Technical Memorandum on Supplemental Whole Effluent Toxicity Testing (WET) at the Unocal Bulk Fuel Terminal Edmonds Washington

Chris Peredney Policy and Technical Support Unit Washington State Department of Ecology

Technical Memorandum on Unocal Edmonds WET Testing

October 10, 2003

To: David South, TCP-NWRO

From: Chris Peredney, TCP-PTSU

Subject: Unocal Edmonds WET Testing Results

Background: The Unocal Edmonds site is a 47-acre former petroleum bulk storage and transfer facility. Bulk fuel operations at the facility were terminated in 1991 and subsequently all petroleum handling equipment has been removed. The facility handled various types of fuel during it operating years. The site is approximately 160 feet from the Puget Sound shoreline at its nearest point. To the northeast and northwest of the site lies Willow Creek which discharges to Puget Sound. North of Willow Creek lays the tidally influenced Union Oil Marsh, a 23-acre freshwater and brackish water marsh.

Due to the potential for contaminated groundwater to discharge to sensitive fresh and marine habitats it was agreed that the toxicity of product removed from groundwater wells should be evaluated for effects to aquatic receptors. WAC 173-340-730(3)(b)(ii) states that Whole Effluent Toxicity (WET) testing will be used to evaluate the effects of substances without ecological effect levels on aquatic resources.

WET testing was conducted by MEC Analytical Systems, Inc. on a Water Accommodated Fraction (WAF) prepared from free product obtained from two wells at the site. Due to ongoing remedial actions at the site they were not able to collect a sufficient amount of free product to conduct test with all four of the species outlined in the *Whole Effluent Toxicity Testing Work Plan, Unocal Edmonds Terminal*, dated June 19, 2002 (as amended January 3, 2003). The two bioassay tests that were conducted were the seven-day chronic fathead minnow (*Pimephales promelas*) and the daphnid (*Ceriodaphnia dubia*), consistent with Ecology's WET test guidance (Ecology 1997).

Results of the tests indicate that the Water Accommodated Fraction (WAF) formulations were toxic to *Pimephales*. The Lowest Observed Effect Concentration (LOEC) was 1,420 ug/L for survival (80% in the LOEC vs. 100% in the control). The No Observed Effect Concentration (NOEC) was 835 ug/L. A preliminary site-specific chronic value for total petroleum hydrocarbons (TPH) may be estimated as the geometric mean between the NOEC and the LOEC, or 1,089 ug/L.

The *Ceriodaphnia* results indicate that at the highest concentration tested, survival was not reduced relative to controls (90% vs. 100%). Mean survival in the next highest treatment was

70%; this effect could be due to a higher exposure to bioavailable WAF than at the highest concentration (potentially due to miscelle formations that were measured but less bioavailable in the highest concentration). However, the *Ceriodaphnia* test design is not sufficiently robust to statistically detect a 20% difference in control survival. Reproductive responses in *Ceriodaphnia* were characterized by high variability amongst individual test organisms, also precluding detection of statistical differences.

Review of the first round of testing pointed out two main sources of uncertainty. The first source was the lack of product variability used for the testing versus that seen in monitoring wells across the site. The second main source of uncertainty was not having a full suite of test organisms. To minimize uncertainty at the site The Department of Ecology commissioned a WET test study to be performed using contaminated ground water from six wells across the site using four aquatic bioassay organisms. The six wells were selected, using stakeholder input, to represent product variability across the site. The test organisms selected were the same organisms selected for the WAF study to account for groundwater discharging into both fresh and marine water.

Methods:

Groundwater Sampling: Ground water sampling was conducted in following the Sampling and Analysis plan developed by SAIC (Appendix A).

Chemical Analysis: Samples were analyzed for petroleum and PAHs by as described in North Creak Analytical Testing Report (Appendix B).

<u>**Results:**</u> The results of the chemical analysis are presented in Appendix B. Level II data validation was performed by EcoChem, Inc., results are presented in Appendix C. The results of the bioassay work are presented in Appendix D and Summarized in Table 1 and Table 2.

<u>Synthesis:</u> The purpose of this study was to determine an allowable level of dissolved petroleum in groundwater that would be protective of surface water organisms. There are several important concepts that must be understood to gain a proper appreciation of the study results.

First it must be realized that there are inherent problems with calculating No Observed Effect Concentration (NOECs), the 50% effect level (EC₅₀) where 50% of the organism exhibit a response, and the geometric mean between the NOEC and the 50%. These problems surface when an effect is not seen at the highest concentration tested. In that case the highest concentration tested becomes the NOEAL and the EC₅₀ is unknown and reported as > the highest concentration. For example in MW-7 the TPH by VPH/EPH was 1439 µg/L. Therefore since no effect on growth was seen in fathead minnows at this concentration the NOEC was 1430 and the EC₅₀ was reported as > 1430 µg/L. Where as in MW-1446 the NOEC was 2222 µg/L and the EC₅₀ was 3289 µg/L. This example is representative of several of the results in the study where

the NOEC and EC_{50} are artifacts of TPH concentrations being below actual effect levels. For this reason the results for samples that did not show a response at the maximum concentration need to be culled from the analysis. Since the EC_{50} is a calculated value and in the case is close to the Lowest Observed Effect Concentration the Geometric mean of the NOEC and the EC_{50} is considered to approximate the median Chronic value (MCV) use by USEPA..

The second confounding issue is the selection of an appropriate measurement of petroleum in the groundwater. Samples were analyzed by both NWTPH and by VPH/EPH. It has been demonstrated at this site and others that the two measurement techniques do not necessarily correlate. So it is necessary to choose an appropriate measurement to relate to a biological response. I ran a correlation analysis between the EPH, VPH, DRO, LRO, GRO and TPH by VPH/EPH. The only two measurements that showed a consistent correlation to the biological responses were DRO and EPH. Upon consultation with members of the Department of Ecology, Toxics Cleanup Program, Policy and Technical Support Unit and researchers outside the Department of Ecology it is the consensus that NWTPH-DRO represents the best metric, at this time, for assessing the toxicity of weathered petroleum compound to aquatic receptors. Therefor for the purpose of this memo results will be discussed primarily in terms of DRO and secondly as TPH-by NWTPH.

Four species were selected for testing. Two seven-day chronic freshwater tests were conducted using the fathead minnow (*Pimephales promelas*) and the daphnid species (*Ceriodaphnia dubia*). Two marine tests were conducted using the Pacific Topsmelt (*Atherinops affinis*) and Mysid Shrimp species (*Mysidopsis bahia*). The mysid was consistently the most sensitive species, with *C. dubia* being the most sensitive freshwater organism. The lowest value that was calculated was the Growth- NOEC for the mysid in MW-7 of 398 µg/L DRO or 615 µg/L TPH-NWTPH. Due to the small sample sizes and lack of repetition the average Growth-NOEC across the six wells provides the best indicator of expected toxicity of site petroleum compounds. The average response across all wells for Mysid growth is 1281 µg/L DRO or 1492 µg/L TPH-NWTPH (Range 398 –1947 µg/L DRO, 615-2212 µg/L DRO). The reason for MW-7 exhibiting the highest toxicity has not yet been established and the results may be due to the inherent variability of the bioassay techniques and subsequent analysis. The results for all of the other organisms showed either no response or a response at levels higher than proposed cleanup levels for other pathways for the site. Other uncertainties in calculating average values include the uncertainties associated with the calculation of a NOEC.

<u>Recommendations:</u> An exhaustive analysis of the data provided by this study has not been completed. However, it can be shown that looking at the general response of the organisms tested that the groundwater cleanup level set for the fish consumption pathway can be reasonably considered to be protective of aquatic organisms at this site.

Species	Endpoint		MW-146	MW-7	MW-17	MW-129	MW-103R	MW-W	AVG
			TPH[]	TPH[]	TPH[]	TPH[]	TPH[]	TPH[]	TPH[]
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	μg/L
Topsmelt	Survival	NOEC	15340	2463	4453	2411	7560	8849	6846
		LC ₅₀	>15340	>2463	>4452	4628	>7560	>8849	4628
		GM	15340	2463	4453	3340	7560	8849	5629
	Growth	NOEC	3835	2463	4453	2411	7560	4425	4191
		EC ₅₀	13039	>2463	>4452	3857	>7560	>8849	8448
		GM	7071	2463	4453	3049	7560	4425	5950
Mysid	Survival	NOEC	3835	2463	2226	2411	7560	4425	3820
Shrimp		LC ₅₀	8284	>2463	3473	4532	>7560	>8849	5430
		GM	5636	2463	2781	3305	7560	4425	4554
	Growth	NOEC	1918	616	1113	1205	1890	2212	1492
		EC ₅₀	6289	1921	2226	2507	>7560	5929	3775
		GM	3473	1088	1574	1738	1890	3622	2373
Fathead	Survival	NOEC	7670	2463	4453	4821	7560	4425	5232
minnow		LC ₅₀	12886	>2463	>4452	8100	>7560	>8849	10493
		GM	9941	2463	4453	6249	7560	4425	7409
	Growth	NOEC	7670	2463	4453	2411	7560	2212	4461
		EC ₅₀	11352	>2463	>4452	6460	>7560	>8849	8906
		GM	9331	2463	4453	3946	7560	2212	6303
Daphnid	Survival	NOEC	15340	2463	4453	9642	7560	8849	8051
		LC ₅₀	>15340	>2463	>4452	>9642	>7560	>8849	4445
		GM	15340	2463	4453	9642	7560	8849	5982
	Repro.	NOEC	3835			4821	1890	4425	3443
		EC ₅₀	9357	>2463	>4452	9257	>7560	>8849	9307
		GM	5990	1232	4453	6680	1890	4425	5660

Table 1-TPH-NWTPH Concentration and Biological Response

(>) Indicates that endpoint could not be computed GM= Geometric Mean, if not calculable then is NOEC

Averages do not include endpoints that could not be computed

Species	Endpoint		MW-146	MW-7	MW-17	MW-129	MW-103R	MW-W	AVG
			DRO[]	DRO[]	DRO[]	DRO[]	DRO[]	DRO[]	DRO[]
Topsmelt	Survival	NOEC	11600	1590	3640	2333	7260	7790	4158
		LC50	>11600	>1590	>3640	4478	>7260	>7790	4478
		GM	11600	1590	3640	3232	7260	7790	4315
	Growth	NOEC	2900	1590	3640	2333	7260	3895	3508
		EC ₅₀	9860	>1590	>3640	3732	>7260	>7790	3732
		GM	5347	1590	3640	2950	7260	3895	3618
Mysid	Survival	NOEC	2900	1590	1820	2333	7260	3895	3205
Shrimp		LC ₅₀	6264	>1590	2839	4385	>7260	>7790	3870
		GM	4262	1590	2273	3198	7260	3895	3522
(Growth	NOEC	1450	398	910	1166	1815	1948	1234
		EC ₅₀	4756	1240	1820	2426	>7260	5219	2626
		GM	2626	702	1287	1682	1815	3188	1800
Fathead	Survival	NOEC	5800	1590	3640	4665	7260	3895	4286
minnow		LC ₅₀	9744	>1590	>3640	7837	>7260	>7790	7837
		GM	7518	1590	3640	6047	7260	3895	5796
	Growth	NOEC	5800	1590	3640	2333	7260	1948	3184
		EC ₅₀	8584	>1590	>3640	6251	>7260	>7790	6251
		GM	7056	1590	3640	3818	7260	1948	4461
Daphnid	Survival	NOEC	11600	1590	3640	9330	7260	7790	6490
		LC ₅₀	>11600	>1590	>3640	>9330	>7260	>7790	4445
		GM	11600	1590	3640	9330	7260	7790	5371
	Repro.	NOEC	2900	795	3640	4665	1815	3895	3246
		EC ₅₀	7076	>1590	>3640	8957	>7260	>7790	8957
		GM	4530	795	3640	6464	1815	3895	5392

Table 2- DRO Concentration and Biological Response

(>) Indicates that endpoint could not be computed GM= Geometric Mean, if not calculable then is NOEC

Averages do not include endpoints that could not be computed

Appendix A SAIC Sampling and Analysis Plan

Final Sampling and Analysis Plan Groundwater Sampling and Analysis

> Unocal Terminal Site Edmonds, Washington

> > May 23, 2003

Prepared for:

Washington State Department of Ecology Northwest Regional Office Bellevue, Washington

Prepared by:

Science Applications International Corporation Bothell, Washington

Table of Contents

1
1
2
3
3
4
4
4
5

Tables follow the text.

1.0 PROJECT BACKGROUND

Science Applications International Corporation (SAIC) will collect groundwater samples from six existing monitoring wells at the Unocal Edmonds former bulk fuel terminal in Edmonds, Washington. The six sampling locations were selected by Washington State Department of Ecology (Ecology) to represent the represent the variability in product composition at the site. SAIC will collect groundwater samples on or about May 16, 2003.

Toxicity (bioassay) testing will be performed on the six groundwater samples using a number of different test organisms. In addition, samples will be chemically analyzed for petroleum hydrocarbons and various petroleum constituents.

This plan addresses the collection and analysis of groundwater samples only. The subsequent use and interpretation of the data generated will be performed at a later date by Ecology staff.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

SAIC will perform the groundwater sampling and will utilize the following subcontractors and approach:

- AMEC Earth & Environmental, Inc., Fife, Washington (AMEC), will perform sevenday bioassay tests on the six groundwater samples submitted to them by SAIC. In addition, AMEC will send seven groundwater samples¹ to North Creek Analytical, Bothell, Washington (NCA) for chemical analyses, as described below.
- North Creek Analytical will perform chemical analyses on the groundwater samples submitted to them by AMEC.
- **EcoChem, Inc.**, Seattle, Washington, will perform Level II data validation for all relevant chemical analyses and will prepare a data validation report documenting the results of the validation.

Ecology has requested that SAIC use AMEC and NCA in order to maintain comparability with previously-analyzed samples from the Unocal site.

¹ Samples to be analyzed by NCA will consist of groundwater that has undergone a degree of processing (e.g., aeration) by AMEC as part of the bioassay testing procedures. AMEC will submit one aliquot of each of the six groundwater samples plus one additional sample (a duplicate of one of the six), for a total of seven analytical samples. It is important to note that the primary purpose of the chemical analyses is to determine the concentration of contaminants that the *test organisms* are exposed to rather than the concentrations in the monitoring wells at the time of sampling.

3.0 GROUNDWATER SAMPLING

Groundwater samples will be collected from the following six wells at the Unocal Edmonds facility:

- MW-7
- MW-17
- MW-103
- MW-146
- MW-129
- MW-W

Purging

An initial depth-to-water measurement will be obtained at each well using an electric water-level probe. Just prior to sampling, each well will be purged to allow collection of representative groundwater. Purging will be performed using a peristaltic pump. Purging will continue until field measurements of pH, conductivity, and temperature stabilize, or until three well-volumes of water have been withdrawn. Field measurements will be made with a Horiba U-10 or equivalent instrument. Parameters will be considered stabilized when subsequent measurements differ by less than 10 percent. Wells will be purged and sampled (see below) with the tubing inlet placed approximately mid-screen. Table 1 lists the wells to be sampled, their diameters, total depths, and screen depths (where known).

Sample Collection

Once a well has been purged, groundwater samples will be collected directly into the appropriate sample containers using the peristaltic pump. Care will be taken to avoid aeration and unnecessary agitation of the sample during and after collection. Tables 2 and 3 show the analyses to be performed on groundwater collected from each well, the required sample containers, and preservation methods.

Samples will be collected into 20-liter polyethylene cubitainers obtained from the bioassay testing laboratory. At least four cubitainers will be collected from each well². Containers will be filled completely, leaving no remaining headspace. During sample collection, the container will be placed in a cooler along with two or more bags of ice cubes. Once the container is full, additional ice will be added to the cooler, if necessary, and the cooler will be closed immediately to maintain the sample in dark conditions.

² All the water collected from each well will be composited together upon receipt by the bioassay laboratory before initiation of testing.

Groundwater samples will be hand-delivered to AMEC where bioassay testing will be initiated. AMEC will prepare subsamples of water for chemical analysis and will submit these samples to North Creek Analytical for testing.

Decontamination

Each well will be purged and sampled using entirely new tubing in order to prevent cross contamination and to eliminate the need for equipment decontamination. Clear polyvinyl chloride (PVC) tubing will be used down-hole; silicone peristaltic tubing sized appropriately for the pump head will be used in the peristaltic pump mechanism. Following sampling, all tubing will be bagged and disposed of.

All non-disposable down-hole equipment (e.g., water-level probe) will be decontaminated between uses with a detergent solution (Alconox or Liquinox), followed by a tap-water rinse, followed by a distilled water rinse. *All efforts will be made to minimize the volume of decontamination fluids that are generated to the extent practicable.*

Investigation Derived Waste

Purge water and water-based decontamination solutions will be placed into appropriately-labeled waste drums that will have been staged at the site. A record of the approximate volume of liquid placed in the drum will be made and this information will be transmitted to Ecology and Unocal personnel. Unocal will be responsible for the subsequent storage, management, and disposal of the purge water.

Other waste material, including personnel protective equipment (disposable coveralls, gloves, sample tubing, etc.) will be placed in plastic garbage bags and transported off site and disposed of as domestic waste.

5.0 QUALITY ASSURANCE PROCEDURES

5.1 Documentation

Field documentation will consist of the following:

Field logbooks will contain a record of each day's activities and all relevant observations, measurements, and data not recorded elsewhere. Copies of the field logbooks will be made at the end of each field event and maintained in the project file.

Sample collection data sheets will be completed for each sample collected. Sample data sheets will contain date and time of sample collection, sample number, station location and depth, field measurements (e.g., pH, conductivity, temperature, etc.), and analyses collected. (For small

sampling events, this information may be recorded in the field logbook instead of on a separate data sheet.)

Sample labels will be attached to each sample container collected. Labels will contain the sample number, date and time of sample collection, analyses requested, and information of sample preservatives.

Sample designation will be in the form of "WET-MW-???" where ??? represents the monitoring well designation. This same sample designation will be used by the bioassay laboratory when preparing samples for chemical analysis. For the field duplicate sample that will be prepared by the bioassay laboratory, the suffix "-FD" will be appended to the duplicate sample designation.

Chain of custody forms will accompany all samples shipped to the laboratory. In addition to containing a record of sample information, chain of custody forms will contain the signature of the sample shipper and will document the date and time the samples were shipped and the airbill number of the carrier (if any). Upon receipt at the laboratory, the chain of custody record will be compared with the samples received, any discrepancies will be noted, and the form will be signed and dated by an authorized laboratory representative and a copy returned to the sender.

5.2 Analytical Methods, Reporting Limits, and QA/QC Criteria

Table 2 shows the bioassay tests to be performed on groundwater collected from each well. Bioassay test procedures, methods, and QA/QC criteria for each of the four bioassay organisms are presented in Appendix A. Chemical analyses to be performed are listed in Table 3. Tables 2 and 3 also list the sample containers, preservatives, and holding times to be used for each analysis. Table 4 shows the chemical parameters that will be analyzed by each method, the target reporting limits that the laboratory will be expected to meet, and the QA/QC acceptance criteria.

5.3 Field QC Sampling

Field QC sampling will involve collection of a split (duplicate) sample for chemical analysis. This sample will be prepared by AMEC and submitted to North Creek Analytical along with the other analytical samples. The duplicate sample will be analyzed for all chemical analyses that are being performed on the other samples.

5.4 Containers, Preservatives, and Holding Times

Tables 3 and 4 summarizes the requirements for sample containers and preservatives as well as the maximum time that samples can be held after sampling and prior to being analyzed.

5.5 Deliverables and Data Validation

Bioassay reports will be prepared for each sample in accordance with WQ-R-95-80. One copy of the bioassay report will be submitted by AMEC to SAIC and one copy will be submitted directly to Ecology.

For Chemical analyses, North Creek Analytical will submit a Level II data package, or equivalent for each sample. Data packages will include a transmittal letter, sample analytical results, method blank results, surrogate recovery results, chain of custody documents, duplicates, matrix spikes, and duplicate matrix spikes. One complete copy of the data package will be submitted to SAIC and one copy will be submitted directly to Ecology.

Chemical analyses/deliverables will be validated by EcoChem. EcoChem will prepare a data validation report documenting the results of the validation. One copy of the validation report will be submitted to SAIC and one copy will be submitted directly to Ecology. Bioassay analyses will be validated separately by Ecology.

Laboratory deliverables will Chemical analyses from North Creek Analytical will be validated by EcoChem, Inc. EcoChem will perform data validation per EPA Level II for all results and per EPA Level IV for a portion of the results (see Table 6 for laboratory deliverables requirements).

Table 1
Monitoring Well Information

Well to be Sampled	Well Diameter (in)	Total Depth (ft below top of casing)	Top of Screen Depth (ft)	Bottom of Screen Depth (ft)
MW-7	2	13.0	3.0	13.0
MW-17	2	14.0	4.0	14.0
MW-103	2	?	?	?
MW-146	2	?	?	?
MW-129	2	14.6	4.1	14.1
MW-W	2	19.0	?	?

Table 2 Bioassay Tests

Analysis	Method	Container	Preservation	Holding Time (days)
7-day <i>Pimephales</i> <i>promelas</i> (Fathead minnow) survival and growth test	EPA/600/4-91/002			
7-day <i>Atherinops</i> <i>affinis</i> (Topsmelt) survival and growth test	EPA/600/R-95/136	Polyethylene cubitainers	Store in darkness 4°C	3
7-day <i>Mysidopsis</i> <i>bahia</i> survival and growth test	EPA/600/4-91/003	(75 liters total)	4 C	
7-day <i>Ceriodaphnia</i> <i>dubia</i> survival and reproduction test	EPA/600/4-91/002			

Analysis	Method	Container	Preservation	Holding Time (days)
NWTPH-G & BTEX by 8021	NWTPH- Gx/8021B	2 Voa Vials - HCl	Add HCl to pH<2; Store 4°C	14
VPH	WA MTCA-VPH	3 Voa Vials HCl	Add HCl to pH<2; Store 4°C	14
NWTPH-D	NWTPH-Dx	2 x 1L Amber-HCl	Add HCl to pH<2; Store 4°C	7
EPH	WA MTCA-EPH	1L Amber HCl	Add HCl or H2SO4 to pH<2; Store 4°C	7
PAHs	8270-SIM	1L Amber	Store cool at 4°C	7
BTEX by 8260	EPA 8260B	3 Voa Vials - HCl	Add HCl to pH<2; Store 4°C	14

Table 3 Chemical Analyses

								DU		Matri	
			100			DD	G A /	Р	0 (X	G L G
Method	Analyte	MDL	MR L	Units	% R	RP D	Surr.% R	RP D	% R	Spike RPD	CAS #
	etroleum Products a										
NWTPH											
-											
Gx/8021	Gasoline Range								80-		8006-
В	Hydrocarbons	10.5	50.0	ug/l	-	25	70-130	25	120	25	61-9
NWTPH											
-											
Gx/8021	D	0.093	0.50	1			00.104	40	80-	40	71-
B	Benzene	0	0	ug/l	-	-	80-134	40	120	40	43-2
NWTPH											
- Gx/8021			0.50						80-		108-
B	Toluene	0.134	0.50	ug/1			68-114	40	120	40	88-3
D NWTPH	Toluelle	0.134	0	ug/l	-	-	00-114	40	120	40	00-3
Gx/8021		0.052	0.50						80-		100-
B	Ethylbenzene	0.052	0.50	ug/l	_	-	72-128	40	120	40	41-4
NWTPH			Ŭ	ug/1			/2 120	10	120	10	
-											
Gx/8021									80-		1330-
В	Xylenes (total)	0.199	1.00	ug/l	-	-	67-125	40	120	40	20-7
NWTPH											
-											
Gx/8021				Surrogat	57-						460-
В	4-BFB (FID)			e	125	-	-	-	-	-	00-4
NWTPH											
-											
Gx/8021				Surrogat	62-						460-
B	4-BFB (PID)			e	120	-	-	-	-	-	00-4
	etroleum Hydrocarb	ons by W	DOE T	PH Policy I	Method	1		1		-	
WA MTCA-									70-		
VPH	C5-C6 Aliphatics	0.714	50.0	ug/l	_	25	70-130	25	130	25	NA
WA	CJ-CO Alipliatics	0.714	50.0	ug/1	-	23	70-130	23	150	23	INA
MTCA-									70-		
VPH	C6-C8 Aliphatics	1.49	50.0	ug/l	-	25	70-130	25	130	25	NA
WA				8							
MTCA-	C8-C10								70-		
VPH	Aliphatics	1.72	50.0	ug/l	-	25	70-130	25	130	25	NA
WA	· ·			Ĭ							
MTCA-	C10-C12								70-		
VPH	Aliphatics	1.03	50.0	ug/l	-	25	70-130	25	130	25	NA
WA											
MTCA-	C8-C10								70-		
VPH	Aromatics	2.50	50.0	ug/l	-	25	70-130	25	130	25	NA
WA											
MTCA-	C10-C12	0.000							70-		
VPH	Aromatics	0.963	50.0	ug/l	-	25	70-130	25	130	25	NA

 Table 4

 Laboratory QA/QC Acceptance Criteria

								DU P		Matri x	
			MR		%	RP	Surr.%	RP	%	Spike	CAS
Method	Analyte	MDL	L	Units	R	D	R	D	R	RPD	#
WA											
MTCA-	C12-C13								70-		
VPH	Aromatics	1.10	50.0	ug/l	-	25	70-130	25	130	25	NA
WA											
MTCA-	Total VPH								70-		
VPH	(TVPH)		50.0	ug/l	-	25	70-130	25	130	25	
WA											
MTCA-				Surrogat	60-						460-
VPH	4-BFB (FID)			e	140	-	-	-	-	-	00-4
WA											
MTCA-				Surrogat	60-						460-
VPH	4-BFB (PID)			e	140	-	-	-	-	-	00-4

 Table 4

 Laboratory QA/QC Acceptance Criteria

								DU		Matri	
								Р		Х	
	A B /	MDI	MR	T T •/	%	RP	Surr.%	RP	%	Spike	CAS
Method Seminolati	Analyte The Petroleum Produ	MDL	L	Units	R	D	R	D	R	RPD	#
NWTPH	Diesel Range	0.054	0.25)x (w/o Aci	a/Silici	a Gei C	iean-up)		63-		68476
-Dx	Hydrocarbons	0.034	0.23	mg/l	_	40	37-126	40	107	40	-34-6
NWTPH	Lube Oil Range	0	0.50	IIIg/1	-	40	37-120	40	60-	40	-54-0
-Dx	Hydrocarbons	0.110	0.50	mg/l	_	40	_	_	140	40	NA
NWTPH	Trydroedroons	0.110	0	Surrogat	50-	-10			140	-10	321-
-Dx	2-FBP			e	150	-	-	_	_	-	60-8
NWTPH	2151			Surrogat	50-						630-
-Dx	Octacosane			e	150	-	-	_	-	-	02-4
	e Petroleum Hydrod	carbons b	v WDO	E TPH Pol		thod		1	II		
WA			<i>,</i>								
MTCA-	C8-C10										
EPH	Aliphatics	0.532	50.0	ug/l	-	-	-	-	-	-	NA
WA	· ·			U							
MTCA-	C10-C12										
EPH	Aliphatics	1.90	50.0	ug/l	-	-	-	-	-	-	NA
WA											
MTCA-	C12-C16										
EPH	Aliphatics	10.0	50.0	ug/l	-	-	-	-	-	-	NA
WA											
MTCA-	C16-C21										
EPH	Aliphatics	10.0	50.0	ug/l	-	-	-	-	-	-	NA
WA											
MTCA-	C21-C34										
EPH	Aliphatics	10.0	50.0	ug/l	-	-	-	-	-	-	NA
WA											
MTCA-	C8-C10	20.0	50.0	/1							
EPH	Aromatics	20.0	50.0	ug/l	-	-	-	-	-	-	NA
WA MTCA-	C10 C12										
	C10-C12	1.4.4	50.0								NIA
EPH WA	Aromatics	1.44	50.0	ug/l	-	-	-	-	-	-	NA
MTCA-	C12-C16										
EPH	Aromatics	10.0	50.0	ug/l	-	_					NA
WA	Alomatics	10.0	50.0	ug/1	-	-	-	-	-	-	INA
MTCA-	C16-C21										
EPH	Aromatics	10.0	50.0	ug/l	-	-	-	-	-	-	NA
WA	11011000	10.0	20.0	ч <u>5</u> /1							1 12 1
MTCA-	C21-C34										
EPH	Aromatics	10.0	50.0	ug/l	-	-	-	-	-	-	NA
WA	Extractable										
MTCA-	Petroleum								70-		
EPH	Hydrocarbons		50.0	ug/l	-	40	70-130	25	130	25	NA
WA											
MTCA-				Surrogat	60-						321-
EPH	2-FBP			e	140	-	-	-	-	-	60-8
WA				Surrogat	60-						630-
MTCA-	Octacosane			e	140	-	-	-	-	-	02-4

 Table 4

 Laboratory QA/QC Acceptance Criteria

								DU		Matri	
Method	Analyte	MDL	MR L	Units	% R	RP D	Surr.% R	P RP D	% R	x Spike RPD	CAS #
EPH											
WA MTCA-				Surrogat	60-						1120-
EPH	Undecane			e	140	-	-	-	-	-	21-4
	ar Aromatic Hydroc			S-SIM	1	1		1		[
8270-	Benzo (a)	0.031	0.10	/1			50 150	25	50-	25	56-
SIM	anthracene	0	0	ug/l	-	-	50-150	25	150	25	55-3
8270-	D ()	0.024	0.10	/1			50.150	25	50-	25	50-
SIM	Benzo (a) pyrene	0	0	ug/l	-	-	50-150	25	150	25	32-8
8270-	Benzo (b)	0.049	0.10	/1			50 150	25	50-	25	205-
SIM	fluoranthene	0	0	ug/l	-	-	50-150	25	150	25	99-2
8270-	Benzo (k)	0.031	0.10	1			50 1 50		50-		207-
SIM	fluoranthene	0	0	ug/l	-	-	50-150	25	150	25	08-9
8270-		0.036	0.10	/1			50.150	0.7	50-	0.7	218-
SIM	Chrysene	0	0	ug/l	-	-	50-150	25	150	25	01-9
8270-	Dibenz (a,h)	0.034	0.10						50-		53-
SIM	anthracene	0	0	ug/l	-	-	50-150	25	150	25	70-3
8270-	Indeno (1,2,3-cd)	0.024	0.10						50-		193-
SIM	pyrene	0	0	ug/l	-	-	50-150	25	150	25	39-5
8270- SIM	l- Methylnaphthale ne	0.024 0	0.10 0	ug/l	-	-	50-150	25	50- 150	25	90- 12-0
8270- SIM	2- Methylnaphthale ne	0.031	0.10	ug/l	_	_	50-150	25	50- 150	25	91- 57-6
8270-		0.043	0.10				00100		50-		91-
SIM	Naphthalene	0	0	ug/l	_	_	50-150	25	150	25	20-3
8270-	1 (0)111101010	Ŭ	Ű	Surrogat	30-		00 100		100		1718-
SIM	p-Terphenyl-d14			e	150	_	_	_	_	-	51-0
	TBE , Naphthalene, a	and n-He	exane bi	-	100			I	1		010
EPA	Methyl tert-butyl			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,							1634-
8260B	ether	0.256	5.00	ug/l	-	_	_	-	-	-	04-4
EPA									80-		71-
8260B	Benzene	0.281	5.00	ug/l	-	-	75-125	20	120	20	43-2
EPA									80-		108-
8260B	Toluene	0.982	5.00	ug/l	-	-	72-125	20	120	20	88-3
EPA	10140110	0.202	2.00	~~D' 1			,_ 120				100-
8260B	Ethylbenzene	0.328	5.00	ug/l	-	-	-	-	-	-	41-4
EPA	2011/10/0120110	0.020	2.00	~~D' 1							1330-
8260B	m,p-Xylene	1.53	5.00	ug/l	-	-	-	-	-	-	20-7
EPA 8260B	o-Xylene	0.463	5.00	ug/l	-	-	-	_	-	-	95- 47-6
EPA	, , , , , , , , , , , , , , , , , , ,			U	1				1		91-
8260B	Naphthalene	0.914	5.00	ug/l	-	-	-	-	-	-	20-3
EPA	1			U	1				1		110-
8260B	n-Hexane	0.387	5.00	ug/l	-	-	-	-	-	-	54-3
EPA				Surrogat	60-						17060
8260B	1,2-DCA-d4			e	140	-	-	-	-	-	-07-0

 Table 4

 Laboratory QA/QC Acceptance Criteria

Method	Analyte	MDL	MR L	Units	% R	RP D	Surr.% R	DU P RP D	% R	Matri x Spike RPD	CAS #
EPA	¹ mary te	MDL	L	Surrogat	60-	D	K	ν	N	KI D	2037-
8260B	Toluene-d8			e	140	-	-	-	-	-	26-5
EPA				Surrogat	60-						460-
8260B	4-BFB			e	140	-	-	-	-	-	00-4

 Table 4

 Laboratory QA/QC Acceptance Criteria

Appendix A

Bioassay Test Standard Operating Procedures (SOPs)

Issue Date: 10 February 2001
Revision Date: 12 December 2002

Page 1 of 4

SAMPLE RECEIPT PROCEDURES

1.0 A. EFFLUENT SAMPLES

1. Open the cooler or container and identify its contents.

I.

