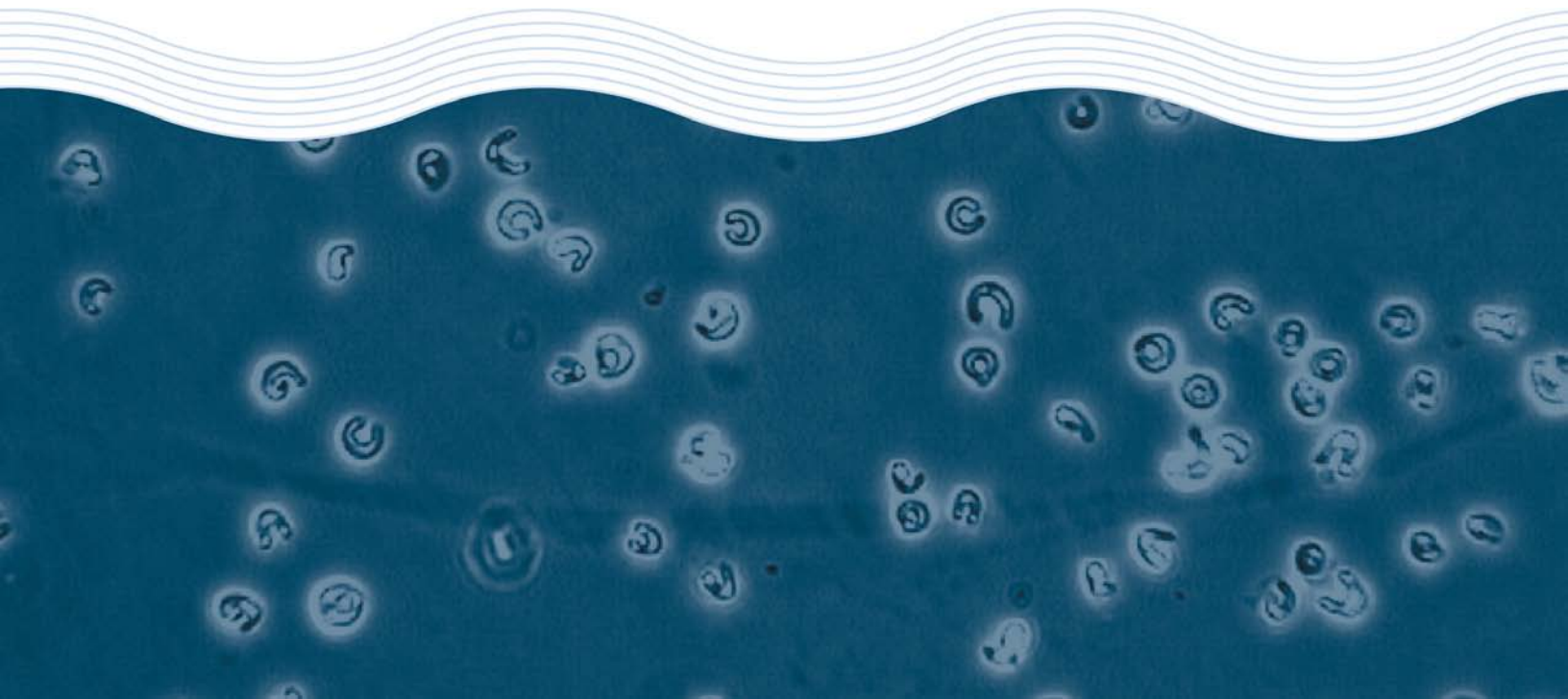


# **Toxicity Assessment of Two Outfall Samples from the Adelaide Desalination Plant**

**Adelaide Aqua**

**Test Report**

**May 2012**



# **Toxicity Assessment of Two Outfall Samples from the Adelaide Desalination Plant**

**Adelaide Aqua**

**Test Report**

**May 2012**

## Toxicity Test Report: TR0686/3

(page 1 of 2)

This document is issued in accordance with NATA's accreditation requirements

<b>Client:</b>	Adelaide Aqua 16 Chrysler Rd Lonsdale SA 5160	<b>ESA Job #:</b>	PR0686
<b>Attention:</b>	Vanessa Ayala	<b>Date Sampled:</b>	15 & 17 May 2012
<b>Client Ref:</b>	Not supplied	<b>Date Received:</b>	18 & 23 May 2012
		<b>Sampled By:</b>	Client
		<b>ESA Quote #:</b>	PL0686_q01

Lab ID No.:	Sample Name:	Sample Description:
5445	Outfall 20%	Aqueous sample, pH 8.0, salinity 65.0‰, total ammonia <2.0mg/L*. Sample received at 16.0°C in apparent good condition
5446	Outfall 30%	Aqueous sample, pH 8.0, salinity 68.0‰, total ammonia <2.0mg/L*. Sample received at 16.0°C in apparent good condition
5467	Seawater	Aqueous sample, pH 8.1, salinity 37.4‰, total ammonia <2.0mg/L*. Sample received at room temperature in apparent good condition

\*Ammonia analysis is not covered by Ecotox Services Australasia's scope of accreditation

<b>Test Performed:</b>	48-hr larval development test using the mussel <i>Mytilus galloprovincialis</i>
<b>Test Protocol:</b>	ESA SOP 106 (ESA 2011), based on APHA (1998) and USEPA (1996)
<b>Test Temperature:</b>	The test was performed at 20±1°C
<b>Deviations from Protocol:</b>	Nil
<b>Comments on Solution Preparation:</b>	The samples 5445 'Outfall 20%' and 5446 'Outfall 30%' were serially diluted with sample 5467 'Seawater' to achieve the test concentrations. A filtered seawater (FSW) control and a diluent control (seawater) were tested concurrently with the samples.
<b>Source of Test Organisms:</b>	Gulf of St Vincent, SA
<b>Test Initiated:</b>	31 May 2012 at 1600h

Sample 5445: Outfall 20%		Sample 5446: Outfall 30%		Vacant
Concentration (%)	% Normal larvae (Mean ± SD)	Concentration (%)	% Normal larvae (Mean ± SD)	
FSW Control	88.8 ± 3.1	FSW Control	88.8 ± 3.1	
Diluent Control	90.3 ± 2.5	Diluent Control	90.3 ± 2.5	
6.3	91.3 ± 5.6	6.3	89.5 ± 3.7	
12.5	78.5 ± 4.0 *	12.5	81.5 ± 5.5 *	
25	0.0 ± 0.0	25	0.0 ± 0.0	
50	0.0 ± 0.0	50	0.0 ± 0.0	
100	0.0 ± 0.0	100	0.0 ± 0.0	
<b>72-hr IC10 = 10.9 (8.9-13.4)%</b>		<b>72-hr IC10 = 12.5 (8.2-13.0)%</b>		
<b>72-hr EC50 = 16.1 (15.7-16.5)%</b>		<b>72-hr EC50 = 16.6 (16.2-16.9)%</b>		
<b>NOEC = 6.3%</b>		<b>NOEC = 6.3%</b>		
<b>LOEC = 12.5%</b>		<b>LOEC = 12.5%</b>		

\*Significantly lower percentage of normally developed larvae compared with the Diluent Control (Dunnett's Test, 1-tailed, P=0.05)

## Toxicity Test Report: TR0686/3

(page 2 of 2)

QA/QC Parameter	Criterion	This Test	Criterion met?
FSW Control mean % normal	≥70%	88.8%	Yes
Reference Toxicant within cusum chart limits	7.0-14.5µg Cu/L	9.9µg Cu/L	Yes



Test Report Authorised by:

Dr Rick Krassoi, Director on 20 June 2012

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

**NATA Accredited Laboratory Number: 14709**

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**Citations:**

APHA (1998) *Standard Methods for the Examination of Water and Wastewater*. 20<sup>th</sup> Ed. American Public Health Association, American Water Works Association and the Water Environment Federation, Washington, DC, USA.

ESA (2011) *Bivalve Larval Development Test*. Issue No. 10. Ecotox Services Australasia, Sydney, NSW

USEPA (1996) *Bivalve acute toxicity test (embryo larval) OPPTS 850.1055. Ecological Effects Test Guidelines*. United States Environmental Protection Agency. Prevention, Pesticides and Toxic Substances. EPA/712/C-96/137.



# Toxicity Test Report: TR0686/4

(page 1 of 2)

<b>Client:</b>	Adelaide Aqua 16 Chrysler Rd Lonsdale SA 5160	<b>ESA Job #:</b>	PR0686
<b>Attention:</b>	Vanessa Ayala	<b>Date Sampled:</b>	15 & 17 May 2012
<b>Client Ref:</b>	Not supplied	<b>Date Received:</b>	18 & 23 May 2012
		<b>Sampled By:</b>	Client
		<b>ESA Quote #:</b>	PL0686_q01

Lab ID No.:	Sample Name:	Sample Description:
5445	Outfall 20%	Aqueous sample, pH 8.0, salinity 65.0‰, total ammonia <2.0mg/L. Sample received at 16°C in apparent good condition
5446	Outfall 30%	Aqueous sample, pH 8.0, salinity 68.0‰, total ammonia <2.0mg/L. Sample received at 16°C in apparent good condition
5467	Seawater	Aqueous sample, pH 8.1, salinity 37.4‰, total ammonia <2.0mg/L. Sample received at 16°C in apparent good condition

<b>Test Performed:</b>	14-day polychaete growth and survival toxicity test using <i>Diopatra asciculata</i>
<b>Test Protocol:</b>	Not applicable
<b>Test Temperature:</b>	The test was performed at 25±2°C.
<b>Deviations from Protocol:</b>	The 96-h toxicity test was extended to 14-d to assess growth and survival endpoints. Test organisms were acclimated at 37±1‰ for five days prior to testing.
<b>Comments on Solution Preparation:</b>	The samples 5445 'Outfall 20%' and 5446 'Outfall 30%' were serially diluted with sample 5467 'Seawater' (Diluent Control) to achieve the test concentrations. A filtered seawater (FSW) control and a diluent control (seawater) were tested concurrently with the samples.
<b>Source of Test Organisms:</b>	Hatchery reared, NSW
<b>Test Initiated:</b>	24 May 2012 at 1200h

Sample 5445: Outfall 20%		Sample 5445: Outfall 20%	
Concentration (%)	% Survival (Mean ± SD)	Concentration (%)	Biomass, mg (Mean ± SD)
FSW Control	95.0 ± 10.0	FSW Control	525.6 ± 173.7
Diluent Control	100 ± 0.0	Diluent Control	471.4 ± 109.4
6.3	100 ± 0.0	6.3	413.7 ± 194.4
12.5	100 ± 0.0	12.5	401.2 ± 115.8
25	100 ± 0.0	25	308.0 ± 152.7
50	0.0 ± 0.0	50	0.0 ± 0.0
100	0.0 ± 0.0	100	0.0 ± 0.0
<b>14 day IC10 (survival) = 32.6 (25.0-50.0)%</b>		<b>14 day IC10 (biomass) = &lt;6.3%</b>	
<b>14 day EC50 (survival) = 35.4 (25.0-50.0)%</b>		<b>14 day IC50 (biomass) = 30.9 (15.5-40.0)%</b>	
<b>NOEC = 25%</b>		<b>NOEC = 25%</b>	
<b>LOEC = 50%</b>		<b>LOEC = 50%</b>	

\*95% confidence limits are not reliable

**Toxicity Test Report: TR0686/4**

(page 2 of 2)

Sample 5446: <i>Outfall 30%</i>		Sample 5446: <i>Outfall 30%</i>	
Concentration (%)	Survival (%)	Concentration (%)	Biomass, mg (Mean ± SD)
FSW Control	95.0 ± 10.0	FSW Control	525.6 ± 173.7
Diluent Control	100 ± 0.0	Diluent Control	471.4 ± 109.4
6.3	100 ± 0.0	6.3	330.5 ± 185.9
12.5	100 ± 0.0	12.5	217.7 ± 20.9 **
25	95.0 ± 10.0	25	315.0 ± 151.0
50	10.0 ± 20 *	50	15.6 ± 31.1 **
100	0.0 ± 0.0	100	0.0 ± 0.0
<b>14 day EC10 (survival) = 27.2 (20.4-31.8)%</b> <b>14 day EC50 (survival) = 36.9 (31.5-42.7)%</b> <b>NOEC = 25%</b> <b>LOEC = 50%</b>		<b>14 day IC10 (biomass) = &lt;6.3%</b> <b>14 day IC50 (biomass) = 28.1%***</b> <b>NOEC = 25%</b> <b>LOEC = 50%</b>	

\*Significantly decreased survival compared with the Diluent Control (Steels Many-One Rank Test, one tailed, P=0.05)

\*\*Significantly decreased biomass compared with the Diluent Control (Dunnett's Test, one tailed, P=0.05)

\*\*\*\*95% confidence limits are not reliable

QA/QC Parameter	Criterion	This Test	Criterion met?
Control mean % survival	>80.0%	95.0%	Yes



Test Report Authorised by:

Dr Rick Krassoi, Director on 20 June 2012

Results are based on the samples in the condition as received by ESA. This document shall not be reproduced except in full.

