	8.2	7.4		
6.25	8.5	8.0	8.5	7.4	8.4	7.8	8.4	7.5	8.5	8.2	8.5	6.0	8.3	7.3		
12.5	8.5	8.0	8.6	7.3	8.4	7.6	8.4	7.8	8.5	8.2	8.5	6.1	8.2	7.1		
25	8.5	8.0	8.6	7.2	8.5	7.6	8.4	7.5	8.6	8.2	8.5	6.0	8.3	7.1		
50	8.5	8.1	8.6	7.3	8.4	7.5	8.4	7.8	8.6	8.2	8.6	6.1	8.1	7.0		
100	8.5															

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.39	8.49	8.30				8.66									
6.25	8.35	8.45	8.30	8.15	8.48	8.35	8.64	8.28	8.57	8.35	8.63	8.35	8.19	8.13		
12.5	8.34	8.49	8.29	8.14	8.46	8.33	8.58	8.33	8.54	8.38	8.61	8.36	8.20	8.21		
25	8.34	8.46	8.30	8.15	8.48	8.31	8.48	8.27	8.51	8.38	8.53	8.36	8.11	8.21		
50	8.33	8.45	8.29	8.16	8.47	8.31	8.24	8.23	8.45	8.36	8.37	8.32	8.14	8.19		
100	8.32	8.48	8.26	8.18	8.44	8.28	↓	8.22	8.36	8.34	8.13	8.27	8.00	8.18		

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 RK NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	371	377	409				(446)		~~444~~							
6.25	437	433	410	404	369	416	471	463	444	484	434	461	431	483		
12.5	470	411	488	475	396	503	526	487	472	477	465	505	484	507		
25	581	515	496	592	433	598	787	563	572	619	568	616	511	517		
50	766	781	696	795	626	805	1252	601	565	827	773	776	773	731		
100	1213	1264	938	1180	1043	1284	↓	1241	1147	1253	1188	1030	1176	1231		

0438

f93506-fm8
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	7	9	8	0

Calculated Chi-Square goodness of fit test statistic = 4.2910
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-fm8
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 22.50
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

TITLE: f93506-fm8
FILE: S:\toxlab\toxstat\f93506-f
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.7900	0.7900
1	Control	2	0.7200	0.7200
1	Control	3	0.7500	0.7500
1	Control	4	0.4800	0.4800
2	6.25%	1	0.7000	0.7000
2	6.25%	2	0.7800	0.7800
2	6.25%	3	0.7700	0.7700
2	6.25%	4	0.5300	0.5300
3	12.5%	1	0.6900	0.6900
3	12.5%	2	0.6600	0.6600
3	12.5%	3	0.7700	0.7700
3	12.5%	4	0.6500	0.6500
4	25%	1	0.7200	0.7200
4	25%	2	0.6900	0.6900
4	25%	3	0.7100	0.7100
4	25%	4	0.7600	0.7600
5	50%	1	0.6600	0.6600
5	50%	2	0.6900	0.6900
5	50%	3	0.6200	0.6200
5	50%	4	0.5900	0.5900
6	100%	1	0.6000	0.6000
6	100%	2	0.5600	0.5600
6	100%	3	0.4800	0.4800
6	100%	4	0.6100	0.6100

f93506-fm8
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.480	0.790	0.685
2	6.25%	4	0.530	0.780	0.695
3	12.5%	4	0.650	0.770	0.693
4	25%	4	0.690	0.760	0.720
5	50%	4	0.590	0.690	0.640
6	100%	4	0.480	0.610	0.563

93506-fm8
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.019	0.140	0.070
2	6.25%	0.013	0.116	0.058
3	12.5%	0.003	0.054	0.027
4	25%	0.001	0.029	0.015
5	50%	0.002	0.044	0.022
6	100%	0.003	0.059	0.030

f93506-fm8
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.065	0.013	1.857
Within (Error)	18	0.126	0.007	
Total	23	0.191		

Critical F value = 2.77 (0.05,5,18)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

f93506-fm8
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.685	0.685		
2	6.25%	0.695	0.695	-0.169	
3	12.5%	0.693	0.693	-0.127	
4	25%	0.720	0.720	-0.592	
5	50%	0.640	0.640	0.761	
6	100%	0.563	0.563	2.071	

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-fm8
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

DUNNETTS 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	Control	4			
2	6.25%	4	0.143	20.8	-0.010
3	12.5%	4	0.143	20.8	-0.008
4	25%	4	0.143	20.8	-0.035
5	50%	4	0.143	20.8	0.045
6	100%	4	0.143	20.8	0.123

№ 1 3

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: Tox, Te	REMARKS
SC-EE09-TX-001	10-26-94	0915	water	2	✓	
SC-EE09-TX-001	10-26-94	0930	soil	2	✓	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	19 Oct 94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lyza Teen	10/27/94 0920	2 °C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

Nº 1. 2

Tinker AFB CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: Toxtest	REMARKS
SC-EE09-TX09	10-26-94	0915	water	3	—	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/26/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lyn Teer	10/27/94 0920	2 °C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

C. dubia and

48-hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

OG NO. 311 & 312
OB NO. 93F506
NDUSTRY: Timber
ONTACT:
FFLUENT:
PDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 12/26/94
START TIME: 1630
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
Con	A	10	10	10	0	25.0	24°C	25.2	8.2		7.8	7.95		8.27	480		601
	B	10	10	10	0												
C. dubia																	
Con	A	5	5	5	0	25.0											
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	LST													
Time		1130	0900	1610													

Comments

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	180	
Total Alkalinity (mg/L CaCO3 @ 4.5)	120	

48-hr Ceriodaphnia dubia ACUTE TOXICITY TEST – STATIC, NONRENEWAL

G NO. 311
B NO.
)USTRY: Tinker
NTACT:
FLUENT: EE10
DES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/26/94
START TIME: 1630
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: 30 mL
TEST SOLN VOLUME/DEPTH: 20 mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (°C) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
12.5	A	5	5	5	0												
	B	5	5	4	1												
	C	5	5	5	0												
	D	5	5	5	0												
25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
50	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
100	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	MLS													
Time		1630	0915	1620													

Comments

LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)		
Total Alkalinity		

48-hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 312
LOB NO.
INDUSTRY: Tinker
CONTACT:
EFFLUENT: EE10
PDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/26/94
START TIME: 1630
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	10	10	10	0	25.0	24.0°	25.4	8.5		8.4	8.41		8.28	537		644
	B	10	10	10	0												
12.5	A	10	10	10	0				8.5		8.3	8.36		8.28	579		666
	B	10	10	10	0												
25	A	10	10	10	0				8.5		8.4	8.26		8.31	593		738
	B	10	10	10	0												
50	A	10	10	10	0				8.6		8.5	8.10		8.37	763		895
	B	10	10	10	0												
100	A	10	10	10	0				8.7		8.4	8.03		8.46	960		1231
	B	10	10	10	0												
Initials		MLS	LST	CJT													
Time		1620	0940	1610													

Comments

LC50 > 100%

Ammonia ND (< 40 ppb)

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)		220
Total Alkalinity (mg/L CaCO3 @ 4.5)		230

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

TEST 4

JOB NO. F93506 | BEGINNING: 1615 hrs; 10/28/94 | Log No. 317
INDUSTRY: Tinker | ENDING: 1415 hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: SC-EE10 | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

CONC	CHAMBER	TIME	1615	1640	1820	1609	1810	1605	1720	1415	
		OBSERVER	MLS	MLS	LJT	MLS	MLS	MLS	LJT	MLS	
			NUMBER OF YOUNG PRODUCED								
			START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	
Mod Con	1			✓	✓	✓	5	12	8	0	25
	2			✓	✓	✓	4	7	10	9	30
	3			✓	✓	✓	5	7	12	11	35
	4			✓	✓	✓	5	10	10	0	25
	5			✓	✓	✓	7	11	10	0	28
	6			✓	✓	✓	6	11	10	0	27
	7			✓	✓	✓	7	10	8	0	25
	8			✓	✓	✓	8	10	8	0	26
	9			✓	✓	✓	5	7	8	0	20
	10			✓	✓	✓	4	6	10	8	28
											26
			START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	
6.25	11			✓	✓	✓	4	8	11	0	24
	12			✓	✓	✓	6	10	10	0	26
	13			✓	✓	6	0	12	13	0	31
	14			✓	✓	✓	4	8	0	11	24
	15			✓	✓	✓	0	7	11	0	18
	16			✓	✓	✓	7	9	8	0	24
	17			✓	✓	4	9	1	11	16	41
	18			✓	✓	✓	7	11	11	0	29
	19			✓	✓	✓	5	12	10	0	27
	20			✓	✓	5	0	9	12	0	26
											26
			START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	
12.5	21			✓	✓	✓	4	9	0	12	25
	22			✓	✓	✓	0	9	11	0	29
	23			✓	✓	✓	4	9	8	0	29
	24			✓	✓	✓	2	11	15	0	28
	25			✓	✓	✓	6	12	13	0	31
	26			✓	✓	✓	5	12	10	0	27
	27			✓	✓	✓	0	10	11	0	21
	28			✓	✓	✓	6	10	11	0	27
	29			✓	✓	✓	2	9	11	0	22
	30			✓	✓	✓	6	11	12	0	29
											28

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F93506 | BEGINNING: ____hrs; / / | Log No. ____
INDUSTRY: Tinker | ENDING: ____hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

TIME
OBSERVER

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
25%	31		✓	✓	✓	0	8	15	0
	32		✓	✓	✓	3	8	14	0
	33		✓	✓	✓	6	10	11	0
	34		✓	✓	✓	6	8	13	0
	35		✓	✓	✓	7	8	16	0
	36		✓	✓	✓	5	13	13	0
	37		✓	✓	✓	4	7	11	0
	38		✓	✓	✓	6	9	8	0
	39		✓	✓	✓	5	10	14	0
	40		✓	✓	✓	7	9	14	0
50%	41		✓	✓	1	6	8	14	0
	42		✓	✓	✓	5	7	11	0
	43		✓	✓	3	0	10	15	0
	44		✓	✓	✓	5	9	13	0
	45		✓	✓	✓	7	9	13	0
	46		✓	✓	✓	6	10	0	11
	47		✓	✓	✓	0	10	13	0
	48		✓	✓	✓	7	10	13	0
	49		✓	✓	✓	6	8	15	0
	50		✓	✓	✓	4	6	12	0
100%	51		✓	✓	✓	5	8	8	0
	52		✓	✓	7	0	12	11	13
	53		✓	✓	✓	5	8	9	0
	54		✓	✓	✓	0	4	12	9
	55		✓	✓	✓	4	8	8	0
	56		✓	✓	✓	6	~~mv~~ 8	~~mv~~ 11	~~mv~~ 0
	57		✓	✓	✓	3	8	10	0
	58		✓	✓	3	0	8	12	0
	59		✓	✓	✓	5	7	13	0
	60		✓	✓	5	0	7	10	14

f93506-cd4
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	2	17	25	12	4

Calculated Chi-Square goodness of fit test statistic = 2.0648
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd4
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 6.44
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

TITLE: f93506-cd4
FILE: S:\TOXLAB\TOXSTAT\F93506-C.
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	25.0000	25.0000
1	Control	2	30.0000	30.0000
1	Control	3	35.0000	35.0000
1	Control	4	25.0000	25.0000
1	Control	5	28.0000	28.0000
1	Control	6	27.0000	27.0000
1	Control	7	25.0000	25.0000
1	Control	8	26.0000	26.0000
1	Control	9	20.0000	20.0000
1	Control	10	28.0000	28.0000
2	6.25%	1	23.0000	23.0000
2	6.25%	2	26.0000	26.0000
2	6.25%	3	31.0000	31.0000
2	6.25%	4	23.0000	23.0000
2	6.25%	5	18.0000	18.0000
2	6.25%	6	24.0000	24.0000
2	6.25%	7	41.0000	41.0000
2	6.25%	8	29.0000	29.0000
2	6.25%	9	27.0000	27.0000
2	6.25%	10	26.0000	26.0000
3	12.5%	1	25.0000	25.0000
3	12.5%	2	20.0000	20.0000
3	12.5%	3	21.0000	21.0000
3	12.5%	4	28.0000	28.0000
3	12.5%	5	31.0000	31.0000
3	12.5%	6	27.0000	27.0000
3	12.5%	7	21.0000	21.0000
3	12.5%	8	27.0000	27.0000
3	12.5%	9	22.0000	22.0000
3	12.5%	10	29.0000	29.0000
4	25%	1	23.0000	23.0000
4	25%	2	25.0000	25.0000
4	25%	3	27.0000	27.0000
4	25%	4	27.0000	27.0000
4	25%	5	31.0000	31.0000
4	25%	6	31.0000	31.0000
4	25%	7	22.0000	22.0000
4	25%	8	23.0000	23.0000
4	25%	9	23.0000	23.0000
4	25%	10	30.0000	30.0000
5	50%	1	29.0000	29.0000
5	50%	2	23.0000	23.0000
5	50%	3	28.0000	28.0000
5	50%	4	27.0000	27.0000
5	50%	5	29.0000	29.0000
5	50%	6	27.0000	27.0000
5	50%	7	23.0000	23.0000
5	50%	8	30.0000	30.0000
5	50%	9	29.0000	29.0000
5	50%	10	22.0000	22.0000

6	100%	1	21.0000	21.0000
6	100%	2	43.0000	43.0000
6	100%	3	22.0000	22.0000
6	100%	4	25.0000	25.0000
6	100%	5	20.0000	20.0000
6	100%	6	25.0000	25.0000
6	100%	7	21.0000	21.0000
6	100%	8	23.0000	23.0000
6	100%	9	25.0000	25.0000
6	100%	10	36.0000	36.0000

f93506-cd4
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	20.000	35.000	26.900
2	6.25%	10	18.000	41.000	26.800
3	12.5%	10	20.000	31.000	25.100
4	25%	10	22.000	31.000	26.200
5	50%	10	22.000	30.000	26.700
6	100%	10	20.000	43.000	26.100

f93506-cd4
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	15.211	3.900	1.233
2	6.25%	37.733	6.143	1.943
3	12.5%	14.989	3.872	1.224
4	25%	12.400	3.521	1.114
5	50%	8.678	2.946	0.932
6	100%	55.878	7.475	2.364

f93506-cd4
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	22.600	4.520	0.187
Within (Error)	54	1304.000	24.148	

Total	59	1326.600

Critical F value = 2.45 (0.05,5,40)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

f93506-cd4
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	26.900	26.900		
2	6.25%	26.800	26.800	0.046	
3	12.5%	25.100	25.100	0.819	
4	25%	26.200	26.200	0.319	
5	50%	26.700	26.700	0.091	
6	100%	26.100	26.100	0.364	

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=40,5)

f93506-cd4
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

DUNNETTS 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	Control	10			
2	6.25%	10	5.077	18.9	0.100
3	12.5%	10	5.077	18.9	1.800
4	25%	10	5.077	18.9	0.700
5	50%	10	5.077	18.9	0.200
6	100%	10	5.077	18.9	0.800

Test #4

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ZOATM.CU Start Date: 10/28/94 Sample ID: SC-EE10-TX-001 Log #: 317

AD	ID 5	1 ✓	AD	ID 41	1 ✓	AD	ID 51	1 ✓	AD	ID 38	1 ✓		ID 27	1 ✓
2 ✓	3 ✓	4 7	2 ✓	3 1	4 6	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 0
5 11	6 10	7 0	5 8	6 14	7 0	5 8	6 9	7 0	5 9	6 8	7 0	5 10	6 11	7 0
AD	ID 49	1 ✓	AD	ID 15	1 ✓	AD	ID 24	1 ✓	AD	ID 9	1 ✓		ID 50	1 ✓
2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 4
5 8	6 15	7 0	5 7	6 11	7 0	5 11	6 15	7 0	5 7	6 8	7 0	5 6	6 12	7 0
AD	ID 10	1 ✓	AD	ID 37	1 ✓	AD	ID 36	1 ✓	AD	ID 17	1 ✓		ID 59	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5	2 ✓	3 4	4 9	2 ✓	3 ✓	4 5
5 6	6 10	7 8	5 7	6 11	7 0	5 13	6 13	7 0	5 1	6 11	7 16	5 7	6 13	7 0
AD	ID 25	1 ✓	AD	ID 8	1 ✓	AD	ID 42	1 ✓	AD	ID 52	1 ✓		ID 39	1 ✓
2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 8	2 ✓	3 ✓	4 5	2 ✓	3 7	4 0	2 ✓	3 ✓	4 5
5 12	6 13	7 0	5 10	6 8	7 0	5 7	6 11	7 0	5 12	6 11	7 13	5 10	6 14	7 0
AD	ID 43	1 ✓	AD	ID 35	1 ✓	AD	ID 13	1 ✓	AD	ID 60	1 ✓		ID 7	1 ✓
2 ✓	3 3	4 0	2 ✓	3 ✓	4 7	2 ✓	3 6	4 0	2 ✓	3 5	4 0	2 ✓	3 ✓	4 7
5 10	6 15	7 0	5 8	6 16	7 0	5 12	6 13	7 0	5 7	6 10	7 14	5 10	6 8	7 0
AD	ID 11	1 ✓	AD	ID 40	1 ✓	AD	ID 6	1 ✓	AD	ID 26	1 ✓		ID 18	1 ✓
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 7	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 7
5 8	6 11	7 0	5 9	6 14	7 0	5 11	6 10	7 0	5 12	6 10	7 0	5 11	6 11	7 0

Comments:

Cup ID	Sample Concentration
1–10:	Control
11–20:	6.25%
21–30:	12.5%
31–40:	25%
41–50:	50%
51–60:	100%

Day	Initials	Time
0	MLS	1615
1	MLS	1640
2	~~MLS~~ LJT	~~1600~~ 1820
3	MLS	1600
4	MLS	1800
5	MLS	1615
6	LJT	1720
7	MLS	1425

Day 7: Some adults carrying broods. Cerio looked ~~Good~~ MLS. healthy

Tox-4

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ♀ A B C D E F G H Start Date: 10/25/94 Sample ID: SC-EELO TX-001 Log #: 317

AD	ID 22	1 ✓	AD	ID 46	1 ✓	AD	ID 20	1 ✓	AD	ID 55	1 ✓		ID 4	1
2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 6	2 ✓	3 5	4 0	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 5
MLS 5 9	6 11	7 0	MLS 5 10	6 0	7 11	MLS 5 9	6 12	7 0	5 8	6 8	7 0	5 10	6 10	7 C
AD	ID 34	1 ✓	AD	ID 3	1 ✓	AD	ID 45	1 ✓	AD	ID 54	1 ✓		ID 31	1
2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 7	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 C
5 8	6 13	7 0	5 7	6 12	7 11	5 9 MLS	6 13	7 0	5 4 7 MLS	6 12	7 9	MLS 5 8	6 15	7 0
AD	ID 14	1 ✓	AD	ID 30	1 ✓	AD	ID 56	1 ✓	AD	ID 16	1 ✓		ID 23	1
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 7	2 ✓	3 ✓	4 4
5 8	6 0	7 11	MLS 5 11	6 12	7 0	5 8 MLS	6 11	7 0	5 9	6 8	7 0	5 9	6 8	7 C
AD	ID 21	1 ✓	AD	ID 57	1 ✓	AD	ID 2	1 ✓	AD	ID 29	1 ✓		ID 48	1
2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 7
9 MLS 5 2	6 0	7 12	5 8	6 10	7 0	5 7	6 10	7 9	5 9 MLS 2	6 11	7 0	5 10	6 13	7 0
AD	ID 33	1 ✓	AD	ID 44	1 ✓	AD	ID 53	1 ✓	AD	ID 19	1 ✓		ID 58	1
2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 5	2 ✓	3 3	4 C
5 10	6 11	7 0	5 9	6 13	7 0	5 8 MLS 2	6 9	7 0	5 12	6 10	7 C	5 8	6 12	7 C
AD	ID 1	1 ✓	AD	ID 12	1 ✓	AD	ID 47	1 ✓	AD	ID 32	1 ✓		ID 28	1
2 ✓	3 ✓	4 5	2 ✓	3 ✓	4 6	2 ✓	3 ✓	4 0	2 ✓	3 ✓	4 3	2 ✓	3 ✓	4
12 MLS 5 2	6 8	7 0	5 10	6 10	7 0	5 10	6 13	7 0	8 MLS 5 2	6 14	7 0	5 10	6 11	7 C

Comments:

Day	0	Initials	MLS	Time	1615
1		✓	MLS		1040
2			LJT		1820
3			MLS		1609
4			MLS		1810
5			MLS		1605
6			LJT		1720
7			MLS		1415

Cup ID	Sample Concentration
1–10:	Control
11–20:	6.25%
21–30:	12.5%
31–40:	25.0%
41–50:	50.0%
51–60:	100.0%

Dil in H_2O: Very Hard (220)

Test 4

Log # 7
Organism: dubia
Sample ID: EE10
Start date: 10/28/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	25.4	25.4	25.4	25.2	25.2	25.0	25.2	25.1	25.0	25.5	25.0	25.5	24.9	25.4		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.4	8.3	8.5	8.5	8.5	8.3	8.7	8.1	8.7	8.5	8.6	8.4	8.6	8.5		
6.25	8.5	8.4	8.5	8.5	8.5	8.2	8.6	8.2	8.7	8.5	8.6	8.4	8.6	8.5		
12.5	8.5	8.4	8.6	8.3	8.5	8.2	8.6	8.2	8.8	8.4	8.6	8.4	8.6	8.6		
25	8.6	8.5	8.7	8.3	8.6	8.3	8.7	8.2	8.8	8.4	8.7	8.4	8.7	8.6		
50	8.7	8.5	8.7	8.3	8.6	8.3	8.7	8.2	8.8	8.4	8.7	8.4	8.7	8.5		
100	8.8	8.6	8.8	8.3	8.6	8.4	8.8	8.3	8.8	8.3	8.8	8.4	8.7	8.7		

pH

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	8.49	8.48	8.59	8.48	8.39	8.44	8.50	8.39	8.46	8.37	8.54	8.29	8.54	8.40		
6.25	8.53	8.45	8.59	8.53	8.36	8.45	8.51	8.42	8.46	8.38	8.53	8.27	8.51	8.42		
12.5	8.50	8.44	8.57	8.52	8.41	8.42	8.50	8.41	8.42	8.39	8.51	8.26	8.42	8.42		
25	8.48	8.43	8.58	8.52	8.40	8.43	8.47	8.40	8.39	8.39	8.49	8.27	8.39	8.46		
50	8.46	8.44	8.55	8.52	8.43	8.43	8.43	8.40	8.31	8.40	8.45	8.27	8.31	8.45		
100	8.43	8.45	8.50	8.50	8.40	8.43	8.38	8.42	8.19	8.45	8.09	8.32	8.15	8.47		

CONDUCTIVITY

CONCENTRATION	Start	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8
		OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
Control	603	538	549	702	669	605	651	6164	636	638	653	550	617	6094		
6.25	1096	583	555	677	702	666	669	6076	669	694	687	654	651	1064		
12.5	638	595	581	517	666	707	688	698	638	726	659	750	682	702		
25	231	737	616	871	753	961	736	765	739	749	697	681	756	708		
50	804	806	660	173	832	839	749	838	845	910	848	784	824	875		
100	1058	996	939	103	1018	918	851	1053	1047	1009	969	1061	1027	1022		

Test 4

FATHEAD MINNOW SURVIVAL AND GROWTH 7-DAY CHRONIC TOXICITY TEST

Log No. 518

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: EE 10
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: ____ hrs; 9/28/94
ENDING: ____ hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
6.25	A	10	10	10	10	10	10	10	10
	B	10	10	10	9	9	9	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
12.5	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
50	A	10	10	9	9	9	9	9	9
	B	10	10	10	10	10	9	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
	TIME:	1715	1730	1720	1820	1720	1700	1600	1810
	INITIAL:	MLS	MLS	LJT	RXK	MM	MLS	MM	MLS

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
6.25	A		1.11395	1.12165			
	B		1.10901	1.11630			
	C		1.12817	1.13494			
	D		1.10325	1.11122			
12.5	A		1.11902	1.12680			
	B		1.10569	1.11288			
	C		1.10708	1.11452			
	D		1.11261	1.11929			
25	A		1.12001	1.12801			
	B		1.11051	1.11749			
	C		1.13132	1.13912			
	D		1.12107	1.12861			
50	A		1.11443	1.12177			
	B		1.11954	1.11776			
	C		1.11892	1.12612			
	D		1.11684	1.12346			

Test 4

FATHEAD MINNOW SURVIVAL AND GROWTH 7-DAY CHRONIC TOXICITY TEST

Log No. 518

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: EE 10
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER:

PERSON CONDUCTING TEST:
BEGINNING: ____ hrs; 10/28/94
ENDING: ____ hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
100	A	10	10	10	10	10	10	10	10
	B	10	10	9	9	8	6	6	6
	C	10	10	10	10	10	9	9	9
	D	10	10	10	10	10	9	9	8 1d
	TIME:	1715	1730	1720	18:50	17 20	1700	1600	17:50
	INITIAL:	MLS	MLS	LJT	RXK	mm	MLS	mm	

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
100	A		1.12667	1.13263			
	B		1.11955	1.12796			
	C		1.12170	1.12729			
	D		1.11605	1.12140			

Tinker AFB Test # 4 TEST START DATE Oct 28, 94

SAMPLE ID EE 10 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
6.25%	A	1.11395	1.12165	0.0077	10	0.77
	B	1.10901	1.1163	0.00729	9	0.81
	C	1.12817	1.13494	0.00677	10	0.68
	D	1.10325	1.11122	0.00797	10	0.80
12.50%	A	1.11902	1.1268	0.00778	10	0.78
	B	1.10569	1.11288	0.00719	10	0.72
	C	1.10708	1.11452	0.00744	10	0.74
	D	1.11261	1.11929	0.00668	10	0.67
25%	A	1.12001	1.12801	0.008	10	0.80
	B	1.11051	1.11749	0.00698	10	0.70
	C	1.13132	1.13912	0.0078	10	0.78
	D	1.12197	1.12861	0.00664	10	0.66
50%	A	1.11443	1.12177	0.00734	9	0.82
	B	1.11054	1.11776	0.00722	9	0.80
	C	1.11892	1.12612	0.0072	10	0.72
	D	1.11684	1.12346	0.00662	10	0.66
100%	A	1.12667	1.13263	0.00596	10	0.60
	B	1.11955	1.12296	0.00341	6	0.57
	C	1.1217	1.12729	0.00559	9	0.62
	D	1.11605	1.1214	0.00535	8	0.67

4 Dilution H_2O: Spring

Log # 318
Organism: P. promelas
Sample ID: EE10
Start date: 10/28/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25.4	25.4	25.4	25.2	25.2	25.1	25.1	25.0	25.0	25.3	24.9	25.3	25.0	25.2		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD mls	Day 1 NEW mls	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.4	~~7.3~~	~~8.7~~													
6.25	8.7	7.4	8.7	8.1	8.6	7.2	8.7	7.7	8.6	8.4	8.6	8.0	8.6	7.9		
12.5	8.7	7.3	8.7	8.1	8.6	7.1	8.7	7.8	8.6	8.3	8.6	8.1	8.6	7.9		
25	8.9	7.3	8.8	8.1	8.6	7.1	8.8	7.9	8.6	8.3	8.6	8.1	8.6	7.9		
50	8.8	7.4	8.8	8.1	8.7	7.1	8.9	7.8	8.7	8.1	8.7	8.0	8.7	7.8		
100	8.8	7.2	8.8	8.1	8.7	7.1	8.9	7.7	8.7	8.0	8.7	8.1	8.7	7.10		

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW mls	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.66		~~8.07~~													
6.25	8.64	8.23	8.11	8.42	8.38	8.11	8.50	8.34	8.65	8.26	8.57	8.34	8.64	8.31		
12.5	8.64	8.23	8.07	8.31	8.35	8.13	8.57	8.32	8.64	8.28	8.58	8.32	8.62	8.27		
25	8.60	8.22	8.08	8.39	8.33	8.13	8.57	8.29	8.60	8.21	8.57	8.27	8.57	8.27		
50	8.54	8.20	8.12	8.40	8.30	8.10	8.50	8.28	8.50	8.22	8.43	8.26	8.43	8.27		
100	8.42	8.18	8.15	8.40	8.24	8.07	8.16	8.26	8.28	8.18	8.16	8.21	8.29	8.17		

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW mls	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	380		~~381~~													
6.25	447	419	415	410	427	393	639	440	386	398	397	497	368	450		
12.5	445	460	433	424	446	456	419	479	425	460	408	497	450	470		
25	509	541	535	560	519	554	410	567	543	547	522	583	525	578		
50	668	695	691	602	675	707	687	731	725	743	629	765	700	785		
100	1023	992	1035	1052	990	985	970	1118	1085	1116	1003	1128	1029	1150		

f93506-fm4
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	7	8	9	0

Calculated Chi-Square goodness of fit test statistic = 5.3637
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-fm4
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 4.68
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

TITLE: f93506-fm4
FILE: S:\toxlab\toxstat\f93506-f
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.9100	0.9100
1	Control	2	1.0100	1.0100
1	Control	3	0.7900	0.7900
1	Control	4	0.9300	0.9300
2	6.25%	1	0.7700	0.7700
2	6.25%	2	0.8100	0.8100
2	6.25%	3	0.6800	0.6800
2	6.25%	4	0.8000	0.8000
3	12.5%	1	0.7800	0.7800
3	12.5%	2	0.7200	0.7200
3	12.5%	3	0.7400	0.7400
3	12.5%	4	0.6700	0.6700
4	25%	1	0.8000	0.8000
4	25%	2	0.7000	0.7000
4	25%	3	0.7800	0.7800
4	25%	4	0.6600	0.6600
5	50%	1	0.8200	0.8200
5	50%	2	0.8000	0.8000
5	50%	3	0.7200	0.7200
5	50%	4	0.6600	0.6600
6	100%	1	0.6000	0.6000
6	100%	2	0.5700	0.5700
6	100%	3	0.6200	0.6200
6	100%	4	0.6700	0.6700

f93506-fm4
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.790	1.010	0.910
2	6.25%	4	0.680	0.810	0.765
3	12.5%	4	0.670	0.780	0.728
4	25%	4	0.660	0.800	0.735
5	50%	4	0.660	0.820	0.750
6	100%	4	0.570	0.670	0.615

93506-fm4
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
	Control	0.008	0.091	0.045
	6.25%	0.004	0.059	0.030
3	12.5%	0.002	0.046	0.023
4	25%	0.004	0.066	0.033
5	50%	0.005	0.074	0.037
6	100%	0.002	0.042	0.021

f93506-fm4
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.179	0.036	9.000
Within (Error)	18	0.076	0.004	
Total	23	0.255		

Critical F value = 2.77 (0.05,5,18)
Since F > Critical F REJECT Ho:All groups equal

f93506-fm4
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.910	0.910		
2	6.25%	0.765	0.765	3.242	*
3	12.5%	0.728	0.728	4.081	*
4	25%	0.735	0.735	3.913	*
5	50%	0.750	0.750	3.578	*
6	100%	0.615	0.615	6.596	*

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-fm4
File: S:\toxlab\toxstat\f93506-f Transform: NO TRANSFORMATION

DUNNETTS 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	Control	4			
2	6.25%	4	0.108	11.8	0.145
3	12.5%	4	0.108	11.8	0.182
4	25%	4	0.108	11.8	0.175
5	50%	4	0.108	11.8	0.160
6	100%	4	0.108	11.8	0.295

№ 1..8

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: Tox Test	REMARKS
SEC-EE10-TX-01	10-25-94	1500	Water	2	✓	
SC-EE10-TX-01	10-25-94	1515	soil	2	✓	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/25/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
			10/26/94 1045	1°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

№ 14_9

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: TOX TCLP	REMARKS
SC-EE10-TX-01	10-25-94	1500	water	3		

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/25/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Liza Jeer	10/26/94 1045	2°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

C. dubia +

319

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 320
JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: Control
NPDES PERMIT NO.:

SAMPLE TYPE: Control
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/29
START TIME: 1700
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
P. promelas	A	10	10	10	0	25.4		25.2	8.3		8.2	8.45		8.24	644		697
Control	B	10	10	10	0												
C. dubia																	
Control	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	MLS													
Time		1700	1230	1630													

Comments

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)		
Total Alkalinity (mg/L CaCO3 @ 4.5)		

48-hr Ceriodaphnia dubia ACUTE TOXICITY TEST – STATIC, NONRENEWAL

3 NO.	319	SAMPLE TYPE:		PHOTOPERIOD:	16 hrs light
3 NO.		SAMPLE TIME:		FEEDING REGIME:	None
USTRY:		ORGANISM SOURCE:	Batch #	TEST VESSEL CAPACITY:	30 mL
NTACT:		START DATE:	10/29/94	TEST SOLN VOLUME/DEPTH:	20 mL
FLUENT:	CC-ECOI-TX-004	START TIME:	1600	NO. ORGANISMS/CONC.:	20
DES PERMIT NO.:		DILUTION WATER:	Hard	NO. REPLICATES:	4

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (SU) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	5	5	5	0	25.4											
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
12.5	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
50	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
100	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	MLS													
Time		1600	1600	1530													

Comments: LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	220	340 MLS
Total Alkalinity		

48-hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 320
JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: CC-ECO1-TX-001
NPDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/29
START TIME: 1300
DILUTION WATER: ~~Spring~~ Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	10	10	10	0	25.4		25.2	8.8		8.2	8.44		8.21	641		649
	B	10	10	10	0												
12.5	A	10	10	10	0				8.7		8.2	8.44		8.22	664		710
	B	10	10	10	0												
25	A	10	10	10	0				8.7		8.1	8.41		8.21	698		812
	B	10	10	10	0												
50	A	10	10	10	0				8.7		8.1	8.32		8.21	772		860
	B	10	10	10	0												
100	A	10	10	10	0				8.7		8.0	8.12		8.21	845		858
	B	10	10	10	0												
Initials		MLS	MLS	MLS													
Time		1:11	1:00	11:0													

Comments

Ammonia < 40 ppb ND LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	220 ~~200~~	220
Total Alkalinity (mg/L CaCO3 @ 4.5)	~~230~~	150

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

NOEC 7 100%

JOB NO: F9350G
INDUSTRY: Tanker
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
PERSON CONDUCTING TEST:

BEGINNING: ____ hrs; / /
ENDING: ____ hrs; / /
FEEDING REGIME:
.05 mL yct/15 mL
.05 mL algal suspension/15 mL

Log No: ____
PHOTOPERIOD: 16 light, 8 dark
ORGANISM SOURCE: WCC
TEST VESSEL CAPACITY: 30 mL
TEST SOLUTION VOLUME: 15mL
NO. REPLICATES: 10
DILUTION WATER:

TIME
OBSERVER

CONC | CHAMBER | NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	
Mod Hd										
Con	1									23
	2									16
	3									28
	4									25
	5		✓	✓	1					14
	6									17
	7									15
	8									17
	9									17
	10									15
		Control data from test 13								18
6.25	11		✓	✓	5	7	5	5	10	30
	12		✓	✓	3	6	~~MS~~ 7	~~MS~~ 9	0	25
	13		✓	✓	5	0	10	9	0	24
	14		✓	✓	4	0	8	8	8	28
	15		✓	✓	4	6	5	10	9	34
	16		✓	✓	4	4	9	0	11	28
	17		✓	✓	1	8	8	7	10	34
	18		✓	✓	~~MS~~ D	~~MS~~	~~MS~~	~~DAY~~	~~MS~~	D+C
	19		✓	✓	3	5	6	14	0	28
	20		✓	✓	5	5	0	11	12	33
12.5	21		✓	✓	4	6	6	11	8	29
	22		✓	✓	3	5	6	8	0	22
	23		✓	✓	4	0	10	9	0	23
	24		✓	✓	3	6	6	0	13	28
	25		✓	✓	5	9	6	9	0	29
	26		✓	✓	3	4	1	10	12	30
	27		✓	✓	✓	0	11	12	0	23
	28		✓	✓	3	0	8	11	0	
	29		✓	✓	3	8	10	0	12	
	30		✓	✓	5	4	7	0	14	28

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F93506 | BEGINNING: ____hrs; / / | Log No: ____
INDUSTRY: Tinker | ENDING: ____hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

CONC	CHAMBER	TIME							
		OBSERVER							
		NUMBER OF YOUNG PRODUCED							
		START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
25%	31		✓	✓	D	X	X	X	X
	32		✓	✓	D	X	X	X	X
	33		✓	✓	3	4	7	10	0
	34		✓	✓	5	7	2	9	11
	35		✓	✓	2	5	4	0	13
	36		✓	✓	0	4	0	11	13
	37		✓	✓	3	7	4	10	0
	38		✓	✓	2	0	9	12	10
	39		✓	✓	1	0	9	8	1
	40		✓	✓	2	6	6	10	0
		START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
50%	41		✓	✓	4	5	2	10	0
	42		✓	✓	5	0	4	17	12
	43		✓	✓	4	6	0	8	11
	44		✓	✓	4	5	5	1	14
	45		✓	✓	2	~~4~~ 7	~~7~~ 5	~~10~~ 9	D 0
	46		✓	✓	3	4	5	13	0
	47		✓	✓	1	5	6	11	0
	48		✓	✓	1	0	6	12	8
	49		✓	✓	1	6	0	11	14
	50		✓	✓	2	0	3	5	8
		START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
100%	51		✓	✓	4	0	6	11	0
	52		✓	✓	1	3	0	11	13
	53		✓	✓	4	6	4	9	0
	54		✓	✓	3	3	5	0	13
	55		✓	✓	3	4	7	10	0
	56		✓	✓	3	4	3	0	11
	57		✓	✓	3	3	4	8	1
	58		✓	✓	1	2	7	10	8
	59		✓	✓	✓	0	2	5	7
	60		✓	✓	4	0	5	11	7

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: D J C A E F Start Date: 9/ Sample ID: CC ECC1 Log #: 3

AD	ID	1
2	3	4
5	6	7

AD	ID	1
2	3	4
5	6	7

AD	ID	1
2	3	4
5	6	7

AD	ID	1
2	3	4
5	6	7

	ID	1
2	3	4
5	6	7

AD	ID 5	1 ✓
2 ✓	3 5	4 9
5 6	6 9	7 0

AD	ID 21	1 ✓
2 ✓	3 1	4
5	6	7

AD	ID 10	1 ✓
2 ✓	3 5	4 5
5 0	6 11	7 12

AD	ID 47	1 ✓
2 ✓	3 3	4 3
5 4	6 8	7 1

	ID 49	1 ✓
2 ✓	3 ✓	4 0
5 2	6 5	7 7

AD	ID 25	1 ✓
2 ✓	3 2	4 5
5 4	6 0	7 13

AD	ID 1	1 ✓
2 ✓	3 3	4 7
5 5	6 5	7 10

AD	ID 48	1 ✓
2 ✓	3 1	4 2
5 7	6 10	7 8

AD	ID 22	1 ✓
2 ✓	3 N/O	4
5	6	7

	ID 11	1 ✓
2 ✓	3 4	4 5
5 6	6 11	7 8

AD	ID 46	1 ✓
2 ✓	3 2	4 0
5 3	6 5	7 8

AD	ID 12	1 ✓
2 ✓	3 2	4 5
5 6	6 8	7 0

AD	ID 50	1 ✓
2 ✓	3 4	4 0
5 5	6 11	7 7

AD	ID D	1 ✓
2 ✓	3 3	4 6
5 7	6 9	7 0

	ID 37	1 ✓
2 ✓	3 1	4 5
5 4	6 11	7 0

AD	ID 41	1 ✓
2 ✓	3 4	4 0
5 6	6 11	7 0

AD	ID 3	1 ✓
2 ✓	3 5	4 0
5 10	6 9	7 0

AD	ID 13	1 ✓
2 ✓	3 4	4 0
5 10	6 9	7 0

AD	ID 23	1 ✓
2 ✓	3 3	4 4
5 7	6 10	7 0

	ID 36	1 ✓
2 ✓	3 3	4 4
5 5	6 13	7 0

AD	ID 24	1 ✓
2 ✓	3 5	4 7
5 9	6 9	7 11

AD	ID 35	1 ✓
2 ✓	3 2	4 7
5 5	6 9	7 D

AD	ID 34	1 ✓
2 ✓	3 4	4 5
5 5	6 1	7 14

AD	ID H	1 ✓
2 ✓	3 4	4 0
5 8	6 8	7 8

	ID 14	1 ✓
2 ✓	3 3	4 6
5 4	6 0	7 13

Comments:

Cup ID	Sample Concentration
1–10:	2.5
11–20:	12.5
21–30:	25
31–40:	50
41–50:	100
51–60:	

Day	Initials	Time
1	LJT	1350
2	LJT	1310
3	MAR	1830
4	MAR	14:20
5	MAR	1420
6	LJT	1745
7	LJT	1700

T25-14

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: U Z E A F G K Start Date: 1-1-94 Sample ID: CC-ECC1 Log #: 3

AD	ID	1	AD	ID	1	AD	ID	1	AD	ID	1		ID	1
2	3	4	2	3	4	2	3	4	2	3	4	2	3	4
5	6	7	5	6	7	5	6	7	5	6	7	5	6	7
AD	ID 16	1 ✓	AD	ID 5	1 ✓	AD	ID 20	1 ✓	AD	ID 26	1 ✓		ID 9	1 ✓
2 ✓	3 3	4 4	2 ✓	3 4	4 6	2 ✓	3 3	4 4	2 ✓	3 0	4 4	2 ✓	3 3	4 5
5 1	6 10	7 12	5 5	6 10	7 9	5 7	6 0	7 14	5 0	6 11	7 13	5 6	6 14	7 C
AD	ID 30	1 ✓	AD	ID 42	1 ✓	AD	ID 6	1 ✓	AD	ID 17	1 ✓		ID 44	1 ✓
2 ✓	3 8	4 6	2 ✓	3 1	4 3	2 ✓	3 4	4 4	2 ✓	3 ✓	4 C	2 ✓	3 3	4 3
5 6	6 10	7 C	5 0	6 11	7 13	5 9	6 0	7 11	5 11	6 12	7 C	5 5	6 0	7 1
AD	ID 31	1 ✓	AD	ID 27	1 ✓	AD	ID 44	1 ✓	AD	ID 28	1 ✓		ID 19	1 ✓
2 ✓	3 4	4 5	2 ✓	3 3	4 7	2 ✓	3 3	4 4	2 ✓	3 2	4 C	2 ✓	3 3	4 5
5 2	6 10	7 0	5 4	6 10	7 C	5 3	6 0	7 11	5 9	6 12	7 10	5 10	6 0	7 1
AD	ID 7	1 ✓	AD	ID 37	1 ✓	AD	ID 24	1 ✓	AD	ID 32	1 ✓		ID 33	1 ✓
2 ✓	3 1	4 8	2 ✓	3 1	4 C	2 ✓	3 1	4 0	2 ✓	3 5	4 C	2 ✓	3 4	4 4
5 8	6 7	7 10	5 6	6 12	7 8	5 9	6 8	7 1	5 4	6 17	7 12	5 C	6 8	7 11
AD	ID 18	1 ✓	AD	ID 43	1 ✓	AD	ID 45	1 ✓	AD	ID 39	1 ✓		ID 8	1 ✓
2 ✓	3 2	4 0	2 ✓	3 4	4 6	2 ✓	3 3	4 4	2 ✓	3 1	4 6	2 ✓	3 ✓ 1	4
5 8	6 11	7 10	5 4	6 9	7 C	5 7	6 10	7 C	5 C	6 11	7 14	5 ✓	6	7

Comments:

Day 5 Initials CJT Time 1530

Cup ID	Sample Concentration
1–10:	6.25
11–20:	12.5
21–30:	25
31–40:	50
41–50:	100
51–60:	

Day	Initials	Time
1	LJT	1350
2	LJT	1310
3	MAR	1830
4	MAR	1420
5	MAR	1420
6	LJT	1745
7	LJT	1700

Test 14

Log C bia
EC-ECC1
11/1/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25	25.3	25	25.0	24.8	25.3	25.0	25.5	25.2	25.4	25.2	25.0	25.0	25.3		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.6	8.5				7.9	~~8.5~~ 7.9	7.8	8.3			8.2	8.4	8.3		
6.25	8.6	8.5	8.5	8.4	8.5	7.9	8.5	7.8	8.3	8.2	8.4	8.2	8.4	8.0		
12.5	8.6	8.5	8.4	8.4	8.5	7.9	8.5	7.9	8.4	8.2	8.4	8.2	8.5	8.2		
25	8.7	8.4	8.4	8.4	8.5	7.9	8.4	7.9	8.4	8.2	8.5	8.2	8.5	8.1		
50	8.7	8.4	8.5	8.5	8.5	7.9	8.5	7.9	8.6	8.2	8.5	8.2	8.6	8.1		
100	8.7	8.4	8.5	8.5	8.5	7.9	8.8	7.0	8.6	8.3	8.5	8.2	8.6	8.1		

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control		8.07														
6.25	8.52	8.13	8.51	8.50	8.49	8.34	8.42	8.40	8.44	8.37	8.33	8.32	8.52	8.32		
12.5	8.44	8.15	8.51	8.49	8.47	8.30	8.40	8.40	8.44	8.35	8.33	8.31	8.51	8.32		
25	8.46	8.16	8.48	8.50	8.44	8.30	8.34	8.41	8.43	8.35	8.34	8.34	8.50	8.31		
50	8.37	8.18	8.44	8.49	8.37	8.29	8.19	8.43	8.31	8.35	8.33	8.35	8.49	8.32		
100	8.23	8.20	8.36	8.51	8.17	8.32	8.01	8.51	8.20	8.40	8.27	8.44	8.48	8.36		

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control		649														
6.25	633	644	683	635	681	688	600	597	598	622	598	590	772	761		
12.5	613	655	716	630	689	702	585	600	639	647	623	667	778	773		
25	627	625	727	745	723	749	653	646	669	683	659	604	778	743		
50	768	597	800	807	812	827	751	722	755	769	749	654	857	777		
100	922	867	886	856	891	922	901	870	~~877~~ 858 915	916	896	927	977	951		

f93506-cd14
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	4	13	25	15	3

Calculated Chi-Square goodness of fit test statistic = 0.6227
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd14
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 8.77
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

TITLE: f93506-cd14
FILE: S:\TOXLAB\TOXSTAT\F93506-C.
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	23.0000	23.0000
1	Control	2	16.0000	16.0000
1	Control	3	28.0000	28.0000
1	Control	4	25.0000	25.0000
1	Control	5	14.0000	14.0000
1	Control	6	17.0000	17.0000
1	Control	7	15.0000	15.0000
1	Control	8	17.0000	17.0000
1	Control	9	17.0000	17.0000
1	Control	10	15.0000	15.0000
2	6.25%	1	30.0000	30.0000
2	6.25%	2	25.0000	25.0000
2	6.25%	3	24.0000	24.0000
2	6.25%	4	28.0000	28.0000
2	6.25%	5	34.0000	34.0000
2	6.25%	6	28.0000	28.0000
2	6.25%	7	34.0000	34.0000
2	6.25%	8	0.0000	0.0000
2	6.25%	9	28.0000	28.0000
2	6.25%	10	33.0000	33.0000
3	12.5%	1	29.0000	29.0000
3	12.5%	2	22.0000	22.0000
3	12.5%	3	23.0000	23.0000
3	12.5%	4	28.0000	28.0000
3	12.5%	5	29.0000	29.0000
3	12.5%	6	30.0000	30.0000
3	12.5%	7	23.0000	23.0000
3	12.5%	8	21.0000	21.0000
3	12.5%	9	33.0000	33.0000
3	12.5%	10	28.0000	28.0000
4	25%	1	0.0000	0.0000
4	25%	2	0.0000	0.0000
4	25%	3	24.0000	24.0000
4	25%	4	34.0000	34.0000
4	25%	5	24.0000	24.0000
4	25%	6	28.0000	28.0000
4	25%	7	24.0000	24.0000
4	25%	8	33.0000	33.0000
4	25%	9	19.0000	19.0000
4	25%	10	24.0000	24.0000
5	50%	1	21.0000	21.0000
5	50%	2	38.0000	38.0000
5	50%	3	29.0000	29.0000
5	50%	4	29.0000	29.0000
5	50%	5	23.0000	23.0000
5	50%	6	25.0000	25.0000
5	50%	7	23.0000	23.0000
5	50%	8	27.0000	27.0000
5	50%	9	32.0000	32.0000
5	50%	10	18.0000	18.0000

6	100%	1	21.0000	21.0000
6	100%	2	28.0000	28.0000
6	100%	3	23.0000	23.0000
6	100%	4	24.0000	24.0000
6	100%	5	24.0000	24.0000
6	100%	6	21.0000	21.0000
6	100%	7	19.0000	19.0000
6	100%	8	28.0000	28.0000
6	100%	9	14.0000	14.0000
6	100%	10	27.0000	27.0000

f93506-cd14
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	14.000	28.000	18.700
2	6.25%	10	0.000	34.000	26.400
3	12.5%	10	21.000	33.000	26.600
4	25%	10	0.000	34.000	21.000
5	50%	10	18.000	38.000	26.500
6	100%	10	14.000	28.000	22.900

f93506-cd14
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	23.344	4.832	1.528
2	6.25%	98.267	9.913	3.135
3	12.5%	16.267	4.033	1.275
4	25%	142.667	11.944	3.777
5	50%	33.833	5.817	1.839
6	100%	19.211	4.383	1.386

f93506-cd14
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	564.683	112.937	2.031
Within (Error)	54	3002.300	55.598	

Total	59	3566.983

Critical F value = 2.45 (0.05,5,40)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

f93506-cd14
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	18.700	18.700		
2	6.25%	26.400	26.400	-2.309	
3	12.5%	26.600	26.600	-2.369	
4	25%	21.000	21.000	-0.690	
5	50%	26.500	26.500	-2.339	
6	100%	22.900	22.900	-1.260	

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=40,5)

f93506-cd14
le: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

DUNNETTS 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	Control	10			
2	6.25%	10	7.703	41.2	-7.700
3	12.5%	10	7.703	41.2	-7.900
4	25%	10	7.703	41.2	-2.300
5	50%	10	7.703	41.2	-7.800
6	100%	10	7.703	41.2	-4.200

TEST 14

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 326

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
SAMPLE TYPE: CC-ECC1
DILUTION WATER:

PERSON CONDUCTING TEST:
BEGINNING: ___hrs; 11/1/94
ENDING: ___hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
6.25	A	9 ~~10~~	9	9	9	8	8	~~8~~	8
	B	10	10	10	10	9	9	9	9
	C	10	10	10	10	10	10	10	10
	D	~~10~~ 9	9	9	9	10	10	10	10
12.5	A	10	10	10	10	10	9	9	9
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	9	9	9	9
25	A	10	10	10	10	9	9	9	9
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
50	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
								11/7/94	11/8/94
	TIME:		1345	1500	1400		1500	17:50	14:25
	INITIAL:	MLS	CJT	mm	mm		mm	RXK	RXK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
6.25	A		1.11452	1.12139	.00687	8	
	B		1.09421	1.10193		9	
	C		1.11028	1.11916		10	
	D		1.12022	1.12771		10	
12.5	A		1.11876	1.12793		9	
	B		1.10286	1.11 [illegible]		10	
	C		1.09203	1.10101		10	
	D		1.12825	1.13538		9	
25	A	1.12867	1.12126	1.12865		9	
	B	1.10883	1.09982	1.10883		10	
	C	1.12762	1.11947	1.12764		10	
	D	1.12003	1.11363	1.12007		10	
50	A		1.10675	1.11513		10	
	B		1.11731	1.12536		10	
	C		1.12678	1.13463		10	
	D		1.11070	1.11951		10	

orange [illegible]

TEST 14

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 356

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
SAMPLE TYPE: CC - ECC1
DILUTION WATER:

PERSON CONDUCTING TEST:
BEGINNING: ____ hrs; 11/1/94
ENDING: ____ hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
100	A	10	9	9	9	9	9	9	9
	B	10	9	9	9	9	9	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
	TIME:		1845	1500	1400	1330	1500	18:10	14:15
	INITIAL:	CJT	CJT	mm	mm	mm	mm	RXK	RXK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
100	A		1.12019	1.12724		9	
	B		1.10593	1.11349		9	
	C		1.09245	1.09874		10	
	D		1.11529	1.12170		10	

PIMEPH14.XLS

Tinker AFB Test # 14 TEST START DATE Nov 1, 94

SAMPLE ID CC-EC01 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
cont	A	1.11765	1.12624	0.00859	10	0.86
	B	1.11428	1.12293	0.00865	10	0.87
	C	1.11232	1.12045	0.00813	10	0.81
	D	1.10291	1.10964	0.00673	10	0.67
6.25%	A	1.11452	1.12139	0.00687	8	0.86
	B	1.09421	1.10193	0.00772	9	0.86
	C	1.11028	1.11916	0.00888	10	0.89
	D	1.12022	1.12771	0.00749	10	0.75
12.50%	A	1.11876	1.12793	0.00917	9	1.02
	B	1.10286	1.11167	0.00881	10	0.88
	C	1.09203	1.10101	0.00898	10	0.90
	D	1.12852	1.13538	0.00686	9	0.76
25%	A	1.12126	1.12865	0.00739	9	0.82
	B	1.09982	1.10883	0.00901	10	0.90
	C	1.11947	1.12764	0.00817	10	0.82
	D	1.11363	1.12007	0.00644	10	0.64
50%	A	1.10675	1.11512	0.00837	10	0.84
	B	1.11731	1.12536	0.00805	10	0.80
	C	1.12678	1.13463	0.00785	10	0.79
	D	1.1107	1.11801	0.00731	10	0.73
100%	A	1.12019	1.12724	0.00705	9	0.78
	B	1.10593	1.11349	0.00756	9	0.84
	C	1.09245	1.09874	0.00629	10	0.63
	D	1.11529	1.1217	0.00641	10	0.64

Test 14

Log # 32
P. promelas
~~SCCEST~~
CC-EC01
11/1/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25	25.5	25.0	24.5	24.2	25.0	25.3	25.3	25.1	25.2	25.0	25.0	25.0	25.3		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.7		8.7	8.4	8.6	8.1	8.3	7.3	8.4	7.3	8.2	4598	8.5	8.2		
6.25	8.6	7.7	8.7	8.3	8.6	8.1	8.2	7.3	8.5	7.3	8.2	7.1	8.5	8.2		
12.5	8.6	7.7	8.7	8.3	8.6	8.1	8.3	7.4	8.5	7.4	8.3	7.0	8.5	8.1		
25	8.7	7.7	8.6	8.4	8.6	8.1	8.3	7.5	8.5	7.3	8.4	7.1	8.4	8.1		
50	8.7	7.7	8.6	8.4	8.6	8.1	8.9	7.4	8.5	7.3	8.6	7.1	8.4	8.1		
100					8.6											

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.70	8.49	8.62	8.49	8.58	8.34	8.22	8.36	8.55	8.31	8.49	8.39	8.54	8.36		
6.25	8.65	8.46	8.58	8.48	8.58	8.38	8.19	8.38	8.55	8.32	8.49	8.36	8.61	8.40		
12.5	8.55	8.43	8.56	8.46	8.53	8.36	8.06	8.36	8.54	8.32	8.45	8.36	8.58	8.40		
25	8.47	8.37	8.49	8.43	8.47	8.33	8.16	8.35	8.47	8.27	8.33	8.34	8.55	8.37		
50	8.24	8.33	8.37	8.43	8.26	8.31	8.08	8.34	8.32	8.25	8.33	8.28	8.47	8.37		
100																

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	397	452	404	452	396	392	372	441	404	438	390	357	373	454		
6.25	489	479	438	466	415	406	426	478	431	469	428	444	420	484		
12.5	497	503	502	510	480	491	448	553	500	534	494	529	494	561		
25	557	611	634	617	565	708	636	569	633	706	617	691	687	709		
50	163	1120	925	822	820	887	911	1030	926	916	892	980	909	1006		
100																

①440

f93506-fm14
File: S:\TOXLAB\TOXSTAT\F93506-F. Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	7	9	8	0

Calculated Chi-Square goodness of fit test statistic = 4.2910
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-fm14
File: S:\TOXLAB\TOXSTAT\F93506-F. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 5.85
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

TITLE: f93506-fm14
FILE: S:\TOXLAB\TOXSTAT\F93506-F.
TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.8600	0.8600
1	Control	2	0.8700	0.8700
1	Control	3	0.8100	0.8100
1	Control	4	0.6700	0.6700
2	6.25%	1	0.8600	0.8600
2	6.25%	2	0.8600	0.8600
2	6.25%	3	0.8900	0.8900
2	6.25%	4	0.7500	0.7500
3	12.5%	1	1.0200	1.0200
3	12.5%	2	0.8800	0.8800
3	12.5%	3	0.9000	0.9000
3	12.5%	4	0.7600	0.7600
4	25%	1	0.8200	0.8200
4	25%	2	0.9000	0.9000
4	25%	3	0.8200	0.8200
4	25%	4	0.6400	0.6400
5	50%	1	0.8400	0.8400
5	50%	2	0.8000	0.8000
5	50%	3	0.7900	0.7900
5	50%	4	0.7300	0.7300
6	100%	1	0.7800	0.7800
6	100%	2	0.8400	0.8400
6	100%	3	0.6300	0.6300
6	100%	4	0.6400	0.6400

f93506-fm14
File: S:\TOXLAB\TOXSTAT\F93506-F. Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.670	0.870	0.803
2	6.25%	4	0.750	0.890	0.840
3	12.5%	4	0.760	1.020	0.890
4	25%	4	0.640	0.900	0.795
5	50%	4	0.730	0.840	0.790
6	100%	4	0.630	0.840	0.722

f93506-fm14
File: S:\TOXLAB\TOXSTAT\F93506-F. Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.008	0.092	0.046
2	6.25%	0.004	0.062	0.031
3	12.5%	0.011	0.106	0.053
4	25%	0.012	0.110	0.055
5	50%	0.002	0.045	0.023
6	100%	0.011	0.104	0.052

f93506-fm14
File: S:\TOXLAB\TOXSTAT\F93506-F. Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.062	0.012	1.500
Within (Error)	18	0.146	0.008	
Total	23	0.208		

Critical F value = 2.77 (0.05,5,18)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

f93506-fm14
File: S:\TOXLAB\TOXSTAT\F93506-F. Transform: NO TRANSFORM

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.803	0.803		
2	6.25%	0.840	0.840	-0.593	
3	12.5%	0.890	0.890	-1.383	
4	25%	0.795	0.795	0.119	
5	50%	0.790	0.790	0.198	
6	100%	0.722	0.722	1.265	

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-fm14
File: S:\TOXLAB\TOXSTAT\F93506-F. Transform: NO TRANSFORM

DUNNETTS 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	Control	4			
2	6.25%	4	0.152	19.0	-0.037
3	12.5%	4	0.152	19.0	-0.088
4	25%	4	0.152	19.0	0.008
5	50%	4	0.152	19.0	0.013
6	100%	4	0.152	19.0	0.080

№ 1. 3

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature) [signature]

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

ANALYSES REQUIRED: Tox Test

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	Tox Test						REMARKS
SC-EC01-TX001	10/28/94		water	2	✓						
SC EC01-TX001	10/28/94		soil	2	✓						
Samples labeled:											
CC-EC01-TX-001			water	2							
CC-EC01-TX-001			soil	2							

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
[signature]	10/28/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Liza Teer	10/29/94 0920	2 °C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

№ 1[illegible] 1

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature) [signature]

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

ANALYSES REQUIRED: TOX Test

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	TOX Test						REMARKS
SC EC01 TX001	10/28/94	1000	water	3	✓						
* CC-EC01-TX-001 - on sample label											

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
[signature]	10/28/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Liza Deer	10/29/94 0920	3° C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature) Donald Spicer

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: TOX, TPH, BTEX	REMARKS
SC ECOI TX001	10/28/94	100	water	3	X	
* CC-ECOI TX-001 - on sample label						

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
Donald Spicer	10/28/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lisa Dee	10/29/94 0920	3°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

C. dubia +

319

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 320
JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: Control
NPDES PERMIT NO.:

SAMPLE TYPE: Control
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/29
START TIME: 1700
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (°C) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (µmhos/cm) 0	24	48
P. promelas	A	10	10	10	0	25.4		25.2	8.3		8.2	8.45		8.24	644		697
Control	B	10	10	10	0												
C. dubia																	
Control	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	MLS													
Time		1700	1230	1630													

Comments

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)		
Total Alkalinity (mg/L CaCO3 @ 4.5)		

48-hr Ceriodaphnia dubia ACUTE TOXICITY TEST – STATIC, NONRENEWAL

G NO. 319
B NO.
)USTRY:
NTACT:
FLUENT: CC-EC027X-00
DES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/29/94
START TIME: 1620
DILUTION WATER: Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: 30 mL
TEST SOLN VOLUME/DEPTH: 20 mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	5	5	5	0	25.4											
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	4	1												
12.5	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
25	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
50	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
100	A	5	5	5	0												
	B	5	5	5	0												
	C	5	5	5	0												
	D	5	5	5	0												
Initials		MLS	MLS	MLS													
Time		1620	1620	1620													

Comments

$LC_{50} > 100\%$

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	220	240
Total Alkalinity	120	120

Test

48–hr Pimephales promelas ACUTE TOXICITY TEST – STATIC, NONRENEWAL

LOG NO. 320
JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT: CC-EC02-TX-001
NPDES PERMIT NO.:

SAMPLE TYPE:
SAMPLE TIME:
ORGANISM SOURCE: Batch #
START DATE: 10/29/94
START TIME: 1300
DILUTION WATER: ~~Spring~~ Hard

PHOTOPERIOD: 16 hrs light
FEEDING REGIME: None
TEST VESSEL CAPACITY: ~~1000~~ mL 266
TEST SOLN VOLUME/DEPTH: 250 ~~500~~ mL
NO. ORGANISMS/CONC.: 20
NO. REPLICATES: 2

CONC (%)	REP ID	SURVIVAL (#) 0	24	48	DEAD	TEMPERATURE (oC) 0	24	48	DO (mg/L) 0	24	48	pH (S.U.) 0	24	48	CONDUCTIVITY (umhos/cm) 0	24	48
6.25	A	10	10	10	0	25.4		25.2	8.6		8.1	8.38		8.15	667		767
	B	10	10	10	0												
12.5	a	10	10	10	0				8.6		8.2	8.42		8.14	682		777
	A	10	10	10	0												
25	A	10	10	10	0				8.6		8.1	8.40		8.13	723		699
	B	10	10	10	0												
50	a	10	10	10	0				8.7		8.0	8.34		8.13	804		778
	B	10	10	10	0												
100	A	10	10	10	0				8.7		8.0	8.18		8.14	815		1143
	B	10	10	10	0												
Initials		MLS	MLS	MLS													
Time		1210	1310	1130													

Comments

Ammonia: ND < 40 ppb

LC50 > 100%

PARAMETER	Control	100% Sample
Total Hardness (mg/L CaCO3)	220 ~~200~~	240
Total Alkalinity (mg/L CaCO3 @ 4.5)	~~230~~ 130	130

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST Test 15

JOB NO: F9350G
INDUSTRY: Tanker
CONTACT:
EFFLUENT: CCEC02
NPDES PERMIT NO:
PERSON CONDUCTING TEST:

BEGINNING: 1530 hrs; 11/1/94
ENDING: 1710 hrs; / /
FEEDING REGIME:
.05 mL yct/15 mL
.05 mL algal suspension/15 mL

Log No. 325
PHOTOPERIOD: 16 light, 8 dark
ORGANISM SOURCE: WCC
TEST VESSEL CAPACITY: 30 mL
TEST SOLUTION VOLUME: 15mL
NO. REPLICATES: 10
DILUTION WATER:

	TIME	1530	1400	1310	1510	1450	1410	1500	1710
	OBSERVER	LJT	LJT	LJT	MLS	MAR	MAR	LJT	LJT

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Mod Hd Con	1								
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								

From test 13 data

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
6.25	11		✓	✓	2	6-D	X	X	X
	12		✓	✓	4	7	1	9	15
	13		✓	✓	2	2	4	4	D-0
	14		✓	✓	4	7	6	6	0
	15		✓	✓	5	0	5	11	9
	16		✓	✓	6	0	6	9	9
	17		✓	✓	0	2	6	8	0
	18		✓	✓	4	6	6	9	0
	19		✓	✓	0	3	4	7	7
	20		✓	✓	1	7	4	9	0

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
12.5	21		✓	✓	4	6	6	8	0
	22		✓	✓	0	2	7	8	0
	23		✓	✓	4	0	8	12	10
	24		✓	✓	5	0	D-S	X	X D
	25		✓	✓	3	5	5	8	0
	26		✓	✓	4	8	7	9	1
	27		✓	✓	4	7	9	7	0
	28		✓	✓	4	0	6	11	13
	29		✓	✓	8	0	9	8	0
	30		✓	✓	0	1	4	9	0

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F93506 | BEGINNING: ____ hrs; / / | Log No: ____
INDUSTRY: Tinker | ENDING: ____ hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES: 10
| | DILUTION WATER:

TIME
OBSERVER

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
25%	31		✓	✓	3	3	1	6	10
	32		✓	✓	0	11	5	9	0
	33		✓	✓	3	5	7	7	0
	34		✓	✓	4	7	9	0	11
	35		✓	✓	4	6	6	10	0
	36		✓	✓	3	6	6	8	0
	37		✓	✓	3	0	8	9	9
	38		✓	✓	5	7	7	0	9
	39		✓	✓	3	6	8	9	0
	40		✓	✓	3	4	1	9	11
50%	41		✓	✓	0	4	1	9	0
	42		✓	✓	4	0	6	10	13
	43		✓	✓	5	2	0	12	14
	44		✓	✓	4	1	0	11	13
	45		✓	✓	5	0	6	12	8
	46		✓	✓	3	6	6	6	0
	47		✓	✓	4	7	10	8	0
	48		✓	✓	2	0	5	11	10
	49		✓	✓	5	0	6	12	7
	50		✓	✓	4	0	4	10	9
100%	51		✓	✓	3	5	3	6	0
	52		✓	✓	3	0	2	7	0
	53		✓	✓	0	3	2	6	0
	54		✓	✓	4	3	0	12	10
	55		✓	✓	4	4	2	8	0
	56		✓	✓	3	0	4	0	5
	57		✓	✓	4	2	0	7	6
	58		✓	✓	1	3	5	0	9
	59		✓	✓	2	3	3	8	0
	60		✓	✓	0	4	5	7	0

TPS: 12

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: A B C D E F G H I J K L M N O P Q R S T U V W Start Date: 11-1-94 Sample ID: CC-ECO2 Log #: 32

AD	ID	1	AD	ID	1	AD	ID	1	AD	ID	1		ID	1
2	3	4	2	3	4	2	3	4	2	3	4	2	3	4
5	6	7	5	6	7	5	6	7	5	6	7	5	6	7
AD	ID 34	1 ✓	AD	ID 34	1 ✓	AD	ID 2	1 ✓	AD	ID 40	1 ✓		ID 15	1 ✓
2 ✓	3 5	4 0	2 ✓	3 4	4 1	2 ✓	3 4	4 7	2 ✓	3 4	4 0	2 ✓	3 3	4 5
5 4	6 12	7 7	5 0	6 11	7 13	5 1	6 9	7 15	5 4	6 10	7 9	5 5	6 8	7 0
AD	ID 24	1 ✓	AD	ID 30	1 ✓	AD	ID 22	1 ✓	AD	ID 31	1 ✓		ID 45	1 ✓
2 ✓	3 4	4 7	2 ✓	3 3	4 4	2 ✓	3 0	4 11	2 ✓	3 0	4 4	2 ✓	3 4	4 4
5 9	6 0	7 11	5 1	6 9	7 11	5 5	6 9	7 0	5 1	6 9	7 0	5 2	6 8	7 0
AD	ID 17	1 ✓	AD	ID 10	1 ✓	AD	ID 42	1 ✓	AD	ID 14	1 ✓		ID 41	1 ✓
2 ✓	3 4	4 2	2 ✓	3 1	4 7	2 ✓	3 3	4 0	2 ✓	3 5	4 0	2 ✓	3 3	4 5
5 0	6 7	7 6	5 4	6 9	7 0	5 2	6 7	7 0	5 8	6	7	5 3	6 6	7 0
AD	ID 16	1 ✓	AD	ID 4	1 ✓	AD	ID 48	1 ✓	AD	ID 32	1 ✓		ID 9	1 ✓
2 ✓	3 4	4 8	2 ✓	3 4	4 7	2 ✓	3 1	4 3	2 ✓	3 4	4 0	2 ✓	3 0	4 3
5 7	6 9	7 1	5 0	6 6	7 0	5 5	6 0	7 9	5 6	6 10	7 13	5 4	6 7	7 7
AD	ID 23	1 ✓	AD	ID 6	1 ✓	AD	ID 33	1 ✓	AD	ID 49	1 ✓		ID 17	1 ✓
2 ✓	3 3	4 5	2 ✓	3 6	4 0	2 ✓	3 5	4 2	2 ✓	3 2	4 3	2 ✓	3 4	4 7
5 7	6 7	7 0	5 0	6 9	7 9	5 0	6 12	7 14	5 5	6 8	7 0	5 9	6 7	7 0

Comments:

Day 0 Initials LJT Time 1520

Cup ID	Sample Concentration
1–10:	100
11–20:	50
21–30:	25
31–40:	12.5
41–50:	6.25
51–60:	0

Day	Initials	Time
1	LJT	1400
2	LJT	1315
3	MLS	1525
4	MAR	14.50
5	MAR	14:00
6	LJT	1800
7	LJT	1710

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ~~C~~ S ~~F~~ ~~B~~ W ~~A~~ Q Start Date: 11-1-94 Sample ID: CCSC02 Log #: 3.2

AD	ID	1	2	3	4	5	6	7
AD	ID 28	1 ✓	2 ✓	3 5	4 7	5 7	6 0	7 9
AD	ID 19	1 ✓	2 ✓	3 8	4 0	5 9	6 8	7 0
AD	ID 1	1 ✓	2 ✓	3 2	4 M/6	5	6	7
AD	ID 43	1 ✓	2 ✓	3 0	4 3	5 2	6 6	7 0
	ID 11	1 ✓	2 ✓	3 4	4 6	5 6	6 8	7 0
AD	ID 8	1 ✓	2 ✓	3 4	4 6	5 6	6 9	7 0
AD	ID 46	1 ✓	2 ✓	3 3	4 0	5 4	6 0	7 5
AD	ID 50	1 ✓	2 ✓	3 0	4 4	5 5	6 7	7 0
AD	ID 44	1 ✓	2 ✓	3 4	4 3	5 0	6 12	7 10
	ID 27	1 ✓	2 ✓	3 3	4 0	5 8	6 9	7 9
AD	ID 12	1 ✓	2 ✓	3 0	4 2	5 7	6 8	7 LJT 60
AD	ID 3	1 ✓	2 ✓	3 2	4 2	5 4	6 6	7 0
AD	ID 38	1 ✓	2 ✓	3 2	4 0	5 5	6 11	7 10
AD	ID 36	1 ✓	2 ✓	3 3	4 6	5 6	6 6	7 0
	ID 20	1 ✓	2 ✓	3 0	4 1	5 4	6 9	7 0
AD	ID 21	1 ✓	2 ✓	3 3	4 3	5 1	6 6	7 10
AD	ID 35	1 ✓	2 ✓	3 5	4 0	5 6	6 12	7 8
AD	ID 26	1 ✓	2 ✓	3 3	4 6	5 6	6 8	7 LJT 90
AD	ID 18	1 ✓	2 ✓	3 4	4 0	5 6	6 11	7 13
	ID 13	1 ✓	2 ✓	3 4	4 0	5 8	6 12	7 10
AD	ID 29	1 ✓	2 ✓	3 3	4 6	5 8	6 9	7 0
AD	ID 5	1 ✓	2 ✓	3 5	4 0	5 5	6 11	7 9
AD	ID 37	1 ✓	2 ✓	3 4	4 7	5 10	6 8	7 LJT 90
AD	ID 25	1 ✓	2 ✓	3 4	4 6	5 6	6 10	7 0
	ID 7	1 ✓	2 ✓	3 0	4 2	5 6	6 8	7 0

Comments:

Cup ID	Sample Concentration	Day 0	Initials LJT	Time 1530
1–10:	6.25	1	LJT	1400
11–20:	12.5	2	LJT	1510
21–30:	25	3	MLS	1510
31–40:	50	4	MAR	1450
41–50:	100	5	MAR	1410
51–60:		6	LJT	1800
		7	LJT	1710

Test 1c

[illegible]
CC EC02
11/1/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25	24.8	24.5	24.8	24.5	25.1	25.0	25.5	25.2	25.4	25.2	25.0	25.0	25.3		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.6															
6.25	8.6	8.5	8.5	8.5	8.5	8.0	8.6	7.9	8.4	8.1	8.4	8.1	8.3	8.2		
12.5	8.6	8.5	8.5	8.4	8.5	8.6	8.5	7.9	8.4	8.2	8.4	8.1	8.3	8.2		
25	8.6	8.5	8.5	8.4	8.5	7.9	8.4	7.9	8.4	8.2	8.5	8.2	8.4	8.2		
50	8.7	8.4	8.5	8.3	8.5	7.9	8.4	7.9	8.5	8.3	8.5	8.2	8.4	8.2		
100	8.7	8.4	8.5	8.3	8.5	8.0	9.1	7.9	8.6	8.3	8.5	8.2	8.5	8.1		

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control																
6.25	8.07	8.08	8.50	8.47	8.49	8.31	8.40	8.27	8.37	8.36	8.37	8.36	8.49	8.32		
12.5	8.42	8.06	8.50	8.48	8.48	8.30	8.39	8.29	8.43	8.36	8.35	8.36	8.48	8.31		
25	8.05	8.07	8.45	8.49	8.46	8.28	8.33	8.29	8.42	8.36	8.33	8.34	8.48	8.32		
50	8.35	8.08	8.40	8.56	8.34	8.30	8.21	8.30	8.33	8.36	8.27	8.38	8.48	8.32		
100	8.18	8.11	8.20	8.46	8.21	8.31	7.99	8.35	8.20	8.34	8.24	8.43	8.46	8.34		

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control																
6.25	588	595	706	684	594	8[illegible]	[illegible]	597	626	614	618	580	724	706		
12.5	589	505	718	587	664	728	603	1022	630	647	643	626	736	750		
25	643	648	749	770	703	710	605	1062	678	694	694	692	606	805		
50	740	778	826	756	801	771	581	657	762	782	782	795	737	883		
100	899	1005	971	941	992	726	978	961	954	944	986	964	1050	1058		

f93506-cd15
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Chi-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	4.020	14.520	22.920	14.520	4.020
OBSERVED	2	16	25	13	4

Calculated Chi-Square goodness of fit test statistic = 1.5139
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-cd15
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 8.20
Closest, conservative, Table H statistic = 12.1 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 9
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 9.00

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).

