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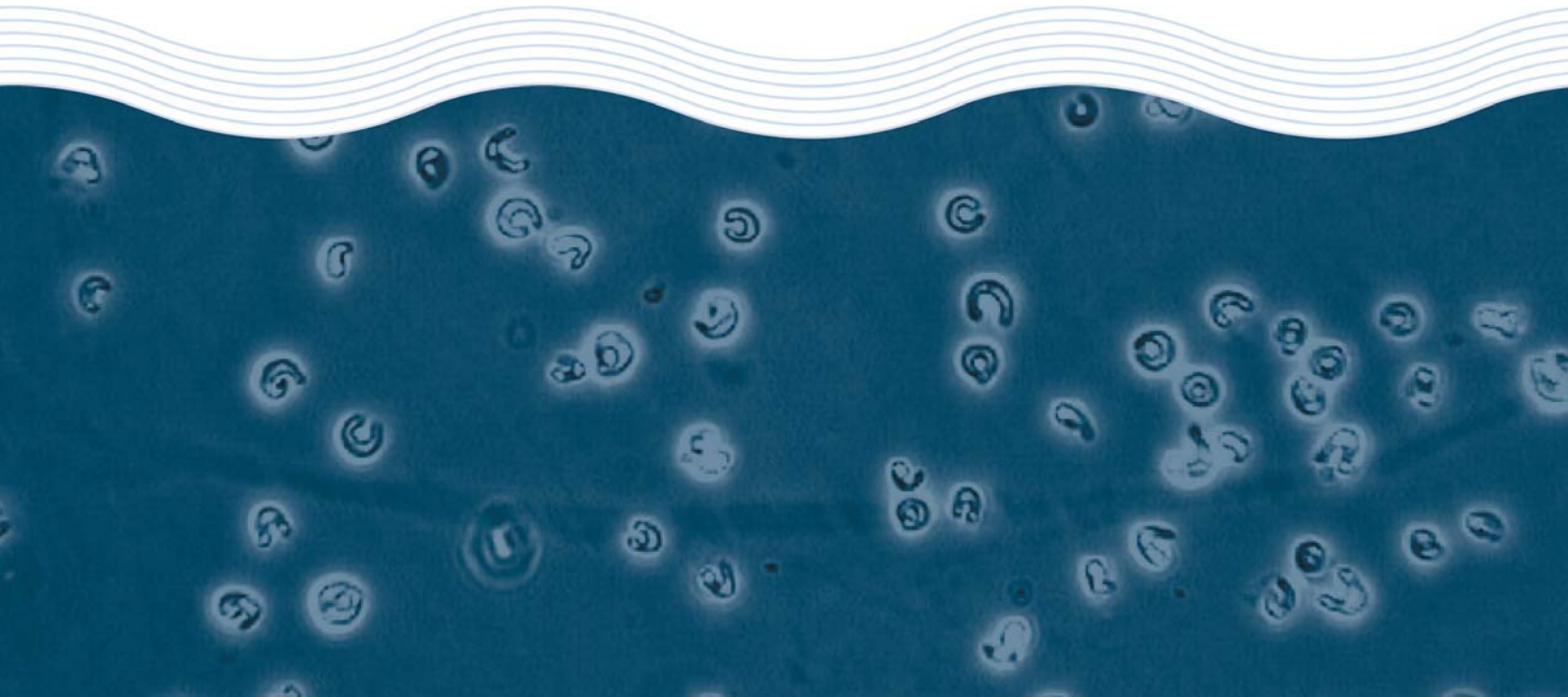
Toxicity Assessment of a Final Outfall Sample from the Albury Pulp Mill

Norske Skog Paper Mills (Australia) Ltd

Test Report

May 2008



Toxicity Assessment of a Final Outfall Sample from the Albury Pulp Mill

Norske Skog Paper Mills (Australia) Ltd

Test Report

May 2008

ECOTOX Services Australasia Pty Ltd ABN>45 094 714 904
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Toxicity Test Report: TR0365/1

Client:	Norske Skog Paper Mills (Australia) Ltd Technical Support & Development Boyer TAS 7140	**ESA Job #:** **Date Sampled:** **Date Received:**	PR0365 12 May 2008 13 May 2008
Attention:	Dr Des Richardson	**Sampled By:**	client
Client Ref:	None provided	**Quote#:**	PL0365_q01

Lab ID No.:	**Sample Name:**	**Sample Description:**
2715	NS Final Outfall	Aqueous sample, pH 8.4, conductivity 1920µS/cm, total ammonia <2.0 mg/L, sample received chilled in bottles of sound condition

Test Performed:	48-hr acute (survival) toxicity test using the freshwater cladoceran *Ceriodaphnia cf dubia*
Test Protocol:	ESA SOP 101, based on USEPA (2002)
Deviations from Protocol:	Nil
Source of Test Organisms:	ESA Laboratory culture
Test Initiated:	13 May 2008 at 1530h

Sample 2715: *NS Final Outfall*	*Vacant*	*Vacant*
Concentration (%) / **% Survival (at 24 hr)**		
0 (control) 100 ± 0.0		
6.25 100 ± 0.0		
12.5 100 ± 0.0		
25 100 ± 0.0		
50 100 ± 0.0		
100 100 ± 0.0		
48 hr EC50 = >100% **NOEC = 100%** **LOEC = >100%**		

The sample was not acutely toxic to the cladoceran *Ceriodaphnia dubia* (Steel's Many-One Rank Test, 1 tailed, P=0.05)

QA/QC Parameter	**Criterion**	**This Test**	**Criterion met?**
Control minimum % survival	≥90 %	100%	Yes
Test Temperature limits	25.0 ± 1 ºC	25.0-25.5ºC	Yes
Reference Toxicant within cusum chart limits	193.2-213.6mg KCl/L	212.1mg KCl/L	Yes

Test Report Authorised by: Dr Rick Krassoi, Director on 26 May 2008

Results are based on the samples in the condition as received by ESA

NATA Accredited Laboratory Number: 14709

The tests, calibrations or methods covered by this document have been performed in accordance with NATA requirements which include the requirements of ISO/IEC 17025 and are traceable to Australian national standards of measurement. This document shall not be reproduced except in full.

Toxicity Test Report: TR0365/2

Client:	Norske Skog Paper Mills (Australia) Ltd Technical Support & Development Boyer TAS 7140	**ESA Job #:** **Date Sampled:** **Date Received:**	PR0365 12 May 2008 13 May 2008
Attention:	Dr Des Richardson	**Sampled By:**	client
Client Ref:	None provided	**Quote#:**	PL0365_q01

Lab ID No.:	**Sample Name:**	**Sample Description:**
2715	NS Final Outfall	Aqueous sample, pH 8.4, conductivity 1920µS/cm, total ammonia <2.0 mg/L, sample received chilled in bottles of sound condition

Test Performed:	7-day partial life-cycle (chronic) toxicity test using the freshwater cladoceran *Ceriodaphnia cf dubia*
Test Protocol:	ESA SOP 101, based on USEPA (2002)
Deviations from Protocol:	Nil
Source of Test Organisms:	ESA Laboratory culture
Test Initiated:	13 May 2008 at 1530h

Sample 2715: *NS Final Outfall*

Concentration (%)	**% Survival (at 7 days)**
0 (control)	90.0 ± 31.6
6.25	100 ± 0.0
12.5	100 ± 0.0
25	100 ± 0.0
50	100 ± 0.0
100	90.0 ± 31.6

7 day EC50 (survival) = >100%
NOEC = 100%
LOEC = >100%

Sample 2715: *NS Final Outfall*

Concentration (%)	**Number of Young (Mean ± SD)**
0 (control)	16.0 ± 6.5
6.25	26.4 ± 3.7
12.5	31.6 ± 4.9
25	32.3 ± 4.0
50	34.8 ± 2.0
100	28.7 ± 11.2

7 day EC50 (reproduction) = >100%
NOEC = 100%
LOEC = >100%

Vacant

The sample was not chronically toxic to the cladoceran *Ceriodaphnia dubia* (Bonferroni *t* test, 1 tailed, P=0.05, df=5,51)

QA/QC Parameter	**Criterion**	**This Test**	**Criterion met?**
Control minimum % survival	≥80 %	90.0%	Yes
Control mean number of young	≥15	16.0	
Test Temperature limits	25.0 ± 1 ºC	24.0-26.0ºC	Yes
Reference Toxicant within cusum chart limits	96.2-332.7mg KCl/L	223.2mg KCl/L	Yes

Test Report Authorised by: Dr Rick Krassoi, Director on 26 May 2008

Results are based on the samples in the condition as received by ESA

NATA Accredited Laboratory Number: 14709

The tests, calibrations or methods covered by this document have been performed in accordance with NATA requirements which include the requirements of ISO/IEC 17025 and are traceable to Australian national standards of measurement. This document shall not be reproduced except in full.

Toxicity Test Report: TR0365/3

Client:	Norske Skog Paper Mills (Australia) Ltd Technical Support & Development Boyer TAS 7140	**ESA Job #:** **Date Sampled:** **Date Received:**	PR0365 12 May 2008 13 May 2008
Attention:	Dr Des Richardson	**Sampled By:**	client
Client Ref:	None provided	**Quote#:**	PL0365_q01

Lab ID No.:	**Sample Name:**	**Sample Description:**
2715	NS Final Outfall	Aqueous sample, pH 8.4, conductivity 1920µS/cm, total ammonia <2.0 mg/L, sample received chilled in bottles of sound condition

Test Performed:	72-hour growth inhibition (chronic) test using the freshwater unicellular green alga *Selenastrum capricornutum (Raphidocellus subcapitata)*
Test Protocol:	USEPA OPPTS 840.5400 and USEPA Method 1003.0
Deviations from Protocol:	None. USEPA Media prepared without EDTA. A colour-matched control was not considered necessary owing to the pale colour of the sample
Source of Test Organisms:	CSIRO Culture CS-327 (axenic laboratory culture)
Test Initiated:	13 May 2008 at 1330h

Summary of Test Method: The test temperature was 25 ± 1 °C. The test vessels were 20mL borosilicate glass scintillation vials with 20mL test solution. There were 4 replicate vessels per treatment. The initial cell density was 10,000 cells/ mL, determined by haemocytometer counts. Cell densities were enumerated at 72 hours by haemocytometer counts. The test vessels were shaken by hand 2 times per day.

Sample 2715: *NS Final Outfall* **Concentration (%)**	**Cell Density (x10^4 cells/mL)**	*Vacant*	*Vacant*
0 (control)	31.6 ± 3.1		
6.25	29.3 ± 5.3		
12.5	37.5 ± 4.6		
25	41.1 ± 2.7		
50	46.0 ± 2.7		
100	41.2 ± 4.9		
72 hr IC50 = >100% **NOEC = 100%** **LOEC = >100%**			

The sample was not toxic to the freshwater alga *Selenastrum capricornutum* (Dunnett's Test, 2-tailed, P=0.05).