# Chain-of-Custody Documentation

# Sample Receipt Notification

**Attention** : Vanes Ayala

**Client** : Adelaide Aqua  
16 Chrysler Rd  
Lonsdale SA 5160

**Email** : Vanesa.Ayala@acciona.com.au  
**Telephone** : 400827816  
**Facsimile** :

**Date** : 23/05/2012

**Re** : Receipt of samples

**Pages** : 3

**ESA Project** : PR0686

For Review

Additional Documentation Required - Please Respond

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## Sample Delivery Details

**Completed Chain of Custody accompanied samples:** YES

**Samples received in apparent good condition and correctly bottled:** YES

**Security seals on sample bottles and esky intact:** YES

**Date samples received** : 18/05/2012

**Time samples received** : 9:30

**No. of samples received** : 2

**Sample matrix** : aqueous

**Sample temperature** : 16-20°C

**Comments** : Includes 4x2.5L Outfall 20% (ESA ID# 5445) and 4x2.5L Outfall 30% (ESA ID# 5446)

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## Contact Details

Customer Services Officer : Tina Micevska

Telephone : 61 2 9420 9481

Facsimile : 61 2 9420 9484

Email : tmicevska@ecotox.com.au

Please contact customer services officer for all queries or issues regarding samples

**Note that the chain-of-custody provides definitive information on the tests to be performed**

---

## Ecotox Services Australia

ABN 45 094 714 904

Unit 27, 2 Chaplin Drive

Lane Cove NSW 2066 Australia

Phone : 61 2 9420 9481

Fax : 61 2 9420 9484

Email : info@ecotox.com.au



Datasheet ID: 601.1  
 Last Revised: 17 February 2011

# Chain-of-Custody / Service Request Form



Customer: Abelardo Ayala Ship To: Ecotox Service Australasia  
 Contact Name: YANUSA AYALA Attention: Tomé Huasco  
 Phone: 0100 877 816 Email: yanusa.ayala@ecotox.com.au (please provide an email address for sample receipt notification)  
 Sampled by: Chetana Patel

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 Containers (eg 2 x 1L)	Tests Requested (See reverse for guidance)			Comments / Instructions
<u>15/5/12</u>	<u>3:38</u>	<u>Outfall 201. Prod.</u>	<u>Grab-and</u>	<u>4 X 2.5L</u>				<p><b>Note that testing will be delayed if an incomplete chain of custody is received</b></p> <ul style="list-style-type: none"> <li>• Additional treatment of samples (i.e. spiking)</li> <li>• Sub-contracted services (i.e. chemical analyses)</li> <li>• Dilutions required (if different than 100% down to 6.25%)</li> <li>• Sample holding time restriction (if applicable)</li> <li>• Sample used for litigation (if applicable)</li> </ul> <p>Note: An MSDS must be attached if Available</p> <p>ESA Project Number: PR _____</p>
<u>15/5/12</u>	<u>6:00</u>	<u>ZSL seawater</u>	<u>6tb</u>	<u>ZSL X1</u>				

1) Released By: <u>Yanusa Ayala</u>	Date: <u>17-5-12</u>	2) Received By: <u>Tina</u>	Date: <u>18/5/12</u>	3) Released By:	Date:	4) Received By:	Date:
Of: <u>Yanusa</u>	Time: <u>9:00</u>	Of: <u>ESA</u>	Time: <u>9:30</u>	Of:	Time:	Of:	Time:

**Note that the chain-of-custody documentation will provide definitive information on the tests to be performed.**

Datasheet ID: 601.1  
 Last Revised: 17 February 2011

# Chain-of-Custody / Service Request Form



Customer: Times Adelaide Aqua  
 Contact Name: Vanessa Ayala  
 Phone: 0400 823 816 Email: vanessa.ayala@ecotox.com.au  
 Sampled by: Chetana  
 Ship To: Ecotox Service Office  
 Attention: Tina Liviska  
 (please provide an email address for sample receipt notification)

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 Containers (eg 2 x 1L)	Tests Requested (See reverse for guidance)		Comments / Instructions
17/5/12	8:25	Outfall 3010R0	Grab	4 X 2.5L			<p><b>Note that testing will be delayed if an incomplete chain of custody is received</b></p> <ul style="list-style-type: none"> <li>• Additional treatment of samples (i.e. spiking)</li> <li>• Sub-contracted services (i.e. chemical analyses)</li> <li>• Dilutions required (if different than 100% down to 6.25%)</li> <li>• Sample holding time restriction (if applicable)</li> <li>• Sample used for litigation (if applicable)</li> </ul> <p>Note: An MSDS must be attached if Available</p> <p>ESA Project Number: PR</p>
17/5/12	8:30	Sea water	Grab	1 X 2.5L			

1) Released By: <u>Vanessa Ayala</u>	Date: <u>17/5/12</u>	2) Received By: <u>Tina</u>	Date: <u>17/5/12</u>	3) Released By:	Date:	4) Received By:	Date:
Of: <u>[Signature]</u>	Time: <u>9:00</u>	Of: <u>ESA</u>	Time: <u>9:30</u>	Of:	Time:	Of:	Time:

Note that the chain-of-custody documentation will provide definitive information on the tests to be performed.

# Sample Receipt Notification

**Attention** : Vanes Ayala

**Client** : Adelaide Aqua  
16 Chrysler Rd  
Lonsdale SA 5160

**Email** : Vanesa.Ayala@acciona.com.au  
**Telephone** : 400827816  
**Facsimile** :

**Date** : 23/05/2012

**Re** : Receipt of samples

**Pages** : 3

**ESA Project** : PR0686

For Review

Additional Documentation Required - Please Respond

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## **Sample Delivery Details**

**Completed Chain of Custody accompanied samples:** YES

**Samples received in apparent good condition and correctly bottled:** YES

**Security seals on sample bottles and esky intact:** YES

**Date samples received** : 23/05/2012

**Time samples received** : 9:30

**No. of samples received** : 1

**Sample matrix** : aqueous

**Sample temperature** : room temperature

**Comments** : Includes 2 x 25L Seawater (ESA ID# 5467)

---

## **Contact Details**

Customer Services Officer : Tina Micevska

Telephone : 61 2 9420 9481

Facsimile : 61 2 9420 9484

Email : tmicevska@ecotox.com.au

Please contact customer services officer for all queries or issues regarding samples

**Note that the chain-of-custody provides definitive information on the tests to be performed**

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## **Ecotox Services Australia**

ABN 45 094 714 904

Unit 27, 2 Chaplin Drive

Lane Cove NSW 2066 Australia

Phone : 61 2 9420 9481

Fax : 61 2 9420 9484

Email : info@ecotox.com.au



# **Statistical Printouts for the Mussel Toxicity Tests**

**Bivalve Larval Development Test-Proportion Normal**

Start Date:	31/05/2012 16:00	Test ID:	PR0686/03	Sample ID:	Outfall 20%
End Date:	2/06/2012 16:00	Lab ID:	5445	Sample Type:	AQ-Aqueous
Sample Date:		Protocol:	ESA 106	Test Species:	MG-Mytilus galloprovincialis
Comments:					

Conc-%	1	2	3	4
FSW Control	0.8900	0.8600	0.9300	0.8700
Diluent Control	0.8700	0.9300	0.9100	0.9000
6.3	0.9600	0.9600	0.8800	0.8500
12.5	0.7800	0.8100	0.7300	0.8200
25	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000

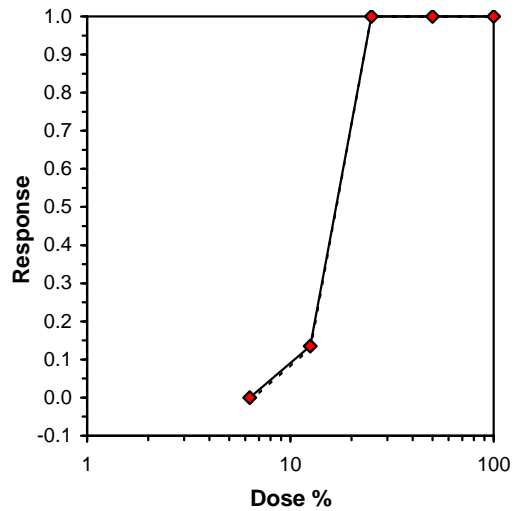
Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					t-Stat	1-Tailed Critical	MSD	Number Resp	Total Number
			Mean	Min	Max	CV%	N					
FSW Control	0.8875	0.9834	1.2312	1.1873	1.3030	4.180	4					
Diluent Control	0.9025	1.0000	1.2550	1.2019	1.3030	3.343	4	*			39	400
6.3	0.9125	1.0111	1.2823	1.1731	1.3694	7.975	4	-0.553	2.180	0.1074	35	400
*12.5	0.7850	0.8698	1.0899	1.0244	1.1326	4.452	4	3.352	2.180	0.1074	86	400
25	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				400	400
50	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				400	400
100	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				400	400

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.951735	0.859	-0.20304	-0.92638
Bartlett's Test indicates equal variances (p = 0.28)	2.540009	9.21034		
The control means are not significantly different (p = 0.50)	0.716225	2.446912		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Diluent Control	6.3	12.5	8.87412	15.87302	0.072219	0.079927	0.043364	0.004857	0.007302	2, 9

**Trimmed Spearman-Kärber**

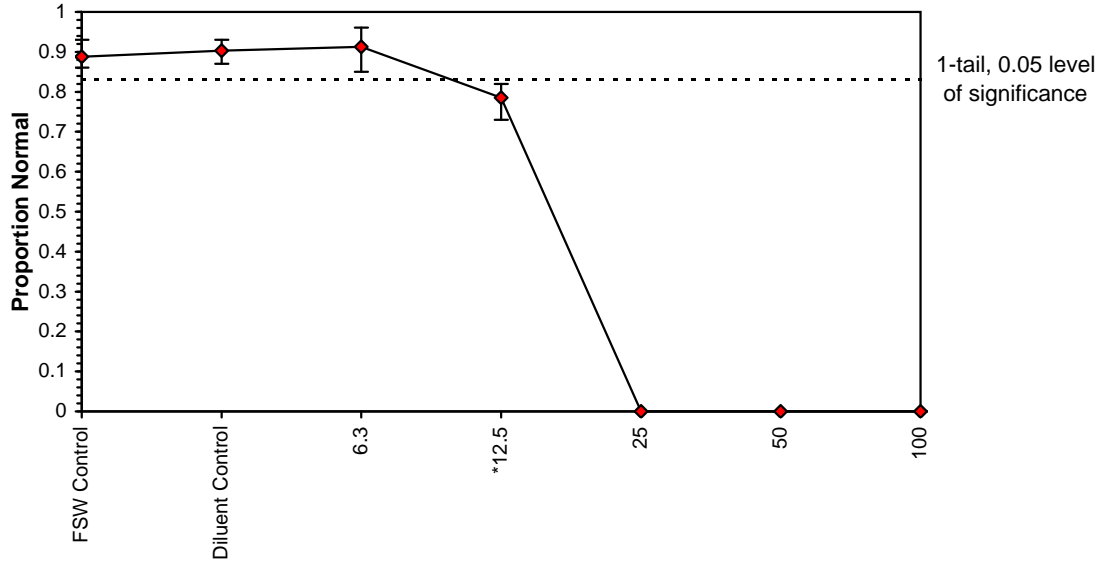
Trim Level	EC50	95% CL	
0.0%	16.107	15.732	16.491
5.0%	16.462	16.009	16.928
10.0%	16.692	16.082	17.326
20.0%	16.747	16.484	17.014
Auto-0.0%	16.107	15.732	16.491