TITLE: f93506-cd15
LE: S:\TOXLAB\TOXSTAT\F93506-C.
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	23.0000	23.0000
1	Control	2	16.0000	16.0000
1	Control	3	28.0000	28.0000
1	Control	4	25.0000	25.0000
1	Control	5	14.0000	14.0000
1	Control	6	17.0000	17.0000
1	Control	7	15.0000	15.0000
1	Control	8	17.0000	17.0000
1	Control	9	17.0000	17.0000
1	Control	10	15.0000	15.0000
2	6.25%	1	8.0000	8.0000
2	6.25%	2	36.0000	36.0000
2	6.25%	3	14.0000	14.0000
2	6.25%	4	23.0000	23.0000
2	6.25%	5	30.0000	30.0000
2	6.25%	6	30.0000	30.0000
2	6.25%	7	16.0000	16.0000
2	6.25%	8	25.0000	25.0000
2	6.25%	9	21.0000	21.0000
2	6.25%	10	21.0000	21.0000
3	12.5%	1	24.0000	24.0000
3	12.5%	2	17.0000	17.0000
3	12.5%	3	34.0000	34.0000
3	12.5%	4	13.0000	13.0000
3	12.5%	5	21.0000	21.0000
3	12.5%	6	29.0000	29.0000
3	12.5%	7	27.0000	27.0000
3	12.5%	8	34.0000	34.0000
3	12.5%	9	25.0000	25.0000
3	12.5%	10	14.0000	14.0000
4	25%	1	23.0000	23.0000
4	25%	2	25.0000	25.0000
4	25%	3	22.0000	22.0000
4	25%	4	31.0000	31.0000
4	25%	5	26.0000	26.0000
4	25%	6	23.0000	23.0000
4	25%	7	29.0000	29.0000
4	25%	8	28.0000	28.0000
4	25%	9	26.0000	26.0000
4	25%	10	28.0000	28.0000
5	50%	1	14.0000	14.0000
5	50%	2	33.0000	33.0000
5	50%	3	33.0000	33.0000
5	50%	4	29.0000	29.0000
5	50%	5	31.0000	31.0000
5	50%	6	21.0000	21.0000
5	50%	7	29.0000	29.0000
5	50%	8	28.0000	28.0000
5	50%	9	30.0000	30.0000
5	50%	10	27.0000	27.0000

6	100%	1	17.0000	17.0000
6	100%	2	12.0000	12.0000
6	100%	3	11.0000	11.0000
6	100%	4	29.0000	29.0000
6	100%	5	18.0000	18.0000
6	100%	6	12.0000	12.0000
6	100%	7	19.0000	19.0000
6	100%	8	18.0000	18.0000
6	100%	9	18.0000	18.0000
6	100%	10	16.0000	16.0000

f93506-cd15
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	10	14.000	28.000	18.700
2	6.25%	10	8.000	36.000	22.400
3	12.5%	10	13.000	34.000	23.800
4	25%	10	22.000	31.000	26.100
5	50%	10	14.000	33.000	27.500
6	100%	10	11.000	29.000	17.000

f93506-cd15
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	23.344	4.832	1.528
2	6.25%	70.044	8.369	2.647
3	12.5%	57.067	7.554	2.389
4	25%	8.544	2.923	0.924
5	50%	34.278	5.855	1.851
6	100%	26.444	5.142	1.626

f93506-cd15
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	843.083	168.617	4.605
Within (Error)	54	1977.500	36.620	

Total	59	2820.583

Critical F value = 2.45 (0.05,5,40)
Since F > Critical F REJECT Ho:All groups equal

f93506-cd15
File: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	18.700	18.700		
2	6.25%	22.400	22.400	-1.367	
3	12.5%	23.800	23.800	-1.884	
4	25%	26.100	26.100	-2.734	
5	50%	27.500	27.500	-3.252	
6	100%	17.000	17.000	0.628	

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=40,5)

f93506-cd15
ile: S:\TOXLAB\TOXSTAT\F93506-C. Transform: NO TRANSFORMATION

DUNNETTS 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	Control	10			
2	6.25%	10	6.252	33.4	-3.700
3	12.5%	10	6.252	33.4	-5.100
4	25%	10	6.252	33.4	-7.400
5	50%	10	6.252	33.4	-8.800
6	100%	10	6.252	33.4	1.700

1 of 1

FATHEAD MINNOW SURVIVAL AND GROWTH 7–DAY CHRONIC TOXICITY TEST

Log No. 526

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
SAMPLE TYPE: CC-ECO2
DILUTION WATER:

PERSON CONDUCTING TEST:
BEGINNING: ____hrs; 11/1/94
ENDING: ____hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
6.25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
12.5	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
25	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	9	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
50	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	9, accident	9
								11/2/94	11/8/94
	TIME:		1815	1530	1430	1245	13:40	7:15	15:15
	INITIAL:	LJT	mm	mm	mm	mm	MAR	RKK	RKK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
6.25	A		1.11443	1.12339		10	
	B		1.12052	1.12965		10	
	C		1.12308	1.13201		10	
	D		1.11201	1.11836		10	
12.5	A		1.11471	1.12454		10	
	B		1.11103	1.11831		10	
	C		1.09318	1.10072		10	
	D		1.09665	1.10557		10	
25	A		1.09878	1.10772		10	
	B		1.12644	1.11425		9	
	C		1.11895	1.12755		10	
	D		1.10227	1.11089		10	
50	A		1.12203	1.12865		10	
	B		1.10483	1.11317		10	
	C		1.11112	1.11961		10	
	D		1.09924	1.10646		9	
						10	
						10	

orange [illegible]

TEST 10

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 326

JOB NO.
INDUSTRY:
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
SAMPLE TYPE: CC-EC02
DILUTION WATER:

PERSON CONDUCTING TEST:
BEGINNING: ____hrs; 10/1/94
ENDING: ____hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
100	A	10	10	10	10	10	10	9 ~~10~~*	9
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
	TIME:		1815	1530	1430	1245	13:40	1740	15:00
	INITIAL:	CJT	mm	mm	mm	mm	MAR	RXK	RXK

GROWTH RESULTS

CONC (%)	REP ID	Boat ID Rusty	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
100	A	1.12730	1.12732	1.12725		9	
	B	1.12344	1.11714	1.12335		10	
	C	1.11516	1.10890	1.11508		10	
	D	1.10679	1.10052	1.10674		10	

* 1 fish accidentally spilled

Tinker AFB Test # 15 TEST START DATE Nov 1, 94

SAMPLE ID CC-EC01 DATE COLLECTED

conc	rep	tare (g)	full boat (g)	tot fish	# of fish	mg dry wt/fish
cont	A	1.11765	1.12624	0.00859	10	0.86
	B	1.11428	1.12293	0.00865	10	0.87
	C	1.11232	1.12045	0.00813	10	0.81
	D	1.10291	1.10964	0.00673	10	0.67
6.25%	A	1.11443	1.12339	0.00896	10	0.90
	B	1.12052	1.12965	0.00913	10	0.91
	C	1.12308	1.13201	0.00893	10	0.89
	D	1.11201	1.11836	0.00635	10	0.64
12.50%	A	1.11471	1.12454	0.00983	10	0.98
	B	1.11103	1.11831	0.00728	10	0.73
	C	1.09318	1.10072	0.00754	10	0.75
	D	1.09665	1.10507	0.00842	10	0.84
25%	A	1.09878	1.10697	0.00819	10	0.82
	B	1.10644	1.11425	0.00781	9	0.87
	C	1.11895	1.12755	0.0086	10	0.86
	D	1.10327	1.11089	0.00762	10	0.76
50%	A	1.12203	1.12865	0.00662	10	0.66
	B	1.10483	1.11217	0.00734	10	0.73
	C	1.11312	1.11961	0.00649	10	0.65
	D	1.09929	1.10646	0.00717	9	0.80
100%	A	1.12132	1.12725	0.00593	9	0.66
	B	1.11714	1.12335	0.00621	10	0.62
	C	1.1089	1.11508	0.00618	10	0.62
	D	1.10052	1.10674	0.00622	10	0.62

Test 1.

Log # 226
Pimpinelas
CC-ECO2
11/1/94

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	25	25.5	25.2	24.5	24.2	25.0	25.3	25.3	25.2	25.2	25.0	25.0	25.0	25.3		
6.25																
12.5																
25																
50																
100																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.6															
6.25	8.6	7.5	8.7	8.3	8.7	8.3	8.3	7.5	8.4	7.3	8.4	8.0	8.3	~~8.4~~ 8.0	~~8.0~~	
12.5	8.6	7.5	8.6	8.2	8.7	8.2	8.2	7.5	8.4	7.4	8.5	7.5	8.4	8.0		
25	8.5	7.6	8.6	8.3	8.6	8.1	8.2	7.6	8.4	7.1	8.5	7.5	8.4	7.9		
50	8.6	7.6	8.6	8.3	8.6	8.1	8.3	7.6	8.5	7.1	8.5	7.6	8.5	7.7		
100	8.6	7.6	8.7	8.3	8.6	8.0	9.0	7.6	8.5	7.1	8.6	7.5	8.5	7.7		

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control																
6.25	8.64	8.46	8.63	8.52	8.57	8.23	8.18	8.39	8.54	8.34	8.52	8.32	8.60	8.41		
12.3	8.65	8.44	8.62	8.51	8.58	8.35	8.19	8.38	8.54	8.28	8.51	8.29	8.61	8.37		
25	8.60	8.41	8.59	8.48	8.54	8.35	8.18	8.39	8.52	8.25	8.48	8.30	8.59	8.38		
50	8.49	8.36	8.51	8.47	8.47	8.33	8.19	8.32	8.38	8.24	8.43	8.29	8.54	8.38		
100	8.29	8.28	8.36	8.41	8.23	8.35	8.09	8.29	8.27	8.22	8.32	8.26	8.47	8.32		

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control																
6.25	418	473	450	452	496	381	422	463	434	466	448	462	414	492		
12.5	442	486	449	472	445	432	444	483	443	497	448	486	472	511		
25	514	560	590	547	516	553	520	520	518	570	519	564	496	598		
50	667	703	700	753	688	733	675	738	676	681	659	704	660	766		
100	993	1032	1012	1105	1003	1083	936	1081	987	972	930	1022	1017	1096		

f93506-fm15
File: S:\TOXLAB\TOXSTAT\F93506-F. Transform: NO TRANSFORMATION

Chi-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	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	7	9	8	0

Calculated Chi-Square goodness of fit test statistic = 4.2910
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

f93506-fm15
File: S:\TOXLAB\TOXSTAT\F93506-F. Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 42.42
Closest, conservative, Table H statistic = 184.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 3
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 3.00

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).

TITLE: f93506-fm15
LE: S:\TOXLAB\TOXSTAT\F93506-F.
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.8600	0.8600
1	Control	2	0.8700	0.8700
1	Control	3	0.8100	0.8100
1	Control	4	0.6700	0.6700
2	6.25%	1	0.9000	0.9000
2	6.25%	2	0.9100	0.9100
2	6.25%	3	0.8900	0.8900
2	6.25%	4	0.6400	0.6400
3	12.5%	1	0.9800	0.9800
3	12.5%	2	0.7300	0.7300
3	12.5%	3	0.7500	0.7500
3	12.5%	4	0.8400	0.8400
4	25%	1	0.8200	0.8200
4	25%	2	0.8700	0.8700
4	25%	3	0.8600	0.8600
4	25%	4	0.7600	0.7600
5	50%	1	0.6600	0.6600
5	50%	2	0.7300	0.7300
5	50%	3	0.6500	0.6500
5	50%	4	0.8000	0.8000
6	100%	1	0.6600	0.6600
6	100%	2	0.6200	0.6200
6	100%	3	0.6200	0.6200
6	100%	4	0.6200	0.6200

f93506-fm15
File: S:\TOXLAB\TOXSTAT\F93506-F. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.670	0.870	0.803
2	6.25%	4	0.640	0.910	0.835
3	12.5%	4	0.730	0.980	0.825
4	25%	4	0.760	0.870	0.828
5	50%	4	0.650	0.800	0.710
6	100%	4	0.620	0.660	0.630

)3506-fm15
File: S:\TOXLAB\TOXSTAT\F93506-F. Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.008	0.092	0.046
2	6.25%	0.017	0.130	0.065
3	12.5%	0.013	0.114	0.057
4	25%	0.002	0.050	0.025
5	50%	0.005	0.070	0.035
6	100%	0.000	0.020	0.010

f93506-fm15
File: S:\TOXLAB\TOXSTAT\F93506-F. Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.139	0.028	3.500
Within (Error)	18	0.139	0.008	
Total	23	0.278		

Critical F value = 2.77 (0.05,5,18)
Since F > Critical F REJECT Ho:All groups equal

f93506-fm15
File: S:\TOXLAB\TOXSTAT\F93506-F. Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.803	0.803		
2	6.25%	0.835	0.835	-0.514	
3	12.5%	0.825	0.825	-0.356	
4	25%	0.828	0.828	-0.395	
5	50%	0.710	0.710	1.463	
6	100%	0.630	0.630	2.727	*

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

f93506-fm15
File: S:\TOXLAB\TOXSTAT\F93506-F. Transform: NO TRANSFORMATION

DUNNETTS 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	Control	4			
2	6.25%	4	0.152	19.0	-0.032
3	12.5%	4	0.152	19.0	-0.022
4	25%	4	0.152	19.0	-0.025
5	50%	4	0.152	19.0	0.093
6	100%	4	0.152	19.0	0.173

№ 1405

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: TOX Test	REMARKS
CC-EC02TX001	10/28/94	0900	water	3	✓	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/28/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
		Lya Teer	10/29/94 0920	3°C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

№ 17

CHAIN OF CUSTODY RECORD

JOB #	PROJECT NAME
F93506	Tinker AFB

SAMPLERS: (Signature)

WOODWARD-CLYDE CONSULTANTS
P.O. BOX 680925
FRANKLIN, TN 37068-0925
(615) 790-0003 FAX (615) 790-0023

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	NUMBER OF CONTAINERS	ANALYSES REQUIRED: TCLP Lead	REMARKS
CC ECO2 TX001	10/28/94	0900	water	2	✓	
CC ECO2 TX001	10/28/94	0930	Soil	2	✓	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	10/28/94 1800				
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED AT LAB BY: (Signature)	DATE/TIME	GENERAL COMMENTS	
			10/29/94 0920	3 °C upon arrival	

Distribution: Original and Yellow copies accompany sample shipment to laboratory
Pink copy retained by samplers. Yellow copy retained by laboratory. Laboratory returns White copy to samplers.

Sulfide for Tinker

CC -

Spaatz - 0.061 mg/L

Rawlings - 0.048

EC -

179 ~ 0.080

149 - 0.029

TOXICITY TEST RESULTS - TINKER AFB REFERENCE STREAM EVALUATIONS

Surface Water Toxicity Results

Chronic toxicity screens were performed using the fathead minnow (*Pimephales promelas*) and *Ceriodaphnia dubia*. A total of four surface water samples were tested and compared to laboratory control water. These samples included two water samples collected from Elm Creek, at the intersection of highway 149 and Elm Creek as well as a sample collected at the intersection of highway 179 and Elm Creek. Two samples were collected from Crutcho Creek, one was collected at the intersection of Rawlings and the creek while the other was collected at the intersection of Spaatz Road and Crutcho Creek.

No significant toxicological effects were detected in either species exposed to any of the surface water samples when compared to control. There was no observed effect on either the survival or growth in fathead minnows or in the survival and/or reproduction of *C. dubia*. Nor was there anything of significance regarding the measured water quality parameters of the water samples received at the testing laboratory.

Sediment Toxicity Results

Short term (10-day) toxicity testing was performed with the amphipod *Hyalella azteca* to evaluate the potential effects of sediment samples collected from Elm Creek and Crutcho Creek. The sampling locations of the sediment samples were the same as that for the surface water samples (see above). A total of six replicates of each sediment sample was set-up. Three were to be sampled after ten days of exposure and the remaining three to be sampled after 28-days of exposure. Based on the results obtained at ten days, the remaining three replicates were sampled on exposure day 11.

The results obtained from those replicates terminated on day 10 revealed a significant decrease in the survival of *H. azteca* exposed to both sediment samples collected from Elm Creek. The probability of the results being due to random chance was evaluated with Fisher's Exact test. The probabilities obtained for the results observed within the Elm Creek samples was 9.6×10^{-4} and 0.016 for Elm Creek sediments collected at highway 149 and 179 respectively. Considering a probability of 0.05 or less as statistically significant, both samples are significantly less than

control. The results obtained from the sediment samples collected from Crutcho Creek produced probabilities of 0.15 and 0.26 for sediment collected at Rawlings and Spaatz respectively. Neither of these probabilities could be considered significant.

Of the replicates sampled for animals exposed to Crutcho Creek sediment collected from the area of Rawlings, one produced a survival of only 20% while the other two replicates revealed 100% and 80% survival rates. It was postulated that the one replicate was an outlier. To assess this and to assure that the results obtained for Elm Creek were significant, the remaining replicates were sampled the following day, exposure day 11.

The replicates of sediment collected from Crutcho Creek at Rawlings revealed an average survival rate of 76.7% with no replicate showing a comparable survival rate to the suspected outlier observed on exposure day 10. Dixon's test for outliers was employed using all six replicates of Crutcho Creek sediment collected at Rawlings. That replicate showing a 20% survival rate was found to be an outlier.

Removing the outlying replicate for the sediment collected from Crutcho Creek and analyzing the data from 10 days and 11 days, the resultant probability that the survival rate is different when compared to control is 0.353. The analysis of all six replicates of the sediment collected from Crutcho Creek at Spaatz revealed a probability of 0.076 that the responses observed were due to random chance alone. Considering all six replicates of the samples collected from Elm Creek, the probabilities are 2.35×10^{-8} and 2.99×10^{-5} for the samples collected at highway 149 and 179 respectively.

Combining the samples collected from the two sites within each creek comparisons were made between the control responses and between the two creeks themselves. The resultant counts of the surviving *H. azteca* were evaluated to determine if analysis of variance (ANOVA) could be used. The data was found to be normally distributed and the variances within the test groups were not found to be heterogeneous. The ANOVA was significant at the 0.05 alpha level. The Bonferroni modified T-test showed that both Elm Creek and Crutcho Creek survival was less than that of the control as did the Williams isotonic regression model test. Two multiple comparison methods, the Tukey method and the Dunn's method, showed that while the survival within the Elm Creek samples was less than that of control the survival within the Crutcho Creek samples was not. The comparison between Crutcho Creek results and Elm Creek results showed

that Crutcho Creek exhibited a significantly greater survival.

Analysis of the overlying water within the sediment samples received at the testing laboratory are not overly enlightening considering the apparent toxicity associated with the samples. Ammonia was not detected in the overlying water of the sediments nor during the exposures. Sulfides were detected in all overlying water samples but the distribution of the concentrations does not match that of the toxicity observed. The only another feature of the water quality analysis that is noteworthy is that of the low dissolved oxygen measurements within the overlying water during the exposures in the Crutcho Creek-Rawlings replicates.

The conclusion of the reported studies is that Crutcho Creek is a superior reference stream over Elm Creek. This conclusion is based on the *Hyalella azteca* bulk sediment toxicity results. There was no observed effects based on the surface water toxicity assessments.

SURFACE WATER SAMPLES WATER QUALITY MEASUREMENTS				
Parameter	Elm Creek at Hy 149	Elm Creek at Hy 179	Crutcho Creek at Rawlings	Crutcho Creek at Spaatz
Dissolved O_2 (mg/L)	8.1	8.2	8.2	8.2
pH	7.66	8.38	8.29	8.32
Hardness as mg $CaCO_3$/L	200	290	250	250
Alkalinity as mg $CaCO_3$/L	220	250	210	220
Sulfides (mg/L)	0.029	0.080	0.048	0.061
Specific Conductivity μmhos/cm	436	553	780	781

ND = Nondetect (electrode detection limit approximately 0.01 mg/L)

CERIODAPHNID TEST RESULTS REFENCE STREAM EVALUATION			
Test Group	Percent Survival	Average # Young	Range in # of Young
Control	100%	13.0	2-20
Elm Creek at Hy. 149	90%	12.1	1-22
Elm Creek at Hy. 179	100%	14.4	2-23
Crutcho Creek at Rawlings	100%	16.0	8-20
Crutcho Creek at Spaatz	90%	15.3	0-20

FATHEAD MINNOW TEST RESULTS REFENCE STREAM EVALUATION			
Test Group	Percent Survival	Average Dry Weight (mg/individual)	Range in dry Weight
Control	90%	0.545	0.493-0.591
Elm Creek at Hy. 149	90%	0.606	0.484-0.707
Elm Creek at Hy. 179	100%	1.04	0.850-1.18
Crutcho Creek at Rawlings	96.7%	1.34	0.555-1.78
Crutcho Creek at Spaatz	100%	2.58	2.03-2.93

OVERLYING WATER ANALYSIS SEDIMENT SAMPLES				
Parameter	Elm Creek at Hy 149	Elm Creek at Hy 179	Crutcho Creek at Rawlings	Crutcho Creek at Spaatz
Dissolved O_2 (mg/L)	5.2	7.5	4.2	3.8
pH	7.90	8.02	7.74	7.82
Total Ammonia	ND	ND	ND	ND
Hardness as mg $CaCO_3$/L	200	310	420	320
Alkalinity as mg $CaCO_3$/L	270	330	370	320
Sulfides (mg/L)	0.249	0.057	0.212	0.196
Specific Conductivity μmhos/cm	455	618	933	878

ND = Nondetect (electrode detection limit approximately 0.01 mg/L)

SURVIVAL COUNTS SEDIMENT TEST EACH REPLICATE WAS STARTED WITH TEN ORGANISMS						
	COUNTS ON DAY 10			COUNTS ON DAY 11		
Test Group	Replicate A	Replicate B	Replicate C	Replicate A	Replicate B	Replicate C
Control	10	10	8	9	10	10
Elm Ck. Hy. 149	1	3	4	2	2	0
Elm Ck. Hy. 179	5	3	6	1	5	4
Crutcho Rawlings	8	10	2[a]	9	7	7
Crutcho Spaatz	7	6	9	8	8	6

[a]Value determined to be an outlier.

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: G M Start Date: 3/17/95 Sample ID: Tinker Log #: 36

AD	ID	1	AD	ID	1	AD	ID	1	AD	ID	1		ID	1
2	3	4	2	3	4	2	3	4	2	3	4	2	3	4
5	6	7	5	6	7	5	6	7	5	6	7	5	6	7
AD	ID 4	1 ✓	AD	ID 39	1 ✓	AD	ID 28	1 ✓	AD	ID 46	1 ✓		ID 35	1 ✓
2 —	3 ✓	4 ✓	2 —	3 ✓	4 ✓	2 —	3 ✓	4 ✓	2 —	3 ✓	4 3	2 —	3 —	4 ✓
5 3	6 6	7 6	5 2	6 2	7 10	5 2	6 ✓	7 6	5 3	6 ✓	7 8	5 3	6 2	7 11
AD	ID 34	1 ✓	AD	ID 47	1 ✓	AD	ID 20	1 ✓	AD	ID 21	1 ✓		ID 10	1 —
2 —	3 ✓	4 ✓	2 —	3 ✓	4 ✓	2 —	3 ✓	4 2	2 —	3 —	4 2	2 —	3 ✓	4 ✓
5 2	6 8	7 8	5 2	6 7	7 6	5 2	6 2	7 9	5 ✓	6 6	7 9	5 3	6 5	7 0
AD	ID 11	1 ✓	AD	ID 42	1 ✓	AD	ID 3	1 ✓	AD	ID 36	1 ✓		ID 27	1 ✓
2 —	3 ✓	4 ✓	2 —	3 ✓	4 ✓	2 —	3 ✓	4 2	2 —	3 ✓	4 ✓	2 —	3 ✓	4 3
5 3	6 9	7 10	5 2	6 7	7 8	5 4	6 6	7 8	5 3	6 5	7 8	5 ✓	6 6	7 9
AD	ID 19	1 ✓	AD	ID 29	1 ✓	AD	ID 40	1 ✓	AD	ID 7	1 ✓		ID 13	1 ✓
2 —	3 ✓	4 ✓	2 —	3 ✓	4 ✓	2 —	3 ✓	4 ✓	2 —	3 ✓	4 ✓	2 —	3 ✓	4 ✓
5 4	6 7	7 ~~7~~ MM	5 3	6 6	7 9	5 4	6 8	7 8	5 4	6 8	7 5	5 1	6 2	7 3
AD	ID 6	1 ✓	AD	ID 12	1 ✓	AD	ID 22	1 ✓	AD	ID 41	1 ✓		ID 33	1 ✓
2 —	3 ✓	4 ✓	2 —	3 —	4 1	2 —	3 ✓	4 3	2 —	3 ✓	4 ✓	2 —	3 ✓	4 ✓
5 ✓	6 7	7 10	5 D	6	7	5 4	6 4	7 ~~0~~ MM 1	5 4	6 10	7 9	5 3	6 7	7 8

Comments:

Cup ID	Sample Concentration
1–10:	Control
11–20:	Elm Creek @ 149
21–30:	Crustene Creek at Rawlings
31–40:	Crustene Creek @ Spangler
41–50:	Elm Creek @ 179
51–60:	

Day	Initials LJT	Time
1	LJT	1130
2	MM	1720
3	LJT	1330
4	LJT	1530
5	MM	1720
6	MM	1715
7	MLS	1600

Ceriodaphnia dubia GRID Ceriodaphnia dubia GRID MONITORING DATA

Grid Letter: ~~W~~ Ø ~~W~~ Ø ~~W~~ O Start Date: 3/17/95 Sample ID: Tinker Log #: 36

AD	ID	1	AD	ID	1	AD	ID	1	AD	ID	1		ID	1
2	3	4	2	3	4	2	3	4	2	3	4	2	3	4
5	6	7	5	6	7	5	6	7	5	6	7	5	6	7
AD	ID 25	1 ✓	AD	ID 32	1 ✓	AD	ID 44	1 ✓	AD	ID 17	1 ✓		ID 49	1 ✓
2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓
5 ✓	6 8	7 8	5 ✓	6 5	7 7	5 3	6 7	7 12	5 2	6 5	7 7	5 2	6 6	7 0
AD	ID 9	1 ✓	AD	ID 16	1 ✓	AD	ID 38	1 ✓	AD	ID 2	1 ✓		ID 26	1 ✓
2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓	2 4	3	4	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓
5 2	6 ✓	7 0	5 3	6 7	7 7	5	6	7	5 3	6 3	7 0	5 2	6 9	7 8
AD	ID 24	1 ✓	AD	ID 8	1 ✓	AD	ID 50	1 ✓	AD	ID 15	1 ✓		ID 48	1 ✓
2 ✓	3 ✓	4 3	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓
5 1	6 2	7 4	5 ✓	6 9	7 4	5 ✓	6 2	7 0	5 1	6 2	7 2	5 1	6 3	7 0
AD	ID 31	1 ✓	AD	ID 45	1 ✓	AD	ID 43	1 ✓	AD	ID 37	1 ✓		ID 30	1 ✓
2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 ✓
5 2	6 7	7 9	5 3	6 9	7 6	5 ✓	6 8	7 13	5 4	6 7	7 8	5 3	6 9	7 8
AD	ID 1	1 ✓	AD	ID 14	1 ✓	AD	ID 23	1 ✓	AD	ID 18	1 ✓		ID 5	1 ✓
2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 2	2 ✓	3 ✓	4 ✓	2 ✓	3 ✓	4 4	2 ✓	3 ✓	4 2
5 ✓	6 8	7 10	5 ✓	6 ✓	7 2	5 4	6 9	7 7	5 3	6 ✓	7 12	5 3	6 1	7 8

Comments:

Cup ID	Sample Concentration	Day Ø	Initials LJT	Time
1–10:	Control	1	LJT	1130
11–20:	Elm Creek @ 149	2	MAR	1220
21–30:	Crutcho Creek at Rawlings	3	LJT	1330
31–40:	Crutcho Creek at Spaatz	4	LJT	1530
41–50:	Elm Creek @ 179	5	MM	1715
51–60:		6	MM	1705
		7	MAR	1700

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

JOB NO: F93504 | BEGINNING: _____ hrs; 2/17/95 | Log No. 362
INDUSTRY: Tinker | ENDING: _____ hrs; / / | PHOTOPERIOD: 16 light, 8 dark
CONTACT: | FEEDING REGIME: | ORGANISM SOURCE: WCC
EFFLUENT: | .05 mL yct/15 mL | TEST VESSEL CAPACITY: 30 mL
NPDES PERMIT NO: | .05 mL algal suspension/15 mL | TEST SOLUTION VOLUME: 15mL
PERSON CONDUCTING TEST: | | NO. REPLICATES:
| | DILUTION WATER:

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	
	TIME									
	OBSERVER									
Con	1							8	10	18
	2						3	3	0	6
	3					2	4	6	8	20
	4						3	6	6	15
	5					2	3	1	8	14
	6							7	10	17
	7						4	8	5	17
	8							9	4	13
	9						2	0	0	2
	10						3	5	0	8
EC149	11						3	9	10	22
	12					1	D			1
	13						1	2	3	6
	14					2	0	0	2	4
	15						1	2	2	5
	16						3	7	7	17
	17						2	5	7	14
	18					4	3	0	12	19
	19						4	7	7	18
	20					2	2	2	9	15
CC Rawling	21					2	0	6	9	17
	22					3	4	4	1	12
	23						4	9	7	20
	24					3	1	2	4	10
	25					2	0	8	8	18
	26						2	9	8	19
	27					3	0	6	9	18
	28						2	0	6	8
	29						3	6	9	18
	30						3	9	8	20

Ceriodaphnia SURVIVAL AND REPRODUCTION CHRONIC TOXICITY TEST

Log No. 362

JOB NO. F93506
INDUSTRY: Tinker
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
PERSON CONDUCTING TEST:

BEGINNING: _____ hrs; / /
ENDING: _____ hrs; / /
FEEDING REGIME:
.05 mL yct/15 mL
.05 mL algal suspension/15 mL

PHOTOPERIOD: 16 light, 8 dark
ORGANISM SOURCE: WCC
TEST VESSEL CAPACITY: 30 mL
TEST SOLUTION VOLUME: 15mL
NO. REPLICATES:
DILUTION WATER:

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
	TIME								
	OBSERVER								
CC Spaatz	31						2	7	9
	32							5	7
	33						3	7	8
	34						2	8	8
	35					2	3	2	11
	36						3	5	8
	37						4	7	8
	38			D					
	39						2	2	10
	40						4	8	8

NUMBER OF YOUNG PRODUCED

CONC	CHAMBER	START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
EC 149	41						4	10	9
	42						2	7	8
	43							8	13
	44						3	7	12
	45						3	9	6
	46					3	3	0	8
	47						2	7	6
	48						1	3	0
	49						2	6	0
	50							2	0

		START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
EC 149	9	1	10
TOTAL	19	1	20

CRITICAL FISHERS VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 9.
Since b is greater than 6 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
CC RAWLINGS	10	0	10
TOTAL	20	0	20

CRITICAL FISHERS VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 10.
Since b is greater than 6 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
CC SPAATZ	9	1	10

TOTAL	19	1	20

CRITICAL FISHERS VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 9.
Since b is greater than 6 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	NUMBER OF DEAD	TOTAL ANIMALS
CONTROL	10	0	10
EC 179	10	0	10
TOTAL	20	0	20

CRITICAL FISHERS VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 10.
Since b is greater than 6 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

SUMMARY OF FISHERS EXACT TESTS

GROUP	IDENTIFICATION	NUMBER EXPOSED	NUMBER DEAD	SIG (P=.05)
	CONTROL	10	0	
1	EC 149	10	1	
2	CC RAWLINGS	10	0	
3	CC SPAATZ	10	1	
4	EC 179	10	0	

Tinker C. dubia Crutcho and Elm Creeks - Log #362
File: 362cd Transform: NO TRANSFORMATION

Chi-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	3.350	12.100	19.100	12.100	3.350
OBSERVED	4	11	19	16	0

Calculated Chi-Square goodness of fit test statistic = 4.8337
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

Tinker C. dubia Crutcho and Elm Creeks - Log #362
File: 362cd Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance

Calculated B statistic = 3.09
Table Chi-square value = 13.28 (alpha = 0.01)
Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 9.00
Used for Chi-square table value ==> df (#groups-1) = 4

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: Tinker C. dubia Crutcho and Elm Creeks - Log #362
FILE: 362cd
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	control	1	18.0000	18.0000
1	control	2	6.0000	6.0000
1	control	3	20.0000	20.0000
1	control	4	15.0000	15.0000
1	control	5	14.0000	14.0000
1	control	6	17.0000	17.0000
1	control	7	17.0000	17.0000
1	control	8	13.0000	13.0000
1	control	9	2.0000	2.0000
1	control	10	8.0000	8.0000
2	EC 149	1	22.0000	22.0000
2	EC 149	2	1.0000	1.0000
2	EC 149	3	6.0000	6.0000
2	EC 149	4	4.0000	4.0000
2	EC 149	5	5.0000	5.0000
2	EC 149	6	17.0000	17.0000
2	EC 149	7	14.0000	14.0000
2	EC 149	8	19.0000	19.0000
2	EC 149	9	18.0000	18.0000
2	EC 149	10	15.0000	15.0000
3	CC Rawlings	1	17.0000	17.0000
3	CC Rawlings	2	12.0000	12.0000
3	CC Rawlings	3	20.0000	20.0000
3	CC Rawlings	4	10.0000	10.0000
3	CC Rawlings	5	18.0000	18.0000
3	CC Rawlings	6	19.0000	19.0000
3	CC Rawlings	7	18.0000	18.0000
3	CC Rawlings	8	8.0000	8.0000
3	CC Rawlings	9	18.0000	18.0000
3	CC Rawlings	10	20.0000	20.0000
4	CC Spaatz	1	18.0000	18.0000
4	CC Spaatz	2	12.0000	12.0000
4	CC Spaatz	3	18.0000	18.0000
4	CC Spaatz	4	18.0000	18.0000
4	CC Spaatz	5	18.0000	18.0000
4	CC Spaatz	6	16.0000	16.0000
4	CC Spaatz	7	19.0000	19.0000
4	CC Spaatz	8	0.0000	0.0000
4	CC Spaatz	9	14.0000	14.0000
4	CC Spaatz	10	20.0000	20.0000
5	EC 179	1	23.0000	23.0000
5	EC 179	2	17.0000	17.0000
5	EC 179	3	21.0000	21.0000
5	EC 179	4	22.0000	22.0000
5	EC 179	5	18.0000	18.0000
5	EC 179	6	14.0000	14.0000
5	EC 179	7	15.0000	15.0000
5	EC 179	8	4.0000	4.0000
5	EC 179	9	8.0000	8.0000
5	EC 179	10	2.0000	2.0000

Tinker C. dubia Crutcho and Elm Creeks - Log #362
'ile: 362cd Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	control	10	2.000	20.000	13.000
2	EC 149	10	1.000	22.000	12.100
3	CC Rawlings	10	8.000	20.000	16.000
4	CC Spaatz	10	0.000	20.000	15.300
5	EC 179	10	2.000	23.000	14.400

Tinker C. dubia Crutcho and Elm Creeks - Log #362
File: 362cd Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	control	34.000	5.831	1.844
2	EC 149	54.767	7.400	2.340
3	CC Rawlings	18.889	4.346	1.374
4	CC Spaatz	34.678	5.889	1.862
5	EC 179	55.378	7.442	2.353

Tinker C. dubia Crutcho and Elm Creeks - Log #362
File: 362cd Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	103.320	25.830	0.653
Within (Error)	45	1779.400	39.542	
Total	49	1882.720		

Critical F value = 2.61 (0.05,4,40)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

Tinker C. dubia Crutcho and Elm Creeks - Log #362
File: 362cd Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	13.000	13.000		
2	EC 149	12.100	12.100	0.320	
3	CC Rawlings	16.000	16.000	-1.067	
4	CC Spaatz	15.300	15.300	-0.818	
5	EC 179	14.400	14.400	-0.498	

Dunnett table value = 2.23 (1 Tailed Value, P=0.05, df=40,4)

Tinker C. dubia Crutcho and Elm Creeks - Log #362
File: 362cd Transform: NO TRANSFORMATION

DUNNETTS 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	control	10			
2	EC 149	10	6.271	48.2	0.900
3	CC Rawlings	10	6.271	48.2	-3.000
4	CC Spaatz	10	6.271	48.2	-2.300
5	EC 179	10	6.271	48.2	-1.400

fatheads					
fathead minnows					
1.11364	1.11758	3.94	8	0.4925	0.54487
1.10459	1.10955	4.96	9	0.551111	
1.12353	1.12944	5.91	10	0.591	
1.12784	1.1342	6.36	9	0.706667	0.606472
1.11439	1.11826	3.87	8	0.48375	
1.12953	1.13582	6.29	10	0.629	
1.11944	1.12499	5.55	10	0.555	1.335111
1.08958	1.10625	16.67	10	1.667	
1.13826	1.15431	16.05	9	1.783333	
1.09275	1.12065	27.9	10	2.79	2.583333
1.11398	1.14332	29.34	10	2.934	
1.11586	1.13612	20.26	10	2.026	
1.10738	1.11588	8.5	10	0.85	1.041574
1.09422	1.10486	10.64	9	1.182222	
1.10976	1.1185	8.74	8	1.0925	

FATHEAD MINNOW SURVIVAL AND GROWTH
7-DAY CHRONIC TOXICITY TEST

Log No. 341

JOB NO. F93506 T3
INDUSTRY: Tinker
CONTACT:
EFFLUENT:
NPDES PERMIT NO:
SAMPLE TYPE:
DILUTION WATER: Spring

PERSON CONDUCTING TEST:
BEGINNING: 1620 hrs; 3/17/95
ENDING: ____ hrs; / / .
TEST
DILUTIONS:
AGE:
ORGANISM SOURCE:

PHOTOPERIOD: 16 hr light
FEEDING REGIME:
0.1 ml Artemia @ 3times/day
TEST VESSEL CAPACITY: 1 liter
TEST SOLUTION VOLUME: 500 mL
NO. ORGANISMS/TREATMENT: 10
NO. REPLICATES: 3 4

CONC (%)	REP ID	SURVIVAL (#) START	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Con	A	10	9	9	① 9	8	8	8	8
	B	10	9	9	① 9	9	9	9	9
	C	10	10	10	① 10	① 10	10	10	10
EC 149	A	10	9	9	9	9	9	9	9
	B	10	10	10	10	9	9	8	8
	C	10	10	10	10	10	10	10	10
CC RAW	A	10	10	10	10	10	10	10	10
	B	10	10	10	② 10	~~9~~ 9	10	10	10
	C	10	10	10	10	10	10	9	9
CC SPARTA	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	8	8	8	10	10	10	10
EC 179	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	9
	C	10	10	10	10	10	10	9	8
TIME:		MAR	MAR	MAR	1415	1610	1555	1630	1345
INITIAL:		1620	1515	1720	LJT	LJT	mm	mm	mm

GROWTH RESULTS

CONC (%)	REP ID	Boat ID	Tare wt (g)	Combined wt (g)	Tot Fish wt (g)	# of Fish	Avg Fish wt (mg)
Con	A		1.11344	1.11758			
	B		1.10454	1.10955			
	C		1.12353	1.12944			
149	A		1.12784	1.13420			
	B		1.11439	1.11826			
	C		1.12953	1.13582			
Raw	A		1.11944	1.12499			
	B		1.08458	1.10625			
	C		1.13826	1.15431			
Sparta	A		1.09275	1.12065			
	B		1.11398	1.14352			
	C		1.11686	1.13612			
179	~~179~~ A		1.10738	1.11588			
	B		1.04422	1.10486			
	C		1.10976	1.11850			

① One fish smaller than others.

② Two smaller fish

361
C. dubia
Tinker

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
H. Control	25.2															
EC 149																
CC Rawing																
CC Sqaute																
EC 179																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
H Control	8.1	6.8		7.5		8.1		8.0		7.9		8.9		8.4		
EC149	8.1	6.8		7.5		8.0		8.0		7.9		8.1		8.4		
CC Rawing	8.2	7.0		7.6		8.0		8.0		7.8		8.0		8.4		
CC Sqaute	8.2	7.2		7.7		8.1		8.0		7.6		8.0		8.4		
EC 179	8.2	7.3		7.5		8.1		8.0		7.6		8.0		8.5		

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
H Control	7.65	7.80		7.52		7.82		7.73		7.78				7.62		
EC 149	7.66	8.18		8.35		8.78		8.83		8.76		8.47		8.65		
CC Raw	8.21	8.15		8.42		8.72		8.79		8.78		8.61		8.67		
CC Sqaute	8.32	8.20		8.51		8.75		8.83		8.80		8.55		8.60		
EC 179	8.38	8.26		8.31		8.82		8.89		8.88		8.69		8.78		

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
H. Control	1077	450		657		737		707		725		524		594		
149	436	410		398		450		456		422		624		409		
Raw	780	760		518		730		765		743		400		588		
Sqaute	781	816		494		814		686		885		686		812		
179	553	562		707		560		581		622		659		566		

Log # 61/362
Job #
Client: Tinker
fish + C. dubia

CHRONIC TOXICITY TEST DATA SHEET

TEMPERATURE

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	24.8															
EC-149																
CC-Raw																
CC-Spratt																
EC-179																
Spring Control																

DISSOLVED OXYGEN

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	8.1	10.5	7.8	7.8	7.9	8.1	8.3		8.3		8.1		8.6			
EC-149	8.1	10.7	7.7	7.3	8.4	7.7	8.4	7.4	8.3	7.5	8.1	8.0	8.6			
CC-Raw	8.2	11.6	7.7	6.9	8.6	7.6	8.4	7.4	8.4	7.6	8.2	7.8	8.5			
CC-Spratt	8.2	10.6	7.8	6.6	8.6	7.6	8.6	7.4	8.4	7.4	8.2	7.6	8.6			
EC-179	8.2	6.6	7.9	6.4	8.7	7.8	8.5	7.4	8.4	7.5	8.2	7.5	8.6			
Spring Control	8.1	11.2	10.2	10.8	7.8	8.0	8.5	7.8	8.5	7.6	8.1		8.2			

pH

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	7.65	7.80	7.76	7.70	7.64	7.83	7.72		7.63		7.74	8.58	7.71			
EC-149	7.66	8.18	8.08	8.10	8.09	8.51	8.67	8.66	8.46	8.67	8.68	8.80	8.66			
CC-Raw	8.29	8.15	8.14	8.13	8.45	8.61	8.63	8.67	8.66	8.66	8.73	8.79	8.65			
CC-Spratt	8.32	8.21	8.17	8.07	8.21	8.45	8.64	8.61	8.68	8.61	8.73	8.80	8.75			
EC-179	8.38	8.27	8.27	8.20	8.26	8.55	8.73	8.77	8.78	8.71	8.80	8.89	8.80			
Spring Control	8.22	7.86	7.87	8.15	8.03	8.65	9.05	8.85	9.03	8.85	8.48	8.55	8.49			

CONDUCTIVITY

CONCENTRATION	Start	Day 1 OLD	Day 1 NEW	Day 2 OLD	Day 2 NEW	Day 3 OLD	Day 3 NEW	Day 4 OLD	Day 4 NEW	Day 5 OLD	Day 5 NEW	Day 6 OLD	Day 6 NEW	Day 7 OLD	Day 7 NEW	Day 8 OLD
Control	677	650	636	647	642	737	657		678		626	751	701			
EC-149	436	710	715	485	550	502	434	499	426	501	449	721	445			
CC-Raw	781	766	685	830	592	812	750	804	748	812	717	802	797			
CC-Spratt	781	802	597	878	695	874	850	813	840	811	832	868	815			
EC-179	553	824	562	587	445	650	555	587	570	586	535	601	557			
Spring Control	713	440	393	446	678	736	716	672	753	670	301	580	584			

	HRD	AIK	Sulfide (mg/L)		AIK	HRD
EC-149	200	220	0.029	Spring H_2O	160	200
CC Raw	250	210	0.048			
CC Spratt	250	220	0.061	Control	180	115

94haew03
File: 94haew03 Transform: NO TRANSFORMATION

Chi-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	0.871	3.146	4.966	3.146	0.871
OBSERVED	0	5	3	5	0

Calculated Chi-Square goodness of fit test statistic = 4.7055
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

94haew03
File: 94haew03 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 9.61
Closest, conservative, Table H statistic = 1036.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 5, df (# reps-1) = 2
Actual values ==> R (# groups) = 5, df (# avg reps-1) = 1.60
(average df used)

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).

TITLE: 94haew03
FILE: 94haew03
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.2729	0.2729
1	Control	2	0.2071	0.2071
1	Control	3	0.1556	0.1556
2	6.25	1	0.1243	0.1243
2	6.25	2	0.1122	0.1122
2	6.25	3	0.1512	0.1512
3	12.5	1	0.1111	0.1111
3	12.5	2	0.1510	0.1510
3	12.5	3	0.0900	0.0900
4	25	1	0.1044	0.1044
4	25	2	0.1756	0.1756
5	50	1	0.0875	0.0875
5	50	2	0.0000	0.0000

94haew03
File: 94haew03 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	3	0.156	0.273	0.212
2	6.25	3	0.112	0.151	0.129
3	12.5	3	0.090	0.151	0.117
4	25	2	0.104	0.176	0.140
5	50	2	0.000	0.087	0.044

94haew03
File: 94haew03 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.003	0.059	0.034
2	6.25	0.000	0.020	0.012
3	12.5	0.001	0.031	0.018
4	25	0.003	0.050	0.036
5	50	0.004	0.062	0.044

94haew03
File: 94haew03 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	0.035	0.009	4.500
Within (Error)	8	0.016	0.002	
Total	12	0.051		

Critical F value = 3.84 (0.05,4,8)
Since F > Critical F REJECT Ho:All groups equal

94haew03
File: 94haew03 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.212	0.212		
2	6.25	0.129	0.129	2.263	
3	12.5	0.117	0.117	2.588	
4	25	0.140	0.140	1.760	
5	50	0.044	0.044	4.118	*

Bonferroni T table value = 2.75 (1 Tailed Value, P=0.05, df=8,4)

94haew03
File: 94haew03 Transform: NO TRANSFORMATION

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	Control	3			
2	6.25	3	0.100	47.4	0.083
3	12.5	3	0.100	47.4	0.095
4	25	2	0.112	53.0	0.072
5	50	2	0.112	53.0	0.168

94haee01
File: 94haee01 Transform: NO TRANSFORMATION

Chi-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	1.005	3.630	5.730	3.630	1.005
OBSERVED	0	6	3	6	0

Calculated Chi-Square goodness of fit test statistic = 6.4054
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

94haee01
File: 94haee01 Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance

Calculated B statistic = 4.41
Table Chi-square value = 15.09 (alpha = 0.01)
Table Chi-square value = 11.07 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 1.50
Used for Chi-square table value ==> df (#groups-1) = 5

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: 94haee01
FILE: 94haee01
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.2729	0.2729
1	Control	2	0.2071	0.2071
1	Control	3	0.1556	0.1556
2	6.25	1	0.3967	0.3967
2	6.25	2	0.2120	0.2120
3	12.5	1	0.2329	0.2329
3	12.5	2	0.0900	0.0900
3	12.5	3	0.1057	0.1057
4	25	1	0.1657	0.1657
4	25	2	0.1243	0.1243
4	25	3	0.1033	0.1033
5	50	1	0.1271	0.1271
5	50	2	0.2322	0.2322
6	100	1	0.2825	0.2825
6	100	2	0.0000	0.0000

94haee01
File: 94haee01 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	3	0.156	0.273	0.212
2	6.25	2	0.212	0.397	0.304
3	12.5	3	0.090	0.233	0.143
4	25	3	0.103	0.166	0.131
5	50	2	0.127	0.232	0.180
6	100	2	0.000	0.282	0.141

94haee01
File: 94haee01 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.003	0.059	0.034
2	6.25	0.017	0.131	0.092
3	12.5	0.006	0.078	0.045
4	25	0.001	0.032	0.018
5	50	0.006	0.074	0.053
6	100	0.040	0.200	0.141

haee01
File: 94haee01 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.048	0.010	1.111
Within (Error)	9	0.084	0.009	
Total	14	0.132		

Critical F value = 3.48 (0.05,5,9)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

94haee01
File: 94haee01 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.212	0.212		
2	6.25	0.304	0.304	-1.068	
3	12.5	0.143	0.143	0.891	
4	25	0.131	0.131	1.043	
5	50	0.180	0.180	0.372	
6	100	0.141	0.141	0.815	

Bonferroni T table value = 2.82 (1 Tailed Value, P=0.05, df=9,5)

94haee01
File: 94haee01 Transform: NO TRANSFORMATION

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	Control	3			
2	6.25	2	0.244	115.4	-0.092
3	12.5	3	0.219	103.2	0.069
4	25	3	0.219	103.2	0.081
5	50	2	0.244	115.4	0.032
6	100	2	0.244	115.4	0.071

94haee03
File: 94haee03 Transform: NO TRANSFORMATION

Chi-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	0.871	3.146	4.966	3.146	0.871
OBSERVED	0	5	3	5	0

Calculated Chi-Square goodness of fit test statistic = 4.7055
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

94haee03
File: 94haee03 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 50.16
Closest, conservative, Table H statistic = 1036.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 5, df (# reps-1) = 2
Actual values ==> R (# groups) = 5, df (# avg reps-1) = 1.60
(average df used)

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).

TITLE: 94haee03
FILE: 94haee03
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.2729	0.2729
1	Control	2	0.2071	0.2071
1	Control	3	0.1556	0.1556
2	6.25	1	0.1200	0.1200
2	6.25	2	0.1467	0.1467
2	6.25	3	0.1056	0.1056
3	12.5	1	0.1067	0.1067
3	12.5	2	0.0811	0.0811
4	50	1	0.0700	0.0700
4	50	2	0.1675	0.1675
4	50	3	0.1260	0.1260
5	100	1	0.3380	0.3380
5	100	2	0.1567	0.1567

94haee03
File: 94haee03 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	3	0.156	0.273	0.212
2	6.25	3	0.106	0.147	0.124
3	12.5	2	0.081	0.107	0.094
4	50	3	0.070	0.168	0.121
5	100	2	0.157	0.338	0.247

94haee03
File: 94haee03 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.003	0.059	0.034
2	6.25	0.000	0.021	0.012
3	12.5	0.000	0.018	0.013
4	50	0.002	0.049	0.028
5	100	0.016	0.128	0.091

94haee03
File: 94haee03 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	0.040	0.010	2.500
Within (Error)	8	0.029	0.004	
Total	12	0.070		

Critical F value = 3.84 (0.05,4,8)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

94haee03
File: 94haee03 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.212	0.212		
2	6.25	0.124	0.124	1.700	
3	12.5	0.094	0.094	2.043	
4	50	0.121	0.121	1.756	
5	100	0.247	0.247	-0.615	

Bonferroni T table value = 2.75 (1 Tailed Value, P=0.05, df=8,4)

94haee03
File: 94haee03 Transform: NO TRANSFORMATION

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	Control	3			
2	6.25	3	0.142	67.1	0.088
3	12.5	2	0.159	75.0	0.118
4	50	3	0.142	67.1	0.091
5	100	2	0.159	75.0	-0.035

crec01
File: 94hacrec01 Transform: NO TRANSFORMATION

Chi-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	1.072	3.872	6.112	3.872	1.072
OBSERVED	0	7	3	6	0

Calculated Chi-Square goodness of fit test statistic = 7.4250
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

crec01
File: 94hacrec01 Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance

Calculated B statistic = 9.15
Table Chi-square value = 15.09 (alpha = 0.01)
Table Chi-square value = 11.07 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 1.67
Used for Chi-square table value ==> df (#groups-1) = 5

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: crec01
FILE: 94hacrec01
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.2729	0.2729
1	Control	2	0.2071	0.2071
1	Control	3	0.1556	0.1556
2	6.25	1	0.1275	0.1275
2	6.25	2	0.1325	0.1325
3	12.5	1	0.1460	0.1460
3	12.5	2	0.0000	0.0000
4	25	1	0.1500	0.1500
4	25	2	0.3840	0.3840
4	25	3	0.1562	0.1562
5	50	1	0.1470	0.1470
5	50	2	0.2071	0.2071
5	50	3	0.1167	0.1167
6	100	1	0.1300	0.1300
6	100	2	0.0900	0.0900
6	100	3	0.2700	0.2700

crec01
File: 94hacrec01 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	3	0.156	0.273	0.212
2	6.25	2	0.128	0.132	0.130
3	12.5	2	0.000	0.146	0.073
4	25	3	0.150	0.384	0.230
5	50	3	0.117	0.207	0.157
6	100	3	0.090	0.270	0.163

crec01
File: 94hacrec01 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.003	0.059	0.034
2	6.25	0.000	0.004	0.002
3	12.5	0.011	0.103	0.073
4	25	0.018	0.133	0.077
5	50	0.002	0.046	0.027

6	100	0.009	0.095	0.055

crec01
File: 94hacrec01 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.039	0.008	1.000
Within (Error)	10	0.075	0.008	
Total	15	0.114		

Critical F value = 3.33 (0.05,5,10)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

crec01
File: 94hacrec01 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.212	0.212		
2	6.25	0.130	0.130	1.003	
3	12.5	0.073	0.073	1.701	
4	25	0.230	0.230	-0.249	
5	50	0.157	0.157	0.752	
6	100	0.163	0.163	0.665	

Bonferroni T table value = 2.76 (1 Tailed Value, P=0.05, df=10,5)

crec01
File: 94hacrec01 Transform: NO TRANSFORMATION

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	Control	3			
2	6.25	2	0.226	106.5	0.082
3	12.5	2	0.226	106.5	0.139
4	25	3	0.202	95.3	-0.018
5	50	3	0.202	95.3	0.055
6	100	3	0.202	95.3	0.049

ee02
File: 94haee02 Transform: 1/SQUARE ROOT(Y+0.5)

Chi-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	1.005	3.630	5.730	3.630	1.005
OBSERVED	0	6	2	7	0

Calculated Chi-Square goodness of fit test statistic = 9.1141
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

ee02
File: 94haee02 Transform: 1/SQUARE ROOT(Y+0.5)

Bartletts test for homogeneity of variance

Calculated B statistic = 13.93
Table Chi-square value = 15.09 (alpha = 0.01)
Table Chi-square value = 11.07 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 1.50
Used for Chi-square table value ==> df (#groups-1) = 5

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).

ITLE: ee02
ILE: 94haee02
TRANSFORM: 1/SQUARE ROOT(Y+0.5) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.2729	1.1375
1	Control	2	0.2071	1.1892
1	Control	3	0.1556	1.2350
2	6.25	1	0.1183	1.2717
2	6.25	2	0.0550	1.3423
3	12.5	1	0.9560	0.8287
3	12.5	2	0.1400	1.2500
3	12.5	3	0.1050	1.2856
4	25	1	0.0911	1.3007
4	25	2	0.0000	1.4142
5	50	1	0.1225	1.2674
5	50	2	0.1160	1.2741
5	50	3	0.1000	1.2910
6	100	1	0.1200	1.2700
6	100	2	0.1067	1.2838

ee02
ile: 94haee02 Transform: 1/SQUARE ROOT(Y+0.5)

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	3	1.137	1.235	1.187
2	6.25	2	1.272	1.342	1.307
3	12.5	3	0.829	1.286	1.121
4	25	2	1.301	1.414	1.357
5	50	3	1.267	1.291	1.278
6	100	2	1.270	1.284	1.277

ee02
File: 94haee02 Transform: 1/SQUARE ROOT(Y+0.5)

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.002	0.049	0.028
2	6.25	0.002	0.050	0.035
3	12.5	0.065	0.254	0.147
4	25	0.006	0.080	0.057
5	50	0.000	0.012	0.007
6	100	0.000	0.010	0.007

ee02
File: 94haee02 Transform: 1/SQUARE ROOT(Y+0.5)

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.094	0.019	1.188
Within (Error)	9	0.143	0.016	
Total	14	0.237		

Critical F value = 3.48 (0.05,5,9)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

ee02
File: 94haee02 Transform: 1/SQUARE ROOT(Y+0.5)

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	1.187	0.212		
2	6.25	1.307	0.087	-1.037	
3	12.5	1.121	0.400	0.637	
4	25	1.357	0.046	-1.474	
5	50	1.278	0.113	-0.874	
6	100	1.277	0.113	-0.777	

Bonferroni T table value = 2.82 (1 Tailed Value, P=0.05, df=9,5)

ee02
File: 94haee02 Transform: 1/SQUARE ROOT(Y+0.5)

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	Control	3			
2	6.25	2	-0.638	-301.3	0.125
3	12.5	3	-0.537	-253.3	-0.188
4	25	2	-0.638	-301.3	0.166
5	50	3	-0.537	-253.3	0.099
6	100	2	-0.638	-301.3	0.099

ew03
File: 94haew03 Transform: NO TRANSFORMATION

ıi-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	0.871	3.146	4.966	3.146	0.871
OBSERVED	0	4	5	4	0

Calculated Chi-Square goodness of fit test statistic = 2.2059
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

ew03
File: 94haew03 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance
Bartletts test for homogeneity of variance

These two tests can not be performed because at least one group has
ero variance.

Data FAIL to meet homogeneity of variance assumption.
Additional transformations are useless.

TRIMMED SPEARMAN-KARBER METHOD. MONTANA STATE UNIV

FOR REFERENCE, CITE:
HAMILTON, M.A., R. C. RUSSO, AND R.V. THURSTON, 1977.
TRIMMED SPEARMAN-KARBER METHOD FOR ESTIMATING MEDIAN
LETHAL CONCENTRATIONS.
ENVIRON. SCI. TECH. 11:714-719;
CORRECTION 12(4):417 (1978).