QA/QC Parameter	**Criterion**	**This Test**	**Criterion met?**
Control minimum cell density	≥20,000 cells/mL	31,600	Yes
Test Temperature limits	25.0 ± 1 ºC	25.0-26.0ºC	Yes
Reference Toxicant within cusum chart limits	0.25-0.44 µg Cu^{2+}/L	0.36µg Cu^{2+}/L	Yes

Test Report Authorised by: Dr Rick Krassoi, Director on 26 May 2008

Results are based on the samples in the condition as received by ESA

Toxicity Test Report: TR0365/4

Client:	Norske Skog Paper Mills (Australia) Ltd Technical Support & Development Boyer TAS 7140	**ESA Job #:** **Date Sampled:** **Date Received:**	PR0365 12 May 2008 13 May 2008
Attention:	Dr Des Richardson	**Sampled By:**	client
Client Ref:	None provided	**Quote#:**	PL0365_q01

Lab ID No.:	**Sample Name:**	**Sample Description:**
2715	NS Final Outfall	Aqueous sample, pH 8.4, conductivity 1920μS/cm, total ammonia <2.0 mg/L, sample received chilled in bottles of sound condition

Test Performed:	96-h Fish Imbalance Test using the larvae of the Eastern Rainbowfish *Melanotaenia splendida*
Test Protocol:	ESA SOP 117, based on USEPA (2002)
Deviations from Protocol:	None.
Source of Test Organisms:	ESA Laboratory culture, sourced from Queensland Hatchery.
Test Initiated:	13 May 2008 at 1500 h

Sample 2715: *NS Final Outfall*		*Vacant*	*Vacant*
Concentration (%)	**% Un-affected (at 96 hr)**		
0 (control)	100 ± 0.0		
6.25	70.0 ± 47.6*		
12.5	95.0 ± 10.0		
25	90.0 ± 20.0		
50	95.0 ± 10.0		
100	100 ± 0.0		
96 hr EC50 (Imbalance) = >100% **NOEC = 100%** **LOEC = >100%**			

The sample did not exhibit toxicity (expressed as loss of balance) to *Melanotaenia splendida* over the 96 hour exposure period.

* The mean % un-affected for the 6.25% treatment was reduced to 70% by the loss of balance of all fish in a single replicate vessel, most likely due to the depletion of oxygen caused by the inadvertent death of one fish. The percent saturation of dissolved oxygen was determined to be 32% in this affected replicate vessel.

QA/QC Parameter	**Criterion**	**This Test**	**Criterion met?**
Control % survival	>90 %	100%	Yes
Test Temperature limits	25.0 ± 1°C	25.0-26.0ºC	Yes
Reference Toxicant within cusum chart limits	0.21-0.60 mg Cu^{2+}/L	0.25 mg Cu^{2+}/L	Yes

Test Report Authorised by: Dr Rick Krassoi Director, on 26 May 2008

Results are based on the samples in the condition as received by ESA

Centre for Environmental Contaminants Research
Lucas Heights Science and Technology Centre
New Illawarra Road, Lucas Heights, NSW
Private Mail Bag 7, Bangor, NSW, 2234, Australia
Telephone 61 2 9710 6812 Fax 61 2 9710 6837

Microtox® Test Report – 08074M

Client: Ecotox Services Australasia
Project: Ecotox Services Australasia (Norske-Skog)
Test Performed: Microtox® Test using the bacteria *Vibrio fischeri*

Samples Collected:	12/5/08		
Samples Received:	13/5/08	**Test Initiated:**	13/5/08
CSIRO Sample No.	**Sample Name**	**Sample Description**	
E08074	NS Outfall	Liquid	

Sample Physico-Chemistry and Preparation: The salinity of the sample as received was 1.0‰, while the pH was 8.2. The sample was centrifuged prior to testing to remove particulates.

Sample	Physico-chemistry				Comments
	pH	‰	mS/cm	DO (%)	
E08074 (As received)	8.22	1.0	2.0	63	Light brown coloured solution
E08074 (Centrifuged)	8.27	1.0	1.9	82	Light brown coloured solution

‰ = Salinity; mS/cm = Conductivity; DO = dissolved oxygen

Test Method: This test measures the decrease in light output of the marine bacterium *Vibrio fischeri* after exposure to the sample for 5-, 15- and 30-min. The toxicity is expressed as the concentration of sample that causes a 50% reduction in the light output of the bacteria (EC50 value). The lower the EC50, the more toxic the sample. The 90% Test Protocol was used, with MOAS adjustment (Azur Environmental, 1998). Eight concentrations of each sample (27-90%) were tested (each in duplicate) using 2% NaCl as the diluent and control water. Exposure duration was 5, 15 and 30 minutes. The lowest observable effect (LOEC) and no observable effect (NOEC) concentrations were calculated using Bonferroni's t-test (ToxCalc Version 5.0.23, Tidepool Software). Phenol was also tested for quality assurance purposes.

Results: The NS Outfall sample was not toxic to the bacterium, with no significant inhibition observed at any concentration tested. There was, however, significant stimulation (2-13% stimulation) of light output in most test concentrations following exposure for 5, 15 and 30 minutes.

Sample	EC50 (%)			LOEC (%)			NOEC (%)		
	5-min	15-min	30-min	5-min	15-min	30-min	5-min	15-min	30-min
NS Outfall	>82	>82	>82	>82	>82	>82	82	82	82

Quality Assurance/Quality Control	**Criterion**	**This Test**	**Criterion Met?**
Reference toxicant 5-, 15-, 30- min EC50 (Phenol, mg/L)	13-26	17, 18, 19	Yes

Comments:

References:

Azur Environmental (1998) Microtox® acute toxicity test (Microtox® Manual). Azur Environmental, Carlsbad, CA, USA.

Test carried out by: Monique Binet, Anthony Platts-Baggs

Test report prepared by: Monique Binet
Experimental Scientist (ph: 02 9710 6812)

Test report authorised by: Jenny Stauber
Senior Principal Research Scientist (ph: 02 9710 6808)

Date: 16/5/08

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Chain-of-Custody Documentation

Datasheet ID: 601.1
21 March 2007

Chain-of-Custody / Service Request Form

ecotox SERVICES AUSTRALASIA

Customer: NORSKE SKOG
Contact: DES RICHARDSON
Sampled By: ELIZABETH REEVES.

Ship To: ECOTOX SERVICES AUSTRALASIA
UNIT 27/2 CHAPLIN DRIVE
Attention: RICK KRASSOI

Sample Date (day / month / year)	Sample Time	Sample Name (exactly as written on the sample vessel)	Sample Method (eg Grab, composite etc.)	Number and Volume of Container (eg 2 x 1L)	Tests Requested: MICROTOX ASSAY	ACUTE CERIODAPHNIA DUBIA ASSAY	CHRONIC CERIODAPHNIA DUBIA ASSAY	ALGAL GROWTH INHIBITION TEST	FISH IMBALANCE TEST	Comments / Instructions
12.05.08	08:45	NS FINAL OUTFALL	GRAB	4x2.5L	X	X	X	X	X	

Page 1 of 1

Note: An MSDS must be attached if Available

ESA Project Number: PR 0365

1) Released By:	Date:	2) Received By:	Date:	3) Released By:	Date:	4) Recieved By:	Date:
LIZ REEVES	12.05.08		13/5/08				
Of: NORSKE SKOG	Time: 14:00	Of: ESA	Time: 0830.	Of:	Time:	Of:	Time:

Ecotox Services Australasia Pty Ltd. Unit 27, 2 Chaplin Drive, Lane Cove NSW 2066 AUSTRALIA

Phone: 61 2 9420-9481 Fax 61 2 9420-9484 info@ecotox.com.au

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Statistical Printouts for the Acute Test with *Ceriodaphnia dubia*

Ceriodaphnia Survival and Reproduction Test-48 Hr Survival

Start Date:	13/05/2008 15:30	Test ID:	PR365/1	Sample ID:	NS Final Outfall
End Date:	15/05/2008 15:30	Lab ID:	2715	Sample Type:	EFF2-Industrial
Sample Date:	12/05/2008 08:45	Protocol:	101-ESA SOP101	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-%	1	2	3	4
DMW-Control	1.0000	1.0000	1.0000	1.0000
6.25	1.0000	1.0000	1.0000	1.0000
12.5	1.0000	1.0000	1.0000	1.0000
25	1.0000	1.0000	1.0000	1.0000
50	1.0000	1.0000	1.0000	1.0000
100	1.0000	1.0000	1.0000	1.0000

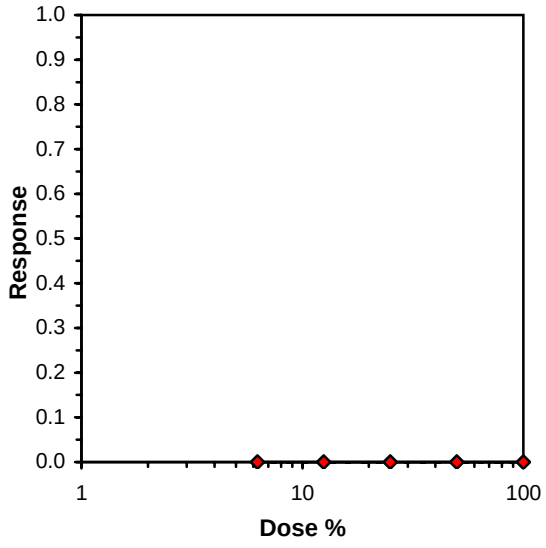
			Transform: Arcsin Square Root					Rank	1-Tailed	Isot
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean
DMW-Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4			1.0000
6.25	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000
12.5	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000
25	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000
50	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000
100	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000

Auxiliary Tests	Statistic	Critical	Skew
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	1	0.884	
Equality of variance cannot be confirmed			

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	100	>100		1

Log-Logit Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>100			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



Ceriodaphnia Survival and Reproduction Test-48 Hr Survival

Start Date:	13/05/2008 15:30	Test ID:	PR365/1	Sample ID:	NS Final Outfall
End Date:	15/05/2008 15:30	Lab ID:	2715	Sample Type:	EFF2-Industrial
Sample Date:	12/05/2008 08:45	Protocol:	101-ESA SOP101	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Auxiliary Data Summary

Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
DMW-Control	% survival	100.00	100.00	100.00	0.00	0.00	4
6.25		100.00	100.00	100.00	0.00	0.00	4
12.5		100.00	100.00	100.00	0.00	0.00	4
25		100.00	100.00	100.00	0.00	0.00	4
50		100.00	100.00	100.00	0.00	0.00	4
100		100.00	100.00	100.00	0.00	0.00	4
DMW-Control	Temp C	25.00	25.00	25.00	0.00	0.00	1
6.25		25.00	25.00	25.00	0.00	0.00	1
12.5		25.00	25.00	25.00	0.00	0.00	1
25		25.00	25.00	25.00	0.00	0.00	1
50		25.00	25.00	25.00	0.00	0.00	1
100		25.00	25.00	25.00	0.00	0.00	1
DMW-Control	pH	8.30	8.30	8.30	0.00	0.00	1
6.25		8.40	8.40	8.40	0.00	0.00	1
12.5		8.40	8.40	8.40	0.00	0.00	1
25		8.30	8.30	8.30	0.00	0.00	1
50		8.30	8.30	8.30	0.00	0.00	1
100		8.30	8.30	8.30	0.00	0.00	1
DMW-Control	Cond uS/cm	170.00	170.00	170.00	0.00	0.00	1
6.25		312.00	312.00	312.00	0.00	0.00	1
12.5		441.00	441.00	441.00	0.00	0.00	1
25		679.00	679.00	679.00	0.00	0.00	1
50		1124.00	1124.00	1124.00	0.00	0.00	1
100		1923.00	1923.00	1923.00	0.00	0.00	1
DMW-Control	DO %sat	100.20	100.20	100.20	0.00	0.00	1
6.25		100.80	100.80	100.80	0.00	0.00	1
12.5		100.30	100.30	100.30	0.00	0.00	1
25		99.90	99.90	99.90	0.00	0.00	1
50		98.80	98.80	98.80	0.00	0.00	1
100		81.80	81.80	81.80	0.00	0.00	1

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Statistical Printouts for the 7-d Chronic Test with *Ceriodaphnia dubia*

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date:	13/05/2008 15:30	Test ID:	PR365/2	Sample ID:	NS Final Outfall
End Date:	20/05/2008 16:00	Lab ID:	2715	Sample Type:	EFF2-Industrial
Sample Date:	12/05/2008 08:45	Protocol:	102-ESA SOP102	Test Species:	CD-Ceriodaphnia dubia
Comments:					

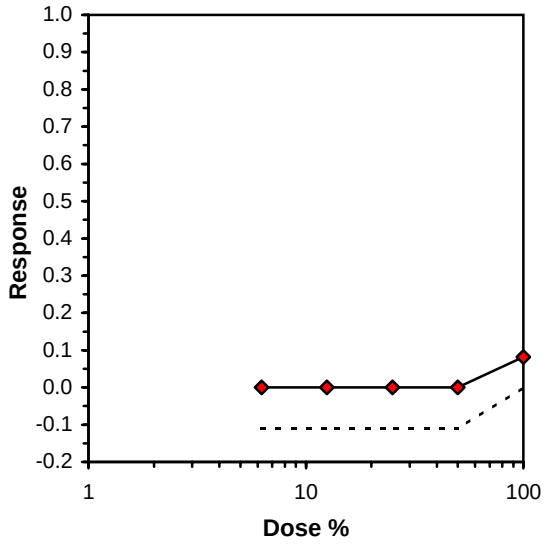
Conc-%	1	2	3	4	5	6	7	8	9	10
DMW-Control	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6.25	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Conc-%	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Isot Mean
DMW-Control	0.9000	1.0000	1	9	10	10			0.9800
6.25	1.0000	1.1111	0	10	10	10	0.5000	0.0500	0.9800
12.5	1.0000	1.1111	0	10	10	10	0.5000	0.0500	0.9800
25	1.0000	1.1111	0	10	10	10	0.5000	0.0500	0.9800
50	1.0000	1.1111	0	10	10	10	0.5000	0.0500	0.9800
100	0.9000	1.0000	1	9	10	10	0.7632	0.0500	0.9000

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	100	>100		1

Log-Logit Interpolation (200 Resamples)

Point	%	SD	95% CL	Skew
IC05	84.785			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date:	13/05/2008 15:30	Test ID:	PR365/2	Sample ID:	NS Final Outfall
End Date:	20/05/2008 16:00	Lab ID:	2715	Sample Type:	EFF2-Industrial
Sample Date:	12/05/2008 08:45	Protocol:	102-ESA SOP102	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Auxiliary Data Summary

Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
DMW-Control	% survival	90.00	0.00	100.00	31.62	6.25	10
6.25		100.00	100.00	100.00	0.00	0.00	10
12.5		100.00	100.00	100.00	0.00	0.00	10
25		100.00	100.00	100.00	0.00	0.00	10
50		100.00	100.00	100.00	0.00	0.00	10
100		90.00	0.00	100.00	31.62	6.25	10
DMW-Control	Temp C	25.00	25.00	25.00	0.00	0.00	1
6.25		25.00	25.00	25.00	0.00	0.00	1
12.5		25.00	25.00	25.00	0.00	0.00	1
25		25.00	25.00	25.00	0.00	0.00	1
50		25.00	25.00	25.00	0.00	0.00	1
100		25.00	25.00	25.00	0.00	0.00	1
DMW-Control	pH	8.30	8.30	8.30	0.00	0.00	1
6.25		8.50	8.50	8.50	0.00	0.00	1
12.5		8.60	8.60	8.60	0.00	0.00	1
25		8.60	8.60	8.60	0.00	0.00	1
50		8.60	8.60	8.60	0.00	0.00	1
100		8.50	8.50	8.50	0.00	0.00	1
DMW-Control	Cond uS/cm	170.00	170.00	170.00	0.00	0.00	1
6.25		312.00	312.00	312.00	0.00	0.00	1
12.5		441.00	441.00	441.00	0.00	0.00	1
25		679.00	679.00	679.00	0.00	0.00	1
50		1124.00	1124.00	1124.00	0.00	0.00	1
100		1423.00	1423.00	1423.00	0.00	0.00	1
DMW-Control	DO %sat	100.20	100.20	100.20	0.00	0.00	1
6.25		100.80	100.80	100.80	0.00	0.00	1
12.5		100.30	100.30	100.30	0.00	0.00	1
25		99.90	99.90	99.90	0.00	0.00	1
50		98.80	98.80	98.80	0.00	0.00	1
100		81.80	81.80	81.80	0.00	0.00	1

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	13/05/2008 15:30	Test ID:	PR365/3	Sample ID:	NS Final Outfall
End Date:	20/05/2008 16:00	Lab ID:	2715	Sample Type:	EFF2-Industrial
Sample Date:	12/05/2008 08:45	Protocol:	102-ESA SOP102	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-%	1	2	3	4	5	6	7	8	9	10
DMW-Control	24.000	0.000	20.000	16.000	16.000	20.000	20.000	12.000	16.000	16.000
6.25	28.000	28.000	24.000	28.000	24.000	26.000	30.000	22.000	33.000	21.000
12.5	31.000	26.000	21.000	32.000	34.000	34.000	38.000	32.000	32.000	36.000
25	35.000	31.000	35.000	32.000	31.000	35.000	31.000	30.000	24.000	39.000
50	35.000	34.000	34.000	36.000	34.000	40.000	34.000	34.000	33.000	34.000
100	35.000	37.000	26.000	30.000	35.000	33.000	38.000	31.000	22.000	0.000

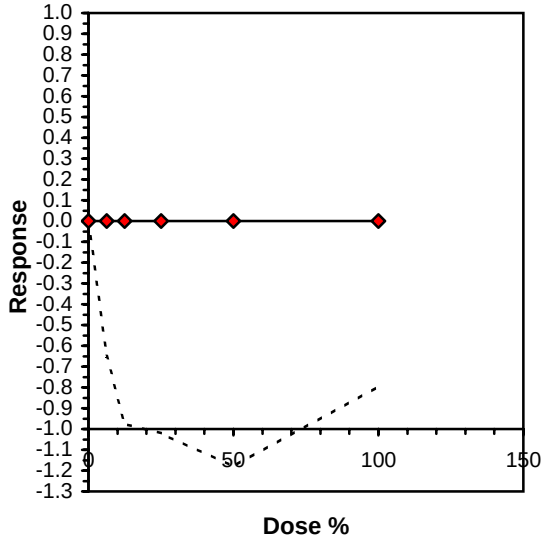
			Transform: Untransformed					Rank	1-Tailed	Isot
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean
DMW-Control	16.000	1.0000	16.000	0.000	24.000	40.825	10			28.300
6.25	26.400	1.6500	26.400	21.000	33.000	14.083	10	152.00	75.00	28.300
12.5	31.600	1.9750	31.600	21.000	38.000	15.517	10	154.00	75.00	28.300
25	32.300	2.0188	32.300	24.000	39.000	12.474	10	154.50	75.00	28.300
50	34.800	2.1750	34.800	33.000	40.000	5.715	10	155.00	75.00	28.300
100	28.700	1.7938	28.700	0.000	38.000	39.148	10	144.50	75.00	28.300

Auxiliary Tests	Statistic	Critical	Skew
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.406229	1.035	-2.27746
Bartlett's Test indicates unequal variances (p = 3.75E-05)	27.93536	15.08627	

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	100	>100		1

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL	Skew
IC05	>100			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	13/05/2008 15:30	Test ID:	PR365/3	Sample ID:	NS Final Outfall
End Date:	20/05/2008 16:00	Lab ID:	2715	Sample Type:	EFF2-Industrial
Sample Date:	12/05/2008 08:45	Protocol:	102-ESA SOP102	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Auxiliary Data Summary

Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
DMW-Control	# young	16.00	0.00	24.00	6.53	15.97	10
6.25		26.40	21.00	33.00	3.72	7.30	10
12.5		31.60	21.00	38.00	4.90	7.01	10
25		32.30	24.00	39.00	4.03	6.21	10
50		34.80	33.00	40.00	1.99	4.05	10
100		28.70	0.00	38.00	11.24	11.68	10
DMW-Control	Temp C	25.00	25.00	25.00	0.00	0.00	1
6.25		25.00	25.00	25.00	0.00	0.00	1
12.5		25.00	25.00	25.00	0.00	0.00	1
25		25.00	25.00	25.00	0.00	0.00	1
50		25.00	25.00	25.00	0.00	0.00	1
100		25.00	25.00	25.00	0.00	0.00	1
DMW-Control	pH	8.30	8.30	8.30	0.00	0.00	1
6.25		8.50	8.50	8.50	0.00	0.00	1
12.5		8.60	8.60	8.60	0.00	0.00	1
25		8.60	8.60	8.60	0.00	0.00	1
50		8.60	8.60	8.60	0.00	0.00	1
100		8.50	8.50	8.50	0.00	0.00	1
DMW-Control	Cond uS/cm	170.00	170.00	170.00	0.00	0.00	1
6.25		312.00	312.00	312.00	0.00	0.00	1
12.5		441.00	441.00	441.00	0.00	0.00	1
25		679.00	679.00	679.00	0.00	0.00	1
50		1124.00	1124.00	1124.00	0.00	0.00	1
100		1423.00	1423.00	1423.00	0.00	0.00	1
DMW-Control	DO %sat	100.20	100.20	100.20	0.00	0.00	1
6.25		100.80	100.80	100.80	0.00	0.00	1
12.5		100.30	100.30	100.30	0.00	0.00	1
25		99.90	99.90	99.90	0.00	0.00	1
50		98.80	98.80	98.80	0.00	0.00	1
100		81.80	81.80	81.80	0.00	0.00	1