**Bivalve Larval Development Test-Proportion Normal**

Start Date: 31/05/2012 16:00 Test ID: PR0686/03 Sample ID: Outfall 20%  
End Date: 2/06/2012 16:00 Lab ID: 5445 Sample Type: AQ-Aqueous  
Sample Date: Protocol: ESA 106 Test Species: MG-Mytilus galloprovincialis  
Comments:

**Dose-Response Plot**





**Bivalve Larval Development Test-Proportion Normal**

Start Date:	31/05/2012 16:00	Test ID:	PR0686/03	Sample ID:	Outfall 20%
End Date:	2/06/2012 16:00	Lab ID:	5445	Sample Type:	AQ-Aqueous
Sample Date:		Protocol:	ESA 106	Test Species:	MG-Mytilus galloprovincialis
Comments:					

**Auxiliary Data Summary**

Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
FSW Control	% Normal	88.75	86.00	93.00	3.10	1.98	4
Diluent Control		90.25	87.00	93.00	2.50	1.75	4
6.3		91.25	85.00	96.00	5.62	2.60	4
12.5		78.50	73.00	82.00	4.04	2.56	4
25		0.00	0.00	0.00	0.00		4
50		0.00	0.00	0.00	0.00		4
100		0.00	0.00	0.00	0.00		4
FSW Control	pH	8.30	8.30	8.30	0.00	0.00	1
Diluent Control		8.10	8.10	8.10	0.00	0.00	1
6.3		8.10	8.10	8.10	0.00	0.00	1
12.5		8.10	8.10	8.10	0.00	0.00	1
25		8.10	8.10	8.10	0.00	0.00	1
50		8.10	8.10	8.10	0.00	0.00	1
100		8.00	8.00	8.00	0.00	0.00	1
FSW Control	Salinity ppt	35.10	35.10	35.10	0.00	0.00	1
Diluent Control		37.40	37.40	37.40	0.00	0.00	1
6.3		39.20	39.20	39.20	0.00	0.00	1
12.5		41.00	41.00	41.00	0.00	0.00	1
25		44.50	44.50	44.50	0.00	0.00	1
50		51.50	51.50	51.50	0.00	0.00	1
100		65.00	65.00	65.00	0.00	0.00	1
FSW Control	DO %	108.30	108.30	108.30	0.00	0.00	1
Diluent Control		98.30	98.30	98.30	0.00	0.00	1
6.3		99.50	99.50	99.50	0.00	0.00	1
12.5		96.90	96.90	96.90	0.00	0.00	1
25		98.20	98.20	98.20	0.00	0.00	1
50		99.10	99.10	99.10	0.00	0.00	1
100		105.10	105.10	105.10	0.00	0.00	1

**Bivalve Larval Development Test-Proportion Normal**

Start Date:	31/05/2012 16:00	Test ID:	PR0686/03	Sample ID:	Outfall 20%
End Date:	2/06/2012 16:00	Lab ID:	5445	Sample Type:	AQ-Aqueous
Sample Date:		Protocol:	ESA 106	Test Species:	MG-Mytilus galloprovincialis
Comments:					

Conc-%	1	2	3	4
FSW Control	0.8900	0.8600	0.9300	0.8700
Diluent Control	0.8700	0.9300	0.9100	0.9000
6.3	0.9600	0.9600	0.8800	0.8500
12.5	0.7800	0.8100	0.7300	0.8200
25	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000

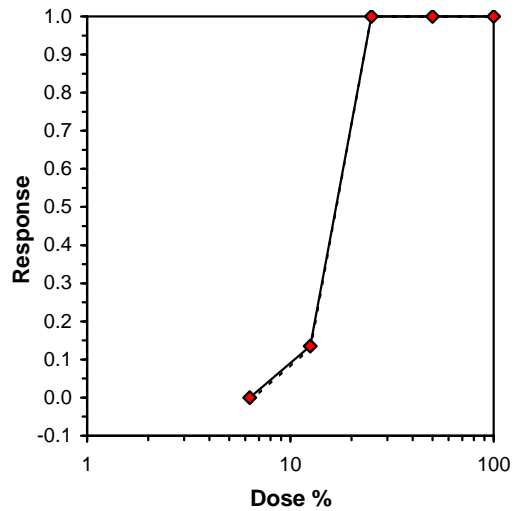
Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					t-Stat	1-Tailed Critical	MSD	Isotonic	
			Mean	Min	Max	CV%	N				Mean	N-Mean
FSW Control	0.8875	0.9834	1.2312	1.1873	1.3030	4.180	4					
Diluent Control	0.9025	1.0000	1.2550	1.2019	1.3030	3.343	4	*			0.9075	1.0000
6.3	0.9125	1.0111	1.2823	1.1731	1.3694	7.975	4	-0.553	2.180	0.1074	0.9075	1.0000
*12.5	0.7850	0.8698	1.0899	1.0244	1.1326	4.452	4	3.352	2.180	0.1074	0.7850	0.8650
25	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				0.0000	0.0000
50	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				0.0000	0.0000
100	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.951735	0.859	-0.20304	-0.92638
Bartlett's Test indicates equal variances (p = 0.28)	2.540009	9.21034		
The control means are not significantly different (p = 0.50)	0.716225	2.446912		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Diluent Control	6.3	12.5	8.87412	15.87302	0.072219	0.079927	0.043364	0.004857	0.007302	2, 9

**Log-Logit Interpolation (200 Resamples)**

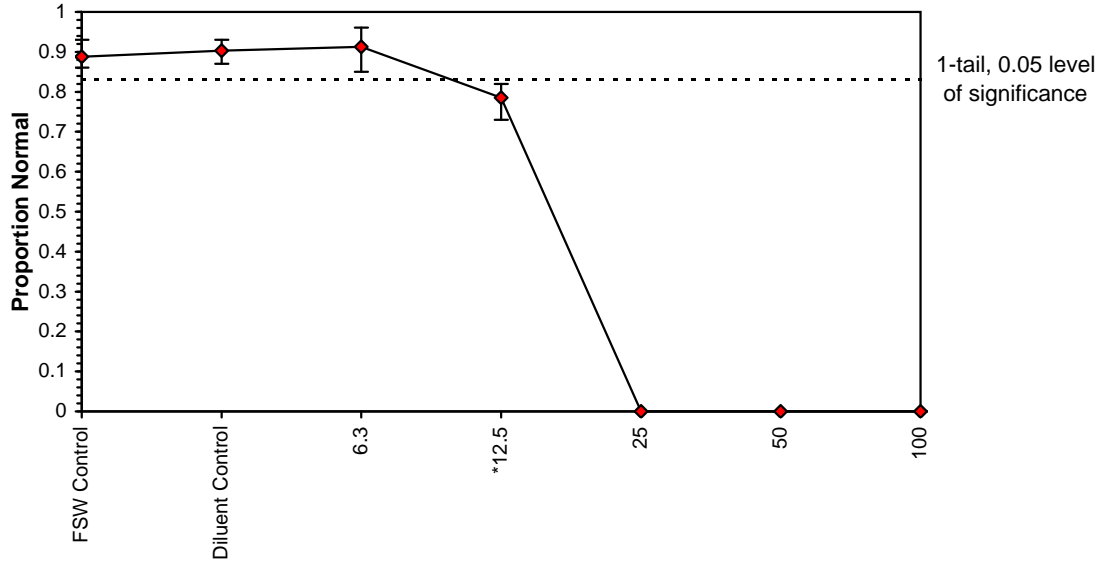
Point	%	SD	95% CL(Exp)		Skew
IC05	8.661	0.740	5.142	9.738	-2.4379
IC10	10.925	0.706	8.928	13.449	0.5150
IC15	12.567	0.318	10.781	12.824	-1.9876
IC20	12.773	0.090	12.448	13.027	-0.2144
IC25	12.961	0.087	12.644	13.212	-0.1961
IC40	13.474	0.082	13.182	13.715	-0.1914
IC50	13.806	0.080	13.528	14.038	-0.1902



**Bivalve Larval Development Test-Proportion Normal**

Start Date: 31/05/2012 16:00 Test ID: PR0686/03 Sample ID: Outfall 20%  
End Date: 2/06/2012 16:00 Lab ID: 5445 Sample Type: AQ-Aqueous  
Sample Date: Protocol: ESA 106 Test Species: MG-Mytilus galloprovincialis  
Comments:

**Dose-Response Plot**



**Bivalve Larval Development Test-Proportion Normal**

Start Date:	31/05/2012 16:00	Test ID:	PR0686/03	Sample ID:	Outfall 20%
End Date:	2/06/2012 16:00	Lab ID:	5445	Sample Type:	AQ-Aqueous
Sample Date:		Protocol:	ESA 106	Test Species:	MG-Mytilus galloprovincialis
Comments:					

**Auxiliary Data Summary**

Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
FSW Control	% Normal	88.75	86.00	93.00	3.10	1.98	4
Diluent Control		90.25	87.00	93.00	2.50	1.75	4
6.3		91.25	85.00	96.00	5.62	2.60	4
12.5		78.50	73.00	82.00	4.04	2.56	4
25		0.00	0.00	0.00	0.00		4
50		0.00	0.00	0.00	0.00		4
100		0.00	0.00	0.00	0.00		4
FSW Control	pH	8.30	8.30	8.30	0.00	0.00	1
Diluent Control		8.10	8.10	8.10	0.00	0.00	1
6.3		8.10	8.10	8.10	0.00	0.00	1
12.5		8.10	8.10	8.10	0.00	0.00	1
25		8.10	8.10	8.10	0.00	0.00	1
50		8.10	8.10	8.10	0.00	0.00	1
100		8.00	8.00	8.00	0.00	0.00	1
FSW Control	Salinity ppt	35.10	35.10	35.10	0.00	0.00	1
Diluent Control		37.40	37.40	37.40	0.00	0.00	1
6.3		39.20	39.20	39.20	0.00	0.00	1
12.5		41.00	41.00	41.00	0.00	0.00	1
25		44.50	44.50	44.50	0.00	0.00	1
50		51.50	51.50	51.50	0.00	0.00	1
100		65.00	65.00	65.00	0.00	0.00	1
FSW Control	DO %	108.30	108.30	108.30	0.00	0.00	1
Diluent Control		98.30	98.30	98.30	0.00	0.00	1
6.3		99.50	99.50	99.50	0.00	0.00	1
12.5		96.90	96.90	96.90	0.00	0.00	1
25		98.20	98.20	98.20	0.00	0.00	1
50		99.10	99.10	99.10	0.00	0.00	1
100		105.10	105.10	105.10	0.00	0.00	1

