

DATA EVALUATION RECORD

1. CHEMICAL: Guthion
2. TEST MATERIAL: 99.6% (technical a.i.), a white solid
3. STUDY TYPE: 21 day Toxicity study
Species Tested: Daphnia magna
4. STUDY ID: Forbis, A. D. (1984) Chronic Toxicity of ^{14}C -Guthion to Daphnia magna Under Flow-Through Test Conditions; Final Report #31802; Prepared by Analytical Bio-Chemistry Laboratories, Inc., for Mobay Chemical Corp., 17745 Metcalf, Stilwell, Kansas, 66085.
5. REVIEWED BY:
Curtis E. Laird
Fishery Biologist
EEB/HED
Signature: Curtis E. Laird
Date: 10-16-85
6. APPROVED BY:
Norman Cook
Supervisory Biologist
EEB/HED
Signature: Norman Cook
Date: 10-24-85
7. CONCLUSIONS:
This study indicated the Guthion MATC after 21 days of exposure was 0.25 and 0.40 ug/l. This study does fulfill the requirement in support of registration for a chronic Daphnia magna study.
8. RECOMMENDATIONS: N/A
9. BACKGROUND: EEB requested additional data to support the new uses on corn and sorghum.
10. DISCUSSION OF INDIVIDUAL TEST: N/A



11. MATERIALS AND METHODS:

- A. Test Animals: were daphnids, Daphnia magna, obtained from in-house culture of Analytical Bio-Chemistry Laboratories, Inc., in Columbia, MO 65202. A half-liter proportional diluter system described by Mount and Brung. All daphnids were held in a temperature controlled area at $20 \pm 2^{\circ}\text{C}$. Daphnids were <24 hours old at the initiation of test.
- B. Dose: Flow-through bioassay using normal concentrations. A solvent control was used. 5 dose levels were used (0.070, 0.12, 0.24, 0.42, and 0.97 ug/l).
- C. Design: Forty daphnids were used per level; 5 dose levels, well water control and a solvent control.
- D. Statistics: One-way and two-way analysis of variance.

12. REPORTED RESULTS:

The Daphnia magna young/adult/reproduction and survival were significantly affected in the mean measured test concentrations of 0.40 and 0.99 ug/l after 21 days of exposure. The daphnia lengths in the ^{14}C -Guthion mean measured concentrations which remained after 21 days of testing (0.083, 0.14 and 0.25 ug/l), were not significantly different from control.

13. STUDY AUTHOR'S CONCLUSIONS:

Five test concentrations were in the flow-through chronic toxicity study (0.070, 0.12, 0.24, 0.42, and 0.97 ug/l). The two-way analysis of variance was used to analyze the length of the surviving adults. The mean young/adult/reproduction/day after 21 days was significantly affected in the mean measured exposure levels of 0.40 and 0.99 ug/l ^{14}C -Guthion. The dissolved oxygen concentrations, which ranged from 6.5 to 8.6 mg/l, represented 70 and 92% saturation at 19°C . The pH values were consistent with the control throughout the study, ranging from 8.2 to 8.4. Exposure concentrations of ^{14}C -Guthion were measured analytically on days 0, 4, 7, 14, and 21. Final report number 31802 was reviewed on July 30, 1984 by Analytical Bio-Chemistry Laboratories, Inc. Quality Assurance Unit. This study was conducted in accordance with the Good Laboratory Practice Standards.

14. REVIEWER'S DISCUSSION AND INTERPRETATION OF THE STUDY:

A. Test Procedures: The test procedures complied with the recommended EPA protocol of Oct., 1982.

B. Statistical Analysis:

The following are EEB's calculated results:

- a. Duncan's Multiple range test shows that group C young/adult/day was significantly different from group A (control) young/adult/day;
- b. Duncan's Multiple range test shows that group B and C adults are significantly different from control group A adults. Group F was not considered in this test due to 100% mortality; and
- c. Duncan's Multiple range test shows that group B length was different from control group A length. Groups E and F were not run due to 100% mortality. Also see attached sheets.

C. Discussion/Results:

The reported statistics analysis of adult mean length, survival and young/adult/reproduction/day from the 21-day Daphnia magna life-cycle study, MATC limits were estimated to be the ¹⁴C-Guthion mean measured concentrations of 0.25 and 0.40 ug/l.