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Statistical Printouts for the *Selenastrum* Growth Inhibition Tests

Phytoplankton Test-Growth-Cell Density

Start Date:	13/05/2008 13:30	Test ID:	PR365/5	Sample ID:	NS Final Outfall
End Date:	16/05/2008 13:30	Lab ID:	2715	Sample Type:	EFF2-Industrial
Sample Date:	12/05/2008 08:45	Protocol:	103-ESA SOP103	Test Species:	SC-Selenastrum capricornutum
Comments:					

Conc-%	1	2	3	4
DMW-Control	327000	270000	330000	337000
6.25	330000	230000	287000	350000
12.5	367000	417000	403000	313000
25	377000	403000	437000	427000
50	427000	493000	463000	457000
100	343000	433000	457000	413000

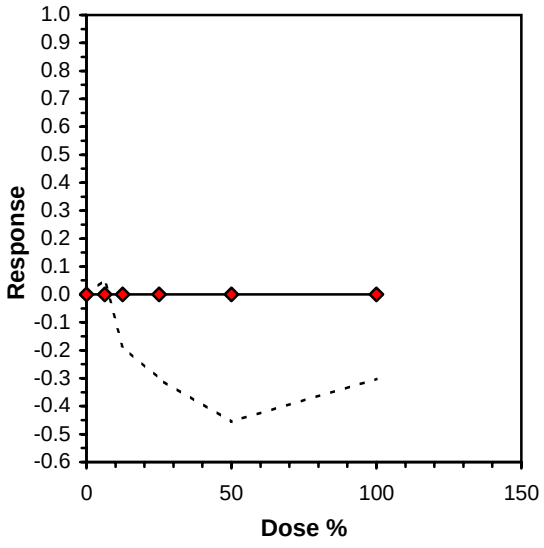
			Transform: Untransformed					1-Tailed			Isot
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean
DMW-Control	316000	1.0000	316000	270000	337000	9.795	4				378791.7
6.25	299250	0.9470	299250	230000	350000	17.753	4	0.586	2.410	68838.39	378791.7
12.5	375000	1.1867	375000	313000	417000	12.371	4	-2.066	2.410	68838.39	378791.7
25	411000	1.3006	411000	377000	437000	6.517	4	-3.326	2.410	68838.39	378791.7
50	460000	1.4557	460000	427000	493000	5.882	4	-5.041	2.410	68838.39	378791.7
100	411500	1.3022	411500	343000	457000	11.927	4	-3.343	2.410	68838.39	378791.7

Auxiliary Tests	Statistic	Critical	Skew
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.927964	0.884	-0.66141
Bartlett's Test indicates equal variances (p = 0.78)	2.501499	15.08627	

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob
Dunnett's Test	100	>100		1	68838.39	0.217843	1.52E+10	1.63E+09	1.6E-04

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>100			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



Phytoplankton Test-Growth-Cell Density

Start Date:	13/05/2008 13:30	Test ID:	PR365/5	Sample ID:	NS Final Outfall
End Date:	16/05/2008 13:30	Lab ID:	2715	Sample Type:	EFF2-Industrial
Sample Date:	12/05/2008 08:45	Protocol:	103-ESA SOP103	Test Species:	SC-Selenastrum capricornutum
Comments:					

Auxiliary Data Summary

Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
DMW-Control	cells x 1000	31.60	27.00	33.70	3.10	5.57	4
6.25		29.93	23.00	35.00	5.31	7.70	4
12.5		37.50	31.30	41.70	4.64	5.74	4
25		41.10	37.70	43.70	2.68	3.98	4
50		46.00	42.70	49.30	2.71	3.58	4
100		41.15	34.30	45.70	4.91	5.38	4
DMW-Control	Temp C	25.00	25.00	25.00	0.00	0.00	1
6.25		25.00	25.00	25.00	0.00	0.00	1
12.5		25.00	25.00	25.00	0.00	0.00	1
25		25.00	25.00	25.00	0.00	0.00	1
50		25.00	25.00	25.00	0.00	0.00	1
100		25.00	25.00	25.00	0.00	0.00	1
DMW-Control	pH	7.90	7.90	7.90	0.00	0.00	1
6.25		8.20	8.20	8.20	0.00	0.00	1
12.5		8.30	8.30	8.30	0.00	0.00	1
25		8.40	8.40	8.40	0.00	0.00	1
50		8.40	8.40	8.40	0.00	0.00	1
100		8.40	8.40	8.40	0.00	0.00	1
DMW-Control	Cond uS/cm	66.00	66.00	66.00	0.00	0.00	1
6.25		210.00	210.00	210.00	0.00	0.00	1
12.5		345.00	345.00	345.00	0.00	0.00	1
25		602.00	602.00	602.00	0.00	0.00	1
50		1080.00	1080.00	1080.00	0.00	0.00	1
100		1937.00	1937.00	1937.00	0.00	0.00	1
DMW-Control	DO %sat	100.50	100.50	100.50	0.00	0.00	1
6.25		98.40	98.40	98.40	0.00	0.00	1
12.5		97.00	97.00	97.00	0.00	0.00	1
25		96.80	96.80	96.80	0.00	0.00	1
50		93.70	93.70	93.70	0.00	0.00	1
100		81.10	81.10	81.10	0.00	0.00	1

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Statistical Printouts for the Larval Fish Imbalance Tests

Fish Imbalance Test-96 Hr Survival

Start Date:	13/05/2008 15:00	Test ID:	pr365/7	Sample ID:	NS Final Outfall
End Date:	17/05/2008 15:00	Lab ID:	2715	Sample Type:	EFF2-Industrial
Sample Date:	12/05/2008	Protocol:	117-ESA SOP117	Test Species:	MX-Melanotaenia splendida
Comments:					

Conc-%	1	2	3	4
D-Control	1.0000	1.0000	1.0000	1.0000
6.25	0.8000	0.0000	1.0000	1.0000
12.5	1.0000	0.8000	1.0000	1.0000
25	1.0000	1.0000	0.6000	1.0000
50	1.0000	1.0000	0.8000	1.0000
100	1.0000	1.0000	1.0000	1.0000

			Transform: Arcsin Square Root					Rank	1-Tailed	Isot
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean
D-Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4			1.0000
6.25	0.7000	0.7000	1.0058	0.2255	1.3453	52.910	4	14.00	10.00	0.9000
12.5	0.9500	0.9500	1.2857	1.1071	1.3453	9.261	4	16.00	10.00	0.9000
25	0.9000	0.9000	1.2305	0.8861	1.3453	18.660	4	16.00	10.00	0.9000
50	0.9500	0.9500	1.2857	1.1071	1.3453	9.261	4	16.00	10.00	0.9000
100	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0.9000

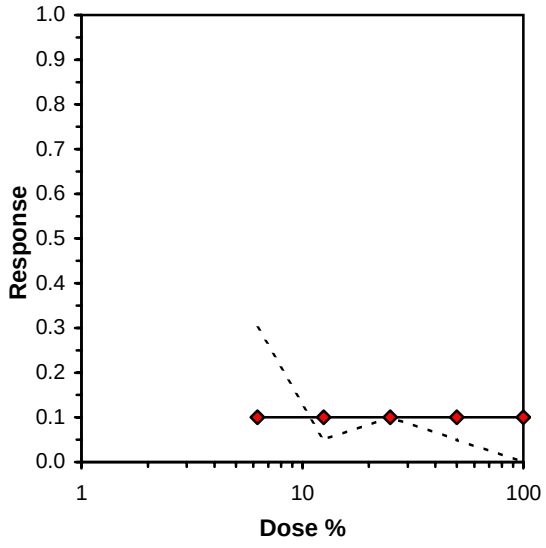
Auxiliary Tests	Statistic	Critical	Skew
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.762041	0.884	-2.02527
Equality of variance cannot be confirmed			

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	100	>100		1

Log-Logit Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05*	4.8705			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			

* indicates IC estimate less than the lowest concentration



Fish Imbalance Test-96 Hr Survival

Start Date:	13/05/2008 15:00	Test ID:	pr365/7	Sample ID:	NS Final Outfall
End Date:	17/05/2008 15:00	Lab ID:	2715	Sample Type:	EFF2-Industrial
Sample Date:	12/05/2008	Protocol:	117-ESA SOP117	Test Species:	MX-Melanotaenia splendida
Comments:					

Auxiliary Data Summary

Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
D-Control	% UN-AFFECTED	100.00	100.00	100.00	0.00	0.00	4
6.25		70.00	0.00	100.00	47.61	9.86	4
12.5		95.00	80.00	100.00	10.00	3.33	4
25		90.00	60.00	100.00	20.00	4.97	4
50		95.00	80.00	100.00	10.00	3.33	4
100		100.00	100.00	100.00	0.00	0.00	4
D-Control	Temp C	25.00	25.00	25.00	0.00	0.00	1
6.25		25.00	25.00	25.00	0.00	0.00	1
12.5		25.00	25.00	25.00	0.00	0.00	1
25		25.00	25.00	25.00	0.00	0.00	1
50		25.00	25.00	25.00	0.00	0.00	1
100		25.00	25.00	25.00	0.00	0.00	1
D-Control	pH	8.00	8.00	8.00	0.00	0.00	1
6.25		8.20	8.20	8.20	0.00	0.00	1
12.5		8.20	8.20	8.20	0.00	0.00	1
25		8.20	8.20	8.20	0.00	0.00	1
50		8.20	8.20	8.20	0.00	0.00	1
100		8.10	8.10	8.10	0.00	0.00	1
D-Control	Cond uS/cm	175.00	175.00	175.00	0.00	0.00	1
6.25		295.00	295.00	295.00	0.00	0.00	1
12.5		416.00	416.00	416.00	0.00	0.00	1
25		657.00	657.00	657.00	0.00	0.00	1
50		1087.00	1087.00	1087.00	0.00	0.00	1
100		1927.00	1927.00	1927.00	0.00	0.00	1
D-Control	DO %sat	99.90	99.90	99.90	0.00	0.00	1
6.25		99.80	99.80	99.80	0.00	0.00	1
12.5		98.70	98.70	98.70	0.00	0.00	1
25		98.20	98.20	98.20	0.00	0.00	1
50		98.80	98.80	98.80	0.00	0.00	1
100		102.10	102.10	102.10	0.00	0.00	1