**Bivalve Acute Toxicity Tests-Proportion Normal**

Start Date:	31/05/2012 16:00	Test ID:	PR0686/04	Sample ID:	Outfall 30%
End Date:	2/06/2012 16:00	Lab ID:	5446	Sample Type:	AQ-Aqueous
Sample Date:		Protocol:	ESA 106	Test Species:	MG-Mytilus galloprovincialis
Comments:					

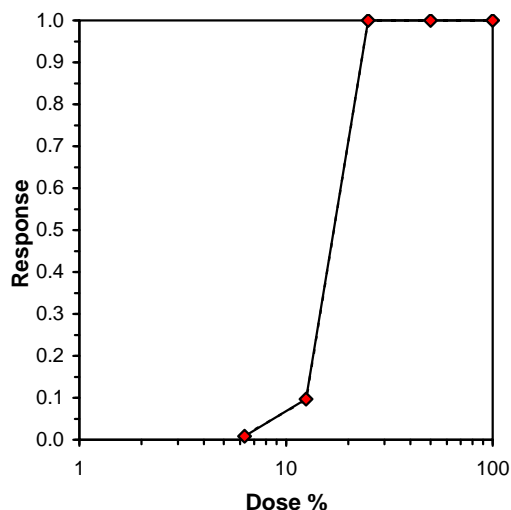
Conc-%	1	2	3	4
FSW Control	0.8900	0.8600	0.9300	0.8700
Diluent Control	0.8700	0.9300	0.9100	0.9000
6.3	0.8700	0.9100	0.8600	0.9400
12.5	0.7600	0.8900	0.8100	0.8000
25	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					t-Stat	1-Tailed Critical	MSD	Number Resp	Total Number
			Mean	Min	Max	CV%	N					
FSW Control	0.8875	0.9834	1.2312	1.1873	1.3030	4.180	4					
Diluent Control	0.9025	1.0000	1.2550	1.2019	1.3030	3.343	4	*			39	400
6.3	0.8950	0.9917	1.2447	1.1873	1.3233	5.031	4	0.241	2.180	0.0938	42	400
*12.5	0.8150	0.9030	1.1296	1.0588	1.2327	6.514	4	2.916	2.180	0.0938	74	400
25	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				400	400
50	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				400	400
100	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				400	400

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.946984	0.859	0.60346	-0.51777
Bartlett's Test indicates equal variances (p = 0.67)	0.79151	9.21034		
The control means are not significantly different (p = 0.50)	0.716225	2.446912		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Diluent Control	6.3	12.5	8.87412	15.87302	0.062101	0.06873	0.019381	0.003699	0.030981	2, 9

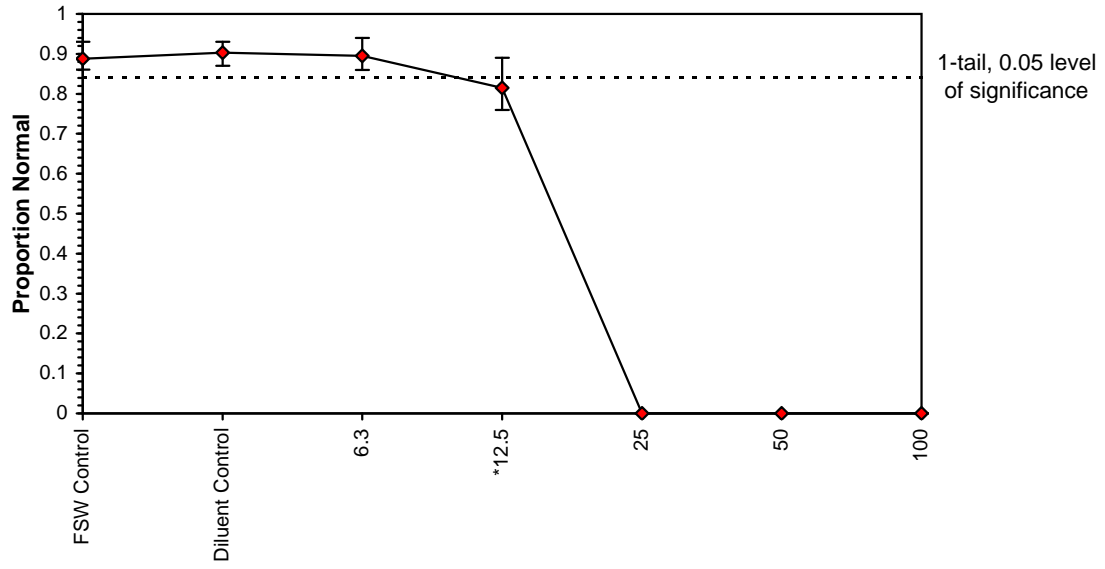
Trimmed Spearman-Kärber			
Trim Level	EC50	95% CL	
0.0%			
5.0%	16.887	16.468	17.317
10.0%	17.032	16.819	17.248
20.0%	17.032	16.819	17.248
Auto-0.8%	16.565	16.221	16.916



**Bivalve Acute Toxicity Tests-Proportion Normal**

Start Date: 31/05/2012 16:00 Test ID: PR0686/04 Sample ID: Outfall 30%  
End Date: 2/06/2012 16:00 Lab ID: 5446 Sample Type: AQ-Aqueous  
Sample Date: Protocol: ESA 106 Test Species: MG-Mytilus galloprovincialis  
Comments:

**Dose-Response Plot**





**Bivalve Acute Toxicity Tests-Proportion Normal**

Start Date:	31/05/2012 16:00	Test ID:	PR0686/04	Sample ID:	Outfall 30%
End Date:	2/06/2012 16:00	Lab ID:	5446	Sample Type:	AQ-Aqueous
Sample Date:		Protocol:	ESA 106	Test Species:	MG-Mytilus galloprovincialis
Comments:					

**Auxiliary Data Summary**

Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
FSW Control	% Normal	88.75	86.00	93.00	3.10	1.98	4
Diluent Control		90.25	87.00	93.00	2.50	1.75	4
6.3		89.50	86.00	94.00	3.70	2.15	4
12.5		81.50	76.00	89.00	5.45	2.86	4
25		0.00	0.00	0.00	0.00		4
50		0.00	0.00	0.00	0.00		4
100		0.00	0.00	0.00	0.00		4
FSW Control	pH	8.30	8.30	8.30	0.00	0.00	1
Diluent Control		8.10	8.10	8.10	0.00	0.00	1
6.3		8.10	8.10	8.10	0.00	0.00	1
12.5		8.10	8.10	8.10	0.00	0.00	1
25		8.10	8.10	8.10	0.00	0.00	1
50		8.10	8.10	8.10	0.00	0.00	1
100		8.00	8.00	8.00	0.00	0.00	1
FSW Control	Salinity ppt	35.10	35.10	35.10	0.00	0.00	1
Diluent Control		37.40	37.40	37.40	0.00	0.00	1
6.3		39.30	39.30	39.30	0.00	0.00	1
12.5		41.40	41.40	41.40	0.00	0.00	1
25		45.30	45.30	45.30	0.00	0.00	1
50		52.90	52.90	52.90	0.00	0.00	1
100		68.00	68.00	68.00	0.00	0.00	1
FSW Control	DO %	108.30	108.30	108.30	0.00	0.00	1
Diluent Control		98.30	98.30	98.30	0.00	0.00	1
6.3		98.00	98.00	98.00	0.00	0.00	1
12.5		97.90	97.90	97.90	0.00	0.00	1
25		98.10	98.10	98.10	0.00	0.00	1
50		99.20	99.20	99.20	0.00	0.00	1
100		106.60	106.60	106.60	0.00	0.00	1

**Bivalve Acute Toxicity Tests-Proportion Normal**

Start Date:	31/05/2012 16:00	Test ID:	PR0686/04	Sample ID:	Outfall 30%
End Date:	2/06/2012 16:00	Lab ID:	5446	Sample Type:	AQ-Aqueous
Sample Date:		Protocol:	ESA 106	Test Species:	MG-Mytilus galloprovincialis
Comments:					

Conc-%	1	2	3	4
FSW Control	0.8900	0.8600	0.9300	0.8700
Diluent Control	0.8700	0.9300	0.9100	0.9000
6.3	0.8700	0.9100	0.8600	0.9400
12.5	0.7600	0.8900	0.8100	0.8000
25	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000

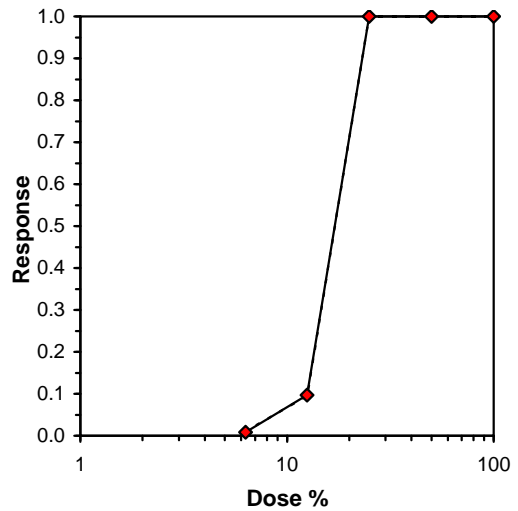
Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					t-Stat	1-Tailed Critical	MSD	Isotonic	
			Mean	Min	Max	CV%	N				Mean	N-Mean
FSW Control	0.8875	0.9834	1.2312	1.1873	1.3030	4.180	4					
Diluent Control	0.9025	1.0000	1.2550	1.2019	1.3030	3.343	4	*			0.9025	1.0000
6.3	0.8950	0.9917	1.2447	1.1873	1.3233	5.031	4	0.241	2.180	0.0938	0.8950	0.9917
*12.5	0.8150	0.9030	1.1296	1.0588	1.2327	6.514	4	2.916	2.180	0.0938	0.8150	0.9030
25	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				0.0000	0.0000
50	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				0.0000	0.0000
100	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.946984	0.859	0.60346	-0.51777
Bartlett's Test indicates equal variances (p = 0.67)	0.79151	9.21034		
The control means are not significantly different (p = 0.50)	0.716225	2.446912		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Diluent Control	6.3	12.5	8.87412	15.87302	0.062101	0.06873	0.019381	0.003699	0.030981	2, 9

**Log-Logit Interpolation (200 Resamples)**

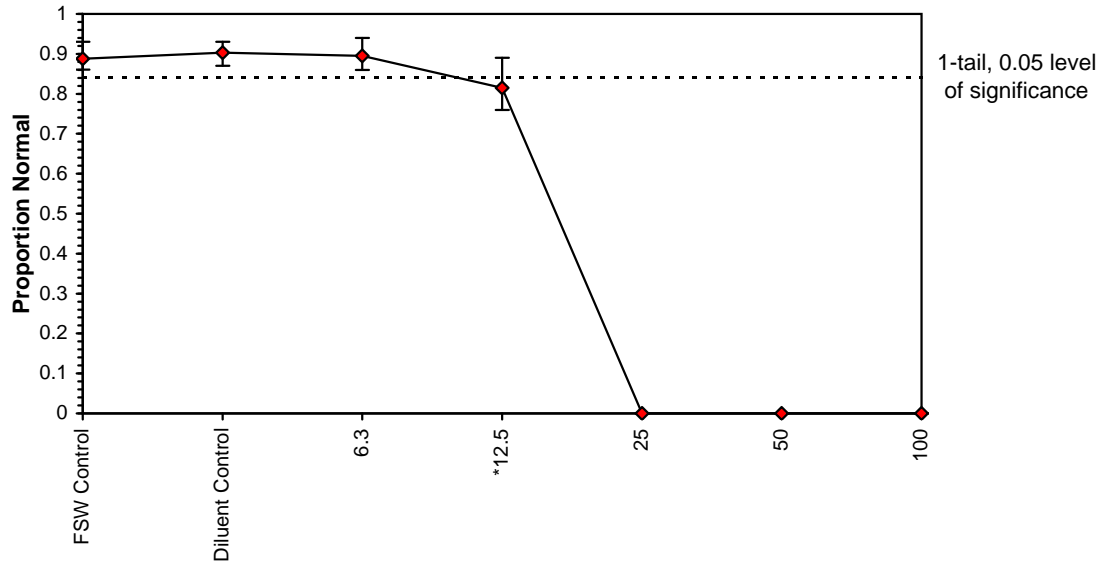
Point	%	SD	95% CL(Exp)		Skew
IC05	9.106	1.494	4.713	14.599	0.3932
IC10	12.515	0.920	8.247	12.968	-0.7866
IC15	12.743	0.182	12.224	13.191	-1.8238
IC20	12.944	0.135	12.553	13.393	0.3531
IC25	13.129	0.133	12.745	13.581	0.3740
IC40	13.634	0.128	13.278	14.086	0.4089
IC50	13.963	0.126	13.616	14.411	0.4210