- Carefully review the chain-of-custody (COC) form(s), taking note of any discrepancies between requested testing and scheduled testing. Notify the lab supervisor of conflicting information and record discrepancies on the COCs in the "Comments" section. If no tests are specified, fill them in according to scheduled testing, and initial next to them to indicate that this part of the COC was completed by laboratory personnel, and not by the client.
- 3. Measure the temperature of the sample and record on the COC(s). Samples must be within acceptable ranges as follows:
- Grab samples received within 1 hour of collection less than 20°C
- Samples received within 4 hours of collection less than 12°C
- Samples received after 4 hours of collection but within 36 hour holding time less than 8°C.
- 4. If sample receipt temperatures are outside acceptable ranges notify the project manager.
- 5. Check to see if any subsamples are required for in-house chemical analyses (e.g. ammonia), or off-site chemical analyses (e.g. metals).
- 6. Sign the COC(s), and be sure to record the date and time as well.
- 7. Note sample condition and number of containers where requested.
- 8. Assign an AMEC sample number from the sample receipt and disposal logs and record on the associated COC form.
- 9. File COC(s) in the appropriate client folder.
- 10. Label container and cap with appropriate sample identification information and date of receipt (i.e. client, sample ID, date, and sample 1, 2, or 3).
- 11. Measure the pH, dissolved oxygen (DO), salinity or conductivity, hardness (if applicable), alkalinity, total chlorine and free chlorine (if necessary). Make necessary adjustments and record information in the sample receipt log.

Note: Hardness is recorded in freshwater samples only (salinity of <3). Free chlorine is measured only if the total chlorine is greater than 0.1 mg/L.

- 12. Record sample description including matrix, color, odor, and particulate information (codes are located on the wall at the check-in station).
- 13. Fill out the sample check-in and data pathway sheets that are in the client folder with all relevant information.

Issue Date: 10 February 2001	Page 2 of 4
Revision Date: 12 December 2002	-

Note: If time does not allow completion of entire sample check-in procedure immediately upon receipt of the sample, record temperature reading and review COC. Place the sample in the 4°C room until check-in procedures can be completed.

B. Sediment Samples

- 1. Measure the temperature in each cooler and record in the sediment receipt and disposal log.
- 2. Ensure that all sediment samples are clearly labeled and match the sample IDs on the COC(s).
- 3. Clearly label the outside of any cooler containing test sediments with the client name, project ID, and the date of receipt.
- 4. Place the samples in the 4°C room until needed for testing.

Issue Date: 10 February 2001	Page 3 of 4
Revision Date: 12 December 2002	

2.0 C. DANGEROUS WASTE MATERIAL (WA 80-12) SAMPLES

- 1. Record the sample receipt date, client name, sample ID, and technician initials in the Dangerous Waste sample receipt log book. <u>This logbook is separate from the effluent sample logbook!</u>
- 2. No physical or chemical measurements are required.
- 3. Store the sample in the locked refrigerator designated for hazardous material until needed for test initiation.
- 4. If the sample does not appear on the schedule, notify Lab Supervisor of receipt.

Sample Holding Times

A. Effluent Samples

All effluent tests must be initiated within 36 hours of sample collection time. The sample then may be used for renewals for up to 72 hours after the time of sample collection.

B. Sediment, Soil, and Dredge Material Samples

Holding times for sediment and soil samples are project specific, typically ranging from two to eight weeks. The holding time for dredge material projects is eight weeks.

C. Dangerous Waste Samples

Dangerous waste samples should be extracted within 7 days of sample receipt and tested within 8 days of sample receipt (WDOE 80-12, p.A-38).

Sample Disposal Procedures

A. Effluent Samples

- 1. Effluent samples that are out of holding time will be disposed of each Monday, unless the client has requested storage of the sample for future chemical or TIE analyses.
- 2. The Lab Supervisor or Manager will place a check mark next to the samples that are OK for disposal in the effluent sample disposal log.
- 3. Remove all of the samples that are cleared for disposal from the 4°C-storage room and place next to the sink.
- 4. Double-check all labels and make sure that only the samples cleared for disposal have been removed from storage.
- 5. Cut each cubitainer with a razor blade and pour contents down the sink while the water is running; <u>be sure to wear gloves</u>!
- 6. Throw all of the emptied and slashed cubitainers out with the regular trash.
- 7. Fill out the effluent sample disposal log with the date of disposal, method of disposal (sink), and technician initials.

B. Sediment, Soil, and Dredge Material Samples

- 1. Sediments will be held for up to 90 days past the date the project report was issued.
- 2. Once this holding time is passed and disposal has been cleared with the client, check the sediment receipt/disposal log to determine the method of disposal.
 - a. If the tests conducted on the sample passed all test acceptability criteria, the sample material can be disposed of in the regular trash.
 - b. If the tests conducted on the sample failed any of the test acceptability criteria, the sample is classified as hazardous material and must be disposed of in the blue 55-gallon drum in the sediment preparation room.

Note: For some materials (usually port dredge material), it may be OK to dispose of toxic material in the regular trash if it passes chemical concentration threshold criteria.

3. Record the method and date of disposal, as well as technician initials in the sediment receipt and disposal log.

C. Dangerous Waste Samples

1. If the tests conducted on the sample passed all test acceptability criteria, the sample material can be disposed of in the regular trash.

SAMPLE HANDLING PROCEDURES

Issue Date: 10 February 2001	Page 5 of 4
Revision Date: 12 December 2002	

- 2. If the tests conducted on the sample failed any of the test acceptability criteria, the sample is classified as hazardous material and must be shipped back to the client. The client will then incur the cost of proper disposal.
- 3. Record the method and date of disposal, as well as technician initials in the WDOE 80-12 sample receipt and disposal log.

Health and Safety

Health and safety precautions and applicable regulations should be considered at all times. Gloves must always be worn when handling samples.

Personnel

Only qualified technicians who have been properly trained and can demonstrate competency with these techniques are permitted to handle samples.

SW/EPA95/AAC-002

7-DAY STATIC RENEWAL TEST USING ATHERINOPS AFFINIS

Issue Date: 1 July 1999	Page 1 of 4
Revised: 8 May 2003	

I. PURPOSE

This method estimates the chronic toxicity of whole effluents and receiving waters to the topsmelt *Atherinops affinis* in a 7-day chronic bioassay. Test results are based on survival and growth (final mass) of the larvae.

SW/EPA95/AAC-002

7-DAY STATIC RENEWAL TEST USING ATHERINOPS AFFINIS

Issue Date: 1 July 1999	Page 2 of 4
Revised: 8 May 2003	

3.0 SUMMARY OF TEST PROCEDURE

- . 5 replicates/concentration
- . 6 fish/replicate
- Age of fish: 9-15 days post hatch
- . 1-liter test container
- . 500 ml solution/container
- 20° C
- . 30 ppt
- Feed Artemia twice per day
- Highest concentration for ref. tox.: $600 \mu g/L Cu$

SW/EPA95/AAC-002

7-DAY STATIC RENEWAL TEST USING ATHERINOPS AFFINIS

Issue Date: 1 July 1999	Page 3 of 4
Revised: 8 May 2003	

4.0 EQUIPMENT/SUPPLIES

- Environmental chamber maintained at 20±1°C and refrigerator at 4°C
- Thermometer, pH meter, dissolved oxygen meter, refractometer, drying oven, and balance
- . Atherinops affinis larvae 9-15 days old
- Brine shrimp (*Artemia* cysts)
- . Clear covers to prevent contamination of test chambers
- . 1-L and 2-L flasks
- . 1-L test containers
- . Graduated cylinders
- . Deionized water and high-quality synthetic sea salt for seawater preparation
- Safety equipment lab coats, eye protection, gloves and respirator as required
- CuCl₂ for reference toxicant testing

III. PROCEDURE

A. Pre-test Set up

- 1. Test animals are purchased from a reputable dealer and shipped via overnight delivery service to the Bioassay Lab.
- 2. The test animals are acclimated to test temperature and fed *Artemia* nauplii during holding. Test animals are between nine and fifteen days old at test initiation.

B. Test Initiation

- 1. Samples are checked in upon receipt. See procedural SOP for details on routine sample check-in procedures. Samples are stored in a refrigerator at 4°C until needed for testing. Tests are initiated within 36 hours of sample collection. Check with laboratory supervisor for client-specific differences.
- 2. Record sample description with matrix, color, odor, and particulate information.

SW/EPA95/AAC-002

7-DAY STATIC RENEWAL TEST USING ATHERINOPS AFFINIS

Issue Date: 1 July 1999	Page 4 of 4
Revised: 8 May 2003	

- 3. Measure chlorine content, alkalinity, and any adjustments made to the control, receiving and sample waters and record on the data sheets.
- 4. Prepare a randomization sheet using the **TOXCALC** database software or Excel. See procedural SOP for details on randomization sheet preparation.
- 5. Measure salinity of sample and adjust salinity to 30 ppt using 40 Fathoms artificial seasalt. Stir sample on magnetic stir plate for a minimum of one hour after adding salt. Check salinity again and adjust to 30 ppt as needed.
- 6. Prepare dilutions according to test specific concentrations. Concentrations are directed by permit language. Bioassays that require a 0.5 dilution series are serially diluted. All other concentrations must be measured with graduated cylinders and pipettes.
- 7. Warm each dilution to $20 \pm 1^{\circ}$ C.
- 8. Measure and record water quality parameters for each test concentration. Water quality parameters include pH, DO, salinity, and temperature.
- 9. Label test containers according to the randomization sheet.
- 10. Distribute 500 ml of each test solution into each of five properly labeled test containers.
- 11. Randomly distribute 6 topsmelt larvae to each test container and place the test containers in the 20°C environmental chamber in randomized order.
- 12. Add food to each test chamber. See procedural SOP for specifications on hatching *Artemia* cysts to use as a food source. Collect 10 milliliters of concentrated hatched *Artemia* nauplii, rinse with deionized water and add to 200 ml of seawater. Add 1 ml of diluted *Artemia* to each test chamber.

C. Daily Monitoring

- 1. Animals are fed twice daily. See step 12 above for feeding procedures.
- 2. Adjust sample salinity to 30 ppt using 40 Fathoms artificial seasalt. Stir sample on magnetic stir plate for a minimum of one hour after adding salt. Check salinity again and adjust to 30 ppt as needed.
- 3. Prepare dilutions according to test specific concentrations and warm to $20 \pm 1^{\circ}$ C.

SW/EPA95/AAC-002

7-DAY STATIC RENEWAL TEST USING ATHERINOPS AFFINIS

Issue Date: 1 July 1999	Page 5 of 4
Revised: 8 May 2003	

- 4. To renew the tests, siphon 80% of the test solution removing excess food, dead animals and debris from the bottom. Save a composite sample from each concentration.
- 5. Count and record number of surviving fish.
- 6. Gently pour the new test solution down the side of each test chamber to avoid subjecting the larvae to excessive turbulence.
- 7. Measure and record water quality parameters (pH, DO, salinity, and temperature) from the composite samples saved from step 3.

D. Test Termination

- 1. Fish are not fed on the day of test termination.
- 2. Count and record the number of surviving fish.
- 8. Each test container is drained through a 500 μm mesh screen to collect surviving larvae. Save a composite sample from each concentration. The animals are rinsed with deionized water, and then sacrificed by dipping the screen containing the larvae into an ice bath.
- 9. Using forceps, gently transfer the larvae onto pieces of aluminum foil that have been dried at 105 °C for a minimum of 6 hours or 60 °C for 24 hours and tared. See procedural SOP for specifications on weighing procedures.
- 10. Dry the larvae at 60°C for 24 hours or at 105°C for at least 6 hours.
- 11. Transfer dried larvae to a desiccator and let cool for at least 2 hours. Weigh to the nearest 0.00001g and record on the data sheet.

IV. TEST ACCEPTABILITY CRITERIA

- 1. Control survival at test termination must be 80 percent or greater.
- 2. The mean weight per larvae must exceed 0.85 mg per fish in the reference and brine controls.
- 3. The LC₅₀ for survival must be within two standard deviations of the control chart mean for the laboratory. The LC₅₀ for the survival with copper must be $\leq 205 \ \mu g/L$.

SW/EPA95/AAC-002

7-DAY STATIC RENEWAL TEST USING ATHERINOPS AFFINIS

Issue Date: 1 July 1999	Page 6 of 4
Revised: 8 May 2003	

4. There must be a minimum significant difference (MSD) of <25% relative to the control for the survival for the reference toxicant test. There must be a MSD of <50% relative to the controls for growth for the reference toxicant test.

V. HEALTH AND SAFETY

Health and safety precautions and applicable regulations should be considered at all times. Gloves should always be worn when handling effluents.

VI. PERSONNEL

Only qualified technicians who have been properly trained and can demonstrate competency with these techniques are permitted to conduct this test.

VII. QUALITY ASSURANCE REQUIREMENTS

Quality assurance practices encompass all aspects of testing including the collection, handling, and preparation of test organisms, samples, and dilution waters. Proper record keeping is required, and concentrated efforts are made for complete documentation on a real-time basis.

VIII. Reference

"Short-Term Method for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms." EPA/600/R-95/136, August 1995.

7 - DAY STATIC RENEWAL TEST USING CERIODAPHNIA DUBIA

Issue Date: 2 October 2001	Page 1 of 4
Revised: 8 May 2003	

I. PURPOSE

This method estimates the chronic toxicity of whole effluents and receiving water to the cladoceran *Ceriodaphnia dubia*. Test results are based on survival and reproduction.

II. SUMMARY OF TEST PROCEDURE

- 10 replicates per concentration
- One neonate per replicate
- Age: <24hours old, all within 8 eight hours of each other with known parentage
- . 30 ml test container
- . 15 ml solution per container
- 25°C
- Fed 100 µl YTC and 100 µl Selenastrum daily
- . Highest concentration for reference toxicant test: 4 g/L NaCl

III. EQUIPMENT/SUPPLIES

- Environmental chamber maintained at $25 \pm 1^{\circ}C$ with timer-controlled ambient lighting and a cold room at $4 \pm 1^{\circ}C$
- Thermometer, pH meter, dissolved oxygen meter, and conductivity meter for routine physical and chemical measurements
- CuCl₂ or NaCl for reference toxicant testing
- · Ceriodaphnia dubia cultures
- Balance analytical, capable of weighing accurately to 0.01 mg
- Test chambers ten 30-mL disposable plastic test chambers per concentration and control
- Numbered "cerio boards" for holding test chambers
- . Clear covers to prevent contamination of test chambers
- 1-L and 400-mL beakers for test solution preparation
- Graduated cylinders, 10-mL and 1-mL disposable pipets
- · Yeast/Trout chow/Chlorophyll (YTC) and Selenastrum suspension to feed animals
- Dissecting microscope with substage lighting

AMEC Northwest Bioassay Lab

FW/EPA02/CDC-002

7 - DAY STATIC RENEWAL TEST USING CERIODAPHNIA DUBIA

Issue Date: 2 October 2001	Page 2 of 4
Revised: 8 May 2003	-

. Safety equipment - lab coats, eye protection, gloves, and respirators as required

III. PROCEDURE

A. Pre-test Set up

- 1. Test animals are purchased from a reputable dealer and cultured in the laboratory.
- 2. A brood board is prepared 7 days prior to test initiation. Sixty neonates are pulled from adults that have produced at least eight young in their third or fourth brood. Each neonate is placed in a 30 ml cup with 15ml DMW (dilute mineral water) and is fed 100 μl each of *Selenastrum* and vitamin-enriched YTC. Daily transfer and feeding of neonates is performed and reproduction is recorded on a brood board sheet.
- **3.** On the day of test initiation, the brood board is checked for reproduction. Only neonates from females that have produced at least 20 neonates in three broods are used. The brood on the day of test initiation must consist of at least 8 neonates (<24 hour old). Each test must use neonates within an 8-hour age range.

FW/EPA02/CDC-002

7 - DAY STATIC RENEWAL TEST USING CERIODAPHNIA DUBIA

Issue Date: 2 October 2001	Page 3 of 4
Revised: 8 May 2003	

5.0 B. TEST INITIATION

- 1. Samples are checked in upon receipt. See procedural SOP for details on routine sample check-in procedures. Routinely, tests must be initiated within 36 hours of sample collection. Check with laboratory supervisor for client-specific differences.
- 2. Record a brief sample description with matrix, color, odor, and particulate information on the data sheet.
- 3. Measure residual chlorine concentration, hardness, alkalinity, ammonia, and any adjustments made to the control, receiving, and sample waters. Record on the data sheet.
- 4. Prepare dilutions according to test specific concentrations. Concentrations are directed by permit language. Bioassays requiring a 0.5 dilution series are serially diluted. All other concentrations must be measured with graduated cylinders and pipettes.
- 5. Measure and record physical and chemical parameters in all concentrations. Water quality measurements include pH, dissolved oxygen, conductivity, and temperature.
- 6. Warm each dilution to $25\pm1^{\circ}$ C.
- 7. Prepare a randomization sheet from the TOXCALC database software. See procedural SOP for details.
- 7. Obtain a numbered "cerio board" and place the appropriate number of cups on the board (10 cups/concentration and control). Number the cups based on the randomization sheet.
- 8. Distribute 100 µl each of *Selenastrum* and vitamin-enriched YTC to each test chamber.
- 9. Distribute approximately 15 mL of the appropriate test solution into each of the ten test containers.
- 10. Into each test container place one neonate (hereafter referred to as the Alpha organism). Use neonates from the same adult for the same replicate for each concentration. For instance Replicate 1 for all concentrations will receive a neonate from one adult that has produced a third brood of eight or more neonates.
- 11. Place the test "cerio board" in the 25°C environmental chamber and cover.

C Daily Monitoring

AMEC Northwest Bioassay Lab

7 - DAY STATIC RENEWAL TEST USING CERIODAPHNIA DUBIA

Issue Date: 2 October 2001	Page 4 of 4
Revised: 8 May 2003	-

- 1. Each successive day of the test prepare new test solutions, warm to $25\pm1^{\circ}$ C, and distribute to new numbered test containers. Distribute 100 μ L of each food to each test container.
- 2. View test containers from the previous day's renewal under a dissecting scope. Count and record the number of neonates and the survival status of the Alpha organism. Remove the Alpha organism with a wide bore transfer pipette, and place in the corresponding cup containing renewed solution.
- 3. Composite and save the test solution from each concentration for final water quality measurements.
- 4. Measure and record chemical and physical parameters (pH, DO, conductivity, and temperature) of the composite samples.

D. Test Termination

- 1. View each test container under the dissecting scope. Count and record the number of neonates and the survival status of the Alpha organism.
- 2. If control survival is greater than or equal to 80 percent and 60 percent of surviving females are in their third brood with an average total number of 15 or more offspring per surviving adult, the test is terminated. If the test is terminated on day 6, the animals are maintained until day 7 for the purpose of evaluating final survival status of each organism.
- 3. Composite and save the test solution from each concentration for final water quality measurements.
- 4. Measure and record chemical and physical parameters (pH, DO, conductivity, and temperature) of the composite samples.

IV. TEST ACCEPTABILITY CRITERIA

This is not a time-dependent test although extension or shortening of more than one day may indicate problems and should prompt close examination of test procedures and animal condition. The acceptability criteria for test termination are the following:

- 80% survival in the controls (including males)
- 60% of surviving females reaching at least three broods
- An average total number of 15 or greater offspring per surviving female

FW/EPA02/CDC-002

7 - DAY STATIC RENEWAL TEST USING CERIODAPHNIA DUBIA

Issue Date: 2 October 2001	Page 5 of 4
Revised: 8 May 2003	-

In addition, a valid reference toxicant test with a logical dose response curve should be obtained, using animals from the same batch.

V. HEALTH AND SAFETY

Health and safety precautions and applicable regulations should be considered at all times. Gloves should always be worn when handling effluents.

VI. PERSONNEL

Only qualified technicians who have been properly trained and can demonstrate competency with these techniques are permitted to conduct this test.

VII. QUALITY ASSURANCE REQUIREMENTS

Quality assurance practices encompass all aspects of testing including the collection, handling, and preparation of test organisms, samples, and dilution waters. Proper record keeping is required and concentrated efforts are made for complete documentation on a real-time basis.

VIII. REFERENCE

USEPA. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Fourth Edition. EPA-821-R-02-013.

FW/EPA02/PPC-002

7 - DAY STATIC RENEWAL TEST USING PIMEPHALES PROMELAS

Issue Date: 2 October 2001	Page 1 of 3
Revised: 8 May 2003	-

I. PURPOSE

This method estimates the chronic toxicity of whole effluents and receiving water to the fathead minnow *Pimephales promelas* in a seven day static-renewal test. Test results are based on the survival and growth (final mass) of the larvae.

II. SUMMARY OF TEST PROCEDURE

- 4 replicates per concentration
- . 10 fish per replicate
- Fathead minnows, <24 hours old
- . 500 ml test container
- . 250 ml test volume
- . 25°C
- . Daily renewals
- . Feed artemia twice
- . Highest concentration of ref.tox: 8 g/L NaCl

III. EQUIPMENT/SUPPLIES

- Environmental chamber maintained at 25±1°C and cold room at 4°C
- Thermometer, pH meter, dissolved oxygen meter, and conductivity meter for routine physical and chemical measurements
- CuCl₂ or Nacl for reference toxicant testing
- Fathead minnows, <24 hours old
- . Brine shrimp (Artemia cysts)
- Balance analytical, capable of weighing accurately to 0.01 mg
- Test chambers four 500-mL disposable plastic test chambers per concentration and control
- . Clear covers to prevent contamination of test chambers
- . Light table for counting the number of surviving larvae
- · 2-L and 1-L beakers for solution preparation
- . Graduated cylinders

FW/EPA02/PPC-002

7 - DAY STATIC RENEWAL TEST USING PIMEPHALES PROMELAS

Issue Date: 2 October 2001	Page 2 of 3
Revised: 8 May 2003	

- . 1- and 10-mL pipets
- . Siphons for test renewal
- . Deionized water and chemicals for making Moderately Hard Synthetic Water
- . Safety equipment lab coats, eye protection, gloves, and respirators as required

IV. PROCEDURE

A. Pre-test Set up

- 1. Laboratory control water is prepared 24 hours (minimum) to 14 days (maximum) prior to testing. See procedural SOP for specifications on preparation of Moderately Hard Synthetic Water (MHSW).
- 2. Set up *Artemia* cysts for hatching 24 hours prior to testing. See procedural SOP or specifics on the preparation and harvesting of Artemia.
- 3. Fish larvae are purchased from a reputable dealer and shipped via overnight delivery to the bioassay laboratory. The larvae are acclimated to testing temperature $(25 \pm 1^{\circ}C)$ upon receipt and fed *Artemia* nauplii during transport and holding. Immediately prior to testing, place ten larvae at random in individual 30-mL polystyrene cups filled with control water.

B. Test Initiation

- 1. Samples are checked in upon receipt. See procedural SOP for details on routine sample check-in procedures. Tests must be initiated within 36 hours of sample collection. Check with laboratory supervisor for project-specific differences.
- 2. Record sample description with matrix, color, odor, and particulate information on the data sheet.
- 3. Measure chlorine content, hardness, alkalinity, ammonia, and any adjustments made to the control, receiving, and sample waters and record on the data sheet.
- 4. Prepare a randomization sheet using the TOXCALC database software or Excel. See procedural SOP for details on randomization sheet preparation.
- 5. Prepare 1.0 L of each test concentration and control water. Prepare dilutions according to test specific concentrations. Concentrations are directed by permit language. Bioassays

FW/EPA02/PPC-002

7 - DAY STATIC RENEWAL TEST USING PIMEPHALES PROMELAS

Issue Date: 2 October 2001	
Revised: 8 May 2003	

Page 3 of 3

which require a 0.5 dilution series are serially diluted. All other concentrations must be measured with graduated cylinders and pipettes.

- 6. Warm each dilution to $25\pm1^{\circ}$ C.
- 7. Measure and record physical and chemical parameters in each concentration. Parameters are pH, dissolved oxygen, conductivity, and temperature.
- 8. Distribute 250 mL of the test solutions into each of four properly labeled test containers. Add fish from step A.3 above.
- 9. Place the test containers in the 25°C environmental chamber.
- 10. Feed animals in each test container. See procedural SOP for specifications on feeding.

C. Daily Monitoring

- 1. Animals are fed twice per day. See procedural SOPs for feeding specifics.
- 2. Follow steps 4-6 under section III-B.
- 3. To renew the tests, siphon test solution leaving 15-20% of the original volume. Save a composite sample from the control, middle, and high concentrations. Excess food, dead animals and debris should be cleaned from the bottom using a disposable transfer pipet.
- 4. Count and record the number of surviving fish.
- 5. Gently pour the new test solution down the side of each test chamber to avoid subjecting the larvae to excessive turbulence.
- 6. Measure chemical and physical parameters (pH, DO, conductivity, and temperature) of the composite samples. Record in the appropriate column on the data sheets.

D. Test Termination

- 1. Fish are not fed on termination day.
- 2. Count and record the number of surviving fish.
- 3. Each test container is drained through a 35-µm mesh screen to collect surviving larvae. A composite sample is saved from each concentration for measurement of chemical and

FW/EPA02/PPC-002

7 - DAY STATIC RENEWAL TEST USING *PIMEPHALES PROMELAS*

Issue Date: 2 October 2001	Page 4 of 3
Revised: 8 May 2003	

physical parameters. The fish are rinsed with deionized water, placed into a tared weighing pan with forceps, and dried at 60°C for 24 hours. See procedural SOP for specifications on weighing procedures.

V. TEST ACCEPTABILITY CRITERIA

Control survival at test termination must be 80 percent or greater and the final mass per test animal must meet or exceed 0.25 mg for test results to be considered acceptable.

VI. HEALTH AND SAFETY

Health and safety precautions and applicable regulations should be considered at all times. Gloves should always be worn when handling effluents.

VII. PERSONNEL

Only qualified technicians who have been properly trained and can demonstrate competency with these techniques are permitted to conduct this test.

VIII. QUALITY ASSURANCE REQUIREMENTS

Quality assurance practices encompass all aspects of testing including the collection, handling, and preparation of test organisms, samples, and dilution waters. Proper record keeping is required and concentrated efforts are made for complete documentation on a real-time basis.

IX. REFERENCE

USEPA. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Fourth Edition. EPA-821-R-02-013.

SW/EPA02/MYC-002

7-DAY STATIC RENEWAL TEST USING MYSIDSOPSIS BAHIA

Issue Date: 1 July 1999	Page 1 of 4	
Revised: 8 May 2003		

6.0 PURPOSE

This method estimates the chronic toxicity of whole effluents and receiving waters to the opossum shrimp *Mysidopsis bahia* in a 7-day chronic bioassay. Test results are based on survival and growth.

SW/EPA02/MYC-002

7-DAY STATIC RENEWAL TEST USING MYSIDSOPSIS BAHIA

Issue Date: 1 July 1999Page 2 of 4Revised: 8 May 2003Page 2 of 4

II. SUMMARY OF TEST PROCEDURE

- 8 replicates/concentration
- . 5 mysid/replicate
- Age of mysid: 7 days
- . 250 ml test container
- . 200 ml solution/container
- $26 \pm 1^{\circ} C$
- . 30 ppt
- Feed artemia twice per day
- Highest concentration for ref. tox.: $600 \ \mu g/L \ Cu$

III. EQUIPMENT/SUPPLIES

- Environmental chamber maintained at $26 \pm 1^{\circ}$ C and refrigerator at 4.0° C
- Thermometer, pH meter, dissolved oxygen meter, refractometer, drying oven, and balance
- . Mysidopsis bahia juveniles, 7 days old
- . Clear covers to prevent contamination of test chambers
- . Artemia cysts for feeding test animals
- Light table for counting surviving mysids
- . 250-mL test containers
- . 2-L flasks
- Graduated cylinders
- . Deionized water and high-quality synthetic sea salt for seawater preparation
- CuCl₂ for reference toxicant testing
- Safety equipment lab coats, eye protection, gloves and respirator as required

III. PROCEDURE

A. Pre-test Set up

1. Test animals of the appropriate age are purchased from a reputable dealer and shipped via overnight delivery service to the Bioassay Lab.

SW/EPA02/MYC-002

7-DAY STATIC RENEWAL TEST USING MYSIDSOPSIS BAHIA

Issue Date: 1 July 1999	Page 3 of 4
Revised: 8 May 2003	

2. The test animals are acclimated to test temperature and fed *Artemia* nauplii during holding. Test animals are seven days old at test initiation.

B. Test Initiation

- Samples are checked in upon receipt. See procedural SOP for details on routine sample check-in procedures. Samples are stored in a refrigerator at 4°C until needed for testing. Tests are initiated within 36 hours of sample collection. Check with laboratory supervisor for client-specific differences.
- 2. Record sample description with matrix, color, odor, and particulate information.
- 3. Measure chlorine content, alkalinity, and any adjustments made to the control, receiving and sample waters and record on the data sheets.
- 4. Prepare a randomization sheet using the **TOXCALC** database software or Excel. See procedural SOP for details on randomization sheet preparation.
- 5. Measure salinity of sample and adjust salinity to 30 ppt using 40 Fathoms artificial seasalt. Stir sample on magnetic stir plate for a minimum of one hour after adding salt. Check salinity again and adjust to 30 ppt as needed.
- 6. Prepare dilutions according to test-specific concentrations. Concentrations are directed by permit language. Bioassays that require a 0.5 dilution series are serially diluted. All other concentrations must be measured with graduated cylinders and pipettes.
- 7. Warm each dilution to $26 \pm 1^{\circ}$ C.
- 8. Measure and record water quality parameters for each test concentration. Water quality parameters include pH, DO, salinity, and temperature.
- 9. Label test containers according to the randomization sheet.
- 10. Distribute dilutions to test chambers (8 reps per concentration; 150 mL test volume per replicate).
- 11. Randomly distribute 5 mysid larvae to each test chamber and place the test containers in the 26°C environmental chamber in randomized order.
- 12. Add food to each test chamber. See procedural SOP for specifications on hatching *Artemia* cysts to use as a food source. Collect 10 milliliters of concentrated hatched *Artemia*

SW/EPA02/MYC-002

7-DAY STATIC RENEWAL TEST USING MYSIDSOPSIS BAHIA

Issue Date: 1 July 1999	Page 4 of 4
Revised: 8 May 2003	

nauplii, rinse with deionized water and add to 200 ml of seawater. Add 1 ml of diluted *Artemia* to each test chamber.