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Statistical Printouts for the Acute Microtox® Toxicity Tests

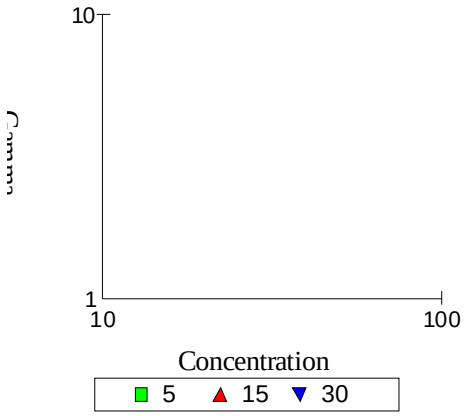
Statistics – Sample

Microtox Test for Sample: NS Outfall E08074

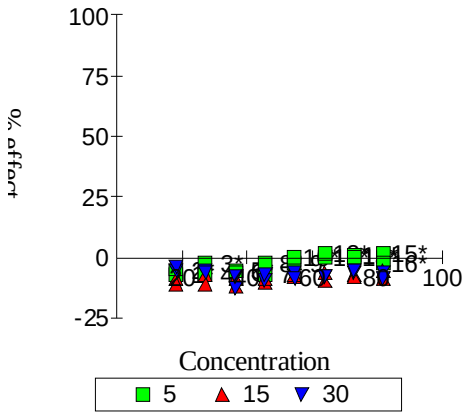
Date: 13/05/2008 03:17 PM

Test Protocol: 90% Basic Test (MOAS)
Sample: E08074
Toxicant: NS Outflow, ESA-Norske Skog Sample
Reagent Lot no.: -
Test description: 90% Protocol, centrifuged sample, 2% N
Test name: NS Outfall ESA
Database file: C:\Program Files\MicrotoxOmni\2007 General M2.mdb

Plot of Gamma vs Concentration



Plot of %Effect vs Concentration



			5 Mins Data:			15 Mins Data:			30 Mins Data:		
Sample	Conc	Io	It	Gamma	% effect	It	Gamma	% effect	It	Gamma	% effect
Control	0.000	94.32	88.37	0.9369 *		81.85	0.8678 #		79.24	0.8401 #	
Control	0.000	99.01	94.90	0.9585 #		85.13	0.8598 #		82.66	0.8349 #	
Control	0.000	93.82	93.15	0.9929 #		82.60	0.8804 #		80.60	0.8591 #	
Control	0.000	93.17	92.27	0.9903 #		84.69	0.9090 #		82.14	0.8816 #	
1	18.20	90.63	94.98	-0.0643 *	-6.877%	86.75	-0.0814 *	-8.864%	81.71	-0.0528 *	-5.581%
2	18.20	93.14	95.94	-0.0480 *	-5.048%	90.73	-0.0974 *	-10.79%	82.81	-0.0395 *	-4.119%
3	27.30	91.93	92.22	-0.0225 *	-2.304%	86.59	-0.0665 *	-7.127%	82.83	-0.0522 *	-5.514%
4	27.30	90.22	94.52	-0.0640 *	-6.843%	88.05	-0.0990 *	-11.00%	81.84	-0.0586 *	-6.229%
5	36.40	88.28	91.53	-0.0542 *	-5.737%	86.93	-0.1071 *	-11.99%	85.00	-0.1131 *	-12.76%
6	36.40	90.07	93.55	-0.0559 *	-5.923%	86.32	-0.0825 *	-8.998%	82.76	-0.0706 *	-7.602%
7	45.50	90.24	94.53	-0.0639 *	-6.830%	87.67	-0.0949 *	-10.49%	84.50	-0.0880 *	-9.658%
8	45.50	90.86	91.28	-0.0239 *	-2.454%	86.72	-0.0787 *	-8.551%	82.84	-0.0634 *	-6.770%
9	54.60	87.46	87.86	-0.0239 *	-2.449%	82.90	-0.0723 *	-7.804%	79.56	-0.0612 *	-6.529%
10	54.60	92.10	90.13	0.0019 *	0.1991%	86.73	-0.0663 *	-7.102%	85.52	-0.0803 *	-8.740%
11	63.90	85.11	83.63	-0.0020 *	-0.2089%	82.23	-0.0899 *	-9.885%	78.64	-0.0758 *	-8.204%
12	63.90	90.93	87.72	0.0164 *	1.618%	85.06	-0.0600 *	-6.391%	83.66	-0.0718 *	-7.744%
13	72.80	88.09	85.52	0.0100 *	0.9930%	83.03	-0.0671 *	-7.200%	80.07	-0.0605 *	-6.445%
14	72.80	88.56	86.95	-0.0012 *	-0.1282%	84.21	-0.0753 *	-8.147%	79.98	-0.0544 *	-5.761%
15	81.90	86.16	82.74	0.0210 *	2.066%	80.21	-0.0555 *	-5.879%	77.92	-0.0557 *	-5.907%
16	81.90	85.10	85.35	-0.0223 *	-2.282%	81.42	-0.0810 *	-8.815%	78.92	-0.0792 *	-8.602%

- used in calculation; * - invalid data; D - deleted from calcs.

Statistical calculations could not be performed on the 5, 15 or 30 Mins data.
Hormesis detected.

Microtox®-5-min

Start Date:	13/05/2008 16:05	Test ID:	ESA	Sample ID:	E08074
End Date:	13/05/2008 16:50	Lab ID:	CSIRO-CECR	Sample Type:	NS Outfall
Sample Date:		Protocol:	AE-Azur Environmental	Test Species:	VF-Vibrio fisheri
Comments:					

Conc-%	1	2	3	4
Control	0.9369	0.9585	0.9929	0.9903
18.2	1.0480	1.0301		
27.3	1.0032	1.0477		
36.4	1.0368	1.0386		
45.5	1.0475	1.0046		
54.6	1.0046	0.9786		
63.9	0.9826	0.9647		
72.8	0.9708	0.9818		
81.9	0.9603	1.0029		

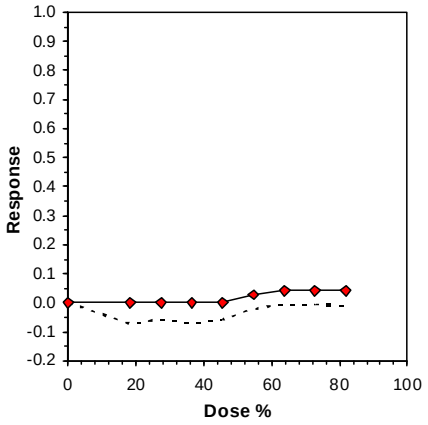
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9697	1.0000	0.9697	0.9369	0.9929	2.769	4				1.0196	1.0000
18.2	1.0390	1.0716	1.0390	1.0301	1.0480	1.221	2	-3.518	2.981	0.0588	1.0196	1.0000
27.3	1.0254	1.0575	1.0254	1.0032	1.0477	3.069	2	-2.827	2.981	0.0588	1.0196	1.0000
36.4	1.0377	1.0702	1.0377	1.0368	1.0386	0.124	2	-3.452	2.981	0.0588	1.0196	1.0000
45.5	1.0261	1.0582	1.0261	1.0046	1.0475	2.958	2	-2.862	2.981	0.0588	1.0196	1.0000
54.6	0.9916	1.0226	0.9916	0.9786	1.0046	1.851	2	-1.113	2.981	0.0588	0.9916	0.9726
63.9	0.9737	1.0041	0.9737	0.9647	0.9826	1.301	2	-0.203	2.981	0.0588	0.9772	0.9584
72.8	0.9763	1.0069	0.9763	0.9708	0.9818	0.796	2	-0.338	2.981	0.0588	0.9772	0.9584
81.9	0.9816	1.0123	0.9816	0.9603	1.0029	3.071	2	-0.607	2.981	0.0588	0.9772	0.9584

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.938183	0.868	-0.16993	-1.09481
Bartlett's Test indicates equal variances (p = 0.66)	5.877397	20.09023		

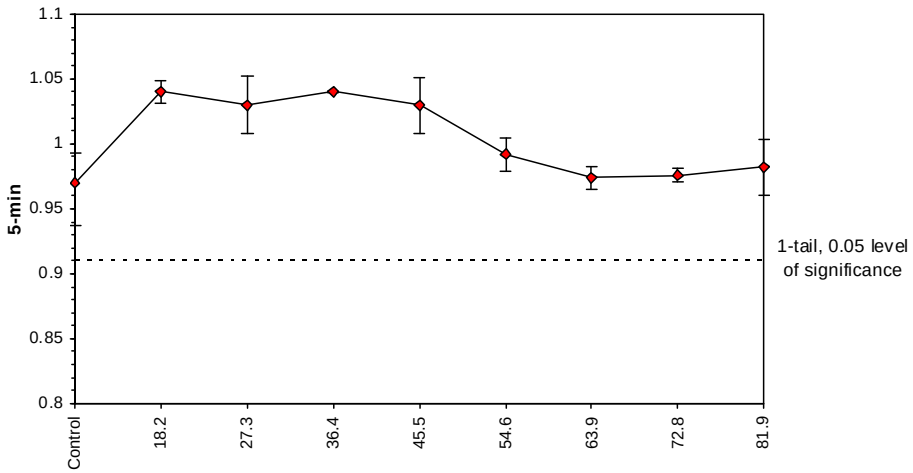
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	81.9	>81.9		1.221001	0.058781	0.060621	0.001942	0.000518	0.023196	8, 11

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>81.9			
IC10	>81.9			
IC15	>81.9			
IC20	>81.9			
IC25	>81.9			
IC40	>81.9			
IC50	>81.9			



Dose-Response Plot



Microtox®-5-min

Start Date:	13/05/2008 16:05	Test ID:	ESA	Sample ID:	E08074
End Date:	13/05/2008 16:50	Lab ID:	CSIRO-CECR	Sample Type:	NS Outfall
Sample Date:		Protocol:	AE-Azur Environmental	Test Species:	VF-Vibrio fisheri
Comments:					

