

US EPA ARCHIVE DOCUMENT

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 ¹⁴C-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



2040131

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

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

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		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

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

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	0.05006413	122.80000000	0.07777778	
----------	----	------------	------------	------------	------------	------------	--------------	------------	--

Daphnia

GENERAL LINEAR MODELS PROCEDURE

257.
258.
259.
260.
261.
262.
263.
264.
265.
266.
267.
268.
269.
270.
271.
272.
273.
274.
275.
276.
277.
278.
279.
280.
281.
282.
283.
284.
285.
286.
287.
288.
289.
290.
291.
292.
293.
294.
295.
296.
297.
298.
299.
300.
301.
302.
303.
304.
305.
306.
307.
308.
309.
310.
311.
312.
313.
314.
315.
316.

1

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				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

SAS

15:22 THURSDAY, OCTOBER 10, 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=15 MSE=0.313
MEANS WITH THE SAME LETTER ARE NOT SIGNIFICANTLY DIFFERENT.

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

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78

CARY, N.C. 27511-8000

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

9:03 FRIDAY, OCTOBER 11, 1985 2

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			ROOT MSE	RESPONSE MEAN
CORRECTED TOTAL	114	12.53443478				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

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.

0ALPHA=0.05 DF=112 MSE=.0765702
WARNING: CELL SIZES ARE NOT EQUAL.
HARMONIC MEAN OF CELL SIZES=36.9287

OMEANS WITH THE SAME LETTER ARE NOT SIGNIFICANTLY DIFFERENT.

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

SAS 9:03 FRIDAY, OCTOBER 11, 1985 4

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	0.05006413	122.90000000	0.07769892	7.021

D
Daphnia

GENERAL LINEAR MODELS PROCEDURE

257.
258.
259.
260.
261.
262.
263.
264.
265.
266.
267.
268.
269.
270.
271.
272.
273.
274.
275.
276.
277.
278.
279.
280.
281.
282.
283.
284.
285.
286.
287.
288.
289.
290.
291.
292.
293.
294.
295.
296.
297.
298.
299.
300.
301.
302.
303.
304.
305.
306.
307.
308.
309.
310.
311.
312.
313.
314.
315.
316.
?

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

SAS

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=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
	A			
B	A	13.300	4	A
B		12.900	4	B
C		8.025	4	E

SAS

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

263.	SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.	
264.									
265.	MODEL	5	87846.50000000	17569.30000000	163.39	0.0001	0.978442	9.8758	
266.									
267.	ERROR	18	1935.50000000	107.52777778		ROOT MSE		RESPONSE MEAN	
268.									
269.									
270.	CORRECTED TOTAL	23	89782.00000000			10.36956015		105.00000000	
271.									
272.									
273.	SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
274.									
275.	TRT	5	87846.50000000	163.39	0.0001	5	87846.50000000	163.39	0.0001
276.	1			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			
	A	150.00	4	D
	A			
	A	149.75	4	C
	A			
	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	.