C. Daily Monitoring

- 1. Animals are fed twice daily. See step 12 above for details on feeding procedures.
- 3. Adjust sample salinity to 30 ppt using 40 Fathoms artificial seasalt. Stir sample on magnetic stir plate for a minimum of one hour after adding salt. Check salinity again and adjust to 30 ppt as needed.
- 2. Prepare dilutions according to test specific concentrations and warm to $26 \pm 1^{\circ}$ C.
- 3. To renew the tests, siphon 80% of the test solution removing excess food, dead animals and debris from the bottom. Save a composite sample from each concentration.
- 4. Count and record the number of surviving mysids.
- 5. Gently pour the new test solution down the side of each test chamber to avoid subjecting the mysids to excessive turbulence.
- 6. Measure and record water quality parameters (pH, D.O., salinity, and temperature) from the composite samples saved from step 3 above.

D. Test Termination

- 1. Mysids are not fed on the day of test termination.
- 2. Count and record the number of surviving mysids.
- 3. Each test container is drained through a 35 μm mesh screen to collect surviving mysid and rinsed with deionized water. Save a composite sample from each concentration for measurement of water quality parameters.
- 4. Using forceps, gently place the mysid on an appropriately labelled and tared piece of aluminum foil that has been dried at 105°C for at least 6 hours or 60°C for 24 hours. See procedural SOP for specifications on weighing procedures.
- 5. Dry the mysid at 60°C for 24 hours or at 105°C for at least 6 hours.

SW/EPA02/MYC-002

7-DAY STATIC RENEWAL TEST USING MYSIDSOPSIS BAHIA

Issue Date: 1 July 1999	Page 5 of 4
Revised: 8 May 2003	

6. Transfer dried mysids to a desiccator and let cool for at least 2 hours. Weigh to the nearest 0.00001g and record on the data sheet.

IV. TEST ACCEPTABILITY CRITERIA

Control survival at test termination must be 80% or greater and the average dry weight of the control juveniles must be equal to or greater than 0.20 mg/mysid.

V. HEALTH AND SAFETY

Health and safety precautions and applicable regulations should be considered at all times. Gloves should always be worn when handling effluents.

VI. PERSONNEL

Only qualified technicians who have been properly trained and can demonstrate competency with these techniques are permitted to conduct this test.

VII. QUALITY ASSURANCE REQUIREMENTS

Quality assurance practices encompass all aspects of testing including the collection, handling, and preparation of test organisms, samples, and dilution waters. Proper record keeping is required, and concentrated efforts are made for complete documentation on a real-time basis.

VIII. REFERENCE

"Short-Term Method for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms." EPA/600/4-91/003, July 1994.

Appendix B North Creek Analytical Sample Analysis Report



Seattle	11720 North Creek Pkwy N, Suite 400, Bothell, WA 98011-8244 425,420,9200 fax 425,420,9210
Spokane	East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
	509.924.9200 fax 509.924.9290
Portland	9405 SW Nimbus Avenue, Beaverton, OR 97008-7132
	503.906.9200 fax 503.906.9210
Bend	20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711
	541.383.9310 fax 541.382.7588
Anchorage	2000 W International Airport Road, Suite A-10, Anchorage, AK 99502-1119
0	007 563 0000 fav 007 563 0010

13 June 2003

Mark Dagel SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell, WA/USA 98011 RE: Unocal Groundwater Study

Enclosed are the results of analyses for samples received by the laboratory on 05/29/03 18:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kortland Orr For Jeanne Garthwaite Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011 Project: Unocal Groundwater Study Project Number: [none]

Reported: 06/13/03 14:50

ANALYTICAL REPORT FOR SAMPLES

Project Manager: Mark Dagel

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-146	B3E0727-01	Water	05/28/03 09:35	05/29/03 18:00
MW-7	B3E0727-02	Water	05/28/03 09:36	05/29/03 18:00
MW-17	B3E0727-03	Water	05/28/03 13:25	05/29/03 18:00
MW-103R	B3E0727-04	Water	05/28/03 17:00	05/29/03 18:00
MW-129	B3E0727-05	Water	05/28/03 15:20	05/29/03 18:00
MW-W	B3E0727-06	Water	05/28/03 19:40	05/29/03 18:00
Trip Blank	B3E0727-07	Water	05/28/03 12:00	05/29/03 18:00

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

North Creek Analytical, Inc. Environmental Laboratory Network Page 1 of 27



SAIC - Bothell	Project:	Unocal Groundwater Study	
18706 North Creek Parkway, Ste 110	Project Number:	[none]	Reported:
Bothell WA/USA, 98011	Project Manager:	Mark Dagel	06/13/03 14:50

Gasoline Hydrocarbons (Benzene to Naphthalene) and BTEX by NWTPH-G and EPA 8021B North Creek Analytical - Bothell

		Reporting							
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<u>MW-146 (B3E0727-01) Water Sam</u>	pled: 05/28/03	09:35 Receiv	red: 05/29/	03 18:00					
Gasoline Range Hydrocarbons	3490	250	ug/l	5	3F03016	06/04/03	06/04/03	NWTPH-Gx/8021	
_								В	
Benzene	983	12.5	"	25	"	"	06/04/03	"	
Toluene	21.8	2.50	"	5	"	"	06/04/03	"	
Ethylbenzene	355	2.50	"	"	"	"	"	"	
Xylenes (total)	43.7	5.00	"	"	"	"	"	"	
Surrogate: 4-BFB (FID)	112 %	62-127			"	"	"	"	
Surrogate: 4-BFB (PID)	129 %	72-127			"	"	"	"	S-04
MW-7 (B3E0727-02) Water Sample	ed: 05/28/03 09	:36 Received	: 05/29/03	18:00					Q-34
Gasoline Range Hydrocarbons	623	50.0	ug/l	1	3F03016	06/04/03	06/04/03	NWTPH-Gx/8021 B	
Benzene	24.5	0.500	"	"	"	"	"	"	
Toluene	4.17	0.500	"	"	"	"	"	"	
Ethylbenzene	59.4	0.500	"	"	"	"	"	"	
Xylenes (total)	62.6	1.00	"	"	"		"	"	
Surrogate: 4-BFB (FID)	128 %	62-127			"	"	"	"	S-04
Surrogate: 4-BFB (PID)	131 %	72-127			"	"	"	"	S-04
MW-17 (B3E0727-03) Water Samp	led: 05/28/03 1	3:25 Receive	d: 05/29/0.	3 18:00					Q-34
Gasoline Range Hydrocarbons	80.8	50.0	ug/l	1	3F03016	06/04/03	06/04/03	NWTPH-Gx/8021 B	
Benzene	ND	0.500	"	"	"		"	"	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"		"	"	"	
Xylenes (total)	ND	1.00	"	"			"	"	
Surrogate: 4-BFB (FID)	97.7 %	62-127			"	"	"	"	
Surrogate: 4-BFB (PID)	112 %	72-127			"	"	"	"	

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell	Project:	Unocal Groundwater Study	
18706 North Creek Parkway, Ste 110	Project Number:	[none]	Reported:
Bothell WA/USA, 98011	Project Manager:	Mark Dagel	06/13/03 14:50

Gasoline Hydrocarbons (Benzene to Naphthalene) and BTEX by NWTPH-G and EPA 8021B North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<u>MW-103R (B3E0727-04) Water</u>	Sampled: 05/28/03	8 17:00 Rece	eived: 05/2	9/03 18:00					
Gasoline Range Hydrocarbons	ND	50.0	ug/l	1	3F03016	06/04/03	06/04/03	NWTPH-Gx/8021	
			"	"				В	
Benzene	ND	0.500							
Toluene	ND	0.500	"	"	"	"		"	
Ethylbenzene	ND	0.500	"	"		"	••	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Surrogate: 4-BFB (FID)	91.7 %	62-127			"	"	"	"	
Surrogate: 4-BFB (PID)	113 %	72-127			"	"	"	"	
<u>MW-129 (B3E0727-05) Water</u>	Sampled: 05/28/03 1	15:20 Receiv	ved: 05/29/	03 18:00					Q-34
Gasoline Range Hydrocarbons	59.4	50.0	ug/l	1	3F03016	06/04/03	06/04/03	NWTPH-Gx/8021 B	
Benzene	0.684	0.500	"	"	"	"	"	"	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	0.535	0.500	"	"		"	"	"	
Xylenes (total)	1.26	1.00	"	"	"	"	"	"	I-06
Surrogate: 4-BFB (FID)	95.8 %	62-127			"	"	"	"	
Surrogate: 4-BFB (PID)	113 %	72-127			"	"	"	"	
MW-W (B3E0727-06) Water Sa	ampled: 05/28/03 19	9:40 Receive	ed: 05/29/0	3 18:00					Q-34
Gasoline Range Hydrocarbons	56.2	50.0	ug/l	1	3F03016	06/04/03	06/04/03	NWTPH-Gx/8021 B	
Benzene	2.51	0.500	"	"		"	"	"	
Toluene	0.764	0.500	"	"		"	"	"	
Ethylbenzene	0.653	0.500	"	"	"	"	"	"	
Xylenes (total)	2.80	1.00	"	"	"	"	"	"	I-06
Surrogate: 4-BFB (FID)	94.8 %	62-127			"	"	"	"	
Surrogate: 4-BFB (PID)	110 %	72-127			"	"	"	"	

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell
18706 North Creek Parkway, Ste 110
Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Gasoline Hydrocarbons (Benzene to Naphthalene) and BTEX by NWTPH-G and EPA 8021B North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes		
Trip Blank (B3E0727-07) Water Sampled: 05/28/03 12:00 Received: 05/29/03 18:00											
Gasoline Range Hydrocarbons	ND	50.0	ug/l	1	3F03016	06/04/03	06/04/03	NWTPH-Gx/8021 B			
Benzene	ND	0.500		"		"	"	B "			
Toluene	ND	0.500		"	"	"	"	"			
Ethylbenzene	ND	0.500	"	"		"	"	"			
Xylenes (total)	ND	1.00	"	"	"	"	"	"			
Surrogate: 4-BFB (FID)	89.6 %	62-127			"	"	"	"			
Surrogate: 4-BFB (PID)	109 %	72-127			"	"	"	"			

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Volatile Petroleum Hydrocarbons by WDOE TPH Policy Method North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-146 (B3E0727-01) Water	- Sampled: 05/28/03 ()9:35 Receiv	ved: 05/29/0	03 18:00					Q-34
C5-C6 Aliphatics	ND	500	ug/l	10	3F10009	06/11/03	06/11/03	WA MTCA-VPH	
C6-C8 Aliphatics	503	500	"	"	"	"	"	"	
C8-C10 Aliphatics	ND	500	"	"	"	"	"	"	
C10-C12 Aliphatics	ND	500	"	"		"	"	"	
C8-C10 Aromatics	832	500	"	"	"	"	"	"	
C10-C12 Aromatics	ND	500	"	"	"	"	"	"	
C12-C13 Aromatics	ND	500	"	"	"	"	"	"	
Total VPH (TVPH)	1330	500	"	"	"	"	"	"	
Surrogate: 4-BFB (FID)	98.1 %	60-140			"	"	"	"	
Surrogate: 4-BFB (PID)	92.7 %	60-140			"	"	"	"	
<u>MW-7 (B3E0727-02) Water</u>	Sampled: 05/28/03 09:	36 Received	1: 05/29/03	18:00					Q-34
C5-C6 Aliphatics	75.7	50.0	ug/l	1	3F10009	06/11/03	06/11/03	WA MTCA-VPH	
C6-C8 Aliphatics	63.2	50.0	"	"	"	"	"	"	
C8-C10 Aliphatics	ND	50.0	"	"	"	"	"	"	
C10-C12 Aliphatics	85.4	50.0	"	"	"	"	"	"	
C8-C10 Aromatics	272	50.0	"	"	"	"	"	"	
C10-C12 Aromatics	172	50.0	"	"	"	"	"	"	
C12-C13 Aromatics	122	50.0	"	"		"	"	"	
Total VPH (TVPH)	790	50.0	"	"	"	"	"	"	
Surrogate: 4-BFB (FID)	129 %	60-140			"	"	"	"	
Surrogate: 4-BFB (PID)	104 %	60-140			"	"	"	"	
MW-17 (B3E0727-03) Water	Sampled: 05/28/03 13	3:25 Receive	ed: 05/29/03	3 18:00					Q-34
C5-C6 Aliphatics	ND	50.0	ug/l	1	3F10009	06/11/03	06/11/03	WA MTCA-VPH	
C6-C8 Aliphatics	ND	50.0		"	"	"	"	"	
C8-C10 Aliphatics	ND	50.0	"	"	"	"	"	"	
C10-C12 Aliphatics	ND	50.0	"	"	"	"	"	"	
C8-C10 Aromatics	ND	50.0	"	"	"	"	"	"	
C10-C12 Aromatics	ND	50.0	"	"	"	"	"	"	
C12-C13 Aromatics	ND	50.0	"	"	"	"	"	"	
Total VPH (TVPH)	ND	50.0	"	"	"	"	"	"	
Surrogate: 4-BFB (FID)	94.4 %	60-140			"	"	"	"	
Surrogate: 4-BFB (PID)	89.4 %	60-140			"	"	"	"	

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none]

Reported: 06/13/03 14:50

Volatile Petroleum Hydrocarbons by WDOE TPH Policy Method North Creek Analytical - Bothell

Project Manager: Mark Dagel

S25C6 Aliphatics ND 50.0 ug1 1 3F10009 06/11/03 06/11/03 WA MTCA-VPH 5C76 Aliphatics ND 50.0 " <	Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
26-C8 Aliphanics ND 50.0 *	MW-103R (B3E0727-04) Water	r Sampled: 05/28/0	3 17:00 Reco	eived: 05/29	9/03 18:00					Q-34
CB-C10 Aliphatics ND 50.0 $"$ <td>C5-C6 Aliphatics</td> <td>ND</td> <td>50.0</td> <td>ug/l</td> <td>1</td> <td>3F10009</td> <td>06/11/03</td> <td>06/11/03</td> <td>WA MTCA-VPH</td> <td></td>	C5-C6 Aliphatics	ND	50.0	ug/l	1	3F10009	06/11/03	06/11/03	WA MTCA-VPH	
C10-C12 Aliphatics ND 50.0 " "<	C6-C8 Aliphatics	ND	50.0	"	"	"	"	"	"	
Investigation ND 50.0 "	C8-C10 Aliphatics	ND	50.0	"	"	"	"	"	"	
C10-C12 Aromatics ND 50.0 "	C10-C12 Aliphatics	ND	50.0	"	"	"	"	"	"	
C12-C13 Aromatics ND 50.0 "	C8-C10 Aromatics	ND	50.0	"	"	"	"	"	"	
ND 50.0 " <td>C10-C12 Aromatics</td> <td>ND</td> <td>50.0</td> <td>"</td> <td>"</td> <td>"</td> <td>"</td> <td>"</td> <td>"</td> <td></td>	C10-C12 Aromatics	ND	50.0	"	"	"	"	"	"	
Surrogate: 4-BFB (FID) 93.8 % 60-140 "	C12-C13 Aromatics	ND	50.0	"	"	"	"	"	"	
Surrogate: 4-BFB (PID) 91.0 % 60-140 " <	Total VPH (TVPH)	ND	50.0	"	"	"	"	"	"	
And Part of BSE0727-05) Water Sampled: 05/28/03 15:20 Received: 05/29/03 18:00 O.34 Z5-C6 Aliphatics ND 50.0 ug/l 1 3F10009 06/11/03 06/11/03 WA MTCA-VPH C6-C8 Aliphatics ND 50.0 "	Surrogate: 4-BFB (FID)	93.8 %	60-140			"	"	"	"	
ND 50.0 ug/l 1 3F10009 06/11/03 06/11/03 WA MTCA-VPH C6-C8 Aliphatics ND 50.0 "<	Surrogate: 4-BFB (PID)	91.0 %	60-140			"	"	"	"	
C6-C8 Aliphatics ND 50.0 "	MW-129 (B3E0727-05) Water	Sampled: 05/28/03	15:20 Receiv	ved: 05/29/0	03 18:00					Q-34
C6-C8 Aliphatics ND 50.0 "	C5-C6 Aliphatics	ND	50.0	ug/l	1	3F10009	06/11/03	06/11/03	WA MTCA-VPH	
C3-C10 Anjmatics ND 50.0 "	C6-C8 Aliphatics	ND	50.0		"	"	"	"	"	
C28-C10 Aromatics ND 50.0 "	C8-C10 Aliphatics	ND	50.0	"	"	"	"	"	"	
CSC-10 Aromatics ND 50.0 Image: ND Image: ND <thi< td=""><td>C10-C12 Aliphatics</td><td>ND</td><td>50.0</td><td>"</td><td>"</td><td>"</td><td>"</td><td>"</td><td>"</td><td></td></thi<>	C10-C12 Aliphatics	ND	50.0	"	"	"	"	"	"	
ID 50.0 IND 50.0 IND 50.0 IND IND <thind< th=""> IND <thi< td=""><td>C8-C10 Aromatics</td><td>ND</td><td>50.0</td><td>"</td><td>"</td><td>"</td><td>"</td><td>"</td><td>"</td><td></td></thi<></thind<>	C8-C10 Aromatics	ND	50.0	"	"	"	"	"	"	
ND 50.0 " <td>C10-C12 Aromatics</td> <td>ND</td> <td>50.0</td> <td>"</td> <td>"</td> <td>"</td> <td>"</td> <td>"</td> <td>"</td> <td></td>	C10-C12 Aromatics	ND	50.0	"	"	"	"	"	"	
Surrogate: 4-BFB (FID) 89,2 % 60-140 " " " " " " " Surrogate: 4-BFB (PID) 89,6 % 60-140 " " " " " " " MW-W (B3E0727-06) Water Sampled: 05/28/03 19:40 Received: 05/29/03 18:00 Q-34 C5-C6 Aliphatics ND 50.0 ug/l 1 3F10009 06/11/03 WA MTCA-VPH C6-C8 Aliphatics ND 50.0 " " " " " " " " " " " " C8-C10 Aliphatics ND 50.0 " " " " " " " "	C12-C13 Aromatics	ND	50.0	"	"	"	"	"	"	
Surrogate: 4-BFB (PID) 89.6 % 60-140 " " " " " " " " " " " Q-34 MW-W (B3E0727-06) Water Sampled: 05/28/03 19:40 Received: 05/29/03 18:00 Q-34 C5-C6 Aliphatics ND 50.0 ug/l 1 3F10009 06/11/03 WA MTCA-VPH C6-C8 Aliphatics ND 50.0 " " " " " " " " " " " " " " " " " " " " " C8-C10 Aliphatics ND 50.0 " " " " " " " " " " " " " " " " " " " " " " " " " " " C10-C12 Aliphatics ND 50.0 " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " "	Total VPH (TVPH)	ND	50.0	"	"	"	"	"	"	
MW-W (B3E0727-06) Water Sampled: 05/28/03 19:40 Received: 05/29/03 18:00 Q-34 C5-C6 Aliphatics ND 50.0 ug/l 1 3F10009 06/11/03 WA MTCA-VPH C6-C8 Aliphatics ND 50.0 "	Surrogate: 4-BFB (FID)	89.2 %	60-140			"	"	"	"	
C5-C6 Aliphatics ND 50.0 ug/l 1 3F10009 06/11/03 WA MTCA-VPH C6-C8 Aliphatics ND 50.0 "	Surrogate: 4-BFB (PID)	89.6 %	60-140			"	"	"	"	
C6-C8 Aliphatics ND 50.0 " <th"< th=""> " "</th"<>	<u>MW-W (B3E0727-06) Water</u>	Sampled: 05/28/03 1	9:40 Receive	ed: 05/29/03	3 18:00					Q-34
C20-C3 Anjhatics ND 50.0 C30-C10 Aliphatics ND 50.0 C10-C12 Aliphatics ND 50.0 C30-C10 Aromatics ND 50.0 C10-C12 Aromatics ND 50.0 Source ate: 4-BFB (FID) 92.5 % 60-140 Source ate: 4-BFB (FID) 92.5 % 60-140	C5-C6 Aliphatics	ND	50.0	ug/l	1	3F10009	06/11/03	06/11/03	WA MTCA-VPH	
C10 Aliphatics ND 50.0 C10-C12 Aliphatics ND 50.0 C20-C12 Aliphatics ND 50.0 C20-C12 Aromatics ND 50.0 C10-C12 Aromatics ND 50.0 C10-C12 Aromatics ND 50.0 C10-C12 Aromatics ND 50.0 C12-C13 Aromatics ND 50.0 Fotal VPH (TVPH) ND 50.0 Surrogate: 4-BFB (FID) 92.5 % 60-140	C6-C8 Aliphatics	ND	50.0		"	"	"		"	
C8-C10 Aromatics ND 50.0 "	C8-C10 Aliphatics	ND	50.0	"	"	"	"	"	"	
C10-C12 Aromatics ND 50.0 "	C10-C12 Aliphatics	ND	50.0	"	"	"	"	"	"	
C12-C13 Aromatics ND 50.0 "	C8-C10 Aromatics	ND	50.0	"	"	"	"	"	"	
ND 50.0 " <td>C10-C12 Aromatics</td> <td>ND</td> <td>50.0</td> <td>"</td> <td>"</td> <td>"</td> <td>"</td> <td>"</td> <td>"</td> <td></td>	C10-C12 Aromatics	ND	50.0	"	"	"	"	"	"	
Surrogate: 4-BFB (FID) 92.5 % 60-140 " <th"< th=""> " " <t< td=""><td>C12-C13 Aromatics</td><td>ND</td><td>50.0</td><td>"</td><td>"</td><td>"</td><td>"</td><td>"</td><td>"</td><td></td></t<></th"<>	C12-C13 Aromatics	ND	50.0	"	"	"	"	"	"	
	Total VPH (TVPH)	ND	50.0	"	"	"	"	"	"	
Surrogate: 4-BFB (PID) 89.8 % 60-140 " " " " "	Surrogate: 4-BFB (FID)	92.5 %	60-140			"	"	"	"	
	Surrogate: 4-BFB (PID)	89.8 %	60-140			"	"	"	"	

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none]

Reported: 06/13/03 14:50

Semivolatile Petroleum Products by NWTPH-Dx (w/o Acid/Silica Gel Clean-up) North Creek Analytical - Bothell

Project Manager: Mark Dagel

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<u>MW-146 (B3E0727-01) Water Sa</u>	mpled: 05/28/03 0	9:35 Receiv	ved: 05/29/0	03 18:00					
Diesel Range Hydrocarbons	11.6	1.25	mg/l	5	3F02012	06/02/03	06/04/03	NWTPH-Dx	
Lube Oil Range Hydrocarbons	ND	2.50	"	"	"	"	"		
Surrogate: 2-FBP	89.3 %	50-150			"	"	"	"	
Surrogate: Octacosane	63.2 %	50-150			"	"	"	"	
MW-7 (B3E0727-02) Water Samp	pled: 05/28/03 09:.	36 Received	1: 05/29/03	18:00					
Diesel Range Hydrocarbons	1.59	0.250	mg/l	1	3F02012	06/02/03	06/05/03	NWTPH-Dx	
Lube Oil Range Hydrocarbons	ND	0.500	"	"	"	"	"	"	
Surrogate: 2-FBP	93.7 %	50-150			"	"	"	"	
Surrogate: Octacosane	86.1 %	50-150			"	"	"	"	
MW-17 (B3E0727-03) Water San	npled: 05/28/03 13	:25 Receive	ed: 05/29/03	3 18:00					
Diesel Range Hydrocarbons	3.64	0.250	mg/l	1	3F02012	06/02/03	06/04/03	NWTPH-Dx	
Lube Oil Range Hydrocarbons	0.732	0.500	"	"	"	"	"		D-10
Surrogate: 2-FBP	91.1 %	50-150			"	"	"	"	
Surrogate: Octacosane	88.1 %	50-150			"	"	"	"	
MW-103R (B3E0727-04) Water S	Sampled: 05/28/03	17:00 Rece	ived: 05/29	0/03 18:00					
Diesel Range Hydrocarbons	7.26	1.25	mg/l	5	3F02012	06/02/03	06/05/03	NWTPH-Dx	
Lube Oil Range Hydrocarbons	ND	2.50	"	"	"	"	"	"	
Surrogate: 2-FBP	74.5 %	50-150			"	"	"	"	
Surrogate: Octacosane	65.8 %	50-150			"	"	"	"	
MW-129 (B3E0727-05) Water Sa	mpled: 05/28/03 1	5:20 Receiv	ved: 05/29/0	03 18:00					
Diesel Range Hydrocarbons	9.33	1.25	mg/l	5	3F02012	06/02/03	06/05/03	NWTPH-Dx	D-06
Lube Oil Range Hydrocarbons	2.53	2.50	"	"	"	"	"	"	D-06
Surrogate: 2-FBP	65.9 %	50-150			"	"	"	"	

North Creek Analytical - Bothell

chain of custody document. This analytical report must be reproduced in its entirety.

Kortland Orr For Jeanne Garthwaite, Project Manager

North Creek Analytical, Inc. Environmental Laboratory Network Page 7 of 27

The results in this report apply to the samples analyzed in accordance with the



SAIC - Bothell
18706 North Creek Parkway, Ste 110
Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Semivolatile Petroleum Products by NWTPH-Dx (w/o Acid/Silica Gel Clean-up) North Creek Analytical - Bothell

	I	Reporting							
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-W (B3E0727-06) Water Sa	mpled: 05/28/03 19:4	0 Receive	a. 02/29/03	3 18.00					
· · · ·						0.4/0.0/0.0	0.110.510.8		
Diesel Range Hydrocarbons	7.79	0.500	mg/l	2	3F02012	06/02/03	06/05/03	NWTPH-Dx	
Lube Oil Range Hydrocarbons	1.03	1.00	"	"	"	"	"	"	
Surrogate: 2-FBP	88.0 % 5	0-150			"	"	"	"	
Surrogate: Octacosane	74.7 % 5	0-150			"	"	"	"	

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Extractable Petroleum Hydrocarbons by WDOE TPH Policy Method North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<u>MW-146 (B3E0727-01) Water</u>	Sampled: 05/28/03	09:35 Receiv	ed: 05/29/0	03 18:00					
C8-C10 Aliphatics	55.9	50.0	ug/l	1	3F02015	06/02/03	06/09/03	WA MTCA-EPH	
C10-C12 Aliphatics	ND	50.0	"	"	"	"	"	"	
C12-C16 Aliphatics	ND	50.0	"	"	"	"	"	"	
C16-C21 Aliphatics	ND	50.0	"	"	"	"	"	"	
C21-C34 Aliphatics	50.5	50.0	"	"	"	"	"	"	
C8-C10 Aromatics	372	50.0	"	"	"	"	06/09/03	"	
C10-C12 Aromatics	334	50.0	"	"	"	"	"	"	
C12-C16 Aromatics	290	50.0	"	"	"	"	"	"	
C16-C21 Aromatics	98.1	50.0	"	"	"	"	"	"	
C21-C34 Aromatics	ND	50.0	"	"	"	"	"	"	
Extractable Petroleum	1200	50.0	"	"	"	"	"	"	
Hydrocarbons									
Surrogate: 2-FBP	68.0 %	60-140			"	"	"	"	
Surrogate: Octacosane	69.5 %	60-140			"	"	06/09/03	"	
Surrogate: Undecane	58.5 %	60-140			"	"	"	"	X
<u>MW-7 (B3E0727-02) Water</u> S	ampled: 05/28/03 09:	:36 Received	: 05/29/03	18:00					
C8-C10 Aliphatics	88.5	50.0	ug/l	1	3F02015	06/02/03	06/09/03	WA MTCA-EPH	
C10-C12 Aliphatics	59.3	50.0	"	"	"	"	"	"	
C12-C16 Aliphatics	ND	50.0	"	"	"	"	"	"	
C16-C21 Aliphatics	ND	50.0	"	"	"	"	"	"	
C21-C34 Aliphatics	ND	50.0	"	"	"	"	"	"	
C8-C10 Aromatics	55.0	50.0	"	"	"	"	06/09/03	"	
C10-C12 Aromatics	58.2	50.0	"	"	"	"	"	"	
C12-C16 Aromatics	91.4	50.0	"	"	"	"	"	"	
C16-C21 Aromatics	50.4	50.0	"	"	"	"	"	"	
C21-C34 Aromatics	ND	50.0	"	"	"	"	"	"	
Extractable Petroleum	403	50.0	"	"	"	"	"	"	
Hydrocarbons									
Surrogate: 2-FBP	66.9 %	60-140			"	"	"	"	
Surrogate: Octacosane	92.8 %	60-140			"	"	06/09/03	"	
Surrogate: Undecane	57.5 %	60-140			"	"	"	"	X

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Extractable Petroleum Hydrocarbons by WDOE TPH Policy Method North Creek Analytical - Bothell

Analyte Re	esult	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-17 (B3E0727-03) Water Sampled: 05/28	/03 13	3:25 Receive	d: 05/29/03	3 18:00					
C8-C10 Aliphatics	ND	50.0	ug/l	1	3F02015	06/02/03	06/09/03	WA MTCA-EPH	
C10-C12 Aliphatics	76.1	50.0	"	"	"		"	"	
C12-C16 Aliphatics	266	50.0	"	"	"		"	"	
C16-C21 Aliphatics	334	50.0	"	"	"		"	"	
C21-C34 Aliphatics	151	50.0	"	"	"	"	"	"	
C8-C10 Aromatics	ND	50.0	"	"	"	"	06/09/03	"	
C10-C12 Aromatics	ND	50.0	"	"	"	"	"	"	
C12-C16 Aromatics	78.0	50.0	"	"	"	"	"	"	
C16-C21 Aromatics	208	50.0	"	"	"		"	"	
C21-C34 Aromatics	147	50.0	"	"	"	"	"	"	
Extractable Petroleum 1	260	50.0	"	"	"	"	"	"	
Hydrocarbons									
Surrogate: 2-FBP 74.:	5 %	60-140			"	"	"	"	
Surrogate: Octacosane 91	1%	60-140			"	"	06/09/03	"	
Surrogate: Undecane 71.0	0 %	60-140			"	"	"	"	
MW-103R (B3E0727-04) Water Sampled: 05/	/28/03	3 17:00 Recei	ived: 05/29	/03 18:00					
C8-C10 Aliphatics	ND	50.0	ug/l	1	3F02015	06/02/03	06/09/03	WA MTCA-EPH	
C10-C12 Aliphatics	ND	50.0	"	"	"	"	"	"	
C12-C16 Aliphatics	ND	50.0	"	"	"	"	"	"	
C16-C21 Aliphatics	ND	50.0	"	"	"	"	"	"	
C21-C34 Aliphatics	ND	50.0	"	"	"	"	"	"	
C8-C10 Aromatics	ND	50.0	"	"	"	"	06/09/03	"	
C10-C12 Aromatics	ND	50.0	"	"	"	"	"	"	
C12-C16 Aromatics	ND	50.0	"	"	"	"	"	"	
C16-C21 Aromatics	ND	50.0	"	"	"	"	"	"	
C21-C34 Aromatics	ND	50.0	"	"	"	"	"	"	
Extractable Petroleum Hydrocarbons	ND	50.0	"	"	"	"	"	"	
Surrogate: 2-FBP 73.0	0 %	60-140			"	"	"	"	
Surrogate: Octacosane 87	3 %	60-140			"	"	06/09/03	"	
Surrogate: Undecane 66.0	6%	60-140			"	"	"	"	