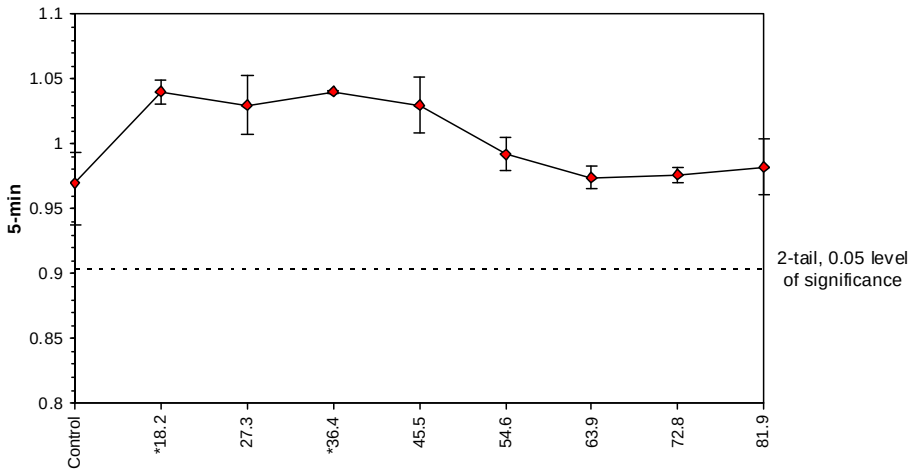
Conc-%	1	2	3	4
Control	0.9369	0.9585	0.9929	0.9903
18.2	1.0480	1.0301		
27.3	1.0032	1.0477		
36.4	1.0368	1.0386		
45.5	1.0475	1.0046		
54.6	1.0046	0.9786		
63.9	0.9826	0.9647		
72.8	0.9708	0.9818		
81.9	0.9603	1.0029		

			Transform: Untransformed					2-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.9697	1.0000	0.9697	0.9369	0.9929	2.769	4			
*18.2	1.0390	1.0716	1.0390	1.0301	1.0480	1.221	2	3.518	3.370	0.0665
27.3	1.0254	1.0575	1.0254	1.0032	1.0477	3.069	2	2.827	3.370	0.0665
*36.4	1.0377	1.0702	1.0377	1.0368	1.0386	0.124	2	3.452	3.370	0.0665
45.5	1.0261	1.0582	1.0261	1.0046	1.0475	2.958	2	2.862	3.370	0.0665
54.6	0.9916	1.0226	0.9916	0.9786	1.0046	1.851	2	1.113	3.370	0.0665
63.9	0.9737	1.0041	0.9737	0.9647	0.9826	1.301	2	0.203	3.370	0.0665
72.8	0.9763	1.0069	0.9763	0.9708	0.9818	0.796	2	0.338	3.370	0.0665
81.9	0.9816	1.0123	0.9816	0.9603	1.0029	3.071	2	0.607	3.370	0.0665

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.938183	0.868	-0.16993	-1.09481
Bartlett's Test indicates equal variances (p = 0.66)	5.877397	20.09023		

Hypothesis Test (2-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	81.9	>81.9		1.221001	0.066459	0.068539	0.001942	0.000518	0.023196	8, 11

Dose-Response Plot



Microtox®-15-min

Start Date:	13/05/2008 16:05	Test ID:	ESA	Sample ID:	E08074
End Date:	13/05/2008 16:50	Lab ID:	CSIRO-CECR	Sample Type:	NS Outfall
Sample Date:		Protocol:	AE-Azur Environmental	Test Species:	VF-Vibrio fisheri
Comments:					

Conc-%	1	2	3	4
Control	0.8678	0.8598	0.8804	0.9090
18.2	0.9572	0.9741		
27.3	0.9419	0.9759		
36.4	0.9847	0.9584		
45.5	0.9715	0.9544		
54.6	0.9479	0.9417		
63.9	0.9662	0.9354		
72.8	0.9426	0.9509		
81.9	0.9309	0.9568		

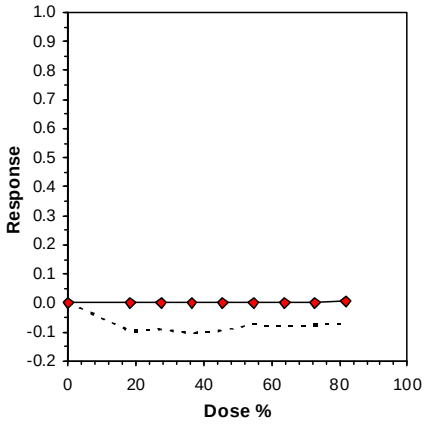
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.8792	1.0000	0.8792	0.8598	0.9090	2.452	4				0.9477	1.0000
18.2	0.9657	1.0983	0.9657	0.9572	0.9741	1.240	2	-5.619	2.981	0.0458	0.9477	1.0000
27.3	0.9589	1.0906	0.9589	0.9419	0.9759	2.510	2	-5.181	2.981	0.0458	0.9477	1.0000
36.4	0.9715	1.1050	0.9715	0.9584	0.9847	1.917	2	-6.001	2.981	0.0458	0.9477	1.0000
45.5	0.9630	1.0952	0.9630	0.9544	0.9715	1.255	2	-5.445	2.981	0.0458	0.9477	1.0000
54.6	0.9448	1.0745	0.9448	0.9417	0.9479	0.462	2	-4.261	2.981	0.0458	0.9477	1.0000
63.9	0.9508	1.0814	0.9508	0.9354	0.9662	2.284	2	-4.653	2.981	0.0458	0.9477	1.0000
72.8	0.9467	1.0767	0.9467	0.9426	0.9509	0.622	2	-4.387	2.981	0.0458	0.9467	0.9990
81.9	0.9438	1.0735	0.9438	0.9309	0.9568	1.934	2	-4.201	2.981	0.0458	0.9438	0.9959

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.955965	0.868	0.413557	-0.59558
Bartlett's Test indicates equal variances (p = 0.92)	3.163157	20.09023		

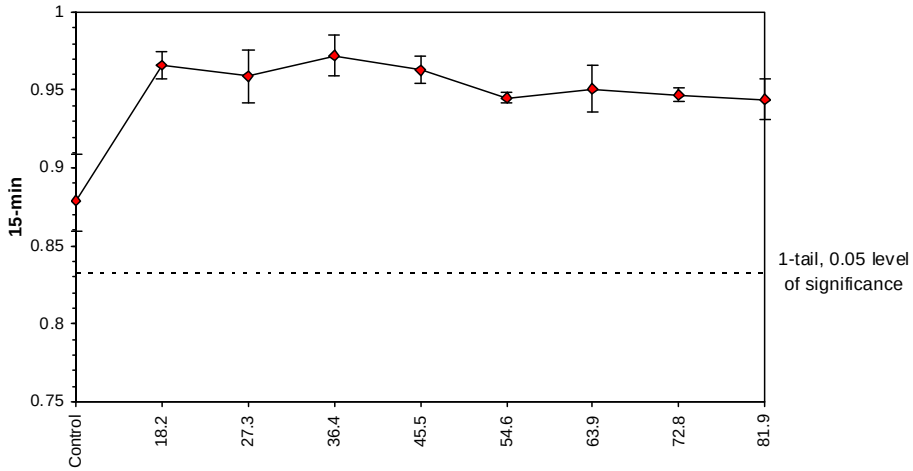
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	81.9	>81.9		1.221001	0.045842	0.052137	0.00253	0.000315	0.001194	8, 11

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>81.9			
IC10	>81.9			
IC15	>81.9			
IC20	>81.9			
IC25	>81.9			
IC40	>81.9			
IC50	>81.9			



Dose-Response Plot



Microtox®-15-min

Start Date:	13/05/2008 16:05	Test ID:	ESA	Sample ID:	E08074
End Date:	13/05/2008 16:50	Lab ID:	CSIRO-CECR	Sample Type:	NS Outfall
Sample Date:		Protocol:	AE-Azur Environmental	Test Species:	VF-Vibrio fisheri
Comments:					

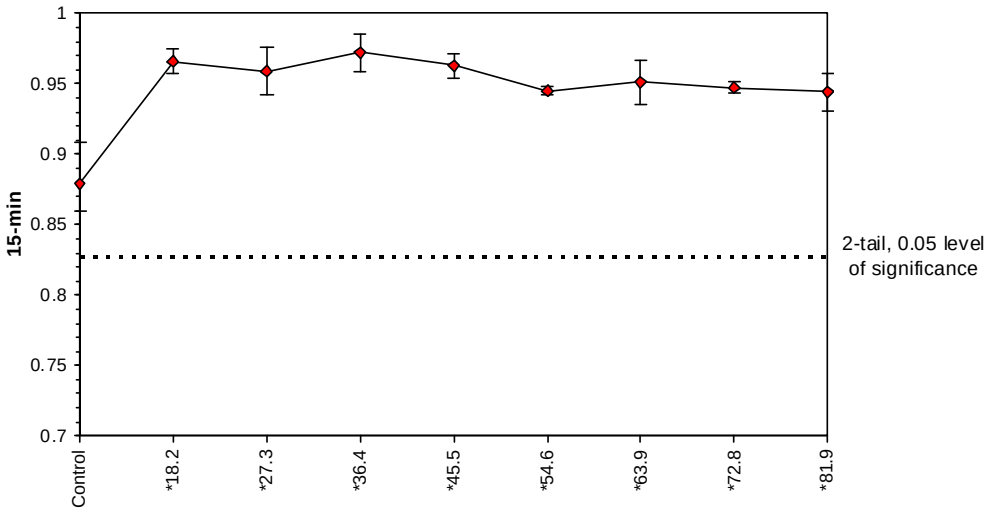
Conc-%	1	2	3	4
Control	0.8678	0.8598	0.8804	0.9090
18.2	0.9572	0.9741		
27.3	0.9419	0.9759		
36.4	0.9847	0.9584		
45.5	0.9715	0.9544		
54.6	0.9479	0.9417		
63.9	0.9662	0.9354		
72.8	0.9426	0.9509		
81.9	0.9309	0.9568		

			Transform: Untransformed						2-Tailed	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.8792	1.0000	0.8792	0.8598	0.9090	2.452	4			
*18.2	0.9657	1.0983	0.9657	0.9572	0.9741	1.240	2	5.619	3.370	0.0518
*27.3	0.9589	1.0906	0.9589	0.9419	0.9759	2.510	2	5.181	3.370	0.0518
*36.4	0.9715	1.1050	0.9715	0.9584	0.9847	1.917	2	6.001	3.370	0.0518
*45.5	0.9630	1.0952	0.9630	0.9544	0.9715	1.255	2	5.445	3.370	0.0518
*54.6	0.9448	1.0745	0.9448	0.9417	0.9479	0.462	2	4.261	3.370	0.0518
*63.9	0.9508	1.0814	0.9508	0.9354	0.9662	2.284	2	4.653	3.370	0.0518
*72.8	0.9467	1.0767	0.9467	0.9426	0.9509	0.622	2	4.387	3.370	0.0518
*81.9	0.9438	1.0735	0.9438	0.9309	0.9568	1.934	2	4.201	3.370	0.0518