**Bivalve Acute Toxicity Tests-Proportion Normal**

Start Date: 31/05/2012 16:00 Test ID: PR0686/04 Sample ID: Outfall 30%  
End Date: 2/06/2012 16:00 Lab ID: 5446 Sample Type: AQ-Aqueous  
Sample Date: Protocol: ESA 106 Test Species: MG-Mytilus galloprovincialis  
Comments:

**Dose-Response Plot**



**Bivalve Acute Toxicity Tests-Proportion Normal**

Start Date:	31/05/2012 16:00	Test ID:	PR0686/04	Sample ID:	Outfall 30%
End Date:	2/06/2012 16:00	Lab ID:	5446	Sample Type:	AQ-Aqueous
Sample Date:		Protocol:	ESA 106	Test Species:	MG-Mytilus galloprovincialis
Comments:					

**Auxiliary Data Summary**

Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
FSW Control	% Normal	88.75	86.00	93.00	3.10	1.98	4
Diluent Control		90.25	87.00	93.00	2.50	1.75	4
6.3		89.50	86.00	94.00	3.70	2.15	4
12.5		81.50	76.00	89.00	5.45	2.86	4
25		0.00	0.00	0.00	0.00		4
50		0.00	0.00	0.00	0.00		4
100		0.00	0.00	0.00	0.00		4
FSW Control	pH	8.30	8.30	8.30	0.00	0.00	1
Diluent Control		8.10	8.10	8.10	0.00	0.00	1
6.3		8.10	8.10	8.10	0.00	0.00	1
12.5		8.10	8.10	8.10	0.00	0.00	1
25		8.10	8.10	8.10	0.00	0.00	1
50		8.10	8.10	8.10	0.00	0.00	1
100		8.00	8.00	8.00	0.00	0.00	1
FSW Control	Salinity ppt	35.10	35.10	35.10	0.00	0.00	1
Diluent Control		37.40	37.40	37.40	0.00	0.00	1
6.3		39.30	39.30	39.30	0.00	0.00	1
12.5		41.40	41.40	41.40	0.00	0.00	1
25		45.30	45.30	45.30	0.00	0.00	1
50		52.90	52.90	52.90	0.00	0.00	1
100		68.00	68.00	68.00	0.00	0.00	1
FSW Control	DO %	108.30	108.30	108.30	0.00	0.00	1
Diluent Control		98.30	98.30	98.30	0.00	0.00	1
6.3		98.00	98.00	98.00	0.00	0.00	1
12.5		97.90	97.90	97.90	0.00	0.00	1
25		98.10	98.10	98.10	0.00	0.00	1
50		99.20	99.20	99.20	0.00	0.00	1
100		106.60	106.60	106.60	0.00	0.00	1

**Bivalve Acute Toxicity Tests-Proportion Normal**

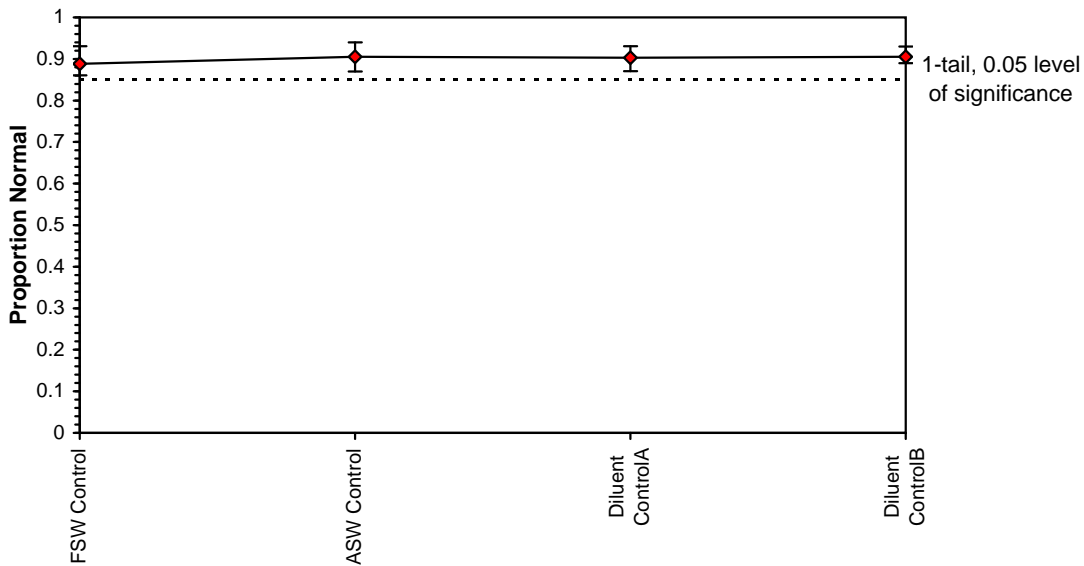
Start Date:	31/05/2012 16:00	Test ID:	PR0686/01	Sample ID:	Controls
End Date:	2/06/2012 16:00	Lab ID:	5467	Sample Type:	Controls
Sample Date:		Protocol:	ESA 106	Test Species:	MG-Mytilus galloprovincialis
Comments:	Diluent Control ID: 5467				

Conc-	1	2	3	4
FSW Control	0.8900	0.8600	0.9300	0.8700
ASW Control	0.9100	0.8700	0.9400	0.9000
Diluent ControlA	0.8700	0.9300	0.9100	0.9000
Diluent ControlB	0.8900	0.9300	0.9000	0.9000

Conc-	Mean	N-Mean	Transform: Arcsin Square Root				N	t-Stat	1-Tailed	
			Mean	Min	Max	CV%			Critical	MSD
FSW Control	0.8875	1.0000	1.2312	1.1873	1.3030	4.180	4	-0.803	1.943	0.0698
ASW Control	0.9050	1.0197	1.2601	1.2019	1.3233	3.978	4	-0.716	1.943	0.0645
Diluent ControlA	0.9025	1.0169	1.2550	1.2019	1.3030	3.343	4	-0.908	1.943	0.0582
Diluent ControlB	0.9050	1.0197	1.2585	1.2327	1.3030	2.439	4			

Auxiliary Tests	Statistic	Critical	Skew	Kurt		
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.943962	0.887	0.423202	-0.64241		
Bartlett's Test indicates equal variances (p = 0.85)	0.797424	11.34487				
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences Treatments vs FSW Control	0.039119	0.044	0.000726	0.001966	0.776505	3, 12

**Dose-Response Plot**



**Bivalve Acute Toxicity Tests-Proportion Normal**

Start Date:	31/05/2012 16:00	Test ID:	PR0686/01	Sample ID:	Controls
End Date:	2/06/2012 16:00	Lab ID:	5467	Sample Type:	Controls
Sample Date:		Protocol:	ESA 106	Test Species:	MG-Mytilus galloprovincialis
Comments:	Diluent Control ID: 5467				

**Auxiliary Data Summary**

Conc-	Parameter	Mean	Min	Max	SD	CV%	N
FSW Control	% Normal	88.75	86.00	93.00	3.10	1.98	4
ASW Control		90.50	87.00	94.00	2.89	1.88	4
Diluent ControlA		90.25	87.00	93.00	2.50	1.75	4
Diluent ControlB		90.50	89.00	93.00	1.73	1.45	4
FSW Control	pH	8.30	8.30	8.30	0.00	0.00	1
ASW Control		8.20	8.20	8.20	0.00	0.00	1
Diluent ControlA		8.10	8.10	8.10	0.00	0.00	1
Diluent ControlB		8.10	8.10	8.10	0.00	0.00	1
FSW Control	Salinity ppt	35.10	35.10	35.10	0.00	0.00	1
ASW Control		37.70	37.70	37.70	0.00	0.00	1
Diluent ControlA		37.40	37.40	37.40	0.00	0.00	1
Diluent ControlB		37.50	37.50	37.50	0.00	0.00	1
FSW Control	DO %	108.30	108.30	108.30	0.00	0.00	1
ASW Control		103.30	103.30	103.30	0.00	0.00	1
Diluent ControlA		98.30	98.30	98.30	0.00	0.00	1
Diluent ControlB		97.90	97.90	97.90	0.00	0.00	1



# **Statistical Printouts for the 14-d Polychaete Worm Toxicity Test**

**Polychaete Survival and Growth Test-Survival**

Start Date: 24/05/2012 16:00 Test ID: PR0686/03 Sample ID: Outfall 20%  
 End Date: 07/06/2012 16:00 Lab ID: 5445 Sample Type: AQ-Aqueous  
 Sample Date: Protocol: ESA 113 Test Species: DA-Diopatra asciculata  
 Comments:

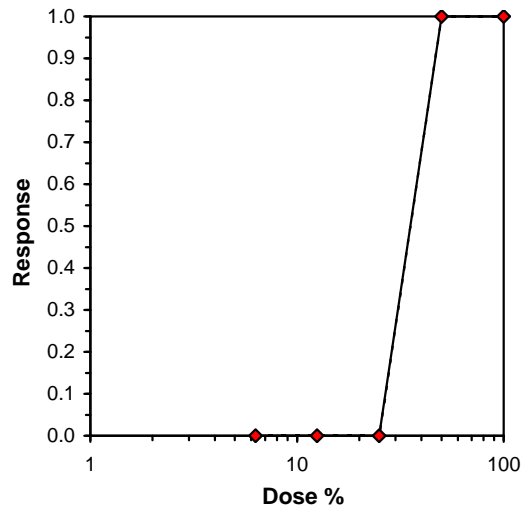
Conc-%	1	2	3	4
FSW Control	0.8000	1.0000	1.0000	1.0000
Diluent Control	1.0000	1.0000	1.0000	1.0000
6.3	1.0000	1.0000	1.0000	1.0000
12.5	1.0000	1.0000	1.0000	1.0000
25	1.0000	1.0000	1.0000	1.0000
50	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				Rank Sum	1-Tailed Critical	Number Resp	Total Number	
			Mean	Min	Max	CV%					N
FSW Control	0.9500	0.9500	1.2857	1.1071	1.3453	9.261	4				
Diluent Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	*	0	20	
6.3	1.0000	1.0000	1.3503	1.3453	1.3652	0.739	4	20.00	10.00	0	21
12.5	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
25	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
50	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4			20	20
100	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4			20	20

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.564851	0.887	2.555506	9.368132
Equality of variance cannot be confirmed				
The control means are not significantly different (p = 0.36)	1	2.446912		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	25	50	35.35534	4
Treatments vs Diluent Control				