DATE: 11/14/94 TEST NUMBER: EW02 DURATION: 96 HOURS
CHEMICAL: EW02 SPECIES: H. AZTECA

RAW DATA:

CONCENTRATION(PERCENT)	6.25	12.50	25.00	50.00	100.00
NUMBER EXPOSED:	40	40	40	40	40
MORTALITIES:	1	0	0	13	38

SPEARMAN-KARBER TRIM: 5.00%

SPEARMAN-KARBER ESTIMATES: LC50: 58.02
95% LOWER CONFIDENCE: 51.54
95% UPPER CONFIDENCE: 65.31

NOTE: MORTALITY [illegible] MONOTONICALLY INCREASING.
ADJUSTMENT [illegible] SPEARMAN-KARBER ESTIMATION.

1994
LC50 &
NOEC
(survival)

TRIMMED SPEARMAN-KARBER METHOD. MONTANA STATE UNIV

FOR REFERENCE, CITE:
HAMILTON, M.A., R. . RUSSO, AND R.V. THURSTON, 1977.
TRIMMED SPEARMAN-[illegible] METHOD FOR ESTIMATING MEDIAN
LETHAL CONCENTR[illegible] [illegible] DAYS.
ENVIRON. SCI. TE[illegible] . [illegible]: [illegible]-719;
CORRECTION 12(4):[illegible] (1978).

DATE: 11/14/94 TEST NUMBER: EE07 DURATION: 96 HOUR
CHEMICAL: EE07 SPECIES: H. AZTECA

RAW DATA:

CONCENTRATION(PERCENT)	6.25	12.50	25.00	50.00	100.00
NUMBER EXPOS[illegible] :	[illegible]	40	40	40	40
MORTALITIES:	0	3	0	5	28
SPEARMAN-KARBE[illegible] M:		30.00%			

SPEARMAN-KARBER E[illegible]IMATES: LC50: 78.58
95[illegible] CONFIDENCE: 69.55
[illegible]: 88.78

NOTE: MORTALITY [illegible] T MONOTONICALLY INCREASING.
ADJUSTME[illegible] SPEARMAN-KARBER ESTIMATION.

TRIMMED SPEARMAN-KARBER METHOD. MONTANA STATE UNIV

FOR REFERENCE, CITE:
HAMILTON, M.A., R. C. RUSSO, AND R.V. THURSTON, 1977.
TRIMMED SPEARMAN-KARBER METHOD FOR ESTIMATING MEDIAN
LETHAL CONCENTRATIONS IN BIOASSAYS.
ENVIRON. SCI. TECH. 11(7): 714-719;
CORRECTION 12(4): [illegible] (1978).

DATE: 11/18/94 **TEST NUMBER:** EW03 **DURATION:** 96 HOURS
CHEMICAL: EW03 **SPECIES:** H. AZTECA

RAW DATA:

CONCENTRATION(PERCENT)	6.25	12.50	25.00	50.00	100.00
NUMBER EXPOSED:		40	40	40	40
MORTALITIES:		4	0	9	20

SPEARMAN-KARBER TRIM: 50.00%

SPEARMAN-KARBER ESTIMATES: LC50: 100.00
95% CONFIDENCE LIMITS
ARE NOT RELIABLE.

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENT OF [illegible] SPEARMAN-KARBER ESTIMATION.

TRIMMED SPEARMAN-KARBER METHOD. MONTANA STATE UNIV

FOR REFERENCE, CITE:
HAMILTON, M.A., R.C. RUSSO, AND R.V. THURSTON, 1977.
TRIMMED SPEARMAN-KARBER METHOD FOR ESTIMATING MEDIAN
LETHAL CONCENTRATIONS IN TOXICITY BIOASSAYS.
ENVIRON. SCI. TECHNOL. 11(7): 714-719;
CORRECTION 12(4):417 (1978).

DATE: 2-95 TEST NUMBER: EE10 DURATION: 28 DAYS
CHEMICAL: EE10 SPECIES: H. AZTECA

RAW DATA:

CONCENTRATION(%)	6.25	12.50	25.00	50.00	100.00
NUMBER EXPOSED:	30	30	30	30	30
MORTALITIES:	11	22	20	20	15
SPEARMAN-KARBER TRIM:		36.67%			

SPEARMAN-KARBER ESTIMATES: LC50: 8.75
95% LOWER CONFIDENCE: 6.40
95% UPPER CONFIDENCE: 11.96

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

TRIMMED SPEARMAN-KARBER METHOD. MONTANA STATE UNIV

FOR REFERENCE, CITE:
HAMILTON, M.A., R.C. RUSSO, AND R.V. THURSTON, 1977.
TRIMMED SPEARMAN-KARBER METHOD FOR ESTIMATING MEDIAN
LETHAL CONCENTRATIONS IN TOXICITY BIOASSAYS.
ENVIRON. SCI. TECHNOL. 11(7): 714-719;
CORRECTION 12(4):417 (1978).

DATE: 2-95 TEST NUMBER: EE01 DURATION: 28 DAYS
CHEMICAL: EE01 SPECIES: H. AZTECA

RAW DATA:

CONCENTRATION(%)	6.25	12.50	25.00	50.00	100.00
NUMBER EXPOSED:	30	30	30	30	30
MORTALITIES:	13	11	11	4	21
SPEARMAN-KARBER TRIM:		32.50%			

SPEARMAN-KARBER ESTIMATES: LC50: 69.10
95% LOWER CONFIDENCE: 55.34
95% UPPER CONFIDENCE: 86.27

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

TRIMMED SPEARMAN-KARBER METHOD. MONTANA STATE UNIV

FOR REFERENCE, CITE:
HAMILTON, M.A., R.C. RUSSO, AND R.V. THURSTON, 1977.
TRIMMED SPEARMAN-KARBER METHOD FOR ESTIMATING MEDIAN
LETHAL CONCENTRATIONS IN TOXICITY BIOASSAYS.
ENVIRON. SCI. TECHNOL. 11(7): 714-719;
CORRECTION 12(4):417 (1978).

DATE: 2-95 TEST NUMBER: EE03 DURATION: 28 DAYS
CHEMICAL: EE03 SPECIES: H. AZTECA

RAW DATA:

CONCENTRATION(%)	6.25	12.50	25.00	50.00	100.00
NUMBER EXPOSED:	30	30	30	30	30
MORTALITIES:	9	8	21	4	16
SPEARMAN-KARBER TRIM:		46.67%			

SPEARMAN-KARBER ESTIMATES: LC50: 82.03
95% LOWER CONFIDENCE: 35.72
95% UPPER CONFIDENCE: 188.37

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

TRIMMED SPEARMAN-KARBER METHOD. MONTANA STATE UNIV

FOR REFERENCE, CITE:
HAMILTON, M.A., R.C. RUSSO, AND R.V. THURSTON, 1977.
TRIMMED SPEARMAN-KARBER METHOD FOR ESTIMATING MEDIAN
LETHAL CONCENTRATIONS IN TOXICITY BIOASSAYS.
ENVIRON. SCI. TECHNOL. 11(7): 714-719;
CORRECTION 12(4):417 (1978).

DATE: 11-10-94 TEST NUMBER: EE06 DURATION: 96 HOURS
CHEMICAL: EE06 SPECIES: H. AZTECA

RAW DATA:

CONCENTRATION(%)	6.25	12.50	25.00	50.00	100.00
NUMBER EXPOSED:	40	40	40	40	40
MORTALITIES:	4	8	11	15	23

SPEARMAN-KARBER TRIM: 42.50%

SPEARMAN-KARBER ESTIMATES: LC50: 77.11
95% LOWER CONFIDENCE: 52.07
95% UPPER CONFIDENCE: 114.20

EW03CHRHA

Conc.	Number Exposed	Number Resp.	Observed Proportion Responding	Adjusted Proportion Responding	Predicted Proportion Responding
Control	30	3	0.1000	0.0000	0.1331
6.2500	30	6	0.2000	0.0771	0.0000
12.5000	30	3	0.1000	-.0382	0.0000
25.0000	30	4	0.1333	0.0002	0.0009
50.0000	30	7	0.2333	0.1156	0.1155
100.0000	30	24	0.8000	0.7693	0.7693

Chi - Square Heterogeneity = 1.447

Mu = 1.885367
Sigma = 0.155643

Parameter	Estimate	Std. Err.	95% Confidence Limits
Intercept	-7.113441	3.540136	(-14.052108, -0.174774)
Slope	6.424978	1.840170	(2.818244, 10.031712)
Spontaneous Response Rate	0.133149	0.031235	(0.071929, 0.194370)

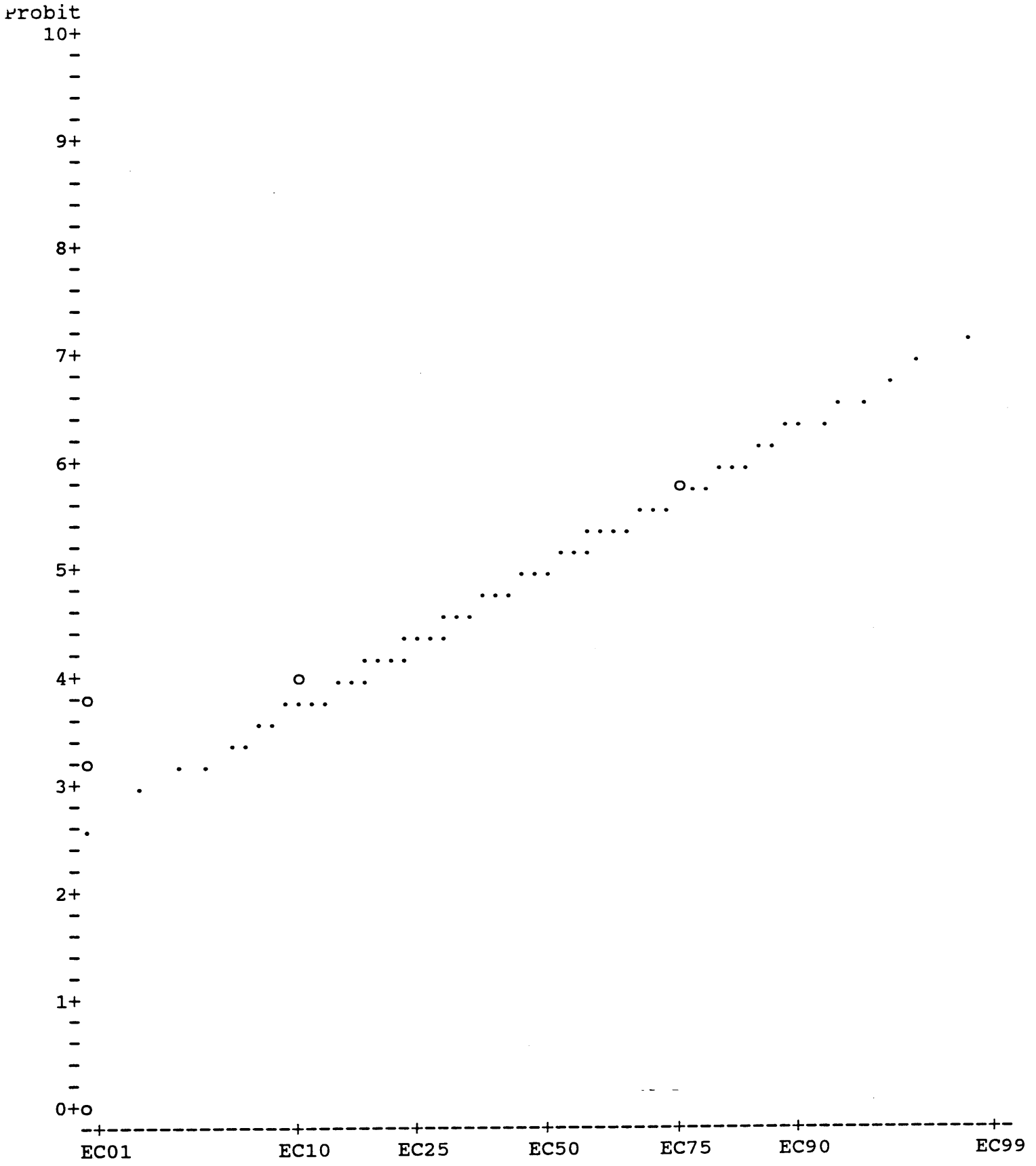
EW03CHRHA

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence	Upper Limits
EC 1.00	33.3653	9.8321	47.9787
EC 5.00	42.5942	16.9975	56.6264
EC10.00	48.5172	22.6907	62.0412
EC15.00	52.9735	27.5177	66.1247
EC50.00	76.8010	58.6822	91.7336
EC85.00	111.3461	93.0251	171.1958
EC90.00	121.5733	99.9976	205.8498
EC95.00	138.4788	110.3694	272.7825
EC99.00	176.7821	131.1001	468.5636

EW03CHRHA

PLOT OF ADJUSTED PROBITS AND PREDICTED REGRESSION LINE



EE02 Chr HA

Conc.	Number Exposed	Number Resp.	Observed Proportion Responding	Adjusted Proportion Responding	Predicted Proportion Responding
Control	30	3	0.1000	0.0000	0.1068
6.2500	30	10	0.3333	0.2536	0.1677
12.5000	30	9	0.3000	0.2163	0.2392
25.0000	30	9	0.3000	0.2163	0.3247
50.0000	30	14	0.4667	0.4029	0.4206
100.0000	30	19	0.6333	0.5895	0.5216

Chi - Square Heterogeneity = 2.640

Mu = 1.935969
Sigma = 1.183545

Parameter	Estimate	Std. Err.	95% Confidence Limits
Intercept	3.364262	0.521793	(2.341547, 4.386976)
Slope	0.844920	0.329487	(0.199124, 1.490715)
Spontaneous Response Rate	0.106838	0.056230	(-0.003373, 0.217049)

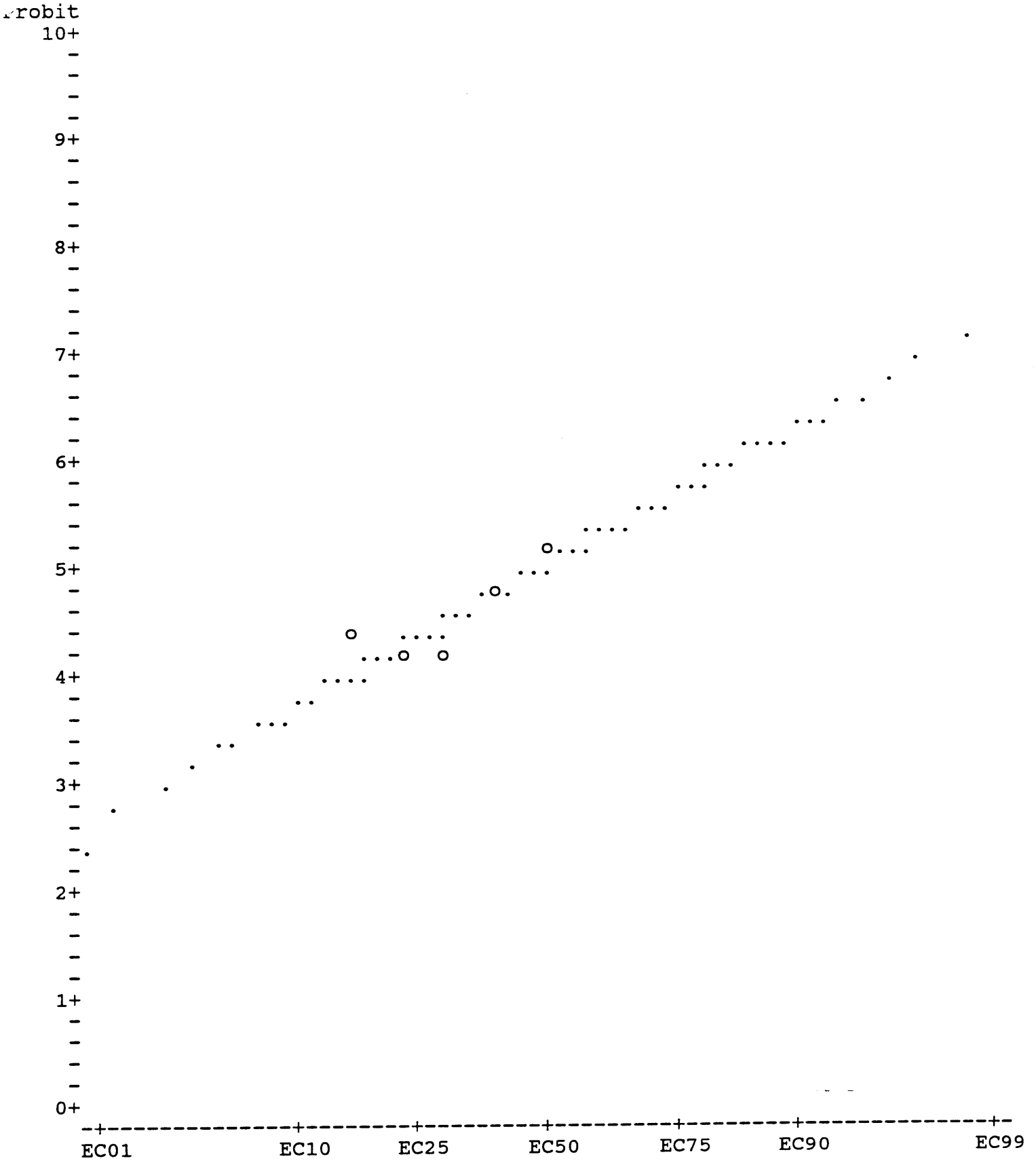
EE02

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper Confidence Limits
EC 1.00	0.1523	0.0000	1.8824
EC 5.00	0.9753	0.0000	5.6546
EC10.00	2.6251	0.0003	10.4242
EC15.00	5.1209	0.0049	16.1568
EC50.00	86.2917	34.4266	1823.9734
EC85.00	1454.1010	265.1099	188155152.0000
EC90.00	2836.6113	396.2356	3132318000.0000
EC95.00	7634.5156	711.0906	%204217483000.0000
EC99.00	48893.2620	2092.3752	% 525365870.0000E+06

EE02

PLOT OF ADJUSTED PROBITS AND PREDICTED REGRESSION LINE



1994 Tinker Chronic H. azteca Survival - EW03
File: 94crhaew03 Transform: 1/SQUARE ROOT(Y+0.5)

apiro Wilks test for normality

D = 0.002

W = 0.920

Critical W (P = 0.05) (n = 18) = 0.897
Critical W (P = 0.01) (n = 18) = 0.858

Data PASS normality at P=0.01 level. Continue analysis.

1994 Tinker Chronic H. azteca Survival - EW03
File: 94crhaew03 Transform: 1/SQUARE ROOT(Y+0.5)

Hartley test for homogeneity of variance
Bartletts test for homogeneity of variance

These two tests cannot be performed because at least one group has zero variance.

Data FAIL to meet homogeneity of variance assumption.
Additional transformations must be tried.

TITLE: 1994 Tinker Chronic H. azteca Survival - EW03
ILE: 94crha
RANSFORM: 1/SQ OOT(Y+0.5) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	control	1	7.0000	0.3651
1	control	2	9.0000	0.3244
1	control	3	8.0000	0.3430
2	6.25	1	9.0000	0.3244
2	6.25	2	10.0000	0.3086
2	6.25	3	8.0000	0.3430
3	12.5	1	9.0000	0.3244
3	12.5	2	8.0000	0.3430
3	12.5	3	9.0000	0.3244
4	25	1	8.0000	0.3430
4	25	2	8.0000	0.3430
4	25	3	7.0000	0.3651
5		1	8.0000	0.3430
5		2	8.0000	0.3430
5		3	7.0000	0.3651
6	1	1	2.0000	0.6325
6	1	2	2.0000	0.6325
6	1	3	2.0000	0.6325

1994 Tinker Chron azteca Survival - EW03
File: 94crhaew03 ansform: RE ROOT(Y+0.5)

SUM ATICS ON TR MED DATA TABLE 1 of 2

GRP	IDENTIFICA		MIN	MAX	MEAN
1	con		0.3	0.365	0.344
2			0.3	0.343	0.325
3		3	0.3	0.343	0.331
4		3	0.3	0.365	0.350
5		3	0.3	0.365	0.350
6	1	3	0.6	0.632	0.632

1994 Tinker Chr EW03
File: 94crhae OOT(Y+0.5)

SU DATA TABLE 2 of 2

GRP	IDENTIFICA			SEM
1	co		.000	0.012
2			.007	0.010
3			.001	0.006

4	[illegible]	[illegible]	0.013	0.007
5	[illegible]	[illegible]	[illegible]3	0.007
6	[illegible]	[illegible]	[illegible]0	0.000

1994 Tinker Ch[illegible] - [illegible]03
File: 94crhaew[illegible] [illegible]OOT(Y+0.5)

K[illegible] - TABLE 1 OF 2

GROUP	IDENT[illegible]	[illegible]EAN CALCULATED IN ORIGINAL UNITS	RANK SUM
1		8.000	26.500
2		9.000	13.500
3		8.667	16.000
4		7.667	32.000
5		7.667	32.000
6		2.000	51.000

Calculated H [illegible]al H Value Table = 11.070
Since Calc [illegible] are equal.

1994 Tinker Ch[illegible] - [illegible]3
File: 94crhaew[illegible] [illegible]OOT(Y+0.5)

DUNNS MULTIPL[illegible] - [illegible]S - TABLE 2 OF 2

GROUP	IDENT[illegible]	GROUP 0 2	0 3	0 1	0 5	0 4	0 6
2		\					
3		.	\				
1		.	.	\			
5		.	.	.	\		
4		.	.	.	.	\	
6		*	.	.	.	.	\

* = significa[illegible] . = no significant difference
Table q value [illegible] SE = 4.189

1994 Tinker Chronic H. azteca - EE02
File: EE0294h[illegible] [illegible]orm: [illegible]/SQUARE ROOT(Y+0.5)

[illegible]i-square test [illegible]: 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	1.206	4.356	6.876	4.356	1.206
OBSERVED	0	6	5	7	0

Calculated Ch[illegible] [illegible] test statistic = 5.1491
Table Chi-Squ[illegible] = [illegible]

Data PASS nor[illegible]. [illegible] analysis.

1994 Tinker Chronic H. azteca - EE02
File: EE0294h[illegible] [illegible]/SQUARE ROOT(Y+0.5)

Hartley test f[illegible] [illegible]riance
Bartletts tes[illegible] [illegible]ance

These two tes[illegible] [illegible] at least one group has
[illegible]ero varianc[illegible]

Data FAIL to m[illegible] [illegible] assumption.
Additional tra[illegible].

1994 Tinker Chronic H. azteca - EE02
File: EE0294h[illegible] Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	[illegible]	48.444	9.689	3.420
Within (Error)	12	34.000	2.833	
Total	[illegible]	[illegible].444		

Critical F value = 3.11 ([illegible],12)
Since F > Critical F [illegible] groups equal

1994 Tinker Chronic H. azteca - EE02
File: EE0294ha[illegible] TRANSFORM

BONFERRONI [illegible] - [illegible] 2 Ho:Control<Treatment

GROUP	IDENT[illegible]	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	[illegible]	9.000		
2	[illegible]	6.667	1.698	
3	[illegible]	7.000	1.455	
4	[illegible]	7.000	1.455	
5	[illegible]	5.333	2.668	
6	[illegible]	3.667	3.881	*

Bonferroni T [illegible] Tailed Value, P=0.05, df=12,5)

1994 Tinker C[illegible]
File: EE0294[illegible] TRANSFORM

BONFERRO[illegible] - [illegible] OF 2 Ho:Control<Treatment

GROUP	IDENT[illegible]	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1				
2		3.684	40.9	2.333
3		3.684	40.9	2.000
4		3.684	40.9	2.000
5		3.684	40.9	3.667
6		3.684	40.9	5.333

1994 Tinker Chronic U. azteca EE03
File: ee0394b[illegible] Transform: [illegible]SQUARE ROOT(Y+0.5)

[illegible]i-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	1.[illegible]	4.[illegible]	6.876	4.356	1.206
OBSERVED	0	5	6	7	0

Calculated C[illegible] test statistic = 4.2237
Table Chi-Sq[illegible] = 13.277

Data PASS no[illegible]. Continue analysis.

1994 Tinker Chronic U. azteca EE03
File: ee0394b[illegible]SQUARE ROOT(Y+0.5)

Hartley test [illegible]
Bartletts te[illegible]

These two te[illegible] because at least one group has
[illegible]ero varian[illegible].

Data FAIL to [illegible] variance assumption.
Additional tr[illegible].

1994 **Tinker** Chronic H. azteca EE03
File: ee0394ba Transform: 1/SQUARE ROOT(Y+0.5)

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

GROUP	IDENTIFICATION	N	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1		[illegible]	[illegible]				
2		[illegible]	[illegible]	13.50	None	3	
3		[illegible]	[illegible]	13.50	None	3	
4		[illegible]	[illegible]	15.00	None	3	
5		[illegible]	[illegible]	12.00	None	3	
6		[illegible]	[illegible]	15.00	None	3	

Critical values for [illegible], one-tailed, and **alpha = 0.05**

94ew01has
File: 94ew01has Transform: NO TRANSFORMATION

ıi-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	1.206	4.356	6.876	4.356	1.206
OBSERVED	0	3	12	3	0

Calculated Chi-Square goodness of fit test statistic = 7.0746
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

94ew01has
File: 94ew01has Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance
Bartletts test for homogeneity of variance

These two tests can not be performed because at least one group has
ero variance.

Data FAIL to meet homogeneity of variance assumption.
Additional transformations are useless.

TITLE: 94ew01has
ILE: 94ew01has
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 3

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	control	1	8.0000	8.0000
1	control	2	8.0000	8.0000
1	control	3	8.0000	8.0000
2	6.25%	1	3.0000	3.0000
2	6.25%	2	3.0000	3.0000
2	6.25%	3	5.0000	5.0000
3	12.5%	1	4.0000	4.0000
3	12.5%	2	3.0000	3.0000
3	12.5%	3	4.0000	4.0000

94ew01has
File: 94ew01has Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	control	3	8.000	8.000	8.000
2	6.25%	3	3.000	5.000	3.667
3	12.5%	3	3.000	4.000	3.667

94ew01has
File: 94ew01has Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	control	0.000	0.000	0.000
2	6.25%	1.333	1.155	0.667
3	12.5%	0.333	0.577	0.333

94ew01has
File: 94ew01has Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F

Between	2	37.556	18.778	33.773
Within (Error)	6	3.333	0.556	
otal	8	40.889		

Critical F value = 5.14 (0.05,2,6)
Since F > Critical F REJECT Ho:All groups equal

94ew01has
File: 94ew01has Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	8.000	8.000		
2	6.25%	3.667	3.667	7.118	*
3	12.5%	3.667	3.667	7.118	*

Bonferroni T table value = 2.45 (1 Tailed Value, P=0.05, df=6,2)

94ew01has
File: 94ew01has Transform: NO TRANSFORMATION

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	control	3			
2	6.25%	3	1.490	18.6	4.333
3	12.5%	3	1.490	18.6	4.333

94ew01has
File: 94ew01has Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	control	8.000				
2	6.25%	3.667	6.00	None	3	
3	12.5%	3.667	6.00	None	3	

Critical values use k = 2, are 1 tailed, and alpha = 0.05

94ew02has
File: 94ew02has Transform: NO TRANSFORMATION

ıi-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	1.206	4.356	6.876	4.356	1.206
OBSERVED	0	5	8	5	0

Calculated Chi-Square goodness of fit test statistic = 2.7862
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

94ew02has
File: 94ew02has Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance
Bartletts test for homogeneity of variance

These two tests can not be performed because at least one group has
ero variance.

Data FAIL to meet homogeneity of variance assumption.
Additional transformations are useless.

TITLE: 94ew02has
LE: 94ew02has
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	control	1	8.0000	8.0000
1	control	2	8.0000	8.0000
1	control	3	8.0000	8.0000
2	4%	1	2.0000	2.0000
2	4%	2	5.0000	5.0000
2	4%	3	1.0000	1.0000
3	8%	1	0.0000	0.0000
3	8%	2	1.0000	1.0000
3	8%	3	4.0000	4.0000
4	16%	1	4.0000	4.0000
4	16%	2	4.0000	4.0000
4	16%	3	0.0000	0.0000
5	32%	1	0.0000	0.0000
5	32%	2	1.0000	1.0000
5	32%	3	0.0000	0.0000
6	64%	1	0.0000	0.0000
6	64%	2	0.0000	0.0000
6	64%	3	0.0000	0.0000

94ew02has
File: 94ew02has Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	control	3	8.000	8.000	8.000
2	4%	3	1.000	5.000	2.667
3	8%	3	0.000	4.000	1.667
4	16%	3	0.000	4.000	2.667
5	32%	3	0.000	1.000	0.333
6	64%	3	0.000	0.000	0.000

94ew02has
File: 94ew02has Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

RP	IDENTIFICATION	VARIANCE	SD	SEM
1	control	0.000	0.000	0.000
2	4%	4.333	2.082	1.202
3	8%	4.333	2.082	1.202

4	16%	5.333	2.309	1.333
5	32%	0.333	0.577	0.333
6	64%	0.000	0.000	0.000

94ew02has
File: 94ew02has Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	125.778	25.156	10.530
Within (Error)	12	28.667	2.389	
Total	17	154.444		

Critical F value = 3.11 (0.05,5,12)
Since F > Critical F REJECT Ho:All groups equal

94ew02has
File: 94ew02has Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	8.000	8.000		
2	4%	2.667	2.667	4.226	*
3	8%	1.667	1.667	5.018	*
4	16%	2.667	2.667	4.226	*
5	32%	0.333	0.333	6.075	*
6	64%	0.000	0.000	6.339	*

Bonferroni T table value = 2.68 (1 Tailed Value, P=0.05, df=12,5)

94ew02has
File: 94ew02has Transform: NO TRANSFORMATION

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	control	3			
2	4%	3	3.383	42.3	5.333
3	8%	3	3.383	42.3	6.333
4	16%	3	3.383	42.3	5.333
5	32%	3	3.383	42.3	7.667
6	64%	3	3.383	42.3	8.000

4ew02has
File: 94ew02has Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	control	8.000				
2	4%	2.667	6.00	None	3	
3	8%	1.667	6.00	None	3	
4	16%	2.667	6.00	None	3	
5	32%	0.333	6.00	None	3	
6	64%	0.000	6.00	None	3	

Critical values use k = 5, are 1 tailed, and alpha = 0.05

94ee10has
File: 94ee10has Transform: NO TRANSFORMATION

Chi-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	1.206	4.356	6.876	4.356	1.206
OBSERVED	0	5	6	7	0

Calculated Chi-Square goodness of fit test statistic = 4.2237
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

94ee10has
File: 94ee10has Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance
Bartletts test for homogeneity of variance

These two tests can not be performed because at least one group has zero variance.

Data FAIL to meet homogeneity of variance assumption.
Additional transformations are useless.

TITLE: 94ee10has
ILE: 94ee10has
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	control	1	8.0000	8.0000
1	control	2	8.0000	8.0000
1	control	3	8.0000	8.0000
2	6.25%	1	6.0000	6.0000
2	6.25%	2	4.0000	4.0000
2	6.25%	3	9.0000	9.0000
3	12.5%	1	3.0000	3.0000
3	12.5%	2	2.0000	2.0000
3	12.5%	3	3.0000	3.0000
4	25%	1	4.0000	4.0000
4	25%	2	6.0000	6.0000
4	25%	3	0.0000	0.0000
5	50%	1	2.0000	2.0000
5	50%	2	4.0000	4.0000
5	50%	3	4.0000	4.0000
6	100%	1	5.0000	5.0000
6	100%	2	4.0000	4.0000
6	100%	3	6.0000	6.0000

94ee10has
File: 94ee10has Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	control	3	8.000	8.000	8.000
2	6.25%	3	4.000	9.000	6.333
3	12.5%	3	2.000	3.000	2.667
4	25%	3	0.000	6.000	3.333
5	50%	3	2.000	4.000	3.333
6	100%	3	4.000	6.000	5.000

94ee10has
File: 94ee10has Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

RP	IDENTIFICATION	VARIANCE	SD	SEM
1	control	0.000	0.000	0.000
2	6.25%	6.333	2.517	1.453
3	12.5%	0.333	0.577	0.333

4	25%	9.333	3.055	1.764
5	50%	1.333	1.155	0.667
6	100%	1.000	1.000	0.577

94ee10has
File: 94ee10has Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	64.444	12.889	4.218
Within (Error)	12	36.667	3.056	
Total	17	101.111		

Critical F value = 3.11 (0.05,5,12)
Since F > Critical F REJECT Ho:All groups equal

94ee10has
File: 94ee10has Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	8.000	8.000		
2	6.25%	6.333	6.333	1.168	
3	12.5%	2.667	2.667	3.737	*
4	25%	3.333	3.333	3.269	*
5	50%	3.333	3.333	3.269	*
6	100%	5.000	5.000	2.102	

Bonferroni T table value = 2.68 (1 Tailed Value, P=0.05, df=12,5)

94ee10has
File: 94ee10has Transform: NO TRANSFORMATION

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	control	3			
2	6.25%	3	3.827	47.8	1.667
3	12.5%	3	3.827	47.8	5.333
4	25%	3	3.827	47.8	4.667
5	50%	3	3.827	47.8	4.667
6	100%	3	3.827	47.8	3.000

ee10has
File: 94ee10has Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	control	8.000				
2	6.25%	6.333	9.00	None	3	
3	12.5%	2.667	6.00	None	3	
4	25%	3.333	6.00	None	3	
5	50%	3.333	6.00	None	3	
6	100%	5.000	6.00	None	3	

Critical values use k = 5, are 1 tailed, and alpha = 0.05

94ee06has
File: 94ee06has Transform: NO TRANSFORMATION

i-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	1.206	4.356	6.876	4.356	1.206
OBSERVED	0	6	7	5	0

Calculated Chi-Square goodness of fit test statistic = 3.1299
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

94ee06has
File: 94ee06has Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance
Bartletts test for homogeneity of variance

These two tests can not be performed because at least one group has
zero variance.

Data FAIL to meet homogeneity of variance assumption.
Additional transformations are useless.

94ee07has
File: 94ee07has Transform: NO TRANSFORMATION

i-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	1.206	4.356	6.876	4.356	1.206
OBSERVED	0	7	4	7	0

Calculated Chi-Square goodness of fit test statistic = 6.8246
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

94ee07has
File: 94ee07has Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance
Bartletts test for homogeneity of variance

These two tests can not be performed because at least one group has
zero variance.

Data FAIL to meet homogeneity of variance assumption.
Additional transformations are useless.

94ee08has
File: 94ee08has Transform: NO TRANSFORMATION

hi-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	1.206	4.356	6.876	4.356	1.206
OBSERVED	0	7	4	7	0

Calculated Chi-Square goodness of fit test statistic = 6.8246
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

94ee08has
File: 94ee08has Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance
Bartletts test for homogeneity of variance

These two tests can not be performed because at least one group has
·ero variance.

Data FAIL to meet homogeneity of variance assumption.
Additional transformations are useless.

TITLE: 94ee08has
TLE: 94ee08has
RANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	control	1	7.0000	7.0000
1	control	2	8.0000	8.0000
1	control	3	8.0000	8.0000
2	6.25%	1	5.0000	5.0000
2	6.25%	2	4.0000	4.0000
2	6.25%	3	3.0000	3.0000
3	12.5%	1	3.0000	3.0000
3	12.5%	2	3.0000	3.0000
3	12.5%	3	3.0000	3.0000
4	25%	1	3.0000	3.0000
4	25%	2	1.0000	1.0000
4	25%	3	1.0000	1.0000
5	50%	1	4.0000	4.0000
5	50%	2	4.0000	4.0000
5	50%	3	3.0000	3.0000
6	100%	1	3.0000	3.0000
6	100%	2	0.0000	0.0000
6	100%	3	0.0000	0.0000

94ee08has
File: 94ee08has Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	control	3	7.000	8.000	7.667
2	6.25%	3	3.000	5.000	4.000
3	12.5%	3	3.000	3.000	3.000
4	25%	3	1.000	3.000	1.667
5	50%	3	3.000	4.000	3.667
6	100%	3	0.000	3.000	1.000

94ee08has
File: 94ee08has Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

RP	IDENTIFICATION	VARIANCE	SD	SEM
1	control	0.333	0.577	0.333
2	6.25%	1.000	1.000	0.577
3	12.5%	0.000	0.000	0.000

4	25%	1.333	1.155	0.667
5	50%	0.333	0.577	0.333
6	100%	3.000	1.732	1.000

94ee08has
File: 94ee08has Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	82.500	16.500	16.500
Within (Error)	12	12.000	1.000	
Total	17	94.500		

Critical F value = 3.11 (0.05,5,12)
Since F > Critical F REJECT Ho:All groups equal

94ee08has
File: 94ee08has Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	7.667	7.667		
2	6.25%	4.000	4.000	4.491	*
3	12.5%	3.000	3.000	5.715	*
4	25%	1.667	1.667	7.348	*
5	50%	3.667	3.667	4.899	*
6	100%	1.000	1.000	8.165	*

Bonferroni T table value = 2.68 (1 Tailed Value, P=0.05, df=12,5)

94ee08has
File: 94ee08has Transform: NO TRANSFORMATION

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	control	3			
2	6.25%	3	2.189	28.6	3.667
3	12.5%	3	2.189	28.6	4.667
4	25%	3	2.189	28.6	6.000
5	50%	3	2.189	28.6	4.000
6	100%	3	2.189	28.6	6.667

ee08has
ile: 94ee08has Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	control	7.667				
2	6.25%	4.000	6.00	None	3	
3	12.5%	3.000	6.00	None	3	
4	25%	1.667	6.00	None	3	
5	50%	3.667	6.00	None	3	
6	100%	1.000	6.00	None	3	

Critical values use k = 5, are 1 tailed, and alpha = 0.05

94ee09has
File: 94ee09has Transform: NO TRANSFORMATION

hi-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	1.206	4.356	6.876	4.356	1.206
OBSERVED	0	8	3	7	0

Calculated Chi-Square goodness of fit test statistic = 9.2501
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

94ee09has
File: 94ee09has Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance
Bartletts test for homogeneity of variance

These two tests can not be performed because at least one group has
ero variance.

Data FAIL to meet homogeneity of variance assumption.
Additional transformations are useless.

TITLE: 94ee09has
FILE: 94ee09has
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	control	1	7.0000	7.0000
1	control	2	8.0000	8.0000
1	control	3	8.0000	8.0000
2	6.25%	1	5.0000	5.0000
2	6.25%	2	4.0000	4.0000
2	6.25%	3	4.0000	4.0000
3	12.5%	1	2.0000	2.0000
3	12.5%	2	2.0000	2.0000
3	12.5%	3	5.0000	5.0000
4	25%	1	3.0000	3.0000
4	25%	2	3.0000	3.0000
4	25%	3	0.0000	0.0000
5	50%	1	2.0000	2.0000
5	50%	2	0.0000	0.0000
5	50%	3	0.0000	0.0000
6	100%	1	0.0000	0.0000
6	100%	2	0.0000	0.0000
6	100%	3	0.0000	0.0000

94ee09has
File: 94ee09has Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	control	3	7.000	8.000	7.667
2	6.25%	3	4.000	5.000	4.333
3	12.5%	3	2.000	5.000	3.000
4	25%	3	0.000	3.000	2.000
5	50%	3	0.000	2.000	0.667
6	100%	3	0.000	0.000	0.000

94ee09has
File: 94ee09has Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

RP	IDENTIFICATION	VARIANCE	SD	SEM
1	control	0.333	0.577	0.333
2	6.25%	0.333	0.577	0.333
3	12.5%	3.000	1.732	1.000

4	25%	3.000	1.732	1.000
5	50%	1.333	1.155	0.667
6	100%	0.000	0.000	0.000

94ee09has
File: 94ee09has Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	116.944	23.389	17.546
Within (Error)	12	16.000	1.333	
Total	17	132.944		

Critical F value = 3.11 (0.05,5,12)
Since F > Critical F REJECT Ho:All groups equal

94ee09has
File: 94ee09has Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	7.667	7.667		
2	6.25%	4.333	4.333	3.536	*
3	12.5%	3.000	3.000	4.950	*
4	25%	2.000	2.000	6.011	*
5	50%	0.667	0.667	7.426	*
6	100%	0.000	0.000	8.133	*

Bonferroni T table value = 2.68 (1 Tailed Value, P=0.05, df=12,5)

94ee09has
File: 94ee09has Transform: NO TRANSFORMATION

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	control	3			
2	6.25%	3	2.527	33.0	3.333
3	12.5%	3	2.527	33.0	4.667
4	25%	3	2.527	33.0	5.667
5	50%	3	2.527	33.0	7.000
6	100%	3	2.527	33.0	7.667

:ee09has
File: 94ee09has Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	control	7.667				
2	6.25%	4.333	6.00	None	3	
3	12.5%	3.000	6.00	None	3	
4	25%	2.000	6.00	None	3	
5	50%	0.667	6.00	None	3	
6	100%	0.000	6.00	None	3	

Critical values use k = 5, are 1 tailed, and alpha = 0.05

94ec02has
File: 94ec02has Transform: NO TRANSFORMATION

Chi-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	1.206	4.356	6.876	4.356	1.206
OBSERVED	0	7	3	8	0

Calculated Chi-Square goodness of fit test statistic = 9.2501
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

94ec02has
File: 94ec02has Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 13.00
Closest, conservative, Table H statistic = 1362.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 2
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 2.00

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).

TITLE: 94ec02has
TLE: 94ec02has
RANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	control	1	7.0000	7.0000
1	control	2	8.0000	8.0000
1	control	3	8.0000	8.0000
2	6.25%	1	1.0000	1.0000
2	6.25%	2	4.0000	4.0000
2	6.25%	3	0.0000	0.0000
3	12.5%	1	1.0000	1.0000
3	12.5%	2	4.0000	4.0000
3	12.5%	3	1.0000	1.0000
4	25%	1	4.0000	4.0000
4	25%	2	3.0000	3.0000
4	25%	3	4.0000	4.0000
5	50%	1	2.0000	2.0000
5	50%	2	4.0000	4.0000
5	50%	3	1.0000	1.0000
6	100%	1	1.0000	1.0000
6	100%	2	5.0000	5.0000
6	100%	3	2.0000	2.0000

94ec02has
File: 94ec02has Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	control	3	7.000	8.000	7.667
2	6.25%	3	0.000	4.000	1.667
3	12.5%	3	1.000	4.000	2.000
4	25%	3	3.000	4.000	3.667
5	50%	3	1.000	4.000	2.333
6	100%	3	1.000	5.000	2.667

94ec02has
File: 94ec02has Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

RP	IDENTIFICATION	VARIANCE	SD	SEM
1	control	0.333	0.577	0.333
2	6.25%	4.333	2.082	1.202
3	12.5%	3.000	1.732	1.000

4	25%	0.333	0.577	0.333
5	50%	2.333	1.528	0.882
6	100%	4.333	2.082	1.202

94ec02has
File: 94ec02has Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	74.667	14.933	6.110
Within (Error)	12	29.333	2.444	
Total	17	104.000		

Critical F value = 3.11 (0.05,5,12)
Since F > Critical F REJECT Ho:All groups equal

94ec02has
File: 94ec02has Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	7.667	7.667		
2	6.25%	1.667	1.667	4.701	*
3	12.5%	2.000	2.000	4.439	*
4	25%	3.667	3.667	3.134	*
5	50%	2.333	2.333	4.178	*
6	100%	2.667	2.667	3.917	*

Dunnett table value = 2.50 (1 Tailed Value, P=0.05, df=12,5)

94ec02has
File: 94ec02has Transform: NO TRANSFORMATION

DUNNETTS 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	control	3			
2	6.25%	3	3.191	41.6	6.000
3	12.5%	3	3.191	41.6	5.667
4	25%	3	3.191	41.6	4.000
5	50%	3	3.191	41.6	5.333
6	100%	3	3.191	41.6	5.000

94ew01haw
File: wt94ew01 Transform: NO TRANSFORMATION

Chi-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	0.804	2.904	4.584	2.904	0.804
OBSERVED	0	4	4	4	0

Calculated Chi-Square goodness of fit test statistic = 2.5097
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

94ew01haw
File: wt94ew01 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 1.87
Closest, conservative, Table H statistic = 729.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 4, df (# reps-1) = 2
Actual values ==> R (# groups) = 4, df (# avg reps-1) = 2.00

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).

94ew01haw
File: wt94ew01 Transform: NO TRANSFORMATION

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	0.2679	CALCULATED t VALUE =	-4.7355
GRP2 (BLANK CRTL) MEAN =	0.6862	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	-0.4183		

TABLE t VALUE (0.05 (2), 4) = 2.776** SIGNIFICANT DIFFERENCE at alpha=0.05
TABLE t VALUE (0.01 (2), 4) = 4.604** SIGNIFICANT DIFFERENCE at alpha=0.01

wt94ew02
File: wt94ew02 Transform: NO TRANSFORMATION

Chi-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	1.206	4.356	6.876	4.356	1.206
OBSERVED	0	7	4	7	0

Calculated Chi-Square goodness of fit test statistic = 6.8246
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

wt94ew02
File: wt94ew02 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 2.52
Closest, conservative, Table H statistic = 1362.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 6, df (# reps-1) = 2
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 2.00

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).

TITLE: wt94ew02
FILE: wt94ew02
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	silt control	1	0.3925	0.3925
1	silt control	2	0.2475	0.2475
1	silt control	3	0.1637	0.1637
2	gravel control	1	0.5800	0.5800
2	gravel control	2	0.7000	0.7000
2	gravel control	3	0.7787	0.7787
3	4	1	0.3000	0.3000
3	4	2	0.2120	0.2120
3	4	3	0.0500	0.0500
4	8	1	0.0000	0.0000
4	8	2	0.0700	0.0700
4	8	3	0.2375	0.2375
5	16	1	0.2725	0.2725
5	16	2	0.2775	0.2775
5	16	3	0.0000	0.0000
6	32	1	0.0000	0.0000
6	32	2	0.2100	0.2100
6	32	3	0.0000	0.0000

wt94ew02
File: wt94ew02 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	silt control	3	0.164	0.392	0.268
2	gravel control	3	0.580	0.779	0.686
3	4	3	0.050	0.300	0.187
4	8	3	0.000	0.237	0.102
5	16	3	0.000	0.278	0.183
6	32	3	0.000	0.210	0.070

wt94ew02
File: wt94ew02 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

RP	IDENTIFICATION	VARIANCE	SD	SEM
1	silt control	0.013	0.116	0.067
2	gravel control	0.010	0.100	0.058
3	4	0.016	0.127	0.073

4	8	0.015	0.122	0.070
5	16	0.025	0.159	0.092
6	32	0.015	0.121	0.070

wt94ew02
File: wt94ew02 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.759	0.152	9.500
Within (Error)	12	0.189	0.016	
Total	17	0.948		

Critical F value = 3.11 (0.05,5,12)
Since F > Critical F REJECT Ho:All groups equal

wt94ew02
File: wt94ew02 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	silt control	0.268	0.268		
2	gravel control	0.686	0.686	-4.050	
3	4	0.187	0.187	0.780	
4	8	0.102	0.102	1.601	
5	16	0.183	0.183	0.819	
6	32	0.070	0.070	1.916	

Dunnett table value = 2.50 (1 Tailed Value, P=0.05, df=12,5)

wt94ew02
File: wt94ew02 Transform: NO TRANSFORMATION

DUNNETTS 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	silt control	3			
2	gravel control	3	0.258	96.4	-0.418
3	4	3	0.258	96.4	0.081
4	8	3	0.258	96.4	0.165
5	16	3	0.258	96.4	0.085
6	32	3	0.258	96.4	0.198

wt94ee06
File: wt94ee06 Transform: NO TRANSFORMATION

Chi-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	1.407	5.082	8.022	5.082	1.407
OBSERVED	0	7	7	7	0

Calculated Chi-Square goodness of fit test statistic = 4.3919
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

wt94ee06
File: wt94ee06 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 27.17
Closest, conservative, Table H statistic = 1705.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 7, df (# reps-1) = 2
Actual values ==> R (# groups) = 7, df (# avg reps-1) = 2.00

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).

TITLE: wt94ee06
FILE: wt94ee06
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 7

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	silt control	1	0.3925	0.3925
1	silt control	2	0.2475	0.2475
1	silt control	3	0.1637	0.1637
2	gravel control	1	0.5800	0.5800
2	gravel control	2	0.7000	0.7000
2	gravel control	3	0.7787	0.7787
3	5	1	0.1900	0.1900
3	5	2	0.8500	0.8500
3	5	3	0.0200	0.0200
4	10	1	0.2600	0.2600
4	10	2	0.0000	0.0000
4	10	3	0.2300	0.2300
5	20	1	0.1250	0.1250
5	20	2	0.0000	0.0000
5	20	3	0.1600	0.1600
6	40	1	0.0000	0.0000
6	40	2	0.2500	0.2500
6	40	3	0.3800	0.3800
7	80	1	0.0000	0.0000
7	80	2	0.2300	0.2300
7	80	3	0.3533	0.3533

wt94ee06
File: wt94ee06 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	silt control	3	0.164	0.392	0.268
2	gravel control	3	0.580	0.779	0.686
3	5	3	0.020	0.850	0.353
4	10	3	0.000	0.260	0.163
5	20	3	0.000	0.160	0.095
6	40	3	0.000	0.380	0.210
7	80	3	0.000	0.353	0.194

wt94ee06
File: wt94ee06 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM

1	silt control	0.013	0.116	0.067
2	gravel control	0.010	0.100	0.058
3	5	0.192	0.438	0.253
4	10	0.020	0.142	0.082
5	20	0.007	0.084	0.049
6	40	0.037	0.193	0.112
7	80	0.032	0.179	0.104

wt94ee06
File: wt94ee06 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.692	0.115	2.556
Within (Error)	14	0.625	0.045	
Total	20	1.317		

Critical F value = 2.85 (0.05,6,14)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

wt94ee06
File: wt94ee06 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	silt control	0.268	0.268		
2	gravel control	0.686	0.686	-2.415	
3	5	0.353	0.353	-0.493	
4	10	0.163	0.163	0.604	
5	20	0.095	0.095	0.998	
6	40	0.210	0.210	0.334	
7	80	0.194	0.194	0.424	

Dunnett table value = 2.53 (1 Tailed Value, P=0.05, df=14,6)

wt94ee06
File: wt94ee06 Transform: NO TRANSFORMATION

DUNNETTS 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	silt control	3			
2	gravel control	3	0.438	163.6	-0.418
3	5	3	0.438	163.6	-0.085
4	10	3	0.438	163.6	0.105
5	20	3	0.438	163.6	0.173
6	40	3	0.438	163.6	0.058
7	80	3	0.438	163.6	0.073

wt94ee07
File: wt94ee07 Transform: NO TRANSFORMATION

iapiro Wilks test for normality

D = 0.381

W = 0.927

Critical W (P = 0.05) (n = 21) = 0.908
Critical W (P = 0.01) (n = 21) = 0.873

Data PASS normality test at P=0.01 level. Continue analysis.

wt94ee07
File: wt94ee07 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 16.53
Closest, conservative, Table H statistic = 1705.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 7, df (# reps-1) = 2
:tual values ==> R (# groups) = 7, df (# avg reps-1) = 2.00

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).

TITLE: wt94ee07
FILE: wt94ee07
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 7

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	silt control	1	0.3925	0.3925
1	silt control	2	0.2475	0.2475
1	silt control	3	0.1637	0.1637
2	gravel control	1	0.5800	0.5800
2	gravel control	2	0.7000	0.7000
2	gravel control	3	0.7787	0.7787
3	5	1	0.3700	0.3700
3	5	2	0.3400	0.3400
3	5	3	0.0000	0.0000
4	10	1	0.0200	0.0200
4	10	2	0.0000	0.0000
4	10	3	0.3700	0.3700
5	20	1	0.0000	0.0000
5	20	2	0.0000	0.0000
5	20	3	0.3200	0.3200
6	40	1	0.0000	0.0000
6	40	2	0.0000	0.0000
6	40	3	0.0900	0.0900
7	80	1	0.0000	0.0000
7	80	2	0.0300	0.0300
7	80	3	0.3800	0.3800

wt94ee07
File: wt94ee07 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	silt control	3	0.164	0.392	0.268
2	gravel control	3	0.580	0.779	0.686
3	5	3	0.000	0.370	0.237
4	10	3	0.000	0.370	0.130
5	20	3	0.000	0.320	0.107
6	40	3	0.000	0.090	0.030
7	80	3	0.000	0.380	0.137

wt94ee07
File: wt94ee07 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM

1	silt control	0.013	0.116	0.067
2	gravel control	0.010	0.100	0.058
3	5	0.042	0.206	0.119
4	10	0.043	0.208	0.120
5	20	0.034	0.185	0.107
6	40	0.003	0.052	0.030
7	80	0.045	0.211	0.122

wt94ee07
File: wt94ee07 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.851	0.142	5.259
Within (Error)	14	0.381	0.027	
Total	20	1.231		

Critical F value = 2.85 (0.05,6,14)
Since F > Critical F REJECT Ho:All groups equal

wt94ee07
File: wt94ee07 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	silt control	0.268	0.268		
2	gravel control	0.686	0.686	-3.118	
3	5	0.237	0.237	0.233	
4	10	0.130	0.130	1.028	
5	20	0.107	0.107	1.202	
6	40	0.030	0.030	1.773	
7	80	0.137	0.137	0.978	

Dunnett table value = 2.53 (1 Tailed Value, P=0.05, df=14,6)

wt94ee07
File: wt94ee07 Transform: NO TRANSFORMATION

DUNNETTS 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	silt control	3			
2	gravel control	3	0.339	126.7	-0.418
3	5	3	0.339	126.7	0.031
4	10	3	0.339	126.7	0.138
5	20	3	0.339	126.7	0.161
6	40	3	0.339	126.7	0.238
7	80	3	0.339	126.7	0.131

wt94ee08
File: wt94ee08 Transform: NO TRANSFORMATION

Chi-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	1.407	5.082	8.022	5.082	1.407
OBSERVED	0	8	6	7	0

Calculated Chi-Square goodness of fit test statistic = 5.7230
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

wt94ee08
File: wt94ee08 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 6.38
Closest, conservative, Table H statistic = 1705.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 7, df (# reps-1) = 2
Actual values ==> R (# groups) = 7, df (# avg reps-1) = 2.00

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).

TITLE: wt94ee08
ILE: wt94ee08
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 7

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	silt control	1	0.3925	0.3925
1	silt control	2	0.2475	0.2475
1	silt control	3	0.1637	0.1637
2	gravel control	1	0.5800	0.5800
2	gravel control	2	0.7000	0.7000
2	gravel control	3	0.7787	0.7787
3	6.25	1	0.0260	0.0260
3	6.25	2	0.2550	0.2550
3	6.25	3	0.3400	0.3400
4	12.5	1	0.1467	0.1467
4	12.5	2	0.4267	0.4267
4	12.5	3	0.4000	0.4000
5	25	1	0.2233	0.2233
5	25	2	0.3300	0.3300
5	25	3	0.2000	0.2000
6	50	1	0.4050	0.4050
6	50	2	0.3125	0.3125
6	50	3	0.1633	0.1633
7	100	1	0.3033	0.3033
7	100	2	0.0000	0.0000
7	100	3	0.0000	0.0000

wt94ee08
File: wt94ee08 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	silt control	3	0.164	0.392	0.268
2	gravel control	3	0.580	0.779	0.686
3	6.25	3	0.026	0.340	0.207
4	12.5	3	0.147	0.427	0.324
5	25	3	0.200	0.330	0.251
6	50	3	0.163	0.405	0.294
7	100	3	0.000	0.303	0.101

wt94ee08
File: wt94ee08 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM

1	silt control	0.013	0.116	0.067
2	gravel control	0.010	0.100	0.058
3	6.25	0.026	0.162	0.094
4	12.5	0.024	0.155	0.089
5	25	0.005	0.069	0.040
6	50	0.015	0.122	0.070
7	100	0.031	0.175	0.101

wt94ee08
File: wt94ee08 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.604	0.101	5.611
Within (Error)	14	0.248	0.018	
Total	20	0.852		

Critical F value = 2.85 (0.05,6,14)
Since F > Critical F REJECT Ho:All groups equal

wt94ee08
File: wt94ee08 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	silt control	0.268	0.268		
2	gravel control	0.686	0.686	-3.819	
3	6.25	0.207	0.207	0.556	
4	12.5	0.324	0.324	-0.516	
5	25	0.251	0.251	0.153	
6	50	0.294	0.294	-0.235	
7	100	0.101	0.101	1.523	

Dunnett table value = 2.53 (1 Tailed Value, P=0.05, df=14,6)

wt94ee08
File: wt94ee08 Transform: NO TRANSFORMATION

DUNNETTS 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	silt control	3			
2	gravel control	3	0.277	103.5	-0.418
3	6.25	3	0.277	103.5	0.061
4	12.5	3	0.277	103.5	-0.057
5	25	3	0.277	103.5	0.017
6	50	3	0.277	103.5	-0.026
7	100	3	0.277	103.5	0.167

wt94ee09
File: wt94ee09 Transform: NO TRANSFORMATION

Chi-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	1.206	4.356	6.876	4.356	1.206
OBSERVED	0	7	5	6	0

Calculated Chi-Square goodness of fit test statistic = 5.1491
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

wt94ee09
File: wt94ee09 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 8.97
Closest, conservative, Table H statistic = 1362.0 (alpha = 0.01)

sed for Table H ==> R (# groups) = 6, df (# reps-1) = 2
Actual values ==> R (# groups) = 6, df (# avg reps-1) = 2.00

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).

ITTLE: wt94ee09
FILE: wt94ee09
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	silt control	1	0.3925	0.3925
1	silt control	2	0.2475	0.2475
1	silt control	3	0.1637	0.1637
2	gravel control	1	0.5800	0.5800
2	gravel control	2	0.7000	0.7000
2	gravel control	3	0.7787	0.7787
3	6.25	1	0.3400	0.3400
3	6.25	2	0.2250	0.2250
3	6.25	3	0.1650	0.1650
4	12.5	1	0.1950	0.1950
4	12.5	2	0.0850	0.0850
4	12.5	3	0.1040	0.1040
5	25	1	0.2833	0.2833
5	25	2	0.2267	0.2267
5	25	3	0.0000	0.0000
6	50	1	0.3050	0.3050
6	50	2	0.0000	0.0000
6	50	3	0.0000	0.0000

wt94ee09
File: wt94ee09 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	silt control	3	0.164	0.392	0.268
2	gravel control	3	0.580	0.779	0.686
3	6.25	3	0.165	0.340	0.243
4	12.5	3	0.085	0.195	0.128
5	25	3	0.000	0.283	0.170
6	50	3	0.000	0.305	0.102

wt94ee09
File: wt94ee09 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	silt control	0.013	0.116	0.067
2	gravel control	0.010	0.100	0.058
3	6.25	0.008	0.089	0.051

4	12.5	0.003	0.059	0.034
5	25	0.022	0.150	0.087
6	50	0.031	0.176	0.102

wt94ee09
File: wt94ee09 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.697	0.139	9.267
Within (Error)	12	0.177	0.015	
Total	17	0.874		

Critical F value = 3.11 (0.05,5,12)
Since F > Critical F REJECT Ho:All groups equal

wt94ee09
File: wt94ee09 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	silt control	0.268	0.268		
2	gravel control	0.686	0.686	-4.183	
3	6.25	0.243	0.243	0.246	
4	12.5	0.128	0.128	1.399	
5	25	0.170	0.170	0.979	
6	50	0.102	0.102	1.662	

Dunnett table value = 2.50 (1 Tailed Value, P=0.05, df=12,5)

wt94ee09
File: wt94ee09 Transform: NO TRANSFORMATION

DUNNETTS 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	silt control	3			
2	gravel control	3	0.250	93.3	-0.418
3	6.25	3	0.250	93.3	0.025
4	12.5	3	0.250	93.3	0.140
5	25	3	0.250	93.3	0.098
6	50	3	0.250	93.3	0.166

wt94ee10
File: wt94ee10 Transform: NO TRANSFORMATION

Chi-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	1.407	5.082	8.022	5.082	1.407
OBSERVED	0	9	5	7	0

Calculated Chi-Square goodness of fit test statistic = 7.6969
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

wt94ee10
File: wt94ee10 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 41.03
Closest, conservative, Table H statistic = 1705.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 7, df (# reps-1) = 2
Actual values ==> R (# groups) = 7, df (# avg reps-1) = 2.00

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).

TITLE: wt94ee10
FILE: wt94ee10
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 7

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	silt control	1	0.3925	0.3925
1	silt control	2	0.2475	0.2475
1	silt control	3	0.1637	0.1637
2	gravel control	1	0.5800	0.5800
2	gravel control	2	0.7000	0.7000
2	gravel control	3	0.7787	0.7787
3	6.25	1	0.2583	0.2583
3	6.25	2	0.2150	0.2150
3	6.25	3	0.2133	0.2133
4	12.5	1	0.0133	0.0133
4	12.5	2	0.1250	0.1250
4	12.5	3	0.3133	0.3133
5	25	1	0.3225	0.3225
5	25	2	0.2067	0.2067
5	25	3	0.0000	0.0000
6	50	1	0.2100	0.2100
6	50	2	0.1250	0.1250
6	50	3	0.3075	0.3075
7	100	1	0.1440	0.1440
7	100	2	0.1500	0.1500
7	100	3	0.2650	0.2650

wt94ee10
File: wt94ee10 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	silt control	3	0.164	0.392	0.268
2	gravel control	3	0.580	0.779	0.686
3	6.25	3	0.213	0.258	0.229
4	12.5	3	0.013	0.313	0.151
5	25	3	0.000	0.323	0.176
6	50	3	0.125	0.307	0.214
7	100	3	0.144	0.265	0.186

wt94ee10
File: wt94ee10 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM

1	silt control	0.013	0.116	0.067
2	gravel control	0.010	0.100	0.058
3	6.25	0.001	0.026	0.015
4	12.5	0.023	0.152	0.088
5	25	0.027	0.163	0.094
6	50	0.008	0.091	0.053
7	100	0.005	0.068	0.039

wt94ee10
File: wt94ee10 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.624	0.104	8.667
Within (Error)	14	0.173	0.012	
Total	20	0.798		

Critical F value = 2.85 (0.05,6,14)
Since F > Critical F REJECT Ho:All groups equal

wt94ee10
File: wt94ee10 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	silt control	0.268	0.268		
2	gravel control	0.686	0.686	-4.677	
3	6.25	0.229	0.229	0.436	
4	12.5	0.151	0.151	1.312	
5	25	0.176	0.176	1.023	
6	50	0.214	0.214	0.601	
7	100	0.186	0.186	0.912	

Dunnett table value = 2.53 (1 Tailed Value, P=0.05, df=14,6)

wt94ee10
File: wt94ee10 Transform: NO TRANSFORMATION

DUNNETTS 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	silt control	3			
2	gravel control	3	0.226	84.5	-0.418
3	6.25	3	0.226	84.5	0.039
4	12.5	3	0.226	84.5	0.117
5	25	3	0.226	84.5	0.092
6	50	3	0.226	84.5	0.054
7	100	3	0.226	84.5	0.082

wt94ee05
File: wt94ee05 Transform: NO TRANSFORMATION

Chi-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	0.804	2.904	4.584	2.904	0.804
OBSERVED	0	3	6	3	0

Calculated Chi-Square goodness of fit test statistic = 2.0518
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

wt94ee05
File: wt94ee05 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance
Bartletts test for homogeneity of variance

These two tests can not be performed because at least one group has
ero variance.

Data FAIL to meet homogeneity of variance assumption.
Additional transformations are useless.

wt94crec02
File: wt94crec02 Transform: NO TRANSFORMATION

Chi-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	1.407	5.082	8.022	5.082	1.407
OBSERVED	0	8	6	7	0

Calculated Chi-Square goodness of fit test statistic = 5.7230
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

wt94crec02
File: wt94crec02 Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 288.20
Closest, conservative, Table H statistic = 1705.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 7, df (# reps-1) = 2
Actual values ==> R (# groups) = 7, df (# avg reps-1) = 2.00

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).