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Extractable Petroleum Hydrocarbons by WDOE TPH Policy Method North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-129 (B3E0727-05) Water	Sampled: 05/28/03 15	5:20 Receiv	ed: 05/29/0	3 18:00					
C8-C10 Aliphatics	ND	50.0	ug/l	1	3F02015	06/02/03	06/10/03	WA MTCA-EPH	
C10-C12 Aliphatics	ND	50.0	"	"	"	"	"	"	
C12-C16 Aliphatics	182	50.0	"	"	"	"	"	"	
C16-C21 Aliphatics	578	50.0	"	"	"	"	"	"	
C21-C34 Aliphatics	225	50.0	"	"	"	"	"	"	
C8-C10 Aromatics	ND	50.0	"	"	"	"	06/09/03	"	
C10-C12 Aromatics	ND	50.0	"	"	"	"	"	"	
C12-C16 Aromatics	80.6	50.0	"	"	"	"	"	"	
C16-C21 Aromatics	332	50.0	"	"	"	"	"	"	
C21-C34 Aromatics	262	50.0	"	"	"	"	"	"	
Extractable Petroleum	1660	50.0	"	"	"	"	"	"	
Hydrocarbons									
Surrogate: 2-FBP	73.8 %	60-140			"	"	"	"	
Surrogate: Octacosane	88.9 %	60-140			"	"	06/10/03	"	
Surrogate: Undecane	66.8 %	60-140			"	"	"	"	
MW-W (B3E0727-06) Water	Sampled: 05/28/03 19:	40 Receive	d: 05/29/03	18:00					
C8-C10 Aliphatics	ND	50.0	ug/l	1	3F02015	06/02/03	06/10/03	WA MTCA-EPH	
C10-C12 Aliphatics	ND	50.0	"	"	"	"	"	"	
C12-C16 Aliphatics	59.7	50.0	"	"	"	"	"	"	
C16-C21 Aliphatics	110	50.0	"	"	"	"	"	"	
C21-C34 Aliphatics	72.1	50.0	"	"	"	"	"	"	
C8-C10 Aromatics	ND	50.0	"	"	"	"	06/10/03	"	
C10-C12 Aromatics	ND	50.0	"	"	"	"	"	"	
C12-C16 Aromatics	ND	50.0	"	"	"	"	"	"	
C16-C21 Aromatics	61.8	50.0	"	"	"	"	"	"	
C21-C34 Aromatics	60.7	50.0	"	"	"	"	"	"	
Extractable Petroleum	365	50.0	"	"	"	"	"	"	
Hydrocarbons									
Surrogate: 2-FBP	72.2 %	60-140			"	"	"	"	
Surrogate: Octacosane	87.1 %	60-140			"	"	06/10/03	"	

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Polynuclear Aromatic Hydrocarbons by GC/MS-SIM North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-146 (B3E0727-01RE1) Water	Sampled: 05/28	3/03 09:35 I	Received: 05	5/29/03 18:00	0				
Acenaphthene	0.237	0.100	ug/l	1	3F04034	06/04/03	06/11/03	EPA 8270C-SIM	
Acenaphthylene	0.318	0.100	"	"	"	"	"	"	
Anthracene	1.08	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	0.253	0.0100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.500	"	50	"	"	06/11/03	"	
Benzo (b) fluoranthene	ND	0.500	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	5.00	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.500	"	"	"	"	"	"	
Chrysene	0.162	0.0100	"	1	"	"	06/11/03	"	
Dibenz (a,h) anthracene	ND	0.500	"	50	"	"	06/11/03	"	
Fluoranthene	ND	0.100	"	1	"	"	06/11/03	"	
Fluorene	1.40	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.500	"	50	"	"	06/11/03	"	
1-Methylnaphthalene	19.8	5.00	"	"	"	"	"	"	
2-Methylnaphthalene	39.2	5.00	"	"	"	"	"	"	
Naphthalene	137	5.00	"	"	"	"	"	"	
Phenanthrene	1.05	0.100	"	1	"	"	06/11/03	"	
Pyrene	ND	0.100	"	"	"	"	"	"	
Surrogate: 1-Methylnaphthalene-d10	96.3 %	30-150			"	"	"	"	
Surrogate: Benzo (a) pyrene-d12	27.7 %	30-150			"	"	"	"	S-04
MW-7 (B3E0727-02RE1) Water S	ampled: 05/28/0	3 09:36 Re	ceived: 05/2	9/03 18:00					
Acenaphthene	0.411	0.100	ug/l	1	3F04034	06/04/03	06/11/03	EPA 8270C-SIM	
Acenaphthylene	ND	0.100	"	"	"	"	"	"	
Anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	0.0148	0.0100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.0100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.0100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.0100	"	"	"	"	"	"	
Chrysene	ND	0.0100	"	"	"	"	"	"	
Dibenz (a,h) anthracene	ND	0.0100	"		"	"	"	"	
Fluoranthene	ND	0.100	"	"	"	"	"	"	
Fluorene	0.703	0.100	"		"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.0100	"		"	"	"	"	
1-Methylnaphthalene	24.1	2.00	"	20	"	"	06/11/03	"	

North Creek Analytical - Bothell



SAIC - Bothell
18706 North Creek Parkway, Ste 110
Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Polynuclear Aromatic Hydrocarbons by GC/MS-SIM North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<u>MW-7 (B3E0727-02RE1) Water Sam</u>	pled: 05/28/0	3 09:36 Rece	ived: 05/2	9/03 18:00					
2-Methylnaphthalene	27.0	2.00	ug/l	20	3F04034	06/04/03	06/11/03	EPA 8270C-SIM	
Naphthalene	39.5	2.00	"	"	"	"	"	"	
Phenanthrene	0.519	0.100	"	1	"	"	06/11/03	"	
Pyrene	ND	0.100	"	"		"	"	"	
Surrogate: 1-Methylnaphthalene-d10	11.3 %	30-150			"	"	"	"	S-04
Surrogate: Benzo (a) pyrene-d12	48.5 %	30-150			"	"	"	"	
MW-17 (B3E0727-03RE1) Water Sam	npled: 05/28/	03 13:25 Rec	eived: 05/2	29/03 18:00					
Acenaphthene	ND	0.100	ug/l	1	3F04034	06/04/03	06/11/03	EPA 8270C-SIM	
Acenaphthylene	ND	0.100	"	"		"	"	"	
Anthracene	ND	0.100	"	"		"	"	"	
Benzo (a) anthracene	0.0337	0.0100	"	"		"	"	"	
Benzo (a) pyrene	ND	0.0100	"	"		"	"	"	
Benzo (b) fluoranthene	ND	0.0100	"	"		"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"		"	"	"	
Benzo (k) fluoranthene	ND	0.0100	"	"		"	"	"	
Chrysene	ND	0.0100	"	"		"	"	"	
Dibenz (a,h) anthracene	ND	0.0100	"	"		"	"	"	
Fluoranthene	ND	0.100	"	"	"	"	"	"	
Fluorene	0.405	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.0100	"	"	"	"	"	"	
1-Methylnaphthalene	0.863	0.100	"	"	"	"	"	"	
2-Methylnaphthalene	0.531	0.100	"	"		"	"	"	
Naphthalene	0.779	0.100	"	"		"	"	"	
Phenanthrene	0.217	0.100	"	"		"	"	"	
Pyrene	0.115	0.100	"	"	"	"	"	"	
Surrogate: 1-Methylnaphthalene-d10	216 %	30-150			"	"	"	"	S-04
Surrogate: Benzo (a) pyrene-d12	56.5 %	30-150			"	"	"	"	

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Polynuclear Aromatic Hydrocarbons by GC/MS-SIM North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-103R (B3E0727-04RE1) Water	Sampled: 05/2	28/03 17:00	Received:)5/29/03 18:	00				
Acenaphthene	ND	0.500	ug/l	5	3F04034	06/04/03	06/11/03	EPA 8270C-SIM	
Acenaphthylene	ND	0.500	"	"	"	"	"	"	
Anthracene	ND	0.500	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.0100	"	1	"	"	06/11/03	"	
Benzo (a) pyrene	ND	0.0100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.0100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.0100	"	"	"	"	"	"	
Chrysene	ND	0.0100	"	"	"	"	"	"	
Dibenz (a,h) anthracene	ND	0.0100	"	"	"	"	"	"	
Fluoranthene	ND	0.100	"	"	"	"	"	"	
Fluorene	ND	0.500	"	5	"	"	06/11/03	"	
Indeno (1,2,3-cd) pyrene	ND	0.0100	"	1	"	"	06/11/03	"	
1-Methylnaphthalene	ND	0.100	"	"	"	"	"	"	
2-Methylnaphthalene	ND	0.100	"	"	"	"	"	"	
Naphthalene	0.225	0.100	"	"	"	"	"	"	
Phenanthrene	ND	0.100	"	"	"	"	"	"	
Pyrene	ND	0.100	"	"	"	"	"	"	
Surrogate: 1-Methylnaphthalene-d10	187 %	30-150			"	"	"	"	S-04
Surrogate: Benzo (a) pyrene-d12	49.6 %	30-150			"	"	"	"	
MW-129 (B3E0727-05RE1) Water	Sampled: 05/28	3/03 15:20 H	Received: 05	<u>/29/03 18:00</u>)				
Acenaphthene	ND	0.100	ug/l	1	3F04034	06/04/03	06/11/03	EPA 8270C-SIM	
Acenaphthylene	ND	0.100	"	"	"	"	"	"	
Anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.0100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.0100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.0100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.0100	"	"	"	"	"	"	
Chrysene	ND	0.0100	"	"	"	"	"	"	
Dibenz (a,h) anthracene	ND	0.0100	"	"	"	"	"	"	
Fluoranthene	ND	0.100	"	"	"	"	"	"	
Fluorene	0.254	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.0100	"	"	"	"	"	"	
1-Methylnaphthalene	0.222	0.100	"	"	"	"	"	"	

North Creek Analytical - Bothell



SAIC - Bothell
18706 North Creek Parkway, Ste 110
Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Polynuclear Aromatic Hydrocarbons by GC/MS-SIM North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-129 (B3E0727-05RE1) Water	Sampled: 05/28	8/03 15:20 R	Received: 05	5/29/03 18:0	0				
2-Methylnaphthalene	ND	0.100	ug/l	1	3F04034	06/04/03	06/11/03	EPA 8270C-SIM	
Naphthalene	0.136	0.100	"	"	"	"	"	"	
Phenanthrene	0.209	0.100	"	"	"	"	"	"	
Pyrene	ND	0.100	"	"	"	"	"	"	
Surrogate: 1-Methylnaphthalene-d10	101 %	30-150			"	"	"	"	
Surrogate: Benzo (a) pyrene-d12	57.1 %	30-150			"	"	"	"	
MW-W (B3E0727-06RE1) Water S	Sampled: 05/28/	03 19:40 Re	eceived: 05/2	29/03 18:00					
Acenaphthene	ND	0.100	ug/l	1	3F04034	06/04/03	06/11/03	EPA 8270C-SIM	
Acenaphthylene	ND	0.100	"	"	"	"	"	"	
Anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.0100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.0100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.0100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.0100	"	"	"	"	"	"	
Chrysene	ND	0.0100	"	"	"	"	"	"	
Dibenz (a,h) anthracene	ND	0.0100	"	"	"	"	"	"	
Fluoranthene	ND	0.100	"	"	"	"	"	"	
Fluorene	ND	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.0100	"	"	"	"	"	"	
1-Methylnaphthalene	0.331	0.100	"	"	"	"	"	"	
2-Methylnaphthalene	0.379	0.100	"	"	"	"	"	"	
Naphthalene	0.407	0.100	"	"	"	"	"	"	
Phenanthrene	ND	0.100	"	"	"	"	"	"	
Pyrene	ND	0.100	"	"	"	"	"	"	
Surrogate: 1-Methylnaphthalene-d10	87.3 %	30-150			"	"	"	"	
Surrogate: Benzo (a) pyrene-d12	33.0 %	30-150			"	"	"	"	

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

BTEX, MTBE, Naphthalene, and n-Hexane by WA VPH North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-146 (B3E0727-01) Water	- Sampled: 05/28/03	09:35 Recei	ved: 05/29/	03 18:00					
Methyl tert-butyl ether	ND	5.00	ug/l	1	3F10020	06/10/03	06/10/03	EPA 8260B	
Toluene	18.0	5.00	"	"		"	"	"	
m,p-Xylene	20.6	5.00	"	"	"	"	"	"	
o-Xylene	8.34	5.00	"	"	"	"	"	"	
n-Hexane	ND	5.00	"	"	"	"	"	"	
Surrogate: 1,2-DCA-d4	96.0 %	60-140			"	"	"	"	
Surrogate: Toluene-d8	97.5 %	60-140			"	"	"	"	
Surrogate: 4-BFB	101 %	60-140			"	"	"	"	
<u>MW-146 (B3E0727-01RE1) W</u>	ater Sampled: 05/28	3/03 09:35 R	eceived: 05	/29/03 18:0	0				
Benzene	836	200	ug/l	40	3F10020	06/10/03	06/10/03	EPA 8260B	
Ethylbenzene	333	200	"	"		"	"	"	
Naphthalene	248	200	"	"	"	"	"	"	
Surrogate: 1,2-DCA-d4	97.5 %	60-140			"	"	"	"	
Surrogate: Toluene-d8	96.5 %	60-140			"	"	"	"	
Surrogate: 4-BFB	97.5 %	60-140			"	"	"	"	
MW-7 (B3E0727-02) Water	Sampled: 05/28/03 09:	36 Receive	d: 05/29/03	18:00					
Methyl tert-butyl ether	ND	5.00	ug/l	1	3F10020	06/10/03	06/10/03	EPA 8260B	
Benzene	26.0	5.00	"	"	"	"	"	"	
Toluene	ND	5.00	"	"	"	"	"	"	
m,p-Xylene	39.1	5.00	"	"	"	"	"	"	
o-Xylene	ND	5.00	"	"	"	"	"	"	
Naphthalene	77.0	5.00	"	"	"	"	"	"	
n-Hexane	ND	5.00	"	"	"	"	"	"	
Surrogate: 1,2-DCA-d4	100 %	60-140			"	"	"	"	
Surrogate: Toluene-d8	95.0 %	60-140			"	"	"	"	
Surrogate: 4-BFB	96.5 %	60-140			"	"	"	"	

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

BTEX, MTBE, Naphthalene, and n-Hexane by WA VPH North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-7 (B3E0727-02RE1) Water	Sampled: 05/28/02	3 09:36 Rece	ived: 05/2	9/03 18:00					
Ethylbenzene	70.5	50.0	ug/l	10	3F10020	06/10/03	06/10/03	EPA 8260B	
Surrogate: 1,2-DCA-d4	95.0 %	60-140			"	"	"	"	
Surrogate: Toluene-d8	96.5 %	60-140			"	"	"	"	
Surrogate: 4-BFB	99.0 %	60-140			"	"	"	"	
MW-17 (B3E0727-03) Water Sa	mpled: 05/28/03 13	3:25 Receive	d: 05/29/0.	3 18:00					
Methyl tert-butyl ether	ND	5.00	ug/l	1	3F10020	06/10/03	06/10/03	EPA 8260B	
Benzene	ND	5.00	"	"	"	"	"	"	
Toluene	ND	5.00	"	"	"	"	"	"	
Ethylbenzene	ND	5.00	"	"	"	"	"	"	
m,p-Xylene	ND	5.00	"	"	"	"	"	"	
o-Xylene	ND	5.00	"	"	"	"	"	"	
Naphthalene	ND	5.00	"	"	"	"	"	"	
n-Hexane	ND	5.00	"	"	"	"	"		
Surrogate: 1,2-DCA-d4	98.5 %	60-140			"	"	"	"	
Surrogate: Toluene-d8	97.0 %	60-140			"	"	"	"	
Surrogate: 4-BFB	99.5 %	60-140			"	"	"	"	
MW-103R (B3E0727-04) Water	Sampled: 05/28/03	3 17:00 Rece	ived: 05/29	9/03 18:00					
Methyl tert-butyl ether	ND	5.00	ug/l	1	3F10020	06/10/03	06/10/03	EPA 8260B	
Benzene	ND	5.00	"	"	"	"	"	"	
Toluene	ND	5.00	"	"	"	"	"	"	
Ethylbenzene	ND	5.00	"	"	"	"	"	"	
m,p-Xylene	ND	5.00	"	"	"	"	"	"	
o-Xylene	ND	5.00	"	"	"	"	"		
Naphthalene	ND	5.00	"	"	"	"	"	"	
n-Hexane	ND	5.00	"	"	"	"	"	"	
Surrogate: 1,2-DCA-d4	98.5 %	60-140			"	"	"	"	
Surrogate: Toluene-d8	98.0 %	60-140			"	"	"	"	
Surrogate: 4-BFB	98.0 %	60-140			"	"	"	"	

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

BTEX, MTBE, Naphthalene, and n-Hexane by WA VPH North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Analyte	Kesun	Lillit	Units	Dilution	Batch	Flepaleu	Allalyzeu	Method	Notes
MW-129 (B3E0727-05) Water	Sampled: 05/28/03	15:20 Receiv	/ed: 05/29/	03 18:00					
Methyl tert-butyl ether	ND	5.00	ug/l	1	3F10020	06/10/03	06/10/03	EPA 8260B	
Benzene	ND	5.00	"	"	"	"	"	"	
Toluene	ND	5.00	"	"	"	"	"	"	
Ethylbenzene	ND	5.00	"	"		"	"	"	
m,p-Xylene	ND	5.00	"	"	"	"	"	"	
o-Xylene	ND	5.00	"	"	"	"	"	"	
Naphthalene	ND	5.00	"	"		"	"	"	
n-Hexane	ND	5.00	"	"	"	"	"	"	
Surrogate: 1,2-DCA-d4	100 %	60-140			"	"	"	"	
Surrogate: Toluene-d8	98.5 %	60-140			"	"	"	"	
Surrogate: 4-BFB	98.5 %	60-140			"	"	"	"	
<u>MW-W (B3E0727-06) Water</u>	Sampled: 05/28/03 1	9:40 Receive	d: 05/29/0	3 18:00					
Methyl tert-butyl ether	ND	5.00	ug/l	1	3F10020	06/10/03	06/10/03	EPA 8260B	
Benzene	ND	5.00	"	"		"	"	"	
Toluene	ND	5.00	"	"	"	"	"	"	
Ethylbenzene	ND	5.00	"	"		"	"	"	
m,p-Xylene	ND	5.00	"	"		"	"	"	
o-Xylene	ND	5.00	"	"		"	"	"	
Naphthalene	ND	5.00	"	"	"	"	"	"	
n-Hexane	ND	5.00	"	"	"	"	"	"	
Surrogate: 1,2-DCA-d4	99.0 %	60-140			"	"	"	"	
Surrogate: Toluene-d8	98.5 %	60-140			"	"	"	"	
Surrogate: 4-BFB	99.5 %	60-140			"	"	"	"	

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell	
18706 North Creek Parkway, Ste 110	Proje
Bothell WA/USA, 98011	Projec
	18706 North Creek Parkway, Ste 110

Project: Unocal Groundwater Study Project Number: [none] roject Manager: Mark Dagel

Reported: 06/13/03 14:50

Gasoline Hydrocarbons (Benzene to Naphthalene) and BTEX by NWTPH-G and EPA 8021B - Quality Control North Creek Analytical - Bothell

		1	ioi ui Cie	cit i intui	y ticui D	ounem					
Analyte		Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3F03016:	Prepared 06/04/03	Using EP.	A 5030B (P	/T)							
Blank (3F03016-Bl	LK1)										
Gasoline Range Hydi	· · ·	ND	50.0	ug/l							
Benzene		ND	0.500	"							
Toluene		ND	0.500	"							
Ethylbenzene		ND	0.500	"							
Xylenes (total)		ND	1.00	"							
Surrogate: 4-BFB (F	TID)	42.6		"	48.0		88.8	62-127			
Surrogate: 4-BFB (F	PID)	54.3		"	48.0		113	72-127			
LCS (3F03016-BS	1)										
Gasoline Range Hydi	ocarbons	504	50.0	ug/l	500		101	80-120			
Benzene		7.11	0.500	"	6.65		107	80-120			
Toluene		35.5	0.500	"	37.0		95.9	80-120			
Ethylbenzene		9.47	0.500	"	8.55		111	80-120			
Xylenes (total)		46.2	1.00		43.0		107	80-120			
Surrogate: 4-BFB (F	TID)	54.5		"	48.0		114	62-127			
Surrogate: 4-BFB (F	PID)	54.3		"	48.0		113	72-127			
LCS Dup (3F0301	6-BSD1)										
Gasoline Range Hydi	rocarbons	498	50.0	ug/l	500		99.6	80-120	1.20	25	
Benzene		7.25	0.500	"	6.65		109	80-120	1.95	40	
Toluene		35.7	0.500	"	37.0		96.5	80-120	0.562	40	
Ethylbenzene		9.67	0.500	"	8.55		113	80-120	2.09	40	
Xylenes (total)		46.5	1.00	"	43.0		108	80-120	0.647	40	
Surrogate: 4-BFB (F	TID)	54.2		"	48.0		113	62-127			
Surrogate: 4-BFB (F	PID)	54.2		"	48.0		113	72-127			
Matrix Spike (3F0	3016-MS1)					Source: H	B3F0005-0	01			
Gasoline Range Hydi	ocarbons	450	50.0	ug/l	500	14.8	87.0	72-119			
Benzene		7.24	0.500	"	6.65	0.199	106	70-129			
Toluene		35.2	0.500	"	37.0	0.266	94.4	73-114			
Ethylbenzene		9.26	0.500	"	8.55	0.125	107	82-120			
Xylenes (total)		44.5	1.00		43.0	0.563	102	74-118			
Surrogate: 4-BFB (F	TID)	50.2		"	48.0		105	62-127			
Surrogate: 4-BFB (F		54.6		"	48.0		114	72-127			

North Creek Analytical - Bothell

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Kortland Orr For Jeanne Garthwaite, Project Manager

North Creek Analytical, Inc. Environmental Laboratory Network Page 19 of 27



SAIC - Bothell	Project: Unocal Groundwater Study	
18706 North Creek Parkway, Ste 110	Project Number: [none]	Reported:
Bothell WA/USA, 98011	Project Manager: Mark Dagel	06/13/03 14:50

Gasoline Hydrocarbons (Benzene to Naphthalene) and BTEX by NWTPH-G and EPA 8021B - Quality Control North Creek Analytical - Bothell

			Reporting		Spike	Source		%REC		RPD	
Analyte		Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
Batch 3F03016:	Prepared 06/04/03	Using EPA	A 5030B (P	/ T)							
Matrix Spike Dup	(3F03016-MSD1)					Source: E	3F0005-	01			
Gasoline Range Hydr	ocarbons	466	50.0	ug/l	500	14.8	90.2	72-119	3.49	25	
Benzene		7.27	0.500	"	6.65	0.199	106	70-129	0.414	40	
Toluene		35.6	0.500	"	37.0	0.266	95.5	73-114	1.13	40	
Ethylbenzene		9.36	0.500	"	8.55	0.125	108	82-120	1.07	40	
Xylenes (total)		45.4	1.00	"	43.0	0.563	104	74-118	2.00	40	
Surrogate: 4-BFB (F	TD)	51.0		"	48.0		106	62-127			
Surrogate: 4-BFB (P	PID)	54.7		"	48.0		114	72-127			

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Volatile Petroleum Hydrocarbons by WDOE TPH Policy Method - Quality Control North Creek Analytical - Bothell

		Dementin	-	Calle	C		0/ DEC		מתת	
Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3F10009: Prepared 06/11/03	Using EP	A 5030B (P	/ T)							
Blank (3F10009-BLK1)										
C5-C6 Aliphatics	ND	50.0	ug/l							
C6-C8 Aliphatics	ND	50.0	"							
C8-C10 Aliphatics	ND	50.0	"							
C10-C12 Aliphatics	ND	50.0	"							
C8-C10 Aromatics	ND	50.0	"							
C10-C12 Aromatics	ND	50.0	"							
C12-C13 Aromatics	ND	50.0	"							
Total VPH (TVPH)	ND	50.0	"							
Surrogate: 4-BFB (FID)	44.3		"	48.0		92.3	60-140			
Surrogate: 4-BFB (PID)	45.2		"	48.0		94.2	60-140			
LCS (3F10009-BS1)										
Total VPH (TVPH)	204	50.0	ug/l	200		102	70-130			
Surrogate: 4-BFB (FID)	44.1		"	48.0		91.9	60-140			
Surrogate: 4-BFB (PID)	45.9		"	48.0		95.6	60-140			
LCS Dup (3F10009-BSD1)										
Total VPH (TVPH)	235	50.0	ug/l	200		118	70-130	14.1	25	
Surrogate: 4-BFB (FID)	44.1		"	48.0		91.9	60-140			
Surrogate: 4-BFB (PID)	45.1		"	48.0		94.0	60-140			
Matrix Spike (3F10009-MS1)					Source: E	B3E0727-0	03			
Total VPH (TVPH)	352	50.0	ug/l	200	0.00	176	70-130			Q-02
Surrogate: 4-BFB (FID)	45.2		"	48.0		94.2	60-140			
Surrogate: 4-BFB (PID)	44.6		"	48.0		92.9	60-140			
Matrix Spike Dup (3F10009-MSD1)					Source: E	B3E0727-(03			
Total VPH (TVPH)	320	50.0	ug/l	200	0.00	160	70-130	9.52	25	Q-02
Surrogate: 4-BFB (FID)	45.8		"	48.0		95.4	60-140			

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell	
18706 North Creek Parkway, Ste 110	
Bothell WA/USA, 98011	

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Semivolatile Petroleum Products by NWTPH-Dx (w/o Acid/Silica Gel Clean-up) - Quality Control North Creek Analytical - Bothell

			•	/						
		Reporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
Batch 3F02012: Prepared 06/02/03	Using EP	A 3520C								
Blank (3F02012-BLK1)										
Diesel Range Hydrocarbons	ND	0.250	mg/l							
Lube Oil Range Hydrocarbons	ND	0.500	"							
Surrogate: 2-FBP	0.274		"	0.320		85.6	50-150			
Surrogate: Octacosane	0.140		"	0.160		87.5	50-150			
LCS (3F02012-BS1)										
Diesel Range Hydrocarbons	1.78	0.250	mg/l	2.00		89.0	63-107			
Surrogate: 2-FBP	0.296		"	0.320		92.5	50-150			
LCS Dup (3F02012-BSD1)										
Diesel Range Hydrocarbons	1.80	0.250	mg/l	2.00		90.0	63-107	1.12	40	
Surrogate: 2-FBP	0.282		"	0.320		88.1	50-150			

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Extractable Petroleum Hydrocarbons by WDOE TPH Policy Method - Quality Control North Creek Analytical - Bothell

			Reporting		Spike	Source		%REC		RPD	
Analyte		Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
Batch 3F02015: P	repared 06/02/03	Using EI	PA 3520C								
Blank (3F02015-BLK	(1)										
C8-C10 Aliphatics		ND	50.0	ug/l							
C10-C12 Aliphatics		ND	50.0	"							
C12-C16 Aliphatics		ND	50.0	"							
C16-C21 Aliphatics		ND	50.0	"							
C21-C34 Aliphatics		ND	50.0	"							
C8-C10 Aromatics		ND	50.0	"							
C10-C12 Aromatics		ND	50.0	"							
C12-C16 Aromatics		ND	50.0	"							
C16-C21 Aromatics		ND	50.0	"							
C21-C34 Aromatics		ND	50.0	"							
Extractable Petroleum I	Hydrocarbons	ND	50.0								
Surrogate: 2-FBP		310		"	404		76.7	60-140			
Surrogate: Octacosane		376		"	410		91.7	60-140			
Surrogate: Undecane		308		"	409		75.3	60-140			
LCS (3F02015-BS1)											
Extractable Petroleum I	Hydrocarbons	3770	50.0	ug/l	5000		75.4	60-130			
Surrogate: 2-FBP		324		"	404		80.2	60-140			
Surrogate: Octacosane		370		"	410		90.2	60-140			
Surrogate: Undecane		346		"	409		84.6	60-140			
LCS Dup (3F02015-E	BSD1)										
Extractable Petroleum I	Hydrocarbons	4030	50.0	ug/l	5000		80.6	60-130	6.67	25	
Surrogate: 2-FBP		322		"	404		79.7	60-140			_
Surrogate: Octacosane		385		"	410		93.9	60-140			
Surrogate: Undecane		355		"	409		86.8	60-140			

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Polynuclear Aromatic Hydrocarbons by GC/MS-SIM - Quality Control North Creek Analytical - Bothell

				j		ounci					
A malanta		D. It	Reporting	I.I	Spike	Source	0/ DEC	%REC	ספוס	RPD	Matt
Analyte		Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
Batch 3F04034: Prep	pared 06/04/03	Using EP	A 3520C								
Blank (3F04034-BLK1)											
Acenaphthene		ND	0.100	ug/l							
Acenaphthylene		ND	0.100	"							
Anthracene		ND	0.100	"							
Benzo (a) anthracene		ND	0.0100	"							
Benzo (a) pyrene		ND	0.0100	"							
Benzo (b) fluoranthene		ND	0.0100	"							
Benzo (ghi) perylene		ND	0.100	"							
Benzo (k) fluoranthene		ND	0.0100	"							
Chrysene		ND	0.0100	"							
Dibenz (a,h) anthracene		ND	0.0100	"							
Fluoranthene		ND	0.100	"							
Fluorene		ND	0.100	"							
Indeno (1,2,3-cd) pyrene		ND	0.0100	"							
1-Methylnaphthalene		ND	0.100	"							
2-Methylnaphthalene		ND	0.100	"							
Naphthalene		ND	0.100	"							
Phenanthrene		ND	0.100	"							
Pyrene		ND	0.100	"							
Surrogate: 1-Methylnaphth	alene-d10	0.778		"	1.00		77.8	30-150			
Surrogate: Benzo (a) pyren	ne-d12	0.888		"	1.00		88.8	30-150			
LCS (3F04034-BS1)											
Acenaphthene		7.66	1.00	ug/l	10.0		76.6	40-150			
Acenaphthylene		7.91	1.00	"	10.0		79.1	40-150			
Anthracene		8.72	1.00	"	10.0		87.2	40-150			
Benzo (a) anthracene		8.74	0.100	"	10.0		87.4	40-150			
Benzo (a) pyrene		10.4	0.100	"	10.0		104	40-150			
Benzo (b) fluoranthene		10.5	0.100	"	10.0		105	40-150			
Benzo (ghi) perylene		9.98	1.00	"	10.0		99.8	40-150			
Benzo (k) fluoranthene		11.5	0.100	"	10.0		115	40-150			
Chrysene		8.86	0.100	"	10.0		88.6	40-150			
Dibenz (a,h) anthracene		8.59	0.100	"	10.0		85.9	40-150			
Fluoranthene		9.89	1.00	"	10.0		98.9	40-150			
Fluorene		7.68	1.00	"	10.0		76.8	40-150			
Indeno (1,2,3-cd) pyrene		9.42	0.100	"	10.0		94.2	40-150			
· · · · · · · · · · · · · · · · · · ·											

North Creek Analytical - Bothell



SAIC - Bothell
18706 North Creek Parkway, Ste 110
Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

Polynuclear Aromatic Hydrocarbons by GC/MS-SIM - Quality Control North Creek Analytical - Bothell