**Graphical Method**

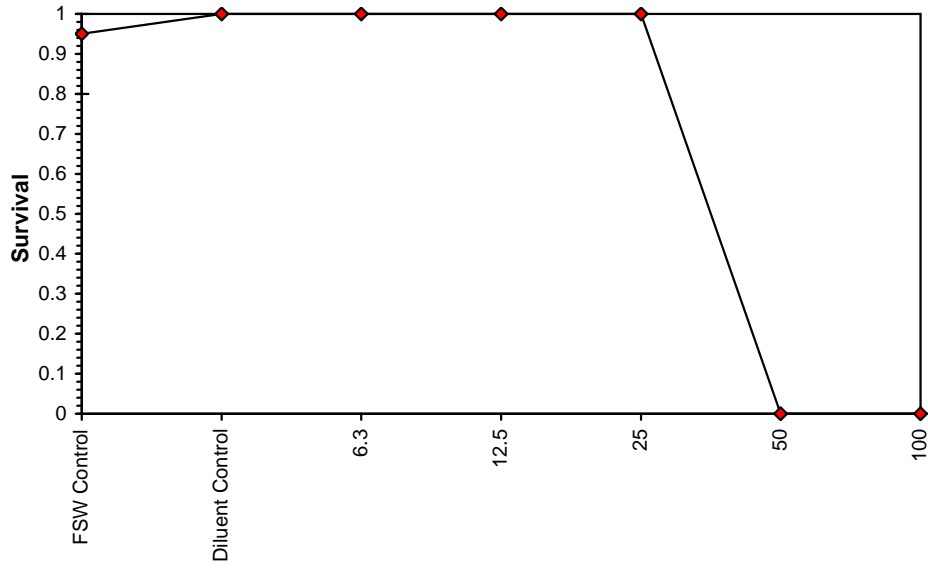
Trim Level	EC50
0.0%	35.355
	35.355



**Polychaete Survival and Growth Test-Survival**

Start Date: 24/05/2012 16:00 Test ID: PR0686/03 Sample ID: Outfall 20%  
End Date: 07/06/2012 16:00 Lab ID: 5445 Sample Type: AQ-Aqueous  
Sample Date: Protocol: ESA 113 Test Species: DA-Diopatra asciculata  
Comments:

**Dose-Response Plot**



**Polychaete Survival and Growth Test-Survival**

Start Date:	24/05/2012 16:00	Test ID:	PR0686/03	Sample ID:	Outfall 20%
End Date:	07/06/2012 16:00	Lab ID:	5445	Sample Type:	AQ-Aqueous
Sample Date:		Protocol:	ESA 113	Test Species:	DA-Diopatra asciculata
Comments:					

**Auxiliary Data Summary**

Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
FSW Control	Weight	525.58	387.20	764.80	173.74	2.51	4
Diluent Control		471.43	379.30	597.30	109.43	2.22	4
6.3		413.73	265.20	683.80	194.43	3.37	4
12.5		401.15	309.90	556.30	115.77	2.68	4
25		307.98	167.10	520.40	152.70	4.01	4
50		0.00	0.00	0.00	0.00		4
100		0.00	0.00	0.00	0.00		4
FSW Control	% Survival	95.00	80.00	100.00	10.00	3.33	4
Diluent Control		100.00	100.00	100.00	0.00	0.00	4
6.3		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		0.00	0.00	0.00	0.00		4
100		0.00	0.00	0.00	0.00		4
FSW Control	Salinity	35.20	35.20	35.20	0.00	0.00	1
Diluent Control		37.50	37.50	37.50	0.00	0.00	1
6.3		39.20	39.20	39.20	0.00	0.00	1
12.5		41.00	41.00	41.00	0.00	0.00	1
25		44.60	44.60	44.60	0.00	0.00	1
50		51.50	51.50	51.50	0.00	0.00	1
100		65.60	65.60	65.60	0.00	0.00	1
FSW Control	DO%	102.60	102.60	102.60	0.00	0.00	1
Diluent Control		101.10	101.10	101.10	0.00	0.00	1
6.3		103.00	103.00	103.00	0.00	0.00	1
12.5		104.80	104.80	104.80	0.00	0.00	1
25		100.50	100.50	100.50	0.00	0.00	1
50		104.20	104.20	104.20	0.00	0.00	1
100		87.40	87.40	87.40	0.00	0.00	1
FSW Control	pH	8.20	8.20	8.20	0.00	0.00	1
Diluent Control		8.20	8.20	8.20	0.00	0.00	1
6.3		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		8.10	8.10	8.10	0.00	0.00	1
100		8.10	8.10	8.10	0.00	0.00	1

**Polychaete Survival and Growth Test-Survival**

Start Date: 24/05/2012 16:00 Test ID: PR0686/03 Sample ID: Outfall 20%  
 End Date: 7/06/2012 16:00 Lab ID: 5445 Sample Type: AQ-Aqueous  
 Sample Date: Protocol: ESA 113 Test Species: DA-Diopatra asciculata  
 Comments:

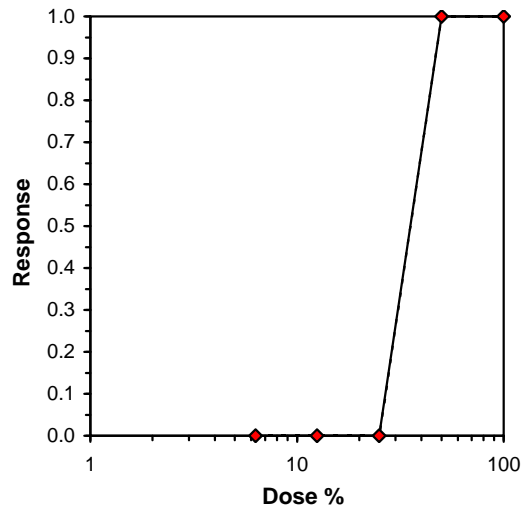
Conc-%	1	2	3	4
FSW Control	0.8000	1.0000	1.0000	1.0000
Diluent Control	1.0000	1.0000	1.0000	1.0000
6.3	1.0000	1.0000	1.0000	1.0000
12.5	1.0000	1.0000	1.0000	1.0000
25	1.0000	1.0000	1.0000	1.0000
50	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				Rank Sum	1-Tailed Critical	Isotonic	
			Mean	Min	Max	CV%			Mean	N-Mean
FSW Control	0.9500	0.9500	1.2857	1.1071	1.3453	9.261	4			
Diluent Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	*		1.0000 1.0000
6.3	1.0000	1.0000	1.3503	1.3453	1.3652	0.739	4	20.00	10.00	1.0000 1.0000
12.5	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000 1.0000
25	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000 1.0000
50	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4			0.0000 0.0000
100	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4			0.0000 0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.564851	0.887	2.555506	9.368132
Equality of variance cannot be confirmed				
The control means are not significantly different (p = 0.36)	1	2.446912		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	25	50	35.35534	4
Treatments vs Diluent Control				

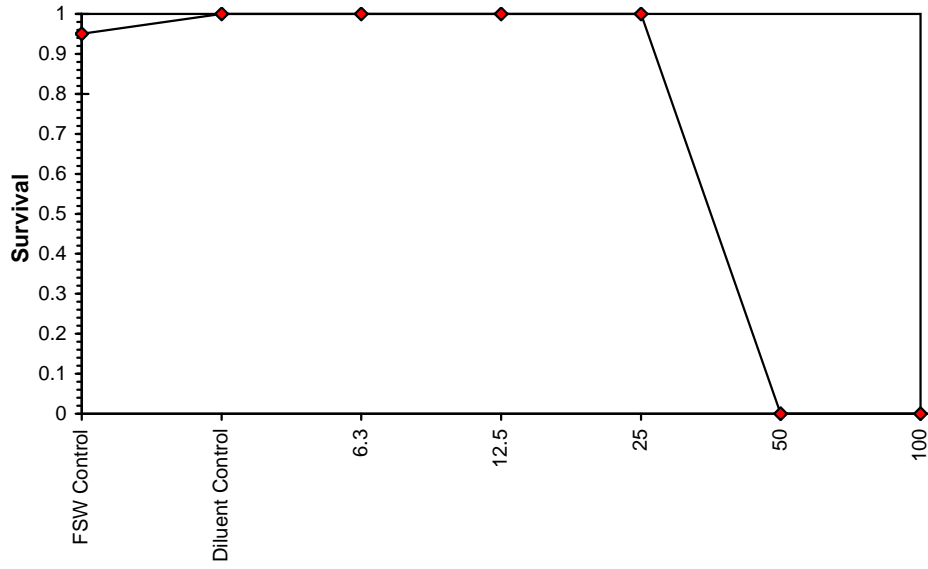
Log-Logit Interpolation (200 Resamples)					
Point	%	SD	95% CL(Exp)		Skew
IC05	31.697	0.000	31.697	31.697	-1.0076
IC10	32.602	0.000	32.602	32.602	-1.0076
IC15	33.176	0.000	33.176	33.176	1.0076
IC20	33.614	0.000	33.614	33.614	-1.0076
IC25	33.980	0.000	33.980	33.980	-1.0076
IC40	34.878	0.000	34.878	34.878	1.0076
IC50	35.414	0.000	35.414	35.414	-1.0076



**Polychaete Survival and Growth Test-Survival**

Start Date: 24/05/2012 16:00 Test ID: PR0686/03 Sample ID: Outfall 20%  
End Date: 7/06/2012 16:00 Lab ID: 5445 Sample Type: AQ-Aqueous  
Sample Date: Protocol: ESA 113 Test Species: DA-Diopatra asciculata  
Comments:

**Dose-Response Plot**





**Polychaete Survival and Growth Test-Survival**

Start Date:	24/05/2012 16:00	Test ID:	PR0686/03	Sample ID:	Outfall 20%
End Date:	7/06/2012 16:00	Lab ID:	5445	Sample Type:	AQ-Aqueous
Sample Date:		Protocol:	ESA 113	Test Species:	DA-Diopatra asciculata
Comments:					

**Auxiliary Data Summary**

Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
FSW Control	Weight	525.58	387.20	764.80	173.74	2.51	4
Diluent Control		471.43	379.30	597.30	109.43	2.22	4
6.3		413.73	265.20	683.80	194.43	3.37	4
12.5		401.15	309.90	556.30	115.77	2.68	4
25		307.98	167.10	520.40	152.70	4.01	4
50		0.00	0.00	0.00	0.00		4
100		0.00	0.00	0.00	0.00		4
FSW Control	% Survival	95.00	80.00	100.00	10.00	3.33	4
Diluent Control		100.00	100.00	100.00	0.00	0.00	4
6.3		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		0.00	0.00	0.00	0.00		4
100		0.00	0.00	0.00	0.00		4
FSW Control	Salinity	35.20	35.20	35.20	0.00	0.00	1
Diluent Control		37.50	37.50	37.50	0.00	0.00	1
6.3		39.20	39.20	39.20	0.00	0.00	1
12.5		41.00	41.00	41.00	0.00	0.00	1
25		44.60	44.60	44.60	0.00	0.00	1
50		51.50	51.50	51.50	0.00	0.00	1
100		65.60	65.60	65.60	0.00	0.00	1
FSW Control	DO%	102.60	102.60	102.60	0.00	0.00	1
Diluent Control		101.10	101.10	101.10	0.00	0.00	1
6.3		103.00	103.00	103.00	0.00	0.00	1
12.5		104.80	104.80	104.80	0.00	0.00	1
25		100.50	100.50	100.50	0.00	0.00	1
50		104.20	104.20	104.20	0.00	0.00	1
100		87.40	87.40	87.40	0.00	0.00	1
FSW Control	pH	8.20	8.20	8.20	0.00	0.00	1
Diluent Control		8.20	8.20	8.20	0.00	0.00	1
6.3		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		8.10	8.10	8.10	0.00	0.00	1
100		8.10	8.10	8.10	0.00	0.00	1

**Polychaete Survival and Growth Test-Weight**

Start Date:	24/05/2012 16:00	Test ID:	PR0686/04	Sample ID:	OUTFALL 20
End Date:	07/06/2012 16:00	Lab ID:	5445	Sample Type:	AQ-Aqueous
Sample Date:		Protocol:	ESA 113	Test Species:	DA-Diopatra asciculata