TITLE: wt94crec02
ILE: wt94crec02
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 7

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	silt control	1	0.3925	0.3925
1	silt control	2	0.2475	0.2475
1	silt control	3	0.1637	0.1637
2	gravel control	1	0.5800	0.5800
2	gravel control	2	0.7000	0.7000
2	gravel control	3	0.7787	0.7787
3	6.25	1	0.1500	0.1500
3	6.25	2	0.3875	0.3875
3	6.25	3	0.0000	0.0000
4	12.5	1	0.0600	0.0600
4	12.5	2	0.4900	0.4900
4	12.5	3	0.1500	0.1500
5	25	1	0.2825	0.2825
5	25	2	0.2967	0.2967
5	25	3	0.2700	0.2700
6	50	1	0.1800	0.1800
6	50	2	0.3925	0.3925
6	50	3	0.1800	0.1800
7	100	1	0.2100	0.2100
7	100	2	0.2700	0.2700
7	100	3	0.4800	0.4800

wt94crec02
File: wt94crec02 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	silt control	3	0.164	0.392	0.268
2	gravel control	3	0.580	0.779	0.686
3	6.25	3	0.000	0.387	0.179
4	12.5	3	0.060	0.490	0.233
5	25	3	0.270	0.297	0.283
6	50	3	0.180	0.392	0.251
7	100	3	0.210	0.480	0.320

wt94crec02
File: wt94crec02 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM

1	silt control	0.013	0.116	0.067
2	gravel control	0.010	0.100	0.058
3	6.25	0.038	0.195	0.113
4	12.5	0.051	0.227	0.131
5	25	0.000	0.013	0.008
6	50	0.015	0.123	0.071
7	100	0.020	0.142	0.082

wt94crec02
File: wt94crec02 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.511	0.085	4.048
Within (Error)	14	0.297	0.021	
Total	20	0.808		

Critical F value = 2.85 (0.05,6,14)
Since F > Critical F REJECT Ho:All groups equal

wt94crec02
File: wt94crec02 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	silt control	0.268	0.268		
2	gravel control	0.686	0.686	-3.536	
3	6.25	0.179	0.179	0.750	
4	12.5	0.233	0.233	0.292	
5	25	0.283	0.283	-0.128	
6	50	0.251	0.251	0.144	
7	100	0.320	0.320	-0.440	

Dunnett table value = 2.53 (1 Tailed Value, P=0.05, df=14,6)

wt94crec02
File: wt94crec02 Transform: NO TRANSFORMATION

DUNNETTS 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	silt control	3			
2	gravel control	3	0.299	111.7	-0.418
3	6.25	3	0.299	111.7	0.089
4	12.5	3	0.299	111.7	0.035
5	25	3	0.299	111.7	-0.015
6	50	3	0.299	111.7	0.017
7	100	3	0.299	111.7	-0.052

TITLE: wt94ee05
FILE: wt94ee05
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 4

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	silt control	1	0.3925	0.3925
1	silt control	2	0.2475	0.2475
1	silt control	3	0.1637	0.1637
2	gravel control	1	0.5800	0.5800
2	gravel control	2	0.7000	0.7000
2	gravel control	3	0.7787	0.7787
3	6.25	1	0.0000	0.0000
3	6.25	2	0.5200	0.5200
3	6.25	3	0.0000	0.0000
4	12.5	1	0.0000	0.0000
4	12.5	2	0.1700	0.1700
4	12.5	3	0.2400	0.2400

wt94ee05
File: wt94ee05 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	silt control	3	0.164	0.392	0.268
2	gravel control	3	0.580	0.779	0.686
3	6.25	3	0.000	0.520	0.173
4	12.5	3	0.000	0.240	0.137

wt94ee05
File: wt94ee05 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	silt control	0.013	0.116	0.067
2	gravel control	0.010	0.100	0.058
3	6.25	0.090	0.300	0.173
4	12.5	0.015	0.123	0.071

wt94ee05
File: wt94ee05 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	3	0.576	0.192	6.000
Within (Error)	8	0.258	0.032	
Total	11	0.833		

Critical F value = 4.07 (0.05,3,8)
Since F > Critical F REJECT Ho:All groups equal

wt94ee05
File: wt94ee05 Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	silt control	0.268	0.268		
2	gravel control	0.686	0.686	-2.864	
3	6.25	0.173	0.173	0.647	
4	12.5	0.137	0.137	0.898	

Dunnett table value = 2.42 (1 Tailed Value, P=0.05, df=8,3)

wt94ee05
File: wt94ee05 Transform: NO TRANSFORMATION

DUNNETTS 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	silt control	3			
2	gravel control	3	0.353	131.9	-0.418
3	6.25	3	0.353	131.9	0.095
4	12.5	3	0.353	131.9	0.131

1994 Tinker Chronic Survival H. azteca - EE01
File: ee0194bas Transform: 1/SQUARE ROOT(Y+0.5)

Chi-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	1.206	4.356	6.876	4.356	1.206
OBSERVED	0	9	4	5	0

Calculated Chi-Square [illegible] test statistic = 8.6612
Table Chi-Sq[illegible] = 13.277

Data PASS normality test. Continue analysis.

1994 Tinker Chronic Survival H. azteca - EE01
File: ee0194b [illegible] SQUARE ROOT(Y+0.5)

Hartley test for homogeneity of variance
Bartletts test [illegible] of variance

These two tests [illegible] because at least one group has zero variance.

Data FAIL to [illegible] variance assumption.
Additional t[illegible].

1994 Tinker Chronic Survival H. azteca - EE01
File: ee0194bcg Transform: 1/SQUARE ROOT(Y+0.5)

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

GROUP	IDENTIFICATION		TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1		[illegible]	0.224				
2		[illegible]5	0.[illegible]4	15.00	None	3	
3		[illegible].5	0.[illegible]6	15.00	None	3	
4		[illegible]5	0.[illegible]6	15.00	None	3	
5		[illegible]	0.[illegible]1	12.00	None	3	
6		[illegible]	0.[illegible]6	15.00	None	3	

Critical values [illegible] = 5, one tailed, and alpha = 0.05

1994 Tinker Chronic Survival H. azteca - EC01
File: ec0194bas Transform: 1/SQUARE ROOT(Y+0.5)

i-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	1.206	4.356	6.876	4.356	1.206
OBSERVED	0	6	5	7	0

Calculated Chi-Square goodness of fit test statistic = 5.1491
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

1994 Tinker Chronic Survival H. azteca - EC01
File: ec0194b [illegible] SQUARE ROOT(Y+0.5)

Hartley test [illegible] variance
Bartletts test [illegible] variance

These two tests [illegible] because at least one group has zero variance.

Data FAIL test [illegible] variance assumption.
Additional t[illegible].

1994 Tinker Chronic Survival H. azteca - EC01
File: ec01[illegible] Transform: 1/SQUARE ROOT(Y+0.5)

[illegible]LCOXON RANK SUM TEST W/ BONFERRONI ADJUSTMENT - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	[illegible]	[illegible]				
2	[illegible]	[illegible]	15.00	None	3	
3	[illegible]	[illegible]	15.00	None	3	
4	[illegible]	[illegible]	15.00	None	3	
5	[illegible]	[illegible]	10.50	None	3	
6	[illegible]	[illegible]	15.00	None	3	

Critical [illegible] = 5, [illegible] 1 tailed, and alpha = 0.05

05 Nov 94

CMC preparing "control mud" for Tinker sediment tests using following recipe:

770g sand (~~513g fine + 257g mod~~ CMC) Industrial sand The Marie Co.
170g #400 silt
100g cow manure (Pioneer South Compost ; Manu
10g dolomite (Estes Ultrareef)
0.15g humic acid

Add 0.5 ± liter ~~DI~~ spring water CMC
Add 5 mL of 36.7g Trout Chow suspension / 100mL DI water

Completed 4 of above, adding each to a 5-gal bucket

Then added
Silt 4*170 = 680g
Added Cow manure 4*100 = 400g
Added humic acid 0.15*4 = 0.6g
Trout chow suspension 5mL*4 = 20mL
mixed and added 5-gal bucket.
Then added 770g*4 = 3,080g sand
added dolomite 10g*4 = 40g
mixed all thoroughly.

Repeated + added 1L water
∴ 12 batches so far w/ 250mL each

(2)

Prepared another 4-batch using 1L water total.

Summary → 16 batches w/ avg 250 mL water each. CMZ

06 Nov 94

~1000 Began making additional "control mud" at 4 recipes per batch using total 1L water.

ie

680 g #400 silt
400 g cow manure
0.6 g humic acid
20 mL trout chow suspension
mix thoroughly
add 3000 g sand and 1L spring water
and 40 g dolomite

made 2 batches.

Calculation of sediment volumes.

Basis

4 replicates of 100, 50, 25, 12.5 and 6.25% plus

Volume for each replicate = 100 mL * 4 reps = 400 mL for

SED CONCENTRATION (%)	Volume Test Sed (mL)	Volume Cont Sed (mL)	Total Volume (mL)
100	400	0	400
50	200	200	400
25	100	300	400
12.5	50	350	400
6.25	25	375	400
0	0	400	400
Tot Volume requirements	775	1625	2400

First four sediment samples = EW01, EW02, EW03, EE10

Method used to prepare sample dilutions:

(1) Glass bowls, glass beakers cleaned with liquinox, water rinse, nitric acid, tapwater rinse, ethanol rinse, tapwater rinse, DI rinse. Stainless Steel spatulas cleaned similarly except no acid step.

(4)

06Nov94 cont.

(2) Sediment homogenized w/in sample container using SS spoon.

(3) Appropriate volume ~~of~~ of test sediment added to graduated 500 mL ~~ft~~ beaker. Control sediment added to bring total volume to 400 mL.

(4) Beaker contents added to glass ~1.5 qt. pyrex mixing bowl and mixed thoroughly using SS spoon.

(5) ~ Equal amounts distributed to 4 ~250-mL glass test jars. Jars were new and had been DI rinsed.

(6) This process was repeated progressing from the 6.25 to 50% test concentration. Beakers, spoons & spatulas were tapwater and DI rinsed between each concentration. Control and 100% were added directly to test jars using sediment height as an approximation of test volume.

EW01 Completed ~ 1330 hrs.
EW01 was red muck. No sand indicated
EW02 also red muck but with some sand. Completed 1450 hrs.
EE10 completed 1450 hrs. EE10 black. A distinct anoxic odor. Muck w/ some pebbles.

EW03 had a sand/gravel texture.

For control, mixed standard control 50:50 v/v w/ DSI Filter (more coarse) sand to more closely approximate EW03 texture. DSI sand was rinsed w/ DI water and was wet when mixed. Still didn't look right. Removed mixing

(250mL) 1 base sediment
(500mL) 2 DSI filter sand (rinsed)
3 150 mL aquarium gravel (rinsed)

Completed ~1700 hrs

Random Assignment of test jars to water delivery systems
Used random numbers of Rolff

system 1 (Rolff)

of drain

22	37	13	32	15
19	10	05	38	07
08	02	04	18	40
39	41	12	42	17
23	24	16	03	27
25	06	26	44	31
21	09	30	11	29
43	33	14	36	20
35	28	34	01	X

1 - 4 ; Control
5 - 8 ; EW01 6.25%
9 - 12 ; EW01 12.5%
13 - 16 ; EW01 25%
17 - 20 ; EW01 50%
21 - 24 ; EW01 100%
25 - 28 ; EW02 6.25%
29 - 32 ; EW02 12.5%
33 - 36 ; EW02 25%
37 - 40 ; EW02 50%
41 - 44 ; EW02 100%

of Drain

EW01 100%	EW02 50%	EW01 25%	EW02 12.5%	EW01 25%
EW01 50%	EW01 12.5%	EW01 6.25%	EW02 50%	EW01 6.25%
EW01 6.25%	Control	Control	EW01 50%	EW02 50%
EW02 50%	EW02 100%	EW01 12.5%	EW02 100%	EW01 50%
EW01 100%	EW01 100%	EW01 25%	Control	EW02 6.25%
EW02 6.25%	EW01 6.25%	EW02 6.25%	EW02 100%	EW02 12.5%
EW01 100%	EW01 12.5%	EW02 12.5%	EW01 12.5%	EW02 12.5%
EW02 100%	EW02 25%	EW01 25%	EW02 25%	EW01 50%
EW02 25%	EW02 6.25%	EW02 25%	Control	X

cycle time set at 1 minute ; Flow set at 4.2 L/minute

48 ~~replicates~~ . 4 x 200 mL / cycle . 4 cycles / day . @ replicate / 175 ml / 300 mL = 1 / 48 repl = 2.0

system 2 (Jeff)

05	23	33	36	29	
21	41	12	19	02	
08	38	13	46	03	
45	22	43	34	06	
37	17	35	31	18	
14	04	09	20	32	
39	16	11	27	47	
01	15	44	07	40	
48	25	30	26	42	
10	24	X	28	X	

1-4 ; Control

5-8 ; Particle size control (C

9-12 ; EW03 6.25%

13-16 ; EW03 12.5%

17-20 ; EW03 25%

21-24 ; EW03 50%

25-28 ; EW03 100%

29-32 ; EE10 6.25%

33-36 ; EE10 12.5%

37-40 ; EE10 25%

41-44 ; EE10 50%

45-48 ; EE10 100%

PZ control	EW03 50%	EE10 12.5%	EE10 12.5%	EE10 6.25%
EW03 50%	EE10 50%	EW03 6.25	EW03 25%	Control
PZ control	EE10 25%	EW03 12.5%	EE10 100%	Control
EE10 100%	EW03 50%	EE10 50%	EE10 12.5%	PZ Control
EE10 25%	EW03 25%	EE10 12.5%	EE10 6.25%	EW03 25%
EW03 12.5%	Control	EW03 6.25%	EW03 25%	EE10 6.25%
EE10 25%	EW03 12.5%	EW03 6.25%	EW03 100%	EE10 100%
Control	EW03 12.5%	EE10 50%	PZ Control	EE10 25%
EE10 100%	EW03 100%	EE10 6.25%	EW03 100%	EE10 50%
EW03 6.25%	EW03 50%	X	EW03 100%	X

cycle time set at 1 minute ; Flow set at 4.2 L/minute

nute

2.0

$$\frac{4200\ mL}{cycle} \cdot \frac{4\ cycles}{dose} \cdot \frac{@rep}{175\ mL} \cdot \frac{1}{48\ rep} = 2.0$$

11/8/94
MLS Dilutions on first five H. azteca sediment samples.
1115 (EW01, EW02, ~~EW03~~ EE10, SC-EE06, SC-EE07)
Test Sample #'s 1, 2, 4, 5 and 6, consecutively.

Method used to prepare sediment dilutions same as 11/6/94.

Sample (SC-EE06) Test sample # 5 : brown muck. No sand indicated.
Sample #6 (SC-EE07) Brown muck with some sand.

Completed at 1715 hours. Added 300 mL Spring water to each replicate.
Completed at 1800 hours. MLS

11/9/94 MLS
1400

Sample 1	Initial D.O.'s (EW-01)
6.25	4.7
12.5	4.8
25	5.4
50	5.5
100	5.5
Control	4.4

Sample 2 (EW-02)	DO
6.25	4.7
12.5	5.0
25	5.1
50	5.5
100	5.8

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EE07)
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)

Sample 4 (EE10) D.O.

6.25	4.9
12.5	4.7
25	4.7
50	2.6
100	3.4

Sample 5

6.25	4.6
12.5	5.0
25	5.1
50	5.1
100	4.6

Sample 6

6.25	1.9
12.5	1.9
25	1.3
50	1.2
100	6.1

11/10/94 RK 0830 some pipettes fell out of the air tube, sometimes during the night. DO measured before reconnection

Test 6	6.25 C	6.3 mg/l	Test 6 6.25 c aerated 7.6
6	12.5 A	3.7	
6	25 B	4.4	
1	25 D	5.5	
1	50 B	5.3	
2	100 B	6.3	
6	6.25 A	4.6	

all pipetts were reconnected and taped.

H. azteca system

Recorded By TH 11/10/94 11: RK

	Test 1	2	4	5	6	Cont.
D.O.						7.8
Temp						25.
D.O. 6.25(A)	7.5	7.6	7.9	7.9	7.2	
Temp	25.5	26.0	26.5	25.5	25.5	
D.O. 12.5(A)	7.1	7.7	7.7	7.6	7.1	
Temp	25.5	25.5	26.0	25.0	25.5	
D.O 25(A)	7.7	7.6	7.7	7.5	7.8	
Temp	25.5	25.5	25.5	26.0	25.5	
DO 50(A)	7.6	7.8	7.8	7.7	7.2	
Temp	11/10/94 7.6 25.5	25.5	26.5	25.5	25.5	
D.O 100(A)	7.6	7.8	7.2	7.5	7.8	
Temp	26.0	25.5	25.5	25.0	26.0	

Test 6, 50B Temp 25.5, D.O. 7.5

Test 2, 12.5B Temp 26.0

11/10/94
MLS Prepared dilutions for samples 7, 8, 11 and 15 for H. azteca. Added spring water to cover.

11/10/94 MLS

L. variegatus system

Cont 7.8 25.5

	Test 1 (MUTT) EW01	2 EW02	3 (JEFF) EW03	4 EE10
D.O. 6.25	6.9	6.9	7.2	7.6
Temp	18.0	18.8	18.0	18.0
D.O. 12.5	7.1	6.7	7.5	7.2
Temp	18.0	19.0	18.0	18.0
D.O 25	6.8	6.7	7.3	7.3
Temp	18.6	19.0	18.0	18.0
D.O 50	7.0	6.9	7.3	~~MLS~~ 6.8
Temp	19.0	18.0	18.2	18.0
D.O. 100	7.0	6.7	~~MLS~~ 7.7	7.3
Temp	19.0	18.8	18.5	18.0
D.O. Control	7.0		~~MLS~~ ~~7.8~~ 7.0	
Temp	18.5		18.0	
D.O. SC Control for Test 3			7.2	
Temp.			18.2	

7, 8,
pring

Ending Lumbriculus Water Quality Parameters

11/11

	TEST 1 EW01	TEST 2 EW02	TEST 3 CW03 ~~EW03~~ LJT	TEST 4 EE10 ~~EW04~~ LJT
DO CONTR	6.9		(SC) 7.1	6.4
pH	7.92		8.10	7.84
CON	~~397~~ ~~394~~		404	409
temp	19.8		18.2	19.0
DO	6.8	7.1	7.2	7.1
pH 6.25	8.13	8.04	8.13	7.88
CON	367	424	407	411
temp	19.8	20.0	18.2	19.2
DO 1	7.0	6.8	7.0	6.4
pH	8.13	7.99	8.15	7.93
CON 12.5	309	425	422	414
Temp	19.5	20.0	18.5	18.9
DO	7.1	7.1	6.8	6.3
pH	8.14	8.09	8.13	7.94
CON 25	363	382	400	408
Temp	19.0	20.0	18.2	19.1
DO	7.0	7.2	7.5	6.6
pH 50	8.09	8.16	8.18	7.95
CON	396	366	400	398
Temp	19.5	20.0	18.0	19.0
DO	7.1	7.2	7.6	7.2
pH 100	8.17	8.12	8.27	8.02
CON	382	361	387	397
temp	20.0	19.5	18.2	19.0

COUNTING L. variegatus

MOTT-

CONTROL 13 ALL ALIVE

11/11/94 0950 MLS Final Counts for L. variegatus Tests 1-4

Con A for Test 1&2: 13 alive Con C: 10

Con B: 9 Con D: 10

Test 1	6.25A: 10	6.25C: 11
EW01	6.25B: 12	6.25D: 13
	12.5A: 13	12.5C: 11
	12.5B: 11	12.5D: 12
	25A: 12	25 ~~A~~ MLS C: 14
	25B: 16	25D: 12
	50A: 25	50C: 13
	50B: 12	50D: 12
	100A: 19	100C: 13
	100B: 21	100D: 18
Test 2	6.25A: ~~MLS~~ 10	6.25C: 10
EW02	6.25B: 10	6.25D: 10
	12.5A: 10	12.5C: 10
	12.5B: 10	12.5D: 9
	25A: 11	25C: ~~MLS~~ 12
	25B: 10	25D: MLS ~~12~~ 13
	50A: Ø (no organisms were added)	50C: 10
	50B: 10	50D: 11
	100A: 10	100C: 11
	100B: 11	100D: 13

T3	Con A: 10	Con C: 10
	Con B: 10	Con D: 9
Test 3	6.25 A: 10	6.25 C: 10
EW03	6.25 B: 10	6.25 D 10
	12.5 A: 10	12.5 C: 10
	12.5 B 10	12.5 D: 9
	25 A: 11	25 C: 10
	25 B: 10	25 D: 10
	50 A 10	50 C: 9
	50 B 11	50 D: 10
	100 A 11	100 C: 11
	100 B 11	100 D: 11
Test 4	6.25 A 11	6.25 C 11
EE10	6.25 B 10	6.25 D 11
	12.5 A 10	12.5 C 10
	12.5 B 10	12.5 D 10
	25 A 10	25 C 10
	25 B 10	25 D 10
	50 A 10	50 C 10
	50 B 10	50 D 10
	100 A 10	100 C 11
	100 B 10	100 D 10
	Con A 10	Con C 10
	Con B 10	Con D 10

H. Azteca System - in situ

11/11/94
14:30 RK

	Test 1	2	4	5	6	control B
DO (mg/l)						7.4
Temp (°C)						24.5
DO mg/l 6.25 (B)	7.5	①8.3	7.2	7.3	7.7	
T°C	25	25.5	25	25.0	25.5	
DO 12.5 B	7.3	7.2	7.6	7.6	6.4	
T°C	25.5	25	25	25	25.5	
DO 25 B	7.2	7.1	7.5	7.3	7.4	
T°C	25	25.5	25	25.5	25	
DO 50 B	7.3	7.2	7.4	7.4	7.3	
T°C	25.5	24.5	25	25.5	25	
DO 100 B	7.6	7.2	7.3	7.3	7.5	
T°C	25.5	25.0	25	25	25.5	

①when air was adjusted new reading was 7.4

H. Azteca in situ

11/12/94
11:30 RK+MAR

Test	1	2	4	5	6	Control
DO (mg/l						7.4
temp(°C)						25.0
DO 6.25C	7.6	6.5	7.6	7.3	6.7	
Temp	25.5	25.5	25.0	25.0	25.5	
DO 12.5C	7.6	7.3	7.3	7.3	7.3	
Temp	25.0	26.0	25.0	26.0	25.0	
DO 25C	7.1	7.1	~~25.5~~ 7.6	6.2	6.4	
Temp	25.0	25.5	25.5	25.0	25.0	
DO 50C	6.9	7.5	7.5	7.4	7.3	
Temp	25.5	25.5	25.0	25.5	25.0	
DO 100C	7.6	7.3	7.2	7.3	6.2	
Temp	25.0	25.0	26.0	25.0	25.0	

Test	7	8	11	15	Cont A
DO					6.8
Temp					25.0
DO 6.25A	7.7	7.4	7.6	7.6	
Temp	25.0	25.0	25.0	25.0	
DO 12.5A	7.6	7.8	7.7	7.8	
temp	25.0	24.5	25.0	25.0	
DO 25A	7.8 ~~7.7~~ ~~25.~~ MAR	7.8	7.7	7.7	
temp	25.0	25.0	25.0	25.0	
DO 50A	7.5	7.8	7.7	7.9	
temp	25.0	24.5	25.0	25.5	
DO 100A	7.0	7.8	7.7	7.7	
Temp	25.0	25.0	25.0	24.5	

Ending Parameters

11/13/94 H. azteca Samples 1, 2, 4, & 5 & 6

Test 10:00 20 ml were Transferred into cups, Measured at Room Tem

Control	Test →	1	2	4	5	6	Contro
7.4	DO (mg/l)						7.7
25.0	pH						8.5
	Cond (µmhos/cm)						766
	T°C						23.2
	DO 6.25 D	7.0	7.0	7.7	7.3	4.9	
	T°C	23.5	23.2	23.0	23.2	23.0	
	DO 12.5 D	7.3	7.5	7.6	7.4	7.4	
	T°C	23.8	23.3	23.0	23.0	23.0	
	DO 25 D	7.5	7.4	7.5	7.5	7.2	
	T°C	23.3	23.8	23.2	23.2	23.0	
	DO 50 D	7.6	7.1	7.2	7.3	7.2	
	T°C	23.2	23.8	23.8	23.2	23.0	
	DO 100 D	7.5	7.6	7.2	7.8	7.9	
	pH	8.28	8.48	8.15	8.28	8.44	
Cont A	Cond	418	490	537	480	401	
6.8	T°C	23.0	23.0	23.0	22.8	23.5	
25.0							

H. Azteca in situ

11/13/94 RK
16:40

Test	7	8	11	15	Cont
DO (mg/l)					7.9
T°C					24.5
DO 6.25 B	7.6	7.5	6.9	7.8	
T°C	24.5	24	24	24.5	
DO 12.5 B	7.6	7.8	7.5	7.5	
T°C	24.5	24	24	24.5	
DO 25 B	7.6	7.6	7.6	8.0	
~~DO~~ T°C	24	24	24	24	
DO 50 B	7.8	7.6	7.8	7.9	
T°C	24.5	24	24.5	24.5	
DO 100 B	6.9	7.6	7.7	7.8	
T°C	24.5	24.5	24	24	

11/13/94 RK
17:10

Lumbriculus in situ

Test	5	6	Refl Cont	7	8	Mutt Cont
DO			5.8			5.5
T°C			21°C			21°C
DO 6.25	5.4	5.2		4.8	5.0	
T°C	20	21		21	21	
DO 12.5	6.4	5.6		5.6	5.5	
T°C	21	20		21	21	
DO 25	6.1	5.8		5.0	5.9	
T°C	21	21		21	21	
DO 50	6.2	5.7		5.1	6.3	
T°C	21°C	20		21	21	
DO 100	5.6	6.0		4.2	6.0	
T°C	21	21		21	21	

11/14/94 Lumbriculus in situ

MLS

Test	5	6	7	8	1 Con Mutt	5 Con Jeff
Cont. D.O.	~~MLS 4.9~~	~~MLS 5.3~~			5.5	4.9
Temp	~~MLS 20.1~~	~~MLS 21.0~~			20.9	20.1
D.O	5.3	5.3	5.2	4.7		
Temp 6.25	~~MLS 19.8~~ 21.1°C	21.0	20.5	20.8		
D.O.	4.6	5.3	4.9	4.6		
Temp 12.5	20.5	20.0	21.0	20.2		
D.O. 25	4.5	4.8	4.9	5.2		
Temp	20.8	20.2	20.2	20.4		
DO. 50	5.3	5.1	4.2	~~MLS 20.4~~	4.6	
Temp	20.2	20.5	20.2	20.4		
D.O. 100	5.0	5.2	3.0	4.9		
Temp	20.0	20.7	21.0	20.5		

11/14/94 RS H azteca in situ

17:20

Test	7	8	11	15	Cont.
DO					7.6
Tc					24.2
DO 6.25 C	7.5	7.7	7.3	7.8	
Tc	24.5	24.0	24.5	24.2	
D.O 12.5 C	7.7	7.6	7.6	~~MLS 7.0~~ 7.8	
Temp	24.2	24.0	24.5	24.5	
DO 25 C	7.4	7.3	7.7	7.8	~~MLS 7.8~~
Temp	24.0	24.0	24.5	24.0	~~MLS 24.2~~
DO 50 C	7.5	7.4	7.8	7.9	
Temp	24.0	24.5	24.0	24.0	
DO 100 C	7.1	7.8	7.6	8.0	
Temp	24.5	24.2	24.0	24.0	

11/4/94
MLS

Final Counts - H. azteca #1, 2, 4, 5, & 6

	Con	A	10	
		B	16	
Test 1	6.25	A	10	
EW01		B	10	
	12.5	A	9	
		B	10	
	25	A	9	
		B	9	
	50	A	6	
		B	10	
	100	A	6	
		B	4	
Test 2	6.25	A	10	
EW02		B	10	
	12.5	A	11	
		B	11	
	25	A	8 + 1 dead	
		B	9	
	50	A	7 + 1 dead	
		B	7	
	100	A	2 + 3 dead	
		B	0 + 5 dead	
Test 4	6.25	A	10	
EE10		B	11	
	12.5	A	10	
		B	9	
	25	A	10	
		B	10	
	50	A	10	
		B	10	

Con	C	10	
	D	9	
6.25	C	9	
	D	10	
12.5	C	9	
	D	7	
25	C	7	
	D	8	
50	C	6	
	D	8	
100	C	9 + 1 dead	
	D	5	
6.25	C	9	
	D	10	
12.5	C	12	
	D	11	
25	C	10	
	D	11	
50	C	8 + 1 dead	
	D	5	
100	C	0 + 4 dead	
	D	0 + 5 dead	
6.25	C	9	
	D	14	
12.5	C	9	
	D	8 + 1 dead	
25	C	10	
	D	12	
50	C	10	
	D	10	

Test 4	100 A	10	100 C 12
Cont	B	10	D 9
Test 5	6.25 A	9	6.25 C 9
EE06	B	8	D 10
	12.5 A	10	12.5 C 8
	B	7 + 1 dead	D 7 + 1 dead
	25 A	6	25 C 8 + 2 dead
	B	8	D 7
	50 A	6 + 3 dead	50 C 6 + 4 dead
	B	6	D 7
	100 A	2 + 1 dead	100 C 7
	B	4	D 4
Test 6	6.25 A	10	6.25 C 10
EE07	B	10	D 10 + 4 dead
	12.5 A	8	12.5 C 9
	B	10	D 10
	25 A	10	25 C 10
	B	10	D 11
	50 A	10	50 C 10
	B	8	D 7
	100 A	4	100 C 3
	B	2	D 3

11/15/94
MLS

Took down tests 7, 8, 11 & 15 for H. azteca
Starting H. azteca #12, 13 & 14.

11/15/94 MLS

Final Parameters-H. azteca 7, 8, 11 & 15

		Test 7	Test 8	Test 11	Test 15
DO		7.7			
pH	Control	8.38			
temp	*	23.5			
Cond		741			
DO		7.7	~~MLS 8.5~~ 7.6	7.7	7.7
pH	6.25	8.40	8.43	8.47	8.46
temp	*	23.5	23.5	23.5	23.5
Cond		692	735	687	665
DO		7.7	~~MLS 8.6~~ 7.7	7.5	7.7
pH	12.5	8.46	8.45	8.45	8.51
temp	*	23.5	23.5	23.6	23.5
Cond		707	735 ~~8.45~~	673	671
DO		7.7	~~MLS 8.6~~ 7.6	7.5	7.8
pH	25	8.44	8.46	8.47	8.53
temp	*	23.4	23.5	23.5	23.5
Cond		685	724	655	660
DO		7.5	~~MLS 8.7~~ 7.7	7.5	7.8
pH	50	8.50	8.44	8.53	8.50
temp	*	23.5	23.5	23.5	23.5
Cond		666	599	592	596
DO		7.4	7.0	7.5	7.8
pH	100	8.45	8.16	8.53	8.43
temp	*	23.5	23.5	23.5	23.5
Cond		631	480	511	485

* all temperatures taken 10 minutes after removing test from environmental chamber.

11/15/94 — Beginning Parameters - H. azteca #12, 13 & 14

MLS

		Test 12	Test 13	Test 14
D.O.	Ammonia Control	7.6	~~MLS~~	
pH		8.46/0.00	~~8.43~~ MLS	
temp		22.7		
Cond		490	~~483~~ MLS	
Hrdns		220		
Alk		190		
D.O	Ammonia 6.25	7.5	7.3	7.5
pH		8.42/0.00	~~8.44~~ 8.43 MLS /0.00	8.47/0.00
temp		22.7	22.0	21.7
Cond		476	484	601
~~Hrdns~~ MLS				
~~Alk~~ MLS				
D.O	12.5	7.4	7.3	7.5
pH		8.41	~~8.43~~ MLS 8.44	8.44
temp		22.5	22.0	21.7
Cond		485	~~476~~ MLS 484	598
D.O	25	7.3	7.3	7.4
pH		8.41	~~8.48~~ MLS 8.45	8.45
temp		22.5	22.0	21.6
Cond		451	~~447~~ MLS 466	558
DO	50	7.3	7.2	7.4
pH		8.42	~~8.55~~ MLS 8.48	8.44
temp		22.3	22.0	21.6
Cond		446	~~365~~ 447 MLS	513
DO	Ammonia 100	7.4	7.4	7.4
pH		8.38/0.00	8.55/0.00	8.44/0.00
temp		22.3	21.8	21.6
Cond		362	365	407
Hrdns		~~200~~	~~200~~	210
Alk		190	200	200

11/15/94 MLS Final Counts - H. azteca #7, 8, 11 & 15

Con	A	10	C	10
	B	9+1 dead	D	9
Test 7	6.25 A	10	6.25 C	10
	B	10	D	9
	12.5 A	10	12.5 C	9
	B	10	D	10
	25 A	10	25 C	21 (added 20 H. azteca by accident)
	B	10	D	10
	50 A	10	50 C	18 (added 20 H. azteca by accident)
	B	9	D	9
	100 A	9	100 C	8
	B	6	D	9
Test 8	6.25 A	10	6.25 C	10
	B	9	D	10
	12.5 A	10	12.5 C	10
	B	10	D	10
	25 A	9	25 C	9
	B	7	D	8
	50 A	8	50 C	10
	B	9	D	9
	100 A	8 + 1 dead	100 C	7
	B	2 + 4 dead	D	6 + 2 dead
Test 11	6.25 A	10	6.25 C	10
	B	~~MLS~~ 9	D	10
	12.5 A	10	12.5 C	10
	B	10	D	9
	25 A	11	25 C	9
	B	9	D	8
	50 A	10	50 C	9
	B	11	D	9

Test 11

Cont.	100	A 10	100 C 8 + 1 dead
		B 10	D 10
Test 15	6.25	A 10	6.25 C 10
		B 11	D ~~mos~~ 10
	12.5	A 10	12.5 C 9
		B 10	D 10
20 H. aztecа cident	25	A 12	25 C 11
		B 10	D 10
1 20 H. aztecа scident	50	A 10	50 C 10
		B 11	D 10
	100	A 10	100 C 10
		B 9	D 9

11/15/94 H. aztecа in Situ #3, 9, & 10 - DAY 1

mls

	Test 3	Test 9	Test 10	Control
D.O. B	/	/	/	7.5
temp				25.0
D.O 6.25	7.7	7.7	7.4	
temp B	24.8	24.8	25.0	
D.O 12.5	7.8	7.8	7.9	
Temp: B	24.5	24.8	25.0	
D.O 25	7.8	7.9	7.9	
temp:	24.9	25.3	24.8	
D.O 50	7.8	7.7	7.7	
temp	24.9	24.5	24.8	
DO 100	7.9	7.7	7.8	
temp	24.5	24.5	24.5	

11/15/94

	9	10	11	12	Con S	Con G	PZ
* L. variegatus test 9, 10, 11, 12 (in situ) – DAY 1							
DO.					6.3	5.5	6.3
temp.					21.0	21.0	21.2
D.O. 6.25	6.5		6.6	6.2	6.2		
temp. B	21.0		21.0	21.0	21.0		
D.O. 12.5	6.8		6.3	6.1	6.3		
temp. B	21.8		21.2	21.0	21.0		
D.O. 25	6.3		6.2	6.1	5.9		
temp. B	21.2		21.4	21.1	21.0		
DO 50	6.3		6.4	5.3	6.2		
temp B	21.4		21.0	20.8	21.0		
D.O. 100	6.7		6.5	5.7	6.4		
temp B	21.0		21.0	21.2	21.0		

PZ 11/16/94 End Lumbriculus Tests 5, 6, 7, 8 - Final Counts

	Control	A: 11	Control C:	10
6.3		B: 11	D:	10
21.2	Test 5	6.25 A: 10	6.25 C:	10
		6.25 B: 10	6.25 D:	10
		12.5 A: 10	12.5 C:	10
		12.5 B: 10	12.5 D:	11
		25 A: 11	25 C:	10
		25 B: 10	25 D:	10
		50 A: 10	50 C:	11
		50 B: 10	50 D:	11
		100 A: 10	100 C:	11
		100 B: 10	100 D:	11
	Test 6	6.25 A: 10	6.25 C:	10
		B: 10	D:	10
		12.5 A: 10	12.5 C:	10
		B: 10	D:	11
		25 A: 10	25 C:	10
		B: 10	D:	10
		50 A: 10	50 C:	10
		B: 10	D:	10
		100 A: 10	100 C:	10
		B: 9	D:	9

11/16/94

Final Counts Lumbriculus (Continued) Tests 5, 6, 7, 8

Control	A: 11	Control C 10
	B: 10	D 10
Test 7	6.25 A: 10	6.25 C: 10
	B: 11	D: 10
	12.5 A: 10	12.5 C: 10
	B: 10 + 1 dead	D: 10
	25 A: 10	25 C: 9
	B: 10	D: 10
	50 A 10	50 C: 10
	B: 10	D: 10
	100 A: 13	100 C: 10
	B: 10	D: 10
Test 8	6.25 A: 10	6.25 C: 10
	B: 10	D: 10
	12.5 A: 10	12.5 C: 10
	B: 11	D: 10
	25 A: 10	25 C: 10
	B: 10	D: 10
	50 A: 10	50 C: 10
	B: 10	D: 10
	100 A: 11	100 C: 10
	B: 10	D: 10

11/16/94 Final Parameters - L. variegatus 5, 6, 7 & 8

	Test 5	Test 6	Test 7	Test 8
D.O.	6.4		6.4	
pH Control	8.23		8.24	
Temp.	21.2		21.0	
Cond.	384		403	
D.O.	6.0	6.2	5.8	6.0
pH 6.25	8.19	8.20	8.19	8.20
temp	21.0	20.8	20.8	20.8
Cond	386	419	415	421
DO	6.0	6.1	6.2	6.2
pH 12.5	8.16	8.20	8.24	8.22
temp	21.0	20.2	20.2	20.8
Cond	405	393	390	415
DO	5.8	6.1	5.9	6.3
pH 25	8.17	8.20	8.22	8.25
temp	20.6	20.4	20.2	20.8
Cond	384	393	396	399
D.O.	6.1	6.3	5.0	6.4
pH 50	8.17	8.25	8.13	8.29
temp	20.8	20.5	20.4	20.8
Cond	374	379	412	385
DO	6.4	6.9	5.9	6.6
pH 100	8.16	8.30	8.26	8.35
temp	21.0	21.0	20.2	20.8
Cond	370	374	382	375

All temps. were taken when the test was broken down and removed from the system.

11/16/94
mls

L. variegatus - in situ - Day 2 - #9, 10, 11 & 12

Sample	9	10	11	12	SCon	GCon	PZ
D.O.					6.9	6.5	6.6
temp					20.0	20.0	20.0
D.O. 6.25	6.4	6.8	6.2	7.1			
temp C	19.8	19.8	20.8	19.8			
D.O. 12.5	6.8	6.5	7.0	6.6			
temp C	20.0	20.4	19.8	20.0			
D.O. 25	6.4	6.7	6.4	7.0			
temp C	19.8	20.0	19.8	20.0			
D.O. 50	6.0	6.3	6.7	7.2			
temp C	20.0	20.2	19.8	19.8			
D.O. 100	6.5	6.8	6.5	6.8			
temp C	20.0	19.8	19.8	20.0			

Day 2: H. azteca - in situ - #3, 9, & 10

~~D.O.~~ Sample	Test 3	Test 9	Test 10	Control
temp:				25.0
D.O:				7.8
temp 6.25	24.8	24.5	25.0	
D.O. C.	7.9	7.5	7.8	
temp 12.5	24.8	24.5	24.8	
D.O. C	7.8	7.9	8.0	
temp 25	24.9	25.0	25.	
D.O. C	7.8	7.8	7.9	
temp 50	24.2	25.5	24.8	
D.O. C	8.0	7.8	7.9	
temp 100	25	24.9	24.2	
D.O. C	7.7	7.7	8.0	

11/16/94
MLS

& 12 DAY 1 H. azteca-in situ- # 12, 13 & 14

Con	PZ	Sample	12	13	14	Control
.5	6.6	temp				24.8
0.0	20.0	D.O.				7.9
		temp 6.25	24.8	24.8	24.9	
		D.O. B	7.8	7.9	7.8	
		temp ~~5~~	25.2	25	25.2	
		D.O. 12.5B	7.7	7.7	7.7	
		temp 25	24.8	24.8	24.8	
		D.O B	7.8	7.8	7.9	
		temp 50	25.2	24.8	25	
		D.O B	7.9	7.8	7.8	
		temp 100	25	25.0	25.0	
		D.O. B	7.9	7.7	6.5	

11/17/94 DAY 3: H. azteca-in situ- # 3, 9 & 10.

		MLS Sample	3	9	10	Control D
rol		temp:				24.2
0		DO:				7.9
8		temp 6.25	25.0	24.8	24.5	
		D.O D	7.8	7.8	6.5	
		temp 12.5	24.8	25.5	25.0	
		D.O D	7.1	7.7	7.9	
		temp 25	25.0	24.2	25.0	
		D.O. D	7.9	7.9	7.7	
		temp 50	24.2	24.2	24.5	
		D.O D	7.8	7.9	7.9	
		temp 100	25.0	24.5	24.2	
		D.O. D	7.8	6.3	8.0	

11/17/94
MLS

H. azteca - in situ - #12, 13 & 14 - Day 2

LJT BC

Sample	12	13	14	Control
temp				25.5
D.O				7.8
temp 6.25	24.5	24.8	24.5	
DO C	7.9	7.8	8.0	
temp 12.5	24.8	25.0	25.0	
DO C	7.8	7.7	7.8	
temp 25	24.8	24.5	24.5	
DO	7.7	7.8	7.8	
temp 50	24.5	24.8	24.8	
DO	7.7	7.7	7.7	
temp 100	24.8	25.0	24.5	
DO	7.8	7.7	7.9	

11/17/94

L. variegatus - in situ - Day 3 # 9, 10, 11, & 12

Sample	9	10	11	12	SCon	G-Con	PZ
temp					20.0	20.0	20.2
DO					4.8	5.2	6.3
temp 6.25	20.0	19.4	20.1	20.0			
DO	6.4	5.9	5.5	5.8			
temp 12.5	20.0	20.0	20.5	20.5			
DO	6.0	6.2	5.0	5.3			
temp 25	19.2	19.5	20.0	20.4			
DO	6.3	6.4	5.3	6.4			
temp 50	19.8	20.5	20.0	20.4			
DO	6.2	6.2	5.2	6.4			
temp 100	19.5	19.8	ms ~~20.1~~ 21.0	20.0			
DO	6.4	6.4	6.3	6.5			

11/17/94
MLS

L. variegatus - in situ - Day 1 - # 13, 14, & 15

Sample	13	14	15	MuttCon	JeffCon	PZCon
temp				19.5	19.0	18.8
DO				5.7	6.0	6.5
temp 6.25	18.4	19.0	19.0			
DO	6.5	6.6	6.0			
temp 12.5	19.0	19.1	19.2			
DO	6.7	6.2	6.0			
temp 25	19.0	19.0	19.0			
DO	6.3	6.2	6.0			
temp 50	18.2	19.2	19.0			
DO	6.7	6.4	6.2			
temp 100	18.2	18.5	19.0			
DO	6.6	6.6	6.9			

11/18/94

H. azteca - Final Parameters # 3, 9 & 10

Sample	3	9	10	Control
temp/pH	24.5/8.55			24.5/8.51
DO/cond	8.0 / 24.3 / 844			8.0/855
temp 6.25	24.5/8.53			
DO	8.0 / 24.5 / 817			
temp 12.5	24.5/8.53			
DO	8.0 / 24.5 / 751			
temp 25	24.5/8.55			
DO	8.0/591			
temp 50	24.5/8.5			
DO	8.0 /			
temp 100	24.5/8.54			
DO	8.1/432			

RE-DO next pg

11/18/94 mm mls

H. azteca - Final Parameters - #3, 9 & 10

Sample	Test 3	Test 9	Test 10	Control
Temp				24.5
DO				8.0
pH				8.51
Cond				855
	24.5	24.5	24.5	
	8.0	7.9	7.9	
6.25	8.55	8.50	8.57	
	844	770	729	
	24.5	24.5	24.5	
	8.0	7.8	7.9	
12.5	8.53	8.52	8.53	
	817	831	745	
Temp	24.5	24.5	24.5	
DO	8.0	7.9	6.1	
pH 25	8.53	8.54	8.32	
Cond	751	682	722	
Temp	24.5	24.5	24.5	
DO	8.0	7.9	6.2	
pH 50	8.55	8.52	8.31	
Cond	591	658	678	
Temp	24.5	24.5	24.5	
DO	8.1	7.9	7.9	
pH 100	8.54	8.53	8.51	
Cond	432	477	465	

11/18/94

10 MLS Final Counts: H. azteca #3, 9, & 10

Control		Con A	Con C
24.5		10	10
		B 11	D 11
8.0	Test 3	6.25A 10	6.25C 10
8.51		B 10	D 10
8.55		12.5A 10	12.5C 10
		B 8	D 8
		25A 10	25C 12
		B 8	D 10
		50A 7	50C 8
		B 6	D – missing
		100A 10	100C 7
		B 8	D 5
	Test 9	6.25A 10 + 1 dead	6.25 C 9
		B 9	D 10
		12.5A 10	12.5C 10
		B 10	D 10
		25A 10	25 C 10
		B 10	D 10
		50A 10	50C 10
		B 10	D 10
		100A 7	100C 6
		B 6	D 7
	Test 10	6.25A 10	6.25C 10
		B 13	D 10
		12.5A ~~MLS~~ 10	12.5C 10
		B 10	D 10
		25A 11	25C 10
		B 10	D 10
		50A 10	50C 20
		B 10	D 19

11/18/94
MLS

Test 10 cont — 100A 6 — 100C 10
B 10 — D 10

11/18/94 L. variegatus - Final Parameters - #9, 10, 11, & 12

Sample	9	10	11	12	9-10 Con	P2	11-12 Control
Temp					21.0	20.2	20.8
DO					6.3	6.7	6.8
pH					8.40	8.44	8.14
Cond					389	417	372

Temp		20.5	20.2	20.5	20.2	
DO	6.25	6.7	7.1	6.7	~~6.8~~ MLS 6.8	
pH		8.45	8.47	8.24	8.40	
Cond		388	386	381	383	
Temp		20.0	20.2	20.5	20.2	
DO	12.5	6.8	7.0	6.2	~~6.8~~ MLS 6.7	
pH		8.46	8.47	8.28	8.41	
Cond		384	392	377	383	
Temp		20.0	20.2	20.4	20.2	
DO		6.9	6.9	6.2	6.8	
pH	25	8.44	8.50	8.29	8.42	
Cond		429	391	381	373	
Temp		20.0	20.0	20.2	20.2	
DO		6.9	6.9	5.6	6.9	
pH	50	8.49	8.42	8.22	8.41	
Cond		374	461	411	390	
Temp		20.0	20.0	20.2	20.1	
DO		7.1	7.3	6.2	7.2	
pH	100	8.54	8.54	8.42	8.49	
Cond		368	377	393	360	

11/18/94 mls Hazteca - Day 3 - #12, 13 & 14

Sample	mls 12	13	14	Con
Temp				24.5
DO				7.9
Temp 6.25	24.8	24.2	24.5	
DO	7.7	7.9	7.9	
Temp 12.5	24.4	24.8	24.8	
DO	7.8	7.6	6.3	
Temp 25	24.8	24.8	24.8	
DO	8.1	7.9	7.7	
Temp 50	25.0	24.5	25.0	
DO	7.7	8.0	6.3	
Temp 100	24.8	24.5	24.5	
DO	7.9	7.8	7.7	

11 & 12 - 11-12 Control
20.8
6.8
8.14
372

11/18/94 mls L. variegatus - Day 2 - #13, 14 & 15

Sample	13	14	15	mutt Con	Jeff Con	PZ con
Temp				18.8	19.5	19
DO				5.6	6.2	6.6
Temp 6.25	19.2	18.5	~~20~~ 19			
DO	6.4	6.6	6.3			
Temp 12.5	19	19	19			
DO	6.5	6.5	6.3			
Temp 25	18.9	19	19			
DO	6.5	6.5	6.4			
Temp 50	19	19	19.2			
DO	6.6	6.7	6.7			
Temp 100	19.2	19	19			
DO	6.7	6.6	6.7			

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L. variegatus - Final Counts #9, 10, 11, & 12

Silt Con	A	10	Con	C	10
	B	10		D	10
T9 6.25	A	11	6.25	C	10
	B	10		D	12
12.5	A	11	12.5	C	10
	B	10		D	10
25	A	10	25	C	12
	B	11		D	11
50	A	12	50	C	10
	B	10		D	12
100	A	10	100	C	11
	B	10		D	10
T10 Gr Con	A	10	Gr. Con	C	10
	B	11		D	11
6.25	A	10	6.25	C	11
	B	10		D	11
12.5	A	10	12.5	C	12
	B	10		D	13
25	A	10	25	C	10
	B	10		D	10
50	A	14	50	C	10
	B	11		D	13
100	A	9	100	C	10
	B	10		D	14
T11 6.25	A	12	6.25	C	11
	B	10		D	11
12.5	A	10	12.5	C	12
	B	11		D	10
25	A	11	25	C	12
	B	10		D	10

11, & 12

	50	A	11	50	C 10
		B	12		D 10
	100	A	16	100	C 10
		B	23		D 12
T12	6.25	A	11	6.25	C 11
		B	10		D 10
	12.5	A	11	12.5	C 11
		B	10		D 11
	25	A	11	25	C 10
		B	11		D 11
	50	A	10	50	C 11
		B	10		D 11
	100	A	10	100	C 10
		B	10		D 10
T 11-12		A	10	Silt	C 10
Scon		B	10	con	D 10

11/19/94 H. azteca Final Counts - # 12, 13 & 14

	Con	A	15	Con	C 9
		B	11		D 10
T. 12	6.25	A	10	6.25	C 10
		B	11		D 9
	12.5	A	10	12.5	C 10
		B	10		D 10
	25	A	10	25	C 10
		B	9		D 10
	50	A	10	50	C 9
		B	9		D 10
	100	A	10	100	C 9
		B	9		D 10

11/18/94
mcs

T13	6.25 A	10	6.25 C 9
	B	10	D 10
	12.5 A	9+1 dead	12.5 C 10
	B	10	D 9
	25 A	10	25 C 10
	B	10	D 10
	50 A	14	50 C 10
	B	10	D 10
	100 A	6	100 C 10
	B	9	D 7
T14	6.25 A	8	6.25 C 10
	B	10	D 11
	12.5 A	9	12.5 C 17
	B	9	D 11
	25 A	16	25 C 13
	B	8	D 10
	50 A	16	50 C 12
	B	10	D 11
	100 A	10	100 C 10
	B	13	D 11

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MLS

L. variegatus - DAY 3 # 13, 14 & 15

Sample	13	Jeff Con 13	14	15	muff con 15	PZ con
Temp		18.5			18.2	19.0
DO	~~6.1~~ M.AC	5.8			5.8	6.0
Temp 6.25	18.5		19.0	18.5		
DO	6.4		6.9	5.8		
Temp 12.5	18.8		19.0	18.8		
DO	6.5		6.7	5.8		
Temp 25	18.5		19.0	19.0		
DO	6.6		6.7	6.4		
Temp 50	18.0		18.8	18.5		
DO	7.0		6.8	6.5		
Temp 100	18.4		18.0	18.8		
DO	6.9		6.9	6.6		

11/19/94 MLS L variegatus - Ending parameters #13, 14, 15

Sample	13	14	15	13 con	15 con	PZ con
Temp						
DO						
Temp 6.25						
DO						
Temp 12.5						
DO						
Temp 25						
DO						
Temp 50						
DO						
Temp 100						
DO						

Redo
Forgot Cond & pH

next page

11/29/94 19
mcs

H. azteca – Ending Parameters, #12, 13 & 14

Sample		12	13	14	Con
Temp					23.5
DO					7.8
pH					8.26
Cond					809
Temp		23.5	23.5	23.5	
DO		7.9	7.8	7.8	
pH	6.25	8.48	8.41	8.49	
Cond		718	681	924	
Temp		23.5	23.5	23.5	
DO	12.5	7.8	7.8	7.9	
pH		8.45	8.45	8.50	
Cond		728	695	845	
Temp		23.5	23.5	23.5	
DO		7.8	7.8	7.9	
pH	25	8.47	8.50	8.44	
Cond		595	661	856	
Temp		23.5	23.5	23.5	
DO		7.9	7.8	7.9	
pH	50	8.45	8.49	8.33	
Cond		590	587	753	
Temp		23.5	23.5	23.5	
DO	100	7.8	7.8	7.7	
pH		8.41	8.45	8.42	
Cond		395	415	491	

11/20/94
13 & 14 MLS L. variegatus - Ending parameters #13, 14, 15

Sample	13 Con	#13	PZ-Con	#14	#15 Con	#15
Temp	20.5		20.2		20.2	
DO	7.2		7.4		7.5	
pH	8.08		8.43		8.41	
Cond	470		389		392	
Temp	~~MLS 20.5~~	20.5	~~MLS 20.5~~	20.5	~~20.5~~	20.5
DO 6.25		6.6		6.8		6.5
pH		8.38		8.44		8.40
Cond	~~MLS 417~~	417		432		379
Temp	~~MLS 20.2~~	20.2	~~MLS 20.0~~	20.0	~~MLS 20.0~~	20.0
DO 12.5		6.6		6.8		6.5
pH		8.39		8.50		8.41
Cond	~~MLS 403~~	403		397		383
Temp	~~MLS 20.2~~	20.2	~~MLS 20.0~~	20.0	~~MLS 20.2~~	20.2
DO 25		6.7		6.8		6.5
pH		8.45		8.51		8.39
Cond	~~MLS 403~~	403		381		391
Temp	~~MLS 20.2~~	20.2	~~MLS 20.2~~	20.2	~~MLS 20.0~~	20.2
DO 50		6.7		6.8		6.5
pH		8.47		8.50		8.42
Cond	~~MLS 390~~	390		401		383
Temp	~~MLS 20.0~~	20.0	~~MLS 20.0~~	20.0	~~MLS 20.2~~	20.2
DO 100		6.9		6.9		6.6
pH		8.50		8.51		8.44
Cond	~~MLS 364~~	364		368		389

11/20/94
MBS

L. variegatus – Final Counts #13, 14, 15

SCon	B	A	10	SCon	C
		B	10		D
#13	6.25	A	10	6.25	C
		B	10		D
	12.5	A	10	12.5	C
		B	10		D
	25	A	10	25	C
		B	10		D
	50	A	11	50	C
		B	10		D
	100	A	10	100	C
		B	10		D
#14	6.25	A	10	6.25	C
		B	10		D
	12.5	A	10	12.5	C
		B	10		D
	25	A	10	25	C
		B	10		D
	50	A	10	50	C
		B	10		D
	100	A	10	100	C
		B	10		D
~~#15~~	P2Con	A	10	P2 Con	C
#14		B	10		D
#15	Con	A	10	#15 Con	C
		B	10		D
#15	6.25	A	9	6.25	C
		B	9		D
	12.5	A	10	12.5	C
		B	10		D

SCon	10
	10
6.25	10
	10
12.5	10
	10
25	10
	10
50	10
	10
100	10
	10
6.25	10
	9
12.5	10
	10
25	10
	10
50	10
	10
100	12
	10
P2 Con	10
	10
#15 Con	10
	9
6.25	10
	10
12.5	10
	10

11/20/94
MLS

L. variegatus - Final Counts

5	25	A 10	25 C 11	
		B 10	D 10	
	50	A 10	50 C 10	
		B 10	D 10	
	100	A 9	100 C 10	
		B 10	D 11	

Beginning Parameters H. azteca - chronic Day 0 *

		Test 1	Test 2	Test 3	Test 4	1 Con	2 Con	3 Con
DO		7.4	7.6	7.5	7.2	7.0	7.5	7.6
temp.	6.25	21.5	21.2	21.2	22.0	21.5	21.8	21.0
pH		8.50	8.36	8.60	8.57	8.32	8.50	8.55
Cond		458	428	614	460	494	713	498
DO		7.4	7.5	7.5	7.1			
temp	12.5	21.8	21.4	21.5	22.0			
pH		8.48	8.47	8.55	8.57			
Cond		454	451	703	438			
DO		7.4	7.5	7.4	6.9			
temp	25	21.8	21.4	21.8	22.0			
pH		8.48	8.48	8.60	8.50			
Cond		514	438	655	433			
D.O.		7.4	7.2	7.3	5.6			
temp	50	21.8	21.8	21.8	22.0			
pH		8.39	8.42	8.58	8.23			
Cond		435	431	575	356			
DO.		7.2	7.1	7.3	5.9			
temp	100	21.2	21.5	21.8	22.0			
pH		8.24	8.37	8.63	8.25			
Cond		376	398	387	400			
Hard.		230	230	240	240	280	310	240
Alk.		200	200	210	180	210	210	21-

11/21/94
MLS

Beginning Parameters- Day Ø # 5, 6, 7, & 8

Test Sample	5	6	7	8	5/6 Con	7/8 Con
Temp					22.2	22.2
DO					7.6	7.6
pH/ammonia					8.67/0.00	8.71/0.00
Cond					456	419
Hrdns					290	360
Alk					290	180
Temp	22.3	22.2	22.3	22.3		
DO 5.0/6.25	7.6 ~~8.69~~	7.8	7.5	7.5		
pH/amm	8.61	8.64	8.66	8.66		
Cond	451	452	460	451		
Temp 10	22.1	22.1	22.3	22.2		
DO 12.5	7.6	7.8	7.5	7.5		
pH/amm.	8.57	8.62	8.63	8.65		
Cond	439	456	450	442		
Temp 20	22.1	22.1	22.2	22.2		
DO 25	7.3	7.8	7.5	7.4		
pH/amm	8.53	8.57	8.56	8.61		
Cond	447	454	454	446		
Temp 40	22.3	22.3	22.3	22.3		
DO 50	7.0	7.3	7.3	7.2		
pH/amm	8.39	8.53	8.44	8.59		
Cond	434	421	453	436		
Temp 80	22.2	22.1	22.5	22.5		
DO 100	7.0	7.1	4.0	6.9		
pH/amm	8.22/0.00	8.48/0.00	8.27/0.00	8.54/0.00		
Cond	433	402	459	411		
Hrdns	150	180	340	170		
Alk	340	250	330	360		

11/22/94
MLS

Beginning Parameters - Day Ø # 9, 10, 11 & 12

Test Sample	9	10	11	12	Gravel Con 9-10	Silt Con 11-12
Temp					23.2	23.0
DO					8.2	8.2
pH/ammonia					8.13/0.0	8.30/0.0
Cond					555	~~440~~ 440
Hrdns					220	280
Alk					200	220
Temp	23.0	23.0	23.0	23.2		
DO 6.25	8.3	8.2	8.3	8.2		
pH	8.32	8.35	8.34	8.32		
Cond	542	566	429	560		
Temp	23.2	23.0	23.2	23.0		
DO 12.5	8.3	8.3	8.2	8.3		
pH	8.34	8.35	8.33	8.36		
Cond	571	524	418	566		
Temp	23.0	23.2	23.2	23.5		
DO 25	8.3	8.3	8.2	8.3		
pH	8.36	8.35	8.29	8.36		
Cond	551	534	426	555		
Temp	23.2	23.0	23.2	23.4		
DO 50	8.3	8.3	7.9	8.3		
pH	8.36	8.36	8.27	8.36		
Cond	521	500	421	538		
Temp	23.0	23.2	23.0	23.2		
DO	8.2	8.2	7.6	8.1		
pH/amm	8.35/0.0	8.34/0.0	8.24/0.0	8.57/0.0		
Cond	498	450	396	408		
Hrdns	240	240	210	230		
Alkalinity	220	230	220	210		

11/22/94
MLS

Day 1 - Parameters - #5, 6, 7 & 8

Sample	5	6	7	8	5/6 Con	7/8 Con
Temp					21.5	21.0
DO					7.6	7.5
Temp 6.25	21.8	21.9	21.0	21.2		
DO	7.6	7.3	7.8	7.6		
Temp 12.5	22.0	22.0	21.2	21.0		
DO	7.3	7.5	7.7	7.2		
Temp 25	23.2	21.0	22.0	23.0		
DO	6.4	7.8	7.6	7.4		
Temp 50	23.0	21.8	21.5	21.9		
DO	6.6	7.1	6.6	6.9		
Temp 100	21.5	23.0	22.0	23.0		
DO	6.4	6.5	8.1	7.0		

* Note: The heater to the recirculating water bath broke and is being replaced.