				<u> </u>	, tical _						
			Reporting		Spike	Source		%REC		RPD	
Analyte		Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
Batch 3F04034: Prepar	red 06/04/03	Using EF	PA 3520C								
LCS (3F04034-BS1)											
1-Methylnaphthalene		7.57	1.00	ug/l	10.0		75.7	40-150			
2-Methylnaphthalene		7.93	1.00	"	10.0		79.3	40-150			
Naphthalene		7.40	1.00	"	10.0		74.0	40-150			
Phenanthrene		8.61	1.00	"	10.0		86.1	40-150			
Pyrene		9.90	1.00	"	10.0		99.0	40-150			
Surrogate: 1-Methylnaphthale	ene-d10	0.786		"	1.00		78.6	30-150			
Surrogate: Benzo (a) pyrene-o	112	0.806		"	1.00		80.6	30-150			
LCS Dup (3F04034-BSD1)											
Acenaphthene		8.72	1.00	ug/l	10.0		87.2	40-150	12.9	40	
Acenaphthylene		9.10	1.00	"	10.0		91.0	40-150	14.0	40	
Anthracene		9.12	1.00	"	10.0		91.2	40-150	4.48	40	
Benzo (a) anthracene		9.04	0.100	"	10.0		90.4	40-150	3.37	40	
Benzo (a) pyrene		10.3	0.100	"	10.0		103	40-150	0.966	40	
Benzo (b) fluoranthene		10.3	0.100	"	10.0		103	40-150	1.92	40	
Benzo (ghi) perylene		10.3	1.00	"	10.0		103	40-150	3.16	40	
Benzo (k) fluoranthene		11.4	0.100	"	10.0		114	40-150	0.873	40	
Chrysene		9.16	0.100	"	10.0		91.6	40-150	3.33	40	
Dibenz (a,h) anthracene		8.97	0.100	"	10.0		89.7	40-150	4.33	40	
Fluoranthene		10.4	1.00	"	10.0		104	40-150	5.03	40	
Fluorene		8.42	1.00	"	10.0		84.2	40-150	9.19	40	
Indeno (1,2,3-cd) pyrene		9.62	0.100	"	10.0		96.2	40-150	2.10	40	
1-Methylnaphthalene		8.36	1.00	"	10.0		83.6	40-150	9.92	40	
2-Methylnaphthalene		8.51	1.00	"	10.0		85.1	40-150	7.06	40	
Naphthalene		8.33	1.00	"	10.0		83.3	40-150	11.8	40	
Phenanthrene		8.88	1.00	"	10.0		88.8	40-150	3.09	40	
Pyrene		10.4	1.00	"	10.0		104	40-150	4.93	40	
Surrogate: 1-Methylnaphthale	ene-d10	0.842		"	1.00		84.2	30-150			
Surrogate: Benzo (a) pyrene-	112	0.781		"	1.00		78.1	30-150			

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell 18706 North Creek Parkway, Ste 110 Bothell WA/USA, 98011

Project: Unocal Groundwater Study Project Number: [none] Project Manager: Mark Dagel

Reported: 06/13/03 14:50

BTEX, MTBE, Naphthalene, and n-Hexane by WA VPH - Quality Control North Creek Analytical - Bothell

		-			·			A DEC		DDD	
Analyte		Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3F10020:	Prepared 06/10/03						,				
		Using EP	A 3030D								
Blank (3F10020-B)	LK1)										
Methyl tert-butyl eth	her	ND	5.00	ug/l							
Benzene		ND	5.00	"							
Toluene		ND	5.00	"							
Ethylbenzene		ND	5.00	"							
m,p-Xylene		ND	5.00	"							
o-Xylene		ND	5.00	"							
Naphthalene		ND	5.00	"							
n-Hexane		ND	5.00	"							
Surrogate: 1,2-DCA	-d4	19.5		"	20.0		97.5	60-140			
Surrogate: Toluene-	d8	20.0		"	20.0		100	60-140			
Surrogate: 4-BFB		19.6		"	20.0		98.0	60-140			
LCS (3F10020-BS	1)										
Benzene		9.12	5.00	ug/l	10.0		91.2	80-120			
Toluene		9.12	5.00	"	10.0		91.2	80-120			
Surrogate: 1,2-DCA	-d4	20.0		"	20.0		100	60-140			
Surrogate: Toluene-	d8	20.0		"	20.0		100	60-140			
Surrogate: 4-BFB		19.5		"	20.0		97.5	60-140			
LCS Dup (3F1002	0-BSD1)										
Benzene		10.0	5.00	ug/l	10.0		100	80-120	9.21	20	
Toluene		10.1	5.00		10.0		101	80-120	10.2	20	
Surrogate: 1,2-DCA	-d4	20.0		"	20.0		100	60-140			
Surrogate: Toluene-	d8	20.0		"	20.0		100	60-140			
Surrogate: 4-BFB		19.5		"	20.0		97.5	60-140			

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager



SAIC - Bothell	Project:	Unocal Groundwater Study	
18706 North Creek Parkway, Ste 110	Project Number:	[none]	Reported:
Bothell WA/USA, 98011	Project Manager:	Mark Dagel	06/13/03 14:50

Notes and Definitions

- D-06 The sample chromatographic pattern does not resemble the fuel standard used for quantitation.
- D-10 The heavy oil range organics present are due to hydrocarbons eluting primarily in the diesel range.
- I-06 The analyte concentration may be artificially elevated due to coeluting compounds or components.
- Q-02 The spike recovery for this QC sample is outside of NCA established control limits due to sample matrix interference.
- Q-34 The sample container submitted for volatile analysis had either headspace or air bubbles greater than 1/4 inch in diameter.
- S-04 The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
- X See case narrative.
- DET Analyte DETECTED
- ND Analyte NOT DETECTED at or above the reporting limit
- NR Not Reported
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference

North Creek Analytical - Bothell

Kortland Orr For Jeanne Garthwaite, Project Manager

Appendix C AMEC Earth and Environmental Toxicity Evaluation of Groundwater Samples Unocal Edmonds, Washington

TOXICITY EVALUATION OF GROUNDWATER SAMPLES

Unocal, Edmonds, Washington

Prepared for SAIC 18706 N. Creek Parkway Suite 110 Bothell, WA 98011

Prepared by AMEC Earth & Environmental Northwest Bioassay Laboratory 5009 Pacific Hwy. E., Suite 2 Fife, WA 98424 253-922-4296

June 2003

SUMMARY

Chronic toxicity tests were conducted on six groundwater samples collected from the Unocal Facility located in Edmonds, Washington. Whole effluent toxicity (WET) tests were conducted using the test organisms *Atherinops affinis* (Pacific topsmelt), *Mysidopsis bahia* (a mysid shrimp), *Pimephales promelas* (fathead minnow), and the water flea *Ceriodaphnia dubia*. Test organism survival, mysid shrimp, topsmelt, and fathead minnow growth, and *Ceriodaphnia* reproduction were evaluated after 7 days of exposure. All samples were serially diluted with laboratory water for testing.

Mark Dagel managed the project for Scientific Applications International Corporation (SAIC) working in conjunction with Washington State Department of Ecology (WDOE). Testing was conducted by AMEC Earth & Environmental, Inc. (AMEC) in Fife, Washington. Samples were collected 28 May 2003 and used to initiate tests on 29 May and renew the tests throughout the duration.

MATERIALS AND METHODS

Sample Collection and Transport

Samples of groundwater were collected from six sites at the Unocal facility in Edmonds, Washington on 28 May 2003. Sample containers consisted of 10 and 20-liter (L) polyethylene collapsible cubitainers. The cubitainers were filled, packed in coolers containing ice, and transported to AMEC by SAIC personnel. Samples arrived within 24 hours of collection in good condition. Appropriate chain-of-custody procedures were employed during collection and transport. Chain-of-custody documentation is contained in Appendix I.

Sample Receipt

Upon arrival at AMEC, coolers were opened and samples were matched to the chain-ofcustody information. Receipt temperature was measured in each sample and recorded on the chain-of-custody form. Water quality parameters were measured in a subsample taken from each effluent sample and recorded in a logbook maintained in the laboratory. A summary of sample receipt water quality parameters is located in Appendix E. Samples were held in a 4°C cold room until use.

Organism Procurement and Handling

Atherinops affinis, Mysidopsis bahia, Pimephales promelas

Test specimens were obtained on 29 May 2003 from Aquatic Biosystems located in Fort Collins, Colorado. Each species was transported separately to AMEC in oxygen-

saturated water contained in plastic bags. Insulated ice chests containing the bags were shipped by overnight delivery service. Upon arrival at AMEC, organism receipt information including physical parameters and organism health was recorded. Test organisms were acclimated to test conditions and held until test initiation.

Ceriodaphnia dubia

Ceriodaphnia neonates were obtained from in-house cultures following EPA's block parentage method (EPA/821/R-02/013). *Ceriodaphnia* brood boards were started one week prior to test initiation by placing one neonate in a 30 milliliter (ml) polypropylene plastic cup containing 15 ml laboratory water and containing 100 microliters (μ l) each of a yeast, CEROPHYLL®, trout chow (YCT) mixture, and a suspension of the green alga, *Selenastrum capricornutum*. The brood board was renewed and fed daily by transferring individuals to new cups containing laboratory water and 100 μ l each of YCT and *Selenastrum*. The number of neonates produced per organism was counted and recorded on a data sheet daily.

Test Procedures

Test procedures are summarized in Tables 1 through 4 and follow protocols described in EPA/600/R-95/136 (1995) for Pacific topsmelt, EPA-821-R-02-014 (2002) for mysid shrimp) and EPA-821-R-02-013 (2002) for fathead minnow and *Ceriodaphnia*. All tests were initiated within 36 hours of sample collection. Samples were tested at five concentrations, beginning with full-strength sample and incorporating a 50-percent dilution series using laboratory water.

Topsmelt, mysid shrimp, and fathead minnow were fed brine shrimp nauplii twice daily, once in the morning and again the afternoon after test solution renewal. No food was added to test chambers on Day 7. An 80 percent solution renewal was conducted daily and the number of test organisms in each chamber was counted and recorded. Temperature, dissolved oxygen (DO), pH, and conductivity were monitored and recorded daily. Any dead test organisms were noted and discarded on a daily basis.

At test termination, the contents of each test chamber in the topsmelt, mysid shrimp, and fathead minnow tests were gently mixed and carefully poured through a fine mesh screen. The test organisms were carefully rinsed with deionized water and transferred to dried, tared weigh pans. Organisms were then dried in an oven for 24 hours at 60°C for 24 hours and weighed.

Test Organism:	Atherinops affinis
Test Organism Source:	Aquatic Biosystems; Fort Collins, Colorado
Test Organism Age:	12 days post hatch
Test Duration:	7 days with daily solution renewal
Feeding:	Artemia nauplii twice daily
Test Chamber:	1000-ml polypropylene beaker
Test Solution Volume:	500 ml
Test Temperature:	20 <u>+</u> 1°C
Dilution Water:	40 Fathoms Artificial Seawater
Salinity:	30 ppt
Test Concentrations (% sample):	100%, 50%, 25%, 12.5%, 6.25%, 0.0%
Number of Organisms/Chamber:	6
Number of Replicates/Conc.:	5
Photoperiod:	16 hours light/ 8 hours dark
Aeration:	Samples aerated prior to mixing dilutions
Deviations:	None
Test Protocol:	EPA/600/R-95/136
Test Acceptability:	> 80% control animal survival mean dry weight > 0.85 mg per surviving control fish
Reference Toxicant:	Copper chloride

Table 1. Pacific Topsmelt 7-day Survival and Growth Test Procedure

Table 2. Mysid Shrimp 7-day Survival and Growth Test Procedure

Test Organism:	Mysidopsis bahia
Test Organism Source:	Aquatic Biosystems; Fort Collins, Colorado
Test Organism Age:	7 days post hatch
Test Duration:	7 days with daily solution renewal
Feeding:	Artemia nauplii twice daily
Test Chamber:	250-ml polypropylene cup
Test Solution Volume:	200 ml
Test Temperature:	26 <u>+</u> 1°C
Dilution Water:	40 Fathoms Artificial Seawater
Salinity:	30 ppt
Test Concentrations (% sample):	100%, 50%, 25%, 12.5%, 6.25%, 0.0%
Number of Organisms/Chamber:	5
Number of Replicates/Conc.:	8
Photoperiod:	16 hours light/ 8 hours dark
Aeration:	Samples aerated prior to mixing dilutions
Deviations:	None
Test Protocol:	EPA-821-R-02-014
Test Acceptability:	2 80% control animal survival mean dry weight <a> 0.20 mg per surviving control fish
Reference Toxicant:	Copper chloride

Table 3. Fathead minnow 7-day Survival and Growth Test Procedure

Test Organism:	Pimephales promelas
Test Organism Source:	Aquatic Biosystems; Fort Collins, Colorado
Test Organism Age:	< 24 hours post hatch
Test Duration:	7 days with daily solution renewal
Feeding:	Artemia nauplii twice daily
Test Chamber:	500-ml polypropylene cup
Test Solution Volume:	250 ml
Test Temperature:	25 <u>+</u> 1°C
Dilution Water:	Moderately Hard Synthetic Freshwater
Test Concentrations (% sample):	100%, 50%, 25%, 12.5%, 6.25%, 0.0%
Number of Organisms/Chamber:	10
Number of Replicates/Conc.:	4
Photoperiod:	16 hours light/ 8 hours dark
Aeration:	Samples aerated prior to mixing dilutions
Deviations:	None
Test Protocol:	EPA-821-R-02-013
Test Acceptability:	2 80% control animal survival mean dry weight <a> 0.25 mg per surviving control fish
Reference Toxicant:	Sodium chloride

Table 4. Ceriodaphnia 7-day Survival and Reproduction Test Procedure

Test Organism:	Ceriodaphnia dubia
Test Organism Source:	In-house cultures
Test Organism Age:	< 24 hours
Test Duration:	7 days with daily solution renewal
Feeding:	100 μl each YCT and <i>Selenastrum</i> daily
Test Chamber:	30-ml polypropylene cup
Test Solution Volume:	15 ml
Test Temperature:	25 <u>+</u> 1°C
Dilution Water:	Moderately Hard Synthetic Water
Test Concentrations (% sample):	100%, 50%, 25%, 12.5%, 6.25%, 0.0%
Number of organisms/chamber:	1
Number of Replicates/Conc.:	10
Photoperiod:	16 hours light/ 8 hours dark
Aeration:	Samples aerated prior to mixing dilutions
Deviations:	None
Test Protocol:	EPA-821-R-02-013
Test Acceptability:	> 80% control animal survival; 60% surviving control organisms producing 3 broods and averaging 15 neonates per surviving adult
Reference Toxicant:	Sodium chloride

Ceriodaphnia neonates were less than 24 hours old and within eight hours of age at test initiation. Solution renewal was performed daily by transferring organisms using a wide pore glass pipet to chambers containing fresh test solution and 100 μ l each YCT and *Selenastrum*. Water quality parameters and survival were monitored and recorded daily. The number of neonates produced per organism each day were counted and recorded, prior to being discarded.

STATISTICAL ANALYSES

Statistical analyses were performed using the appropriate data analysis pathway and procedures contained in the Toxcalc Comprehensive Toxicity Data Analysis and Database Software, Version 5.0 (Tidepool Scientific Software !992 – 1994).

RESULTS

Tables detailing individual replicate results are contained in Appendices A, B, C, and D for Pacific topsmelt, mysid shrimp, fathead minnow, and *Ceriodaphnia*, respectively. Sample receipt information, water quality data, statistical analyses, reference toxicant data, and chain-of-custody information are contained in Appendices E, F, G, H, and I, respectively.

Mean control survival was 90 percent, or greater, in all tests. This value exceeds the EPA guideline survival criterion of 80 percent. Topsmelt, mysid shrimp, and fathead minnow growth exceeded the EPA criterion of a minimum average of 0.85, 0.20, and 0.25 mg per surviving organisms in the controls. *Ceriodaphnia* reproduction in the controls exceeded the minimum requirement of 60 percent of surviving control organisms producing three broods averaging a minimum of 15 neonates.

Table 5 summarizes the NOEC and EC_{50} values for samples for all species tested. The NOEC is the highest concentration exhibiting no effect and the EC_{50} is the concentration estimated to produce an effect on 50 percent of the organisms.

	Endpoir	nt			Sam	ole ID		
Species	(% Samp		MW-146	MW-7	MW-17	MW- 103R	MW-129	MW-W
	Survival	NOEC	100	100	100	100	25	100
Tonomolt	Suivivai	LC ₅₀	>100	>100	>100	>100	48	>100
Topsmelt	Oneventhe	NOEC	25	100	100	100	25 50 40 >100 25 50	50
	Growth	EC ₅₀	85	>100	>100	>100	40	>100
	Suprival	NOEC	25	100	50	100	25	50
Mysid	Survival	LC ₅₀	54	>100	78	>100	47	>100
Shrimp	Growth	NOEC	12.5	25	25	25 25 12.	12.5	25
	Growin	EC ₅₀	41	78	50	>100	26	67
	Survival	NOEC	50	100	100	100	50	50
Fathead	Survivar	LC ₅₀	84	>100	>100	>100	84	>100
minnow	Growth	NOEC	50	100	100	100	25	25
	Growin	EC ₅₀	74	>100	>100	>100	67	>100
	Survival	NOEC	100	100	100	100	100	100
Coriodophoio	Suivivai	LC ₅₀	>100	>100	>100	>100	>100	>100
Ceriodaphnia	Reproduction	NOEC	25	50	100	25	50	50
		EC ₅₀	61	>100	>100	>100	96	>100

Table 5. Whole Effluent Toxicity Test Results – NOEC and EC_{50} in % Sample

Note: NOEC - No Observed Effect Concentration

REFERENCE TOXICANT TESTS

Reference toxicant tests were conducted concurrent with the samples to assess the health of test organisms and the consistency of our laboratory procedures. The results are summarized in Table 6. Results for tests with all four test species were within internal control chart limits of \pm two standard deviations (Appendix H).

Species	Test ID	Endpoint	CV	
Endpoint		-	(%)	
Desifie Tenemalt		<u>(μg/L CuCl₂)</u>		
Pacific Topsmelt Survival (LC50)	RT052903AA	482	33.8	
Growth (EC50)		457	32.3	
Mysid Shrimp	RT052903MY			
Survival LC50)		485	24.9	
Growth (EC50)		489	23.1	
		(g/L NaCl)		
Pimephales promelas Survival (LC50)	RT052903PP	5.8	15.2	
Growth (EC50)		4.9	22.2	
Ceriodaphnia dubia	RT052903CD			
Survival (LC50)		1.6	20.5	
Reproduction (ÉC	50)	0.9	30.2	

Table 6. Chronic Reference Toxicant Results

REFERENCES

- EPA. 1995. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms. EPA/600/R-95/136, February 1995.
- EPA. 2002. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms. Fourth Edition. EPA-821-R-02-013, October 2002.
- EPA. 2002. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Marine and Estuarine Organisms. Third Edition. EPA-821-R-02-014, October 2002.
- Tidepool Scientific Software. 1992-1994. TOXCALC Comprehensive Toxicity Data Analysis and Database Software, Version 5.0.
- WADOE. 2001. Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria. Washington State Department of Ecology. Water Quality Program. Publication number: WQ-R-95-80, Revised December 2001.

Appendix A

Atherinops affinis (Pacific Topsmelt)

Test Results Summaries

Appendix Table A-1. Unocal Groundwater Study Pacific Topsmelt Chronic Survival & Growth *WET-MW-146* Test Initiation: 29 May 2003

			Survival			Gro	wth	
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	6	100		43.26	52.87	1.602	
	2	6	100		43.75	54.06	1.718	
Control	3	6	100	100	42.67	53.28	1.768	1.755
	4	6	100		43.53	54.49	1.827	
	5	6	100		42.90	54.07	1.862	
	1	6	100		44.30	53.28	1.497	
	2	6	100		41.65	53.04	1.898	
6.25	3	6	100	100	44.08	50.86	1.130	1.528
	4	6	100		44.16	55.83	1.945	
	5	6	100		44.11	51.13	1.170	
	1	6	100		43.79	54.41	1.770	
	2	6	100		44.46	54.28	1.637	
12.5	3	6	100	100	42.40	51.91	1.585	1.612
	4	6	100		43.25	52.14	1.482	
	5	6	100		44.42	53.94	1.587	
	1	6	100		41.53	52.59	1.843	
	2	6	100		43.77	56.83	2.177	
25	3	6	100	100	43.74	53.39	1.608	1.773
	4	6	100		42.73	53.22	1.748	
	5	6	100		41.71	50.64	1.488	
	1	6	100		42.74	50.22	1.247	
	2	6	100		43.99	53.56	1.595	
50	3	6	100	97	43.45	50.04	1.098	1.345
	4	6	100		43.92	53.29	1.562	
	5	5	83		43.27	50.62	1.225	
	1	4	67		43.26	47.24	0.663	
	2	1	17		41.97	42.91	0.157	
100	3	6	100	73	44.06	49.93	0.978	0.681
	4	6	100		43.65	49.06	0.902	
	5	5	83		43.91	48.13	0.703	

Appendix Table A-2. Unocal Groundwater Study Pacific Topsmelt Chronic Survival & Growth *WET-MW-7* Test Initiation: 29 May 2003

			Survival			Gro	wth	
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	6	100		43.11	55.15	2.007	
	2	6	100		43.98	54.18	1.700	
Control	3	6	100	100	43.98	58.22	2.373	2.046
	4	6	100		42.85	53.98	1.855	
	5	6	100		42.23	56.00	2.295	
	1	6	100		42.83	54.74	1.985	
	2	6	100		42.89	56.41	2.253	
6.25	3	6	100	100	43.87	57.08	2.202	2.059
	4	6	100		43.60	56.38	2.130	
	5	6	100		43.70	54.04	1.723	
	1	6	100		41.85	53.57	1.953	
	2	6	100		42.85	53.59	1.790	
12.5	3	6	100	100	43.41	53.49	1.680	1.913
	4	6	100		44.00	55.41	1.902	
	5	6	100		43.09	56.52	2.238	
	1	6	100		43.93	54.48	1.758	
	2	6	100		43.06	52.22	1.527	
25	3	6	100	100	44.12	54.36	1.707	1.645
	4	6	100		43.69	52.43	1.457	
	5	6	100		42.95	53.61	1.777	
	1	6	100		43.81	56.58	2.128	
	2	6	100		43.47	53.63	1.693	
50	3	6	100	100	43.34	57.49	2.358	2.017
	4	6	100		43.46	53.95	1.748	
	5	6	100		43.81	56.75	2.157	
	1	6	100		43.41	54.21	1.800	
	2	6	100		41.67	51.94	1.712	
100	3	6	100	100	43.88	56.67	2.132	1.689
	4	6	100		43.20	51.47	1.378	
	5	6	100		43.28	51.82	1.423	

Appendix Table A-3. Unocal Groundwater Study Pacific Topsmelt Chronic Survival & Growth *WET-MW-17* Test Initiation: 29 May 2003

			Survival			Gro	wth	
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	6	100		42.79	52.81	1.670	
	2	6	100		44.02	54.49	1.745	
Control	3	6	100	97	43.08	53.40	1.720	1.727
	4	5	83		43.11	55.27	2.027	
	5	6	100		43.49	52.32	1.472	
	1	6	100		43.20	55.09	1.982	
	2	6	100		42.95	53.44	1.748	
6.25	3	6	100	100	42.96	51.44	1.413	1.839
	4	6	100		43.53	54.34	1.802	
	5	6	100		43.61	57.11	2.250	
	1	5	83		42.89	50.18	1.215	
	2	6	100		43.94	56.41	2.078	
12.5	3	5	83	93	42.95	50.76	1.302	1.673
	4	6	100		43.57	53.32	1.625	
	5	6	100		42.01	54.87	2.143	
	1	6	100		44.12	56.33	2.035	
	2	6	100		42.74	52.60	1.643	
25	3	6	100	100	43.07	52.07	1.500	1.752
	4	6	100		42.35	52.24	1.648	
	5	6	100		42.73	54.33	1.933	
	1	6	100		43.56	53.01	1.575	
	2	6	100		44.05	53.84	1.632	
50	3	5	83	97	43.68	52.12	1.407	1.565
	4	6	100		43.83	52.66	1.472	
	5	6	100		43.47	53.92	1.742	
	1	6	100		42.96	49.04	1.013	
	2	6	100		44.05	56.93	2.147	
100	3	6	100	100	43.15	53.46	1.718	1.556
	4	6	100		42.23	52.07	1.640	
	5	6	100		43.62	51.20	1.263	

Appendix Table A-4. Unocal Groundwater Study Pacific Topsmelt Chronic Survival & Growth *WET-MW-103R* Test Initiation: 29 May 2003

			Survival			Gro	wth	
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	6	100		43.83	54.46	1.772	
	2	6	100		40.45	52.32	1.978	
Control	3	6	100	100	43.52	53.24	1.620	1.881
	4	6	100		43.00	53.86	1.810	
	5	6	100		42.82	56.16	2.223	
	1	6	100		42.44	55.02	2.097	
	2	6	100		41.45	50.52	1.512	
6.25	3	6	100	97	43.40	52.65	1.542	1.752
	4	6	100		43.81	55.49	1.947	
	5	5	83		43.38	53.37	1.665	
	1	6	100		42.75	53.54	1.798	
	2	6	100		42.40	51.90	1.583	
12.5	3	6	100	100	42.31	51.58	1.545	1.572
	4	6	100		43.99	50.23	1.040	
	5	6	100		42.52	53.88	1.893	
	1	6	100		42.18	52.69	1.752	
	2	6	100		42.60	51.60	1.500	
25	3	6	100	100	43.34	54.35	1.835	1.728
	4	6	100		43.13	53.03	1.650	
	5	6	100		43.28	54.69	1.902	
	1	6	100		42.47	54.02	1.925	
	2	6	100		43.26	53.97	1.785	
50	3	6	100	100	43.36	55.36	2.000	1.909
	4	6	100		45.15	54.65	1.583	
	5	6	100		43.38	56.88	2.250	
	1	6	100		42.81	50.23	1.236	
	2	6	100		42.86	52.35	1.582	
100	3	6	100	100	43.40	53.10	1.617	1.582
	4	6	100		42.94	54.07	1.855	
	5	6	100		43.01	52.73	1.620	

Appendix Table A-5. Unocal Groundwater Study Pacific Topsmelt Chronic Survival & Growth *WET-MW-129* Test Initiation: 29 May 2003

			Survival			Gro	wth	
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	6	100		42.84	54.64	1.967	
	2	6	100		42.53	55.26	2.122	
Control	3	6	100	100	44.07	54.64	1.762	1.880
	4	6	100		43.82	54.26	1.740	
	5	6	100		44.14	55.00	1.810	
	1	6	100		44.00	56.24	2.040	
	2	6	100		43.39	55.24	1.975	
6.25	3	6	100	100	42.40	55.60	2.200	2.005
	4	6	100		44.66	55.35	1.782	
	5	6	100		44.05	56.23	2.030	
	1	6	100		43.28	51.91	1.438	
	2	6	100		43.22	54.04	1.803	
12.5	3	6	100	100	42.43	50.65	1.370	1.545
	4	6	100		43.33	53.79	1.743	
	5	6	100		44.06	52.27	1.368	
	1	6	100		46.07	56.15	1.680	
	2	4	67		43.72	50.18	1.077	
25	3	6	100	93	40.60	51.22	1.770	1.715
	4	6	100		43.50	55.24	1.957	
	5	6	100		44.14	56.70	2.093	
	1	0	0		-	-	0.000	
	2	2	33		42.28	46.41	0.688	
50	3	2	33	47	43.21	44.11	0.150	0.498
	4	5	83		43.22	48.13	0.818	
	5	5	83		44.30	49.31	0.835	
	1	0	0		-	-	0.000	
	2	0	0		-	-	0.000	
100	3	0	0	3	-	-	0.000	0.016
	4	0	0		-	-	0.000	
	5	1	17		44.05	44.52	0.078	

Appendix Table A-6. Unocal Groundwater Study Pacific Topsmelt Chronic Survival & Growth *WET-MW-W* Test Initiation: 29 May 2003

			Survival			Gro	wth	
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	6	100		43.28	52.99	1.618	
	2	6	100		44.34	57.00	2.110	
Control	3	6	100	100	42.18	51.90	1.620	1.821
	4	6	100		43.30	55.15	1.975	
	5	6	100		43.50	54.20	1.783	
	1	6	100		41.83	53.00	1.862	
	2	6	100		44.62	53.20	1.430	
6.25	3	6	100	100	44.86	54.38	1.587	1.750
	4	6	100		43.57	55.60	2.005	
	5	6	100		43.29	54.50	1.868	
	1	6	100		43.26	54.75	1.915	
	2	5	83		43.36	53.20	1.640	
12.5	3	6	100	97	43.90	55.78	1.980	1.770
	4	6	100		43.54	51.22	1.280	
	5	6	100		42.88	55.09	2.035	
	1	6	100		43.37	55.30	1.989	
	2	6	100		43.52	56.22	2.117	
25	3	6	100	100	44.31	54.23	1.653	1.933
	4	6	100		43.80	54.05	1.708	
	5	6	100		44.03	57.23	2.200	
	1	6	100		44.71	58.45	2.290	
	2	6	100		43.65	53.02	1.562	
50	3	6	100	93	44.40	54.75	1.725	1.691
	4	5	83		43.25	52.03	1.463	
	5	5	83		41.69	50.19	1.417	
	1	5	83		44.30	53.80	1.583	
	2	6	100		44.20	53.10	1.483	
100	3	6	100	97	42.90	51.29	1.398	1.411
	4	6	100		43.50	51.04	1.257	
	5	6	100		44.28	52.29	1.335	

Appendix Table A-1. Unocal Groundwater Study Pacific Topsmelt Chronic Survival & Growth *WET-MW-7*

Test Initiation: 29 May 2003

Foils dried again and final weights checked and adjusted

			Survival			Gro	wth	
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	6	100		43.11	55.10	1.998	
	2	6	100		43.98	54.29	1.718	
Control	3	6	100	100	43.98	58.10	2.353	2.047
	4	6	100		42.85	54.00	1.858	
	5	6	100		42.23	56.06	2.305	
	1	6	100		42.83	54.85	2.003	
	2	6	100		42.89	56.41	2.253	
6.25	3	6	100	100	43.87	57.13	2.210	2.071
	4	6	100		43.60	56.49	2.148	
	5	6	100		43.70	54.13	1.738	
	1	6	100		41.85	53.65	1.967	
	2	6	100		42.85	53.60	1.792	
12.5	3	6	100	100	43.41	53.41	1.667	1.915
	4	6	100		44.00	55.41	1.902	
	5	6	100		43.09	56.57	2.247	
	1	6	100		43.93	54.76	1.805	
	2	6	100		43.06	52.38	1.553	
25	3	6	100	100	44.12	54.34	1.703	1.659
	4	6	100		43.69	52.45	1.460	
	5	6	100		42.95	53.60	1.775	
	1	6	100		43.81	56.54	2.122	
	2	6	100		43.47	53.71	1.707	
50	3	6	100	100	43.34	57.55	2.368	2.023
	4	6	100		43.46	53.99	1.755	
	5	6	100		43.81	56.80	2.165	
	1	6	100		43.41	54.40	1.832	
	2	6	100		41.67	52.17	1.750	
100	3	6	100	100	43.88	56.74	2.143	1.719
	4	6	100		43.20	51.69	1.415	
	5	6	100		43.28	52.00	1.453	

Appendix B

Mysidopsis bahia (Mysid shrimp)

Test Results Summaries

Appendix Table B-1. Unocal Groundwater Study Mysid Shrimp Chronic Survival & Growth *WET-MW-146* Test Initiation: 29 May 2003