Conc-%	1	2	3	4
FSW Control	108.52	81.54	77.44	152.96
Diluent Control	75.86	105.76	76.06	119.46
6.3	55.74	136.76	53.04	71.20
12.5	61.98	63.10	111.26	84.58
25	104.08	61.40	33.42	47.48
50	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00

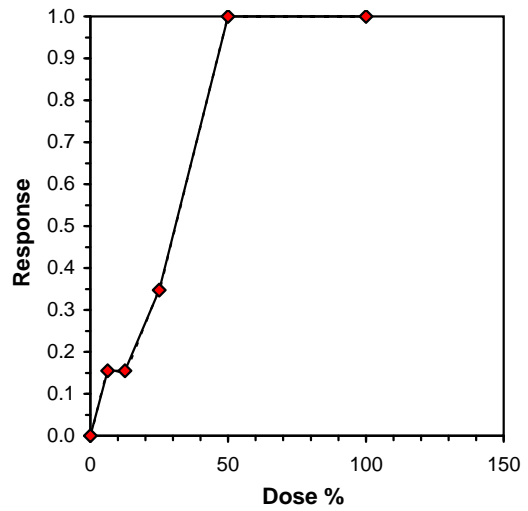
Conc-%	Mean	N-Mean	Transform: Untransformed				Rank Sum	1-Tailed Critical	Isotonic	
			Mean	Min	Max	CV%			Mean	N-Mean
FSW Control	105.12	1.1149	105.115	77.440	152.960	33.058	4			
Diluent Control	94.29	1.0000	94.285	75.860	119.460	23.213	4	*		94.29 1.0000
6.3	79.19	0.8398	79.185	53.040	136.760	49.515	4	14.00	10.00	79.71 0.8454
12.5	80.23	0.8509	80.230	61.980	111.260	28.859	4	15.00	10.00	79.71 0.8454
25	61.60	0.6533	61.595	33.420	104.080	49.582	4	12.00	10.00	61.60 0.6533
50	0.00	0.0000	0.000	0.000	0.000	0.000	4			0.00 0.0000
100	0.00	0.0000	0.000	0.000	0.000	0.000	4			0.00 0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.878091	0.887	0.973407	-0.12842
Bartlett's Test indicates equal variances (p = 0.76)	1.179871	11.34487		
The control means are not significantly different (p = 0.62)	0.52743	2.446912		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	25	50	35.35534	4

Linear Interpolation (200 Resamples)					
Point	%	SD	95% CL(Exp)		Skew
IC05*	2.037	5.678	0.259	26.363	1.5521
IC10*	4.075	6.579	0.518	38.925	1.2076
IC15*	6.112	7.337	0.777	39.849	0.8113
IC20	15.453	7.798	0.000	36.390	0.3368
IC25	18.707	7.604	0.000	36.584	-0.0678
IC40	27.039	5.539	8.204	38.023	-0.9965
IC50	30.866	4.380	15.517	40.019	-0.6432

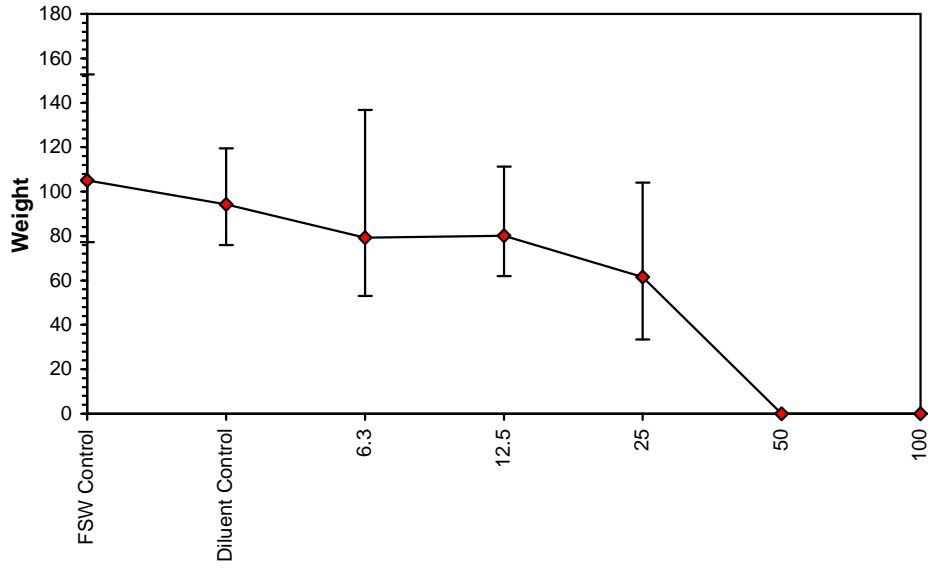
\* indicates IC estimate less than the lowest concentration



**Polychaete Survival and Growth Test-Weight**

Start Date: 24/05/2012 16:00 Test ID: PR0686/04 Sample ID: OUTFALL 20  
End Date: 07/06/2012 16:00 Lab ID: 5445 Sample Type: AQ-Aqueous  
Sample Date: Protocol: ESA 113 Test Species: DA-Diopatra asciculata  
Comments:

**Dose-Response Plot**



**Polychaete Survival and Growth Test-Weight**

Start Date:	24/05/2012 16:00	Test ID:	PR0686/04	Sample ID:	OUTFALL 20
End Date:	07/06/2012 16:00	Lab ID:	5445	Sample Type:	AQ-Aqueous
Sample Date:		Protocol:	ESA 113	Test Species:	DA-Diopatra asciculata

Comments:

**Auxiliary Data Summary**

Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
FSW Control	Weight	525.58	387.20	764.80	173.74	2.51	4
Diluent Control		471.43	379.30	597.30	109.43	2.22	4
6.3		413.73	265.20	683.80	194.43	3.37	4
12.5		401.15	309.90	556.30	115.77	2.68	4
25		307.98	167.10	520.40	152.70	4.01	4
50		0.00	0.00	0.00	0.00		4
100		0.00	0.00	0.00	0.00		4
FSW Control	% Survival	95.00	80.00	100.00	10.00	3.33	4
Diluent Control		100.00	100.00	100.00	0.00	0.00	4
6.3		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		0.00	0.00	0.00	0.00		4
100		0.00	0.00	0.00	0.00		4
FSW Control	Salinity	35.20	35.20	35.20	0.00	0.00	1
Diluent Control		37.50	37.50	37.50	0.00	0.00	1
6.3		39.20	39.20	39.20	0.00	0.00	1
12.5		41.00	41.00	41.00	0.00	0.00	1
25		44.60	44.60	44.60	0.00	0.00	1
50		51.50	51.50	51.50	0.00	0.00	1
100		65.60	65.60	65.60	0.00	0.00	1
FSW Control	DO%	102.60	102.60	102.60	0.00	0.00	1
Diluent Control		101.10	101.10	101.10	0.00	0.00	1
6.3		103.00	103.00	103.00	0.00	0.00	1
12.5		104.80	104.80	104.80	0.00	0.00	1
25		100.50	100.50	100.50	0.00	0.00	1
50		104.20	104.20	104.20	0.00	0.00	1
100		87.40	87.40	87.40	0.00	0.00	1
FSW Control	pH	8.20	8.20	8.20	0.00	0.00	1
Diluent Control		8.20	8.20	8.20	0.00	0.00	1
6.3		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		8.10	8.10	8.10	0.00	0.00	1
100		8.10	8.10	8.10	0.00	0.00	1

**Polychaete Survival and Growth Test-Survival**

Start Date: 24/05/2012 16:00 Test ID: PR0686/05 Sample ID: Outfall 30%  
 End Date: 07/06/2012 16:00 Lab ID: 5446 Sample Type: AQ-Aqueous  
 Sample Date: Protocol: ESA 113 Test Species: DA-Diopatra asciculata  
 Comments:

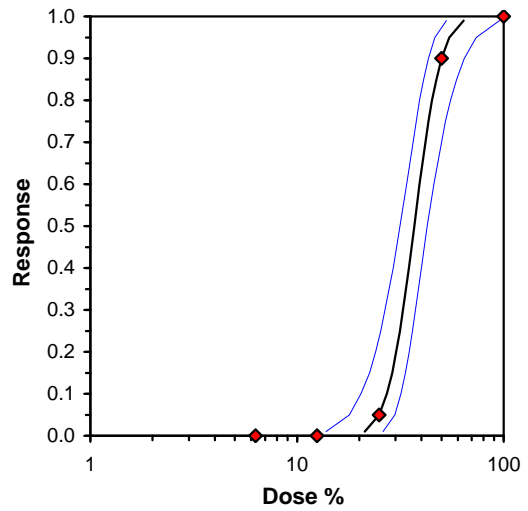
Conc-%	1	2	3	4
FSW Control	0.8000	1.0000	1.0000	1.0000
Diluent Control	1.0000	1.0000	1.0000	1.0000
6.3	1.0000	1.0000	1.0000	1.0000
12.5	1.0000	1.0000	1.0000	1.0000
25	1.0000	1.0000	1.0000	0.8000
50	0.4000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				Rank Sum	1-Tailed Critical	Number Resp	Total Number
			Mean	Min	Max	CV%				
FSW Control	0.9500	0.9500	1.2857	1.1071	1.3453	9.261	4			
Diluent Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	*	0	20
6.3	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0
12.5	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0
25	0.9500	0.9500	1.2857	1.1071	1.3453	9.261	4	16.00	10.00	1
*50	0.1000	0.1000	0.3403	0.2255	0.6847	67.468	4	10.00	10.00	18
100	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4			20

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.737203	0.905	1.68342	6.59177
Equality of variance cannot be confirmed				
The control means are not significantly different (p = 0.36)	1	2.446912		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	25	50	35.35534	4
Treatments vs Diluent Control				

Parameter	Value	SE	95% Fiducial Limits		Maximum Likelihood-Probit						
					Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	9.723705	2.014718	5.774858	13.67255	0	0.000306	7.814728	1	1.567136	0.102841	3
Intercept	-10.2384	3.197191	-16.5049	-3.97187							
TSCR											
Point	Probits	%	95% Fiducial Limits								
EC01	2.674	21.27604	13.77357	26.12983							
EC05	3.355	25.00211	17.8589	29.66083							
EC10	3.718	27.24828	20.44513	31.83688							
EC15	3.964	28.87669	22.35362	33.46155							
EC20	4.158	30.24003	23.95941	34.86589							
EC25	4.326	31.46084	25.39375	36.16722							
EC40	4.747	34.76011	29.18466	39.95916							
EC50	5.000	36.9093	31.53109	42.70044							
EC60	5.253	39.19136	33.87883	45.8821							
EC75	5.674	43.30133	37.7213	52.32558							
EC80	5.842	45.04943	39.22302	55.32542							
EC85	6.036	47.17632	40.96395	59.16256							
EC90	6.282	49.99567	43.15296	64.53742							
EC95	6.645	54.48725	46.4305	73.70576							
EC99	7.326	64.0296	52.84132	95.3204							

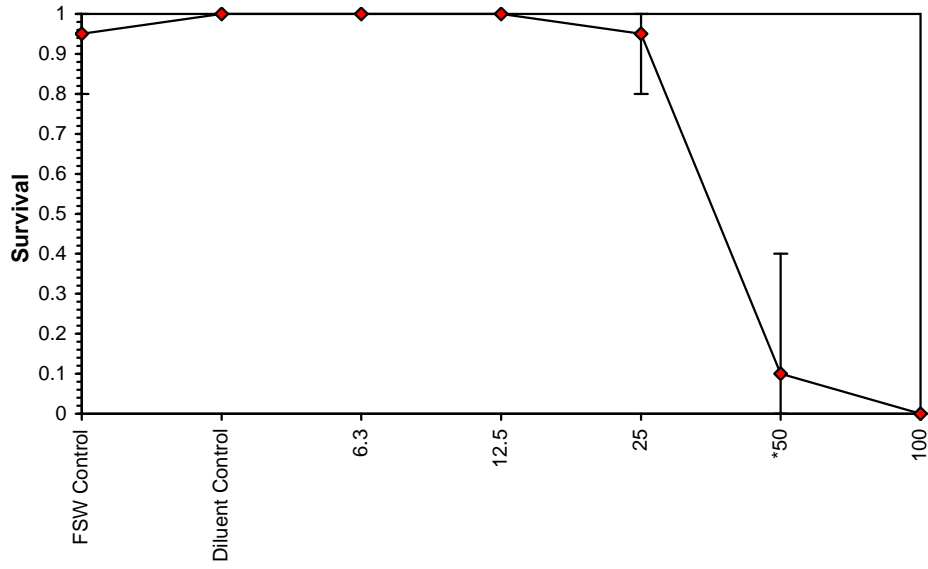


Significant heterogeneity detected (p < 0.01)