Day Ø - Parameters - #1, 2, 4

11/23/94

Sample	1	2	4	Cont.
Temp				22.0
DO				~~371~~ 8.7
ph/Ammonia				8.01 / 0.00
Cond.				371
Hardns.				340
ALK.				350

1600 All test vessels fed YTC and algae.

11/23/94 Day 0

Sample	1	2	4	Con.
Temp 6.25	22.0	4°10 / 22.0	22.0	
D.O.	8.5	8.0	7.7	
ph / AMMONIA	8.28/0.00	8.33/0.00	8.12/0.00	
Cond.	482	472	467	
Temp	22.0	8 / 22.0	22.0	
DO 12.5	8.4	8.0	7.8	
ph / AMMONIA	8.28/0.00	8.25/0.00	8.21/0.00	
COND.	454	474	457	
Temp	22.0	16 / 22.0	22.0	
DO 25	8.4	8.0	7.6	
pH / AMMONIA	8.23/0.00	8.27/0.00	8.17/0.00	
COND.	473	454	457	
Temp.	22.0	32 / 22.0	22.0	
DO 50	7.9	8.1	7.5	
pH / AMMONIA	8.20/0.00	8.26/0.00	8.18/0.00	
COND.	436	440	438	
Temp.	22.0	64 / 22.0	22.0	
DO 100	7.9	8.1	6.8	
pH / AMMONIA	8.21/0.00	8.25/0.00	8.22/0.00	
COND.	430	434	426	
HARDNESS	230	200	190	
Alkalinity	180	340	200	

1600 All test vessels fed 4TC and algae

11/23/94

DAY-2 Parammeters #5, 6, 7, 8

Sample	5	6	7	8	5.16 CON	7.18 CON
Temp					21.5	
DO					7.4	
Temp 6.25	SB ~~7.3~~ 22.0	22.0	21.4	21.0		
DO	SB ~~22.2~~ 7.4	7.5	7.2	7.1		
Temp 12.5	22.0	7.2	21.0	21.2		
DO	7.1	22.6	7.2	7.0		
Temp 25	SB ~~7.3~~ 22.2	7.2	22.0	22.0		
DO	~~22.2~~ 7.3	22.8	6.9	7.0		
Temp 50	22.5	22.0	20.2	22.0		
DO	SB ~~22~~ 7.1	7.0	7.4	6.8		
Temp 100	26.8	22.2	22.0	20.2		
DO	6.5	7.0	6.4	6.6		

Day-1 Paramaters #9, 10, 11, 12

Sample	9	10	11	12	grave CON 9-10	SIT CON 11-12
Temp					19.1	20.0
DO					7.4	7.2
Temp 6.25	20.4	19.1	19.0	21.2		
DO	7.4	7.5	7.1	7.5		
Temp 12.5	21.2	22.0	21.5	19.2		
DO	7.5	7.5	7.1	7.5		
Temp 25	19.5	20.4	20.8	19.2		
DO	7.0	7.4	6.8	7.6		
Temp 50	21.4	21.2	19.0	20.2		
DO	7.4	7.4	6.6	7.4		
Temp 100	19.2	20.0	21.0	22.5		
Do	7.2	7.3	6.3	7.3		

11/24/94 Day 3 Parameters #5, 6, 7, 8

~~7/8~~
CON

Sample	5	6	7	8
Temp				
DO				
Temp	24.0	24.0	24.0	23.0
DO 6.25	6.3	6.8	7.0	6.9
Temp	25.0	23.0	24.0	23.0
DO 12.5	7.1	7.1	7.1	6.8
Temp	23.0	23.0	23.0	23.0
DO 25	6.5	7.0	7.1	7.2
Temp 50	24.0	24.0	23.0	24.0
DO	6.7	6.8	6.6	6.5
Temp 100	23.0	23.0	23.0	23.0
DO	6.6	6.8	6.3	7.1

5/6 CON: 23.0 / 7.2

7/8 CON: 23.0 / 7.2

Day - 2 Parameters ~~9 10 11 12~~ SB

Sample	9	10	11	12
Temp				
DO				
Temp	21.0	20.0	19.0	21.0
DO 6.25	7.1	7.4	7.1	7.4
Temp 12.5	21.0	22.0	20.0	19.0
DO	7.2	6.9	6.4	7.3
Temp 25	21.0	21.0	21.0	21.0
DO	7.4	7.1	7.0	6.8
Temp 50	21.0	21.0	22.0	19.0
DO	7.0	7.0	7.6	7.1
Temp 100	22.0	19.0	21.0	23.0
DO	7.1	6.3	5.9	7.1

Grand CON 9/10: 21.0 / 7.4

S.I.T CON 11/12: 19.0 / 7.3

S.I.T CON 11-12: 20.0 / 7.2

11/24/94

Day-1 Parameters

Sample	1	2	4	CoN
Temp				19.0
DO				7.7
Temp 6.25	20.0	20.0	19.0	
DO	7.6	7.4	7.4	
Temp 12.5	19.0	19.0	19.0	
DO	7.3	7.6	7.2	
Temp 25	20.0	21.0	20.0	
DO	7.6	7.2	7.2	
Temp 50	20.0	20.0	~~7.2~~ 50/19.0	
DO	7.5	7.3	7.5	
Temp 100	20.0	19.0	21.0	
DO	7.1	7.3	6.9	

1530 All test vessels fed 4TC and algae.

11/25/94 next page

Sample	3	13	14	15	G-Con	S-Con
Temp						
DO						
Temp 6.25'						
D.O.						
Temp 12.5'						
DO						
temp 25						
DO						
Temp 50						
DO						
Temp 100						
DO						

11/25 new parameters on next page

11/25/94 Beginning Parameters - H. azteca, Day Ø Tests # 3, 13, 14, 15

Sample	3	13	14	15	G-Con	S-Con
temp					22.0	22.2
DO					7.6	7.5
pH/Ammonia					8.20	8.47
Cond					723	500
Hrd					270	180
Alk					100	220
temp	21.8	21.3	21.2	21.5		
DO 6.25	7.4	7.4	7.4	7.3		
pH	8.45	8.46	8.48	8.48		
Cond	668	625	603	468		
temp	21.5	21.8	21.5	21.8		
DO 12.5	7.4	7.2	7.4	7.3		
pH	8.46	8.47	8.47	8.45		
Cond	638	614	649	474		
temp	21.8	21.8	22.0	22.3		
DO 25	7.4	7.3	7.4	7.3		
pH	8.46	8.49	8.47	8.44		
Cond	610	574	620	453		
temp	22.0	22.1	21.8	21.5		
DO 50	7.4	7.3	7.2	7.3		
pH	8.47	8.51	8.49	8.46		
Cond	555	519	532	438		
temp	21.5	21.8	21.7	21.8		
DO	7.4	7.0	7.0	7.2		
pH/Ammonia	8.54	8.54	8.50	8.49		
~~Hrd~~ Cond	401	397	444	422		
Hrd	210	220	210	180		
Alk	210	210	200	210		

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11/25/94 Day 4 Parameters #5,6,7,8

Sample	5	6	7	8	5/6 Con	7/8 Con
Temp					23.5	23.5
DO					7.0	7.1
Temp 6.25	24.0	24.0	23.5	24.0		
DO	7.1	7.2	6.9	7.2		
Temp 12.5	23.5	24.0	23.0	23.5		
DO	6.8	6.8	7.2	6.9		
Temp 25	24.0	23.0	24.0	24.0		
DO	6.7	7.1	7.1	6.9		
Temp 50	24.5	24.0	24.0	23.5		
DO	6.8	7.2	7.2	6.8		
Temp 100	23.5	23.5	24.0	23.0		
DO	7.0	6.9	6.3	6.4		

Day 3 Parameters - 9, 10, 11, 12

Sample	9	10	11	12	G-Con	S-Con
Temp					23.2	24.0
DO					7.7	7.5
Temp 6.25	24.0	22.8	23.2	24.5		
DO	7.5	7.4	7.4	7.9		
Temp 12.5	23.0 SB	24.0	22.2	24.0		
DO	~~6.8~~ 7.2	9.0	6.7	7.4		
Temp 25	23.0	22.5	23.8	23.8		
DO	8.4	7.6	8.0	7.7		
Temp 50	~~24.0~~ 23.5 SB	22.5	24.0	23.0		
DO	~~6.6~~ 8.1 SB	6.9	6.6	7.1		
Temp 100	24.5	24.2	24.5	22.8		
DO	8.3	7.6	7.4	8.4		

11/25/94 Day 2 - Parameters #1, 2, 4

Sample	1	2	4	Con
Temp				23.0
DO				7.5
Temp 6.25	22.8	23.0	21.8	
DO	7.4	8.2	7.5	
Temp 12.5	22.2	22.2	21.0	
DO	7.6	7.6	7.5	
Temp 25	22.8	23.2	22.0	
DO.	7.7	7.4	6.9	
Temp 50	22.8	22.8	23.0	
DO	6.6	7.6	6.8	
Temp 100	22.0	22.5	21.8	
DO	7.4	7.5	6.4	

1805 All test vessels fed YTC and algae

11/26/94

JMB Parameters #1, 2 & 4 - Day 3

	1	2	4	Control
Temp				21.0
DO				7.3
6.25 Temp (4)	21.5	22.5	20.5	
DO (2)	8.2	7.3	8.4	
12.5 Temp	21.5	22.5	20.9	
DO (8)	7.6	7.9	7.4	
25 Temp	21.5	22.5	20.5	
DO (6)	7.5	7.3	8.1	
50 Temp	22.0	22.0	20.8	
DO (32)	7.7	7.6	7.7	

	1	2	4
100 Temp	21.2	21.5	22.0
(c) DO	7.6	7.9	7.5

Parameters Tests #9, 10, 11 & 12 Day 4

	9	10	11	12	Control (silt)	Control (gravel)
Temp					22.2	21.8
DO					7.5	7.3
6.25 Temp	22.0	21.0	23.1	22.8		
DO	7.5	7.7	7.7	7.5		
R5 Temp	23.2	21.5	24.0	23.5		
DO	7.3	7.8	7.0	7.2		
45 Temp	22.8	23.2	22.5	24.5		
DO	7.5	7.5	7.6	7.7		
150 Temp	23.0	23.0	23.0	23.5		
DO	7.6	7.4	7.3	7.5		
100 Temp	22.5	22.5	22.5	22.0		
DO	8.0	7.5	7.6	7.6		

Parameters Tests 5, 6, 7 & 8 - Day 5

	5	6	7	8	Control
Temp					23.2
DO					7.3
C1 Temp	23.5	23.5	23.2	23.2	
DO	7.3	7.6	7.5	7.6	
C2 Temp	23.5	23.5	23.2	23.0	
DO	7.5	7.8	7.4	8.0	
C3 Temp	23.5	23.2	23.5	24.0	
DO	7.6	7.4	7.2	8.3	
C4 Temp	24.5	24.0	23.8	23.5	
DO	7.4	8.0	7.6	7.4	
C5 Temp	23.8	23.5	24.5	24.0	
DO	7.3	8.1	7.7	7.6	

12/10 all test vessels fed YTC and algae

Parameters Tests #3, 13, 14 & 15 Day 1

		3	13	14	15	Control	Control (gravel)
	Temp					23.5	23.8
	DO					6.5	6.9
6.25	Temp	24.0	24.5	25.2	23.5		
	DO	7.0	6.8	7.0	6.6		
12.5	Temp	25.0	23.0	25.2	23.0		
	DO	6.8	6.7	6.5	6.9		
25	Temp	25.2	25.0	24.8	25.0		
	DO	6.5	6.5	6.8	6.8		
50	Temp	25.0	25.0	25.0	25.0		
	DO	6.8	6.6	6.4	6.7		
100	Temp	23.2	25.0	24.5	25.0		
	DO	6.7	6.5	6.4	6.7		

11/27/94 Tests 1, 2 & 4 - Day 4

Parameters		1	2	4	Control
11/8	Temp				23.0
	DO				5.8
6.25	Temp	23.8		22.6	
	DO	5.6		5.6	
12.5	Temp	23.0	22.4	23.2	
8	DO	5.6	5.8	5.5	
25	Temp	23.2	22.8	23.0	
06	DO		5.9	5.6	
50	Temp	22.2	23.0	23.2	
32	DO	5.2	5.6	4.9	
100	Temp	22.2	23.2	22.2	
64	DO	4.7	5.8	5.6	

11/27/94 Parameters Tests #~~3, 13, 14 & 15~~ 9, 10, 11 & 12 : Day ~~5~~ 5

~~Tem~~ Sample	9	10	11	12	GC	SC
Temp					22.8	23.4
DO					4.6	4.5
Temp 6.25	23.2	23.2	22.4	24.0		
DO	4.9	4.8	5.2	5.8		
Temp 12.5	22.8	24.0	24.0	23.4		
DO	4.5	5.3	4.6	4.8		
25 Temp	24.0	23.5	23.8	23.0		
DO	4.6	5.3	5.0	5.1		
50 Temp	24.0	24.0	24.0	23.8		
DO	5.1	5.1	4.6	5.1		
100 Temp	23.2	24.0	23.8	23.1		
DO	4.6	4.5	4.0	5.1		

Parameters - Tests - 5, 6, 7 & 8 - Day 6

Sample	5	6	7	8	SC1	SC2
Temp				23.8	23.9	23.8
DO				5.3	5.8	5.8
5-6.25 Temp		23.8	23.2	23.0		
DO		6.0	5.1	5.1		
10-12.5 Temp	24.0	23.8	24.0	23.4		
DO	5.4	4.9	5.3	4.8		
20-25 Temp	24.6	24.0	24.0	24.0		
DO	4.3	5.1	5.3	5.2		
40-50 Temp	23.8	23.4	23.6	23.8		
DO	5.0	4.8	3.9	5.0		
80-100 Temp	23.8	23.6	24.0	23.4		
DO	4.6	4.5	3.8	4.3		

Day 2 - Parameters - Tests: 3, 13, 14 & 15

~~Temp~~ Sample	3	13	14	15	SC	GC
~~DO~~ Temp	/	/	/	/	26.2	25.8
DO					5.5	6.0
Temp 6.25	26.5	25.2	25.8	26.0		
DO	5.6	6.2	5.0	5.8		
12.5 Temp	26.0	25.5	26.0	25.5		
DO	5.2	6.0	5.9	6.0		
Temp 25	26.8	26.2	25.5	26.2		
DO	5.0	5.6	5.9	5.5		
50 Temp	26.0	26.2	25.0	26.8		
DO	6.0	5.5	5.7	5.7		
100 Temp	26.0	26.0	25.5	26.2		
DO	6.0	5.3	5.4	5.0		

18:15 Tests fed algae + ITC

11/28/94 Tests 1, 2 + 4 - Day 5

Sample	1	2	4	Con.
Temp				24.0
DO				5.2
Temp 6.25 4	24.5	23.8	22.2	
DO	5.4	6.2	6.1	
Temp 12.5 8	23.0	23.5	23.0	
DO ~~11.5 8~~	5.5	6.2	6.1	
Temp 25 16	4.1	23.0	24.2	
DO	22.9	5.9	5.9	
Temp 50 32 ~~32 16~~	① 23.0	24.1	23.8	
DO	4.7	6.4	6.1	
Temp 100 64	23.4	22.0	23.2	
DO	5.5	4.4	5.8	

① Replicate was not getting water exchange - due to plugged outlet

SC
25.8
6.0

11/28/94 Parameters - Tests 9, 10, 11 & 12 Day 6

Sample	9	10	11	12	GCon	SCon
Temp					24.8	24.2
DO					6.8	5.9
Temp 6.25	24.0	24.2	23.9	24.2		
DO	6.2	5.2	5.8	6.3		
Temp 12.5	24.2	24.0	23.0	24.1		
DO	6.6	5.5	6.5	5.4		
Temp 25	24.0	23.8	24.0	24.5		
DO	5.5	5.7	5.5	6.7		
Temp 50	24.2	23.0	23.5	24.2		
DO	6.2	6.3	5.5	5.2		
Temp 100	23.8	24.2	24.1	24.5		
DO	6.0	5.8	6.6	5.8		

Parameters Tests 5, 6, 7, & 8 - Day 7

Sample	5	6	7	8	SC1	SC2
Temp					24.8	
DO					6.6	
Temp 5 / 6.25	25.0	23.8	24.0	23.5		
DO	5.9	6.0	5.9	6.1		
Temp 10 / 12.5	24.2	24.4	24.0	25.0		
DO	6.5	6.0	6.3	5.7		
Temp 20 / 25	23.8	24.6	24.8	24.0		
DO	5.7	5.7	5.9	5.8		
Temp 40 / 50	24.0	24.2	25.0	24.2		
DO	5.8	5.9	4.8	5.0		
Temp 80 / 100	23.9	24.2	24.2	24.5		
DO	5.4	5.8	5.4	4.9		

11/28/94 Parameters - Tests 3, 13, 14 + 15 - Day 3

Sample	3	13	14	15	SC	GC
Temp					23.0	29.0
DO					5.9	6.4
Temp 6.25	24.0	22.0	23.8	22.5		
DO	6.3	6.2	6.1	6.7		
Temp 12.5	24.2	22.1	22.8	23.0		
DO	6.1	6.3	6.3	6.2		
Temp 25	24.0	23.0	23.8	23.0		
DO	6.0	6.0	6.2	6.1		
Temp 50	21.0	23.5	22.0	24.0		
DO	6.0	6.2	6.2	5.9		
Temp 100	21.2	23.3	22.1	23.0		
DO	6.3	6.0	6.5	6.6		

Day 7 - Parameters Con't Tests 5, 6, 7 & 8 - pH + Cond.

Sample	5	6	7	8	Control
~~Temp~~ pH					
Cond ~~DO~~					
~~Temp~~ pH 6.25					
~~DO~~ Cond					
~~Temp~~ pH 12.5					
~~DO~~ Cond					
~~Tem~~ pH 25					
Cond					
pH 50					
Cond					
pH 100					
Cond					

next page

11/28/94 Parameters for Tests 5, 6, 7 + 8: pH + Cond

Sample	5	6	7	8	Control
pH					8.23
Cond					360
Ammonia					ND
pH	8.35	8.33	8.36	8.41	
Cond 5 6.25	362	360	308	364	
Ammonia	ND	ND	ND	ND	
pH	8.37	8.34	8.38	8.41	
Cond 10 12.5	357	365	297	364	
Ammonia	ND	ND	ND	ND	
pH	8.27	8.33	8.41	8.34	
Cond 20 25	365	360	364	372	
Ammonia	ND	ND	ND	ND	
pH	8.26	8,33	8.56	8.35	
Cond 40 50	360	344	379	372	
Ammonia	ND	ND	ND	ND	
pH	8.25	8.37	8.59	8.32	
Cond 80 100	358	362	364	377	
Ammonia	ND	ND	ND	ND	

+ Cond.

1530 Tests fed algae + YTC

11/29/94 Parameters Tests 5, 6, 7, 8 - Day 8

Sample		5	6	7	8	Control
Temp						23.9
DO						5.5
Temp	5	24.2	25.0	25.2	22.4	
DO	6.25	4.6	5.6	5.3	5.2	
Temp	10	24.2	24.2	23.9	24.0	
DO	12.5	5.2	5.2	5.1	4.8	
Temp	20	24.0	24.0	24.0	24.0	
DO	25	4.5	5.0	4.8	5.1	
Temp	40	23.0	24.0	25.2	25.0	
DO	50	4.7	4.5	3.6	4.5	
Temp	80	24.1	24.8	24.5	25.0	
DO	100	4.1	5.4	3.2	4.3	

Parameters Tests 1, 2 + 4 - Day 6

Sample		1	2	4	Con
Temp					23.0
DO					5.8
Temp	6.25	25.2	24.0	22.8	
Do	4	5.1	5.4	5.7	
Temp	8	23.0	24.0	23.8	
DO	12.5	5.8	5.8	5.8	
Temp	16	25.0	24.2	23.2	
DO	25	5.0	5.4	5.5	
Temp	32	23.4	25.0	24.2	
DO	50	5.5	4.6	5.2	
Temp	64	24.0	24.2	24.8	
DO	100	4.7	4.8	4.9	

11/29/94 Parameters · 9, 10, 11 & 12 · Day 7

Sample	9	10	11	12	G-C	S-C
Temp					22.1	23.8
DO					5.7	5.0
pH					7.94	8.03
Cond					425	401
Ammonia					ND	ND
Temp	23.8	24.0	22.0	24.0		
DO	5.2	4.5	5.8	5.3		
pH 6.25	8.03	8.16	8.23	8.38		
Cond	414	400	372	397		
Ammonia	ND	ND	ND	ND		
Temp	22.8	22.5	25.0	24.0		
DO	5.3	5.5	5.3	5.4		
pH	8.05	8.14	8.22	8.25		
Cond 12.5	392	404	392	413		
Ammonia	ND	ND	ND	ND		
Temp	24.2	23.8	22.6	23.0		
DO	4.3	4.6	48.3	5.40		
pH 25 ~~12.5~~	8.08	8.17	8.22	8.28		
Cond	425	408	388	402		
Ammonia	ND	ND	ND	ND		
Temp	24.5	23.2	22.9	24.2		
DO	4.5	4.8	4.1	4.6		
pH 50 ~~25~~	8.08	8.15	8.24	8.18		
Cond	425	399	411	414		
Ammonia	ND	ND	ND	ND		

11/29/94 Parameters 9, 10, 11 + 12 - Day 7

Sample	9	10	11	12	~~G-C~~	~~S-C~~
Temp	23.8	23.8	23.0	23.0		
DO	4.0	4.1	3.7	5.0		
pH ~~50~~ 100	8.00	8.09	8.64	8.18		
Cond	402	385	402	379		
Ammonia	ND	ND	ND	ND		
Temp						
DO						
pH 100						
Cond	~~424~~ WATER					
Ammonia	~~ND~~					

Parameters 3, 13, 14 + 15 - Day 4

Sample	3	13	14	15	G-C	S-C
Temp					22.8	22.2
DO					5.4	5.2
Temp 6.25	23.0	23.2	22.2	21.5		
DO	5.0	5.8	4.5	5.6		
Temp 12.5	22.2	21.0	25.0	22.0		
DO	5.2	5.8	5.5	5.8		
Temp 25	23.0	23.0	22.2	22.2		
DO	5.2	5.0	5.1	5.3		
Temp 50	23.5	22.6	22.2	22.2		
DO	5.3	4.9	~~5.0~~ 5.5 EST	5.0		
Temp 100	22.0	24.0	21.2	24.0		
DO	5.4	4.9	5.3	5.3		

1210 Tests fed algae + YTC

11/30/94 Parameters Tests - 5, 6, 7 & 8 - Day 9

Sample	5	6	7	8	Control
Temp					23.0
DO					6.3
Temp 5 / 6.25	23.8	23.8	23.0	23.0	
DO	6.7	6.9	7.4	7.1	
Temp 10 / 12.5	24.0	22.2	22.4	23.0	
DO	6.8	6.2	6.7	6.6	
Temp 20 / 25	23.0	22.8	23.4	22.2	
DO	5.6	6.2	5.6	5.9	
Temp 40 / 50	24.0	23.5	23.2	24.0	
DO	6.4	6.6	4.9	6.6	
Temp 80 / 100	23.2	22.8	24.0	23.2	
DO	5.2	5.5	4.3	5.8	

Parameters - 9, 10, 11 & 12 - Day 8

Sample	9	10	11	12	S-C	G-C
Temp					21.0	21.0
DO					7.1	6.3
Temp 6.25	22.0	20.0	21.6	21.0		
DO	6.1	7.9	7.1	7.5		
Temp 12.5	21.1	22.2	22.8	21.2		
DO	7.0	6.1	6.7	6.0		
Temp 25	21.0	20.2	21.8	21.8		
DO	7.2	6.3	5.7	5.9		
Temp 50	21.0	21.6	21.4	21.2		
DO	6.9	6.9	6.2	7.1		
Temp 100	22.4	20.0	22.0	20.8		
DO	6.0	7.0	5.3	6.3		

11/30/94 Parameters: 1, 2 & 4 - Day 7

Sample	1	2	4	Control
Temp				20.8
DO				6.6
pH				8.21
Cond				363
Ammonia				ND
Temp	21.0	21.0	20.5	
DO	6.2	6.4	8.3	
pH 4 6.25	8.28	8.35	8.51	
Cond	363	368	365	
Ammonia	ND	ND	ND	
Temp	20.8	20.2	20.8	
DO	6.8	7.6	6.9	
pH 8 12.5	8.24	8.43	8.46	
Cond	366	367	371	
Ammonia	ND	ND	ND	
Temp	21.0	21.0	20.5	
DO	6.0	6.7	6.8	
pH 16 25	8.27	8.43	8.42	
Cond	363	365	370	
Ammonia	ND	ND	ND	
Temp	20.2	21.0	21.2	
DO	5.6	6.7	6.0	
pH 32 50	8.16	8.44	8.39	
Cond	374	364	371	
Ammonia	ND	ND	ND	

1/30/94 Parameters 1, 2 + 4 - Day 7

Sample	1	2	4	~~Control~~ CJT
Temp	21.2	20.4	20.4	
DO	5.3	6.1	6.1	
pH 64 100	8.23	8.43	8.42	
Cond	359	359	363	
Ammonia	ND	ND	ND	

Parameters 3, 13, 14 + 15 - Day 5

Sample	3	13	14	15	G.C	S.C
Temp					23.2	21.8
DO					6.9	7.3
Temp 6.25	22.0	23.5	21.8	23.2		
DO	7.2	6.9	7.7	7.4		
Temp 12.5	21.2	21.2	21.2	22.8		
DO	7.3	8.2	7.5	7.6		
Temp 25	21.2	22.2	22.2	21.2		
DO	6.6	7.4	7.6	6.9		
Temp 50	21.0	23.0	23.0	21.0		
DO	7.6	5.8	7.4	7.2		
Temp 100	24.0	21.2	23.0	22.6		
DO	7.1	6.9	7.8	7.5		

1215 Tests fed algae + YTC

12/1/94 Parameters Tests 5, 6, 7 & 8 - Day 10

Sample		5	6	7	8	Control
Temp	6.25					23.8
DO						6.0
Temp	~~5~~ 6.25	24.2	23.2	23.9	24.0	
DO		6.6	6.1	6.0	5.8	
Temp	~~10~~ 12.5	24.0	24.5	23.2	24.2	
DO		6.1	6.2	6.1	6.6	
Temp	~~20~~ 25	23.8	22.5	24.2	23.9	
DO		5.9	6.2	6.2	5.8	
Temp	40 50	24.5	23.8	23.5	23.5	
DO		5.3	5.3	4.6	5.9	
Temp	80 100	24.0	24.2	23.8	24.4	
DO		5.5	5.1	5.2	5.9	

Parameters 9, 10, 11 & 12 - Day 9

Sample		9	10	11	12	G-C	S-C
Temp						23.8	22.5
DO						6.8	6.9
Temp	6.25	21.5	21.8	22.0	23.2		
DO		6.4	6.4	6.2	6.7		
Temp	12.5	21.0	22.0	21.0	21.0		
DO		6.7	7.2	6.6	6.0		
Temp	25	23.2	21.2	21.2	23.0		
DO		6.3	6.2	5.8	5.9		
Temp	50	22.0	23.0	22.0	21.2		
DO		6.5	6.7	6.8	6.1		
Temp	100	22.0	23.0	21.8	22.2		
DO		6.7	6.4	5.4	6.5		

12/1/94 Parameters 1, 2, 4 : Day 8

Sample		1	2	4	Control
Temp					21.0
DO					6.6
Temp	4 (1.25)	21.0	21.2	21.0	
DO		7.4	6.7	7.6	
Temp	8 (12.5)	22.0	21.6	21.6	
DO		7.1	6.7	7.6	
Temp	16 (25)	21.2	21.2	22.0	
DO		6.6	7.0	7.0	
Temp	32 (50)	22.0	22.2	21.0	
DO		6.4	6.4	6.6	
Temp	64 (100)	22.0	21.0	22.2	
DO		6.3	5.4	6.5	

Parameters 3, 13, 14 + 15 - Day 6

Sample		3	13	14	15	G-C	S-C
Temp						22.8	22.0
DO						7.9	7.0
Temp	6.25	22.3	22.0	21.2	21.5		
DO		7.1	6.8	7.0	7.1		
Temp	12.5	21.3	22.8	22.0	22.0		
DO		7.3	6.6	7.2	7.2		
Temp	25	21.5	22.0	21.8	22.0		
DO		7.0	6.6	7.1	7.2		
Temp	50	21.0	22.4	22.5	21.5		
DO		6.9	6.7	6.7	7.2		
Temp	100	21.8	21.2	22.8	22.2		
DO		7.3	7.0	6.9	7.3		

1610 Tests fed 4TC and algae

12/2/94 PARAMETER TESTS 5, 6, 7, 8 - DAY 11

SAMPLE	5	6	7	8	CONTROL
TEMP					23°
DO					6.9
TEMP 5	23.2°	23°	23.5°	23°	
DO	6.8	7.0	7.7	6.5	
TEMP 10	23.8°	24°	22.8°	24°	
DO	6.4	6.7	6.3	7.3	
TEMP 20	23°	23.5°	23.8°	22.8°	
DO	5.9	7.2	7.3	7.8	
TEMP 40	23.8°	23°	23.8°	23.2°	
DO	6.5	5.6	6.4	6.4	
TEMP 80	23°	22.8°	23°	23.5°	
DO	5.2	5.6	5.4	6.7	

PARAMETERS 9, 10, 11, 12 DAY 10

SAMPLE	9	10	11	12	G-C	S-C
TEMP					22°	22°
DO					7.4	7.0
TEMP 6.25	22°	22.5°	22.8°	22°		
DO	7.4	7.0°	6.7	7.3		
TEMP 12.5	22.8°	22.8°	23.2°	22°		
DO	6.9	7.3	6.3	7.0		
TEMP 25	22°	21.8°	22°	23°		
DO	7.0	6.6	7.1	6.4		
TEMP 50	22.2°	21.8°	21.8°	22.8°		
DO	7.1	6.9	7.4	6.8		
TEMP 100	22.8°	21.8°	23°	22°		
DO	7.4	6.7	5.0	6.5		

12/4/91 PARAMETERS 1, 2, 4 DAY 9

SAMPLE:	1	2	4	CONTROL
TEMP	/	/		20.8
DO				7.5
TEMP 4	21°	21.2°	21°	
DO 6.5	7.5	7.5	7.9	
TEMP 8	21°	21°	21°	
DO 12.5 5 TH	7.5 TH	8.0	8.2	
TEMP 16	21.4°	21°	20.8°	
DO 25	7.4	7.6	7.6	
TEMP 32	21°	21°	21.2°	
DO 50	6.9	7.1	7.1	
TEMP 64	21.5°	21°	21°	
DO 100	6.3	6.9	7.6	

PARAMETERS 3, 13, 14, + 15 DAY 7

SAMPLE	3	13	14	15	G-C	S-C
TEMP	/	/	/	/	22°	22°
DO					7.6	7.5
TEMP 6.5	22.2°	23°	22°	22.5°		
DO	7.5	7.1	7.6	7.4		
TEMP 12.5	22°	23.2°	22°	22.2°		
DO	7.7	7.0	7.7	7.4		
TEMP 25	22.2°	21.5°	21.2°	22°		
DO	7.7	7.7	7.8	7.7		
TEMP 50	21.5°	21.5°	22°	22°		
DO	7.6	7.7	8.2	8.0		
TEMP 100	22.5°	23°	22.5	22.5°		
DO	7.0	7.6	7.2	8.2		

1205 All test vessels fed 4TC and algae.

12/3/94 Parameters 5, 6, 7, 8 - Day 12

Sample	5	6	7	8	Control
Temp	/	/	/	/	24°
DO					6.7
$Temp_{5}$	24.2°	24°	24°	24°	
$DO_{6.25}$	6.9	6.2	6.2	6.5	
$Temp_{10}$	25°	24°	24°	24.2°	
$DO_{12.5}$	6.2	6.4	6.4	6.1	
$Temp_{20}$	24.2°	24.2°	24.8°	24.2°	
DO_{25}	6.4	6.5	6.3	6.4	
$Temp_{40}$	24°	24°	24°	24.1°	
DO_{50}	6.5	6.1	5.2	6.2	
$Temp_{200}$	24°	24°	25°	24.4°	
DO_{100}	5.8	6.7	4.8	5.4	

Parameters 9, 10, 11, 12 - Day 11

	9	10	11	12	G-C	S-C
Temp	//	/	/	/	21.1°	22°
DO					7.1	6.7
$Temp_{6.25}$	21°	21.2°	21.2°	23.8°		
DO	6.7	6.4	7.1	7.0		
$Temp_{12.5}$	23°	21°	22.6°	21.2°		
DO	6.7	6.6	6.2	6.4		
$Temp_{25}$	21.8°	22°	22.6°	20.9°		
DO	6.9	7.2	6.1	6.9		
$Temp_{50}$	22.1°	23°	21.6°	22.1°		
DO	6.8	6.6	5.9	6.5		
$Temp_{100}$	21.3°	22°	22.2°	23.1°		
DO	6.4	6.9	5.5	7.6		

12/3/94 Parameters 1, 2, 4 - Day 10

	1	2	4	Control
Temp				21.6°
DO				7.4
Temp 4	21.7°	21.7°	21.6°	
DO 6.25	7.6	7.5	7.5	
Temp 8	21.8°	21.6°	21.6°	
DO 12.5	7.3	7.6	7.3	
Temp 16	21.6	21.6°	21.6°	
DO 25	7.2	7.9	7.3	
Temp 32	21.6°	21.6°	21.7°	
DO 50	7.2	7.5	7.3	
Temp 64	21.5°	21.6°	21.6°	
DO 100	7.3	7.1	7.2	

Parameters 3, 13, 14, 15 Day 8

	3	13	14	15	G-C	S-C
Temp					22°	22°
DO					6.9	7.4
Temp 6.25	21.9°	21.9°	22°	22°		
DO	7.5	7.0	8.0	7.4		
Temp 12.5	22°	22°	21.8°	22°		
DO	7.2	7.4	8.2	7.3		
Temp 25	21.9°	21.9°	21.9°	22°		
DO	7.1	7.6	7.5	7.8		
Temp 50	21.8°	22°	22°	22°		
DO	7.0	7.4	7.4	8.2		
Temp 100	22°	22°	~~22°~~	22°		
DO	7.1	7.6	7.2	7.4		

1605 all test vessels fed YTC and algae.

12/4/94 Parameter Tests 5, 6, 7, 8 - Day 13

Sample	5	6	7	8	Control
Temp	/	/	/	/	25.8°
DO					5.4
Temp 5	25.8°	25.8°	25.8°	24.2°	
DO 6.25	5.8	6.1	5.8	5.7	
Temp 10	25.8°	25.8°	26°	25.2°	
DO 12.5	5.9	6.1	5.2	5.4	
Temp 20 25	25.8°	25.4°	25.8°	25.8°	
DO	4.9	4.9	5.1	5.7	
Temp 40 50	26°	25.4°	25.8°	26°	
DO	5.4	5.3	4.3	5.6	
Temp 80 100	25.4°	25.8°	26°	25.4°	
DO	4.6	4.8	4.2	4.2	

Parameters Tests 9, 10, 11, 12 - Day 12

Sample	9	10	11	12	SC	G-C
Temp	/	/	/	/	25.2°	25.2°
DO					5.9	6.0
Temp 6.25	25.2°	24.6°	25.2°	25.8°		
DO	5.7	6.2	5.2	6.2		
Temp 12.5	25°	25°	24.8°	25°		
DO	5.8	6.0	6.2	5.7		
Temp 25	25.2°	25.2°	25.2°	25.2°		
DO	5.4	5.6	4.6	5.8		
Temp 50	25.2°	25.2°	24.8°	25.4°		
DO	6.2	6.2	4.2	5.9		
Temp 100	25°	25°	25°	25°		
DO	5.8	6.2	4.4	5.9		

2/4/94 Parameters Tests (1, 2, 4 - Day 1)

Sample	1	2	4	Control
Temp	/	/	/	24.8
DO				6.1
Temp 4 (6.25)	25.4°	24.8°	25.1°	
DO	5.9	6.2	6.1	
Temp 8 (12.5)	24.2°	25°	24.8°	
DO	6.9	6.0	5.1	
Temp 16 (25)	25.8°	24.2°	25°	
DO	5.7	6.3	6.4	
Temp 32 (50)	25.1°	24.6°	25.6°	
DO	4.7	6.4	5.8	
Temp 64 (100)	24.8°	25.2°	24.8	
DO	5.2	4.9	6.2	

Parameters Tests 3, 13, 14, 15 - Day 9

Sample	3	13	14	15	G-C	S-C
Temp	/	/	/	/	25.8°	25.8°
DO					6.8	6.7
Temp 6.25	25.8°	25.6°	25.8°	25.6°		
DO	7.1	5.6	6.9	6.2		
Temp 12.5	25.8°	25.8°	25.8	25.6°		
DO	6.7	6.7	6.5	7.2		
Temp 25	25.8	25.6°	25.8°	25.8°		
DO	6.5	6.8	7.2	6.7		
Temp 50	25.6°	25.6°	25.8°	25.6°		
DO	7.2	6.5	5.7	6.6		
Temp 100	25.8°	25.8°	25°	25.8		
DO	5.8	6.5	6.0	6.7		

1210 all test vessels fed YTC and algae

12/5/94 Parameters Tests 5, 6, 7 + 8 - Day 14

Sample	5	6	7	8	Control
Temp					25.0
DO					5.9
pH					7.76
Cond					352
Ammonia					ND
Temp	25.2	25.0	24.8	25.2	
DO	6.1	5.5	5.6	5.9	
pH 5 6.25	7.96	8.18	8.32	8.33	
Cond	349	359	358	359	
Ammonia	ND	ND	ND	ND	
Temp	25.0	24.0	25.2	25.2	
DO	6.1	5.4	5.2	5.7	
pH 10 12.5	8.04	8.17	8.38	8.35	
Cond	349	355	360	358	
Ammonia	ND	ND	ND	ND	
Temp	25.2	24.5	25.2	25.0	
DO	5.1	5.0	5.1	5.3	
pH 20 25	8.07	8.18	8.35	8.28	
Cond	354	360	365	357	
Ammonia	ND	ND	ND	ND	
Temp	25.0	25.0	24.8	25.0	
DO	6.1	4.9	4.3	4.9	
pH 40 50	8.18	8.37	8.35	8.22	
Cond	337	362	368	358	
Ammonia	ND	ND	ND	ND	

12/5/94 Parameters - tests 5, 6, 7+8 - Day 14

Sample	5	6	7	8
Temp	25.0	25.2	25.0	25.0
DO	4.5	5.1	4.5	3.9
pH 80 100	8.18	8.41	8.47	8.40
Cond	359	363	363	368
Ammonia	ND	ND	ND	ND

Parameters Tests 9, 10, 11 & 12 - Day 13

Sample	9	10	11	12	S-C	G-C
Temp					23.0	24.8
DO					6.0	5.6
Temp 6.25	25.0	23.2	23.2	25.2		
DO	5.7	5.0	6.1	5.4		
Temp 12.5	23.5	25.0	24.0	25.0		
DO	5.4	5.6	5.3	5.3		
Temp 25	23.0	22.8	25.0	23.8		
DO	6.1	5.4	4.7	5.8		
Temp 50	22.9	23.0	22.8	23.2		
DO	6.0	4.9	4.7	5.9		
Temp 100	25.2	22.8	23.8	22.5		
DO	5.4	6.1	5.9	6.4		

MLS Calibrated D.O. meters before taking D.O. measurements. Temp. 23.5°C. Calibrated meter to 8.6 ppm.

12/5/94 Parameters Tests 1, 2 + 4 (Control) Day 12

Sample		1	2	4	Control
Temp					23.2
DO					5.5
Temp	4/6.25	23.6	24.2	24.2	
DO		5.2	5.7	6.1	
Temp	8/12.5	24.5	22.8	24.8	
DO		5.9	6.1	7.0	
Temp	16/25	23.2	23.5	24.2	
DO		5.1	5.4	5.6	
Temp	32/50	23.5	23.8	24.5	
DO		4.5	4.3	5.8	
Temp	64/100	24.5	24.0	24.0	
DO		4.8	4.9	5.4	

Parameters - 3, 13, 14 + 15 - Day 10

Sample		3	13	14	15	G-C	S-C
Temp				~~25.0~~ LJT		25.0	24.8
DO				~~6.5~~ LJT		6.7	6.5
pH						8.26	8.23
Cond						345	350
Ammonia						ND	ND
Temp		25.0	25.5	25.0	25.0		
DO		7.0	6.5	6.7	6.8		
pH	6.25	8.27	8.32	8.33	8.36		
Cond		344	339	343	344		
Ammonia		ND	ND	ND	ND		

12/5/94 Parameter 3, 13, 14 & 15 = Day 10

Sample	3	13	14	15
Temp	25.0	25.0	25.5	25.0
DO	6.6	6.6	6.6	6.3
pH 12.5	8.29	8.31	8.34	8.36
Cond	342	341	344	344
Ammonia	ND	ND	ND	ND
Temp	25.8	24.8	25.0	25.0
DO	6.7	6.5	6.7	6.6
pH 25	8.29	8.33	8.32	8.35
Cond	340	341	350	346
Ammonia	ND	ND	ND	ND
Temp	24.8	25.2	25.0	24.8
DO 50	7.0	6.6	6.7	6.9
pH	8.30	8.32	8.33	8.34
Ammonia	ND	ND	ND	ND
Temp	25.5	25.8	25.0	25.5
DO	7.0	6.7	6.5	6.8
pH 100	8.33	8.34	8.34	8.35
Cond	340	342	344	343
Ammonia	ND	ND	ND	ND
Cond (50)	337	342	343	343

5-C
24.8
6.5
8.23
350
ND

0805 Test vessels fed algae and YTC.

Changed D.O. membrane and recalibrated.

12/6/94 Parameters - 5, 6, 7 + 8 - Day 15

Sample	5	6	7	8	Control
Temp					24.1
DO					5.7
Temp 5 / 6.25	25.0	25.0	24.2	23.4	
DO	5.6	5.5	5.3	5.7	
Temp 10 / 12.5	24.8	25.0	24.2	24.2	
DO	5.7	5.4	5.2	5.6	
Temp 20 / 25	25.8	24.2	24.5	24.4	
DO	5.1	5.2	4.8	5.4	
Temp 40 / 50	24.8	24.0	25.0	24.0	
DO	5.0	5.3	4.4	5.1	
Temp 80 / 100	24.0	24.2	24.5	24.2	
DO	4.3	4.2	3.9	4.0	

Parameters 9, 10, 11 + 12 - Day 14

Sample	9	10	11	12	S-C	G-C
Temp					24.0	23.0
DO					5.5	5.9
pH					7.93	7.67
Cond					342	343
Ammonia					0.0	0.0
Temp	23.9	23.2	23.4	24.8		
DO	5.8	5.3	5.9	6.0		
pH 6.25	8.03	8.06	8.08	8.18		
Cond	339	348	343	343		
Ammonia	0.0	0.0	0.0	0.0		

12/6/94 Parameters -9, 10, 11 & 12 - Day 14

Sample	9	10	11	12
Temp	24.8	23.8	24.8	24.0
DO	6.1	5.5	4.8	5.6
pH 12.5	8.21	8.15	8.14	8.16
Cond	336	351	354	344
Ammonia	0.0	0.0	0.0	0.0
Temp	24.0	24.5	24.0	23.5
DO	5.0	5.4	4.7	5.7
pH 25	8.17	8.19	8.38	8.26
Cond	343	345	352	348
Ammonia	0.0	0.0	0.0	0.0
Temp	24.5	24.2	23.2	25.0
DO	5.4	6.0	4.0	5.4
pH 50	8.26	8.31	8.46	8.27
Cond	343	340	377	349
Ammonia	0.0	00	0.0	0.0
Temp	24.0	24.2	24.0	24.0
DO	5.6	5.2	4.0	5.7
pH 100	8.28	8.25	8.35	8.30
Cond	355	343	358	342
Ammonia	0.0	0.0	0.0	0.0

Parameters 1, 2 & 4 - Day 13

Sample	1	2	4	SCon
Temp				22.4
DO				5.7
Temp 4 / 6.25	23.0	22.8	22.4	
DO	7.0	6.2	6.1	
Temp 8 / 12.5	23.8	24.0	22.1	
DO	6.4	6.1	6.1	

12/6/94 Parameters 1, 2, & 4 - Day 13

Sample		1	2	4
Temp	16/25	22.8	22.2	22.2
DO		5.9	6.3	5.3
Temp	32/50	22.5	22.1	23.0
DO		5.5	5.8	5.9
Temp	64/100	23.0	22.4	22.2
DO		5.4	6.1	5.3

Parameters 3, 13, 14 & 15 - Day 11

Sample	3	13	14	15	G-C	S-C
Temp					24.9	
DO					6.0	6.4
Temp 6.25	25.0	24.0	24.0	24.1		
DO	5.8	6.7	6.2	6.2		
Temp 12.5	24.5	25.0	24.2	24.0		
DO	6.3	5.9	6.5	6.7		
Temp 25	24.8	24.4	24.2	24.0		
DO	5.9	6.3	6.6	6.4		
Temp 50	23.0	24.8	24.1	24.5		
DO	5.7	6.4	6.1	6.2		
Temp 100	23.0	24.2	24.8	24.0		
DO	6.4	6.1	6.1	6.5		

1210 Test vessels fed algae and YTC.
D.O. meters calibrated @ 20.5°C and 9.1 ppm.

12/7/94 Parameters: 5, 6, 7 & 8 - Day 16

Sample	5	6	7	8	Control
Temp					25.0
DO					5.3
Temp 5 6.25	25.0	25.2	25.0	24.5 ~~25.5~~ TT	
DO	3.7	5.2	5.5	5.6	
Temp 10-12.5	25.2	24.8	24.8	25.2	
DO	5.2	5.2	5.1	5.8	
Temp 20-25	24.8	24.8	25.2	25.0	
DO	5.3	5.2	5.1	5.5	
Temp 40-50	25.2	25.0	25.0	25.2	
D.O.	4.3	4.5	3.6	5.1	
Temp 80-100	24.0	24.9	24.5	25.0	
DO	4.8	4.1	3.5	3.7	

Parameters: 9, 10, 11 & 12 - Day 15

~~Sample~~	9	10	11	12	SC	GC
~~DO~~/temp					5.6/24.8	6.0/25.0
Temp 6.25	23.5	25.0	24.0	24.2		
DO	5.7	5.4	5.1	5.3		
Temp 12.5	23.2	24.9	24.0	23.0		
DO	5.6	6.0	4.8	5.4		
Temp 25	25.2	23.8	24.0	25.5		
DO	5.6	5.8	4.2	5.0		
Temp 50	24.0	24.8	24.8	24.0		
DO	5.9	5.8	5.0	4.9		
Temp 100	24.8	24.5	24.0	24.9		
DO	6.1	5.9	3.5	5.5		

D.O. probe calibrated before parameters

12/7/94 Parameters: 1, 2 & 4 - Day 14

Sample	1	2 (4)	4	SCon
Temp				23.0
DO				6.2
pH				8.11
Cond				347
Ammonia				ND
Temp	23.0	23.0	23.5	
DO	5.4	5.3	6.1	
pH 4-6.25	~~348~~ 8.12 JT	8.11	8.13	
Cond	348	348	306	
Ammonia	ND	ND	ND	
Temp	23.0	23.0	23.0	
DO	5.1	5.4	6.0	
pH 8-12.5	~~349~~ 8.11 JT	8.14	8.10	
Cond	349	347	324	
Ammonia	ND	ND	ND	
Temp	23.0	23.0	24.5	
DO	5.3	5.1	5.4	
pH 16-25	~~350~~ 8.10 JT	8.18	8.26	
Cond	350	362	324	
Ammonia	ND	ND	ND	
Temp	23.0	23.8	23.2	
DO	4.8	5.2	5.7	
pH 32-50	~~349~~ 8.09 JT	8.23	8.23	
Cond	349	351	351	
Ammonia	ND	ND	ND	

12/7/94 cont

Parameters: 1, 2, 4 - Day 14

Sample	1	2	4	SCon
Temp	23.2	23.0	23.0	
DO 64-	~~5.2~~ 5.3	5.6	5.4	
pH 100	~~8.49~~ 8.08	8.26	8.22	
Cond	349	375	349	
Ammonia	ND	ND	ND	

Parameters: 3, 13, 14 & 15 - Day 12

Sample	3	13	14	15	GCon	SCon
Temp					24.0	22.8
D.O					5.5	5.1
Temp 6.25	24.0	~~23.0~~ 23.0	24.0	23.2		
D.O	5.7	4.5	5.8	4.2		
Temp 12.5	24.0	22.8	24.2	24.0		
D.O.	5.2	4.6	5.9	6.0		
Temp 25	24.2	24.2	24.5	24.0		
D.O	5.8	5.8	5.7	5.7		
Temp 50	22.8	24.0	23.0	23.2		
D.O	4.6	6.0	4.6	4.5		
Temp 100	23.2	25.0	23.0	23.0		
D.O	4.7	5.2	4.9	4.7		

1513 All test vessels fed YTC and algae.

12/8/94 MLS

D.O. meter calibrated to 8.6 ppm at 23.5°C.

Parameters 5, 6, 7 & 8 - Day 17

Sample	5	6	7	8	Con
Temp					24.0
D.O.					5.6
Temp 5-6.25	24.2	24.5	24.0	23.2	
D.O	5.9	5.7	4.1	5.2	
Temp 10-12.5	24.8	23.0	23.1	24.0	
D.O	5.4	6.0	5.8	5.6	
Temp 20-25	24.5	23.8	24.0	24.2	
DO	5.2	5.5	5.2	5.6	
Temp 40-50	23.8	22.6	24.2	23.9	
D.O	5.3	5.8	4.7	5.2	
Temp 80-100	23.8	24.2	24.0	24.0	
DO	4.1	4.6	4.2	4.2	

Parameters 9, 10, 11, 12 - Day 16

Sample	9	10	11	12	Scon	GCon
Temp					22.5	21.1
DO					5.4	5.7
Temp 6.25	23.2	21.2	21.0	23.4		
DO	5.8	5.1	5.6	6.2		
Temp 12.5	23.2	21.2	23.0	21.5		
DO	6.5	5.7	5.3	5.3		
Temp 25	22.0	22.2	22.8	21.2		
DO	5.5	6.0	5.0	6.0		
Temp 50	23.5	23.8	21.8	23.5		
DO	6.1	7.0	4.0	5.1		
Temp 100	22.0	23.0	22.5	21.5		
DO	5.5	5.2	4.3	5.3		

~~Calibrated DO meter before parameters were taken~~

12/8/94

MLS Parameters: 1, 2 & 4 - Day 15

Sample	1	2	4	SCon
Temp				23.1
DO				5.3
Temp 4-6.25	22.0	22.0	22.0	
DO	7.0	6.1	5.4	
Temp 8-12.5	21.8	23.0	msg 21.8	
DO	4.0	6.2	4.7	
Temp 16-25	21.8	21.8	238	
DO	5.3	6.2	5.5 MLS	
Temp 32-50	23.2	21.8	22.0	
DO	5.7	5.4	6.1	
Temp 64-100	23.5	22.0	23.0	
DO	5.5	5.7	4.6	

Parameters: 3, 13, 14 & 15 - Day 13

Sample	3	13	14	15	SCon	GCon
Temp					25.8	24.5
DO					5.5	6.3
Temp 6.25	25.2	21.4	24.0	21.0		
DO	5.3	5.1	5.5	8.6		
Temp 12.5	21.2	25.0	22.5	23.2		
DO	5.2	5.9	5.9	6.0		
Temp 25	23.5	24.0	23.5	24.2		
DO	5.7	6.0	6.0	5.9		
Temp 50	23.0	24.0	23.2	25.0		
DO	5.8	5.7	5.9	5.7		
Temp 100	21.5	25.2	25.0	25.0		
DO	5.1	5.5	4.2	6.0		

1500: All test vessels fed algae and YTC.

12/9/94 Parameters 5, 6, 7 + 8 - Day 18 (DO meter calibrated to 9.3 at 19.5 °C)

Sample	5	6	7	8	Con
Temp					24.5
DO					5.3
Temp 5 / 6.25	24.9	25.0	24.8	24.8	
DO	5.2	5.3	5.2	5.2	
Temp 10 / 12.5	25.0	24.5	24.8	25.0	
DO	5.2	5.2	4.8	5.4	
Temp 20 / 25	24.4	24.5	25.0	24.7	
DO	4.8	5.0	4.9	5.5	
Temp 40 / 50	24.5	24.5	25.0	25.0	
DO	4.9	4.5	4.7	5.0	
Temp 80 / 100	24.5	24.8	24.5	24.8	
DO	4.1	4.4	3.9	3.8	

Parameters 9, 10, 11 + 12 - Day 17

Sample	9	10	11	12	S-C	G-C
Temp					24.5	24.8
DO					5.4	5.6
Temp 6.25	24.8	24.5	24.5	25.0		
DO	5.6	5.2	5.1	5.7		
Temp 12.5	24.0	24.8	24.8	25.0		
DO	5.1	5.5	4.9	5.5		
Temp 25	24.0	24.4	24.5	25.0		
DO	5.5	5.5	4.4	5.3		
Temp 50	24.2	24.2	24.2	24.5		
DO	5.3	4.5	4.4	5.3		
Temp 100	24.8	24.0	24.8	24.8		
DO	5.6	4.9	3.5	5.5		

9.3

at 19.5 °C 12/9/94 Parameters - 1, 2 + 4 - Day 16

Sample	1	2	4	S-Con
Temp				24.0
DO				5.3
Temp 4 6.25	24.2	24.4	24.2	
DO	5.4	5.5	5.1	
Temp 8 12.5	24.6	24.0	24.9	
DO	5.4	6.1	4.3	
Temp 16 25	24.0	24.0	24.4	
DO	5.4	5.6	5.3	
Temp 32 50	24.2	24.4	24.8	
DO	4.2	4.7	5.4	
Temp 64 100	24.8	24.2	24.2	
DO	5.0	5.8	5.1	

Parameters - 3, 13, 14 + 15 - Day 14

Sample	3	13	14	15	S-C	G-C
Temp					23.2	23.0
DO					4.9	5.0
pH					8.07	8.06
Cond					361	363
Ammonia					0.00	0.00
Temp	22.0	25.0	23.8	23.0		
DO	4.9	5.1	5.4	5.2		
pH 6.25	8.06	8.07	8.06	8.09		
Cond	347	350	342	338		
Ammonia	ND	ND	ND	ND		

~~1605 mls all test vessels fed 4TC and algae~~ at end of next page.

12/9/94 Parameters 3, 13, 14 + 15 (Con't) - Day 14

Sample	3	13	14	15
Temp	23.5	23.2	22.8	22.5
DO	5.1	5.4	5.4	5.0
pH 12.5	8.08	8.07	8.05	8.11
Cond	342	340	339	334
Ammonia	ND	ND	ND	ND
Temp	24.9	24.0	23.5	23.0
DO	5.2	5.6	4.5	5.1
pH 25	8.12	8.13	8.13	8.13
Cond	341	340	342	336
Ammonia	ND	ND	ND	ND
Temp	22.0	24.5	22.0	24.9
DO	5.4	5.3	5.4	4.8
pH 50	8.18	8.20	8.18	8.16
Cond	331	342	334	345
Ammonia	ND	ND	ND	ND
Temp	22.2	24.0	23.0	22.8
DO	5.1	5.3	5.0	5.6
pH 100	8.18	8.15	8.18	8.17
Cond	335	339	338	335
Ammonia	0.00-ND	0.00-ND	0.00-ND	0.00-ND

1600 All test vessels fed YTC and algae

12/10/94 D.O. meters calibrated to 8.8 ppm at 22 °C.
1205 All test vessels fed YTC and algae

12/10/94 Parameters: 5, 6, 7 & 8 - Day 19

Sample	5	6	7	8	Con
Temp					24.8
DO					5.7
Temp 5-6.25	25.0	24.0	~~25.8~~ 24.8 mcs	24.0	
DO	4.2	5.8	5.3	5.8	
Temp 10-12.5	25.0	24.8	24.2	24.4	
DO	5.7	5.4	5.7	5.5	
Temp 20-25	24.2	24.8	25.0	24.5	
DO	5.3	5.6	5.4	5.7	
Temp 40-50	24.4	24.8	24.4	~~25.8~~ 24.8 mcs	
DO	4.6	5.2	4.6	5.3	
Temp 80-100	24.0	24.8	25.0	24.2	
DO	5.0	5.7	4.0	3.6	

Parameters 9, 10, 11 & 12 - Day 18

Sample	9	10	11	12	SC	GC
Temp					24.0	24.8
DO					5.6	5.9
Temp 6.25	24.0	23.4	25.0	24.0		
DO	5.7	5.6	5.8	5.9		
Temp 12.5	24.5	24.5	24.0	24.0		
DO	5.5	5.9	4.6	5.7		
Temp 25	25.0	24.8	24.4	24.4		
DO	5.6	5.7	5.2	5.2		
Temp 50	25.0	24.8	24.5	24.2		
DO	5.9	6.0	4.9	5.3		
Temp 100	25.0	24.6	24.0	24.0		
DO	6.0	5.6	3.1	5.7		

°C.

12/10/94 Parameters 1, 2 & 4 - Day 17

Sample		1	2	4	SCon
Temp					23.9
DO					5.9
Temp	4-6.25	24.0	23.8	23.9	
D.O		5.3	5.4	6.0	
Temp	8-12.5	23.5	23.2	23.5	
D.O		5.2	4.5	5.5	
Temp	16-25	24.0	23.8	23.8	
D.O.		4.7	4.5	5.8	
Temp	32-50	23.8	23.6	24.0	
DO		5.1	5.8	5.3	
Temp	64-100	24.0	24.4	24.0	
DO		5.0	4.0	4.8	

Parameters 3, 13, 14 & 15 - Day 15

Sample		3	13	14	15	SC	GC
Temp						21.8	22.4
DO						6.2	6.7
Temp	6.25	23.0	22.2	23.2	22.2		
DO		6.4	6.1	5.6	6.0		
Temp	12.5	23.0	23.0	24.4	23.0		
DO		5.7	6.0	6.1	6.3		
Temp	25	24.0	23.8	22.4	23.0		
DO		5.9	6.5	6.4	6.2		
Temp	50	22.0	24.4	22.8	24.3		
DO		6.1	6.0	5.8	6.2		
Temp	100	24.0	23.0	22.0	24.2		
DO		5.9	6.2	6.2	6.3		

BH

12/11/94 Parameters 5, 6, 7 + 8 - Day 20 (DO calibrated to 8.7 at 23°C)

Sample		5	6	7	8	Con
Temp						24.0
DO						6.3
Temp	5 / 6.25	24.2	24.5	25.0	24.0	
DO		6.2	6.3	5.6	6.0	
Temp	10 / 12.5	24.0	23.8	24.0	24.0	
DO		4.7	6.0	6.0	5.2	
Temp	20 / 25	24.0	24.0	24.0	24.0	
DO		5.2	5.6	6.0	6.0	
Temp	40 / 50	23.9	24.0	24.5	23.8	
DO		5.1	5.7	5.2	5.1	
Temp	80 / 100	24.0	24.0	24.8	24.0	
DO		4.5	4.9	5.1	4.3	

Parameters 9, 10, 11 & 12 - Day 19

Sample		9	10	11	12	S-C	G-C
Temp						23.8	22.2
DO						6.0	6.4
Temp	6.25	23.0	23.0	22.0	24.0		
DO		5.8	5.9	6.5	6.2		
Temp	12.5	24.0	22.5	24.5	23.0		
DO		6.4	6.0	5.0	6.1		
Temp	25	23.5	24.0	23.5	22.5		
DO		6.3	5.8	5.3	6.4		
Temp	50	24.5	23.8	23.0	~~24.5~~		
DO		~~5.0~~ 5.9	6.2	4.1	~~2.8~~ LJT 5.2		
Temp	100	~~23.5~~ 23.6	24.2	23.0	~~6.4~~ LJT 22.8		
DO		6.3	5.5	4.6	6.4		

1515 all test vessels fed 4TC and algae.

12/11/94 Parameters 1, 2 + 4 - Day 18

Sample		1	2	4	Con
Temp					23.0
DO					6.5
Temp	4 / 6.25	23.8	23.2	23.0	
DO		6.6	6.1	6.7	
Temp	8 / 12.5	22.7	23.0	22.0	
DO		6.1	6.2	7.7	
Temp	16 / 25	23.5	23.0	24.2	
DO		5.6	6.1	5.6	
Temp	32 / 50	23.5	23.0	23.0	
DO		5.6	6.1	5.6	
Temp	64 / 100	24.0	24.5	24.0	
DO		5.3	4.8	6.1	

Parameters 3, 13, 14 + 15 - Day 16

Sample		3	13	14	15	S-C	G-C
Temp						22.0	21.5
DO						6.8	7.8
Temp	6.25	22.0	21.8	22.5	22.0		
DO		7.2	4.9	6.8	4.9		
Temp	12.5	22.0	21.8	23.0	21.8		
DO		6.9	5.0	7.2	4.9		
Temp	25	23.8	23.0	21.8	22.0		
DO		7.1	7.5	6.1	7.2		
Temp	50	22.0	23.2	22.0	23.0		
DO		6.6	7.1	7.2	7.4		
Temp	100	21.8	23.0	22.2	23.5		
Do		4.9	7.3	4.4	7.6		

12/12/94 Parameters 5, 6, 7 & 8 - Day 21

Sample	5	6	7	8	Con
Temp					24.2
DO					6.6
pH					~~8.31~~ 8.66 LJT
Cond					475
Ammonia					ND
Temp	24.2	24.4	24.0	24.0	
DO	6.4	6.0	5.9	6.3	
pH 5 6.25	~~8.48~~ LJT 8.49	~~9.03~~ LJT 8.53	~~9.15~~ LJT 8.61	~~9.08~~ LJT 8.50	
Cond	401	380	375	370	
Ammonia	ND	ND	ND	ND	
Temp	24.8	24.2	24.0	24.2	
DO	6.7	6.2	6.1	6.3	
pH 10 12.5	~~8.94~~ LJT 8.51	~~9.04~~ LJT 8.54	~~9.18~~ LJT 8.65	~~9.06~~ LJT 8.53	
Cond	381	374	377	370	
Ammonia	ND	ND	ND	ND	
Temp	24.0	24.0	24.2	24.0	
pH DO	5.7	5.4	5.8	5.9	
pH 20 25	~~9.00~~ LJT 8.49	~~9.09~~ LJT 8.54	~~9.16~~ LJT 8.61	~~9.17~~ LJT 8.71	
Cond	386	388	380	368	
Ammonia	ND	ND	ND	ND	
Temp	24.0	24.2	24.1	24.4	
DO	5.3	5.8	5.5	6.3	
pH 40 50	~~9.07~~ LJT 8.63	~~9.15~~ LJT 8.61	~~9.03~~ LJT 8.41	~~9.10~~ LJT 8.57	
Cond	403	382	373	376	
Ammonia	ND	ND	ND	ND	
Temp	24.8	24.3	24.0	24.0	
DO	4.3	5.5	5.0	4.8	
pH 80 100	~~9.12~~ LJT 8.62	~~9.18~~ LJT 8.64	~~8.97~~ LJT 8.35	~~9.12~~ LJT 8.56	
Cond/Amm.	411/ND	388/ND	375/ND	386/ND	

12/12/94

Parameters 9, 10, 11, & 12 - Day 2C

Sample	9	10	11	12	SCon	GCon
Temp					22.8	23.2
DO					6.8	6.6
Temp 6.25	23.9	23.8	23.6	23.2		
DO	6.2	6.3	6.1	7.4		
Temp 12.5	23.5	23.4	24.1	23.8		
DO	6.6	6.3	6.1	6.7		
Temp 25	23.2	23.0	23.9	24.0		
DO	6.8	6.6	6.0	5.9		
Temp 50	23.2	23.0	23.4	23.4		
DO	6.7	6.8	5.9	6.0		
Temp 100	24.0	22.9	23.8	23.0		
DO	6.5	6.1	4.4	7.1		

Parameters 1, 2 & 4 - Day 19

Sample	1	2	4	Con
Temp				23.0
DO				5.9
Temp 4-6.25	23.2	24.1	24.0	
DO	6.1	5.7	6.4	
Temp 8-12.5	24.2	23.0	24.0	
DO	5.7	7.9	5.6	
Temp 16-25	23.4	23.1	24.2	
DO	5.1	6.4	5.8	
Temp 32-50	23.4	23.8	24.8	
DO	5.0	4.9	5.0	
Temp 64-100	24.8	22.9	23.6	
DO	5.2	5.6	5.4	

12/12/94 Parameters: 3, 13, 14 & 15 - Day 17

Sample	3	13	14	15	Slon	6Con
Temp					24.0	23.9
D.O					7.5	7.7
Temp 6.25	22.0	24.0	22.2	21.2		
D.O	7.3	6.2	7.6	6.6		
Temp 12.5	23.0	21.2	21.0	22.2		
DO	7.5	6.7	7.4	7.6		
Temp 25	24.0	22.8	22.2	21.9		
DO	7.4	7.7	7.5	7.6		
Temp 50	21.2	23.4	21.8	23.8		
DO	7.0	7.7	6.9	7.4		
Temp 100	21.8	23.0	22.0	22.9		
DO	6.6	7.6	6.8	8.2		

Calibrated D.O. meter to 8.8 at 22.0°C

1605 All test vessels fed 4TC and algae.

12/13/94 Parameters: 5, 6, 7, & 8 - Day 22

Sample		5	6	7	8	Con
Temp						22.5
DO						5.6
Temp	5 / 6.25	22.8	22.5	22.0	22.2	
DO		5.2	6.1	5.5	5.9	
Temp	10 / 12.5	23.0	22.8	22.2	22.5	
DO		6.0	5.7	5.9	5.9	
Temp	20 / 25	22.5	22.2	23.0	22.2	
DO		5.0	5.3	5.6	5.6	
Temp	40 / 50	22.4	22.8	22.8	22.2	
DO		5.0	4.9	4.7	5.4	
Temp	80 / 100	22.5	23.0	22.8	22.8	
DO		5.2	5.4	4.3	3.8 ✓	

Parameters: 9, 10, 11 & 12 - Day 21

Sample		9	10	11	12	S-C	G-C
Temp						22.0	22.5
Do						5.5	6.0
pH						8.46	8.53
Cond						356	331
Ammonia						ND	ND
Temp		21.8	21.8	22.0	22.2		
DO		5.8	6.0	5.1	6.4		
pH	6.25	8.52	8.54	8.57	8.51		
Cond		348	348	324	351		
Ammonia		ND	ND	ND	ND		

D.O. meter calibrated to 9.1 at 20.5°C.

12/13/94 Parameters 9, 10, 11 + 12 - Day 21 (Con't)

Sample	9	10	11	12
Temp	21.8	22.8	21.8	21.8
DO	5.4	6.0	5.4	6.0
pH 12.5	8.43	8.52	8.61	8.54
Cond	368	347	363	354
Ammonia	ND	ND	ND	ND
Temp	23.0	22.0	21.8	22.8
DO	6.0	5.8	4.9	5.7
pH 25	8.48	8.52	8.62	8.56
Cond	349	346	380	351
Ammonia	ND	ND	ND	ND
Temp	22.2	22.8	21.8	22.0
DO	6.0	6.1	5.4	5.6
pH 50	8.56	8.53	8.60	8.55
Cond	342	345	373	355
Ammonia	ND	ND	ND	ND
Temp	22.2	22.0	22.0	22.5
DO	6.2	5.9	2.9	6.0
pH 100	8.57	8.55	8.25	8.57
Cond	345	354	426	345
Ammonia	ND	ND	ND	ND

Parameters - 1, 2 + 4 - Day 20

Sample	1	2	4	Con
Temp				22.0
DO				5.4
Temp 4 (6.25)	22.0	22.2	22.0	
DO	5.8	5.2	5.4	

12/13/94 Parameters 1, 2 + 4 - Day 20 (Con't)

Sample		1	2	4
Temp	8 / 12.5	22.0	22.0	21.8
DO		5.9	6.5	5.4
Temp	16 / 25	22.5	21.8	21.8
DO		4.9	5.1	5.4
Temp	32 / 50	21.8	22.0	22.0
DO		5.7	6.2	5.1
Temp	64 / 100	22.5	22.0	22.2
DO		4.4	5.1	5.1

Parameters - 3, 13, 14 & 15 - Day 18

Sample		3	13	14	15	S-C	G-C
Temp						23.5	25.5
DO						5.5	5.2
Temp	6.25	25.0	24.0	24.0	23.2		
DO		6.4	5.4	6.9	4.9		
Temp	12.5	24.2	24.0	24.0	24.0		
DO		6.8	6.9	6.9	5.2		
Temp	25	24.0	23.8	24.8	25.2		
DO		6.9	7.0	6.8	6.8		
Temp	50	23.2	23.8	24.2	24.5		
DO		5.3	6.6	5.6	6.7		
Temp	100	25.2	24.8	24.0	23.5		
DO		5.4	6.6	5.5	5.4		

1530 All test vessels fed algae + YTC

MLS

12/14/94 Oxygen meter calibrated to 9.5 ppm at 18.0°C.

Parameters 5, 6, 7 & 8 - Day 23

Sample	5	6	7	8	Con
Temp					23.2
DO					6.4
Temp 5-6.25	23.2	23.1	23.0	22.4	
DO	6.1	6.3	5.8	6.2	
Temp 10-12.5	23.2	22.8	23.0	23.0	
D.O	6.0	5.8	5.7	4.9	
Temp 20-25	23.0	23.0	23.0	23.0	
DO	4.8	5.6	6.4	6.2	
Temp 40-50	23.1	22.2	23.2	23.0	
D.O	5.7	5.9	5.2	5.0	
Temp 80-100	23.0	23.2	23.2	22.8	
DO	5.2	5.5	4.2	5.0	

Parameters 9, 10, 11, 12 - Day 22

Sample	9	10	11	12	SC	GC
Temp					21.0	21.2
DO					5.6	5.4
Temp 6.25	22.0	21.0	21.2	23.0		
DO	5.8	6.2	6.2	6.2		
Temp 12.5	22.6	21.0	21.4	20.8		
DO	6.2	6.0	5.7	6.0		
Temp 25	21.2	21.6	22.4	21.0		
DO	6.5	5.9	5.4	6.6		
Temp 50	22.1	22.2	21.0	21.4		
DO	6.3	6.0	4.5	5.5		
Temp 100	20.8	21.2	22.2	21.0		
DO	5.8	5.8	4.4	6.7		

Parameters 1, 2 & 4 - Day 21

MLS

12/14/94 Sample		1	2	4	Con
Temp					22.4
DO					5.6
pH					7.88
Cond					~~448~~ UT 418
Ammonia					ND
Temp		22.0	22.0	22.2	
DO	4-6.25	6.1	5.8	6.2	
pH		8.37	8.49	8.47	
Cond		350	353	347	
Ammonia		ND	ND	ND	
Temp		22.0	22.1	22.0	
DO	8-12.5	6.1	5.5	7.1	
pH		8.37	8.51	8.52	
Cond		347	350	337	
Ammonia		ND	ND	ND	
Temp		22.0	22.2	22.2	
DO	16-29	5.7	4.5	5.9	
pH		8.34	8.54	8.56	
Cond		353	354	344	
Ammonia		ND	ND	ND	
Temp		22.6	22.0	22.0	
DO	32-50	5.3	5.6	5.0	
pH		8.33	8.47	8.64	
Cond		350	355	365	
Ammonia		ND	ND	ND	
Temp		22.2	22.0	22.4	
DO	64-100	4.8	4.3	6.1	
pH		8.31	8.37	8.60	
Cond		356	375	351	
Ammonia		ND	ND	ND	

mcs

12/14/94 Parameters 3, 13, 14 & 15 – Day 19

Sample	3	13	14	15	SC	GC
Temp					22.9	24.0
DO					6.1	7.4
Temp 625	23.4	23.2	23.5	24.2		
DO 625	6.3	6.1	6.7	5.7		
Temp 12.5	24.4	23.0	23.2	23.4		
DO 12.5	6.8	6.1	7.0	6.5		
Temp 25	23.4	23.8	23.4	24.0		
DO 25	7.1	7.2	5.6	6.9		
Temp 50	23.0	23.2	23.2	25.0		
DO 50	6.3	7.0	6.4	6.7		
Temp 100	23.8	24.2	23.0	24.2		
DO 100	5.7	6.9	6.0	7.4		

1300 All test vessels fed algae & YTC.

Ben

12/15/94 Parameters: 5, 6, 7 & 8 – Day 24

Sample	5	6	7	8	Con
Temp					22.8
DO					6.0
Temp 5	22.5	23.5	22.2	23.0	
DO 625	5.2	5.9	6.7	6.3	
Temp 10-12.5	23.0	23.8	23.0	23.0	
DO 10-12.5	6.8	6.3	6.7	6.7	
Temp 20-25	23.0	22.2	23.0	22.0	
DO 20-25	5.6	6.1	6.4	7.1	
Temp 40-50	24.0	23.5	23.0	22.5	
DO 40-50	6.4	5.9	6.0	6.3	
Temp 80-100	22.0	23.8	23.8	23.0	
DO 80-100	6.3	7.2	5.2	5.5	

MLS

12/15/94

Parameters 9, 10, 11 & 12 - Day 23

Sample	9	10	11	12	SC	GC
Temp					21.5	22.0
DO					6.3	6.4
Temp 6.25	21.2	21.0	21.0	22.0		
DO	6.1	4.6	6.3	6.6		
Temp 12.5	20.8	21.5	21.2	21.0		
DO	6.8	6.8	6.5	6.2		
Temp 25	21.8	21.8	21.0	21.2		
DO	6.6	6.8	5.6	6.2		
Temp 50	21.2	21.0	21.0	21.0		
DO	6.5	6.2	6.4	6.3		
Temp 100	21.5	21.0	21.5	21.8		
DO	7.1	6.0	6.1	6.9		

Parameters 1, 2 & 4 - Day 22

Sample	1	2	4	Con
Temp				20.5
DO				4.8
Temp 4- 6.25	21.0	21.8	21.0	
DO	6.5	6.0	5.1	
Temp 8- 12.5	21.5	20.8	20.8	
DO	6.4	5.9	5.6	
Temp 16- 25	21.2	21.0	22.0	
DO	6.1	5.4	5.6	
Temp 32- 50	21.5	21.2	21.0	
DO	5.7	5.4	5.6	
Temp 64- 100	21.0	21.0	21.2	
DO	5.7	4.2	5.3	

12/15/94 mcs — Parameters 3, 13, 14, 15 - Day 20

Sample	3	13	14	15	SC	GC
Temp					23.2	23.2
DO					6.4	6.4
Temp 6.25	23.0	21.5	23.0	21.0		
DO	7.2	6.6	7.2	7.0		
Temp 12.5	23.0	23.2	23.2	21.8		
DO	6.7	7.0	7.1	6.9		
Temp 25	25.0	23.5	23.2	23.0		
DO	7.2	7.4	7.3	7.1		
Temp 50	21.5	24.5	22.0	24.2		
DO	6.4	7.1	7.0	7.1		
Temp 100	21.8	24.0	23.0	24.5		
DO	6.9	7.3	6.3	7.3		

D.O. meter calibrated to 9.6 ppm at 17.5 °C.
1600 All test vessels fed algae and YTC.