			Survival			Gro	wth	
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	5	100		43.10	44.91	0.362	
	2	5	100		41.60	43.21	0.322	
	3	5	100		42.64	44.65	0.402	
Control	4	5	100	100	41.05	42.89	0.368	0.381
Control	5	5	100	100	43.48	45.40	0.384	0.001
	6	5	100		43.97	45.88	0.382	
	7	5	100		43.55	45.66	0.422	
	8	5	100		42.74	44.77	0.406	
	1	4	80		42.81	44.44	0.326	
	2	5	100		42.82	44.64	0.364	
	3	5	100		42.46	44.66	0.440	
6.25	4	5	100	95	44.38	46.27	0.378	0 381
0.20	5	5	100	00	45.78	48.20	0.484	0.001
	6	5	100		41.87	43.78	0.382	
	7	4	80		44.08	45.64	0.312	
	8	5	100		41.40	43.19	0.358	
	1	5	100		43.87	45.65	0.356	
	2	5	100		42.68	44.27	0.318	
	3	5	100		42.98	44.78	0.360	
12.5	4	5	100	98	42.49	44.43	0.388	0.259
	5	4	80	98	43.28	45.00	0.344	0.358
	6	5	100		44.34	46.15	0.362	
	7	5	100		41.85	43.67	0.364	
	8	5	100		44.04	45.89	0.370	
	1	4	80		42.24	43.26	0.204	
	2	5	100		42.48	44.36	0.376	
	3	5	100		43.20	44.95	0.350	
05	4	5	100	00	41.89	43.78	0.378	0.004
25	5	5	100	98	43.64	45.21	0.314	0.324
	6	5	100		42.81	44.55	0.348	
	7	5	100		42.53	43.99	0.292	
	8	5	100		42.15	43.79	0.328	
	1	3	60		43.03	43.57	0.108	
	2	3	60		42.91	43.69	0.156	
	3	2	40		42.13	42.42	0.058	
50	4	4	80	00	42.30	42.96	0.132	0.400
50	5	5	100	68	41.27	42.10	0.166	0.129
	6	3	60		42.72	43.27	0.110	
	7	3	60		41.30	42.04	0.148	
	8	4	80		42.22	43.00	0.156	
	1	1	20		44.94	45.09	0.030	
	2	0	0		-	-	0.000	
	3	0	0		-	-	0.000	
400	4	0	0 0	-	-	-	0.000	0.000
100	5	1	20	5	40.67	40.76	0.018	0.006
	6	0	0		-	-	0.000	
	7	0	0		-	_	0.000	
	8	Ő	õ		-	_	0.000	
	v	v	v				0.000	

Appendix Table B-2. Unocal Groundwater Study Mysid Shrimp Chronic Survival & Growth *WET-MW-7* Test Initiation: 29 May 2003

			Survival			Gro	wth	
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	4	80		42.64	44.02	0.276	
	2	5	100		43.56	45.42	0.372	
	3	5	100		44.01	45.54	0.306	
Control	4	5	100	95	42.59	44.17	0.316	0.336
Control	5	5	100	00	42.33	44.13	0.360	0.000
	6	5	100		42.30	44.32	0.404	
	7	5	100		42.67	44.66	0.398	
	8	4	80		42.45	43.72	0.254	
	1	5	100		42.24	43.38	0.228	
	2	5	100		43.36	45.39	0.406	
	3	5	100		42.41	44.10	0.338	
6.25	4	4	80	95	42.77	43.76	0.198	0.298
0.20	5	4	80	55	43.13	44.73	0.320	0.200
	6	5	100		41.65	42.65	0.200	
	7	5	100		40.41	41.94	0.306	
	8	5	100		42.34	44.26	0.384	
	1	5	100		41.18	42.75	0.314	
	2	5	100		43.16	44.70	0.308	
	3	5	100		42.55	44.01	0.292	
12.5	4	4	80	98	43.17	44.33	0.232	0.302
12.5	5	5	100	90	42.91	44.40	0.298	0.302
	6	5	100		43.91	45.58	0.334	
	7	5	100		43.04	44.54	0.300	
	8	5	100		42.62	44.30	0.336	
	1	3	60		42.94	43.43	0.098	
	2	4	80		43.22	44.70	0.296	
	3	5	100		42.85	44.30	0.290	
25	4	5	100	88	41.63	43.33	0.340	0.267
25	5	5	100	00	42.47	43.83	0.272	0.207
	6	5	100		43.46	45.18	0.344	
	7	5	100		42.76	44.37	0.322	
	8	3	60		42.07	42.93	0.172	
	1	4	80		41.48	42.60	0.224	
	2	3	60		42.67	43.46	0.158	
	3	4	80		43.31	44.70	0.278	
50	4	5	100	88	42.44	43.82	0.276	0.247
30	5	5	100	00	42.48	43.87	0.278	0.247
	6	5	100		41.40	43.06	0.332	
	7	5	100		42.75	43.83	0.216	
	8	4	80		43.66	44.72	0.212	
	1	4	80		43.69	44.41	0.144	
	2	5	100		42.97	43.63	0.132	
	3	3	60		43.19	43.42	0.046	
100	4	4	80	85	43.02	43.54	0.104	0.104
100	5	5	100	00	42.26	42.86	0.120	0.104
	6	5	100		43.20	43.77	0.114	
	7	4	80		43.11	43.50	0.078	
	8	4	80		42.19	42.66	0.094	

Appendix Table B-3. Unocal Groundwater Study Mysid Shrimp Chronic Survival & Growth *WET-MW-17* Test Initiation: 29 May 2003

			Survival			Gro	wth	
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	5	100		39.91	41.17	0.252	
	2	4	80		44.20	45.55	0.270	
	3	5	100		43.71	45.25	0.308	
Control	4	5	100	93	44.16	45.96	0.360	0.285
e e i i i e i	5	5	100	00	45.65	47.04	0.278	0.200
	6	4	80		43.85	45.26	0.282	
	7	5	100		42.06	43.40	0.268	
	8	4	80		41.01	42.30	0.258	
	1	5	100		42.33	43.59	0.252	
	2	4	80		43.98	44.79	0.162	
	3	4	80		38.78	39.86	0.216	
6.25	4	4	80	88	42.98	44.25	0.254	0.254
	5	5	100		41.91	43.48	0.314	
	6	5	100		45.12	46.52	0.280	
	7	4	80		43.49	44.72	0.246	
	8	4	80		43.09	44.62	0.306	
	1	3	60		42.70	43.86	0.232	
	2	4	80		44.69	45.88	0.238	
	3	5	100		41.39	42.82	0.286	
12.5	4	5	100	83	43.58	44.66	0.216	0.224
	5	4	80		42.90	43.96	0.212	-
	6	5	100		41.58	42.90	0.264	
	7	3	60		44.80	45.39	0.118	
	8	4	80		43.54	44.68	0.228	
	1	4	80		43.04	44.04	0.200	
	2	5	100		41.60	42.83	0.246	
	3	5	100		42.76	44.18	0.284	
25	4	5	100	98	42.14	43.62	0.296	0.248
	5	5	100		41.13	42.38	0.250	
	6	5	100		42.35	43.28	0.186	
	7	5	100		40.56	41.77	0.242	
	8	5	100		43.50	44.88	0.276	
	1	5	100		41.33	42.44	0.222	
	2	3	60 40		42.13	42.70	0.114 0.084	
	3	2			43.30	43.72		
50	4 5	5 5	100 100	80	43.25 44.18	44.00 45.36	0.150 0.236	0.156
	5 6	5 5	100		44.18 43.47	45.36 44.26	0.236	
	6 7	5	40		43.47 43.55	44.26 44.03	0.158	
	8	5	100		43.83	44.03	0.188	
	1	0	0		-	-	0.000	
	2	3	60		44.35	44.60	0.050	
	3	2	40		43.87	44.13	0.052	
	4	0	0	_	-	-	0.000	
100	5	0	0	23	_	-	0.000	0.025
	6	2	40		43.67	43.85	0.036	
	7	1	20		43.71	43.90	0.038	
	8	1	20		44.13	44.26	0.026	
	v				11.10	11.20	0.020	

Appendix Table B-4. Unocal Groundwater Study Mysid Shrimp Chronic Survival & Growth *WET-MW-103R* Test Initiation: 29 May 2003

			Survival			Gro	wth	
Concentration	Destructu		* • • • • •	Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	4	80		42.80	44.30	0.300	
	2	4	80		42.71	44.22	0.302	
	3	5	100		43.50	45.44	0.388	
Control	4	5	100	95	41.80	43.55	0.350	0.338
	5	5 5	100		43.22	45.06	0.368	(mg)
	6	5	100		42.70	44.25	0.310	
	7 8	5 5	100 100		42.03 43.63	43.93	0.380 0.304	
	0 1	5				45.15		
			100 100		44.35	46.24	0.378	
	2	5			43.10	45.26	0.432	
	3	5	100		43.48	44.99	0.302	
6.25	4	3	60	88	43.24	44.62	0.276	0.313
	5	4	80		42.64	43.82	0.236	
	6	4	80		43.95	45.34	0.278	
	7	5	100		42.12	43.69	0.314	
		8 4 80 43.45 44.90 0.290						
	1	5	100		41.92	43.65	0.346	
	2	5	100		42.51	43.97	0.292	
12.5	3	4	80		43.73	45.10	0.274	
	4	5	100	98	43.04	44.47	0.286	0.316
	5	5	100		45.18	46.78	0.320	
	6	5	100		43.56	45.51	0.390	
	7	5	100		43.14	44.85	0.342	
	8	5	100		42.95	44.33	0.276	
	1	5	100		43.14	44.62	0.296	
	2	4	80	95	42.95	44.22	0.254	
	3	5	100		42.74	44.46	0.344	
25	4	5	100		43.28	45.21	0.386	0.317
	5	5	100		43.72	45.38	0.332	
	6	5	100		43.61	45.29	0.336	
	7	5	100		42.79	44.39	0.320	
	8	4	80		43.19	44.54	0.270	
	1	4	80		43.17	44.40	0.246	
	2	5	100		43.40	45.16	0.352	
	3	5	100		43.24	44.59	0.270	
50	4	4	80	90	43.83	44.83	0.200	0.275
	5	5	100		43.64	45.31	0.334	
	6	4	80		43.41	44.84	0.286	
	7	5	100		43.21	44.87	0.332	
	8	4	80		43.31	44.20	0.178	
	1	5	100		42.85	43.63	0.156	
	2	4	80		43.66	44.83	0.234	
	3	5	100		43.48	44.65	0.234	
100	4	5	100	90	44.19	45.68	0.298	0.227
100	5	4	80		42.97	43.94	0.194	
	6	4	80		42.45	43.35	0.180	
	7	5	100		44.40	45.93	0.306	
	8	4	80		43.79	44.84	0.210	

Appendix Table B-5. Unocal Groundwater Study Mysid Shrimp Chronic Survival & Growth *WET-MW-129* Test Initiation: 29 May 2003

			Survival			Gro	wth	
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	4	80		43.82	45.15	0.266	
	2	5	100		43.44	45.14	0.340	
	3	4	80		43.76	45.01	0.250	
Control	4	5	100	93	42.17	44.10	0.386	0.322
	5	5	100		43.67	45.66	0.398	0.011
	6	5	100		42.71	44.48	0.354	-
	7	4	80		43.00	44.15	0.230	
	8	5	100		42.21	43.98	0.354	
	1	5	100		43.49	44.80	0.262	
	2	5	100		44.02	45.78	0.352	
	3	5	100		43.60	45.46	0.372	
6.25	6.25 4 4	80	95	43.15	44.78	0.326	0.302	
	5	4	80		43.53	44.48	0.190	
	6	5 5	100		42.54	44.06	0.304	
	7	5 5	100		43.69	45.38	0.338	
	8	5	100		43.44	44.81	0.274	
	1	4	80		44.46	45.98	0.304	
	2	5	100		41.19	42.95	0.352	
	3	5	100		43.56	44.60	0.208	
12.5	4	5	100	95	43.29	44.40	0.222	0.268
	5	5	100		43.20	44.62	0.284	
	6 7	4 5	80		43.53	44.43	0.180	
	8	5 5	100 100		43.25 42.97	44.24 44.95	0.198 0.396	
	o 1	2	40				0.396	
	2	2 5	40 100		43.50 43.18	43.59 44.36	0.018	
	2 3	4	80		43.18	44.30	0.230	
	4	4 5	100		43.02	43.90	0.192	
25	4 5	4	80	85	43.72	44.27	0.134	0.158
	6	5	100		43.30	44.60	0.260	
	7	5	100		43.34	44.15	0.162	
	8	4	80		43.88	44.64	0.152	
	1	2	40		43.74	44.22	0.096	
	2	3	60		43.01	43.56	0.110	
	3	2	40		42.79	43.37	0.116	
	4	2	40		44.50	44.57	0.014	
50	5	3	60	45	43.26	43.82	0.112	0.081
	6	3	60		43.73	44.50	0.154	
	7	2	40		42.89	42.91	0.004	
	8	-	20		43.90	44.11	0.042	
	1	0	0		-	-	-	
	2	0	0		-	-	-	
	3	0	0		-	-	-	
100	4	0	0	0	-	-	-	
	5	0	0	0	-	-	-	-
	6	0	0		-	-	-	
	7	0	0		-	-	-	
	8	0	0		-	-	-	

Appendix Table B-6. Unocal Groundwater Study Mysid Shrimp Chronic Survival & Growth *WET-MW-W* Test Initiation: 29 May 2003

			Survival		Growth				
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight	
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)	
	1	5	100		42.74	44.48	0.348		
	2	5	100		43.10	44.69	0.318		
	3	5	100		42.53	44.23	0.340		
Control	4	5	100	98	42.29	43.87	0.316	0.332	
	5	5	100		42.68	44.55	0.374		
	6	5	100		43.36	44.95	0.318		
	7	5	100		43.86	45.57	0.342		
	8	4	80		43.42	44.90	0.296		
	1	5	100		42.09	43.78	0.338		
	2	5	100		42.71	44.37	0.332		
	3	5	100		42.84	44.94	0.420		
6.25	4	5	100	93	43.97	45.87	0.380	0.330	
	5	5	100		43.24	45.02	0.356		
	6	4	80		43.36	44.81	0.290		
	7	4	80		42.44	43.72	0.256		
	8	4	80		43.37	44.69	0.264		
	1	5	100		42.63	44.20	0.314		
	2	5	100		43.43	45.42	0.398	0.335	
	3	5	100		42.68	44.30	0.324		
12.5	4	5	100	98	42.54	43.97	0.286		
	5	4	80		43.65	45.05	0.280		
	6	5	100		42.98	44.87	0.378		
	7	5	100		42.92	44.68	0.352		
	8	5	100		42.52	44.27	0.350		
	1	5	100		43.31	45.07	0.352	0.299	
	2	5	100		42.16	43.45	0.258		
	3	5	100	98	42.69	44.50	0.362		
25	4	5	100		43.01	44.33	0.264		
	5	4	80		43.04	44.11	0.214		
	6	5	100		44.48	45.98	0.300		
	7	5	100		44.03	45.69	0.332		
	8	5	100		44.22	45.78	0.312		
	1	5	100		43.79	44.76	0.194		
	2	5	100		43.68	44.93	0.250		
	3	5	100		42.43	43.32	0.178		
50	4	5	100	93	42.04	43.20	0.232	0.204	
	5	4	80		42.53	43.40	0.174		
	6	5	100		44.85	45.67	0.164		
	7	4	80		43.70	44.67	0.194		
	8	4	80		42.96	44.17	0.242		
	1	5	100		44.10	44.92	0.164		
	2	3	60		43.30	43.80	0.100	0.108	
	3	3	60		42.25	42.74	0.098		
100	4	3	60	68	44.01	44.58	0.114		
	5	3	60		42.78	43.19	0.082		
	6	3	60		43.95	44.41	0.092		
	7	5 2	100		42.13	42.91	0.156		
	8	2	40		43.60	43.87	0.054		

Appendix C

Pimephales promelas (Fathead minnow)

Test Results Summaries

Appendix Table C-1. Unocal Groundwater Study Fathead minnow Chronic Survival & Growth *WET-MW-146* Test Initiation: 29 May 2003

			Survival		Growth				
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight	
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)	
	1	10	100		43.08	49.52	0.644	0.601	
Control	2	9	90	93	42.85	47.95	0.510		
Control	3	8	80	93	42.66	48.59	0.593		
	4	10	100		43.28	49.86	0.658		
	1	10	100		42.56	47.54	0.498		
6.25	2	9	90	98	43.08	49.68	0.660	0.622	
0.25	3	10	100	90	42.73	49.87	0.714		
	4	10	100		40.58	46.74	0.616		
	1	10	100	95	42.99	48.20	0.521	0.591	
12.5	2	10	100		42.09	48.45	0.636		
12.5	3	9	90		42.60	49.04	0.644		
	4	9	90		42.62	48.25	0.563		
	1	8	80	85	41.65	46.43	0.478	0.533	
25	2	9	90		43.06	49.48	0.642		
25	3	9	90		43.04	48.07	0.503		
	4	8	80		42.08	47.17	0.509		
	1	7	70		42.61	47.66	0.505	0.525	
50	2	9	90	00	41.08	46.39	0.531		
50	3	8	80	83	41.17	46.60	0.543		
	4	9	90		41.12	46.34	0.522		
	1	4	40		41.47	43.05	0.158		
100	2	5	50	33	42.67	44.33	0.166	0 112	
100	3	2	20	33	42.82	43.39	0.057	0.112	
	4	2	20		41.23	41.88	0.065		

Appendix Table C-2. Unocal Groundwater Study Fathead minnow Chronic Survival & Growth *WET-MW-7* Test Initiation: 29 May 2003

			Survival		Growth				
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight	
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)	
	1	10	100		42.83	48.15	0.532	0.521	
Control	2	9	90	90	42.79	48.08	0.529		
Control	3	8	80	90	42.52	47.54	0.502	0.521	
	4	9	90		42.92	48.11	0.519		
	1	10	100		42.82	48.71	0.589		
6.25	2	10	100	98	44.42	49.39	0.497	0.572	
0.25	3	9	90	90	42.46	48.24	0.578		
	4	10	100		42.14	48.38	0.624		
	1	10	100	90	42.86	47.57	0.471	0.493	
12.5	2	9	90		42.52	47.81	0.529		
12.5	2 3	8	80		42.21	46.80	0.459		
	4	9	90		42.98	48.09	0.511		
	1	9	90	90	43.36	47.80	0.444	0.497	
25	2	9	90		42.98	47.84	0.486		
25	3	9	90		42.15	48.15	0.600		
	4	9	90		42.80	47.37	0.457		
	1	10	100		42.81	48.75	0.594	0.576	
50	2	9	90	95	42.48	49.00	0.652		
50	3	10	100	95	43.83	48.57	0.474		
	4	9	90		43.36	49.20	0.584		
	1	10	100		43.18	47.81	0.463		
100	2	10	100	98	42.98	49.26	0.628	0 565	
100	3	10	100	90	42.97	49.04	0.607	0.565	
	4	9	90		42.50	48.11	0.561		

Appendix Table C-3. Unocal Groundwater Study Fathead minnow Chronic Survival & Growth *WET-MW-17* Test Initiation: 29 May 2003

			Survival		Growth				
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight	
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)	
	1	10	100	95	43.43	50.02	0.659	0.563	
Control	2	10	100		43.61	49.80	0.619		
Control	3	8	80		42.89	47.45	0.456	0.000	
	4	10	100		42.70	47.87	0.517		
	1	9	90		41.97	46.13	0.416		
6.25	2 3	10	100	95	42.88	48.53	0.565	0.532	
0.25	3	10	100	90	44.31	49.94	0.563		
	4	9	90		42.32	48.16	0.584		
	1	9	90		44.02	49.43	0.541	0.489	
12.5	2 ^b	-	-	83	-	-	-		
12.5	3	8	80		42.82	47.98	0.516		
	4	8	80		42.37	46.48	0.411		
	1	9	90	88	44.58	48.56	0.398	0.448	
25	2	8	80		43.74	48.01	0.427		
23	3	8	80		43.09	47.46	0.437		
	4	10	100		43.20	48.48	0.528		
	1	9	90		44.04	49.89	0.585	0.472	
50	2	8	80	88	41.16	44.60	0.344		
50	3	9	90	00	43.66	48.74	0.508		
	4	9	90		43.84	48.34	0.450		
	1	10	100		42.32	46.68	0.436		
100	2 3	9	90	98	40.89	45.60	0.471	0.455	
100	3	10	100	30	43.85	48.74	0.489	0.400	
	4	10	100		42.08	46.32	0.424		

a- Weight per fish evaluated using the combined growth & survival endpoint. Divide weight per container by initial fish count. b-replicate 2 in 12.5% concentration removed from calculations. The cup was spilled on day 2 of the test and test organisms were lost.

Appendix Table C-4. Unocal Groundwater Study Fathead minnow Chronic Survival & Growth *WET-MW-103R* Test Initiation: 29 May 2003

		Survival Growth						
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	10	100		37.99	43.86	0.587	
Control	2	10	100	100	43.21	47.74	0.453	0.523
Control	3	10	100	100	42.67	47.62	0.495	0.525
	4	10	100		43.67	49.23	0.556	
	1	9	90		42.40	47.71	0.531	
6.25	2	10	100	90	43.83	49.77	0.594	0 506
0.25	3	8	80	90	45.65	50.05	0.440	0.506
	4	9	90		43.14	47.71	0.457	
	1	10	100	98	41.50	47.43	0.593	0.603
12.5	2	9	90		42.91	48.86	0.595	
12.5	3	10	100		43.80	50.10	0.630	
	4	10	100		42.24	48.17	0.593	
	1	9	90	95	43.64	48.54	0.490	0.555
25	2	10	100		42.27	48.42	0.615	
25	3	10	100		41.96	47.91	0.595	
	4	9	90		43.61	48.81	0.520	
	1	7	70		41.17	45.39	0.422	
50	2	10	100	88	43.48	49.05	0.557	0.476
50	3	8	80	00	42.36	46.88	0.452	
	4	10	100		43.17	47.89	0.472	
	1	7	70		43.48	47.72	0.424	0.450
100	2	9	90	85	44.02	48.60	0.458	
100	3	9	90	60	43.17	48.26	0.509	0.459
	4	9	90		43.22	47.67	0.445	

Appendix Table C-5. Unocal Groundwater Study Fathead minnow Chronic Survival & Growth *WET-MW-129* Test Initiation: 29 May 2003

		Survival Growth					wth	
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	10	100		44.59	50.81	0.622	0.582
Control	2	9	90	93	42.66	48.30	0.564	
Control	3	9	90	90	42.96	49.07	0.611	0.302
	4	9	90		42.16	47.46	0.530	
	1	9	90		42.23	48.13	0.590	
6.25	2	10	100	95	44.95	50.81	0.586	0.557
0.25	3	9	90	95	44.76	49.95	0.519	
	4	10	100		42.85	48.16	0.531	
	1	9	90	85	44.43	50.15	0.572	0.596
12.5	2	9	90		43.10	50.04	0.694	
12.5	2 3	9	90		42.33	47.90	0.557	
	4	7	70		43.07	48.67	0.560	
	1	8	80	90	43.80	48.86	0.506	0.515
25	2	9	90		43.48	48.48	0.500	
25	3	9	90		42.96	48.58	0.562	
	4	10	100		42.71	47.62	0.491	
	1	10	100		43.08	47.42	0.434	0.404
50	2	8	80	93	42.88	47.20	0.432	
50	3	10	100	93	43.15	47.06	0.391	
	4	9	90		44.96	48.55	0.359	
	1	5	50		42.68	43.26	0.058	
100	2	2	20	33	43.69	44.00	0.031	0.065
100	3	5	50	55	42.93	44.60	0.167	0.005
	4	1	10		44.48	44.53	0.005	

Appendix Table C-6. Unocal Groundwater Study Fathead minnow Chronic Survival & Growth *WET-MW-W* Test Initiation: 29 May 2003

			Survival			Gro	wth	
Concentration				Mean %	Tare Weight	Total Weight	Weight per	Mean Weight
%	Replicate	# Alive	% Survival	Survival	mg	mg	Fish ^a (mg)	(mg)
	1	9	90		41.64	47.03	0.539	
Control	2	10	100	98	43.59	49.19	0.560	0.577
Control	3	10	100	90	41.86	47.84	0.598	0.577
	4	10	100		42.30	48.39	0.609	
	1	10	100		42.02	47.22	0.520	
6.25	2	9	90	88	45.56	51.55	0.599	0.531
0.25	3	9	90	00	44.16	49.38	0.522	0.551
	4	7	70		44.14	48.95	0.481	
	1	10	100		44.02	49.44	0.542	
12.5	2	9	90	93	43.78	49.26	0.548	0.512
12.5	2 3	8	80	93	44.20	48.54	0.434	0.512
	4	10	100		43.75	49.00	0.525	
	1	10	100		44.23	49.71	0.548	
25	2	10	100	93	46.11	50.86	0.475	0.514
25	3	8	80	93	41.17	46.02	0.485	0.514
	4	9	90		42.50	47.97	0.547	
	1	9	90		44.08	48.47	0.439	
50	2	10	100	93	46.16	50.50	0.434	0.466
50	3	9	90	93	41.21	46.47	0.526	0.400
	4	9	90		43.64	48.30	0.466	
	1	6	60		43.48	46.28	0.280	
100	2	8	80	70	44.53	48.10	0.357	0.302
100	3	6	60	70	46.40	49.14	0.274	0.302
	4	8	80		43.77	46.75	0.298	

a- Weight per fish evaluated using the combined growth & survival endpoint. Divide weight per container by initial fish count.

Appendix D

Ceriodaphnia dubia

Test Results Summaries

Appendix Table D-1. Unocal Groundwater Study Ceriodaphnia dubia Chronic Survival & Reproduction WET-MW-146 Test Initiation: 29 May 2003

		Sur	vival	Reproc	duction			Sur	vival	Reproc	luction
Concentration %	Replicate	#Alive	Mean % Survival	Neonates per adult	Mean neonates per adult	Concentration %	Replicate	#Alive	Mean % Survival	Neonates per adult	Mean neonates per adult
Control	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1	100	17 29 20 21 16 20 17 22 25 16	20	25	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1	100	16 19 21 25 19 13 20 17 24 29	20
6.25	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1	100	24 20 24 19 23 14 22 19 21	21	50	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1	100	9 14 12 18 13 14 19 14 20 16	15
12.5	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1 1	100	20 26 24 22 17 20 22 19 23 20	21	100	1 2 3 4 5 6 7 8 9 10	1 1 1 1 0 1 1 1	90	3 1 2 1 0 0 2 0 2	1

Note: Reproduction endpoint evaluated after 6 days of exposure because 60% of surviving control organisms had produced 3 broods of neonates. NOEC and EC50 values calculated using neonate production through both 6 and 7 days of exposure provide the same results. Survival was evaluated after 7 days of exposure.

Appendix Table D-2. Unocal Groundwater Study Ceriodaphnia dubia Chronic Survival & Reproduction WET-MW-7 Test Initiation: 29 May 2003

		Sur	vival	Reproc	luction			Survival		Reproc	luction
Concentration %	Replicate	#Alive	Mean % Survival	Neonates per adult	Mean neonates per adult	Concentration %	Replicate	#Alive	Mean % Survival	Neonates per adult	Mean neonates per adult
Control	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 0 1 1	90	20 22 17 20 22 19 6 26 17 14	18	25	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1	100	22 19 20 23 22 16 16 4 24	19
6.25	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1	100	20 24 22 29 22 21 23 26 22 14	22	50	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1	100	16 20 23 14 16 17 22 16 17 17	18
12.5	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1	100	27 16 25 24 22 20 11 17 27 18	21	100	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1 1	100	18 13 9 12 15 16 12 12 7 18	13

Note: Reproduction endpoint evaluated after 6 days of exposure because 60% of surviving control organisms had produced 3 broods of neonates. NOEC and EC50 values calculated using neonate production through both 6 and 7 days of exposure provide the same results. Survival was evaluated after 7 days of exposure.

Appendix Table D-3. Unocal Groundwater Study Ceriodaphnia dubia Chronic Survival & Reproduction WET-MW-17 Test Initiation: 29 May 2003

		Sur	vival	Reproc	duction			Survival		Reproc	luction
Concentration %	Replicate	#Alive	Mean % Survival	Neonates per adult	Mean neonates per adult	Concentration %	Replicate	#Alive	Mean % Survival	Neonates per adult	Mean neonates per adult
Control	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1	100	21 17 25 23 16 15 17 19 23	19	25	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1 1	100	15 15 21 19 8 13 17 11 17 19	16
6.25	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1	100	24 14 18 21 21 22 20 19 25	20	50	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1	100	2 20 20 16 23 9 16 17 21 20	16
12.5	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1 1	100	18 13 20 20 12 21 24 18 1 17	16	100	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1 1	100	13 16 20 12 16 17 15 18 6 12	15

Note: Reproduction endpoint evaluated after 6 days of exposure because 60% of surviving control organisms had produced 3 broods of neonates. Survival was evaluated after 7 days of exposure.

Appendix Table D-4. Unocal Groundwater Study Ceriodaphnia dubia Chronic Survival & Reproduction WET-MW-103R Test Initiation: 29 May 2003

		Sur	vival	Reproc	luction			Survival		Reproc	luction
Concentration %	Replicate	#Alive	Mean % Survival	Neonates per adult	Mean neonates per adult	Concentration %	Replicate	#Alive	Mean % Survival	Neonates per adult	Mean neonates per adult
Control	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1	100	19 20 19 18 21 26 17 17 23 16	20	25	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1	100	16 18 14 16 9 12 20 16 9 25	16
6.25	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1 1	100	24 22 24 19 15 22 16 23 21 21	21	50	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1	100	10 13 14 17 16 6 12 10 4	12
12.5	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1 1	100	16 15 16 20 21 19 20 22 18 21	19	100	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1 1	100	13 6 5 6 12 13 26 22 12 19	13

Note: Reproduction endpoint evaluated after 6 days of exposure because 60% of surviving control organisms had produced 3 broods of neonates. NOEC and EC50 values calculated using neonate production through both 6 and 7 days of exposure provide the same results. Survival was evaluated after 7 days of exposure.

Appendix Table D-5. Unocal Groundwater Study Ceriodaphnia dubia Chronic Survival & Reproduction WET-MW-129 Test Initiation: 29 May 2003

		Sur	vival	Reproc	luction			Survival		Reproc	luction
Concentration %	Replicate	#Alive	Mean % Survival	Neonates per adult	Mean neonates per adult	Concentration %	Replicate	#Alive	Mean % Survival	Neonates per adult	Mean neonates per adult
Control	1 2 3 4 5 6 7 8 9 10	1 1 1 1 0 1 1 1	90	10 21 18 19 19 - 21 19 18 22	19	25	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1	100	26 21 19 24 20 21 25 26 18 20	22
6.25	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1	100	17 24 20 26 22 17 19 24 22 25	22	50	1 2 3 4 5 6 7 8 9 10	1 0 1 1 1 1 1	90	14 - 17 10 31 19 12 18 16 13	17
12.5	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1	100	25 21 15 10 21 24 24 20 14	19	100	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1	100	8 9 5 9 10 8 10 8 11	9

Note: Reproduction endpoint evaluated after 6 days of exposure because 60% of surviving control organisms had produced 3 broods of neonates. NOEC and EC50 values calculated using neonate production through both 6 and 7 days of exposure provide the same results. Survival was evaluated after 7 days of exposure.