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.955965	0.868	0.413557	-0.59558
Bartlett's Test indicates equal variances (p = 0.92)	3.163157	20.09023		

Hypothesis Test (2-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	<18.2	18.2			0.051829	0.058947	0.00253	0.000315	0.001194	8, 11

Dose-Response Plot



Microtox®-30-min

Start Date:	13/05/2008 16:05	Test ID:	ESA	Sample ID:	E08074
End Date:	13/05/2008 16:50	Lab ID:	CSIRO-CECR	Sample Type:	NS Outfall
Sample Date:		Protocol:	AE-Azur Environmental	Test Species:	VF-Vibrio fisheri
Comments:					

Conc-%	1	2	3	4
Control	0.8401	0.8349	0.8591	0.8816
18.2	0.9016	0.8891		
27.3	0.9010	0.9071		
36.4	0.9628	0.9188		
45.5	0.9364	0.9117		
54.6	0.9097	0.9286		
63.9	0.9240	0.9200		
72.8	0.9090	0.9031		
81.9	0.9044	0.9274		

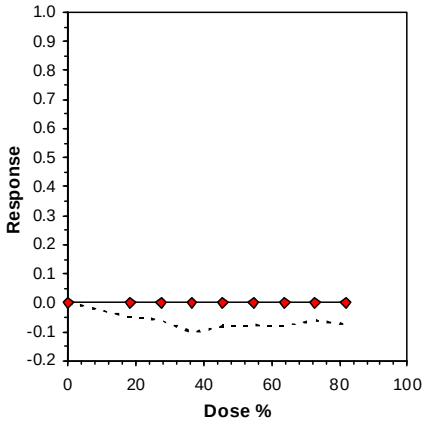
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.8539	1.0000	0.8539	0.8349	0.8816	2.482	4				0.9090	1.0000
18.2	0.8953	1.0485	0.8953	0.8891	0.9016	0.986	2	-2.811	2.981	0.0439	0.9090	1.0000
27.3	0.9041	1.0587	0.9041	0.9010	0.9071	0.477	2	-3.403	2.981	0.0439	0.9090	1.0000
36.4	0.9408	1.1018	0.9408	0.9188	0.9628	3.307	2	-5.899	2.981	0.0439	0.9090	1.0000
45.5	0.9241	1.0821	0.9241	0.9117	0.9364	1.887	2	-4.760	2.981	0.0439	0.9090	1.0000
54.6	0.9191	1.0763	0.9191	0.9097	0.9286	1.453	2	-4.425	2.981	0.0439	0.9090	1.0000
63.9	0.9220	1.0797	0.9220	0.9200	0.9240	0.302	2	-4.621	2.981	0.0439	0.9090	1.0000
72.8	0.9060	1.0610	0.9060	0.9031	0.9090	0.456	2	-3.537	2.981	0.0439	0.9090	1.0000
81.9	0.9159	1.0725	0.9159	0.9044	0.9274	1.777	2	-4.204	2.981	0.0439	0.9090	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.981354	0.868	0.31867	-0.12771
Bartlett's Test indicates equal variances (p = 0.61)	6.333463	20.09023		

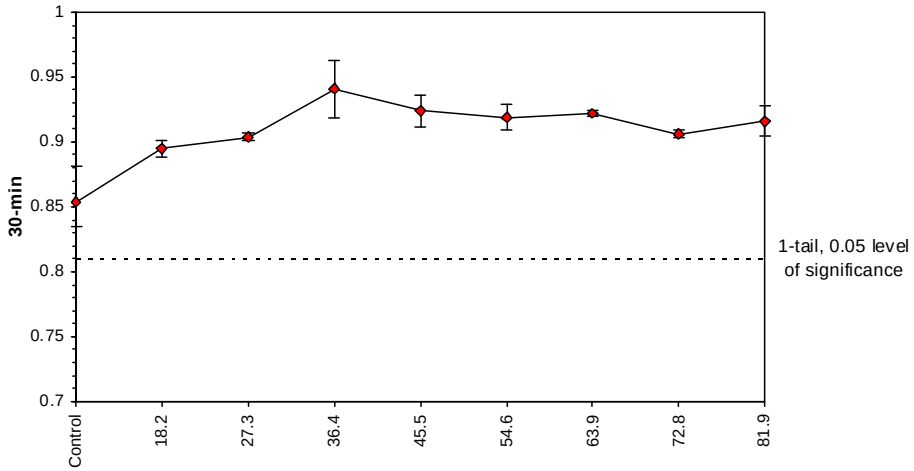
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	81.9	>81.9		1.221001	0.04392	0.051434	0.001887	0.000289	0.002873	8, 11

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>81.9			
IC10	>81.9			
IC15	>81.9			
IC20	>81.9			
IC25	>81.9			
IC40	>81.9			
IC50	>81.9			



Dose-Response Plot



Microtox®-30-min

Start Date:	13/05/2008 16:05	Test ID:	ESA	Sample ID:	E08074
End Date:	13/05/2008 16:50	Lab ID:	CSIRO-CECR	Sample Type:	NS Outfall
Sample Date:		Protocol:	AE-Azur Environmental	Test Species:	VF-Vibrio fisheri
Comments:					

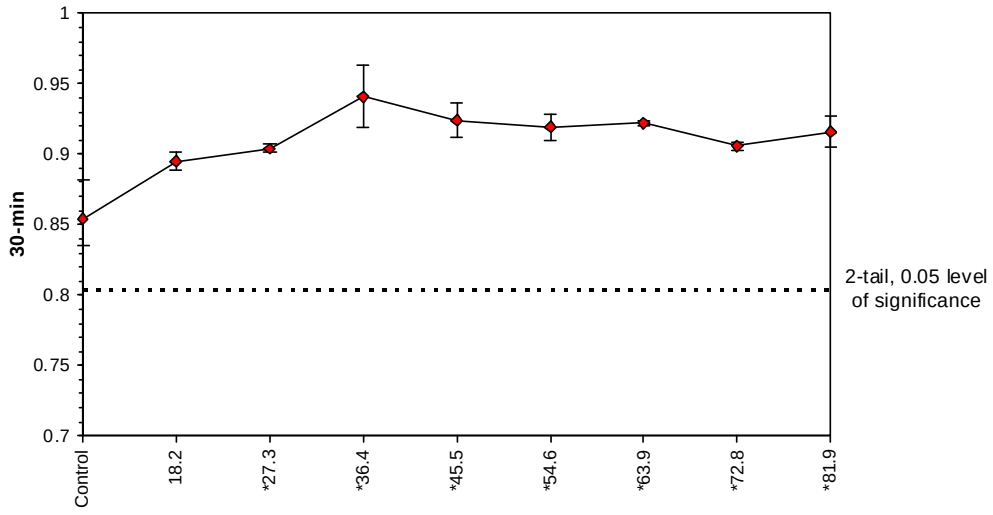
Conc-%	1	2	3	4
Control	0.8401	0.8349	0.8591	0.8816
18.2	0.9016	0.8891		
27.3	0.9010	0.9071		
36.4	0.9628	0.9188		
45.5	0.9364	0.9117		
54.6	0.9097	0.9286		
63.9	0.9240	0.9200		
72.8	0.9090	0.9031		
81.9	0.9044	0.9274		

			Transform: Untransformed						2-Tailed	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.8539	1.0000	0.8539	0.8349	0.8816	2.482	4			
18.2	0.8953	1.0485	0.8953	0.8891	0.9016	0.986	2	2.811	3.370	0.0497
*27.3	0.9041	1.0587	0.9041	0.9010	0.9071	0.477	2	3.403	3.370	0.0497
*36.4	0.9408	1.1018	0.9408	0.9188	0.9628	3.307	2	5.899	3.370	0.0497
*45.5	0.9241	1.0821	0.9241	0.9117	0.9364	1.887	2	4.760	3.370	0.0497
*54.6	0.9191	1.0763	0.9191	0.9097	0.9286	1.453	2	4.425	3.370	0.0497
*63.9	0.9220	1.0797	0.9220	0.9200	0.9240	0.302	2	4.621	3.370	0.0497
*72.8	0.9060	1.0610	0.9060	0.9031	0.9090	0.456	2	3.537	3.370	0.0497
*81.9	0.9159	1.0725	0.9159	0.9044	0.9274	1.777	2	4.204	3.370	0.0497

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.981354	0.868	0.31867	-0.12771
Bartlett's Test indicates equal variances (p = 0.61)	6.333463	20.09023		

Hypothesis Test (2-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	18.2	27.3	22.29036	5.494505	0.049657	0.058151	0.001887	0.000289	0.002873	8, 11

Dose-Response Plot

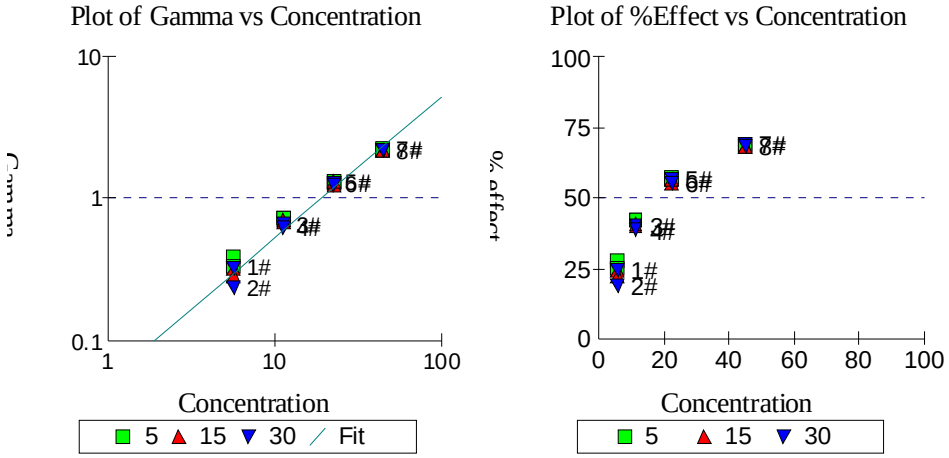


Reference Toxicant:

Microtox Test for Sample: Phenol Std 13.05.08

Date: 13/05/2008 04:20 PM

Test Protocol: Phenol Standard
Sample: Phenol 13.05.08
Toxicant: Phenol
Reagent Lot no.: -
Test description: Phenol Standard 13.05.08, beside NS Ou
Test name: Phenol 13.05.08
Database file: C:\Program Files\MicrotoxOmni\2007 General M2.mdb