12/16/94 mcs — Parameters 5, 6, 7 & 8 - Day 25

Sample	5	6	7	8	Con
Temp					22.8
DO					6.7
Temp 5-6.25	24.0	23.0	23.0	23.8	
DO	6.4	6.3	6.0	6.2	
Temp 10-12.5	24.0	23.8	23.0	23.4	
DO	6.0	5.9	6.1	6.1	
Temp 20-25	23.4	23.2	22.8	23.0	
DO	5.3	6.0	6.0	6.1	
Temp 40-50	24.0	24.0	23.2	24.2	
DO	5.4	5.6	4.9	6.2	
Temp 80-100	23.8	23.0	23.8	23.2	
DO	4.6	5.7	3.7	4.4	

mcs

12/16/94 cont

Parameters 9, 10, 11 & 12 - Day 24

Sample	9	10	11	12	SC	GC
Temp	/	/	/	/	21.2	22.0
DO	/	/	/	/	6.3	6.2
Temp 6.25	22.4	21.2	22.0	22.0		
DO	5.7	6.1	6.0	6.7		
Temp 12.5	21.2	22.8	23.0	21.8		
DO	5.9	6.0	5.9	6.5		
Temp 25	22.0	21.0	22.0	22.2		
DO	6.4	6.4	6.3	5.6		
Temp 50	21.6	21.8	21.8	22.0		
DO	5.8	6.7	6.2	6.1		
Temp 100	22.4	21.8	22.0	22.1		
DO	6.5	6.6	4.3	6.7		

Parameters 1, 2 & 4 - Day 23

Sample	1	2	4	Con
Temp	/	/	/	22.4
DO	/	/	/	5.7
Temp 4-6.25	22.8	23.0	23.0	
DO	6.4	5.7	6.0	
Temp 8-12.5	23.2	22.0	23.4	
DO	6.0	7.1	6.0	
Temp 16-25	23.0	23.0	23.0	
DO	5.6	6.3	5.5	
Temp 32-50	22.8	22.0	22.5	
DO	4.8	6.5	5.2	
Temp 64-100	23.8	23.1	22.8	
DO	4.5	6.3	5.3	

MLS

12/16/94 Parameters 3, 13, 14 & 15 - Day 21

Sample	3	13	14	15	SC	GC
Temp	23.8	24.2	23.0	23.0	24.0	23.0
DO	5.6	MLS 6.6	5.8	7.2	5.7	6.0
pH 6.25	8.43	8.56	8.46	8.61	8.53	8.49
Cond	MLS 332	335	334	331	359	337
Amm	ND	ND	ND	ND	ND	ND
Temp	23.2	23.4	24.0	24.0		
DO	6.0	7.0	5.6	5.8		
pH 12.5	8.43	8.58	8.45	8.50		
Cond	332	328	333	334		
Amm	ND	ND	ND	ND		
Temp	24.2	23.0	23.0	23.2		
DO 25	6.0	5.8	5.9	5.6		
pH	8.43	8.56	8.43	8.48		
Cond	328	329	334	336		
Amm	ND	ND	ND	ND		
Temp	23.0	23.4	23.2	23.2		
DO 50	5.6	5.8	5.9	5.8		
pH	8.44	8.48	8.45	8.47		
Cond	335	339	336	335		
Amm	ND	ND	ND	ND		
Temp	23.8	23.0	23.2	23.0		
DO 100	7.4	5.8	6.9	7.4		
pH	8.60	8.47	8.55	8.57		
Cond	333	338	336	337		
Amm	ND	ND	ND	ND		

DO meter calibrated to 9.2ppm at 20.0°C.
All test vessels fed 4TC and algae

12-17-94 Parameters 9, 10, 11, 12 - Day 25

Sample	9	10	11	12	SC	GC
Temp	\	\	\	\	24.2	24.2
DO					6.3	6.7
Temp 0.25	23.2	24.8	24.0	23.6		
DO	6.7	5.5	6.6	7.1		
Temp 12.5	23.6	24.5	24.5	24.2		
DO	7.0	6.3	5.9	6.4		
Temp 25	24.2	24.8	23.2	24.2		
DO	6.3	6.7	6.1	6.7		
Temp 50	23.8	23.8	24.2	25.0		
DO	6.7	6.9	4.7	6.4		
Temp 100	24.8	25.0	23.2	24.8		
DO	6.1	6.7	5.4	6.8		

Parameters 1, 2, 4 - Day 24

Sample	1	2	4	Con
Temp	\	\	\	24.8
DO				6.7
Temp 4	24.8	24.8	24.8	
Do 6.25	6.9	6.9	6.7	
Temp 8	25.0	24.8	24.4	
DC 12.5	6.9	6.6	7.5	
Temp 14	24.8	24.8	24.8	
DO 25	6.2	6.5	6.6	
Temp 32	25.2	24.6	24.8	
DO 50	5.0	5.4	5.9	
Temp 64	24.8	25.0	25.2	
DO 100	6.2	6.5	5.8	

12-17-94 Parameters 3, 13, 14, 15 - Day 22

Sample	3	13	14	15	SC	GC
Temp	/	/	/	/	~~25.6~~ 6.6	25.0
DO					6.6	6.7
Temp 6.25	25.1	25.2	24.6	24.8		
DO	6.2	6.2	6.4	6.2		
Temp 12.5	24.8	24.8	24.8	25.0		
DO	6.8	6.1	6.6	6.6		
Temp 25	25.0	24.0	24.8	24.7		
DO	6.9	6.0	6.1	6.4		
Temp 50	24.0	24.8	24.8	24.8		
DO	5.9	6.7	6.7	6.8		
Temp 100	25.2	25.0	25.2	25.0		
DO	6.2	6.6	6.1	7.1		

Parameters 5, 6, 7, 8 - Day 26

Sample	5	6	7	8	Con
Temp	/	/	/	/	24.2
DO					7.1
Temp 5	24.0	24.8	24.2	24.6	
DO 6.25	6.9	6.7	6.2	7.1	
Temp 10	24.2	23.6	23.6	24.2	
DO 12.5	6.6	6.7	6.8	6.4	
Temp 20	24.8	23.2	24.2	24.8	
DO 25	6.1	6.5	~~24.2~~ 6.9	6.8	
Temp 40	24.8	24.2	24.0	24.8	
DO 50	6.9	6.2	6.1	6.1	
Temp 80	24.8	24.2	24.2	24.0	
DO 100	5.4	6.3	6.0	5.4	

12-18-94 Parameters 9, 10, 11, 12 — Day 26

Sample	9	10	11	12	SC	GC
Temp	/	/	/	/	23.5	23.0
DO					6.5	6.3
Temp 6.25	23.5	24.0	23.5	23.5		
DO	5.6	6.2	6.4	7.1		
Temp 12.5	24.0	23.5	23.8	23.0		
DO	6.6	6.4	6.3	6.4		
Temp 25	23.6	24.0	24.0	24.0		
DO	6.6	6.8	6.1	6.3		
Temp 50	23.8	23.5	22.6	23.8		
DO	6.8	6.4	6.3	6.9		
Temp 100	23.5	23.5	24.0	23.5		
DO	6.7	6.2	4.3	6.3		

Parameters 1, 2, 4 — Day 25

Sample	1	2	4	CON
Temp	/	/	/	24.0
DO				6.2
Temp 4	24.0	24.0	24.0	
DO 6.25	6.4	5.7	6.2	
Temp 8	24.0	~~24.0~~ 23.5	24.0	
DO 12.5	6.1	~~6.3~~ 6.17	6.1	
Temp 16	24.0	24.0	24.0	
DO 25	5.9	6.3	5.8	
Temp 32	24.0	24.0	24.0	
DO 50	5.4	5.6	5.6	
Temp 64	24.0	24.0	24.0	
DO 100	4.5	5.8	5.7	

12-13-94 Parameters 3, 13, 14, 15 - Day 23

Sample	3	13	14	15	SC	LC
Temp					24.5	25.0
DO					7.0	7.0
Temp 6.25	25.0	~~24.5~~ 24.5	25.0	24.5		
DO	6.5	7.3	6.8	7.9		
Temp 12.5	25.0	23.0	25.0	24.0		
DO	6.7	6.6	6.8	7.4		
Temp 25	24.7	24.8	25.0	24.8		
DO	~~4.7~~ 6.5	~~7.8~~ 7.1	7.0	6.9		
Temp 50	25.0	25.0	24.2	24.2		
DO	6.7	7.1	7.3	6.8		
Temp 100	24.0	25.0	24.8	23.8		
DO	7.1	7.1	6.9	6.7		

Parameters 5, 6, 7, 8 - Day 27

Sample	5	6	7	8	CON
Temp					24.0
DO					7.0
Temp 5	~~24.0~~ 24.0	23.8	23.2	24.0	
DO 6.25	~~7.0~~ 7.0	7.0	6.7	7.0	
Temp 10	24.5	23.8	23.8	24.0	
DO 12.5	6.7	6.9	6.9	6.8	
Temp 20	~~24.0~~ 24.0	23.8	24.0	22.0	
DO 25	6.7	6.7	6.5	6.4	
Temp 40	24.0	24.2	24.0	24.0	
DO 50	6.3	6.4	5.9	6.1	
Temp 80	23.8	6.2	24.0	24.1	
DO 100	5.8	23.8	5.5	5.8	

12/19/94 Final Parameters - Test 5, 6, 7 & 8

Sample		5	6	7	8	Con
Temp		21.8	21.8	21.0	21.7	22.3
DO		7.6	7.1	6.9	7.4	7.0
pH	5-6.25	8.44	8.68	8.69	8.65	8.50
Cond		281	270	336	334	308
Ammonia		ND	ND	ND	ND	ND
Temp		22.0	21.5	20.9	21.7	
DO	10-12.5	7.4	7.4	7.0	7.4	
pH		8.56	8.71	8.70	8.75	
Cond		291	325	327	342	
Ammonia		ND	ND	ND	ND	
Temp		22.4	21.5	21.0	21.5	
DO	20-25	7.0	7.0	6.8	7.0	
pH		8.50	8.67	8.70	8.71	
Cond		290	330	332	337	
Ammonia		ND	ND	ND	ND	
Temp		22.0	21.8	22.2	21.8	
DO	40-50	7.1	6.7	7.1	6.4	
pH		8.61	8.65	8.61	8.82	
Cond		322	337	334	353	
Ammonia		ND	ND	ND	ND	
Temp		~~8.69~~ 22.5	22.2	22.0	22.3	
DO	80	6.9	6.9	7.0	6.5	
pH	100	~~22.~~ 8.69	8.72	8.61	8.70	
Cond		354	349	341	355	
Ammonia		ND	ND	ND	ND	

DO meter calibrated to 8.7 ppm at 23 °C.

Parameters 9, 10, 11 & 12 - Day 27

Sample	9	10	11	12	SC	GC
Temp					22.8	22.0
DO					6.8	7.3
Temp 6.25	21.8	22.5	22.0	22.0		
DO	6.7	6.5	7.0	6.8		
Temp 12.5	22.0	22.0	23.0	22.0		
DO	6.7	6.8	6.6	6.6		
Temp 25	22.5	23.0	23.0	22.0		
DO	7.0	7.2	6.2 6.6 WT	6.9		
Temp 50	21.8	21.8	22.5	23.0		
DO	6.7	6.6	5.5	6.7		
Temp 100	22.0	23.0	27.0	22.0		
DO	6.6	6.9	5.1	7.5		

Parameters: 1, 2 & 4 - Day 26

Sample	1	2	4	Con
Temp				24.0
DO				6.5
Temp 4-6.25	23.8	24.0	24.0	
DO	6.5	6.0	6.1	
Temp 8-12.5	24.0	23.8	23.2	
DO	6.6	6.0	8.1	
Temp 16-25	22.2	24.0	24.0	
DO	6.6	6.2	6.4	
Temp 32-50	24.0	23.8	23.8	
DO	5.9	6.1	5.5	
Temp 64-100	23.5	24.0	24.0	
DO	6.2	6.3	6.2	

12/19/94 Parameters: 3, 13, 14 & 15 - Day 24

Sample		3	13	14	15	SC	GC
Temp						22.2	23.2
DO						7.8	7.8
Temp	6.25	23.0	22.2	22.0	21.8		
DO		7.6	7.9	7.7	7.7		
Temp	12.5	22.0	22.0	22.8	22.8		
DO		7.1	7.3	7.5	7.5		
Temp	25	22.8	22.8	22.0	23.0		
DO		7.6	7.6	7.6	8.0		
Temp	50	22.0	22.5	22.4	22.0		
DO		7.6	7.5	7.7	7.6		
Temp	100	22.0	23.4	22.0	23.2		
DO		7.6	7.7	7.4	8.1		

12/19/94

End Tests 5, 6, 7 & 8

Con		>500 Daphnia
Con		1 dead H. azteca
Con		No Hyalella
Con		2 Dead Hyalella
Con		Nothing
Con		1 Daphnia
T5-	5	1 Oligochaete
	5	1 dead Hyalella
	5	nothing
T5-	10	nothing
	10	1 Oligochaete
	10	Nothing
T5-	20	2 Oligochaetes
	20	1 Oligochaetes
	20	Nothing
T5-	40	1 Oligochaete
	40	2 Oligochaetes
	40	1 Oligochaete
T5-	80	5 Oligochaetes
	80	4 Oligochaetes
	80	2 Oligochaetes
T6-	5	Nothing
	5	Nothing
	5	Nothing
T6	10	2 Oligochaetes
	10	5 Oligochaetes
	10	2 Oligochaetes
T6	20	1 Oligochaete
	20	2 Oligo
	20	2 Oligo

12/19/94

T6 40 ≈5 Oligochaetes - sheen seen on water
40 2 Oligochaetes
40 5 Oligochaetes
T6 80 3 Oligochaetes
80 7 "
80 5 "
T7 - 6.25 ≈25 Oligochaetes
6.25 ≈3 "
6.25 ≈25 "
T7 12.5 ≈50 Oligochaetes, 1 dead Hyalella
12.5 ≈ 56 "
12.5 ≈ 50 "
T7 25 ≈25 Oligochaetes
25 ≈50 "
25 ≈25 "
T7 50 ≈50 Oligochaetes
50 ≈ 50
50 ≈100
T7 100 >50 Oligochaetes, few Daphnia
100 >100 "
100 >100 "
T8 6.25 ≈5 Oligochaetes
6.25 nothing
6.25 nothing
T8 12.5 2 dead Hyalella
12.5 nothing
12.5 nothing
T8 25 nothing
25 nothing
25 3 Oligochaetes

12/19/94

T8	50	≈ 2 Oligochaetes
	50	1 "
	50	1 "
T8	100	1 Oligochaete
	100	1 "
	100	2 "

12/20/94 Con Silt - 2 ~~H~~yalella alive - 1 dead

Con ~~S~~Silt -

Con Silt - MLS

Con Gravel

Con Gravel

Con Gravel

9 - 6.25 next page

6.25

6.25

6.25

12/20/94 End Test 9, 10, 11 & 12

Silt Con 2 alive - 1 dead
Silt Con 3 dead
Silt Con 5 dead
Gravel Con 2 alive - 1 dead
Gravel Con 1 alive - 3 dead
Gravel Con 4 alive
9- 6.25 6 alive
6.25 4 alive
6.25 4 alive ; 2 dead
9- 12.5 3 dead
12.5 6 alive ; 3 dead
12.5 4 alive
9- 25 2 dead
25 3 dead 1 Alive
25 4 alive ; 2 dead
9- 50 3 dead
50 2 Alive
50 2 alive ; 1 dead
9- 100 1 Alive 2 dead
100 4 Alive 1 dead
100 1 alive ; 1 dead
10- 6.25 7 alive
6.25 2 alive
6.25 3 alive
10 - 12.5 3 alive
12.5 4 alive ; 1 dead
12.5 4 alive
10 - 25 4 Alive, 1 dead
25 4 Alive 1 dead
25 2 alive

12/20/94

10-50 2 alive, 2 dead
50 1 " 1 "
50 3 alive ; 1 dead
10-100 1 alive, 1 oligochaete
100 2 Alive, 1 dead
100 1 alive ; 2 dead
11-6.25 1 dead
6.25 nothing
6.25 1 Oligochaete
11-12.5 nothing
12.5 nothing
12.5 5 Oligochaetes
11-25 4 Oligochaetes
25 4 Oligochaetes
25 8 Oligochaetes
11-50 30 Oligochaetes
50 26 Oligochaetes
50 22 Oligochaetes
11-100 ≈ 50 Oligochaetes
100 ≈ 50 Oligochaetes
100 >50 Oligochaetes
12-6.25 1 Live 3 dead
6.25 4 dead
6.25 3 Alive 3 dead
12-12.5 nothing Alive 2 dead
12.5 3 Alive 2 dead
12.5 6 Alive 2 dead
12-25 4 Alive 2 dead
25 3 Alive
25 4 Alive 1 oligochaete

8/20/94

12-	50	nothing	
	50	2 alive	1 oligochaete
	50		1 oligochaete
12-	100		1 oligochaete
	100		2 "
	100		2 "

Parameters 1, 2 + 4 - Day 27

Sample		1	2	4	Control
Temp					
DO					
Temp	4	22.2	23	23	
DO	6.25	7.0	6.9	6.6	
Temp	8	23.8	22	24	
DO	12.5	6.1	7.9	6.5	
Temp	16	22	22	23	
DO	25	6.9	7.2	6.7	
Temp	32	22.2	22.2	22	
DO	50	6.4	7.7	6.1	
Temp	64	22.2	23	22.2	
DO	100	6.2	6.9	6.3	

Parameters 3, 13, 14 + 15 - Day 25

Sample		3	13	14	15	S-Con	G-Con
Temp						23	25
DO						8.1	8.1
Temp	6.25	24.4	25	24.2	23.2		
DO		7.6	7.8	7.4	8.1		
Temp	12.5	24.6	24.2	25	24		
DO		7.6	7.8	7.6	7.8		

12/20/94 (Cont)

Sample	3	13	14	15
Temp 25	25.2	25	25	24.8
DO	7.7	7.8	7.2	7.4
Temp 50	24	24.2	25	24
DO	8.8	7.6	7.4	7.8
Temp 100	24.8	24.8	25	25
DO	8.0	7.7	7.9	7.9

Ending Parameters ~~8~~ 9, 10, 11 + 12

Sample	9	10	11	12	S-Con	G-Con
Temp					22.1	22.5
DO					8.6	8.4
pH					8.46	8.36
~~Amm~~ Cond					431	476
~~Cond~~ Ammonia					N/D	N/D
Temp	~~8.53~~ 22	22	22	21.9		
DO	8.6	8.7	8.7	8.9		
pH 6.25	8.53	8.60	8.68	8.64		
Cond	425	416	444	476		
Ammonia	N/D	N/D	N/D	N/D		
Temp	21.7	21.4	21.6	21.8		
DO	8.6	8.7	8.8	8.9		
pH 12.5	8.56	8.62	8.69	8.66		
Cond	429	427	448	452		
Ammonia	N/D	N/D	N/D	N/D		
Temp	21.5	21.4	21.4	21.9		
DO	8.6	8.8	8.8	8.9		
pH 25	8.56	8.64	8.65	8.68		
Cond	426	416	447	446		
Ammonia	N/D	N/D	N/D	N/D		

Sample	9	10	11	12
Temp	21.6	21.5	21.2	21.8
~~DO~~ pH	8.60	8.63	8.63	8.67
~~pH~~ DO_{50}	8.6	8.8	8.8	8.9
Cond	407	409	444	419
Ammonia	N/D	N/D	N/D	N/D
Temp	22	22	21.2	21.6
~~DO~~ pH	8.59	8.65	8.53	8.68
~~pH~~ DO_{100}	8.7	8.7	8.8	8.9
Cond	422	430	436	459
Ammonia	N/D	N/D	N/D	N/D

DO meter cal to 8.4 @ 24°C

12/21/94 Parameters 3, 13, 14 + 15

Sample

Temp

DO

Temp 6.25

DO

Temp 12.5

DO

Temp 25

DO

Temp 50

DO

Temp 100

DO

ended test

12/2/94 Parameters 1, 2 + 4 Ending Day 28

Sample	1	2	4	Control
Temp				~~42~~ 21.5
DO				8.2
pH				7.78
Cond				426
Ammonia				ND
Temp	21.4	21.6	21.1	
DO	8.3	8.5	8.5	
pH 4 6.25	8.05	8.20	8.25	
Cond	428	442	440	
Ammonia	ND	ND	ND	
Temp	21.3	21.6	21.3	
DO	8.5	8.5	8.7	
pH 8 12.5	8.08	8.22	8.24	
Cond	423	448	443	
Ammonia	ND	ND	ND	
Temp	21.2	21.5	21.0	
DO	8.7	8.7	8.8	
pH 16 25	8.09	8.29	8.44	
Cond	415	446	459	
Ammonia	ND	ND	ND	
Temp	21.1	21.4	21.0	
DO	8.7	8.7	8.8	
pH 32 50	8.09	8.27	8.46	
Cond	427	446	458	
Ammonia	ND	ND	ND	
Temp	21.2	21.1	21.3	
DO	8.7	8.8	8.9	
pH 64 100	8.10	8.27	8.42	
Cond	435	443	447	
Ammonia	ND	ND	ND	

12/21/94 Ending Counts Tests 1, 2 + 4

Silt Con 2 alive 2 dead

Silt Con 2 dead

Silt Con 3 dead

Test 1 6.25 2 Oligochaetes

6.25 nothing

6.25 2 Oligochaetes

12.5 1 Oligochaete

12.5 5 Oligochaetes

12.5 4 "

25 4 Oligochaetes

25 3 Oligochaetes

25 5 Oligochaetes

50 10 Oligochaetes

50 4 Oligochaetes

50 5 Oligochaetes - sheen on water

100 2 Oligochaetes - sheen on water

100 2 Oligochaetes - sheen on water

100 8 Oligochaetes - sheen on water

Test 2 4 nothing

4 nothing

4 nothing

8 nothing

8 nothing

16 nothing

16 nothing

16 nothing

32 3 Oligochaetes

32 nothing

32 nothing

12/21/94

Test 2	64	3 Oligochaetes
	64	1 Oligochaete
	64	2 Oligochaetes, 1 mite
Test 4	6.25	2 alive 2 dead
	6.25	NO alive 2 "
	6.25	nothing
	12.5	nothing
	12.5	1 dead
	12.5	4 ~~AS~~ alive
	25	1 dead
	25	nothing
	25	nothing
	50	nothing
	50	2 Oligochaetes
	50	nothing
	100	2 alive
	100	2 alive
	100	nothing

12/21/94 Ended Test 3, 13, 14 & 15 - Day 26

Gravel Con 2 alive, 3 dead
Gravel Con 2 alive
Gravel Con 1 " 2 dead
Silt Con 1 alive, 3 dead
Silt Con 2 dead
Silt Con nothing
3 - 6.25 2 dead
6.25 1 alive
6.25 3 alive
B 12.5 3 alive, 1 dead
12.5 2 alive
12.5 ~~nothing~~ 5 alive
3 - 25 1 alive
25 nothing
25 3 alive
3 50 3 alive
50 1 alive
50 1 alive, 1 dead
3 100 1 alive, 1 dead
100 nothing
100 nothing
13 - 6.25 3 alive, 2 dead
6.25 nothing
6.25 2 alive
13 12.5 1 alive
12.5 ~~5 alive~~ 2 alive
12.5 2 alive
13 25 ~~3~~ alive
25 ~~Nothing 3 alive~~ NOTHING
25 1 alive, 2 dead, 1 Oligochaete

13	50	4 alive
	50	1 alive, 2 dead
	50	nothing
13	100	nothing
	100	nothing
	100	nothing
14	6.25	2 alive, 1 dead
	6.25	1 dead
	6.25	2 Alive, 1 Dead
14	12.5	2 alive, 3 dead
	12.5	1 alive, 1 dead
	12.5	3 dead
14	25	4 alive, 2 dead
	25	3 alive, 2 dead
	25	5 alive
14	50	3 alive
	50	4 dead
	50	3 Oligochaetes
14	100	3 dead
	100	1 dead, 7 Oligochaetes
	100	3 oligochaetes
15	6.25	2 Dead
	6.25	4 "
	6.25	4 Alive 3 Dead
15	12.5	3 Alive 2 Dead
	12.5	4 Alive 2 Dead
	12.5	2 " 1 "
15	25	nothing
	25	2 Alive 1 dead
	25	3 Alive 2 Dead

15	50	3 dead
	50	2 alive 2 dead
	50	3 dead
15	100	2 alive 1 dead
	100	nothing
	100	1 alive + 1 dead

12/21/94 Parameters - End Test 3, 13, 14, 15

Sample	3	13	14	15	SC	GC
Temp					22.0	21.8
DO					8.0	8.2
pH					7.86	7.99
Cond					586	487
Ammonia					ND	ND
Temp	22.0	21.5	21.2	21.2		
DO	~~2.0~~ 7.8	8.0	8.2	8.5		
pH 6.25	8.20	8.25	8.31	8.31		
Cond	486	469	496	469		
Ammonia	ND	ND	ND	ND		
Temp	21.6	21.5	21.1	21.9		
DO	~~21.6~~ 7.9	8.0	8.3	8.3		
pH 12.5	8.22	8.28	8.33	8.27		
Cond	481	489	496	471		
Ammonia	ND	ND	ND	ND		
Temp	21.5	21.4	21.1	22.0		
DO	~~21.~~ 8.0	8.0	8.3	8.2		
pH 25	8.24	8.32	8.36	8.32		
Cond	474	481	486	486		
Ammonia	ND	ND	ND	ND		
Temp	21.5	21.1	21.1	21.9		
DO	8.0	8.0	8.3	8.3		
pH 50	8.21	8.31	8.36	8.34		
Cond	470	482	495	492		
Ammonia	ND	ND	ND	ND		
Temp	21.4	21.1	21.1	22.2		
DO	8.0	8.1	8.4	8.3		
pH 100	8.22	8.32	8.33	8.33		
Cond	461	488	472	475		
Ammonia	ND	ND	ND	ND		

12/21/94 Parameters - End Test 3, 13, 14, 15

Sample	3	13	14	15	SC	GC
Temp					22.0	21.8
DO					8.0	8.2
pH					7.86	7.99
Cond					586	487
Ammonia					ND	ND
Temp	22.0	21.5	21.7	21.2		
DO	~~2.0~~ 7.8	8.0	8.2	8.5		
pH 6.25	8.20	8.25	8.31	8.31		
Cond	486	469	496	469		
Ammonia	ND	ND	ND	ND		
Temp	21.6	21.5	21.1	21.9		
DO	~~21.6~~ 7.9	8.0	8.3	8.3		
pH 12.5	8.22	8.28	8.33	8.27		
Cond	481	489	496	471		
Ammonia	ND	ND	ND	ND		
Temp	21.5	21.4	21.1	22.0		
DO	~~21.~~ 8.0	8.0	8.3	8.2		
pH 25	8.24	8.32	8.36	8.32		
Cond	474	481	486	486		
Ammonia	ND	ND	ND	ND		
Temp	21.5	21.1	21.1	21.9		
DO	8.0	8.0	8.3	8.3		
pH 50	8.21	8.31	8.36	8.34		
Cond	470	482	495	492		
Ammonia	ND	ND	ND	ND		
Temp	21.4	21.1	21.1	22.2		
DO	8.0	8.1	8.4	8.3		
pH 100	8.22	8.32	8.33	8.33		
Cond	461	488	472	475		
Ammonia	ND	ND	ND	ND		

1/11/95
MLS

Preparing control mud for the gravel samples #3, 9, 10, 13 and 14.

First, made silty mud - 1 batch (large bat

680 g #400 silt
400 g cow manure
0.6 g humic acid
20 ml trout chow suspension
3080 g fine sand
40 g dolomite

and 1L of spring water run through a carbon column.

Then made gravel-mud by mixing
1250 g of base sediment
2500 g of rinsed filter sand
750 g of aquarium gravel - rinsed

Began to mix samples 3, 9, 10, 13 and 14 with the control mud. Dilutions sequence: 100%, 50%, 25%, 12.5%, 6.25%
Mixed 400 mL and distributed it evenly between the three replicates.

Concentr.	Sample Sediment (mLs)	Control Mud (mLs)
100%	400	∅
50%	200	200
25%	100	300
12.5%	50	350
6.25%	25	375

Topped off each test vessel with carbon filtered spring water.

Added 10 Hyalella to a test vessel containing no mud, but 400 mL of carbon filtered spring water.

Took overlying water sample for water parameters. (next page)

Added 1.5 mL of Tetramin slurry to each test vessel. Added ~100 mL of leaf slurry and 100 ml of Tetramin ~~slurry~~ mix slurry to each gallon delivery tank.

Leaf Slurry Dry Weight Analysis (10 mL of slurry)

Dried wt of leaves - boat wt =

A 1.1367 - 1.1252g = .0115g = 11.5 mg

B 1.1232 - 1.1114g = .0118g = 11.8mg

C 1.1311g - 1.1151g = .0160g = 16.0 mg

$\bar{X}$ = 13.1 mg of leaf debris/10 mL

1-12-95 Day 0 - Beginning Test Parameters 3, 9, 10, 13 + 14

Sample	Control	3	9	10	13	14
Temp	23.0					
DO	8.0					
pH	8.06					
Cond.	917					
Ammonia	ND					
Temp		22.9	22.3	22.6	22.7	22.3
DO		7.8	7.7	7.9	7.4	7.4
pH 6.25		8.47	8.67	8.72	8.70	8.64
Cond		664	616	576	706	669
Ammonia		ND	ND	ND	ND	ND
Temp		22.7	22.4	22.4	22.6	22.3
DO		7.8	7.8	7.9	7.5	7.3
pH 12.5		8.55	8.68	8.71	8.70	8.66
Cond		608	556	572	646	669
Ammonia		ND	ND	ND	ND	ND
Temp		22.6	22.3	22.4	22.4	22.3
DO		7.9	7.8	7.8	7.4	7.4
pH 25		8.59	8.68	8.73	8.67	8.67
Cond		585	567	581	745	646
Ammonia		ND	ND	ND	ND	ND
Temp		22.6	22.3	22.4	22.3	22.3
DO		7.9	7.8	7.8	7.4	7.4
pH 50		8.58	8.68	8.72	8.66	8.60
Cond		576	580	567	692	696
Ammonia		ND	ND	ND	ND	ND
Temp		22.3	22.4	22.4	22.3	22.4
DO		7.8	7.9	7.8	7.4	7.3
pH 100		8.65	8.68	8.71	8.73	8.56
Cond		417	432	433	424	479
Ammonia		ND	ND	ND	ND	ND

1-13-95 Day 1: ~~Beginning~~ Test Parameters 3, 9, 10, 13, 14

Sample	Con	3	9	10	13	14
Temp	24.0					
D.O	5.9					
Temp 6.25		24.0	24.0	24.0	24.0	24.0
Do		5.4	6.1	6.0	5.4	5.8
Temp 12.5		24.0	24.0	24.0	24.0	24.0
DO		5.8	5.4	5.7	5.3	5.4
Temp 25		24.0	24.0	24.0	24.0	24.0
DO		5.4	5.3	6.1	5.6	5.5
Temp 50		24.0	24.0	24.0	24.0	24.0
DO		5.4	5.1	5.7	5.0	5.7
Temp 100		24.0	24.0	24.0	24.0	24.0
DO		5.5	5.3	5.6	5.1	5.0

1-14-95 Day 2: Test Parameters 3, 9, 10, 13, 14

Sample	Con	3	9	10	13	14
Temp	24					
D.O	5.7					
Temp 6.25		24.0	24.0	24.0	24.0	24.0
Do.		5.4	6.1	6.0	5.8	5.4
Temp 12.5	~~24.0~~	24.0	24.0	24.0	24.0	24.0
D.C.	~~5.9~~	5.9	5.7	5.8	5.6	5.2
Temp 25		24.0	24.0	24.0	24.0	24.0
D.O	~~5~~	5.7	4.9	6.0	6.0	5.0
Temp. 50		24.0	24.0	24.0	24.0	24.0
D.O.		5.8	4.9	6.0	5.4	4.0
Temp 100		24.0	24.0	24.0	24.0	24.0
D.O.		5.4	5.0	5.0	5.1 mr	5.5

1/5/95 Day 3: Test Parameters 3, 9, 10, 13 + 14

Sample	Con	3	9	10	13	14
Temp	23.0					
DO	5.9					
Temp 6.25		23.2	23.0	23.0	23.4	23.0
DO		6.0	5.7	6.4	6.4	6.2
Temp 12.5		23.2	23.0	23.0	23.0	23.4
DO		6.2	6.4	6.1	6.5	5.6
Temp 25		22.8	23.2	23.0	23	23.0
DO		6.0	5.9	6.2	5.9	5.4
Temp 50		23.0	23.0	23.0	22.9	23.0
DO		5.6	5.1	5.8	5.6	5.7
Temp 100		23.0	23.2	23.0	23.2	23.2
DO		6.1	5.1	6.1	5.4	5.7

1/16/95 Parameters: Day 4, Test 3, 9, 10, 13, 14

Sample	Con	3	9	10	13	14
Temp	22.0					
DO	6.8					
Temp 6.25		23.0	23.5	22.8	23.2	22.8
DO		6.7	6.5	6.7	7.0	6.0
Temp 12.5		23.0	22.9	23.0	22.5	23.0
DO		6.7	6.3	6.9	6.4	6.2
Temp 25		23.0	23.0	22.2	23.0	23.2
DO		6.6	5.9	6.6	6.9	6.5
Temp 50		23.0	22.5	23.0	23.4	23.2
DO		6.4	6.1	6.7	6.0	6.3
Temp 100		23.0	23.5	22.9	22.5	23.0
DO		6.5	6.1	6.6	5.5	6.2

D.O. meter was calibrated

1/16/95 Sediment dilutions done on tests 1, 2, 4, 5, 6 topped off with carbon filtered spring water

1/17/95 Overlying water parameters on tests 1, 2, 4, 5 + 6.
Day 0 - Beginning Parameters - Calibrated DO. meter

Sample	Control	1	2	4	5	6
Temp	20.0	19.8	19.9	19.8	19.8	19.8
DO 6.25	7.0	6.2	6.2	6.0	6.0	7.4
pH 4 5	7.65	7.87	8.23	8.31	8.31	8.49
Cond	515	434	413	423	426	480
Ammonia	ND	ND	ND	ND	ND	ND
Temp		19.8	19.9	19.9	20.0	20.0
DO 12.5		6.1	5.8	6.2	6.0	7.2
pH 8 10		7.94	8.24	8.36	8.34	8.50
Cond		409	405	343	414	473
Ammonia		ND	ND	ND	ND	ND
Temp		20.0	19.9	19.9	20.0	20.0
DO 25		5.8	5.7	5.8	5.9	7.0
pH 16 20		8.02	8.24	8.34	8.34	8.47
Cond		415	413	409	387	443
Ammonia		ND	ND	ND	ND	ND
Temp		19.9	19.9	20.0	20.0	20.0
DO 50		5.5	5.5	5.5	5.9	6.5
pH 32 40		8.04	8.24	8.32	8.29	8.45
Cond		387	391	411	431	461
Ammonia		ND	ND	ND	ND	ND
Temp		19.9	19.9	20.0	20.0	20.0
DO 100		5.0	5.5	5.6	5.5	5.8
pH 64 80		8.06	8.20	8.25	8.30	8.32
Cond		324	375	438	407	413
Ammonia		ND	ND	ND	ND	ND

Day 5 Parameters Tests 3, 9, 10, 13, 14

Sample	CONTROL	3	9	10	13	14
Temp	23.5					
DO	6.4					
Temp 6.25		23.0	23.8	23.2	24.0	22.8
DO		6.5	6.8	7.1	6.6	6.6
Temp 12.5		24.5	23.0	23.5	23.5	23.5
DO		6.3	6.7	6.9	6.6	6.5
Temp 25		23.5	23.5	24.0	23.2	23.0
DO		6.6	6.0	6.8	6.7	6.2
Temp 50		23.2	23.2	22.8	23.5	23.2
DO		6.7	6.1	7.3	6.3	6.7
Temp 100		23.8	23.5	23.2	23.0	23.0
DO		6.5	6.6	6.4	5.5	6.3

Fed delivery tanks leaf slurry and Tetramin slurry.

Day 6 Parameters Tests 3, 9, 10, 13, 14

Sample	Control	3	9	10	13	14
Temp	23.0					
DO	5.7					
Temp 0		24.0	23.2	24.0	24.0	24.0
DO		5.9	5.7	6.1	6.0	~~24.0~~ MR 6.1
Temp 12.5		22.8	23.2	23.2	23.2	~~5.5~~ MR 24.0
DO		6.6	5.9	5.9	6.14	5.5
Temp 25		23.2	22.8	24.0	23.8	23.0
DO		6.3	6.1	6.1	5.9	5.9
Temp 50		23.2	23.4	23.0	23.5	23.4
DO		6.1	5.4	6.4	5.7	5.7
Temp 100		22.8	24.0	23.4	23.8	23.8
DO		6.1	5.9	5.9	5.3	5.5

Day 1 - Parameters tests 1, 2, 4, 5, 6

Sample	control	1	2	4	5	6
Temp ~~4.25~~ 4,5	24.5					
DO	6.2					
Temp 6.25		23.2	23.8	24.0	24.2	24.0
DO 4, 5		6.0	6.0	6.1	6.1	6.0
Temp 12.5		23.8	24.2	24.8	24.0	24.2
DO 8, 10		6.1	6.4	5.7	6.2	6.3
Temp 25		23.0	24.0	24.0	23.8	24.2
DO 10 20		6.1	6.2	6.2	6.1	5.9
Temp 50		23.2	23.0	24	24.2	24.5
DO 32 40		5.8	6.2	5.3	5.4	5.5
Temp 100 64 80		22.8	24.8	24.2	23.2	24.0
DO		5.8	5.7	4.9	5.7	5.3

1-19-95 Day 2 Parameters: 1, 2, 4, 5, 6

Sample	Control	1	2	4	5	6
Temp	23.0					
DO	6.5					
Temp 4 5-		23.8	22.7	23.2	23.5	23.9
DO 6.25		6.4	6.6	6.5	6.4	6.6
Temp 8 10-		22.0	22.0	22.0	23.9	23.0
DO 12.5		6.4	6.3	6.4	6.2	6.6
Temp 16 20-		23.5	24.0	23.0	22.0	23.5
DO 25		6.3	6.1	6.4	6.3	6.3
Temp 32 40		23.8	21.8	23.5	23.8	23.0
DO 50		5.3	6.3	6.1	6.1	6.3
Temp 64 80		23.0	23.5	23.8	23.5	22.5
DO 100		5.7	6.1	5.6	5.8	5.9

Filled both tanks with carbon filtered springwater. Added 20 ml leaf slurry to each and 125 mL of Tetramin

1-19-95 Day 7 Parameters: 3, 9, 10, 13 & 14

Sample	Control	3	9	10	13	14
Temp	23.2	/	/	/	/	/
DO	6.1					
Temp 6.25		23.2	23.5	22.9	23.4	23.8
DO		6.6	6.2	6.4	6.2	6.5
Temp 12.5		22.8	23.2	23.0	23.0	23.5
DO		6.6	6.3	6.7	6.6	6.2
Temp 25		23.2	22.0	24.0	23.0	24.0
DO		6.3	6.7	6.5	6.3	5.7
Temp 50		22.5	23.4	23.0	23.8	22.2
DO		6.6	6.0	6.6	6.2	6.4
Temp 100		23.0	23.2	23.0	22.9	22.9
DO		6.5	6.4	6.3	6.1	6.1

Removed Day 7 Control - Gravel from test to test viability of Hyalella. Recoved 10 of the 10 Hyalella put in on Day Ø.

1-20 95 Filled both tanks with Carbon filtered spring water. Added 200 mL leaf slurry and 800 mL Tetramin slurry to each tank.
Blended enough Tetramin + leaves to last through weekend.
Calibrated D.O. meter. Parameters on next page

BS

d
o each.

(Con't)

1-20-95 Parameters 3, 9, 10, 13 & 14 - Day 8

Sample	Control	3	9	10	13	14
Temp		/	/	/	/	/
DO	7.1					
Temp 6.25						
DO		7.0	6.9	6.9	7.0	6.7
Temp 12.5						
DO		6.9	6.9	6.9	6.8	6.7
Temp 25						
DO		7.0	6.7	6.9	6.9	6.7
Temp 50						
DO		6.9	6.4	7.0	6.9	6.6
Temp 100						
DO		6.9	6.6	6.9	6.6	6.6

Parameters 1, 2, 4, 5 & 6 - Day 3

Sample	Control	1	2	4	5	6
Temp	23.0	/	/	/	/	/
DO	6.5					
Temp 4 5 6.25		24.8	25.0	24.0	25.0	23.4
DO		6.1	6.2	6.4	6.1	6.6
Temp 8 10 12.5		24.0	24.5	23.4	23.8	23.2
DO		6.3	6.4	6.2	6.3	6.2
Temp 16 20 25		23.5	24.2	25.0	24.2	24.5
DO		6.1	6.4	6.1	6.2	6.4
Temp 32 40 50		22.4	25.0	23.5	23.2	25.0
DO		5.7	6.0	6.3	5.9	5.9
Temp 64 80 100		24.0	25.0	24.8	24.9	24.0
DO		5.6	6.0	5.4	5.5	5.9

1-20-95 Parameters 3, 9, 10, 13 & 14 - Day 8

cont.

Sample	Control	3	9	10	13	14
pH	8.04					
Cond	406					
ammonia	ND					
pH		8.33	8.42	8.50	8.52	8.51
Cond 6.25		363	345	346	350	324
ammonia		ND	ND	ND	ND	ND
pH		8.36	8.36	8.47	8.52	8.49
Cond 12.5		353	365	348	350	370
ammonia		ND	ND	ND	ND	ND
pH		8.38	8.36	8.50	8.56	8.52
Cond 25		341	353	357	347	350
ammonia		ND	ND	ND	ND	ND
pH		8.39	8.46	8.58	8.54	8.50
Cond 50		345	381	342	332	370
Ammonia		ND	ND	ND	ND	ND
pH		8.42	8.49	8.55	8.53	8.49
Cond 100		335	337	331	338	338
ammonia		ND	ND	ND	ND	ND

1-21-95 Parameters 1, 2, 4, 5, + 6 - Day 4

Sample	Control	1	2	4	5	6
Temp	23.9					
D.O.	6.7					
Temp 4 5		24°	24°	24.2°	24.5°	24°
D.O. 6.25		6.8	6.7	6.7	6.2	6.6
Temp 8 10		23°	24°	24°	24.5°	23.5°
D.O. 12.5		6.4	6.6	6.8	6.3	6.6
Temp 16 20		24°	24°	24°	24°	24°
D.O. 25		6.3	6.9	6.7	6.4	6.7
Temp 32 40		24.5°	24.5°	24.4°	24.2°	24°
D.O. 50		5.1	6.5	6.4	6.2	6.5
Temp 64 80		24°	24°	24°	24°	24°
D.O. 100		5.7	6.5	6.0	5.8	5.3

Parameters 3, 9, 10, 13, + 14 Day 9

Sample	Control	3	9	10	13	14
Temp	23					
D.O.	~~7.2~~ 6.7					
Temp 6.25		23.2°	23°	23°	23°	23.1°
D.O.		6.7 ~~7.2~~	6.5	6.7	6.4	6.5
Temp 12.5		23.2°	23°	23°	22.9°	23.4°
D.O.		6.7 ~~7.2~~	6.5	6.8	6.5	6.3
Temp 25		23°	23.3°	23°	23°	23°
D.O.		~~6.4~~	6.1	6.2	6.9	6.2
Temp 50		23°	23°	23.1°	23°	23.1
D.O.		6.6	6.0	6.6	6.4	6.2
Temp 100		23°	23°	23°	23°	23.2
D.O.		6.6	6.5	6.3	6.3	6.2

1-22-95 Parameters 1, 2, 4, 5, + 6 - Day 5

Sample	Control	1	2	4	5	6
Temp	23.2					
DO	7.2					
Temp 4 5 6.25		24.2	24.1	~~24.1~~ mr 23.5	25.1	23.9
DO		6.9	7.2	~~7.2~~ mr 7.3	6.9	7.2
Temp 8 10 12.5		23.0	24.9	23.8	24.6	23.9
DO		7.2	7.0	7.0	7.1	7.1
Temp 16 20 25		23.2	23.0	24.6	24.5	25.0
DO		6.9	7.0	7.1	6.9	6.5
Temp 32 40 50		6.2	24.4	23.2	24.2	25.0
DO		6.8	7.1	7.1	6.3	7.2
Temp 64 80 100		22.8	24.8	24.2	24.6	23.8
DO		6.1	6.9	6.8	6.8	6.1

Parameters 3, 9, 10, 13, + 14 - Day 10

Sample	Control	3	9	10	13	14
Temp	21.8					
DO	7.1		~~25.6~~ MAR ~~7.1~~ MAR 23.0			
Temp 6.25		22.0	7.1	21.8	21.8	21.2
DO		7.0	7.1	7.2	7.0	7.0
Temp 12.5		24.6	22.0	22.1	22.8	23.8
DO		7.1	7.0	7.0	7.1	6.9
Temp 25		21.8	22.0	23.1	22.1	21.4
DO		7.6	6.8 mr	7.2	7.0	6.9
Temp 50		22.2	22.1	21.8	23.2	23.1
DO		7.2	6.6	7.0	7.0	6.4
Temp 100		22.6	22.8	22.0	22.9	22.4
DO		7.2	7.3	7.2	6.6	6.7

23.95 Parameters: 3, 9, 10, 13, 14 - Day 11

Sample	Con	3	9	10	13	14
Temp	22.8	/	/	/	/	/
DO	6.9					
Temp		23.5	23.8	24.2	23.0	24.2
DO 6.25		7.3	7.1	7.3	7.1	7.2
Temp		23.0	22.8	23.2	23.0	24.0
DO 12.5		7.4	7.3	7.0	7.2	7.5
Temp		23.9	23.2	24.0	22.8	24.2
DO 25		7.1	6.7	7.2	7.1	6.9
Temp SC		23.5	22.6	23.2	23.5	23.5
DO		7.3	7.2	7.2	7.1	6.9
Temp		23.8	23.8	23.5	23.4	23.2
DO 100		7.3	7.0	7.0	6.9	7.2

Parameters: 1, 2, 4, 5, 6 - Day 16

Sample	Con	1	2	4	5	6
Temp	22.8	/	/	/	/	/
DO	7.1					
Temp 4		23.5	23.5	24.0	23.0	23.2
DO 5 6.25		7.3	7.3 ~~6.1~~	7.0	7.2	7.0
Temp 8 10		22.5	23.8	22.5	23.8	22.5
DO 12.5		7.1	7.0	7.3	6.9	7.3
Temp 16 20		23.4	23.0	23.5	22.0	23.9
DO 25		6.7	6.8	7.3	7.2	6.8
Temp 32 40		22.0	22.2	22.2	23.8	23.8
DO 50		7.1	7.2	7.1	6.9	6.8
Temp 64 80		22.8	24.0	24.0	23.2	23.8
DO 100		6.2	6.9	6.8	6.4	5.4

1/24/95 Day 7 - Parameters 1, 2, 4, 5 + 6

Sample	Control	1	2	4	5	6
Temp	22.6					
DO	7.7					
pH	8.09					
Cond	412					
Ammonia	ND					
Temp	22.8		22.4	22.7	22.5	22.4
DO	7.4		7.7	7.7	7.7	7.9
pH (4 5 2.25)	8.23		8.42	8.57	8.50	8.52
Cond	330		341	345	310	335
Ammonia	ND		ND	ND	ND	ND
Temp	22.6		22.4	22.9	22.5	22.4
DO	7.6		7.7	7.5	7.7	7.6
pH (3 10 12.5)	8.35		8.46	8.51	8.46	8.57
Cond	336		332	345	327	337
Ammonia	ND		ND	ND	ND	ND
Temp	22.6		22.7	22.8	22.3	22.6
DO	7.5		7.4	7.6	7.4	7.3
pH (16 20 25)	8.33		8.47	8.51	8.47	8.62
Cond	334		333	338	322	339
Ammonia	ND		ND	ND	ND	ND
Temp	22.5		22.7	22.8	22.6	22.4
DO	7.5		7.3	7.4	7.1	7.3
pH (32 40 50)	8.36		8.54	8.49	8.45	8.72
Cond	330		337	339	342	356
Ammonia	ND		ND	ND	ND	ND
Temp	22.3		22.9	22.6	22.4	22.4
DO	7.0		7.0	7.2	6.8	6.7
pH (64 80 100)	8.32		8.72	8.45	8.43	8.93
Cond	326		340	340	336	317
Ammonia	ND		ND	ND	ND	ND

Agl

(cont'd)

1-24-95 Parameters: 3, 9, 10, 13, 14 - Day 12

Sample	Control	3	9	10	13	14
Temp	24.2	/	/	/	/	/
DO	7.2					
Temp 6.25	24.5	24.7	22.9	23.6	23.5	23.8
DO	7.4	7.4	7.5	7.7	7.6	7.3
Temp 12.5	24.5	24.2	23.4	23.6	23.8	23.9
DO	9.5	7.3	7.3	7.2	7.5	7.4
Temp 25	24.0	24.0	22.8	23.4	24.6	24.7
DO	7.0	7.3	7.2	7.4	7.3	7.5
Temp 50	23.9	24.6	23.9	22.9	25.0	23.2
DO	7.2	7.1	7.0	7.2	7.1	7.2
Temp 100	25.2	23.8	24.2	25.0	24.8	23.6
DO	7.1	7.0	6.8	7.0	7.0	7.1

1-25-95 Parameters: 3, 9, 10, 13, & 14 - Day 13

Sample	Control	3	9	10	13	14
Temp	22.0	/	/	/	/	/
DO	6.5					
Temp 6.25		24.8	24.0	24.8	24.0	23.2
DO		6.5	6.5	6.3	6.3	6.4
Temp 12.5		25.0	23.2	23.0	23.5	23.8
DO		6.4	6.2	6.2	6.3	6.3
Temp 25		23.2	22.0	22.0	22.4	24.0
DO		6.5	6.6	6.6	6.6	6.1
Temp 50		23.0	23.2	23.0	23.2	23.2
DO		6.4	6.4	6.4	6.1	6.6
Temp 100		22.8	23.0	22.2	23.4	22.4
DO		5.7	6.3	6.3	6.1	5.8

1/25/95 Day 8: Parameters 1, 2, 4, 5 & 6

Sample	Control	1	2	4	5	6
Temp	24.2					
DO	6.1					
Temp 4 5		25.2	23.8	24.0	24.8	24.0
DO 6.25		5.8	6.2	6.1	5.7	6.0
Temp 8 10		23.0	23.2	23.4	23.0	24.0
DO 12.5		6.0	5.9	6.0	5.8	5.2
Temp 16 20		23.4	25.2	23.0	24.4	24.0
DO 25		5.2	5.3	6.4	5.7	5.8
Temp 32 40		24.9	23.0	24.0	22.4	25.0
DO 50		5.0	5.6	6.4	5.5	4.9
Temp 64 80		24.0	24.0	24.4	22.2	24.0
DO 100		5.1	5.2	5.5	5.1	4.2

Took overlying water parameters on tests 7, 8, 11, 12 and 15. Mud was diluted on 1/24/95 and carbon filtered spring water was used to cover (or top off) the dilutions/test concentrations. Parameter measurements on next page.

1/25/95 Parameters 7, 8, 11, 12 & 15 - Day 0

Sample	Control	7	8	11	12	15
Temp	21.4					
DO	8.2					
pH	8.30					
Cond	400					
Ammonia	ND					
Temp		21.1	20.5	20.4	20.3	20.6
DO		8.3	8.2	8.1	8.2	8.3
pH 6.25		8.56	8.62	8.59	8.67	8.74
Cond		~~410~~ JT	428	424	411	415
Ammonia		ND	ND	ND	ND	ND
Temp		20.9	20.4	20.4	20.0	20.5
DO		8.3	8.1	8.1	8.2	8.1
pH 12.5		8.53	8.64	8.71	8.68	8.65
Cond		480	421	430	415	407
Ammonia		ND	ND	ND	ND	ND
Temp		20.7	20.1	20.2	20.6	20.5
~~Cond~~ DO JT		7.7	8.0	8.0	8.2	8.2
pH 25		8.52	8.68	8.68	8.68	8.69
Cond		479	408	422	409	403
Ammonia		ND	ND	ND	ND	ND
Temp		20.4	20.2	20.5	20.5	20.3
DO		7.5	8.0	8.0	8.2	8.1
pH 50		8.55	8.66	8.62	8.73	8.69
Cond		449	396	423	386	433
Ammonia		ND	ND	ND	ND	ND
Temp		20.3	20.4	20.7	20.8	20.5
DO		6.5	7.9	7.8	8.2	8.2
pH 100		8.48	8.65	8.60	8.74	8.71
Cond		389	400	360	349	401
Ammonia		ND	ND	ND	ND	ND

1-24-95 Parameters: 3, 9, 10, 13 + 14 - Day 14

sample	control	3	9	10	13	14
Temp	22.0					
DO	6.3					
pH	8.28					
Cond.	362					
Ammonia	ND					
Temp		22.0	22.0	21.0	22.0	22.2
DO 6.25		6.7	6.7	6.7	6.16	6.8
pH		8.32	8.34 mix 8.42	8.36 mix 8.45	8.32 mix 8.43	8.45
Cond.		306	317 324	321 335	296 327	331
Ammonia		ND	ND	ND	ND	ND
Temp		21.8	22.0	22.0	21.8	22.0
DO 12.5		6.5	6.8	6.8	6.5	6.2
pH		8.34	8.43	8.46	8.42	8.44
Cond.		317	329	331	328	330
ammonia		ND	ND	ND	ND	ND
Temp		21.8	21.6	21.4	22.0	22.2
DO 25		6.6	6.2	6.7	6.5	6.9
~~Temp~~ pH		8.36	8.41	8.46	8.42	8.44
cond.		321	335	326	352	373
ammonia		ND	ND	ND	ND	ND
Temp		22.0	21.8	22.0	22.0	22.0
DO		6.3	6.6	6.4	6.2	6.4
pH 50		8.32	8.42	8.45	8.43	8.42
Cond		296	334	327	332	339
ammonia		ND	ND	ND	ND	ND
Temp		21.4	22.0	21.8	22.2	21.8
DO 100		6.4	6.8	6.0	6.3	6.1
pH		8.34	8.43	8.44	8.44	8.40
Cond.		321	332	321	329	321
Ammonia		ND	ND	ND	ND	ND

1-26-95 Parameters: 1, 2, 4, 5, 6 — Day 9

Sample	Control	1	2	4	5	6
Temp	22.2					
DO	6.7					
Temp 4 5 6.25		22.0	22.0	22.2	22.0	22.2
DO		6.7	6.7	6.4	6.6	6.2
Temp 8 10 12.5		21.0	22.2	21.2	22.0	21.4
DO		6.8	6.4	6.6	6.1	6.6
Temp 16 20 25		22.0	22.4	21.8	21.4	22.0
DO		6.1	6.2	6.6	6.5	6.0
Temp 32 40 50		22.0	21.0	22.2	22.2	22.2
DO		5.6	6.8	6.4	5.9	6.0
Temp 64 80 100		22.2	22.0	22.2	22.2	22.0
DO		5.7	5.8	5.7	5.0	5.0

Parameters: 7, 8, 11, 12, 15 - Day 1

Sample	Control	7	8	11	12	15
Temp	21.2					
DO	7.5					
Temp 6.25		21.0	21.8	22.0	21.0	2nd 22.0
DO		7.3	7.0	7.5	7.6	7.0 6.8
Temp 12.5		21.4	22.0	21.8	21.8	21.4
DO		7.2	7.2	7.4	7.2	7.5
Temp 25		21.2	21.8	20.9	21.2	21.8
DO		7.1	7.0	7.3	7.2	7.1
Temp 50		21.0	21.2	21.2	21.0	21.2
DO		6.1	6.9	7.1	6.2	7.0
Temp 100		21.0	21.0	21.6	21.0	21.1
DO		5.4	4.5	5.2	7.3	6.8

01/27/95

1-26-95

Removed Day 14 Control (Gravel) from test - to test ~~sensitivity~~ viability of Hyalella. Recovered 10 of the 10 Hyalella put in on Day 0.

Filled tanks and added leaf slurry and tetramin slurry

1-27-95 Parameters: 3, 9, 10, 13 + 14 - Day 15

Sample	Control	3	9	10	13	14
Temp	25.8					
DO	6.1					
Temp		26.0	26.0	25.8	25.8	25.2
DO 6.25		6.5	6.6	6.1	6.2	6.5
Temp		25.8	25.8	25.2	26.0	25.8
DO 12.5		6.3	6.6	6.0	6.2	6.0
Temp		25.5	25.5	26.0	25.5	25.2
DO 25		6.2	6.6	6.0	6.6	5.6
Temp		25.0	26.0	25.8	25.8	25.0
DO 50		6.3	6.7	6.4	5.8	6.1
Temp		25.9	25.8	25.5	25.5	25.5
DO 100		5.9	5.9	5.8	6.0	5.3

D.O. meter calibrated before parameters were taken.

1/31/95

1-27-95 Parameters: 1, 2, 4, 5 + 6 - Day 10

Sample	Control	1	2	4	5	6
Temp	25.8	/	/	/	/	/
DO	6.4	/	/	/	/	/
Temp 4 5 6.25		27.0	24.2	24.4	24.2	25.0
DO		6.1	7.0	6.6	6.7	6.3
Temp 8 10 12.5		24.2	24.2	25.0	23.8	24.8
DO		7.3	6.8	6.7	6.9	6.5
Temp 16 20 25		23.2	24.0	26.0	25.0	25.0
DO		7.1	6.9	6.0	6.3	6.2
Temp 32 40 50		24.0	23.6	24.2	25.8	25.4
DO		7.5	7.1	6.8	6.9	6.7
Temp 64 80 100		23.0	25.0	24.2	23.0	24.0
DO		6.8	5.8	6.3	6.5	6.0

Parameters: 7, 8, 11, 12 + 15 - Day 2

Sample	Control	7	8	11	12	15
Temp	21.2	/	/	/	/	/
DO	8.5	/	/	/	/	/
Temp		22.1	22.0	22.0	22.2	22.0
DO 6.25		7.3	7.4	7.7	7.9	7.9
Temp		22.0	22.1	22.0	21.8	22.0
DO 12.5		8.6	7.9	7.7	8.2	7.4
Temp		21.2	22.0	21.8	22.0	21.4
DO 25		7.5	7.8	7.8	7.8	8.0
Temp		21.0	22.0	22.2	21.6	22.0
DO 50		7.4	6.9	7.6	8.1	7.5
Temp		22.0	22.0	21.8	22.0	22.2
DO 100		7.6	7.4	7.0	7.7	8.0

1-28-95 Parameters 3, 9, 10, 13, 14 Day 16

Sample	Control	3	9	10	13	14
Temp	26.0					
D.O.	5.9					
Temp 6.25		26.5	26.5	26.0	26.0	26.3
D.O.		6.0	5.8	5.4	5.7	5.4
Temp 12.5		25.0	26.5	26.0	26.0	26.5
D.O.		6.0	5.7	5.5	5.6	5.0
Temp 25		26.5	26.0	26.0	25.0	25.0
D.O.		6.3	5.7	5.4	4.8	5.3
Temp 50		26.5	26.5	26.0	26.5	26.3
D.O.		5.6	6.5	5.5	5.5	5.1
Temp 100		26.0	26.5	26.3	26.0	26.0
D.O.		4.8	6.2	4.6	5.8	5.3

Parameters 1, 2, 4, 5, 6 Day 11

Sample	Control	1	2	4	5	6
Temp.	24.5					
D.O.	5.8					
Temp 4 / 5		24.5	24.5	24.8	24.5	24.5
D.O. 6.25		6.1	6.1	5.1	5.2	5.6
Temp 8 / 10		24.5	24.8	24.8	24.5	24.5
D.O. 12.5		5.6	5.8	5.7	5.4	5.4
Temp 16 / 20		24.8	24.5	24.3	24.5	24.5
D.O. 25		5.2	5.3	5.5	5.1	4.3
Temp 32 / 40		24.5	24.5	24.5	24.5	24.5
D.O. 50		5.2	4.8	5.7	4.4	4.5
Temp 64 / 80		24.3	24.5	24.5	24.5	24.5
D.O. 100		5.2	4.4	5.5	4.2	4.4

1-28-95 Parameters 7, 8, 11, 12, 15 Day 3

Sample	Control	7	8	11	12	15
Temp	24.0					
D.O.						
Temp 6.25		23.8	24.0	24.0	24.0	24.0
D.O.		6.7	5.6	6.4	5.9	6.0
Temp 12.5		24.0	24.2	24.0	24.1	24.0
D.O.		6.2	5.6	6.6	5.9	5.7
Temp 25		24.0	23.8	235	24.0	24.0
D.O.		6.0	5.7	6.2	5.6	6.0
Temp 50		24.0	24.0	24.0	24.0	24.0
D.O.		5.8	6.0	6.2	6.1	6.0
Temp 100		23.8	235	24.0	24.0	24.0
D.O.		5.6	5.5	5.4	5.7	5.5

1-29-95 Parameters 3, 9, 10, 13, 14 - Day 17

Sample	Control	3	9	10	13	14
Temp	25.0					
D.O.	5.0					
Temp 6.25		26.0	26.0	26.0	26.2	25.8
D.O.		4.2	5.2	4.6	4.5	5.4
Temp 12.5		26.0	26.0	26.0	26.0	25.5
D.O.		4.8	4.9	4.5	5.4	5.4
Temp 25		26.0	25.8	25.5	25.5	25.8
D.O.		4.7	4.9	4.6	4.6	4.5
Temp 50		26.0	26.0	25.8	25.8	26.0
D.O.		4.1	4.8	4.2	4.3	4.2
Temp 100		26.0	26.0	25.8	26.0	26.0
D.O.		4.9	5.2	4.6	4.5	4.5

1-29-95 Parameters 1, 2, 4, 5, 6 - Day 12

Sample	Control	1	2	4	5	6
Temp	25.5					
D.O.	5.4					
Temp 4 5		25.5	25.5	25.5	25.5	25.5
D.O. 6.25		5.2	4.5	4.8	5.6	4.6
Temp 8 10		25.5	25.5	25.5	25.5	25.5
D.O. 12.5		~~5.8~~ 4.8	4.6	5.2	4.8	4.3
Temp. 14 20		25.5	25.5	25.5	25.5	25.5
D.O. 25		4.3	4.8	4.6	4.6	4.6
Temp 32 40		25.5	25.5	25.5	25.5	25.0
D.O. 50		4.6	4.8	5.5	3.5	3.7
Temp 64 80		25.4	25.5	25.5	25.0	25.5
D.O. 100		4.3	3.8	4.6	4.3	4.0

Parameters 7, 8, 11, 12, 15 - Day 4

Sample	Control	7	8	11	12	15
Temp	23.0					
D.O.	6.0					
Temp 6.25	~~23.0~~ →	23.0	22.0	22.5	22.0	22.0
D.O.		5.8	5.9	6.5	6.7	6.0
Temp 12.5	~~22.0~~ →	22.0	22.3	22.0	22.0	22.0
D.O.		5.3	5.4	8.0	6.8	6.0
Temp 25	~~22.5~~ →	22.5	22.0	22.0	23.0	22.0
D.O.		5.8	6.1	7.6	6.2	6.6
Temp 50	~~22.0~~ →	22.0	22.0	22.3	22.5	22.0
D.O.		5.8	~~22.0~~ 5.9	6.6	6.5	6.4
Temp 100	~~22.0~~ →	22.0	22.0	22.4	22.5	22.0
D.O.		5.5	6.4	6.2	6.2	5.8

MLS

8 -Th 1-30-95 Parameters: 7, 8, 11, 12 & 15 - Day 5 - Wed

Sample	Con	7	8	11	12	15
Temp	22.4	/	/	/	/	/
DO	5.5					
Temp 6.25		21.4	22.5	22.0	21.8	23.0
DO		5.2	6.4	4.8	5.1	5.1
Temp 12.5		21.8	22.0	23.5	21.5	21.8
DO		5.9	5.6	6.1	5.7	5.1
Temp 25		21.0	22.0	21.5	22.0	21.8
DO		5.3	5.8	6.3	5.6	6.3
Temp 50		21.0	22.0	22.0	22.0	22.2
DO		5.3	5.1	5.2	5.2	5.7
Temp 100		21.0	22.0	22.2	22.0	22.0
DO		5.2	5.3	5.2	4.9	5.8

Tue 1-31-95 D.O. meter calibrated. Test tanks filled + fed Tetramin + leaf slurry

1-31-95 Parameters 3, 9, 10, 13 + 14 - Day 19

Sample	Control	3	9	10	13	14
Temp	22.2	/	/	/	/	/
DO	6.0					
Temp 6.25		23.8	23.0	23.0	22.0	22.4
DO		6.3	6.4	5.8	6.2	6.3
Temp 12.5		22.0	21.8	23.4	23.2	22.0
DO		5.7	6.6	6.3	6.1	5.9
Temp 25		21.2	23.2	23.4	21.8	21.0
DO		5.8	6.4	5.9	5.3	5.8
Temp 50		22.8	22.0	21.2	24.0	23.0
DO		5.9	6.6	6.1	5.5	5.7
Temp 100		23.9	24.2	22.0	22.0	22.0
DO		5.3	6.2	MLS 6.6 5.4	6.6	5.9

wry

(Con't)

1-31-95 Parameters 7, 8, 11, 12 + 15 - Day 6

Sample	Control	7	8	11	12	15
Temp	22.0	/	/	/	/	/
DO	6.1	/	/	/	/	/
Temp 0.25		21.2	21.8	22.2	21.2	21.8
DO		6.2	6.2	5.9	5.9	6.1
Temp 12.5		21.4	22.2	23.0	22.2	22.0
DO		6.2	6.4	6.8	6.6	6.1
Temp 25		22.0	21.2	21.0	21.4	21.2
DO		5.5	6.1	6.2	6.1	5.8
Temp 50		21.4	21.8	21.6	21.2	21.0
DO		6.1	5.8	6.5	6.3	5.8
Temp 100		22.8	21.2	22.0	21.8	22.0
DO		5.2	5.2	5.2	6.1	6.0

2-1-95 Parameters 3, 9, 10, 13 + 14 - Day 20

Sample	Control	3	9	10	13	14
Temp	24.0	/	/	/	/	/
DO	6.2	/	/	/	/	/
Temp 0.25		24.0	24.0	22.8	23.0	23.2
DO		6.3	7.2	6.2	6.4	6.3
Temp 12.5		22.0	23.4	24.0	24.4	25.0
DO		6.6	6.5	5.9	6.3	6.5
Temp 25		23.9	22.2	24.6	24.0	22.0
DO		5.8	6.8	5.7	6.2	5.9
Temp 50		21.8	23.6	23.0	24.2	23.0
DO		6.5	6.3	5.2	5.7	5.9
Temp 100		24.4	24.0	23.0	24.0	23.2
DO		5.1	5.7	6.2	5.9	5.7

DO meter calibrated. Tanks filled + fed leaf and Tetramin slurry.