Appendix Table D-6. Unocal Groundwater Study Ceriodaphnia dubia Chronic Survival & Reproduction WET-MW-W Test Initiation: 29 May 2003

		Survival F		Reproc	duction			Sur	vival	Reproc	luction
Concentration %	Replicate	#Alive	Mean % Survival	Neonates per adult	Mean neonates per adult	Concentration %	Replicate	#Alive	Mean % Survival	Neonates per adult	Mean neonates per adult
Control	1 2 3 4 5 6 7 8 9 10	0 1 1 1 1 1 1 1	90	6 29 25 37 21 22 28 25 28	25	25	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1	100	36 31 33 31 36 29 27 18 38 34	31
6.25	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1	100	48 40 45 37 38 38 42 36 39 33	40	50	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1	100	28 27 28 29 31 32 29 21 35	29
12.5	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1 1	100	40 42 38 34 30 37 37 34 41 40	37	100	1 2 3 4 5 6 7 8 9 10	1 1 1 1 1 1 1 1	100	17 23 12 20 18 14 15 19 21 18	18

Appendix E

Sample Receipt Information

	Sample ID										
	MW-146	MW-7	MW-17	MW-103 R	MW-129	MW-W					
AMEC ID	03-0186	03-0187	03-0188	03-0189	03-0190	03-0191					
Sample Date	5/28/2003	5/28/2003	5/28/2003	5/28/2003	5/28/2003	5/28/2003					
Sample Time	09:35	09:36	13:25	17:00	15:20	19:40					
Receipt Date	5/29/2003	5/29/2003	5/29/2003	5/29/2003	5/29/2003	5/29/2003					
Receipt Time	08:20	08:20	08:20	08:20	08:20	08:20					
Receipt Temp. (°C)	1.0	2.5	3.8	4.3	1.2	4.8					
Dissoloved Oxygen (mg/L)	1.5	4.0	3.7	2.4	1.8	3.0					
рН	6.43	6.48	6.68	6.67	6.72	6.75					
Conductivity (µS/cm)	388	255	225	699	717	826					
Salinity (ppt)	0.1	0.1	0.1	0.4	0.4	0.6					
Hardness (mg/L CaCO ₃)	>400	>400	116	>400	>400	>400					
Alkalinity (mg/L CaCO ₃)	264	184	88	392	>400	>400					
Chlorine (mg/L)	<0.03	0.06	0.12	0.05	<0.03	<0.03					
Ammonia (mg/L)	3.5	1.6	0.9	5.7	2.6	4.4					

Appendix Table E. Unocal Groundwater Study Sample Receipt Information

Appendix F

Water Quality Data

Atherinops affinis

Client:	
Sample ID:	
Test No:	

<u>Unocal</u> +1 <u>MW-146</u> 0305-27NW

Initial and Final Chemistries

Seven Day Chronic Saltwater Bioassay Start Date & Time: 5/29/03 1945 Stop Date & Time: 5/5/03 1960

Test species: Athennopy affinis

121	T									•				
"To Concentration		0					E	ays						
Concentration		0		1	N. PUTT Assessed Assessed in	2		3		4		5	1	6
pH		Final	inita	to bulley astronomic	a init.	final		final	init.	final	Sold R	de la comat		final
	83	8.03	8.37	8,04	8.33	3 8.09	8,35	8.05	8.45	793		8.06	8.38	
DO (mg/l)	6.9	6.1	6,8	6,1	7.0	S.	6.8	10.5	170	5,8	6.8	6.0	6.8	20
Salinity (ppt)	29.0	29.0	29.6	29.7	29.7	30.8	29.4	28 10	29.7	29,4	292	29.7	29.0	236
Temperature (°C)	20.8	20,	20.0	20.4	205	20.0	70,0	2011	70.0	tig &	207	120 3	2000	Ma
	L					-	D	ays	12-1	11.1.6	120.1	1	1010	11.9
Concentration		0		1		2		3		4	1	5	T	6
0.25		final		final	init.	Solution	Shine	-	init.	final	k init.	final		final
pH	8.19	8.00	8,14	7.95	8.11	7.96	8.10	7.99	8.32	9.03	8.32	18.02	8.96	8.09
DO (mg/l)	7.0	6.2	6.8	6.2	6,8	59	66	1, 3	6.9	6.0	6.8		1 10	
Salinity (ppt)	29.0	29.3	29.6	27.9	29.5	310	24.5	24	29,2	745	29.3	6.2	6.6	64
Temperature (°C)	197	19.8	20.0	20.0	700	70 2		1	70.0	19.9		<u>297</u>	29.7	28.8
					12	20.0	1.1.1.1	ays	20,0	17-1	19.7	166	20.0	30.1
Concentration		0		1	<u> </u>	2		ays 3			r			
12.5	init	final	init	- final:	init			final		4		5		6
pH	8.09	7.97	7.88	-791	7.84	7.90			inif.	final	inif.	final	init.	final
DO (mg/l)	6.8	6.0	6.8	5.9	- XX -	59	7.86	7.94	8.18	7.94	8,14	7.99	8.12	807
Salinity (ppt)	290		29.6	30.2	39.5	$1 \sim 1$	6.	lera	6.8	58	6.7	5,7	6,6	6.2
Temperature (°C)	198	20.1	20.0	19 4		31.0	29.5	27.5	293	29.3	29.4	29.2	29.2	29.0
<u></u>	1.1.2	21	10.0	161	19.7	20,1	M. 5	20.1	20.1	19.8	19.7	1197	70.0	200
													10	
Concentration		1 1		1				ays				<u> </u>	12	
Concentration	(-		1		2		3	4			5		6
25	init.	a an	mic	STREET, NEW DESIGNATION	ini,	final	init	3 final	init.	l final		5 final		6 final
25 ph		final. 7.92	7,37	788	init. 7.35		init. 7.38	3 final 7.92	-	final 7,91		-		final
25 pH DO (mg/l)	init 7,87 6,7	a an	init. 7,37 6,5	788 5.8	mit. 7.35 6.8	final 7,85 5,7	init 7.38 6,7	3 final	init.		init. 7,74 6,6	final		final <u>8.07</u>
25 pH DO (mg/l) Salinity (ppt)	init. 7.87 6.7 29.0	final. 7.92	7,37	788	init. 7.35	final 7,85	init. 7.38	3 「final 〒.92 (ロンス	1001. 785 4.6	final 7,91	init. 7,74 6,6	final 7,92 6,0		final 8.07 6.3
25 pH DO (mg/l)	init 7,87 6,7	final. 7.92	7,37	788 5.8	mit. 7.35 6.8	final 7,85 5,7	init 7.38 6,7	3 「final 〒.92 (ロンス	init. 785	final 7,91 5,9	init. 7,74	final 7,92	init 7.78 6.6 29.3	final 8.07 6.3 29.4
25 pH DO (mg/l) Salinity (ppt) Temperature (°C)	init. 7.87 6.7 29.0 19.7	Tinal 7.92 5.8 29.5 19,6	7,37	7,88 5.8 29.9	mit. 7.35 6.8	final 7,85 5,7	7.38 6.7 29.5 19.4	3 final F.92 (e.2 27人	init. 785 6.6 29.2	final 7,91 5,9 29,4	init. 7.74 6,6 29,3	final 7,92 6,0	init. 7.78 6.6	final 8.07 6.3
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration	init 7.97 6.7 29.0 19.7	192 7.92 5.8 29.5 19,6	7,37 6,5 29,5 19,9	788 5.8 29.9 70.1	1011 7.35 6.8 29.5 19.5	final 7,85 5,7 30,8 19,9	init 7.38 6.7 29,5 19,4 Da	3 Final 7.92 (e.2 27.6 Z7.6 Z0.0 ays 3	init. 785 6.6 29.2	final 7.9 5.9 29.4 19.9	init. 7.74 6,6 29,3 19.0	final 7.92 6.0 29.6 10,3	init 7.78 6.6 29.3 20.3	final 8.07 6.3 29.4 20.1
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50	init. 7.87 6.7 29.0 19.7	Tinal 7.92 5.8 29.5 19,6	7,37 6,5 29,5 19,9	7,88 5,8 29,9 20.1	1011 7.35 6.8 29.5 19.5	final 7,85 5,7 30,8 19,9	init 7.38 6.7 29,5 19,4 Da	3 Final 7.92 (e.2 27.6 Z7.6 Z0.0 ays 3	init. 785 4.6 29.2 70.1	Final 7.91 5.9 29.4 19.9	init. 7.74 6.6 29.3 19.0	final 792 60 29.6 14,3	init 7.78 6.6 29.3 20.3	final 8.07 6.3 29.4 20.1
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH	init 7.97 6.7 29.0 19.7	192 7.92 5.8 29.5 19,6	7,37 6,5 29,5 19,9	788 5.8 29.9 70.1	1011 7.35 6.8 29.5 19.5	final 7,85 5,7 30,8 19,9 2 final	init 7.38 6.7 29,5 19,4 Da	3 final 7.92 (a.2 27.5 Zo.0 ays 3 final	init. 785 4.6 29.2 20.1 4	final 7.91 5.9 3.9,4 9.9 19.9 final	init 7.74 6.6 29.3 19.0	final 7.93 6.0 29.6 10,3 5 5	init 7.78 6.6 29.3 20.0 init	final 8.07 6.3 29.4 20.1 5 final
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration GO pH DO (mg/l)	init. 7.97 6.7 29.0 19.7	100al 7.92- 5.8 29.5 19,6 19,6 19,6 19,6 19,6 19,6 19,6 19,6	7,37 6,5 2,9,5 14,9 19,9	7.88 5.8 29.9 20.1 final	init, 7,35 5,8 29,5 14,5 14,5 101 7,07	final 7,85 5,7 30,8 19,9 2 final 7,87	init 7.38 6.7 29,5 19.4 D: init	3 final F.92 (a.2 27.6 Z0.0 ays 3 final F.95	init. 785 66 27.2 70.1 4 Init. 7.28	final 7,91 5,9 29,4 19,9 final 7,88	init. 7.74 6.6 29.3 19.0 init. 7.3]	final 792 60 29.6 10,3 5 5 final 7.89	init 7.78 6.6 29.3 20.0 init 7.23	final 8.07 6.3 29.4 20.1 final 8.07
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH	inii 7.87 6.7 29.0 19.7 19.7 19.7 19.7 19.7 19.7 19.7 19.7	final 7.92- 5.8 29.5 19,6 19,6 19,6 19,6 19,6 19,6 19,6 19,6	7,37 6,5 2,9,5 14,1 19,1 1 1010 7,04 6,6	7.88 5.8 29.9 70.1 final 7.88 5.8	init, 7,35 6,8 29,5 14,5 14,5 14,5 10,7 7,07 6,7	final 7.85 5.7 30.8 17.9 2 final 7.87 5.8	init 7.38 6.7 2.95 19.4 D: D: 19.4 D: 19.4 D: 19.4 D: 19.4 D: 19.4 D: 19.4 D: 19.4 D: 19.4 D: 19.4 D: 19.4 D: 19.4 D: 19.4 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 19.4 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 19.7 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 19.4 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 19.4 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 19.4 D: 19.5 D: 10.5 D: 19.5 D: 19.5 D: 10 10 10 10 10 10 10 10 10 10 10 10 10	3 final F. 92 (a.2 27.4 Zo.0 ays 3 final 7.95 (a.4	1111 7-85 4.6 29.2 20.1 4 1015 7.28 6.3	$\begin{array}{c} \text{final} \\ 7,91 \\ 5,9 \\ \hline 3,9 \\ \hline 9,9 \hline$	init. 7.74 6.6 29.3 9.0 init. 7.3 6.5	final 792 60 29.6 10, 3 5 5 final 7.89 6,0	init 7.78 6.6 29.3 20.0 10 7.23 6.2	final 8.07 6.3 294 201 5 final 8.07 6.3
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt)	init. 7.97 6.7 19.0 19.7 19.7 10 10 10 10 10 10 10 10 10 10 10 10 10	final 7.92 5.8 29.5 19.6 Einal 7.89 5.9 29.3	7,37 6,5 2,9,5 14,9 19,9	7.88 5.8 29.9 70.1 70.1 7.88 5.8 30.0	Init. 7.35 6.8 29.5 19.5 19.5 19.5 19.5 19.5 19.5 19.3	final 7.85 5.7 30,8 19,9 19,9 2 final 7.87 5.8 30,7	init 7.38 6.7 29.5 19.4 D: 19.4 D: 7.04 6.7 29.6	3 final 7.92 (4.2 27.4 Z 0.0 ays 3 final 7.95 (4.4 27.3	init. 785 4.6 27.2 20.1 f.28 6.3 28.6	final 7.91 5.9 4.9 19.9 19.9 final 7.88 5.8 2.9 2.9	Init 7.74 6.6 29.3 [9.0 init 7.3] 6.5 29.2	final 792 29.6 10 7 5 final 7.89 6.0 39.9	init 7.78 6.6 29.3 28.3 7.23 init 7.23 6.2 2.3	final 8.07 6.3 29.4 20.1 final 8.07 6.3 29.2
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration GO pH DO (mg/l)	inii 7.87 6.7 29.0 19.7 19.7 19.7 19.7 19.7 19.7 19.7 19.7	final 7.92- 5.8 29.5 19,6 19,6 19,6 19,6 19,6 19,6 19,6 19,6	7,37 6,5 2,9,5 14,1 19,1 1 1010 7,04 6,6	7.88 5.8 29.9 70.1 final 7.88 5.8	init, 7,35 6,8 29,5 14,5 14,5 14,5 10,7 7,07 6,7	final 7.85 5.7 30.8 17.9 2 final 7.87 5.8	init 7.38 6.7 29,5 19.4 D: 19.4 D: 19.4 D: 19.4 C.7 29.6 (1.0	3 final 7.92 (a.2) 27.6 $Z^{0}.0$ ays 3 final 7.95 (a.4) 7.95 (a.4) 7.95 (a.4) 7.95 (a.4) 27.3 $2^{0}.0$	init. 785 4.6 27.2 20.1 f.28 6.3 28.6	$\begin{array}{c} \text{final} \\ 7,91 \\ 5,9 \\ \hline 3,9 \\ \hline 9,9 \hline$	init. 7.74 6.6 29.3 9.0 init. 7.3 6.5	final 792 60 29.6 10, 3 5 5 final 7.89 6,0	init 7.78 6.6 29.3 28.3 7.23 init 7.23 6.2 2.3	final 8.07 6.3 294 201 5 final 8.07 6.3
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt) Temperature (°C)	$ \begin{array}{c} \text{init.} \\ 7.97 \\ 6.7 \\ 29.0 \\ 19.7 \\ 19.7 \\ 19.7 \\ 0 \\ 19.7 \\ 0 \\ 19.7 \\ 19.4$	final 7.92 5.8 29.5 19,6 19,6 Einal 7.89 5.9 29.3 19.5	7,37 6,5 (2,9,5 14, 1 14, 1 1 10 10 10 10 10 10 10 10 10 10 10 10	7,88 5,8 29,9 70.1 70.1 5,8 5,8 30,0 20.0	mit 7.35 <u>C.8</u> <u>29.5</u> <u>14.5</u> <u>14.5</u> <u>14.5</u> <u>2</u> <u>14.5</u> <u>2</u> <u>14.3</u> <u>14.3</u>	$\begin{array}{c} \text{final} \\ 7.85 \\ 5.7 \\ 30.8 \\ 19.9 \\ 19.9 \\ \hline 30.8 \\ 19.9 \\ \hline 30.7 \\ 19.9 \\ \hline 30.7 \\ 19.9 \\ \hline 19.9 \\ \hline \end{array}$	init 7.38 6.7 29.5 19.4 Da init 7.04 6.7 29.6 (1.0 Da	3 final 7.92 (e.2 27.6 Z7.6 Z0.0 ays 3 final 7.95 (e.4 27.3 20,0 ys	1000000000000000000000000000000000000	final 7,91 5,9 3,9,4 19,9 19,9 final 7,88 5,8 2,9,2 19,8	Init 7.74 6.6 29,3 [9.0 Init. 7.3] 6.5 37.2 9.2	final 7,92 6,0 2,9,6 12 7,6 12 7,9 5 6,0 3,9,9 14,5	init 7.78 6.6 2.9.3 2.0 init 7.23 6.2 2.9.5 2.9.5 2.0.0	final 8.07 6.3 294 201 final 8.07 6.3 29.2 20.1
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt)	$ \begin{array}{c} \text{init.} \\ 7.97 \\ 6.7 \\ 19.0 \\ 19.1 \\ 19.1 \\ 0 \\ 19.1 \\ 0 \\ 19.1 \\ 0 \\ 19.1 \\ 0 \\ 10.4 \\ 10.4 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0$	final 7.92 5.8 29.5 19.6 19.6 19.7 29.3 19.3 19.5	7,37 6,5 (2,9,5 (4, 1) 14, 1 14, 14, 14, 14, 14, 14, 14, 14, 14, 14,	7,88 5,8 29,9 70.1 70.1 7,88 5,8 30,0 20.0	mit. 7.35 6.8 29.5 14.5 14.5 14.5 14.5 14.5 14.5 29.3 17.3 17.3	$\begin{array}{c} \text{final} \\ 7.85 \\ 5.7 \\ 30.8 \\ 19.9 \\ 19.9 \\ \hline 30.8 \\ 19.9 \\ \hline 30.7 \\ 19.9 \\ \hline 30.7 \\ 19.9 \\ \hline 19.9 \\ \hline \end{array}$	init 7.38 6,7 29,5 19,4 Da init 7.04 6,7 29,6 (1.0 Da	$ \frac{3}{1.92} $ $ \frac{1.92}{2.92} $ $ \frac{27.4}{20.0} $ $ \frac{27.4}{20.0} $ $ \frac{7.95}{20.0} $ $ \frac{4}{27.3} $ $ \frac{27.3}{20.0} $ $ \frac{27.3}{20.0} $ $ \frac{27.3}{20.0} $ $ \frac{27.3}{20.0} $	1000000000000000000000000000000000000	final 7,91 5,9 3,9,4 19,9 19,9 5,8 5,8 2,9,2 19,8	Init 7.74 6.6 29.3 [9.0 Init. 7.3] 6.5 37.2 9.2	$\begin{array}{c} \text{final} \\ 7,92 \\ 6,0 \\ 29,6 \\ 124 \\ 7,9 \\ 6,0 \\ 39,9 \\ 16, 5 \\ 16, 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 $	init 7.78 6.6 2.9.3 2.0.0 init 7.23 6.2 2.9.5 2.0.0	$\begin{array}{c} \text{final} \\ 8.07 \\ 0.3 \\ 29.4 \\ 20.1 \\ \hline \\ 29.4 \\ \hline \\ 29.4 \\ \hline \\ 29.2 \\ \hline \\ \hline \\ 6.3 \\ \hline \\ 79.2 \\ \hline \\ 29.2 \\ \hline \\ 20.1 \\ \hline \end{array}$
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration	$ \begin{array}{c} \text{init.} \\ 7.97 \\ 6.7 \\ 29.0 \\ 19.7 \\ 19.7 \\ 19.7 \\ 0 \\ 19.7 \\ 0 \\ 19.7 \\ 19.4$	$\begin{array}{c} \textbf{final} \\ \hline 7.92 \\ \hline 5.8 \\ \hline 29.5 \\ \hline 4.6 \\ \hline 7.89 \\ \hline 7.89 \\ \hline 7.89 \\ \hline 29.3 \\ \hline 29.3 \\ \hline 19.5 \\ \hline 19.5 \\ \hline \end{array}$	7,37 6,5 (2,9,5 (4, 1) 14, 1 14, 14, 14, 14, 14, 14, 14, 14, 14, 14,	7.88 5.8 29.9 70.1 final 7.88 5.8 30.0 20.0 final final	1011 7.35 6.8 29.5 14.5 14.5 1011 7.07 6.7 29.3 17.3 17.3	final 7,35 5,7 30,8 19,3 19,3 19,3 final 7,87 5,8 30,7 19,9 2 final	init 7.38 6,7 29,5 19,4 0 init 7.09 6,7 29,6 12,0 Da	$\frac{3}{\text{final}}$ $\frac{7.72}{(a.2)}$ $\frac{27.4}{27.4}$ $\frac{27.4}{20.0}$ $\frac{7.95}{(a.4)}$ $\frac{7.95}{(a.4)}$ $\frac{4.95}{(a.5)}$ $\frac{4.9}{27.3}$ $\frac{7.3}{(0.0)}$ $\frac{7.3}{(0.0)}$ $\frac{7.3}{(0.0)}$ $\frac{7.3}{(0.0)}$ $\frac{7.3}{(0.0)}$	$ \begin{array}{c} \text{init.} \\ 785 \\ $	final 7,91 5,9 39,4 19,9 final 788 5,8 29,2 19,8 final final	init 7.74 6.6 29.3 [9.0 init 7.3] 6.5 3.2 9.2 9.2	final 7.92 2.9.6 124.7 5 final 7.89 6.0 2.9.9 14.5 5 final	imit 7.78 6.6 2.9.3 20.0 imit 7.23 6.2 2.9.5 2.0.0 imit	final 8.07 29.4 20.1 final 8.07 6.3 29.2 29.2 30.1 final
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 100 pH	$ \begin{array}{c} \text{init.} \\ 7.87 \\ 6.7 \\ 29.0 \\ 19.7 \\ 19.7 \\ 19.7 \\ 0 \\ 101. \\ 7.49 \\ 5.3 \\ 19.4 \\ 101.4 \\ 0 \\ 0 \\ 101.4 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0$	final 7.92 5.8 29.5 19.6 19.5 19.5 19.5 19.5 19.5 19.5 19.5 19.5 19.5 19.5 19.5 19.5 19.5 final 7.96	7,37 6,5 2,9,5 19,1 10,1 10,1 10,1 10,1 10,1 10,1 10,1	7.88 5.8 29.9 70.1 final 7.88 5.8 30.0 20.0 final final	init 7.35 6.8 29.5 19.5 19.5 19.5 19.5 19.5 29.3 19.3 19.3 19.3 19.3 20.7 29.3 19.3 19.3 20.7 29.3 19.3 20.7 29.3 19.5 20.7 20.7 20.7 20.7 20.7 20.7 20.7 20.7	$\begin{array}{c} \text{final} \\ 7.85 \\ 5.7 \\ 30.8 \\ 19.9 \\ \hline 30.8 \\ 19.9 \\ \hline 30.7 \\ \hline 5.8 \\ 30.7 \\ 19.9 \\ \hline 30.7 \\ 19.9 \\ \hline \end{array}$	init 7.38 6.7 2.95 19.4 Da 19.4 Da 19.4 0.7 2.9.6 11.0 Da 3 0.1 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7	3 final 7.92 (a.2) 27.4e 27.4e 70.0 ays 3 final 7.95 (a.2) 70.0 27.0 27.0 27.0 27.0 27.0 27.0 27.0 3 final 7.95 (a.2) (a.2) 7.95 (a.2) (a.2) 7.95 (a.2) (a.2) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) (a.3) 7.95 (a.3)	$\begin{array}{c} \text{init.} \\ 7.85 \\ 4.6 \\ 2.7.2 \\ 70.1 \\ \hline 7.28 \\ 6.3 \\ 6.4 \\ \hline 7.28 \\ \hline $	final 7,91 5,9 29,4 19,9 19,9 19,9 5,8 29,2 14,8 19,8 19,8 19,8 19,8 19,8 19,8 19,8 19	Init 7.74 6.6 29.3 [9.0 Init 7.3] 6.5 37.2 9.2 9.2	final 7.92 29.6 29.6 10,7 5 final 7.89 6.0 3.9.9 4,5 5 final 7.88	imit 7.78 6.6 2.9.3 20.0 imit 7.23 6.2 2.9.5 2.0.0 imit	$\begin{array}{c} \text{final} \\ 8.07 \\ 0.3 \\ 29.4 \\ 20.1 \\ \hline \\ 29.4 \\ \hline \\ 29.4 \\ \hline \\ 29.2 \\ \hline \\ \hline \\ 6.3 \\ \hline \\ 79.2 \\ \hline \\ 29.2 \\ \hline \\ 20.1 \\ \hline \end{array}$
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 100 pH DO (mg/l)	$ \begin{array}{c} \text{init} \\ 7.87 \\ 6.7 \\ 29.0 \\ 19.7 \\ 19.7 \\ 19.7 \\ 0 \\ 101.4 \\ 7.49 \\ 6.5 \\ 19.4 \\ 0 \\ 101.4 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0$	$\begin{array}{c} \text{final} \\ 7.92 \\ 5.8 \\ 29.5 \\ 19.6 \\$	7.37 6.5 7.9.5 19.9 11.9 11.9 11.9 11.9 11.9 11.9	7.88 5.8 29.9 72.1 final 7.88 5.8 30.0 22.0 final 7.94 6.3	$\begin{array}{c} \text{Init.} \\ 7.35 \\ \hline c.8 \\ \hline 29.5 \\ \hline 19.5 \\ \hline 19.5 \\ \hline 101. \\ \hline 707 \\ \hline 6.7 \\ \hline 29.3 \\ \hline 19.3 \\ \hline 19.3 \\ \hline 19.3 \\ \hline 200 \\ \hline 101. \\ \hline 0.8 \\ \hline 0.7 \\ \hline 0.$	tinal 7,85 5,7 30,8 19,3 19,3 19,3 19,3 2 19,3 30,7 19,7 2 19,7 2 19,7 2 19,7 5,8 30,7 19,7 5,8 30,7 19,7 5,1 19,7 5,7 5,7 5,7 5,7 5,7 5,7 5,7 5,7 5,7 5	init 7.38 6.7 2.9.5 19.4 Da 19.4 Da 19.4 0.2 19.4 0.2 19.4 0.2 19.4 0.2 19.4 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	3 final 7.92 (a.2) 27.4e 27.4e 70.0 ays 3 final 7.95 (a.4) 7.95 (a.4) 7.95 (a.2) 70.0 3 final 7.97 (a.2) 70.0 70.0 70.0 7.95 (a.2) 70.0 70.0 7.95 (a.2) 70.0 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.97 (a.3) 7.97 (a.3) 7.97 (a.3) 7.97 (a.3) 7.97 (a.3)	$\begin{array}{c} \text{init.} \\ 7.85 \\ 4.6 \\ 2.7.2 \\ 70.1 \\ \hline 7.28 \\ 6.3 \\ \hline 6.3 \\ \hline 7.28 \\ 6.3 \\ \hline 7.28 \\ 6.3 \\ \hline 4 \\ \hline 19.5 \\ 6.3 \\ \hline 7.5 $	$\begin{array}{c} \text{final} \\ \textbf{7,91} \\ \textbf{5,9} \\ \textbf{3,94} \\ \textbf{19,9} \\ \textbf{19,9} \\ \textbf{19,9} \\ \textbf{19,9} \\ \textbf{19,9} \\ \textbf{19,9} \\ \textbf{5,8} \\ 5,$	init 7.74 6.6 29.3 19.0 init 7.31 6.5 29.2 9.2 init 6.5	final 7.92 6.0 29.6 14, 7 5 final 7.89 6.0 3.9.9 14, 5 5 final 7.88 5.8	$ \begin{array}{c} \text{init} \\ 7,78 \\ 6,6 \\ 29,3 \\ 7,23 \\ 7,23 \\ 7,23 \\ 6,2 \\ 1010 \\ 7,23 \\ 6,2 \\ 1010 \\ 6,87 \\ 6,6 \\ \end{array} $	final 8.07($0.329.420.1final8.07(6.329.220.1final8.01(9.1$
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 100 pH DO (mg/l) Salinity (ppt)	$ \begin{array}{c} \text{init} \\ 7.87 \\ 6.7 \\ 29.0 \\ 19.7 \\ 19.7 \\ 19.7 \\ 6.5 \\ 3.7 \\ 7.49 \\ 6.5 \\ 3.7 \\ 7.7 \\ 6.3 \\ 10.4 \\ 0 \\ 101.4 \\ 0 \\ 0 \\ 101.4 \\ 0 \\ 0 \\ 101.4 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0$	$\begin{array}{c} \text{final} \\ 7.92 \\ 5.8 \\ 29.5 \\ 19.6 \\$	7.37 6.5 2.9.5 19.9 1 19.9 1 1 7.04 6.6 6.6 29.5 1 4.7 1 1 1 1 6.7 1 2.7 5.4 1 2.7 5.4 2.1 2.1 2.1 2.5 1.5 1 2.5 1 2.5 1.5 1 2.5 1 1 2.5 1 1 2.5 1 2.5 1 2.5 1 2.5 1 1 2.5 1 1 1 1 1 2.5 1 2.5 1 2.5 1 2.5 1 2.5 1 2.5 1 1 1 1 2.5 1 2.5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	$\begin{array}{c} 7.88 \\ 5.8 \\ 29.9 \\ 70.1 \\ \\ \hline \\ 7.88 \\ 5.8 \\ \hline \\ 30.0 \\ \hline \\ 20.0 \\ \hline \\ \hline \\ 30.0 \\ \hline \\ 20.0 \\ \hline \\ \hline \\ 5.8 \\ \hline \\ 30.0 \\ \hline \\ 20.0 \\ \hline \\ \hline \\ 5.8 \\ \hline \\ 30.0 \\ \hline \\ 20.0 \\ \hline \\ \hline \\ 5.8 \\ \hline \\ 30.0 \\ \hline \\ \hline \\ 20.0 \\ \hline \\ \hline \\ 5.8 \\ \hline \\ 30.0 \\ \hline \\ \hline \\ 20.0 \\ \hline \\ \hline \\ 5.8 \\ \hline \\ 30.0 \\ \hline \\ 20.0 \\ \hline \\ \hline \\ 5.8 \\ \hline \\ 30.0 \\ \hline \\ 20.0 \\ \hline \\ \hline \\ 5.8 \\ \hline \\ 30.0 \\ \hline \\ 20.0 \\ \hline \\ \hline \\ 5.8 \\ \hline \\ 30.0 \\ \hline \\ 20.0 \\ \hline \\ 5.8 \\ \hline \\ 5.8 \\ \hline \\ 30.0 \\ \hline \\ 20.0 \\ \hline \\ 5.8 \\ \hline \\ 5.8$	$\begin{array}{c} \text{mit} \\ 7.35 \\ \hline c, 8 \\ \hline 2.9, 5 \\ \hline 14, 5 \\ \hline 2000 \\ \hline 2000$	tinal 7,85 5,7 30,8 19,3 19,3 2 final 7,87 5,8 30,7 19,7 2 final 7,90 5,1 30,3	init 7.38 6.7 2.9.5 19.4 Da inite 7.09 6.7 2.9.6 11.0 Da inite 5.85 6.7	$ \begin{array}{c} 3 \\ \hline final \\ \hline 7.92 \\ \hline (a.2) \\ 27.4 \\ 27.0 \\ 3 \\ \end{array} \begin{array}{c} \hline 7.92 \\ \hline 70.0 \\ \hline 70.0 \\ \hline 70.0 \\ \hline 70.0 \\ \hline 70.0 \\ \hline 70.0 \\ \hline 70.0 \\ \hline 70.0 \\ \hline 70.0 \\ \hline 70.0 \\ \hline 70.0 \\ 70.0 \\$	$\begin{array}{c} \text{init.} \\ 7.85 \\ 4.6 \\ 2.7.2 \\ 70.1 \\ \hline 7.28 \\ 6.3 \\ \hline 6.3 \\ \hline 7.28 \\ 6.3 \\ \hline 7.28 \\ 6.3 \\ \hline 4 \\ \hline 19.5 \\ 6.3 \\ \hline 7.5 $	$\begin{array}{c} \text{final} \\ \textbf{7,91} \\ \textbf{5,9} \\ \textbf{3,94} \\ \textbf{19,9} \\ \textbf{19,9} \\ \textbf{19,9} \\ \textbf{19,9} \\ \textbf{19,9} \\ \textbf{19,9} \\ \textbf{5,8} \\ 5,$	init 7.74 6.6 29.3 19.0 init 7.31 6.5 9.2 9.2 init 6.5	final 7.92 29.6 29.6 10,7 5 final 7.89 6.0 3.9.9 4,5 5 final 7.88	$ \begin{array}{c} \text{init} \\ 7,78 \\ 6,6 \\ 29,3 \\ 7,23 \\ 7,23 \\ 7,23 \\ 6,2 \\ 1010 \\ 7,23 \\ 6,2 \\ 1010 \\ 6,87 \\ 6,6 \\ \end{array} $	final 8.07($0.329.420.1final8.07(6.329.220.1final8.018.018.01$
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 100 pH DO (mg/l)	$ \begin{array}{c} \text{init} \\ 7.87 \\ 6.7 \\ 29.0 \\ 19.7 \\ 19.7 \\ 19.7 \\ 0 \\ 101.4 \\ 7.49 \\ 6.5 \\ 19.4 \\ 0 \\ 101.4 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0$	$\begin{array}{c} \text{final} \\ 7.92 \\ 5.8 \\ 29.5 \\ 19.6 \\ 19.6 \\ 19.6 \\ 29.5 \\ 19.6 \\$	7.37 6.5 2.9.5 19.9 1 19.9 1 1 7.04 6.6 6.6 29.5 1 4.7 1 1 1 1 6.7 1 2.7 5.4 1 2.7 5.4 2.1 2.1 2.1 2.5 1.5 1 2.5 1 2.5 1.5 1 2.5 1 1 2.5 1 1 2.5 1 2.5 1 2.5 1 2.5 1 1 2.5 1 1 1 1 1 2.5 1 2.5 1 2.5 1 2.5 1 2.5 1 2.5 1 1 1 1 2.5 1 2.5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7.88 5.8 29.9 72.1 final 7.88 5.8 30.0 22.0 final 7.94 6.3	$\begin{array}{c} \text{Init.} \\ 7.35 \\ 6.8 \\ 29.5 \\ 19.5 \\ 19.5 \\ 19.5 \\ 19.5 \\ 19.5 \\ 19.5 \\ 19.5 \\ 19.5 \\ 29.5 \\ 19.5 \\$	tinal 7,85 5,7 30,8 19,3 19,3 19,3 19,3 2 19,3 30,7 19,7 2 19,7 2 19,7 2 19,7 5,8 30,7 19,7 5,8 30,7 19,7 5,1 19,7 5,7 5,7 5,7 5,7 5,7 5,7 5,7 5,7 5,7 5	init 7.38 6.7 2.9.5 19.4 Da 19.4 Da 19.4 0.2 19.4 0.2 19.4 0.2 19.4 0.2 19.4 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	3 final 7.92 (a.2) 27.4e 27.4e 70.0 ays 3 final 7.95 (a.4) 7.95 (a.4) 7.95 (a.2) 70.0 3 final 7.97 (a.2) 70.0 70.0 70.0 7.95 (a.2) 70.0 70.0 7.95 (a.2) 70.0 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.2) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.95 (a.3) 7.97 (a.3) 7.97 (a.3) 7.97 (a.3) 7.97 (a.3) 7.97 (a.3)	$\begin{array}{c} \text{init.} \\ 7.85 \\ 4.6 \\ 2.7.2 \\ 70.1 \\ \hline 7.28 \\ 6.3 \\ \hline 6.3 \\ \hline 7.28 \\ 6.3 \\ \hline 7.28 \\ 6.3 \\ \hline 4 \\ \hline 19.5 \\ 6.3 \\ \hline 7.5 $	$\begin{array}{c} \text{final} \\ \hline 7,91 \\ \hline 5,9 \\ \hline 3,9,4 \\ \hline 19,9 \\ \hline 19,9 \\ \hline 19,9 \\ \hline 19,9 \\ \hline 19,8 \\ \hline 7,88 \\ \hline 5,8 \\ \hline 5$	init 7.74 6.6 29.3 19.0 init 7.31 6.5 29.2 9.2 init 6.5	final 7.92 6.0 29.6 14, 7 5 final 7.89 6.0 3.9.9 14, 5 5 final 7.88 5.8	init 7.78 6.6 29.3 7.9.3 7.23 7.33 7.33 6.3 20.0 6.2 20.0 6.6 39.8	$\begin{array}{c} \text{final} \\ 8.07 \\ 0.3 \\ 29.4 \\ 0.1 $