D. Adequacy of Study:

1. Category: Core
2. Rationale: N/A
3. Repairability: N/A

15. COMPLETION OF ONE-LINER: Yes

16. CBI APPENDIX: N/A

9:03 FRIDAY, OCTOBER 11, 1985

LENGTH

Daphnia

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
TRT	3	A B C

NUMBER OF OBSERVATIONS IN DATA SET = 115
SAS

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GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: RESPONSE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	2	3.95856908	1.97928454	25.85	0.0001	0.315816	6.4850
ERROR	112	8.57586570	0.07657023				
CORRECTED TOTAL	114	12.53443478					

ROOT MSE 0.27671326 RESPONSE MEAN 4.26695652

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TRT	2	3.95856908	25.85	0.0001	2	3.95856908	25.85	0.0001

SAS 9:03 FRIDAY, OCTOBER 11, 1985 3

GENERAL LINEAR MODELS PROCEDURE

DUNCAN'S MULTIPLE RANGE TEST FOR VARIABLE: RESPONSE
NOTE: THIS TEST CONTROLS THE TYPE I COMPARISONWISE ERROR RATE,
NOT THE EXPERIMENTWISE ERROR RATE.
ALPHA=0.05 DF=112 MSE=.0765702
WARNING: CELL SIZES ARE NOT EQUAL.
HARMONIC MEAN OF CELL SIZES=36.9287
MEANS WITH THE SAME LETTER ARE NOT SIGNIFICANTLY DIFFERENT.

DUNCAN	GROUPING	MEAN	N	TRT
	A	4.4143	35	A
	A	4.3531	49	B
	B	3.9645	31	C

SAS

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VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
----- TRT=A -----									
RESPONSE	35	4.41428571	0.25104822	3.90000000	4.80000000	0.04243489	154.50000000	0.06302521	5.687
----- TRT=B -----									
RESPONSE	49	4.35306122	0.29233403	3.80000000	4.90000000	0.04176200	213.30000000	0.08545918	6.716
----- TRT=C -----									
RESPONSE	31	3.96451613	0.27874527	3.30000000	4.30000000	0.05086413	122.80000000	0.07657023	6.716

GENERAL LINEAR MODELS PROCEDURE

Daphnia

DEPENDENT VARIABLE: RESPONSE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	4	92.68300000	23.17075000	74.03	0.0001	0.951786	4.5522
ERROR	15	4.69500000	0.31300000				
CORRECTED TOTAL	19	97.37800000					
					ROOT MSE	RESPONSE MEAN	
					0.55946403	12.29000000	

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TRT	4	92.68300000	74.03	0.0001	4	92.68300000	74.03	0.0001

GENERAL LINEAR MODELS PROCEDURE

DUNCAN'S MULTIPLE RANGE TEST FOR VARIABLE: RESPONSE
NOTE: THIS TEST CONTROLS THE TYPE I COMPARISONWISE ERROR RATE,
NOT THE EXPERIMENTWISE ERROR RATE.

0ALPHA=0.05 DF=15 MSE=0.313
OMEANS WITH THE SAME LETTER ARE NOT SIGNIFICANTLY DIFFERENT.

DUNCAN	GROUPING	MEAN	N	TRT
	A	13.825	4	C
	A			
B	A	13.400	4	D
B	A			
B	A	13.300	4	A
B				
B		12.900	4	B
	C	8.025	4	E

SAS

15:22 THURSDAY, OCTOBER 10, 1985 5

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
TRT=A									
RESPONSE	4	13.30000000	0.20000000	13.00000000	13.40000000	0.10000000	53.20000000	0.04000000	1.504
TRT=B									
RESPONSE	4	12.90000000	0.48304589	12.20000000	13.30000000	0.24152295	51.60000000	0.23333333	3.745
TRT=C									
RESPONSE	4	13.82500000	0.51881275	13.20000000	14.30000000	0.25940637	55.30000000	0.26916667	3.753
TRT=D									
RESPONSE	4	13.40000000	0.39157800	12.90000000	13.80000000	0.19578900	53.60000000	0.15333333	2.922
TRT=E									
RESPONSE	4	8.02500000	0.93229108	6.80000000	8.80000000	0.46614554	32.10000000	0.86916667	11.617

9:03 FRIDAY, OCTOBER 11, 1985

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9:03 FRIDAY, OCTOBER 11, 1985 2

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SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
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CORRECTED TOTAL	114	12.53443478					

ROOT MSE RESPONSE MEAN
0.27671326 4.26695652

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TRT	2	3.95856908	25.85	0.0001	2	3.95856908	25.85	0.0001

SAS
9:03 FRIDAY, OCTOBER 11, 1985 3

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HARMONIC MEAN OF CELL SIZES=36.9287

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DUNCAN	GROUPING	MEAN	N	TRT
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	A			
	A	4.3531	49	B
	B	3.9645	31	C

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9:03 FRIDAY, OCTOBER 11, 1985 4