(Con't)
2-1-95 Parameters 1, 2 4, 5 + 6 Day 15

Sample	Control	1	2	4	5	6
Temp	21.8	/	/	/	/	/
DO	6.7	/	/	/	/	/
Temp 4 5 6.25		24.0	25.0	25.2	23.0	21.6
DO		5.9	5.7	5.9	6.0	6.1
Temp 8 10 12.5		24.8	22.4	25.2	24.2	23.0
DO		6.2	5.8	5.8	5.8	5.4
Temp 16 20 25		25	24.0	25.0	22.0	22.0
DO		5.8	5.5	5.4	4.9	5.1
Temp 32 40 50		24.4	23.0	23.2	24.8	25.0
DO		5.2	4.8	5.9	4.8	4.7
Temp 64 80 100		22.1	22.0	22.8	22.0	22.0
DO		5.0	4.6	5.0	4.2	4.9

Parameters 7, 8, 11, 12 + 15 - Day 7

Sample	Control	7	8	11	12	15
Temp	22.4	/	/	/	/	/
DO	7.5	/	/	/	/	/
pH	7.82	/	/	/	/	/
Cond	291	/	/	/	/	/
Ammonia	ND	/	/	/	/	/
Temp		21.8	22.0	21.8	21.8	22.2
DO		7.4	7.6	7.6	7.6	7.8
pH 6.25		8.08	8.19	8.27	8.28	8.27
Cond		303	309	310	302	314
Ammonia		ND	ND	ND	ND	ND
Temp		22.0	22.0	22.0	22.2	21.6
DO		7.4	7.6	7.7	7.6	7.7
pH 10.5		8.15	8.22	8.22	8.29	8.28
Cond		300	306	308	307	309
Ammonia		ND	ND	ND	ND	ND

(Con't)

2-1-95 Parameters 7, 8, 11, 12 & 15 - Day 7

Sample	7	8	11	12	15
Temp	21.7	22.0	21.8	22.2	21.5
DO	7.5	7.5	7.7	7.6	7.6
pH 05	8.15	8.23	8.24	8.28	8.28
Cond	302	309	309	308	308
Ammonia	ND	ND	ND	ND	ND
Temp	22.1	22.0	22.2	21.8	21.9
DO	7.5	7.6	7.5	7.6	7.5
pH 50	8.14	8.17	8.27	8.29	8.32
Cond	309	308	313	306	309
Ammonia	ND	ND	ND	ND	ND
Temp	22.2	22.2	22.2	22.0	22.0
DO	7.4	7.8	7.6	7.5	7.6
pH 100	8.11	8.19	8.32	8.28	8.30
Cond	307	308	314	306	305
Ammonia	ND	ND	ND	ND	ND

Removed Day 7 control from test to test viability of Hyalella. Recovered 10 of 10 Hyalella put in on Day 0.

2-2-95 Removed Day 21 control - recovered 8 of 10 adults and 30 young.

Filled tanks, fed leaf slurry and tetramin slurry.

Parameters next page.

2-2-95 Parameters 3, 9, 10, 13, 14 Day 21

Sample	Control	3	9	10	13	14
Temp	23.6					
DO	5.9					
pH	7.58					
Cond	300					
Ammonia	ND					
Temp		23.0	22.4	24.0	24.8	24.8
DO		6.1	6.1	5.9	5.3	5.7
pH 6.25		7.98	8.01	7.99	7.96	8.01
Cond		296	300	311	320	314
Ammonia		ND	ND	ND	ND	ND
Temp		25	25.0	22.0	23.0	25.2
DO		5.8	5.9	5.6	5.8	5.5
pH 12.5		7.96	8.02	8.02	7.99	8.00
Cond		308	314	305	306	324
Ammonia		ND	ND	ND	ND	ND
Temp		23.0	23.0	24.4	24.0	24.2
DO		5.9	5.8	6.0	6.0	5.8
pH 25		8.00	8.01	8.02	8.03	8.04
Cond		298	305	308	307	319
Ammonia		ND	ND	ND	ND	ND
Temp		23.2	24.2	22.4	23.8	24.2
DO		5.7	6.2	5.9	5.2	5.0
pH 50		7.96	8.02	8.04	8.02	8.03
Cond		310	315	304	307	310
Ammonia		ND	ND	ND	ND	ND
Temp		24.2	23.2	23.0	23.6	23.2
DO		5.7	5.8	5.6	5.4	5.4
pH 100		7.98	8.03	8.03	8.00	8.00
Cond		309	305	305	304	306
Ammonia		ND	ND	ND	ND	ND

2-2-95 Parameters 1, 2, 4, 5 + 6 - Day 16

Sample	Control	1	2	4	5	6
Temp	26.0	/	/	/	/	/
DO	5.6					
Temp 4		23.0	23.0	24.0	26.8	25.1
DO 6.25		5.4	5.4	5.7	5.8	5.0
Temp 8		25.6	26.0	26.0	23.8	26.1
DO 10 12.5		5.1	4.7	5.0	5.4	4.7
Temp 16		26.4	26.0	23.0	25.6	24.0
DO 20 25		4.8	4.7	5.4	5.1	5.0
Temp 32		24.2	26.2	25.4	25.0	23.8
DO 40 50		4.8	4.3	5.8	5.0	4.8
Temp 64	26.0		25.2	24.2	25.0	24.0
DO 80 100	4.4		3.8	4.9	4.0	4.7

Parameters 7, 8, 11, 12 & 15 - Day 8

Sample	Control	7	8	11	12	15
Temp	23.6	/	/	/	/	/
DO	5.5					
Temp 6.25		23.2	24.0	23.0	23.0	23.2
DO		5.5	6.0	5.3	5.5	5.3
Temp 12.5		23.0	23.8	23.2	23.0	23.5
DO		5.8	5.8	6.1	6.0	5.9
Temp 25		23.2	23.0	23.4	23.2	23.8
DO		5.0	6.1	6.3	5.8	5.9
Temp 50		22.8	23.0	23.8	23.6	23.4
DO		5.4	5.6	5.7	5.6	5.3
Temp 100		23.0	23.0	23.2	23.0	22.8
DO		4.5	5.3	4.2	5.5	5.7

2-3-95 Parameters 3, 9, 10, 13 & 14 - Day 22

Sample	Control	3	9	10	13	14
Temp	22.2	/	/	/	/	/
DO	5.4					
Temp 6.25		22.4	22.0	22.0	22.0	22.0
DO		6.5	6.6	6.1	6.1	5.8
Temp 12.5		22.0	22.2	22.2	22.5	22.0
DO		6.4	6.6	6.6	5.9	5.7
Temp 25		21.8	22.4	22.0	22.0	22.0
DO		6.1	6.5	6.3	6.2	5.9
Temp 50		22.8	21.8	22.0	22.2	23.0
DO		6.0	6.4	6.4	6.1	5.4
Temp 100		22.2	23.0	22.0	22.0	22.0
DO		5.8	6.6	5.9	5.6	5.8

Parameters 1, 2, 4, 5 & 6 - Day 17

Sample	Control	1	2	4	5	6
Temp	22.5	/	/	/	/	/
DO	5.8					
Temp 4 5 6.25		22.2	22.0	22.0	22.8	22.5
DO		6.2	5.9	6.4	6.4	6.0
Temp 8 10 12.5		22.2	22.5	22.5	22.7	22.5
DO		6.2	6.2	6.1	5.8	6.2
Temp 16 20 25		22.4	22.4	22.0	22.0	22.0
DO		6.0	5.9	6.5	6.4	5.4
Temp 32 40 50		22.2	22.2	22.5	22.0	21.8
DO		5.8	5.5	5.8	5.5	6.0
Temp 64 80 100		22.0	22.0	22.0	22.4	22.5
DO		5.1	5.3	5.9	4.9	5.7

2-3-95 Parameters 7, 8, 11, 12 & 15 - Day 9

Sample	Control	7	8	11	12	15
Temp	22.5	/	/	/	/	/
DO	6.2					
Temp Water		23.0	22.5	23.0	21.8	23.0
DO		5.7	5.8	6.0	6.0	6.0
Temp 12.5		22.6	23.0	23.0	23.0	22.4
DO		5.9	6.0	6.0	5.6	6.0
Temp 25		23.0	23.0	21.8	22.6	21.8
DO		5.6	5.7	6.2	5.9	5.9
Temp 50		22.0	22.4	23.0	22.2	22.0
DO		5.6	5.4	5.5	6.3	5.9
Temp 100		23.0	22.8	22.5	23.0	23.0
DO		5.0	5.4	4.4	6.0	6.0

Filled Tanks and fed leaf slurry and Tetramin slurry.

2-4-95 Parameters 3, 9, 10, 13, 14 Day -23

Sample	Control	3	9	10	13	14
Temp	23.0					
DO	6.8					
Temp 6.25		23.0	23.5	23.5	24.0	23.0
D.O		6.8	6.7	6.7	6.4	6.3
Temp 12.5		23.0	23.0	23.5	23.0	23.5
D.O		6.9	6.6	6.4	6.1	5.8
Temp 25		23.0	23.0	23.5	23.0	23.5
D.O		6.5	6.2	6.6	6.5	6.0
Temp 50		23.5	23.0	23.5	23.0	24.0
D.O		6.3	6.5	6.4	6.3	6.0
Temp 100		23.5	23.0	23.5	23.0	23.5
D.O.		6.6	6.0	6.1	6.1	5.8

2-4-95 Parameters 1, 2, 4, 5, 6 Day 18

Sample	Control	1	2	4	5	6
Temp	23.8					
D.O.	6.9					
Temp 2.5		24.0	23.8	24.0	23.8	23.5
D.O. 6.25		6.6	5.8	6.1	5.7	6.2
Temp 8 10		24.0	23.5	24.0	23.8	23.5
D.O. 12.5		6.1	5.5	5.9	5.7	5.7
Temp 16 20		23.8	23.8	24.0	24.0	23.5
D.O 25		6.0	5.9	6.2	5.5	5.7
Temp 32 40		24.0	23.8	23.8	24.0	24.0
D.O. 50		5.4	5.3	5.8	5.4	5.5
Temp 64 80		24.0	24.0	23.8	24.0	24.0
D.O. 100		4.9	4.8	5.4	4.6	5.1

Parameters 7, 8, 11, 12, 15 Day 10

Sample	Control	7	8	11	12	15
Temp	22.0					
D.O	5.9					
Temp 6.25		22.0	22.0	22.5	22.0	22.0
D.O.		5.4	5.6	6.1	5.7	5.5
Temp. 12.5		22.5	22.3	22.0	22.0	22.0
D.O.		5.6	6.0	6.1	5.8	5.6
Temp 25		22.0	22.0	22.0	22.0	22.0
D.O.		4.9	5.9	5.8	5.8	5.7
Temp 50		22.0	22.2	22.0	22.0	22.0
D.O.		5.6	5.6	5.6	6.1	5.4
Temp 100		22.0	22.0	22.0	22.0	22.0
D.O.		5.8	5.3	3.6	5.6	5.3

2-5-95 Parameters 3, 9, 10, 13, 14 - Day 24

Sample	control	3	9	10	13	14
Temp	24.0					
DO	6.0					
Temp 6.25		24.0	24.6	23.8	24.0	24.0
DO		5.9	6.4	6.0	5.9	6.0
Temp 12.5		23.0	24.0	24.0	24.1	24.2
DO		6.4	6.1	5.5	6.1	5.8
Temp 25		23.8	23.2	24.0	23.2	23.0
DO		5.9	6.1	5.6	5.9	5.7
Temp 50		22.6	24.2	24.0	24.0	23.6
DO		5.8	6.0	5.8	5.6	6.0
Temp 100		24.0	24.0	23.0	22.6	24.0
DO		5.2	4.8	6.1	6.0	5.2

Parameters 1, 2, 4, 5, 6 - Day 19

Sample	control	1	2	4	5	6
Temp	24.0					
DO	6.0					
Temp 4 5 6.25		24.8	24.2	24.2	25.2	24.0
DO		5.9	5.7	5.6	5.2	5.7
Temp 8 10 12.5		23.2	24.5	24.2	24.0	25.0
DO		6.1	4.9	5.3	5.4	5.1
Temp 16 20 25		24.0	22.0	23.0	24.0	24.0
DO		5.5	5.8	5.3	5.1	5.2
Temp 32 40 50		24.0	25.2	24.2	24.0	24.2
DO		5.2	4.7	5.4	4.6	5.0
Temp 64 80 100		24.2	24.0	25.6	24.0	24.0
DO		4.7	4.5	4.9	3.1	4.9

2-5-95 Parameters 7, 8, 11, 12, 15 - day 14

Sample	Control	7	8	11	12	15
Temp	21.2					
DO	5.5					
Temp 6.25		21.0	24.0	21.2	21.0	20.8
DO		5.1	5.3	5.4	5.0	5.3
Temp 12.5		21.2	21.0	20.8	22.0	21.2
DO		5.1	5.6	5.5	5.5	5.4
Temp 25		21.2	20.8	20.8	21.6	21.2
DO		5.4	5.3	5.4	5.7	5.5
Temp 50		21.6	24.0	21.0	21.2	21.2
DO		5.3	5.2	5.6	5.6	5.7
Temp 100		21.2	21.6	21.0	21.8	21.6
DO		5.2	5.0	5.7	5.9	5.2

2-6-95 Parameters 3, 9, 10, 13, 14 - Day 25

Sample	Control	3	9	10	13	14
Temp	25.2					
DO	5.5					
Temp 6.25		25.5	25.4	25.4	25.0	25.5
DO		5.7	5.5	5.5	5.5	5.6
Temp 12.5		23.8	24.2	25.5	25.2	25.2
DO		5.0	5.6	5.7	5.3	5.4
Temp 25		23.8	25.4	25.5	23.8	24.0
DO		5.8	5.5	5.7	5.4	5.8
Temp 50		25.2	24.2	23.6	25.0	24.8
DO		5.2	5.6	5.2	4.9	5.1
Temp 100		25.2	25.5	24.2	24.2	25.2
DO		5.1	5.8	4.8	5.8	5.0

2-6-95 Parameters - 1, 2, 4, 5, 6 - Day 20

Sample	Control	1	2	4	5	6
Temp	26.2					
DO	5.6					
Temp 4 5 6.25		25.0	26.2	25.0	24.0	25.6
DO		5.1	5.0	5.0	4.8	4.6
Temp 8 10 12.5		25.8	24.8	24.8	25.8	24.8
DO		5.1	4.8	4.7	5.0	4.7
Temp 16 20 25		26.0	25.8	25.2	25.8	24.6
DO		4.8	5.0	4.9	4.6	4.2
Temp 32 40 50		26.2	26.0	25.8	25.0	26.2
DO		4.8	4.0	4.9	4.2	4.5
Temp 64 80 100		26.2	26.2	26.2	25.8	26.2
DO		4.2	4.0	4.5	3.5	4.0

Parameters - 7, 8, 11, 12, 15 - day 12

Sample	control	7	8	11	12	15
Temp	23.2					
DO	5.7					
Temp 6.25		23.0	23.0	22.5	22.2	23.0
DO		5.0	4.6	4.7	5.1	4.7
Temp 12.5		22.5	23.0	23.0	23.0	23.0
DO		5.1	4.5	4.1	5.0	4.9
Temp 25		23.0	23.0	23.0	23.0	23.2
DO		4.5	5.3	5.0	5.8	5.2
Temp 50		22.2	23.0	22.8	22.8	22.2
DO		5.1	4.9	4.4	4.7 5 max	4.4
Temp 100		22.2	22.2	22.2	22.4	23.0
DO		4.5	4.4	2.8	5.1	5.2

Parameters 3, 9, 10, 13, 14 Day 21

Sample	3	9	10	13	14	Con
Temp						24.9
DO						6.0
Temp 6.25	24.2	24.0	23.8	23.8	23.5	
DO	5.8	5.9	6.0	5.6	5.9	
Temp 12.5	22.8	23.0	23.8	25.2	24.6	
DO	6.0	6.1	6.0	5.6	5.8	
Temp 25	22.6	24.4	24.2	22.8	22.4	
DO	5.9	5.8	5.7	6.0	6.0	
Temp 50	25.2	23.2	23.8	23.8	25.8	
DO	5.8	6.0	6.0	5.6	5.0 mg/l	
Temp 100	24.0	25.0	23.0	23.2	24.4	
DO	5.2	5.6	5.2	6.2	5.4	

Parameters 1, 2, 4, 5 & 6 - Day 21

Sample	Con	1	2	4	5	6
Temp	25.8					
DO	6.0					
Temp 4 5		23.8	26.0	24.4	25.0	26.2
DO 6.25		6.1	5.3	5.4	5.8	5.2
Temp 8 10		24.8	25.0	25.8	25.2	24.8
DO 12.5		5.8	5.4	5.3	5.5	5.5
Temp 16 20		25.4	25.0	25.0	24.8	25.5
DO 25		5.2	5.2	5.6	5.2	5.0
Temp 32 40		25.0	25.8	26.0	24.8	25.0
DO 50		5.2	5.2	5.2	4.7	5.1
Temp 64 80		24.4	25.4	24.9	24.8	25.0
DO 100		4.7	4.7	5.2	4.2	4.7

D.O. meter calibrated. All tanks fed Tetramin slurry and beef slurry

Con
24.9
6.0

Parameters - 7, 8, 11, 12, 15 - Day 13

Sample	Con	7	8	11	12	15
Temp	21.2					
DO	7.3					
Temp 6.25		21.6	21.4	21.2	21.2	21.0
DO		7.0	6.8	6.8	6.7	7.0
Temp 12.5		21.2	21.2	21.4	21.6	21.4
DO		6.8	6.7	7.0	7.0	7.0
Temp 25		21.0	21.0	21.2	21.8	21.8
DO		6.6	6.8	6.7	7.1	7.0
Temp 50		21.0	21.2	21.4	21.6	21.8
DO		6.7	6.8	6.7	7.1	7.0
Temp 100		21.0	21.0	21.6	21.2	21.0
DO		6.6	6.7	5.8	7.0	7.0

Parameters - 1, 2, 4, 5, 6 (Cont.)

Sample	Con	1	2	4	5	6	X
pH 4	8.20	8.21	8.31	8.31	8.17	8.34	
Cond 6.25	327	315	334	339	328	339	
Ammonia	ND	ND	ND	ND	ND	ND	
pH		8.13	8.19	8.36	8.13	8.29	
Cond 12.5		331	321	332	340	326	
Ammonia		ND	ND	ND	ND	ND	
pH		8.12	8.22	8.29	8.33	8.27	
Cond 25		321	323	322	322	309	
Ammonia		ND	ND	ND	ND	ND	
pH		8.05	8.15	8.36	8.47	8.30	
Cond 50		326	328	346	330	288	
Ammonia		ND	ND	ND	ND	ND	
pH		8.04	8.21	8.31	8.06	8.23	
Cond 100		315	328	322	320	327	
Ammonia		ND	ND	ND	ND	ND	

2-8-95 Parameters 3, 9, 10, 13, 14 - Day - 27

Sample	Control	3	9	10	13	14
Temp	22.8					
DO	6.5					
Temp 6.25		21.5	21.4	23.8	24.2	23.8
DO		6.6	6.2	6.2	5.9	6.2
Temp 12.5		22.0	24.0	21.4	22.0	24.5
DO		6.4	6.1	6.5	6.3	5.9
Temp 25		21.9	21.8	21.8	23.4	22.2
DO		6.7	6.5	6.2	6.1	6.6
Temp 50		21.5	24.2	21.2	22.2	23.0
DO		6.0	6.4	6.3	6.5	6.1
Temp 100		24.0	21.8	21.8	21.2	21.8
DO		6.2	6.3	6.0	5.9	6.1

Parameters 1, 2, 4, 5, 6 - Day 22

Sample	Control	1	2	4	5	6
Temp	21.2					
DO	6.3					
Temp 4 5 6.25		24.8	24.8	25.2	22.2	22.0
DO		5.7	5.2	5.4	6.2	5.7
Temp 8 10 12.5		25.2	25.0	24.8	25.0	25.0
DO		5.6	2.1	5.5	4.9	5.4
Temp 16 20 25		22.0	24.0	24.6	24.8	25.2
DO		6.0	5.1	4.4	5.1	5.4
Temp 32 40 50		25.6	24.6	24.8	24.8	25.0
DO		4.9	4.8	5.6	4.9	5.3
Temp 64 80 100		23.2	25.2	24.0	25.2	24.0
DO		4.9	4.6	5.5	4.4	4.1

2-7-95 Parameters 7, 8, 11, 12, 15 - Day 14

Sample	control	7	8	11	12	15
Temp	22.8					
DO	5.9					
pH	8.91					
Cond	226					
Ammonia						
Temp 6.25		21.8	22.5	21.8	22.0	22.4
DO		5.3	5.1	4.7	4.9	5.1
pH		8.84	8.89	8.86	9.00	8.97
Cond.		208	204	217	211	218
Ammonia		ND	ND	ND	ND	ND
Temp 12.5		21.8	22.8	22.5	22.0	22.0
DO		5.1	5.2	6.0	5.4	5.1
pH		8.85	8.92	9.01	8.99	8.97
Cond		204	209	214	210	212
Ammonia		ND	ND	ND	ND	ND
Temp 25		22.5	23.8	21.8	22.8	22.5
DO		4.7	5.5	4.8	5.7	5.3
pH		8.83	8.94	8.99	9.00	9.01
Cond		213	211	217	215	210
Ammonia		ND	ND	ND	ND	ND
Temp 50		21.6	22.0	21.8	22.8	22.4
DO		5.1	4.7	4.3	5.5	5.0
pH		8.86	8.87	9.18	8.99	8.98
Cond		207	212	221	213	211
Ammonia		ND	ND	ND	ND	ND
Temp 100		21.8	22.0	22.2	21.6	22.2
DO		4.4	4.3	3.4	5.2	5.4
pH		8.83	8.87	9.17	9.03	9.00
Cond		208	213	224	206	209
Ammonia		ND	ND	ND	ND	ND

2-8-95 Day 14 Control: counted 9 of 10 adults found + 1 young.

2-9-95 Ending Counts Tests: 3, 9, 10, 13 & 14 · Day 28

Control A	9 adults	16 young	Control C	9	25		
B	9	10	D				
Test 3 6.25A	7	16	C	8	11		
B	9	3	D				
12.5 A	9	22	C	8	5		
B	10	3	D				
25 A	9	20	C	9	0	68.9	S/K
B	8	0	D				P
50 A	8	1	C	7	0		/
B	8	3	D				
100 A	2	0	C	2	0		
B	2	0	D				
Test 9 6.25A	6	2	6.25 C	8	0		
B	6	0	D				
12.5A	8	1	12.5 C	X6	17	?	adults
B	7	3	D				
25 A	6	0	25 C	6	6		
B	9	7	D				P/
50A	8	14	50 C	3	1		
B	5	3	D				
100 A	1	0	100 C	5	1		
B	5	0	D				
Test 10 6.25 A	6	3	6.25 C	9	0		
B	6	2	D				
12.5 A	6	1	12.5 C	67	5		
B	9	5	D				
25 A	3	0	25 C	6	2		P/
B	0	0	D				
50 A	8	2	50 C	10	11		
B	8	0	D				
100 A	6	0	100 C	3	0		
B	5	0	D				

(Cont)

2-9-95 Ending Counts

Test 13: 6.25A	6	8	6.25 C	5	0	
B	4	0	D			
12.5A	7	0	12.5 C	7	6	
B	5	4	D			
25 A	7	13	25 C	5	8	P/
B	7	4	D			
50 A	9	7	50 C	9	23	
B	8	41	D			
100 A	4	1	100 C	3	4	
B	2	0	D			
14: 6.25 A	5	0	6.25 C	8	20	
B	8	9	D			
12.5 A	6	3	12.5 C	5	20	
B	5	15	D			
25 A	7	34	25 C	8	32	7/100%
B	5	10	D			
50 A	10	7	50 C	9	22	
B	7	7	D			
100 A	7	2	100 C	8	0	
B	8	0	D			

2-9-95 Ending Parameters Tests 3, 9, 10, 13, 14

Sample	Control	3	9	10	13	14
Temp	23.1					
DO	7.3					
pH	7.54					
Cond	247					
Ammonia	ND					
Temp		22.0	22.0	21.8	21.8	23.4
DO		7.5	7.0	7.2	7.1	6.9
pH 6.25		7.75	7.97	8.01	8.00	8.02
Cond		228	318	300	312	314
Ammonia		ND	ND	ND	ND	ND
Temp		22.0	21.8	21.6	21.8	23.2
DO		7.0	7.1	7.1	7.0	6.9
pH 12.5		7.82	8.00	8.00	8.02	8.01
Cond		210	310	313	311	319
Ammonia		ND	ND	ND	ND	ND
Temp		22.0	21.8	21.6	20.8	23.6
DO		7.2	7.1	7.1	6.9	6.8
pH 25		7.93	7.99	8.02	8.00	8.04
Cond		313	313	314	310	324
Ammonia		ND	ND	ND	ND	ND
Temp		21.8	22.2	20.8	21.6	22.8
DO		7.0	7.0	7.0	6.8	6.8
pH 50		7.93	7.98	8.02	8.01	8.09
Cond		310	310	312	294	317
Ammonia		ND	ND	ND	ND	ND
Temp		21.8	22.0	22.0	22.8	24.1
DO		6.8	7.1	7.1	6.8	6.8
pH 100		7.92	7.99	8.01	8.01	8.10
Cond		312	314	312	312	922
Ammonia		ND	ND	ND	ND	ND

2-9-95 Parameters 1, 2, 4, 5 + 6 - Day 23

Sample	Control	1	2	4	5	6
Temp	25.0	/	/	/	/	/
DO	6.0	/	/	/	/	/
Temp 4 5 6.25		25.6	25.0	23.8	24.0	25.0
DO		5.8	5.7	6.0	5.9	5.6
Temp 8 10 12.5		25.1	24.0	24.2	25.2	24.0
DO		6.1	5.8	5.6	5.5	5.7
Temp 20 25		24.2	24.0	23.8	23.5	24.2
DO		5.8	5.6	6.1	5.5	5.1
Temp 32 40 50		24.2	24.8	25.1	23.8	24.0
DO		5.5	5.4	5.6	4.9	5.1
Temp 64 80 100		23.8	24.0	23.8	25.0	24.0
DO		4.8	5.2	5.4	4.3	5.3

2-9-95 Parameters 7, 8, 11, 12, 15 - Day 15

Sample	Control	7	8	11	12	15
Temp	22.8	/	/	/	/	/
DO	6.0	/	/	/	/	/
Temp 6.25		22.2	23.0	22.0	21.8	22.2
DO		5.8	5.5	5.2	5.7	5.4
Temp 12.5		22.0	22.5	22.6	22.5	21.8
DO		5.7	5.6	6.0	5.8	5.4
Temp 25		22.2	22.8	22.0	22.8	22.8
DO		5.1	5.7	5.1	5.9	5.5
Temp 50		22.0	22.2	22.0	22.2	22.5
DO		5.6	5.6	4.5	5.7	5.3
Temp 100		22.0	22.0	22.2	21.8	22.2
DO		4.6	4.6	3.5	5.5	5.8

2-10-95 Parameters 1, 2, 5, 4 + 6 - Day 24

Sample	Control	1	2	4	5	6
Temp	26.0	/	/	/	/	/
DO	5.5					
Temp 4 5 6.25		24.0	25.5	26.0	23.4	25.2
DO		5.5	4.2	4.5	4.9	5.2
Temp 8 10 12.5		26.0	23.0	26.2	26.0	23.2
DO		5.1	5.1	4.6	4.7	5.4
Temp 16 20 25		26.0	26.2	26.4	22.4	23.0
DO		4.8	4.4	4.5	5.1	6.0
Temp 32 40 50		25.8	23.2	23.8	26.0	24.8
DO		4.5	4.6	5.0	4.2	4.7
Temp 64 80 100		22.6	22.6	22.8	22.2	23.0
DO		4.5	4.4	4.9	4.3	5.4

Parameters 7, 8, 11, 12 + 15 - Day 16

Sample	Control	7	8	11	12	15
Temp	22.2	/	/	/	/	/
DO	5.7					
Temp 6.25		23.0	23.0	22.8	22.6	23.2
DO		5.5	5.4	5.6	5.7	5.9
Temp 12.5		22.4	21.8	22.2	23.4	23.0
DO		5.2	5.5	5.4	6.0	5.6
Temp 25		22.0	21.6	22.2	23.0	22.0
DO		5.6	5.8	5.0	5.6	5.6
Temp 50		22.2	23.0	22.2	22.0	23.0
DO		5.5	5.1	5.7	5.7	5.7
Temp 100		22.2	22.2	22.8	23.2	23.0
DO		4.3	4.9	4.2	5.5	5.6

2-11-95 Parameters 1, 2, 4, 5 + 6 - Day 25

Sample	control	1	2	4	5	6
Temp	27.0					
DO	5.1					
Temp 4 / 5 / 6.25		21.0	21.2	22.0	25.2	24.5
DO		5.5	5.5	5.3	4.7	4.5
Temp 8 / 10 / 12.5		25.8	26.2	25.6	21.5	26.4
DO		4.8	4.1	4.1	4.9	4.3
Temp 16 / 20 / 25		24.5	22.4	21.0	25.2	22.2
DO		4.5	4.3	4.9	4.2	5.7
Temp 32 / 40 / 50		22.2	24.4	25.8	22.0	22.2
DO		4.9	3.6	4.7	4.2	5.6
Temp 64 / 80 / 100		25.8	23.0	22.0	22.5	22.0
DO		3.4	4.4	5.2	3.8	6.3

Parameters 7, 8, 11, 12, + 15 - Day 17

Sample	Control	7	8	11	12	15
Temp	28.0					
DO	5.9					
Temp 6.25		22.2	23.2	22.4	22.4	23.0
DO		5.7	5.3	4.9	6.0	5.5
Temp 12.5		22.4	23.0	22.8	22.8	22.7
DO		5.7	6.0	5.7	5.8	5.6
Temp 25		22.6	23.0	23.0	22.8	23.0
DO		4.9	5.7	5.0	5.9	5.6
Temp 50		22.0	22.2	22.2	23.0	23.0
DO		5.4	5.4	4.6	5.8	5.5
Temp 100		22.2	22.0	22.3	22.0	23.2
DO		4.8	4.7	4.4 ~~5.3~~	5.3	6.2

2-12-95 Parameters 1, 2, 4, 5 + 6 - Day 26

Sample	Control	1	2	4	5	6
Temp	26.0					
DO	6.0					
Temp 4 5 6.25		22.0	22.0	22.0	mid 22.0 25.2	24.8
DO		6.3	6.4	6.3	mid 6.3 25.3	5.7
Temp 8 10 12.5		21.2	21.2	21.2	22.0	21.2
DO		5.7	5.2	4.6	5.8	5.5
Temp 14 20 25		24.5	22.2	22.0	20.5	22.2
DO		5.6	5.7	6.1	5.5	6.3
Temp 32 40 50		22.0	21.0	24.0	22.2	22.0
DO		5.6	5.0	5.5	5.8	6.3
Temp 64 80 100		24.5	22.8	22.2	22.2	22.0
DO		5.0	5.3	6.0	4.8	6.5

Parameters 7, 8, 11, 12 + 15 - Day 18

Sample	Control	7	8	11	12	15
Temp	22.8					
DO	6.1					
Temp 6.25		21.8	23.0	23.0	22.6	22.8
DO		6.0	5.5	5.4	5.4	5.4
Temp 12.5		21.5	22.2	22.2	22.2	22.0
DO		5.6	6.1	6.1	5.8	5.0
Temp 25		23.0	22.0	23.0	22.0	23.0
DO		5.1	5.7	5.2	6.0	5.6
Temp 50		22.0	23.0	23.0	22.0	22.8
DO		5.4	5.6	4.4	5.7	5.2
Temp 100		23.0	22.0	22.5	23.6	22.0
DO		4.8	5.4	4.4	5.4	6.0

3-13-95 Parameters 1, 2, 4, 5 + 6 - Day 27

Sample	Control	1	2	4	5	6
Temp	25.2	/	/	/	/	/
DO	5.8					
Temp 4 5 6.25		25.2	26.2	22.0	22.8	25.2
DO		5.6	5.5	6.4	6.5	5.9
Temp 8 10 12.5		25.4	22.4	22.2	25.6	22.0
DO		5.7	6.5	6.0	5.7	6.3
Temp 16 20 25		24.3	23.0	22.0	22.0	21.8
DO		5.7	6.3	6.5	6.0	5.9
Temp 32 40 50		25.0	24.6	26.0	22.0	21.8
DO		5.7	5.3	5.4	5.7	5.3
Temp 64 80 100		24.2	21.8	22.0	25.2	22.2
DO		5.0	5.8	5.8	4.5	5.7

Parameters 7, 8, 11, 12 + 15 Day 19

Sample	Control	7	8	11	12	15
Temp	23.0	/	/	/	/	/
DO	7.2					
Temp 6.25		23.0	23.0	23.2	21.8	23.0
DO		5.5	5.3	5.4	5.3	5.4
Temp 12.5		23.0	22.8	22.8	22.8	23.0
DO		5.7	5.4	5.3	5.4	5.8
Temp 25		23.0	23.0	22.8	23.0	23.0
DO		5.3	5.4	5.3	5.8	5.8
Temp 50		22	22.8	21.8	22.6	23.0
DO		5.4	5.3	4.3	5.3	5.3
Temp 100		22.0	23.2	22.8	23.0	22.2
DO		5.3	5.1	4.5	5.4	6.0

2-14-95 Parameters - Ending 1, 2, 4, 5, 6

Sample	Control	1	2	~~4~~ 5	~~5~~ 4	6
Temp	23.1					
DO	7.1					
pH	7.68					
Cond	230					
Ammonia	ND					
Temp		22.9	22.8	22.9	22.2	21.8
DO 4		7.0	6.5	6.8	6.7	6.4
pH 5		7.84	7.95	8.07	8.23	8.23
Cond 6.25		299	302	321	342	324
Ammonia		ND	ND	ND	ND	ND
Temp		22.8	23.3	22.3	22.8	22.5
DO 8		7.0	6.7	6.8	6.7	6.6
pH 10		7.95	8.15	8.04	8.34	8.22
Cond 12.5		302	337	282	337	331
Ammonia		ND	ND	ND	ND	ND
Temp		22.9	22.7	22.3	22.5	21.5
DO 16		6.7	6.6	6.8	6.5	6.5
pH 20		8.07	8.19	8.17	8.30	8.22
Cond 25		321	325	322	330	313
Ammonia		ND	ND	ND	ND	ND
Temp		22.7	22.7	22.4	22.5	21.2
DO 32		6.6	6.6	6.1	6.3	6.7
pH 40		7.97	8.15	8.26	8.37	8.22
Cond 50		259	319	325	332	309
Ammonia		ND	ND	ND	ND	ND
Temp		21.8	21.6	22.3	21.0	21.0
DO 64		6.4	6.4	6.1	6.4	6.6
pH 80		7.93	8.13	8.20	8.27	8.24
Cond 100		310	294	329	268	308
Ammonia		ND	ND	ND	ND	ND

2/14/95 Final Counts 1, 2, 4, 5, 6

Control A	8 adults	2 young
B	8	0
C	8	0
1: 6.25 A	3	0
B	3	0
C	5	0
12.5 A	4	0
B	3	0
C	4	0
25 A	0	0
B	0	0
C	0	0
50 A	0	0
B	0	0
C	0	0
100 A	0	0
B	0	0
C	0	0
2: 4 A	2	0
B	5	0
C	1	0
8 A	0	0
B	1	0
C	4	0
16 A	4	0
B	4	0
C	0	0
32 A	0	0
B	1	0
C	0	0
2: 64 A	0	0
B	0	0
C	0	0
4: 6.25 A	6	0
B	4	0
C	9	1
12.5 A	3	0
B	2	0
C	3	0
25 A	4	0
B	1	0
C	0	0
50 A	2	0
B	4	0
C	4	0
100 A	5	0
B	4	0
C	6	0
5: 5 A	6	0
B	3	0
C	1	0
10 A	3	0
B	0	0
C	1	0
20 A	0	0
B	2	0
C	4	0
40 A	1	0
B	1	0
C	2	0

< 6.25

City sheen on water

< 4%

< 5%

2/14/95 Final Counts

5:30	A	0	0
	B	1	0
	C	3	0
6:5	A	1	0
	B	3	1
	C	0	0
10	A	1	0
	B	0	0
	C	1	0
20	A	0	0
	B	0	0
	C	1	0
40	A	0	0
	B	0	0
	C	1	0
80	A	0	0
	B	1	0
	C	1	0

<45%

<45%

Parameters 7, 8, 11, 12 + 15 · Day 20

Sample	Con	7	8	11	12	15
Temp/DO 6.25	22.0/6.2	21.6/5.9	21.8/6.2	22.0/5.9	21.5/5.8	21.2/6.5
Temp 12.5		22.0	22.0	21.4	22.2	21.5
DO		6.1	6.3	5.6	6.8	6.3
Temp 25		21.4	21.6	21.0	22.0	21.2
DO		6.8	6.0	6.0	5.7	6.4
Temp 50		21.4	21.2	21.5	21.4	22.0
DO		5.8	5.7	6.1	6.1	6.5
Temp 100		21.4	21.2	21.6	22.4	22.5
DO		4.9	5.5	4.9	6.2	6.1

Day 21

2/15/95 Parameters: Test 7, 8, 11, 12 & 15

Sample	Con	7	8	11	12	15
Temp	25.0					
DO	4.8					
Temp 6.25		24.8	24.0	24.6	24.6	24.8
DO		4.3	4.3	5.2	4.5	4.6
Temp 12.5		25.0	25.0	24.6	24.0	24.6
DO		4.1	4.4	4.0	4.8	4.2
Temp 25		25.0	24.8	24.0	25.0	24.0
DO		4.7	4.0	4.2	4.7	4.8
Temp 50		23.8	24.0	24.8	24.0	23.6
DO		4.4	4.2	4.0	5.1	4.9
Temp 100		24.8	24.6	24.0	25.0	24.8
DO		3.9	4.1	3.5	4.5	5.0

2/16/95 Day 22 - Parameters 7, 8, 11, 12 + 15

Sample	Con	7	8	11	12	15
Temp	22.4					
DO	4.8	/	/	/	/	/
Temp 6.25		22.0	23.0	22.0	22.2	22.6
DO		4.7	4.7	3.8	3.9	4.2
Temp 12.5		22.0	22.5	22.2	22.2	22.2
DO		4.2	~~3.9~~ 4.2	4.3	4.0	4.2
Temp 25		23.0	22.4	22.4	22.2	23.0
DO		3.8	4.6	4.3	4.8	4.7
Temp 50		22.0	22.2	22.2	22.2	23.0
DO		4.6	4.1	3.0	4.3	4.7
Temp 100		22.2	22.2	22.8	22.0	22.0
DO		3.5	4.1	3.2	4.3	4.7

2/17/95 Parameters 7, 8, 11, 12 & 15 - Day 23

Sample	Control	7	8	11	12	15
Temp	21.8	/	/	/	/	/
DO	5.3					
Temp 6.25		21.8	22.0	22.0	22.0	21.8
DO		5.3	5.3	5.0	5.5	5.7
Temp 12.5		23.0	22.0	22.2	22.2	22.0
DO		5.1	5.3	5.1	6.1	5.8
Temp 25		21.2	21.8	21.0	22.2	21.2
DO		5.8	5.5	4.4	5.3	5.4
Temp 50		22.0	21.6	21.8	21.4	22.0
DO		5.4	5.1	5.3	5.7	5.4
Temp 100		21.2	21.8	21.8	23.0	22.2
DO		4.1	4.8	4.0	5.1	5.3

2/18/95 Parameters 7, 8, 11, 12, 15 - Day 24

Sample	Control	7	8	11	12	15
Temp	23.1	\	\	\	\	\
DO	6.3					
Temp 6.25	\	22.0	23.2	23.0	22.5	23.2
DO		6.1	6.2	5.4	6.1	5.3
Temp 12.5	\	22.8	23.0	22.2	23.0	23.0
DO		6.1	5.7	5.6	5.9	4.6
Temp 25	\	23.2	23.0	22.8	22.8	23.0
DO		5.7	6.0	5.7	6.3	6.2
Temp 50	\	22.2	22.2	22.5	23.0	22.8
DO		6.2	5.8	5.1	5.9	6.1
Temp 100	\	22.6	22.6	23.0	22.2	23.2
DO		4.9	5.3	5.0	6.1	6.5

2/19/95 Parameters 7, 8, 11, 12, 15 - Day 25

Sample	Control	7	8	11	12	15
Temp	23.2					
DO	5.2					
Temp 6.25		22.2	22.6	22.4	23.2	22.4
DO		5.4	5.6	4.6	5.6	4.9
Temp 12.5		22.0	22.2	23.2	22.0	22.8
DO		5.4	5.4	5.1	5.4	5.3
Temp 25		22.6	23.2	22.8	22.8	22.8
DO		5.1	5.8	5.4	5.7	5.9
Temp 50		23.2	22.0	23.4	22.8	22.6
DO		5.6	4.9	4.4	5.6	5.6
Temp 100		23.2	22.8	23.0	23.0	22.8
DO		4.3	4.8	4.6	5.4	5.8

2/20/95 Parameters 7, 8, 11, 12, 15 Day 26

Sample	Control					
Temp	22.0					
DO	6.7					
Temp 6.25		22.0	21.5	22.0	22.0	22.0
DO		6.6	7.7	6.5	6.6	7.0
Temp 12.5		22.0	21.8	22.0	22.0	22.0
DO		5.7	7.3	6.3	6.4	6.7
Temp 25		22.0	22.0	21.5	22.2	21.5
DO		7.1	6.6	6.4	7.2	7.0
Temp 50		22.0	22.0	22.0	21.5	22
DO		6.7	6.8	6.2	7.5	7.3
Temp 100		21.5	22.0	21.8	22.0	22.7
DO		7.6	6.3	6.3	5.7	6.9

2/21/95 Parameters 7, 8, 11, 12, 15 - Day 27

Sample	Control	7	8	11	12	15
Temp	22.0					
DO	6.3					
Temp 6.25		22.8	23.0	22.8	22.0	23.2
DO		6.6	6.2	5.8	5.6	5.8
Temp 12.5		22.8	22.0	23.0	22.8	23.2
DO		6.0	6.1	6.6	6.5	5.7
Temp 25		23.0	22.0	23.2	22.0	22.8
DO		5.9	5.9	5.9	6.2	6.3
Temp 50		22.0	23.0	22.0	23.0	23.0
DO		6.2	6.3	5.2	6.8	6.3
Temp 100		22.0	23.0	22.2	22.0	23.0
DO		5.1	5.2	5.1	6.2	6.9

MLS

2/22/95 Final Counts: 7, 8, 11, 12 & 15

Con	A	7/0	T8	100A	0
	B	8/2		B	0
	C	8/0		C	0
T7	6.25A	4/0 5/0 spilled wine (FOH)	T11	6.25A	0
	B	4/0		B	0
	C	3/0		C	0
12.5	A	3/0	12.5	A	0
	B	3/0		B	0
	C	3/0		C	0
25	A	3/0	25	A	0
	B	1/0		B	0
	C	1/0		C	0
50	A	4/0	50	A	0
	B	4/0		B	0
	C	3/0		C	0
100	A	3/0	100	A	0
	B	0/0		B	0
	C	0/0		C	0
T8	6.25A	4/0	T12	6.25A	0
	B	4/0		B	1/0
	C	4/0		C	0
	12.5A	2/0		12.5A	0
	B	2/0		B	1
	C	5/0		C	1
	25A	3/0		25A	0
	B	3/0		B	0
	C	0/0		C	0
	50A	2/0		50A	0
	B	0/0		B	0
	C	0/0		C	0

T12	100 A	0
	B	0
	C	0
T15	6.25A	1
	B	4
	C	0
12.5	A	1
	B	4
	C	1
25	A	4
	B	3
	C	4
50	A	2
	B	4
	C	1
100	A	1
	B	5
	C	2

MLS

2/22/95 Final Parameters 7, 8, 11, 12 & 15

Sample	Con	7	8	11	12	15
Temp	22	22	24	22	24	22
DO	8.7	8.5	8.6	8.5	8.6	8.7
pH 625	8.19	8.17	8.15	8.16	8.17	8.17
Cond	329	311	310	313	311	3.11
Ammonia						
Temp		22	22	22	22	22
DO		8.7	8.8	8.8	8.8	8.9
pH 125		8.14	8.15	8.18	8.16	8.12
Cond		314	315	308	289	283
Ammonia		N/D	N/D	N/D	N/D	N/D
Temp		22	22	22	22	22
DO		8.8	8.8	8.8	8.7	8.9
pH 25		8.13	8.12	8.18	8.19	8.21
Cond		318	320	325	319	321
Ammonia		N/D	N/D	N/D	N/D	N/D
Temp		22	22	22	22	22
DO		8.7	8.7	8.6	8.7	8.8
pH 50		8.21	8.27	8.24	8.25	8.24
Cond		317	327	325	319	321
Ammonia		N/D	N/D	N/D	N/D	N/D
Temp		22	22	22	22	22
DO	8.7	8.7	8.7	8.7	8.8	8.8
pH 100	8.25	8.28	8.30	8.29	8.29	
Cond	319	329	324	318	318	
Ammonia	N/D	N/D	N/D	N/D	N/D	

Weights of Hyalia 3-7-95

Test	#Test	Boat Wt	Boat w/#
EW01	1 - 6.25A	1.12000	1.12070
EW01	1 - 6.25B	1.11532	1.11677
EW01	1 - 6.25C	1.11026	1.11157
EW01	1 - 12.5A	1.12513	1.12565
EW01	1 - 12.5B	1.12641	1.12657
EW01	1 - 12.5C	1.12706	1.12823
EW02	2 - 4A	1.10908	1.10968
EW02	2 - 4B	1.11124	1.11230
EW02	2 - 4C	1.09408	1.09413
EW02	2 - 8B	1.11461	1.11468
EW02	2 - 8C	1.10892	1.10987
EW02	2 - 16A	1.11853	1.11962
EW02	2 - 16B	1.10453	1.10564
EW02	2 - 32B	1.12098	1.12119
EE10	4 - 6.25A	1.10704	1.10859
EE10	4 - 6.25B	1.10712	1.10798
EE10	4 - 6.25C	1.09459	1.09651
EE10	4 - 12.5A	1.09899	1.09903
EE10	4 - 12.5B	1.13052	1.13077
EE10	4 - 12.5C	1.12165	1.12259
EE10	4 - 25A	1.11804	1.11933
EE10	4 - 25B	1.11348	1.11472
EE10	4 - 50A	1.11338	1.11380
EE10	4 - 50B	1.11454	1.11504
EE10	4 - 50C	1.12260	1.12388
EE10	4 - 100A	1.11246	1.11318
EE10	4 - 100B	1.13463	1.13523
EE10	4 - 100C	1.12504	1.12663

Test	#Test+Sample	Boat wt	+ Holder
E606	5 - 5A	1.12466	1.12580
E606	5 - 5B	1.10803	1.11058
E606	5 - 5C	1.10680	1.10632
E606	5 - 10A	1.12478	1.12556
E606	5 - 10C	1.10001	1.10024
E606	5 - 20A	1.09723	1.09748
E606	5 - 20C	1.10165	1.10229
E606	5 - 40A	1.11501	1.11495
E606	5 - 40B	1.11505	1.11530
E606	5 - 40C	1.09465	1.09539
E606	5 - 80B	1.10717	1.10740
E606	5 - 80C	1.12781	1.12887
E607	6 - 5A	1.10220	1.10257
E607	6 - 5B	1.12098	1.12200
E607	6 - 10A	1.10633	1.10635
E607	6 - 10C	1.11483	1.11520
E607	6 - 20C	1.10622	1.10654
E607	6 - 40C	1.11098	1.11107
E607	6 - 80B	1.10625	1.10628
E607	6 - 80C	1.10210	1.10248
E608	7 - 6.25A	1.11981	1.11994
E608	7 - 6.25B	1.13498	1.13600
E608	7 - 6.25C	1.12231	1.12333
E608	7 - 12.5A	1.12638	1.12682
E608	7 - 12.5B	1.12679	1.12807
E608	7 - 12.5C	1.12910	1.13030
E608	7 - 25A	1.10638	1.10705
E608	7 - 25B	1.12469	1.12502
E608	7 - 25C	1.09654	1.09674

Hydride	Test	#Test - Sample	Boat wt	+ Hydride
2580	ECO8	7 - 50A	1.11395	1.11557
11058	ECO8	7 - 50B	1.10474	1.10599
0632	ECO8	7 - 50C	1.10627	1.10676
12556	ECO8	7 - 100A	1.10169	1.10260
0024	ECO9	8 - 6.25A	1.09520	1.09690
09748	ECO9	8 - 6.25B	1.11760	1.11850
.10229	ECO9	8 - 6.25C	1.09758	1.09824
11495	ECO9	8 - 12.5A	1.12882	1.12921
.11530	ECO9	8 - 12.5B	1.11920	1.11937
09589	ECO9	8 - 12.5C	1.11407	1.11459
.10740	ECO9	8 - 25A	1.11110	1.11196
12887	ECO9	8 - 25B	1.12201	1.12269
.0257	ECO9	8 - 50A	1.10138	1.10199
)200	ECO5	12 - 6.25B	1.09585	1.09637
0635	ECO5	12 - 12.5B	1.12985	1.13002
1520	ECO5	12 - 12.5C	1.13163	NR ~~1.11760~~ 1.13187
10654	ECO2	15 - 6.25A	1.10807	1.10822
1107	ECO2	15 - 6.25B	1.12624	1.12779
1628	ECO2	15 - 12.5A	1.10750	1.10756
0248	ECO2	15 - 12.5B	1.09469	1.09665
1994	ECO2	15 - 12.5C	1.12427	1.12442
6600	ECO2	15 - 25A	1.12864	1.12977
2333	ECO2	15 - 25B	1.12102	1.12191
2682	ECO2	15 - 25C	1.11066	1.11174
2807	ECO2	15 - 50A	1.09579	1.09615
3030	ECO2	15 - 50B	1.10382	1.10539
0705	ECO2	15 - 50C	1.12064	1.12084
.12502	ECO2	15 - 100A	1.12265	1.12286
.09674	ECO2	15 - 100B	1.09483	1.09618

Test	#Test - Sample	Boat wt	+Asphalt
Eco2	15 - 100c	1,09551	1,09647
Silt	Con A	1.09209 1,09488 mr	1,09523
Silt	Con B	1.09426 1,12265 mr	1.09624
Silt	Conc	1.11568	1.11699
Gravel	conA	1,11635	1,12041
Gravel	conB	1,10143	1.10703
Gravel	conC	1.12115	1,12738

+Aralulk
1,09647
1,09523
1,09624
1,11699
1,12041
1,10703
1,12738

3/17/95 Received samples labeled Elm Creek at 149, Elm Creek at 179, Crutcho Creek at Rawlings and Crutcho Creek at Spaatz Rd.

3/21/95 Creek overlying water parameters:

Sample	D.O	pH	Temp.	Ammonia	Hardness	Alkalinity
EC 149	5.2	7.90		ND	200	270
EC 179	7.5	8.02		ND	310	330
CC Raw.	4.2	7.74		ND	420	370
CC Spaatz	3.8	7.82		ND	320	320

Sample	Cond
EC 149	455
EC 179	618
CC Raw	933
CC Spaatz	878

3/31/95 Beginning water parameters for H. azteca (Day 10 and Day 28 tests)

Sample	D.O.	Temp	pH	Cond	Ammonia	Hrd.	Alk
Control	7.6	22.0	7.84	950	ND	260	140
EC 149	7.4	20.4	8.18	399	ND	190	160
EC 179	8.1	20.4	8.36	461	ND	200	170
CC Raw	4.5	21.2	8.27	471	ND	230	220
CC Spaatz	6.1	20.7	8.17	440	ND	210	190

The H2O temperature was allowed to come up to 22.0°C in all vessels before organisms were added

3/31/95 (Cont)

Added spring water (carbon filtered) to tank and fed Tetramin slurry and leaf slurry. Added 10 organisms to each test vessel and placed test vessels in flow through system.

4-1-95 Spring H_2O added with Food. Recycled H_2O was not working, but was fixed Reason for low temps.

4-1-95 Day #1	Sample	Temp	DO
	CON	20.0	7.0
	EC149	19.5	5.9
	EC179	20.0	7.1
	RAW	19.5	1.6
	SPAATZ	19.5	4.9

4-2-95 Day #2	Sample	Temp	DO
	CON	24.0	5.9
	EC149	23.0	6.6
	EC179	23.6	5.6
	RAW	23.6	1.6
	SPAATZ	24.6	2.3

4-3-95 Day 3	Sample	Temp	DO
	Control	23.8	7.0
	EC149	23.2	6.3
	EC179	23.2	6.2
	Raw	23.4	3.0
	Spaatz	23.0	5.1

Calibrated meter before use

ms

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ixed

4-4-95	Sample	Temp	DO
Day 4	Control	23.9	7.0
	EC149	24.0	6.6
	EC179	23.8	6.5
	RAW	23.8	4.5
	Spaatz	24.0	5.1

4-5-95	Sample	Temp	DO
Day 5	Control	23.2	6.6
	EC149	23.0	6.1
	EC179	23.0	6.2
	RAW	23.2	3.5
	Spaatz	22.2	3.7

4-6-95	Sample	Temp	DO	Calibrated
Day 6	Control	24.0	6.6	meter before
	EC149	23.2	6.5	use.
	EC179	23.0	6.4	
	Raw	23.8	4.8	
	Spaatz	22.6	4.3	

4-7-95	~~Temp~~	Control	EC149	EC179	Raw	Spaatz
Day 7 -	Temp	23.8	23.1	24.1	23.9	23.3
	DO	7.3	7.2	7.0	5.3	5.9
	pH	7.83	8.33	8.38	8.06	8.25
	Cond	387	317	319	328	329
	Ammonia	ND	ND	ND	ND	ND

Calibrated meter before use.

4-8-95	Sample	Temp	DO	Calibrated
Day 8	Control	24.0	7.2	DO meter
	EC 149	24.1	6.4	before use.
	EC 179	23.8	6.7	
	Raw	24.0	4.2	
	Spoatz	23.8	4.3	

filled Tank with filtered spring water. Fed leaf slurry and Tetramin slurry.

4-9-95	Sample	Temp	DO
Day 9	Control	24.0	7.0
	EC149	23.8	6.8
	EC179	24.1	7.1
	Raw	24.1	4.9
	Spoatz	23.8	4.4

4-10-95	Sample		*alive	Temp	DO
Day 10	Control	A	10	24.0	8.3
		B	10		
		C	8		
	EC149	A	1	24.3	8.3
		B	3		
		C	4		
	EC179	A	5	24.6	8.2
		B	3		
		C	6		

Sample			Temp	D.O.
Raw	A	8	23.4	8.2
	B	10		
	C	2		
Spoatz	A	7	24.3	8.2
	B	6		
	C	9		

4-8-95 Day 8	Sample	Temp	DO	Calibrated DO meter before use.
	Control	24.0	7.2	
	EC 149	24.1	6.4	
	EC 179	23.8	6.7	
	Raw	24.0	4.2	
	Spaatz	23.8	4.3	

filled Tank with filtered spring water Fed kat slurry and Tetramin slurry.

4-9-95 Day 9	Sample	Temp	DO
	Control	24.0	7.0
	EC149	23.8	6.8
	EC179	24.1	7.1
	Raw	24.1	4.9
	Spaatz	23.8	4.4

4-10-95 Day 10	Sample		*alive	Temp	DO
	Control	A	10	24.0	8.3
		B	10		
		C	8		
	EC149	A	1	24.3	8.3
		B	3		
		C	4		
	EC179	A	5	24.6	8.2
		B	3		
		C	6		

Sample			Temp	D.O.
Raw	A	8	23.4	8.2
	B	10		
	C	2		
Spaatz	A	7	24.3	8.2
	B	6		
	C	9		

4-10-95	Temp	DO	pH	Cond	Ammonia	Day 10
Control	24.0	8.3	7.54	377	ND	
EC149	24.3	8.3	8.22	332	ND	
EC179	24.6	8.2	8.31	333	ND	
Raw	23.4	8.2	8.13	345	ND	
Spoetz	24.3	8.2	8.17	349	ND	

4-11-95 Day 11	Sample		①Temp	DO	pH	Cond	Ammonia
	Control-A	9	22.4	8.3	8.28	384	ND
	B	10					
	C	10					
	EC149-A	2	22.6	8.1	8.45	331	ND
	B	2					
	C	0					
	EC179-A	1	22.5	8.1	8.39	326	ND
	B	5					
	C	4					
D.O.	CC-Raw A	9	22.7	6.3	8.20	337	ND
8.2	B	7					
	C	7					
	CC Spoetz A	8	22.7	7.4	8.19	339	ND
8.2	B	8					
	C	6					

① All parameters were measured after system was torn down. Samples were at room temperature for ≈5 hours before parameters were measured

4-14-95 Sulfide analysis: Elm Creek and Crutcho Creek (numbers on next ~~day~~ page) LJT

4-14-95 Sample	Sulfide (mg/L)
EC 149	0.249
EC 179	0.057
CC Rawlings	0.212
CC Spaatz	0.196

film - oily sheen, on both samples from Crutcho Creek

SOP-E9

STATIC & STATIC-RENEWAL TOXICITY TEST PROCEDURES FOR DETERMINING THE TOXICITY OF SOLDIER CREEK SEDIMENTS TO *Lumbriculus variegatus*

INTRODUCTION

Purpose and Background

This protocol describes a two step toxicity assessment of sediments collected from Soldier Creek to *Lumbriculus variegatus*. The first step is an initial acute toxicity test and the second is a chronic toxicity assessment. The objectives of the initial acute toxicity test is to determine 1) if the sample is capable of producing an acute toxic response (specifically lethality) and if so 2) define the test concentrations for the chronic toxicity assessment. Specific toxicological endpoints include;

- Lethality (acute and chronic toxicity tests)
- Growth (chronic toxicity test only)

Lethality will be represented by the LC_{50}, that concentration calculated to produce 50% mortality in the population of test animals. Effects on growth will be represented by the NOAEC (no observed adverse effect concentration) and the LOAEC (lowest observed adverse effect concentration). These endpoints are determined statistically at a significance (alpha) level of 0.05. The NOAEC is the highest test concentration at which there is no statistically significant adverse effect on survival or growth. The LOAEC is the lowest test concentration at which a statistically significant adverse effect on survival and/or growth occurred. The specifics of the calculations for these endpoints are presented in the statistical section of this protocol.

Methods and Materials

TEST ORGANISMS

1. Species. *Lumbriculus variegatus* will be used to test the toxicity of sediment samples for this protocol. The test animals will be adults for both the acute toxicity test and for the chronic toxicity assessment. Forty animals will be exposed to each test dilution and

control in 4 replicate test vessels for the acute toxicity assessment and one to five grams of *L. variegatus* in four replicate test vessels for the chronic toxicity test.

2. Origin and Acclimation. Cultures of *L. variegatus* are maintained at WCC's Environmental Toxicology Laboratory in Franklin, TN. The culture techniques follow procedures in accordance with WCC SOP 035. Mass cultures consist of animals grown within aquaria provided with recirculating culture media. The culture media consists of moderately hard reconstituted fresh water (USEPA, 1991) and trout chow starter (#1). The *L. variegatus* are routinely cultured at 23° C under 50 to 100 foot candles and a photoperiod of 16 hours and 8 hours dark.

3. Reference Toxicity Testing. The *L. variegatus* cultured, in house, are subjected to a toxicity assay with a reference toxicant; $CdCl_2$ to determine the sensitivity of any batch of animals used in toxicity testing.

TEST DESIGN AND PHYSICAL SYSTEM

1. Test Vessels. Acute toxicity assessments will use 300 ml test vessels. Each test vessel will contain 100 ml (cm^3) of test sediment sample dilutions or control sediment. Each container will also be filled will 175 ml of laboratory water. There will be four test vessels for each test dilution and control for the acute toxicity tests. Each vessel will be randomly assigned to a grid location within the test chamber; an environmentally controlled chamber. Chronic toxicity testing will use 4 to 6 liter test vessels. There will be four replicate test vessels for each test dilution and control. Test vessels will be filled with at least 1 liter of sediment and water. All test vessels and glassware used in the preparation of test dilutions will be cleaned following the outline provided in USEPA, 1991 and WCC SOP 010. All vessels will be covered to reduce evaporation and receive 2 test vessel volumes of water over a 24 hour period.

2. Test Design-Acute Toxicity Test. The test will consist of at least 5 sediment dilutions and a dilution sediment control. The sample dilutions will follow a geometric progression and are preliminarily set at 100, 50, 25, 12.5, and 6.25%. If after one to five hours, 100% mortality is observed in the 100% and/or 50% sample dilutions, additional sample dilutions may be added, such as 3.1%, 1.5% or 0.75%.

3. Dilution Sediment and Overlying Water. Dilution sediment will be either quartz sand, sterilized field collected sediment or a combination of the two. The control (dilution) sediment will be made to resemble the texture (grain size distribution) of the test sediment, based on visual observations. Overlying water will be reconstituted fresh water similar to that of the overlying water sampled, based on water hardness and alkalinity. The source of the water used to prepare synthetic fresh waters is laboratory tap water that is coarse-filtered, activated carbon filtered, UV sterilized, reverse osmosis filtered (Millipore 0-60®) and Super-Q filtered (Millipore Super-Q filter®) and subsequently glass distilled. This system provides a quality of water that exceeds ASTM/CAP/NCCLS standards for Type 1 reagent grade water. Dilution water will be prepared in a minimum of 19L batches and stored in high density polyethylene (HDPE) containers. It will be aerated to bring the pH and dissolved gases into equilibrium with the atmosphere. Total hardness, total alkalinity, pH, dissolved oxygen and specific conductance are measured on each batch of water and will be within 15% of the overlying water sampled within the Soldier Creek sediment samples.

4. Test Temperature. The test temperature will be 23±1°C. Temperature will be maintained by placing test vessels in a temperature-controlled environmental chamber.

5. Lighting. Coolwhite fluorescent lamps are used to illuminate the testing area. Light intensity at the surface of the test vessel will be between 50 and 100 foot-candles. The photoperiod will be 16 hour light and 8 hours dark.

6. Test Duration. Each acute toxicity test will be a 96 hour exposure and each chronic toxicity assessment will encompass a 28 day exposure period.

TEST MATERIAL

1. Receipt and Documentation. Upon arrival at WCC, the package containing the test material will be inspected for damage. The container of sediment sample will be removed from the shipping package and inspected for damage. Information located on the sample label will be transcribed into a WCC laboratory data log book. This data form will be

archived and placed in the study report at the completion of the study. Sample description, date, time, temperature, and condition will be recorded as well.

2. Initial Overlying Water Chemistry Measurements. The temperature of the sample will be measured as soon as it is received with a calibrated thermometer and recorded. Once a subsample of the overlying water is at experimental temperature, the pH, specific conductance, dissolved oxygen (DO), total alkalinity, and total EDTA hardness will be measured. The pH, conductivity, and DO will be measured with calibrated meters, while total alkalinity and hardness will be measured using colormetric methods described by APHA (1989) and WCC SOPs 114 & 115.

TEST PROCEDURE-ACUTE TOXICITY SCREEN

1. Prior to Test Initiation. Prior to the start of the test, adult *L. variegatus* will be removed from the cultures and placed in a separate vessel containing culture water. If the overlying water hardness and/or alkalinity is outside 15% of the culture water the collected test organisms will be tempered to the hardness/alkalinity of the overlying water. This will be accomplished by progressive additions to or dilution of the culture water.

2. Test Set-up. A sample of the sediment will be brought to the test temperature and used to prepare the exposure concentrations. Test concentrations will be prepared on a volume/volume basis and distributed to the replicate test chambers. Overlying water, prepared from laboratory water will be carefully decanted into the test vessels so as not to disturb the sediment. The pH, dissolved oxygen content and conductivity of these waters will be measured prior to the addition of the test animals. If the dissolved oxygen level is below 40% of the saturation point, the test solution will be aerated to such a level.