			5 Mins Data:			15 Mins Data:			30 Mins Data:		
Sample	Conc	Io	It	Gamma	% effect	It	Gamma	% effect	It	Gamma	% effect
Control	0.000	94.51	83.50	0.8835 #		77.87	0.8239 #		73.66	0.7794 #	
Control	0.000	98.42	85.39	0.8676 #		79.45	0.8073 #		75.76	0.7698 #	
Control	0.000	98.81	84.15	0.8516 #		79.55	0.8051 #		76.28	0.7720 #	
Control	0.000	95.94	81.93	0.8540 #		79.23	0.8258 #		75.16	0.7834 #	
1	5.625	94.13	58.66	0.3867 #	27.89%	58.25	0.3179 #	24.12%	55.13	0.3252 #	24.54%
2	5.625	85.02	55.24	0.3301 #	24.82%	53.91	0.2861 #	22.25%	53.44	0.2348 #	19.01%
3	11.25	97.96	48.94	0.7298 #	42.19%	47.66	0.6762 #	40.34%	45.73	0.6626 #	39.85%
4	11.25	95.27	47.61	0.7293 #	42.17%	45.84	0.6949 #	41.00%	45.53	0.6240 #	38.43%
5	22.50	96.83	36.53	1.291 #	56.34%	35.24	1.241 #	55.37%	32.75	1.295 #	56.42%
6	22.50	95.94	35.68	1.324 #	56.97%	34.00	1.301 #	56.54%	33.16	1.246 #	55.47%
7	45.00	92.15	24.71	2.223 #	68.97%	23.65	2.178 #	68.53%	22.33	2.203 #	68.78%
8	45.00	97.88	26.61	2.179 #	68.54%	25.16	2.173 #	68.48%	23.93	2.175 #	68.50%

- used in calculation; * - invalid data; D - deleted from calcs.

Microtox Test for Sample: Phenol Std 13.05.08 continued…

Calculations on 5 Mins data:
EC50 Concentration:17.27mg/L (95% confidence range: 16.06 to 18.57)
95% Confidence Factor: 1.076
Estimating Equation:LOG C =1.138 x LOG G +1.237
Coeff. of Determination (R^2):0.9913
Slope: 0.8710
Correction Factor: 0.8642

Calculations on 15 Mins data:
EC50 Concentration:18.42mg/L (95% confidence range: 16.94 to 20.03)
95% Confidence Factor: 1.087
Estimating Equation:LOG C =1.047 x LOG G +1.265
Coeff. of Determination (R^2):0.9887
Slope: 0.9442
Correction Factor: 0.8155

Calculations on 30 Mins data:
EC50 Concentration:18.93mg/L (95% confidence range: 16.88 to 21.23)
95% Confidence Factor: 1.121
Estimating Equation:LOG C =0.9852 x LOG G +1.277
Coeff. of Determination (R^2):0.9792
Slope: 0.9939
Correction Factor: 0.7761

Microtox®-5-min

Start Date:	13/05/2008 17:05	Test ID:	ESA	Sample ID:	REF-Ref Toxicant
End Date:	13/05/2008 17:50	Lab ID:	CSIRO-CECR	Sample Type:	PH-Phenol Standard
Sample Date:		Protocol:	AE-Azur Environmental	Test Species:	VF-Vibrio fisheri
Comments:	nominal concentrations				

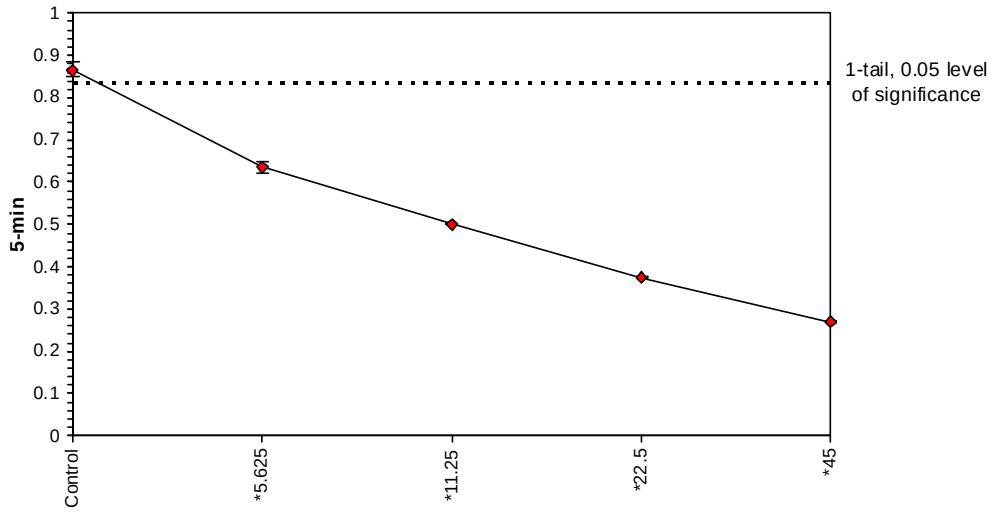
Conc-mg/L	1	2	3	4
Control	0.8835	0.8676	0.8516	0.8540
5.625	0.6232	0.6497		
11.25	0.4996	0.4997		
22.5	0.3773	0.3719		
45	0.2681	0.2719		

			Transform: Untransformed					1-Tailed		
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.8642	1.0000	0.8642	0.8516	0.8835	1.699	4			
*5.625	0.6365	0.7365	0.6365	0.6232	0.6497	2.950	2	21.778	2.841	0.0297
*11.25	0.4997	0.5782	0.4997	0.4996	0.4997	0.021	2	34.860	2.841	0.0297
*22.5	0.3746	0.4335	0.3746	0.3719	0.3773	1.012	2	46.823	2.841	0.0297
*45	0.2700	0.3124	0.2700	0.2681	0.2719	0.973	2	56.824	2.841	0.0297

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.931444	0.805	0.51508	0.314235
Bartlett's Test indicates equal variances (p = 0.05)	9.514215	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	<5.625	5.625			0.029709	0.034379	0.154655	0.000146	8.1E-10	4, 7

Dose-Response Plot



Microtox®-15-min

Start Date:	13/05/2008 17:05	Test ID:	ESA	Sample ID:	REF-Ref Toxicant
End Date:	13/05/2008 17:50	Lab ID:	CSIRO-CECR	Sample Type:	PH-Phenol Standard
Sample Date:		Protocol:	AE-Azur Environmental	Test Species:	VF-Vibrio fisheri
Comments:	nominal concentrations				

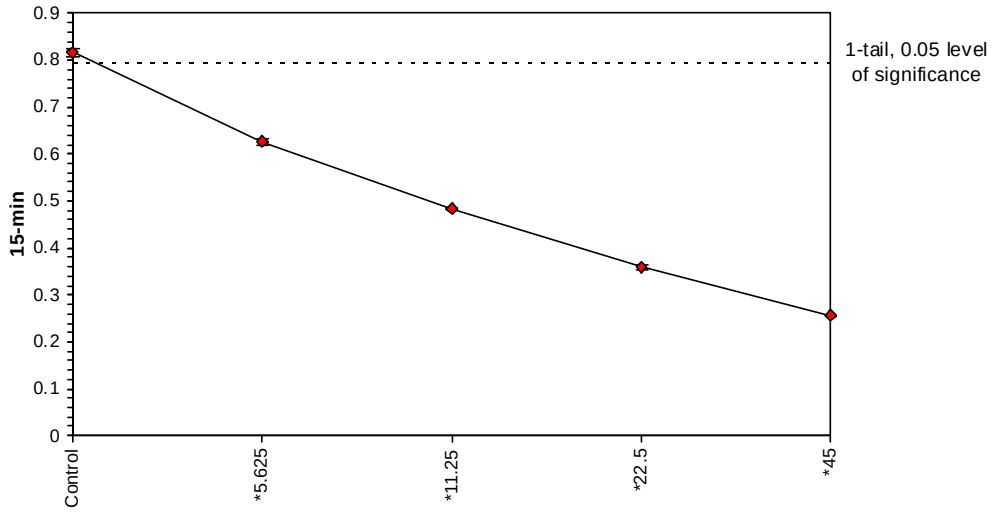
Conc-mg/L	1	2	3	4
Control	0.8239	0.8073	0.8051	0.8258
5.625	0.6188	0.6341		
11.25	0.4865	0.4812		
22.5	0.3639	0.3544		
45	0.2566	0.2570		

			Transform: Untransformed					1-Tailed		
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.8155	1.0000	0.8155	0.8051	0.8258	1.333	4			
*5.625	0.6265	0.7682	0.6265	0.6188	0.6341	1.723	2	25.069	2.841	0.0214
*11.25	0.4838	0.5933	0.4838	0.4812	0.4865	0.784	2	43.979	2.841	0.0214
*22.5	0.3592	0.4404	0.3592	0.3544	0.3639	1.880	2	60.510	2.841	0.0214
*45	0.2568	0.3149	0.2568	0.2566	0.2570	0.111	2	74.076	2.841	0.0214

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.954338	0.805	-0.00519	-1.27497
Bartlett's Test indicates equal variances (p = 0.25)	5.37606	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	<5.625	5.625			0.021428	0.026276	0.136519	7.58E-05	1.3E-10	4, 7

Dose-Response Plot



Microtox®-30-min

Start Date:	13/05/2008 17:05	Test ID:	ESA	Sample ID:	REF-Ref Toxicant
End Date:	13/05/2008 17:50	Lab ID:	CSIRO-CECR	Sample Type:	PH-Phenol Standard
Sample Date:		Protocol:	AE-Azur Environmental	Test Species:	VF-Vibrio fisheri
Comments:	nominal concentrations				

Conc-mg/L	1	2	3	4
Control	0.7794	0.7698	0.7720	0.7834
5.625	0.5857	0.6286		
11.25	0.4668	0.4779		
22.5	0.3382	0.3456		
45	0.2423	0.2445		

			Transform: Untransformed					1-Tailed		
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.7761	1.0000	0.7761	0.7698	0.7834	0.819	4			
*5.625	0.6071	0.7822	0.6071	0.5857	0.6286	4.994	2	15.349	2.841	0.0313
*11.25	0.4724	0.6086	0.4724	0.4668	0.4779	1.659	2	27.586	2.841	0.0313
*22.5	0.3419	0.4406	0.3419	0.3382	0.3456	1.533	2	39.431	2.841	0.0313
*45	0.2434	0.3136	0.2434	0.2423	0.2445	0.628	2	48.378	2.841	0.0313

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.937092	0.805	0.009236	2.362406
Bartlett's Test indicates equal variances (p = 0.14)	6.966578	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	<5.625	5.625			0.031287	0.040312	0.123858	0.000162	2.5E-09	4, 7

Dose-Response Plot