**Polychaete Survival and Growth Test-Survival**

Start Date: 24/05/2012 16:00 Test ID: PR0686/05 Sample ID: Outfall 30%  
End Date: 07/06/2012 16:00 Lab ID: 5446 Sample Type: AQ-Aqueous  
Sample Date: Protocol: ESA 113 Test Species: DA-Diopatra asciculata  
Comments:

**Dose-Response Plot**



**Polychaete Survival and Growth Test-Survival**

Start Date:	24/05/2012 16:00	Test ID:	PR0686/05	Sample ID:	Outfall 30%
End Date:	07/06/2012 16:00	Lab ID:	5446	Sample Type:	AQ-Aqueous
Sample Date:		Protocol:	ESA 113	Test Species:	DA-Diopatra asciculata
Comments:					

**Auxiliary Data Summary**

Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
FSW Control	Weight	525.58	387.20	764.80	173.74	2.51	4
Diluent Control		471.43	379.30	597.30	109.43	2.22	4
6.3		330.53	148.90	588.00	185.90	4.13	4
12.5		217.68	200.60	243.70	20.91	2.10	4
25		315.03	163.50	484.90	151.02	3.90	4
50		15.55	0.00	62.20	31.10	35.86	4
100		0.00	0.00	0.00	0.00		4
FSW Control	% Survival	95.00	80.00	100.00	10.00	3.33	4
Diluent Control		100.00	100.00	100.00	0.00	0.00	4
6.3		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		95.00	80.00	100.00	10.00	3.33	4
50		10.00	0.00	40.00	20.00	44.72	4
100		0.00	0.00	0.00	0.00		4
FSW Control	Salinity	35.20	35.20	35.20	0.00	0.00	1
Diluent Control		37.50	37.50	37.50	0.00	0.00	1
6.3		39.60	39.60	39.60	0.00	0.00	1
12.5		41.40	41.40	41.40	0.00	0.00	1
25		45.20	45.20	45.20	0.00	0.00	1
50		52.60	52.60	52.60	0.00	0.00	1
100		68.20	68.20	68.20	0.00	0.00	1
FSW Control	DO%	102.60	102.60	102.60	0.00	0.00	1
Diluent Control		101.10	101.10	101.10	0.00	0.00	1
6.3		113.20	113.20	113.20	0.00	0.00	1
12.5		110.90	110.90	110.90	0.00	0.00	1
25		111.10	111.10	111.10	0.00	0.00	1
50		98.40	98.40	98.40	0.00	0.00	1
100		88.70	88.70	88.70	0.00	0.00	1
FSW Control	pH	8.20	8.20	8.20	0.00	0.00	1
Diluent Control		8.20	8.20	8.20	0.00	0.00	1
6.3		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		8.20	8.20	8.20	0.00	0.00	1

**Polychaete Survival and Growth Test-Weight**

Start Date: 24/05/2012 16:00 Test ID: PR0686/05 Sample ID: Outfall 30%  
 End Date: 07/06/2012 16:00 Lab ID: 5446 Sample Type: AQ-Aqueous  
 Sample Date: Protocol: ESA 113 Test Species: DA-Diopatra asciculata  
 Comments:

Conc-%	1	2	3	4
FSW Control	108.52	81.54	77.44	152.96
Diluent Control	75.86	105.76	76.06	119.46
6.3	53.00	64.04	29.78	117.60
12.5	48.74	45.10	40.12	40.18
25	32.70	96.98	43.04	79.30
50	12.44	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00

Conc-%	Mean	N-Mean	Transform: Untransformed				N	t-Stat	1-Tailed Critical	MSD	Isotonic	
			Mean	Min	Max	CV%					Mean	N-Mean
FSW Control	105.12	1.1149	105.115	77.440	152.960	33.058	4					
Diluent Control	94.29	1.0000	94.285	75.860	119.460	23.213	4	*			94.29	1.0000
6.3	66.11	0.7011	66.105	29.780	117.600	56.245	4	1.675	2.360	39.701	66.11	0.7011
*12.5	43.54	0.4617	43.535	40.120	48.740	9.605	4	3.017	2.360	39.701	53.27	0.5650
25	63.01	0.6682	63.005	32.700	96.980	47.939	4	1.859	2.360	39.701	53.27	0.5650
*50	3.11	0.0330	3.110	0.000	12.440	200.000	4	5.420	2.360	39.701	3.11	0.0330
100	0.00	0.0000	0.000	0.000	0.000	0.000	4				0.00	0.0000

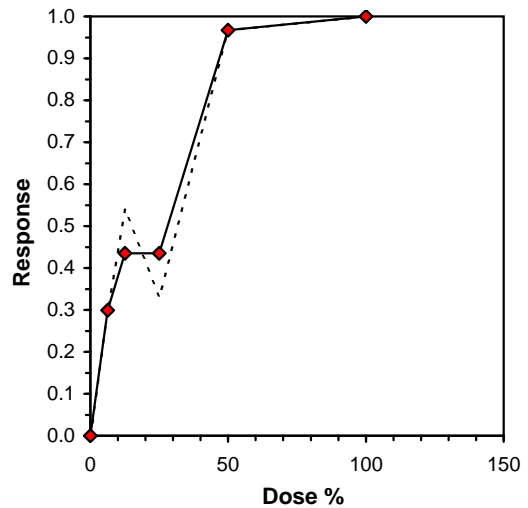
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.960454	0.905	0.619536	0.752393
Bartlett's Test indicates equal variances (p = 0.01)	13.12021	13.2767		
The control means are not significantly different (p = 0.62)	0.52743	2.446912		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnnett's Test	25	50	35.35534	4	39.7006	0.42107	4549.81	565.9787	0.001136	4, 15
Treatments vs Diluent Control										

**Linear Interpolation (200 Resamples)**

Point	%	SD	95% CL(Exp)		Skew
IC05*	1.054	2.136	0.277	11.034	1.7346
IC10*	2.108	2.284	0.554	11.989	1.3278
IC15*	3.162	2.419	0.831	13.281	1.0589
IC20*	4.216	3.248	1.108	14.805	2.7484
IC25*	5.270	4.511	1.385	37.099	2.8200
IC40	10.905	9.388	0.732	42.735	0.7016
IC50	28.054	8.518	0.000	38.411	-1.2365

\* indicates IC estimate less than the lowest concentration

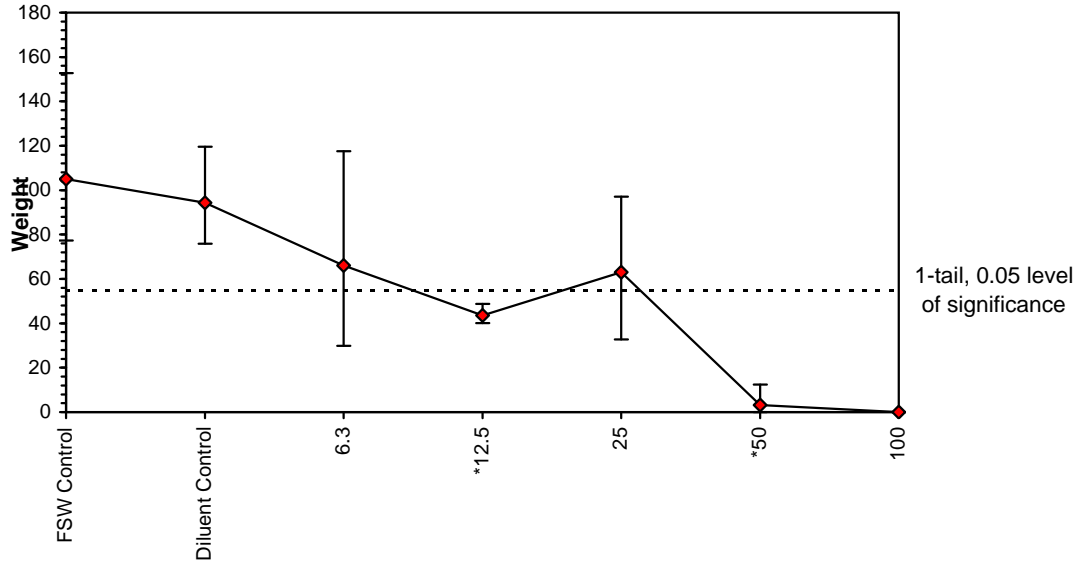




**Polychaete Survival and Growth Test-Weight**

Start Date: 24/05/2012 16:00 Test ID: PR0686/05 Sample ID: Outfall 30%  
End Date: 07/06/2012 16:00 Lab ID: 5446 Sample Type: AQ-Aqueous  
Sample Date: Protocol: ESA 113 Test Species: DA-Diopatra asciculata  
Comments:

**Dose-Response Plot**



**Polychaete Survival and Growth Test-Weight**

Start Date:	24/05/2012 16:00	Test ID:	PR0686/05	Sample ID:	Outfall 30%
End Date:	07/06/2012 16:00	Lab ID:	5446	Sample Type:	AQ-Aqueous
Sample Date:		Protocol:	ESA 113	Test Species:	DA-Diopatra asciculata

Comments:

**Auxiliary Data Summary**

Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
FSW Control	Weight	525.58	387.20	764.80	173.74	2.51	4
Diluent Control		471.43	379.30	597.30	109.43	2.22	4
6.3		330.53	148.90	588.00	185.90	4.13	4
12.5		217.68	200.60	243.70	20.91	2.10	4
25		315.03	163.50	484.90	151.02	3.90	4
50		15.55	0.00	62.20	31.10	35.86	4
100		0.00	0.00	0.00	0.00		4
FSW Control	% Survival	95.00	80.00	100.00	10.00	3.33	4
Diluent Control		100.00	100.00	100.00	0.00	0.00	4
6.3		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		95.00	80.00	100.00	10.00	3.33	4
50		10.00	0.00	40.00	20.00	44.72	4
100		0.00	0.00	0.00	0.00		4
FSW Control	Salinity	35.20	35.20	35.20	0.00	0.00	1
Diluent Control		37.50	37.50	37.50	0.00	0.00	1
6.3		39.60	39.60	39.60	0.00	0.00	1
12.5		41.40	41.40	41.40	0.00	0.00	1
25		45.20	45.20	45.20	0.00	0.00	1
50		52.60	52.60	52.60	0.00	0.00	1
100		68.20	68.20	68.20	0.00	0.00	1
FSW Control	DO%	102.60	102.60	102.60	0.00	0.00	1
Diluent Control		101.10	101.10	101.10	0.00	0.00	1
6.3		113.20	113.20	113.20	0.00	0.00	1
12.5		110.90	110.90	110.90	0.00	0.00	1
25		111.10	111.10	111.10	0.00	0.00	1
50		98.40	98.40	98.40	0.00	0.00	1
100		88.70	88.70	88.70	0.00	0.00	1
FSW Control	pH	8.20	8.20	8.20	0.00	0.00	1
Diluent Control		8.20	8.20	8.20	0.00	0.00	1
6.3		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		8.20	8.20	8.20	0.00	0.00	1