3. Random Assignment of the Test Animals. A total of greater than 240 neonates will be pooled into a single vessel containing culture media. From this vessel groups of five animals will be randomly assigned to a test dilution or control group. Once assigned to a test dilution or control group the five animals will be placed in a transfer vessel containing overlying water. The assignments and transfers will continue until each group has a complement of 10 animals. From the transfer vessel for each test dilution and control, groups of five neonates will be randomly assigned to a replicate until each

replicate has a total of ten animals. This procedure satisfies a stratified random assignment.

4. Test Initiation. The test will be considered initiated with the completion of the distribution of the test organisms to their test chamber.

5. Biological Data. At 24, 48, 72 and 96 hours of exposure, observations for mortality and abnormal effects will be made. Mortality is defined as no body movement upon gentle prodding. Any dead *L. variegatus* will be removed at each observation time. Abnormal effects include but are not limited to orientation of the animals in the test vessels, coloration changes, surfacing behavior, and locomotor activity.

6. Measurement of Water Quality Variables. Temperature will be measured every 24 hours with a calibrated thermometer in a surrogate test vessel filled with dilution water. Dissolved oxygen will also be measured every 24 hours within at least one replicate of each test concentration and control. Any notable characteristics of the test solutions (e.g., presence of precipitates, solution cloudiness, etc.) will be noted along with the daily observations. At the termination of the test, pH and conductivity will be made in addition to the daily measurements.

TEST PROCEDURE-CHRONIC TOXICITY TESTING

1. Test Set-up. A sample of the sediment will be brought to the test temperature and used to prepare the exposure concentrations. Test concentrations will be prepared on a volume/volume basis and distributed to the replicate test chambers. The pH, dissolved oxygen content and conductivity of the overlying water will be measured prior to the addition of the test animals. If the dissolved oxygen level is below 40% of the saturation point, the water will be aerated to such a level. The individual test chambers will then be randomly distributed to spacial grid locations based on a random ~~number~~ table (e.g. Rolhf, 1981).

3. Random Assignment of the Test Animals. A total of greater than 150 gms of worms will be pooled into a single vessel containing culture media. From this vessel groups of 1 to 5 gms will be randomly assigned to a test dilution or control group. Once assigned to a

test dilution or control group the animals will be placed in a transfer vessel containing overlying water. The assignments and transfers will continue until each group has a complement of 5 to 25 gms. From the transfer vessel for each test dilution and control, groups of 1 to 5 gms will be randomly assigned to a replicate until each

replicate has a total of 1 to 5 gms of worms. This procedure satisfies a stratified random assignment.

3. Test Initiation. The test will be considered initiated with the completion of the distribution of the test organisms to their test chamber.

4. Biological Data. Daily observations for mortality and abnormal effects will be made. Mortality is defined as no movement of body after gentle prodding. Any dead *L. variegatus* will be removed at each observation time. Abnormal effects include but are not limited to orientation of the animals in the test vessels, coloration changes, surfacing behavior, and locomotor activity.

5. Test Maintenance. Overlying water will be renewed on a daily basis a total of 2 L (2 volume replacements) will be exchanged. Intermittent flow of freshly prepared overlying water will be delivered to each exposure vessel.

6. Measurement of Water Quality Variables. Temperature will be measured every 24 hours with a calibrated thermometer in at least one replicate exposure vessel for each test concentration and control. Dissolved oxygen will also be measured in at least one test replicate on a daily basis. The overlying water pH and conductivity will be measured three times a week during the exposure period in at least one replicate of each test concentration and control. Each batch of water used as renewal water will be measured for dissolved oxygen, pH, conductivity, total alkalinity and hardness. At the termination of exposure, total alkalinity and hardness will be measured within at least one replicate of the highest sediment test concentration and a control exposure vessel. Any notable characteristics of the test sediments or overlying water (e.g., presence of precipitates, solution cloudiness, etc.) will be noted along with the daily observations.

STATISTICAL METHODS

The LC_{50} will be calculated for those samples that were capable of producing greater than 50% mortality in the test organisms. The calculation will employ one or more of the following methods; probit transformation and subsequent regression analysis, the trimmed Spearman-Karber method or, the binomial probability method. The selection of the method will be based on the toxicity results. If two or more sample test concentrations result in partial mortality, bracketing 50%, the probit method will be used. If partial mortality is observed in only one test concentration, the Trimmed Spearman-Karber method will be used. This method will also be used if the concentration to effect relationship is not monotonic in character. The binomial probability method, an interpolation with a bionomially derived confidence interval, will be used if only 100% and 0% mortality rates are observed within the test concentrations.

Sublethal effects will be assessed using parametric statistical techniques (e.g. analysis of variance), if the data is found to be normally distributed and if the test groups and control(s) exhibit homogeneity of variances. The data may be transformed (e.g. square root transformation for count data, arc-sine transformation for percentages and/or natural log transformation for weight data) if these conditions are not met. If no transformation is found to allow parametric statistical analysis, non-parametric methods will be used.. Multiple comparison techniques for experiments with controls (e.g. Dunnett's Test or Steel's Many One Rank Test) will be used to determine if the toxicological endpoints observed within the sample test concentrations significantly differ from control. Statistical significance will be set at an alpha of 0.05 for these assessments. These comparisons will be single-sided to determine if there is a significant adverse effect due to exposure to the test samples. These effects would be; a reduction in growth and/or a reduction in survival.

Reporting of Results

The raw data and final draft of the report are reviewed by WCC's Quality Assurance Unit. A single copy of the draft report and a copy of the original raw data will be submitted to Tinker for review. Upon acceptance by Tinker, a signed original report along with the original raw data will be submitted to Tinker. The report will include, but not be limited to, the following information:

- objectives and procedures of the study including any changes from the original protocol

- initiation and completion dates of the definitive test, project number, name and address of the test facility

- signatures of appropriate laboratory individuals associated with the study

- information on the sample as provided on the sample label along with any information provided by Tinker, the date of its receipt and its storage conditions at WCC

- scientific name of the test organism, source, age and percent mortality of the population 48 hours prior to testing

- exposure system description, test design (e.g., number of treatment levels and replicates), dimensions of the test vessels and depth and volume of the test solution

- summary of the data analyses, mortality observations and water quality measurements

- authenticated copies, or originals if required, of the original data collection bench sheets on which the survival/mortality observations were made, the water chemistry analysis performed and statistical interpretation of the results

- reference to the statistical methods used in the data analyses, the LC_{50} concentrations with 95% confidence limits (if possible), and the NOAEC concentration

- results of the most recent reference toxicity assay with the test species under similar test conditions and how the results compare to the running record of reference toxicity assays

- deviations from the study protocol and any unusual observations that may have impacted the study results

- the locations where any specimens, raw data, and the final report are to be stored

SUMMARY OF RECOMMENDED SEDIMENT TOXICITY TEST CONDITIONS FOR THE AMPHIPOD (Lumbriculus variegatus) SURVIVAL TEST A 96 HOUR STATIC-RENEWAL ACUTE TEST

1.	Test type	Static
2.	Temperature (°C)	23 +/- 1°C
3.	Light quality	Ambient laboratory illumination
4.	Light intensity	10 - 20 uE/m^2 -sec
5.	Photoperiod	16 h light, 8 h darkness
6.	Test chamber size	0.3 liter
7.	Test solution volume	100 cm^3 sediment, 175 ml water per replicate
8.	Renewal of overlying water	2 test vessel volumes per 24 hours
9.	Age of test organisms	Adults
10.	No. larvae per test chamber	10
11.	No. replicate chambers per sediment sample	4
12.	No. larvae per sediment sample concentration	40
13.	Feeding regime	None

14.	Aeration	D.O. concentration is to be maintained above 40% of saturation. Aeration rate should not exceed 100 bubble a minute.
15.	Cleaning	None
16.	Effect measured	Survival
17.	Minimum acceptable control survival	80%

SUMMARY OF RECOMMENDED SEDIMENT TOXICITY TEST CONDITIONS FOR THE AMPHIPOD (Lumbriculus variegatus) SURVIVAL & GROWTH TEST A 28 DAY STATIC-RENEWAL - CHRONIC TEST

1.	Test type	Static-renewal
2.	Temperature (°C)	23 +/- 1°C
3.	Light quality	Ambient laboratory illumination
4.	Light intensity	10 - 20 uE/m^2 -sec
5.	Photoperiod	16 h light, 8 h darkness
6.	Test chamber size	4 - 6 liter
7.	Test solution volume	1 L sediment, 1 L water per replicate (minimum)
8.	Renewal of overlying water	Two volume replacements per 24 hours
9.	Age of test organisms	Adults

10.	No. larvae per test chamber	1 to 5 grams
11.	No. replicate chambers per sediment sample	4
12.	No. larvae per sediment sample concentration	4 to 20 grams
13.	Feeding regime	None
14.	Aeration	D.O. concentration is to be maintained above 40% of saturation. Aeration rate should not exceed 100 bubble a minute.
15.	Cleaning	None
16.	Effect measured	Survival, growth, reproduction
17.	Minimum acceptable control survival	80%

References

American Public Health Association, American Water Works Association and the Water Pollution Control Federation. 1989. Standard Methods for the Examination of Water and Wastewater. 17th Ed. American Public Health Association, Washington, DC.

American Society for Testing and Materials. 1992. Standard Guide for Conducting Sediment Toxicity Tests with Freshwater Invertebrates. E-1383-92. ASTM E-47.03, ASTM, Philadelphia, PA.

American Society for Testing and Materials. 1994. Proposed Standard Test Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates. Draft 1/7/94. E-47.01

American Society for Testing and Materials. 1992. New Standard Guide for Collection, Storage, Characterization, and Manipulation of Sediments for Toxicological Testing. E-1391-90. ASTM 47.03, ASTM Philadelphia, PA.

Busacker, G., D. Anderson, A. Gibson, & T. Dillon. 1990. "Bioassessment Methodologies for the Regulatory Testing of Freshwater Dredged Material" Miscellaneous Paper EL-90-7, US Army Engineer District, St. Paul, St. Paul, MN, and US Army Engineer Waterways Experiment Station, Vicksburg, MS.

United States Environmental Protection Agency. 1991. Sediment Toxicity Evaluation: Phase I (Characterization), Phase II (Identification) and Phase III (Conformation) Modifications of Effluent Procedures. DRAFT. EPA/600/6-91/007.

United States Environmental Protection Agency and the US Army Corps of Engineers. 1990. Evaluation of Dredged Material Proposed for Ocean Disposal: Testing Manual. EPA-503/8-91/001.

United States Environmental Protection Agency. 1990. Manual for the Evaluation of Laboratories Performing Aquatic Toxicity Tests. EPA/600/4-90/031.

United States Environmental Protection Agency. 1989. Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Marine and Estuarine Organisms. EPA/600/4-87/028.

Sokal, R.R. and F.J. Rolhf. 1981. Biometry: The Principles and Practice of Statistics in Biological Research. Second Edition. W.H. Freeman & Co., San Francisco, CA.

Thomas, N., J.O. Lamberson, and R.C. Swartz. 1992. Bulk sediment toxicity approach. Chapter 3 In *Sediment Classification Methods Compendium*. B. Baker & M. Kravitz, Ed.s, US Environmental Protection Agency, EPA 823-R-92-006.

STATIC & STATIC-RENEWAL TOXICITY TEST PROCEDURES FOR DETERMINING THE TOXICITY OF SOLDIER CREEK SURFACE WATERS TO *Lumbriculus variegatus*

TO BE COMPLETED BY THE STUDY SPONSOR:

SPONSOR: _____

_____

_____

_____ PHONE: _____

PROJECT NUMBER: _____

TEST MATERIAL: Field collected sediment samples

TEST SPECIES: *Lumbriculus variegatus*

PROTOCOL APPROVAL:

Sponsor's Representative: _____
Typed Name/Title

_____
Signature Date

TO BE COMPLETED BY WCC PERSONNEL PRIOR TO TEST INITIATION:

WCC Study Director: _____
Typed Name/Title

_____
Signature Date

Proposed Test Dates: initiation: completion:

Comments/Notes:

SOP-E7

STATIC & STATIC-RENEWAL TOXICITY TEST PROCEDURES FOR DETERMINING THE TOXICITY OF SOLDIER CREEK SEDIMENTS TO *HYALELLA AZTECA*

INTRODUCTION

Purpose and Background

This protocol describes a two step toxicity assessment of sediments collected from Soldier Creek within the Tinker study area boundaries to *Hyalella azteca*. The first step is an initial acute toxicity test and the second is a chronic toxicity assessment. The objectives of the initial acute toxicity test is to determine 1) if the sample is capable of producing an acute toxic response (specifically lethality) and if so 2) define the test concentrations for the chronic toxicity assessment. Specific toxicological endpoints include;

- Lethality (acute and chronic toxicity tests)
- Reproduction (chronic toxicity test only)
- Growth (chronic toxicity test only)
- Acute to chronic toxicity ratio (acute lethality/chronic lethality)

Lethality will be represented by the LC_{50}, that concentration calculated to produce 50% mortality in the population of test animals. Effects on reproduction and growth will be represented by the NOAEC (no observed adverse effect concentration) and the LOAEC (lowest observed adverse effect concentration). These endpoints are determined statistically at a significance (alpha) level of 0.05. The NOAEC is the highest test concentration at which there is no statistically significant adverse effect on survival, reproduction or growth. The LOAEC is the lowest test concentration at which a statistically significant adverse effect on survival, reproduction and/or growth occurred. The acute to chronic toxicity ratio is the ratio between the acute (96 hour) LC_{50} and the chronic (28 day) LC_{50}. The specifics of the calculations for these endpoints are presented in the statistical section of this protocol.

Methods and Materials

TEST ORGANISMS

1. Species. *Hyalella azteca* will be used to test the toxicity of sediment samples for this protocol. The test animals will be second to third instar for the acute toxicity test and first instar neonates, less than or equal to 24 hours of age for the chronic toxicity assessment. Thirty animals will be exposed to each test dilution and control in 3 replicate test vessels for both the acute toxicity assessment and the chronic toxicity test.

2. Origin and Acclimation. Cultures of *H. azteca* are maintained at WCC's Environmental Toxicology Laboratory in Franklin,TN. The culture techniques follow procedures in accordance with WCC SOP 035. Mass cultures consist of animals grown within an algal turf scrubber with secondary cultures in 2 to 3 liter beakers with an initial seeding of 20 to 50 adults. The culture media consists of moderately hard reconstituted fresh water (USEPA, 1991), algal cells and rabbit chow. The cultures kept within beakers are fed on a Monday, Wednesday, Friday schedule. The *H. azteca* are routinely cultured at 25° C under 50 to 100 foot candles and a photoperiod of 16 hours and 8 hours dark.

3. Reference Toxicity Testing. The *H. azteca* cultured, in house, are subjected to a toxicity assay with a reference toxicant; $CdCl_2$ to determine the sensitivity of any batch of animals used in toxicity testing.

TEST DESIGN AND PHYSICAL SYSTEM

1. Test Vessels. Test vessels will be 500 ml containers. Each test vessel will contain 100 ml (cm^3) of test sediment sample dilutions or control sediment. Each container will also be filled will 300 ml of laboratory water. There will be three test vessels for each test dilution and control for both the acute and chronic toxicity tests. Each vessel will be randomly assigned to a grid location within the test chamber; an environmentally controlled chamber. All test vessels and glassware used in the preparation of test dilutions will be cleaned following the outline provided in USEPA, 1991 and WCC SOP 010. All vessels will be covered to reduce evaporation.

2. Test Design-Acute Toxicity Test. The test will consist of at least 5 sediment dilutions and a dilution sediment control. The sample dilutions will follow a geometric progression and are preliminarily set at 100, 50, 25, 12.5, and 6.25%. If after one to five hours, 100% mortality is observed in the 100% and/or 50% sample dilutions, additional sample dilutions may be added, such as 3.1%, 1.5% or 0.75%.

3. Dilution Sediment and Overlying Water. Dilution sediment will be either quartz sand, sterilized field collected sediment or a combination of the two. The control (dilution) sediment will be made to resemble the texture (grain size distribution) of the test sediment, based on visual observations. Overlying water will be reconstituted fresh water similar to that of the overlying water sampled, based on water hardness and alkalinity. The source of the water used to prepare synthetic fresh waters is laboratory tap water that is coarse-filtered, activated carbon filtered, UV sterilized, reverse osmosis filtered (Millipore 0-60®) and Super-Q filtered (Millipore Super-Q filter®) and subsequently glass distilled. This system provides a quality of water that exceeds ASTM/CAP/NCCLS standards for Type 1 reagent grade water. Dilution water will be prepared in a minimum of 19L batches and stored in high density polyethylene (HDPE) containers. It will be aerated to bring the pH and dissolved gases into equilibrium with the atmosphere. Total hardness, total alkalinity, pH, dissolved oxygen and specific conductance are measured on each batch of water and will be within 15% of the overlying water sampled within the Soldier Creek sediment samples.

4. Test Temperature. The test temperature will be 25±1°C. Temperature will be maintained by placing test vessels in a temperature-controlled environmental chamber.

5. Lighting. Coolwhite fluorescent lamps are used to illuminate the testing area. Light intensity at the surface of the test vessel will be between 50 and 100 foot-candles. The photoperiod will be 16 hour light and 8 hours dark.

6. Test Duration. Each acute toxicity test will be a 96-hour exposure and each chronic toxicity assessment will encompass a 28-day exposure period.

TEST MATERIAL

1. Receipt and Documentation. Upon arrival at WCC, the package containing the test material will be inspected for damage. The container of sediment sample will be removed from the shipping package and inspected for damage. Information located on the sample label will be transcribed into a WCC laboratory data log book. This data form will be archived and placed in the study report at the completion of the study. Sample description, date, time, temperature, and condition will be recorded as well.

2. Initial Overlying Water Chemistry Measurements. The temperature of the sample will be measured as soon as it is received with a calibrated thermometer and recorded. Once a subsample of the overlying water is at experimental temperature, the pH, specific conductance, dissolved oxygen (DO), total alkalinity, and total EDTA hardness will be measured. The pH, conductivity, and DO will be measured with calibrated meters, while total alkalinity and hardness will be measured using colormetric methods described by APHA (1989) and WCC SOPs 114 & 115.

TEST PROCEDURE-ACUTE TOXICITY SCREEN

1. Prior to Test Initiation. Prior to the start of the test, second to third instar *H. azteca* will be removed from the cultures and placed in a separate vessel containing culture water. If the overlying water hardness and/or alkalinity is outside 15% of the culture water the collected test organisms will be tempered to the hardness/alkalinity of the overlying water. This will be accomplished by progressive additions to or dilution of the culture water.

2. Test Set-up. A sample of the sediment will be brought to the test temperature and used to prepare the exposure concentrations. Test concentrations will be prepared on a volume/volume basis and distributed to the replicate test chambers. Overlying water, prepared from laboratory water will be carefully decanted into the test vessels so as not to disturb the sediment. The pH, dissolved oxygen content, and conductivity of these waters will be measured prior to the addition of the test animals. If the dissolved oxygen level is below 60% of the saturation point, the test solution will be aerated to such a level.

3. Random Assignment of the Test Animals. A total of greater than 180 neonates will be pooled into a single vessel containing culture media. From this vessel groups of five animals will be randomly assigned to a test dilution or control group. Once assigned to a test dilution or control group the five animals will be placed in a transfer vessel containing overlying water. The assignments and transfers will continue until each group has a complement of 10 animals. From the transfer vessel for each test dilution and control, groups of five neonates will be randomly assigned to a replicate until each replicate has a total of ten animals. This procedure satisfies a stratified random assignment.

4. Test Initiation. The test will be considered initiated with the completion of the distribution of the test organisms to their test chamber.

5. Biological Data. At 24, 48, 72 and 96 hours of exposure, observations for mortality and abnormal effects will be made. Mortality is defined as no movement of body or appendages upon gentle prodding. Any dead *H. azteca* will be removed at each observation time. Abnormal effects include but are not limited to orientation of the animals in the test vessels, coloration changes, surfacing behavior, and locomotor activity.

6. Measurement of Water Quality Variables. Temperature will be measured every 24 hours with a calibrated thermometer in a surrogate test vessel filled with dilution water. Dissolved oxygen will also be measured every 24 hours within at least one replicate of each test concentration and control. Any notable characteristics of the test solutions (e.g., presence of precipitates, solution cloudiness, etc.) will be noted along with the daily observations. At the termination of the test, pH and conductivity will be made in addition to the daily measurements.

TEST PROCEDURE-CHRONIC TOXICITY TESTING

1. Prior to Test Initiation. On the day before test initiation, gravid females will be isolated from their offspring in a separate culture vessel. The morning of the test, neonates produced by the separated gravid females will be collected to serve as test animals. Such a procedure insures that the animals collected for use in the test will be less than or equal

to 24 hours of age. If the overlying water hardness and/or alkalinity is outside 15% of the culture the test animals will be tempered to the hardness/alkalinity of the surface water sample. This will be accomplished by progressive additions to or dilution of the culture water.

2. Test Set-up. A sample of the sediment will be brought to the test temperature and used to prepare the exposure concentrations. Test concentrations will be prepared on a volume/volume basis and distributed to the replicate test chambers. The pH, dissolved oxygen content, and conductivity of the overlying water will be measured prior to the addition of the test animals. If the dissolved oxygen level is below 60% of the saturation point, the water will be aerated to such a level. The individual test chambers will then be randomly distributed to spacial grid locations based on a random number table (e.g. Rolhf, 1981).

3. Random Assignment of the Test Animals. A total of greater than 180 neonates will be pooled into a single vessel containing culture media. From this vessel groups of five animals will be randomly assigned to a test dilution or control group. Once assigned to a test dilution or control group the five animals will be placed in a transfer vessel containing overlying water. The assignments and transfers will continue until each group has a complement of 10 animals. From the transfer vessel for each test dilution and control, groups of five neonates will be randomly assigned to a replicate until each replicate has a total of ten animals. This procedure satisfies a stratified random assignment.

3. Test Initiation. The test will be considered initiated with the completion of the distribution of the test organisms to their test chamber.

4. Biological Data. Daily observations for mortality and abnormal effects will be made. Mortality is defined as no movement of body or appendages upon gentle prodding. Any dead *H. azteca* will be removed at each observation time. Abnormal effects include but are not limited to orientation of the animals in the test vessels, coloration changes, surfacing behavior, and locomotor activity. Any and all offspring produced during the exposure duration will be removed and enumerated on a daily basis and duly recorded.

5. Test Maintenance. Overlying water will be renewed on a daily basis a total of 600 ml (2 volume replacements) will be exchanged. Intermittent flow of freshly prepared overlying water will be delivered to each exposure vessel. Food will directly added to the test vessels.

6. Measurement of Water Quality Variables. Temperature will be measured every 24 hours with a calibrated thermometer in at least one replicate exposure vessel for each test concentration and control. Dissolved oxygen will also be measured in at least one test replicate on a daily basis. The overlying water pH and conductivity will be measured three times a week during the exposure period in at least one replicate of each test concentration and control. Each batch of water used as renewal water will be measured for dissolved oxygen, pH, conductivity, total alkalinity and hardness. At the termination of exposure, total alkalinity and hardness will be measured within at least one replicate of the highest sediment test concentration and a control exposure vessel. Any notable characteristics of the test sediments or overlying water (e.g., presence of precipitates, solution cloudiness, etc.) will be noted along with the daily observations.

STATISTICAL METHODS

The LC_{50} will be calculated for those samples that were capable of producing greater than 50% mortality in the test organisms. The calculation will employ one or more of the following methods; probit transformation and subsequent regression analysis, the trimmed Spearman-Karber method or, the binomial probability method. The selection of the method will be based on the toxicity results. If two or more sample test concentrations result in partial mortality, bracketing 50%, the probit method will be used. If partial mortality is observed in only one test concentration, the Trimmed Spearman-Karber method will be used. This method will also be used if the concentration to effect relationship is not monotonic in character. The binomial probability method, an interpolation with a bionomially derived confidence interval, will be used if only 100% and 0% mortality rates are observed within the test concentrations.

Sublethal effects will be assessed using parametric statistical techniques (e.g. analysis of variance), if the data is found to be normally distributed and if the test groups and control(s) exhibit homogeneity of variances. The data may be transformed (e.g. square root transformation for count data, arc-sine transformation for percentages and/or natural log transformation for

weight data) if these conditions are not met. If no transformation is found to allow parametric statistical analysis, non-parametric methods will be used.. Multiple comparison techniques for experiments with controls (e.g. Dunnett's Test or Steel's Many One Rank Test) will be used to determine if the toxicological endpoints observed within the sample test concentrations significantly differ from control. Statistical significance will be set at an alpha of 0.05 for these assessments. These comparisons will be single-sided to determine if there is a significant adverse effect due to exposure to the test samples. These effects would be; a reduction in growth, a reduction in the production of offspring and/or a reduction in survival.

Reporting of Results

The raw data and final draft of the report are reviewed by WCC's Quality Assurance Unit. A single copy of the draft report and a copy of the original raw data will be submitted to Tinker for review. Upon acceptance by Tinker, a signed original report along with the original raw data will be submitted to Tinker. The report will include, but not be limited to, the following information:

- objectives and procedures of the study including any changes from the original protocol
- initiation and completion dates of the definitive test, project number, name and address of the test facility
- signatures of appropriate laboratory individuals associated with the study
- information on the sample as provided on the sample label along with any information provided by Tinker, the date of its receipt and its storage conditions at WCC
- scientific name of the test organism, source, age and percent mortality of the population 48 hours prior to testing

- exposure system description, test design (e.g., number of treatment levels and replicates), dimensions of the test vessels and depth and volume of the test solution

- summary of the data analyses, mortality observations and water quality measurements

- authenticated copies, or originals if required, of the original data collection bench sheets on which the survival/mortality observations were made, the water chemistry analysis performed and statistical interpretation of the results

- reference to the statistical methods used in the data analyses, the LC_{50} concentrations with 95% confidence limits (if possible), and the NOAEC concentration

- results of the most recent reference toxicity assay with the test species under similar test conditions and how the results compare to the running record of reference toxicity assays

- deviations from the study protocol and any unusual observations that may have impacted the study results

- the locations where any specimens, raw data, and the final report are to be stored

SUMMARY OF RECOMMENDED SEDIMENT TOXICITY TEST CONDITIONS FOR THE AMPHIPOD (HYALELLA AZTECA) SURVIVAL TEST A 96 HOUR STATIC - ACUTE TEST

1.	Test type	Static
2.	Temperature (°C)	25 +/- 1°C
3.	Light quality	Ambient laboratory illumination
4.	Light intensity	10 - 20 uE/m^2 -sec
5.	Photoperiod	16 h light, 8 h darkness
6.	Test chamber size	0.5 liter
7.	Test solution volume	100 cm^3 sediment, 300 ml water per replicate
8.	Renewal of overlying water	None, except to replace evaporation
9.	Age of test organisms	Second or third instar
10.	No. larvae per test chamber	10
11.	No. replicate chambers per sediment sample	3
12.	No. larvae per sediment sample concentration	30
13.	Feeding regime	None

14.	Aeration	D.O. concentration is to be maintained above 60% of saturation. Aeration rate should not exceed 100 bubble a minute.
15.	Cleaning	None
16.	Effect measured	Survival
17.	Minimum acceptable control survival	80%

SUMMARY OF RECOMMENDED SEDIMENT TOXICITY TEST CONDITIONS FOR THE AMPHIPOD (HYALELLA AZTECA) SURVIVAL, REPRODUCTION & GROWTH TEST
A 28 DAY STATIC-RENEWAL - CHRONIC TEST

1.	Test type	Static-renewal
2.	Temperature (°C)	25 +/- 1°C
3.	Light quality	Ambient laboratory illumination
4.	Light intensity	10 - 20 uE/m^2 -sec
5.	Photoperiod	16 h light, 8 h darkness
6.	Test chamber size	0.5 liter
7.	Test solution volume	100 cm^3 sediment, 300 ml water per replicate
8.	Renewal of overlying water	Two volume replacements per 24 hours

9.	Age of test organisms	First instar
10.	No. larvae per test chamber	10
11.	No. replicate chambers per sediment sample	3
12.	No. larvae per sediment sample concentration	30
13.	Feeding regime (daily)	4 mg rabbit pellets & ~ 10^7 algal cells
14.	Aeration	D.O. concentration is to be maintained above 60% of saturation. Aeration rate should not exceed 100 bubble a minute.
15.	Cleaning	None
16.	Effect measured	Survival, growth, reproduction
17.	Minimum acceptable control survival	80%

References

American Public Health Association, American Water Works Association and the Water Pollution Control Federation. 1989. Standard Methods for the Examination of Water and Wastewater. 17th Ed. American Public Health Association, Washington, DC.

American Society for Testing and Materials. 1992. Standard Guide for Conducting Sediment Toxicity Tests with Freshwater Invertebrates. E-1383-92. ASTM E-47.03, ASTM, Philadelphia, PA.

American Society for Testing and Materials. 1993. Proposed Guide for Designing Biological Tests with Sediments. DRAFT #2 E-1525. ASTM 47.03, ASTM, Philadelphia, PA.

American Society for Testing and Materials. 1992. New Standard Guide for Collection, Storage, Characterization, and Manipulation of Sediments for Toxicological Testing. E-1391-90. ASTM 47.03, ASTM Philadelphia, PA.

Busacker, G., D. Anderson, A. Gibson, & T. Dillon. 1990. "Bioassessment Methodologies for the Regulatory Testing of Freshwater Dredged Material" Miscellaneous Paper EL-90-7, US Army Engineer District, St. Paul, St. Paul, MN, and US Army Engineer Waterways Experiment Station, Vicksburg, MS.

United States Environmental Protection Agency. 1991. Sediment Toxicity Evaluation: Phase I (Characterization), Phase II (Identification) and Phase III (Conformation) Modifications of Effluent Procedures. DRAFT. EPA/600/6-91/007.

United States Environmental Protection Agency and the US Army Corps of Engineers. 1990. Evaluation of Dredged Material Proposed for Ocean Disposal: Testing Manual. EPA-503/8-91/001.

United States Environmental Protection Agency. 1990. Manual for the Evaluation of Laboratories Performing Aquatic Toxicity Tests. EPA/600/4-90/031.

United States Environmental Protection Agency. 1989. Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Marine and Estuarine Organisms. EPA/600/4-87/028.

Sokal, R.R. and F.J. Rolhf. 1981. Biometry: The Principles and Practice of Statistics in Biological Research. Second Edition. W.H. Freeman & Co., San Francisco, CA.

Thomas, N., J.O. Lamberson, and R.C. Swartz. 1992. Bulk sediment toxicity approach. Chapter 3 In *Sediment Classification Methods Compendium*. B. Baker & M. Kravitz, Ed.s, US Environmental Protection Agency, EPA 823-R-92-006.

STATIC & STATIC-RENEWAL TOXICITY TEST PROCEDURES FOR DETERMINING THE TOXICITY OF SOLDIER CREEK SURFACE WATERS TO *Hyalella azteca*

TO BE COMPLETED BY THE STUDY SPONSOR:

SPONSOR: _____

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_____ PHONE: _____

PROJECT NUMBER: _____

TEST MATERIAL: Field collected sediment samples

TEST SPECIES: *Hyalella azteca*

PROTOCOL APPROVAL:

Sponsor's Representative: _____
Typed Name/Title

_____
Signature Date

TO BE COMPLETED BY WCC PERSONNEL PRIOR TO TEST INITIATION:

WCC Study Director: _____
Typed Name/Title

_____
Signature Date

Proposed Test Dates: initiation: completion:

Comments/Notes:

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STATIC & STATIC-RENEWAL TOXICITY TEST PROCEDURES FOR DETERMINING THE TOXICITY OF SOLDIER CREEK SEDIMENTS TO *Lumbriculus variegatus*

WCC PROTOCOL SOP-E9

STATIC & STATIC-RENEWAL TOXICITY TEST PROCEDURES FOR DETERMINING THE TOXICITY OF SOLDIER CREEK SEDIMENTS TO *Lumbriculus variegatus*

INTRODUCTION

SUMMARY AND OBJECTIVES

This protocol describes a two step toxicity assessment of sediments collected from Soldier Creek within the Tinker Airforce Base to *Lumbriculus variegatus*. The first step is an initial acute toxicity test and the second is a chronic toxicity assessment. The objectives of the initial acute toxicity test is to determine 1) if the sample is capable of producing an acute toxic response (specifically lethality) and if so 2) define the test concentrations for the chronic toxicity assessment. Specific toxicological endpoints include;

- Lethality (acute and chronic toxicity tests)
- Growth (chronic toxicity test only)

Lethality will be represented by the LC_{50}, that concentration calculated to produce 50% mortality in the population of test animals. Effects on growth will be represented by the NOAEC (no observed adverse effect concentration) and the LOAEC (lowest observed adverse effect concentration). These endpoints are determined statistically at a significance (alpha) level of 0.05. The NOAEC is the highest test concentration at which there is no statistically significant adverse effect on survival or growth. The LOAEC is the lowest test concentration at which a statistically significant adverse effect on survival and/or growth occurred. The specifics of the calculations for these endpoints are presented in the statistical section of this protocol.

METHODS AND MATERIALS

TEST ORGANISMS

1. Species. *Lumbriculus variegatus* will be used to test the toxicity of sediment samples for this protocol. The test animals will be adults for both the acute toxicity test and for the chronic toxicity assessment. Forty animals will be exposed to each test dilution and control in 4 replicate test vessels for the acute toxicity assessment and one to five grams of *L. variegatus* in four replicate test vessels for the chronic toxicity test.

2. Origin and Acclimation. Cultures of *L. variegatus* are maintained at WCC's Environmental Toxicology Laboratory in Franklin TN. The culture techniques follow procedures in accordance with WCC SOP 035. Mass cultures consist of animals grown within aquaria provided with recirculating culture media. The culture media consists of moderately hard reconstituted fresh water (USEPA, 1991) and trout chow starter (#1). The *L. variegatus* are routinely cultured at 23° C under 50 to 100ft can. and a photoperiod of 16 hours and 8 hours dark.

3. Reference Toxicity Testing. The *L. variegatus* cultured, in house, are subjected to a toxicity assay with a reference toxicant; $CdCl_2$ to determine the sensitivity of any batch of animals used in toxicity testing.

TEST DESIGN AND PHYSICAL SYSTEM

1. Test Vessels. Acute toxicity assessments will use 300 ml test vessels. Each test vessel will contain 100 ml (cm^3) of test sediment sample dilutions or control sediment. Each container will also be filled will 175 ml of laboratory water. There will be four test vessels for each test dilution and control for the acute toxicity tests. Each vessel will be randomly assigned to a grid location within the test chamber; an environmentally controlled chamber. Chronic toxicity testing will use 4 to 6 liter test vessels. There will be four replicate test vessels for each test dilution and control. Test vessels will be filled with at least 1 liter of sediment and water. All test vessels and glassware used in the preparation of test dilutions will be cleaned following the outline provided in USEPA, 1991 and WCC SOP 010. All vessels will be covered to reduce evaporation and recieve 2 test vessel volumes of water over a 24 hour period.

2. Test Design-Acute Toxicity Test. The test will consist of at least 5 sediment dilutions and a dilution sediment control. The sample dilutions will follow a geometric progression and are preliminarily set at 100, 50, 25, 12.5, and 6.25%. If after one to five hours, 100% mortality is observed in the 100% and/or 50% sample dilutions, additional sample dilutions may be added, such as 3.1%, 1.5% or 0.75%.

3. Dilution Sediment and Overlying Water. Dilution sediment will be either quartz sand, sterilized field collected sediment or a combination of the two. The control (dilution) sediment will be made to resemble the texture (grain size distribution) of the test sediment, based on visual observations. Overlying water will be reconstituted fresh water similar to that of the overlying water sampled, based on water hardness and alkalinity. The source of the water used to prepare synthetic fresh waters is laboratory tap water that is coarse-filtered, activated carbon filtered, UV sterilized, reverse osmosis filtered (Millipore 0-60®) and Super-Q filtered (Millipore Super-Q filter®) and subsequently glass distilled. This system provides a quality of water that exceeds ASTM/CAP/NCCLS standards for Type 1 reagent grade water. Dilution water will be prepared in a minimum of 19L batches and stored in high density polyethylene (HDPE) containers. It will be aerated to bring the pH and dissolved gases into equilibrium with the atmosphere. Total hardness, total alkalinity, pH, dissolved oxygen and specific conductance are measured on each batch of water and will be within 15% of the overlying water sampled within the Soldier Creek sediment samples.

4. Test Temperature. The test temperature will be $23 \pm 1\,^{\circ}C$. Temperature will be maintained by placing test vessels in a temperature-controlled environmental chamber.

5. Lighting. Coolwhite fluorescent lamps are used to illuminate the testing area. Light intensity at the surface of the test vessel will be between 50 and 100 foot-candles. The photoperiod will be 16 hour light and 8 hours dark.

6. Test Duration. Each acute toxicity test will be a 96 hour exposure and each chronic toxicity assessment will encompass a 28 day exposure period.

TEST MATERIAL

1. Receipt and Documentation. Upon arrival at WCC, the package containing the test material will be inspected for damage. The container of sediment sample will be removed from the shipping package and inspected for damage. Information located on the sample label will be transcribed into a WCC laboratory data log book. This data form will be archived and placed in the study

report at the completion of the study. Sample description, date, time, temperature, and condition will be recorded as well.

2. Initial Overlying Water Chemistry Measurements. The temperature of the sample will be measured as soon as it is received with a calibrated thermometer and recorded. Once a subsample of the overlying water is at experimental temperature, the pH, specific conductance, dissolved oxygen (DO), total alkalinity, and total EDTA hardness will be measured. The pH, conductivity, and DO will be measured with calibrated meters, while total alkalinity and hardness will be measured using colormetric methods described by APHA (1989) and WCC SOPs 114 & 115.

TEST PROCEDURE-ACUTE TOXICITY SCREEN

1. Prior to Test Initiation. Prior to the start of the test, adult *L. variegatus* will be removed from the cultures and placed in a separate vessel containing culture water. If the overlying water hardness and/or alkalinity is outside 15% of the culture water the collected test organisms will be tempered to the hardness/alkalinity of the overlying water. This will be accomplished by progressive additions to or dilution of the culture water.

2. Test Set-up. A sample of the sediment will be brought to the test temperature and used to prepare the exposure concentrations. Test concentrations will be prepared on a volume/volume basis and distributed to the replicate test chambers. Overlying water, prepared from laboratory water will be carefully decanted into the test vessels so as not to disturb the sediment. The pH, dissolved oxygen content and conductivity of these waters will be measured prior to the addition of the test animals. If the dissolved oxygen level is below 40% of the saturation point, the test solution will be aerated to such a level.

3. Random Assignment of the Test Animals. A total of greater than 240 neonates will be pooled into a single vessel containing culture media. From this vessel groups of five animals will be randomly assigned to a test dilution or control group. Once assigned to a test dilution or control group the five animals will be placed in a transfer vessel containing overlying water. The assignments and transfers will continue until each group has a complement of 10 animals. From the transfer vessel for each test dilution and control, groups of five neonates will be randomly assigned to a replicate until each replicate has a total of ten animals. This procedure satisfies a stratified random assignment.

4. Test Initiation. The test will be considered initiated with the completion of the distribution of the test organisms to their test chamber.

5. Biological Data. At 24, 48, 72 and 96 hours of exposure, observations for mortality and abnormal effects will be made. Mortality is defined as no body movement upon gentle prodding. Any dead *L. variegatus* will be removed at each observation time. Abnormal effects include but are not limited to orientation of the animals in the test vessels, coloration changes, surfacing behavior, and locomotor activity.

6. Measurement of Water Quality Variables. Temperature will be measured every 24 hours with a calibrated thermometer in a surrogate test vessel filled with dilution water. Dissolved oxygen will also be measured every 24 hours within at least one replicate of each test concetration and control. Any notable characteristics of the test solutions (e.g., presence of precipitates, solution cloudiness, etc.) will be noted along with the daily observations. At the termination

of the test, pH and conductivity will be made in addition to the daily measurements.

TEST PROCEDURE-CHRONIC TOXICITY TESTING

1. Test Set-up. A sample of the sediment will be brought to the test temperature and used to prepare the exposure concentrations. Test concentrations will be prepared on a volume/volume basis and distributed to the replicate test chambers. The pH, dissolved oxygen content and conductivity of the overlying water will be measured prior to the addition of the test animals. If the dissolved oxygen level is below 40% of the saturation point, the water will be aerated to such a level. The individual test chambers will then be randomly distributed to spacial grid locations based on a random number table (e.g. Rolhf, 1981).

3. Random Assignment of the Test Animals. A total of greater than 150 gm.s of worms will be pooled into a single vessel containing culture media. From this vessel groups of 1 to 5 gm.s will be randomly assigned to a test dilution or control group. Once assigned to a test dilution or control group the animals will be placed in a transfer vessel containing overlying water. The assignments and transfers will continue until each group has a complement of 5 to 25 gm.s. From the transfer vessel for each test dilution and control, groups of 1 to 5 gm.s will be randomly assigned to a replicate until each replicate has a total of 1 to 5 gm.s of worms. This procedure satisfies a stratified random assignment.

3. Test Initiation. The test will be considered initiated with the completion of the distribution of the test organisms to their test chamber.

4. Biological Data. Daily observations for mortality and abnormal effects will be made. Mortality is defined as no movement of body after gentle prodding. Any dead *L. variegatus* will be removed at each observation time. Abnormal effects include but are not limited to orientation of the animals in the test vessels, coloration changes, surfacing behavior, and locomotor activity.

5. Test Maintenance. Overlying water will be renewed on a daily basis a total of 2 L (2 volume replacements) will be exchanged. Intermittent flow of freshly prepared overlying water will be delivered to each exposure vessel.

6. Measurement of Water Quality Variables. Temperature will be measured every 24 hours with a calibrated thermometer in at least one replicate exposure vessel for each test concentration and control. Dissolved oxygen will also be measured in at least one test replicate on a daily basis. The overlying water pH and conductivity will be measured three times a week during the exposure period in at least one replicate of each test concentration and control. Each batch of water used as renewal water will be measured for dissolved oxygen, pH, conductivity, total alkalinity and hardness. At the termination of exposure, total alkalinity and hardness will be measured within at least one replicate of the highest sediment test concentration and a control exposure vessel. Any notable characteristics of the test sediments or overlying water (e.g., presence of precipitates, solution cloudiness, etc.) will be noted along with the daily observations.

STATISTICAL METHODS

The LC_{50} will be calculated for those samples that were capable of producing greater than 50% mortality in the test organisms. The calculation will employ one or more of the following methods;

probit transformation and subsequent regression analysis, the trimmed Spearman-Karber method or, the binomial probability method. The selection of the method will be based on the toxicity results. If two or more sample test concentrations result in partial mortality, bracketing 50%, the probit method will be used. If partial mortality is observed in only one test concentration, the Trimmed Spearman-Karber method will be used. This method will also be used if the concentration to effect relationship is not monotonic in character. The binomial probability method, an interpolation with a bionomially derived confidence interval, will be used if only 100% and 0% mortality rates are observed within the test concentrations.

Sublethal effects will be assessed using parametric statistical techniques (e.g. analysis of variance), if the data is found to be normally distributed and if the test groups and control(s) exhibit homogeneity of variances. The data may be transformed (e.g. square root transformation for count data, arc-sine transformation for percentages and/or natural log transformation for weight data) if these conditions are not met. If no transformation is found to allow parametric statistical analysis, non-parametric methods will be used.. Multiple comparison techniques for experiments with controls (e.g. Dunnett's Test or Steel's Many One Rank Test) will be used to determine if the toxicological endpoints observed within the sample test concentrations significantly differ from control. Statistical significance will be set at an alpha of 0.05 for these assessments. These comparisons will be single-sided to determine if there is a significant adverse effect due to exposure to the test samples. These effects would be; a reduction in growth and/or a reduction in survival.

REPORTING OF RESULTS

The raw data and final draft of the report are reviewed by WCC's Quality Assurance Unit. A single copy of the draft report and a copy of the original raw data will be submitted to the Sponsor for review. Upon acceptance by the Sponsor, a signed original report along with the original raw data will be submitted to the Sponsor. The report will include, but not be limited to, the following information.

- Objectives and procedures of the study including any changes from the original protocol.
- Initiation and completion dates of the definitive test, project number, name and address of the test facility.
- Signatures of appropriate laboratory individuals associated with the study.
- Information on the sample as provided on the sample label along with any information provided by the Sponsor, the date of its receipt and its storage conditions at WCC.
- Scientific name of the test organism, source, age and percent mortality of the population 48 hours prior to testing.
- Exposure system description, test design (e.g., number of treatment levels and replicates), dimensions of the test vessels and depth and volume of the test solution.
- Summary of the data analyses, mortality observations and water quality measurements. Authenticated copies, or originals if required, of the original data collection bench sheets on which the survival / mortality observations were made, the water chemistry analysis performed and statistical interpretation of the results.

- Reference to the statistical methods used in the data analyses, the LC_{50} concentrations with 95% confidence limits (if possible), and the NOAEC concentration.

- Results of the most recent reference toxicity assay with the test species under similar test conditions and how the results compare to the running record of reference toxicity assays.

- Deviations from the study protocol and any unusual observations that may have impacted the study results.

- The locations where any specimens, raw data, and the final report are to be stored.

SUMMARY OF RECOMMENDED SEDIMENT TOXICITY TEST CONDITIONS FOR THE AMPHIPOD (Lumbriculus variegatus) SURVIVAL TEST A 96 HOUR STATIC-RENEWAL ACUTE TEST

1.	Test type	Static
2.	Temperature (°C)	23 +/- 1°C
3.	Light quality	Ambient laboratory illumination
4.	Light intensity	10 - 20 uE/m^2·sec
5.	Photoperiod	16 h light, 8 h darkness
6.	Test chamber size	0.3 liter
7.	Test solution volume	100 cm^3 sediment, 175 ml water per replicate
8.	Renewal of overlying water	2 test vessel volumes per 24 hours
9.	Age of test organisms	Adults
10.	No. larvae per test chamber	10
11.	No. replicate chambers per sediment sample	4
12.	No. larvae per sediment sample concentration	40
13.	Feeding regime	None
14.	Aeration	D.O. concentration is to be maintained above 40% of saturation. Aeration rate should not exceed 100 bubble a minute.
15.	Cleaning	None
16.	Effect measured	Survival
17.	Minimum aceptable control survival	80%

SUMMARY OF RECOMMENDED SEDIMENT TOXICITY TEST CONDITIONS FOR THE AMPHIPOD (Lumbriculus variegatus) SURVIVAL & GROWTH TEST A 28 DAY STATIC-RENEWAL - CHRONIC TEST

1.	Test type	Static-renewal
2.	Temperature (°C)	23 +/- 1°C
3.	Light quality	Ambient laboratory illumination
4.	Light intensity	10 - 20 uE/m^2·sec
5.	Photoperiod	16 h light, 8 h darkness
6.	Test chamber size	4 - 6 liter
7.	Test solution volume	1 L sediment, 1 L water per replicate (minium)
8.	Renewal of overlying water	Two volume replacements per 24 hours
9.	Age of test organisms	Adults
10.	No. larvae per test chamber	1 to 5 grams
11.	No. replicate chambers per sediment sample	4
12.	No. larvae per sediment sample concentration	4 to 20 grams
13.	Feeding regime	None
14.	Aeration	D.O. concentration is to be maintained above 40% of saturation. Aeration rate should not exceed 100 bubble a minute.
15.	Cleaning	None
16.	Effect measured	Survival, growth, reproduction
17.	Minimum aceptable control survival	80%

REFERENCES

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American Society for Testing and Materials. 1992. New Standard Guide for Collection, Storage, Characterization, and Manipulation of Sediments for Toxicological Testing. E-1391-90. ASTM 47.03, ASTM Philadelphia, PA.

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STATIC & STATIC-RENEWAL TOXICITY TEST PROCEDURES FOR DETERMINING THE TOXICITY OF SOLDIER CREEK SURFACE WATERS TO *Lumbriculus variegatus*

TO BE COMPLETED BY THE STUDY SPONSOR:

SPONSOR: _____

_____

_____

_____ PHONE: _____

PROJECT NUMBER: _____

TEST MATERIAL: Field collected sediment samples

TEST SPECIES: *Lumbriculus variegatus*

PROTOCOL APPROVAL:

Sponsor's Representative: _____
Typed Name/Title

_____
Signature Date

TO BE COMPLETED BY WCC PERSONNEL PRIOR TO TEST INITIATION:

WCC Study Director: _____
Typed Name/Title

_____
Signature Date

Proposed Test Dates: initiation: _____ completion: _____

Comments/Notes:

_____

_____

STATIC & STATIC-RENEWAL TOXICITY TEST PROCEDURES FOR DETERMINING THE TOXICITY OF SOLDIER CREEK SEDIMENTS TO *Hyalella azteca*

WCC PROTOCOL SOP-E9

STATIC & STATIC-RENEWAL TOXICITY TEST PROCEDURES FOR DETERMINING THE TOXICITY OF SOLDIER CREEK SEDIMENTS TO *HYALELLA AZTECA*

INTRODUCTION

SUMMARY AND OBJECTIVES

This protocol describes a two step toxicity assessment of sediments collected from Soldier Creek within the Tinker Airforce Base to *Hyalella azteca*. The first step is an initial acute toxicity test and the second is a chronic toxicity assessment. The objectives of the initial acute toxicity test is to determine 1) if the sample is capable of producing an acute toxic response (specifically lethality) and if so 2) define the test concentrations for the chronic toxicity assessment. Specific toxicological endpoints include;

- Lethality (acute and chronic toxicity tests)
- Reproduction (chronic toxicity test only)
- Growth (chronic toxicity test only)
- Acute to chronic toxicity ratio (acute lethality/chronic lethality)

Lethality will be represented by the LC_{50}, that concentration calculated to produce 50% mortality in the population of test animals. Effects on reproduction and growth will be represented by the NOAEC (no observed adverse effect concentration) and the LOAEC (lowest observed adverse effect concentration). These endpoints are determined statistically at a significance (alpha) level of 0.05. The NOAEC is the highest test concentration at which there is no statistically significant adverse effect on survival, reproduction or growth. The LOAEC is the lowest test concentration at which a statistically significant adverse effect on survival, reproduction and/or growth occurred. The acute to chronic toxicity ratio is the ratio between the acute (96 hour) LC_{50} and the chronic (28 day) LC_{50}. The specifics of the calculations for these endpoints are presented in the statistical section of this protocol.

METHODS AND MATERIALS

TEST ORGANISMS

1. Species. *Hyalella azteca* will be used to test the toxicity of sediment samples for this protocol. The test animals will be second to third instar for the acute toxicity test and first instar neonates, less than or equal to 24 hours of age for the chronic toxicity assessment. Thirty animals will be exposed to each test dilution and control in 3 replicate test vessels for both the acute toxicity assessment and the chronic toxicity test.

2. Origin and Acclimation. Cultures of *H. azteca* are maintained at WCC's Environmental Toxicology Laboratory in Franklin TN. The culture techniques follow procedures in accordance with WCC SOP 035. Mass cultures consist of animals grown within an algal turf scrubber with secondary cultures in 2 to 3 liter beakers with an initial seeding of 20 to 50 adults. The culture media consists of moderately hard reconstituted fresh water (USEPA, 1991), algal cells and rabbit chow. The cultures kept within beakers are fed on a Monday, Wednesday, Friday schedule. The *H. azteca* are routinely cultured at 25° C under 50 to 100ft can. and a photoperiod of 16 hours and 8 hours dark.

3. Reference Toxicity Testing. The *H. azteca* cultured, in house, are subjected to a toxicity assay with a reference toxicant; $CdCl_2$ to determine the sensitivity of any batch of animals used in toxicity testing.

TEST DESIGN AND PHYSICAL SYSTEM

1. Test Vessels. Test vessels will be 500 ml containers. Each test vessel will contain 100 ml (cm^3) of test sediment sample dilutions or control sediment. Each container will also be filled will 300 ml of laboratory water. There will be three test vessels for each test dilution and control for both the acute and chronic toxicity tests. Each vessel will be randomly assigned to a grid location within the test chamber; an environmentally controlled chamber. All test vessels and glassware used in the preparation of test dilutions will be cleaned following the outline provided in USEPA, 1991 and WCC SOP 010. All vessels will be covered to reduce evaporation.

2. Test Design-Acute Toxicity Test. The test will consist of at least 5 sediment dilutions and a dilution sediment control. The sample dilutions will follow a geometric progression and are preliminarily set at 100, 50, 25, 12.5, and 6.25%. If after one to five hours, 100% mortality is observed in the 100% and/or 50% sample dilutions, additional sample dilutions may be added, such as 3.1%, 1.5% or 0.75%.

3. Dilution Sediment and Overlying Water. Dilution sediment will be either quartz sand, sterilized field collected sediment or a combination of the two. The control (dilution) sediment will be made to resemble the texture (grain size distribution) of the test sediment, based on visual observations. Overlying water will be reconstituted fresh water similar to that of the overlying water sampled, based on water hardness and alkalinity. The source of the water used to prepare synthetic fresh waters is laboratory tap water that is coarse-filtered, activated carbon filtered, UV sterilized, reverse osmosis filtered (Millipore 0-60®) and Super-Q filtered (Millipore Super-Q filter®) and subsequently glass distilled. This system provides a quality of water that exceeds ASTM/CAP/NCCLS standards for Type 1 reagent grade water. Dilution water will be prepared in a minimum of 19L batches and stored in high density polyethylene (HDPE) containers. It will be aerated to bring the pH and dissolved gases into equilibrium with the atmosphere. Total hardness, total alkalinity, pH, dissolved oxygen and specific conductance are measured on each batch of water and will be within 15% of the overlying water sampled within the Soldier Creek sediment samples.

4. Test Temperature. The test temperature will be $25 \pm 1\,^{\circ}C$. Temperature will be maintained by placing test vessels in a temperature-controlled environmental chamber.

5. Lighting. Coolwhite fluorescent lamps are used to illuminate the testing area. Light intensity at the surface of the test vessel will be between 50 and 100 foot-candles. The photoperiod will be 16 hour light and 8 hours dark.

6. Test Duration. Each acute toxicity test will be a 96 hour exposure and each chronic toxicity assessment will encompass a 28 day exposure period.

TEST MATERIAL

1. Receipt and Documentation. Upon arrival at WCC, the package containing the test material will be inspected for damage. The container of sediment sample will be removed from the shipping

package and inspected for damage. Information located on the sample label will be transcribed into a WCC laboratory data log book. This data form will be archived and placed in the study report at the completion of the study. Sample description, date, time, temperature, and condition will be recorded as well.

2. Initial Overlying Water Chemistry Measurements. The temperature of the sample will be measured as soon as it is received with a calibrated thermometer and recorded. Once a subsample of the overlying water is at experimental temperature, the pH, specific conductance, dissolved oxygen (DO), total alkalinity, and total EDTA hardness will be measured. The pH, conductivity, and DO will be measured with calibrated meters, while total alkalinity and hardness will be measured using colormetric methods described by APHA (1989) and WCC SOPs 114 & 115.

TEST PROCEDURE-ACUTE TOXICITY SCREEN

1. Prior to Test Initiation. Prior to the start of the test, second to third instar *H. azteca* will be removed from the cultures and placed in a separate vessel containing culture water. If the overlying water hardness and/or alkalinity is outside 15% of the culture water the collected test organisms will be tempered to the hardness/alkalinity of the overlying water. This will be accomplished by progressive additions to or dilution of the culture water.

2. Test Set-up. A sample of the sediment will be brought to the test temperature and used to prepare the exposure concentrations. Test concentrations will be prepared on a volume/volume basis and distributed to the replicate test chambers. Overlying water, prepared from laboratory water will be carefully decanted into the test vessels so as not to disturb the sediment. The pH, dissolved oxygen content and conductivity of these waters will be measured prior to the addition of the test animals. If the dissolved oxygen level is below 60% of the saturation point, the test solution will be aerated to such a level.

3. Random Assignment of the Test Animals. A total of greater than 180 neonates will be pooled into a single vessel containing culture media. From this vessel groups of five animals will be randomly assigned to a test dilution or control group. Once assigned to a test dilution or control group the five animals will be placed in a transfer vessel containing overlying water. The assignments and transfers will continue until each group has a complement of 10 animals. From the transfer vessel for each test dilution and control, groups of five neonates will be randomly assigned to a replicate until each replicate has a total of ten animals. This procedure satisfies a stratified random assignment.

4. Test Initiation. The test will be considered initiated with the completion of the distribution of the test organisms to their test chamber.

5. Biological Data. At 24, 48, 72 and 96 hours of exposure, observations for mortality and abnormal effects will be made. Mortality is defined as no movement of body or appendages upon gentle prodding. Any dead *H. azteca* will be removed at each observation time. Abnormal effects include but are not limited to orientation of the animals in the test vessels, coloration changes, surfacing behavior, and locomotor activity.

6. Measurement of Water Quality Variables. Temperature will be measured every 24 hours with a calibrated thermometer in a surrogate test vessel filled with dilution water. Dissolved oxygen will also be measured every 24 hours within at least one replicate of each test concetration and

control. Any notable characteristics of the test solutions (e.g., presence of precipitates, solution cloudiness, etc.) will be noted along with the daily observations. At the termination of the test, pH and conductivity will be made in addition to the daily measurements.

TEST PROCEDURE-CHRONIC TOXICITY TESTING

1. Prior to Test Initiation. On the day before test initiation, gravid females will be isolated from their offspring in a separate culture vessel. The morning of the test, neonates produced by the separated gravid females will be collected to serve as test animals. Such a procedure insures that the animals collected for use in the test will be less than or equal to 24 hours of age. If the overlying water hardness and/or alkalinity is outside 15% of the culture the test animals will be tempered to the hardness/alkalinity of the surface water sample. This will be accomplished by progressive additions to or dilution of the culture water.

2. Test Set-up. A sample of the sediment will be brought to the test temperature and used to prepare the exposure concentrations. Test concentrations will be prepared on a volume/volume basis and distributed to the replicate test chambers. The pH, dissolved oxygen content and conductivity of the overlying water will be measured prior to the addition of the test animals. If the dissolved oxygen level is below 60% of the saturation point, the water will be aerated to such a level. The individual test chambers will then be randomly distributed to spacial grid locations based on a random number table (e.g. Rolhf, 1981).

3. Random Assignment of the Test Animals. A total of greater than 180 neonates will be pooled into a single vessel containing culture media. From this vessel groups of five animals will be randomly assigned to a test dilution or control group. Once assigned to a test dilution or control group the five animals will be placed in a transfer vessel containing overlying water. The assignments and transfers will continue until each group has a complement of 10 animals. From the transfer vessel for each test dilution and control, groups of five neonates will be randomly assigned to a replicate until each replicate has a total of ten animals. This procedure satisfies a stratified random assignment.

3. Test Initiation. The test will be considered initiated with the completion of the distribution of the test organisms to their test chamber.

4. Biological Data. Daily observations for mortality and abnormal effects will be made. Mortality is defined as no movement of body or appendages upon gentle prodding. Any dead *H. azteca* will be removed at each observation time. Abnormal effects include but are not limited to orientation of the animals in the test vessels, coloration changes, surfacing behavior, and locomotor activity. Any and all offspring produced during the exposure duration will be removed and enumerated on a daily basis and duly recorded.

5. Test Maintenance. Overlying water will be renewed on a daily basis a total of 600 ml (2 volume replacements) will be exchanged. Intermittent flow of freshly prepared overlying water will be delivered to each exposure vessel. Food will directly added to the test vessels.

6. Measurement of Water Quality Variables. Temperature will be measured every 24 hours with a calibrated thermometer in at least one replicate exposure vessel for each test concentration and control. Dissolved oxygen will also be measured in at least one test replicate on a daily basis. The overlying water pH and conductivity will be measured three times a week during the exposure period in at least one replicate of each test concentration and control. Each batch

of water used as renewal water will be measured for dissolved oxygen, pH, conductivity, total alkalinity and hardness. At the termination of exposure, total alkalinity and hardness will be measured within at least one replicate of the highest sediment test concentration and a control exposure vessel. Any notable characteristics of the test sediments or overlying water (e.g., presence of precipitates, solution cloudiness, etc.) will be noted along with the daily observations.

STATISTICAL METHODS

The LC_{50} will be calculated for those samples that were capable of producing greater than 50% mortality in the test organisms. The calculation will employ one or more of the following methods; probit transformation and subsequent regression analysis, the trimmed Spearman-Karber method or, the binomial probability method. The selection of the method will be based on the toxicity results. If two or more sample test concentrations result in partial mortality, bracketing 50%, the probit method will be used. If partial mortality is observed in only one test concentration, the Trimmed Spearman-Karber method will be used. This method will also be used if the concentration to effect relationship is not monotonic in character. The binomial probability method, an interpolation with a bionomially derived confidence interval, will be used if only 100% and 0% mortality rates are observed within the test concentrations.

Sublethal effects will be assessed using parametric statistical techniques (e.g. analysis of variance), if the data is found to be normally distributed and if the test groups and control(s) exhibit homogeneity of variances. The data may be transformed (e.g. square root transformation for count data, arc-sine transformation for percentages and/or natural log transformation for weight data) if these conditions are not met. If no transformation is found to allow parametric statistical analysis, non-parametric methods will be used.. Multiple comparison techniques for experiments with controls (e.g. Dunnett's Test or Steel's Many One Rank Test) will be used to determine if the toxicological endpoints observed within the sample test concentrations significantly differ from control. Statistical significance will be set at an alpha of 0.05 for these assessments. These comparisons will be single-sided to determine if there is a significant adverse effect due to exposure to the test samples. These effects would be; a reduction in growth, a reduction in the production of offspring and/or a reduction in survival.

REPORTING OF RESULTS

The raw data and final draft of the report are reviewed by WCC's Quality Assurance Unit. A single copy of the draft report and a copy of the original raw data will be submitted to the Sponsor for review. Upon acceptance by the Sponsor, a signed original report along with the original raw data will be submitted to the Sponsor. The report will include, but not be limited to, the following information.

- Objectives and procedures of the study including any changes from the original protocol.
- Initiation and completion dates of the definitive test, project number, name and address of the test facility.
- Signatures of appropriate laboratory individuals associated with the study.
- Information on the sample as provided on the sample label along with any information provided by the Sponsor, the date of its receipt and its storage conditions at WCC.

- Scientific name of the test organism, source, age and percent mortality of the population 48 hours prior to testing.

- Exposure system description, test design (e.g., number of treatment levels and replicates), dimensions of the test vessels and depth and volume of the test solution.

- Summary of the data analyses, mortality observations and water quality measurements. Authenticated copies, or originals if required, of the original data collection bench sheets on which the survival / mortality observations were made, the water chemistry analysis performed and statistical interpretation of the results.

- Reference to the statistical methods used in the data analyses, the LC_{50} concentrations with 95% confidence limits (if possible), and the NOAEC concentration.

- Results of the most recent reference toxicity assay with the test species under similar test conditions and how the results compare to the running record of reference toxicity assays.

- Deviations from the study protocol and any unusual observations that may have impacted the study results.

- The locations where any specimens, raw data, and the final report are to be stored.

SUMMARY OF RECOMMENDED SEDIMENT TOXICITY TEST CONDITIONS FOR THE AMPHIPOD (HYALELLA AZTECA) SURVIVAL TEST A 96 HOUR STATIC - ACUTE TEST

1.	Test type	Static
2.	Temperature (°C)	25 +/- 1°C
3.	Light quality	Ambient laboratory illumination
4.	Light intensity	10 - 20 uE/m^2·sec
5.	Photoperiod	16 h light, 8 h darkness
6.	Test chamber size	0.5 liter
7.	Test solution volume	100 cm^3 sediment, 300 ml water per replicate
8.	Renewal of overlying water	None, except to replace evaporation
9.	Age of test organisms	Second or third instar
10.	No. larvae per test chamber	10
11.	No. replicate chambers per sediment sample	3
12.	No. larvae per sediment sample concentration	30
13.	Feeding regime	None
14.	Aeration	D.O. concentration is to be maintained above 60% of saturation. Aeration rate should not exceed 100 bubble a minute.
15.	Cleaning	None
16.	Effect measured	Survival
17.	Minimum aceptable control survival	80%

SUMMARY OF RECOMMENDED SEDIMENT TOXICITY TEST CONDITIONS FOR THE AMPHIPOD (HYALELLA AZTECA) SURVIVAL, REPRODUCTION & GROWTH TEST
A 28 DAY STATIC-RENEWAL - CHRONIC TEST

1.	Test type	Static-renewal
2.	Temperature (°C)	25 +/- 1°C
3.	Light quality	Ambient laboratory illumination
4.	Light intensity	10 - 20 uE/m^2·sec
5.	Photoperiod	16 h light, 8 h darkness
6.	Test chamber size	0.5 liter
7.	Test solution volume	100 cm^3 sediment, 300 ml water per replicate
8.	Renewal of overlying water	Two volume replacements per 24 hours
9.	Age of test organisms	First instar
10.	No. larvae per test chamber	10
11.	No. replicate chambers per sediment sample	3
12.	No. larvae per sediment sample concentration	30
13.	Feeding regime (daily)	4 mg rabbit pellets & $\simeq 10^7$ algal cells
14.	Aeration	D.O. concentration is to be maintained above 60% of saturation. Aeration rate should not exceed 100 bubble a minute.
15.	Cleaning	None
16.	Effect measured	Survival, growth, reproduction
17.	Minimum aceptable control survival	80%

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STATIC & STATIC-RENEWAL TOXICITY TEST PROCEDURES FOR DETERMINING THE TOXICITY OF SOLDIER CREEK SURFACE WATERS TO *Hyalella azteca*

TO BE COMPLETED BY THE STUDY SPONSOR:

SPONSOR: _____

_____

_____

_____ PHONE: _____

PROJECT NUMBER: _____

TEST MATERIAL: Field collected sediment samples

TEST SPECIES: *Hyalella azteca*

PROTOCOL APPROVAL:

Sponsor's Representative: _____
Typed Name/Title

_____
Signature Date

TO BE COMPLETED BY WCC PERSONNEL PRIOR TO TEST INITIATION:

WCC Study Director: _____
Typed Name/Title

_____
Signature Date

Proposed Test Dates: initiation: _____ completion: _____

Comments/Notes:

_____

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