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
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RESPONSE	35	4.41428571	0.25104822	3.90000000	4.80000000	0.04243489	154.50000000	0.06302521	5.687
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RESPONSE	49	4.35306122	0.29233403	3.80000000	4.90000000	0.04176200	213.30000000	0.08545918	6.716
----- TRT=C -----									
RESPONSE	31	3.96451613	0.27874527	3.30000000	4.30000000	0.05006413	122.90000000	0.07769892	7.031

GENERAL LINEAR MODELS PROCEDURE

Daphnia

DEPENDENT VARIABLE: RESPONSE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	4	92.68300000	23.17075000	74.03	0.0001	0.951786	4.5522
ERROR	15	4.69500000	0.31300000		ROOT MSE	RESPONSE MEAN	
CORRECTED TOTAL	19	97.37800000			0.55946403	12.29000000	

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TRT	4	92.68300000	74.03	0.0001	4	92.68300000	74.03	0.0001

GENERAL LINEAR MODELS PROCEDURE

DUNCAN'S MULTIPLE RANGE TEST FOR VARIABLE: RESPONSE
 NOTE: THIS TEST CONTROLS THE TYPE I COMPARISONWISE ERROR RATE,
 NOT THE EXPERIMENTWISE ERROR RATE.

OALPHA=0.05 DF=15 MSE=0.313

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DUNCAN	GROUPING	MEAN	N	TRT
	A	13.825	4	C
	A			
B	A	13.400	4	D
B	A			
B	A	13.300	4	A
B				
B		12.900	4	B
	C	8.025	4	E

SAS

15:22 THURSDAY, OCTOBER 10, 1985 5

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
TRT=A									
RESPONSE	4	13.30000000	0.20000000	13.00000000	13.40000000	0.10000000	53.20000000	0.04000000	1.504
TRT=B									
RESPONSE	4	12.90000000	0.48304589	12.20000000	13.30000000	0.24152295	51.60000000	0.23333333	3.745
TRT=C									
RESPONSE	4	13.82500000	0.51881275	13.20000000	14.30000000	0.25940637	55.30000000	0.26916667	3.753
TRT=D									
RESPONSE	4	13.40000000	0.39157800	12.90000000	13.80000000	0.19578900	53.60000000	0.15333333	2.922
TRT=E									
RESPONSE	4	8.02500000	0.93229108	6.80000000	8.80000000	0.46614554	32.10000000	0.86916667	11.617

GENERAL LINEAR MODELS PROCEDURE

ADULTS
Daphnia

DEPENDENT VARIABLE: RESPONSE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	5	87846.50000000	17569.30000000	163.39	0.0001	0.978442	9.8758
ERROR	18	1935.50000000	107.52777778		ROOT MSE		RESPONSE MEAN
CORRECTED TOTAL	23	89782.00000000			10.36956015		105.00000000

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TRT	5	87846.50000000	163.39	0.0001	5	87846.50000000	163.39	0.0001

SAS

10:12 TUESDAY, OCTOBER 15, 1985 4

GENERAL LINEAR MODELS PROCEDURE

DUNCAN'S MULTIPLE RANGE TEST FOR VARIABLE: RESPONSE

NOTE: THIS TEST CONTROLS THE TYPE I COMPARISONWISE ERROR RATE,
NOT THE EXPERIMENTWISE ERROR RATE.

ALPHA=0.05 DF=18 MSE=107.528

MEANS WITH THE SAME LETTER ARE NOT SIGNIFICANTLY DIFFERENT.

DUNCAN	GROUPING	MEAN	N	TRT
	A	150.00	4	A
	A	150.00	4	D
	A	149.75	4	C
	A	137.25	4	B
	B	43.00	4	E
	C	0.00	4	F

SAS

10:12 TUESDAY, OCTOBER 15, 1985 5

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
----- TRT=A -----									
RESPONSE	4	150.00000000	0	150.00000000	150.00000000	0	600.00000000	0	0.000
----- TRT=B -----									
RESPONSE	4	137.25000000	24.83780720	100.00000000	150.00000000	12.41890360	549.00000000	616.91666667	18.097
----- TRT=C -----									
RESPONSE	4	149.75000000	0.50000000	149.00000000	150.00000000	0.25000000	599.00000000	0.25000000	0.334
----- TRT=D -----									
RESPONSE	4	150.00000000	0	150.00000000	150.00000000	0	600.00000000	0	0.000
----- TRT=E -----									
RESPONSE	4	43.00000000	5.29150262	36.00000000	48.00000000	2.64575131	172.00000000	28.00000000	12.306
----- TRT=F -----									
RESPONSE	4	0	0	0	0	0	0	0	.