	Control	MU-146	
Alkalinity*	176	264	
Initial Chlorine†		NO	
Ammonia †	-	3.5	

* mg/L as CaCO3; † mg/L; ND: no chlorine detected

Sample Description:

Animal Source: Date Received: Date of Hatch:

ADD	
5/28/03	
5/17/113	
	_

Comments:

AMEC Earth & Environmental Northwest Bioassay Lab 5009 Pacific Hwy. E., Suite 2-0 Fife, WA 98424

Analysts:	ME	m	¥
Reviewed:	M		

AMEC Earth & Er	vironmental -	NW Bioassay Lab	Initial and Final	Chemistries nic Saltwater Bioassay
	Alian co l		Start Date & Tin	
Client:	Unocal		Stop Date & Tim	
Sample ID:	#2 /	<u>1w-7</u>		therinops affiris
ſest No:	0305-28	NW	Test species.	milling sayour
			Days	
¶ 0 Concentration		1 2	3	4 5 6
	0 Brite final	mite Emal Smit	inal mile dinel.	init final mit final init. final
CON	Contraction of the second second		3.07 8.35 8.03 5	3.45 8.4 18.45 8.05 8.38 8.08
pH	8.31 9.09	6,8 5,9 7,0	5.9 6.8 4.4	7.0 6.6 6.8 5.7 6.8 6.9
DO (mg/l) Salinity (ppt)	29.0 29.0		30.7 29.4 28.8	297 297 292 296 29.0 29.7
Temperature (°C)	19.2 20.2	19.3 20.6 19.9 2		10.0 20.2 20.7 20.0 20.2 19.7
Temperature (C)			Days	4 5 6
Concentration	0	1 2	3	
10.25	Eline Sheel	Shill mar mire	final init final	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
pH	8.31 8.01			6.9 5.9 6.9 5.7 6.7 5.7
DO (mg/l)	6,8 5,9			20 1 296 294 296 29. 296
Salinity (ppt)	29.0 29.3			19, 7 20.0 20.1 20.2 20.7 19.8
Temperature (°C)	19.0 19.8	20,1 20,1 19,8	201 201 201] Days	
	ļ	1 2		4 5 6
Concentration	0			init final smit, final mit final
12.5	init. final 8.10 7.99		8,00 8.14 8.01	8.26 8.02 8.29 8.02 8.21 1.44
pH		6.7 6,1 7.0	59 6.8 6.5	6.9 5.8 6.9 5.6 6.8 5.9
DO (mg/l)	6.9 5.9		30.9 29.2 27.4	29.0 29.7 29.4 29.5 29.3 30.7
Salinity (ppt)		799 20. 7 19.3	20.0 20.0 20.3	19,6 19.8 19.0 19,9 20.3 20.0
Temperature (°C)	11.0 1 10 1-	<u>11_le_1_1</u>	Days	4 5 6
Concentration	0	1 2	3	
25	Sinte Shield	mil, Sinal Shile	final init. final	
pH	7.86 7.93	7.96 7.93 7.99	7.96 7.83 7.96	
DO (mg/l)	6.9 6.0	69 6.4 7.2	5.7 6.8 6.3	0.0 0.0 0.0 0.0 0.0 0.00
Salinity (ppt)	29.0 29.3	29.3 30,4 29,7	306 29.4 28.2	29.0 39.6 29.4 29.7 29.3 29.6
Temperature (°C		20. 20. 1 19.1	20.0 19.3 20.0	
,		, 	Days 2 3	4 5 6
Concentration	0			init. final init final init. final
50		inite final linit	7.96 7.34 7.93	7.56 793 7.76 7.93 7.57 1.91
рН	7.49 7.90	7.71 7.94 7.71	59 71 64	4.9 57 70 5,8 6,9 5,8
DO (mg/l)	6.9 5.8		30,9 29.0 27.5	
Salinity (ppt)			19,4 19,2 20.0	17,1 9.7 19.0 19.9 19.5 19.7
Temperature (°C) 19.0 19.8	20.0 20.0 19.0	Days	
	0	1 1	2 3	4 5 6
Concentration	init Ina	A REAL PROPERTY AND A REAL	final init. final	
<u>р</u> Н	7.09 7.94	STORY SERVICES AND CONTRACTION OF A DAMA MARKED COMPACT AND A DAMA AND AND AND AND AND AND AND AND AND AN	799 7.05 7.97	T.00 1 112 100 1019 171 101
DO (mg/l)	71 5.6	74 6.2 7.4	5.9 7.4 len	
Salinity (ppt)	29,5 30,6	29.729.0 29.7	30.7 29.0 23.4	0.01 0.07 0.00 11 2 199
Temperature (°		20,1 20,1 Phys	19.8 19.3 20.0	19.20 9 8 19.0 28.1 19.3 11.1
Temperature		19.07		AMEC Earth & Environmental
				Northwest Bioassay Lab
	Control	MW-7		5009 Pacific Hwy. E., Suite 2-0
Alkalinity*	176	184		Fife, WA 98424
Initial Chlorine		106	<u> </u>	
Ammonia t	/	1.6		Analysts: NF gf im
* mg/L as CaCO3	; † mg/L; ND: no	chlorine detected		Reviewed:
				Hereiten HS-
Sample Descript	on:		Comments:	
Animal Source:	ABS		- Comments:	
Date Received:	5/28/03	······································		
Date Received: Date of Hatch:		3		

Ì.

Client:	
Sample ID:	
Test No:	

Unocal Mw - 10305-29 NW

Initial and Final Chemistries

Seven Day Chronic Saltwater Bioassay

5/29/03 1445 Start Date & Time: Stop Date & Time: 615103 Test species: Athennops affinis

1400

010	1						D	ays						
Concentration	1	0		1		2		3		4		5		6
CON		final	init.	final		final	init.	final	ainit.	final	init.	final		final.
рН	8.3	7,94	8.37	8.06	8.33	8.04	8.35	797	8.45	7.99	8.45	7.94	8.39	8.11
DO (mg/l)	6,8	6.1	6.8	5,9	7.0	6.T	68	6.5	7.0	5.7	6.8	5.9	6.8	6.4
Salinity (ppt)	29.0	29.0	29.6	30.1	29.7	30.3	29.4	29.10	39.7	30,5	29,2	129.5	290	28.4
Temperature (°C)	19.8	20.2	20,1	70-5	19.9	20.1	20.0	20.0	20.6	19.4	21.0	20.0	21.0	20.0
				•			Da	ays						
Concentration		0		1		2		3		4		5		5
6.25		Manal				final	init		init.	final	einit.	final	init.	final
рН	8.26		8,33	804	8.28	7.98	832	8.00	୫3୪	7.95	8.39	8.00	8,34	8.00
DO (mg/l)	6.8	5.8	6.9	6.	7.0	6.	6.9	4.6	69	5.8	6.8	5.7	6.7	6.1
Salinity (ppt)	29.0	27.1	29.7	30.9	29.7	30,4	29.5	28.2	30,	29,0	29.6	303	29.0	29.2
Temperature (°C)	20.0	50.5	198	20,1	4.1	20.0	19,4	19.9	2011	19:7	20.0	20.0	20.0	20.0
							Da	ays						
Concentration		0		1		2		3		4		5		5
12.5	init.	final	inut.		init.		. init.	final	jinit.	final	init.	final	init.	final
pН	8,19	7.94	8.27	7,98	8,23	8,00	8.26	8.03	8.33	8,03	\$.35	806	8.29	8.03
DO (mg/l)	6.9	5,9	70	6.0	7.1	5.9	6.9	le-le	70	5,8	6,9	6.2	6.7	1.2
Salinity (ppt)	29,0	27.2	29.7	29,9	29.7	30.8	29.5	27.5	29.4	29.7	29.7	29.5	29,2	29.4
Temperature (°C)	19.0	901	19.7	19.9	19.0	19.4		19.3	19.9	19.0	199	200	20.0	20.0
							Da	ays						
Concentration		0		1		2		ays 3		4		5	(5
Concentration 25		0 final		1 Sfinals		2 Ffinal i		3	init.	4 final	init.		init,	
		6 mal		_			init. 8.12	3		final	L			final
25	init.	final 7,90 5,7	init.	final	init	Final 7,98 6,0	init. 8.12 6,9	3 Minal	init.	final &00	init.	dinal	init. 8.17	
<u>25</u> рн	init. 8,06	final 7,90 5,7	init.	final 7.98 5,9	imit. 8,10 7,2	Final 7,98 6,0	init. 8.12 6,9	3 final 8.00	8,21 6,9	final 8.00 5:8	init. 8,24	final 9.03	init. 8.17 6.8	final
25 pH DO (mg/l)	init. 8,06 7.0	6 mal	1101. 8,14 6,9	final. 7.98	init	Final 1 7,98	init. 8.12	3 final 8.00 6.2	init. 8,21	final &00	init. 8,24 6,8	final 9,03 5,7	init. 8.17	final <u> </u>
25 pH DO (mg/l) Salinity (ppt)	7.06 7.0 29.1	611a1 7.90 5.7 29.4	8,14 6.9 29.7	final 7.98 5.9 29.9	init. 8,10 7.2 29.6	(mal) 7,98 6,0 310	init. 8.12 6,9 29,2 19.1	3 Final 8.00 6.2 27.6	mit. 8,21 6.9 29,4	final 8.00 5:8 29:7	init. 8,24 6,8 29.7	final 9.03 5, 7 29.9	init. 8.17 6.8 29.2	final <u> </u>
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration	31011. 3.06 7.0 2.1.1 19.2	6111a1 7,90 5,7 3,9,4 19,9 19,9	1001.1 8,14 6,9 29.7 20,2	final 7.98 5.9 29.9	init. 8,10 7.2 29.6 14. °	(mal) 7,98 6,0 310	init, 8.12 6,9 29,2 19.1 Di	3 final 8.00 6.2 27.6 19.6	8,21 5,9 29,4 19,5	final 8.00 5:8 29:7	init 8,24 6,8 29,7 19.0	final 9.03 5, 7 29.9	init. 8.17 6.8 29.2	final 8.02 6.1 29.0 2.0.0
25 pH DO (mg/l) Salinity (ppt) Temperature (°C)	31011. 3.06 7.0 2.1.1 19.2	rmal 7.90 5.7 29.4 19.9	1001.1 8,14 6,9 29.7 20,2	final 7.98 5.9 29.9 70.0	init. 8,10 7,2 29.6 19, °	funal 7,98 6,0 3,10 19,1	init, 8.12 6,9 29,2 19.1 Di	3 final 8.00 6.2 27.6 19.6 19.6 ays	8,21 5,9 29,4 19,5	final 800 5:8 29:7 19.9	init 8,24 6,8 29,7 19.0	final 9.03 5.7 29.9 20.0	init. 8.17 6.8 29.2 20.0	final 8.02 6.1 29.0 2.0.0
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration	31011. 3.06 7.0 2.1.1 19.2	6111a1 7,90 5,7 3,9,4 19,9 19,9	8,14 6,9 29,7 20,2	final 7.98 5.9 29.9 70.0	init. 8,10 7,2 29.6 19, °	198 6,0 310 19.1	init. 8.12 6.9 29.2 19.1 Da	$\begin{array}{c} 3 \\ \hline final \\ 8 \\ 0 \\ \hline \\ 4 \\ 27 \\ 6 \\ 17 \\ 6 \\ 19 \\ 6 \\ 19 \\ 6 \\ 3 \\ 3 \\ \end{array}$	Init. 8,21 6.9 29,4 19.5	final 800 5.8 29.7 9.9	init 8,24 6,8 29,7 19.0	final 9.03 5.7 29.9 20.0	init 8.17 6.8 39.2 20.0	final 8,02 6.1 29.0 20.0
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration EO	init. 8.06 7.0 29.1 19.2 init.	final 7,90 5,7 39,4 19,9 19,9 0	init. 8,14 6,9 29,7 20,2	final 7,98 5,9 29,9 70,0 1 final	init. 8,10 7,2 29.6 19.0	Final 7,98 6,0 310 19,1 2 final	init. 8.12 6.9 29.2 19.1 D:	$\begin{array}{c} 3 \\ \hline \textbf{final} \\ 8.00 \\ \hline (e.2) \\ 27.6 \\ 12.6 \\ 19.6 \\ \textbf{ays} \\ \textbf{3} \\ \hline \textbf{final} \\ \hline 7.9.7 \\ \end{array}$	init. 8,21 6,9 29,4 19.5	final $\$,00$ 5.8 29.7 9.9 4 final 7.97	init 8,24 6,8 29,7 19.0	final 9.03 5.7 29.9 20.0 5 final 7.98	init. 8.17 6.8 39.3 20.0	final 8.02 6.1 29.0 20.0 5 final
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH	init. 8,06 7,0 2,1,1 19,2 init. 7,90 7,0	final 7,90 5,7 39,4 19,9 19,9 0	init. 8,14 6,9 29,7 20,2	final 7.98 5.9 29.9 70.0 1 final 7,95	init. 8,10 7,2 29.6 19.° 19.° 7,90 7,90 7,9	Final 7,98 6,0 310 19.1 2 (final) 7,96 6,0	init. 8.12 6.7 2.9.2 19.1 Da 19.1 7.8] 7.8]	$\begin{array}{c} 3 \\ \hline final \\ 8.00 \\ \hline (0.2 \\ 27.6 \\ 19.6 \\ 19.6 \\ 19.8 \\ 3 \\ \hline final \\ \end{array}$	$\frac{1000}{8.21}$ $\frac{8.21}{6.9}$ 29.4 19.5 10.5 $\frac{1000}{7.94}$	final 8.00 5.8 29.7 19.9 4 final 7.97 6.0	inii 8.24 6.8 29.7 19.0 19.0 19.0 7.0	final 9.03 5.7 29.9 20.0 5 final 7.98 6.1	1011. 8.17 6.8 29.2 20.0 1011 17.92 7.92	$ \begin{array}{c} final \\ 8.02 \\ 4.0 \\ 20.0 \\ 20.0 \\ \hline final \\ 7.97 \\ $
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l)	init. 8,06 70 29.1 19.2 init. 7,90	final 7,90 5,7 39,4 19,9 19,9 0	init. 8,14 29.7 20.2 init. 7.86 7.4	Final 7.98 5.9 29.9 70.0 1 Final 7.95 5.9	init. 8,10 7,2 29.6 19, °	Final 7,98 6,0 310 19,1 2 final 7,96	init. 8.12 6.9 29.2 19.1 Da	$\begin{array}{c} 3 \\ \hline \textbf{final} \\ 8.00 \\ \hline (e.2) \\ 27.6 \\ 12.6 \\ 19.6 \\ \textbf{ays} \\ \textbf{3} \\ \hline \textbf{final} \\ \hline 7.9.7 \\ \end{array}$	init. 8,21 6,9 29,4 19.5	final $\$,00$ 5.8 29.7 9.9 4 final 7.97	init 8,24 6,8 29,7 19.0 init 8,02	final 9.03 5.7 29.9 20.0 5 final 7.98	1011. 8.17 6.8 29.3 20.0 imit. 7.92 7.0	final 8,02 6.1 29.0 20.0 5 final 7.97
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt)	ainit. 3.06 7.0 29.1 192 init. 7.30 7.90 3.9.1	Final 7,90 5.7 39,4 19,7 19,7 19,7 0 final 7,90 5,8 3,9,5	8,14 8,14 29,7 20,2 1,36 7,4 29,5	final 7.98 5.9 29.9 20.0 7.95 5.9 3.9,9 3.9,9	unit. 8,10 7,2 29,6 19, ° 19, ° 19, ° 19, ° 7,90 7,90 7,4 29,6	$\begin{array}{c} \text{final} \\ 1.98 \\ 6.0 \\ 3.10 \\ 19.1 \\ 19.1 \\ 19.1 \\ 1.96 \\ 6.0 \\ 30.6 \end{array}$	8.12 6.9 2.9.2 14.1 Di Init: 7.81 7.9 7.9 7.9 7.9 7.9 7.9 7.9 7.9 7.9 7.9	$ \begin{array}{c} 3 \\ $	Init. 8,21 6,9 29,4 19,5 Init. 7,94 7,1 28,1	final 8.00 5.8 29.7 9.9 4 final 7.97 6.0 27.6	mit 8,24 6,8 29,7 19.0 19.0 5,02 7,0 2,9,7	final 9.03 5.7 29.9 20.0 5 final 7.98 6.1 30.2	8.17 6.8 39.3 20.0 init 7.93 7.0 3.9.3	
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt)	8.06 7.0 2.9.1 192 192 7.90 7.90 7.0 2.9.1 [d.0	Final 7,90 5.7 39,4 19,7 19,7 19,7 0 final 7,90 5,8 3,9,5	8,14 8,14 6,9 29,7 20,2 7,9 7,9 7,9 7,9 7,9 2,5 2,0,0	final 7.98 5.9 29.9 20.0 7.95 5.9 3.9,9 3.9,9	unit 8,10 7,2 29.6 14, ° 7,4 7,90 7,4 29.6 7,4 29.6	$\begin{array}{c} \text{final} \\ 1.98 \\ 6.0 \\ 3.10 \\ 19.1 \\ 19.1 \\ 19.1 \\ 1.96 \\ 6.0 \\ 30.6 \end{array}$	$\begin{array}{c} \text{init.} \\ 8.12 \\ 6.9 \\ 2.9.2 \\ 14.1 \\ Di \\ \hline 7.81 \\ 7.81 \\ 7.9 \\ 19.5 \\ 19.4 \\ 0 \\ 19.4 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ $	$ \begin{array}{c} 3 \\ $	Inii 8,21 6,9 29,4 19,5 (init.) 7,94 7,1 28,9 14.0	final 8.00 5.8 29.7 9.9 4 final 7.97 6.0 27.6	mit. 8,24 6,8 29,7 14.0 3mit. 8,02 7,0 29,7 14.2	final 9.03 5.7 29.9 20.0 5 final 7.98 6.1 30.2	8.17 6.8 39.3 20.0 init 7.93 7.0 3.9.3	$\begin{array}{c} \text{final} \\ 8,02 \\ 6,1 \\ 29,0 \\ 20,0 \\ \hline \\ 5 \\ \hline \\ 6,1 \\ \hline \\ 7,97 \\ \hline \\ 6,1 \\ \hline \\ 20,0 \\ \hline \\ 20,0 \\ \hline \end{array}$
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt) Temperature (°C)	8.06 7.0 2.9.1 192 7.90 7.90 7.0 2.9.1 [d.0	$\begin{array}{c} \text{final} \\ 7,90 \\ 5.7 \\ 3.7 \\ 3.7 \\ 19.7 \\ 19.7 \\ 7.90 \\ 5.8 \\ 3.9 \\ 5.8 \\ 3.9 \\ 5.8 \\ 3.9 \\ 5.7 \\ 19.7 \\ 19.7 \end{array}$	8,14 8,14 6,9 29,7 20,2 7,9 7,9 7,9 7,9 7,9 2,5 2,0,0	final 7.98 5.9 29.9 70.0 1 1 final 7,95 5.9 39.9 29.9 20.2	unit 8,10 7,2 29.6 14, ° 7,4 7,90 7,4 29.6 7,4 29.6	198 798 6,0 310 19,1 2 (final) 7,96 6,0 30,6 19,5	$\begin{array}{c} \text{init.} \\ 8.12 \\ 6.9 \\ 2.9.2 \\ 14.1 \\ Di \\ \hline 7.81 \\ 7.81 \\ 7.9 \\ 19.5 \\ 19.4 \\ 0 \\ 19.4 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ $	$ \begin{array}{c} 3 \\ 8.00 \\ 6.2 \\ 27.6 \\ 27.6 \\ 19.6 \\ 19.6 \\ 3 \\ \hline 7.97 \\ 6.4 \\ 24.9 \\ 24.9 \\ 19.4 \\ 19.4 \\ 3 \\ \hline 8 \\ 3 \\ \hline 9 \\ 19.4 \\ 19.4 \\ 3 \\ \hline 9 \\ 3 \\ \hline 9 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10$	Inii 8,21 6,9 29,4 19,5 (init.) 7,94 7,1 28,9 14.0	final 8.00 5.8 29.7 19.9 4 final final 6.0 29.6 19.2	mit. 8,24 6,8 29,7 14.0 3mit. 8,02 7,0 29,7 14.2	$\begin{array}{c} final \\ 9.03 \\ 5.7 \\ 29.9 \\ 20.0 \\ \hline \\ 5 \\ \hline \\ final \\ 7.98 \\ 6.1 \\ 30.2 \\ 20.0 \\ \hline \\ 30.2 \\ 0.0 \\ \hline \\ 5 \\ \hline \end{array}$	8.17 6.8 39.2 20.0 init. 7.92 7.0 29.2 19.8	$\begin{array}{c} \text{final} \\ 8,02 \\ 6,1 \\ 29,0 \\ 20,0 \\ \hline \\ 5 \\ \hline \\ 6,1 \\ \hline \\ 7,97 \\ \hline \\ 6,1 \\ \hline \\ 20,0 \\ \hline \\ 20,0 \\ \hline \end{array}$
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt) Temperature (°C)	$\begin{array}{c} \text{(init)} \\ 8,06 \\ 7,0 \\ 2,9,1 \\ 19,2 \\ \hline \\ 7,90 \\ 7,90 \\ 7,0 \\ 3,9,1 \\ [a.0] \\ a.0 \\ \hline \\ \text{(init)} \end{array}$	$\begin{array}{c} \text{final} \\ 7,90 \\ 5,7 \\ 3,9 \\ 19,1 \\ 10,1 \\ $	8,14 8,14 6,9 29,7 20,2 (1011, 7,9 7,9 3,95 20,0	final 7.98 5.9 29.9 7.98 5.9 7.95 5.9 29.9 29.9 29.9 29.9 29.9 29.9 1 final 7.95 7.95 7.95 5.9 29.9 29.9 1 final	$\frac{1000}{7.2}$ $\frac{39.6}{7.4}$ $\frac{7.90}{7.4}$ $\frac{7.90}{7.4}$ $\frac{29.6}{7.4}$ $\frac{19.6}{7.4}$	tinal 798 6,0 310 19,1 2 final 7,96 6,0 30,6 19,5 2	$\begin{array}{c} \text{init.} \\ 8.!2 \\ 6.9 \\ 2.9.2 \\ 19.1 \\ 19.1 \\ 7.81 \\ 7.81 \\ 7.9 \\ 19.0 \\$	$ \begin{array}{c} 3 \\ \hline final \\ 8.00 \\ (e.2- \\ 27.6 \\ 27.6 \\ 19.6 \\ 19.6 \\ 19.6 \\ 19.6 \\ 27.9 \\ 7.9 \\ 19.7 \\ 19.4 \\ 2.7.9 \\ 19.4 \\ 2.7.9 \\ 19.4 \\ 3 \\ \hline final \\ 100 \\ $	inii. 8,21 6,9 29,4 19,5 inii. 7,94 7,1 28,9 12,2 inii.	final $8,00$ 5.8 29.7 9.9 4 final 7.97 6.0 29.6 19.2 4 final	mit. 8,24 6,8 29,7 14.0 mit. 8,02 7,0 29,7 14.2	$\begin{array}{c} final \\ 9.03 \\ 5.7 \\ 29.9 \\ 20.0 \\ \hline \\ 5 \\ \hline \\ final \\ 7.98 \\ 6.1 \\ 30.2 \\ 20.0 \\ \hline \\ 30.2 \\ 0.0 \\ \hline \\ 5 \\ \hline \end{array}$	1011. 8.17 6.8 39.3 20.0 10.0 10.0 10.0 29.3 19.8 19.8	$\begin{array}{c} \text{final} \\ 8, 02 \\ 6, 1 \\ 29, 02 \\ \hline 20, 0 \\ \hline 20, 0 \\ \hline 5 \\ \hline 6 \\ \hline 7, 97 \\ \hline 6, 1 \\ \hline 29, 5 \\ \hline 20, 0 \\ \hline 5 \\ \hline 6 \\ \hline 6 \\ \hline 6 \\ \hline 7, 97 \\ \hline 6 \\ \hline 7, 97 \\ \hline 6 \\ \hline 7, 97 \\ \hline 7, 97 \\ \hline 6 \\ \hline 7, 97 \\ \hline$
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration <i>FO</i> pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration <i>[CO</i> pH	8.06 7.0 2.9.1 192 7.90 7.90 7.0 2.9.1 [d.0	final 7.90 5.7 3.94 19.1 0 (000 5.8 3.9.5 19.7 19.7 0 (100 19.7 0 7.85	8,14 8,14 6,9 29,7 20,2 30,2 7,4 29,5 20,0	$ \begin{array}{c} final \\ 7.78 \\ 5.9 \\ 7.9.9 \\ 7.9.9 \\ 7.9.9 \\ 7.9$	unit 8,10 7,2 29,6 14, ° 7,4 7,4 29,6 7,4 29,6	Final 7.98 6.0 3.10 19.1 2 (final) 7.96 6.0 30.6 19.5 2 (final) 7.97	$\begin{array}{c} \text{init.} \\ 8.12 \\ 6.7 \\ 2.9.2 \\ 14.1 \\ 14.1 \\ 7.81 \\ 7.81 \\ 7.1 \\ 29.5 \\ 19.0 \\$	$ \begin{array}{c} 3 \\ 8.00 \\ 6.2 \\ 27.6 \\ 19.6 \\ 27.6 \\ 19.6 \\ 3 \\ \hline 7.97 \\ 6.4 \\ 24.9 \\ 24.9 \\ 19.4 \\ 19.4 \\ 3 \\ \hline 8 \\ 3 \\ \hline 9 \\ 19.4 \\ 19.4 \\ 3 \\ \hline 9 \\ 3 \\ \hline 9 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10$	Init. 8,21 6,9 29,4 19,5 Init. 7,94 7,1 28,9 12,2	final $8,00$ 5.8 29.7 $9.9.7$ $9.9.7$ $9.7.7$ $9.9.7$ $9.7.7$ $9.7.7$ $9.7.7$ $9.7.7$ $9.7.7$ 19.97 4 7.97 19.2 4 Final 7.97 4 Final 7.97	mit. 8,24 6,8 29,7 14.0 mit. 8,02 7,0 29,7 14.2	$\begin{array}{c} final \\ 9.03 \\ 5.7 \\ 29.9 \\ 20.0 \\ \hline \\ 5 \\ \hline \\ final \\ 7.98 \\ 6.1 \\ 30.2 \\ \hline \\ 30.2 \\ \hline \\ 20.0 \\ \hline \\ 5 \\ \hline \\ final \\ \hline \\ 7.98 \\ \hline \\ 9.8 \\ \hline \\ 7.98 \\ \hline \\ 30.3 \\ \hline \\ 20.0 \\ \hline \\ 5 \\ \hline \\ \hline \\ 7.98 \\ \hline \hline \\ 7.98 \\ \hline \hline \hline \\ 7.98 \\ \hline \hline \\ 7.98 \\ \hline \hline \hline \\ 7.98 \\ \hline \hline \hline \\ 7.98 \\ \hline \hline \hline \hline \\ 7.98 \\ \hline \hline \hline \hline \hline \\ 7.98 \\ \hline $	8.17 6.8 39.2 20.0 init. 7.92 7.0 29.2 19.8	
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration <i>FO</i> pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration <i>I CO</i> pH DO (mg/l)	init. 8,06 7,0 2,1,1 19,2 init. 7,90 7,0 3,9,1 [a.0 init. 7,35 7,1	$\begin{array}{c} \text{final} \\ 7,90 \\ 5,7 \\ 3,9 \\ 19,1 \\ 10,1 \\ $	$\begin{array}{c} \text{Init.}\\ 8,14\\ 6,9\\ 29.7\\ 20.2\\ 30$	$\begin{array}{c} \text{final} \\ 7.98 \\ 5.9 \\ 29.9 \\ 70.0 \\ 7.95 \\ 5.9 \\ 3.9.9 \\ 20.1 \\ 3.9 \\ 7.95 \\ 5.9 \\ 20.1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\$	$\begin{array}{c} \text{init} \\ 8,10 \\ 7,2 \\ 29,6 \\ 19, \circ \\ \hline 7,9 \\ 7,9 \\ 7,9 \\ 7,9 \\ 7,9 \\ 7,9 \\ 7,9 \\ 7,9 \\ 7,9 \\ 7,9 \\ 7,9 \\ 7,5 \\ 7,5 \\ 7,7 \\ \hline 7,7 \\ \end{array}$	final 7,98 6,0 3 ip 19,1 2 final 7,96 6,0 30,6 19,5 2 final 7,97 5,7	$\begin{array}{c} \text{init.} \\ 8.!2 \\ 6.9 \\ 2.9 \\ 19.1 \\ \hline 7.9 \\ \hline 7.1 \\ 7.9 \\ \hline 7.1 \\ 7.9 \\ \hline 7.1 \\ \hline 7.9 \\ \hline 7.1 \\ \hline 7.9 \\ \hline 7.1 \\ \hline 7.9 \\ \hline 7.3 \\ \hline 0.3 $	$\begin{array}{c} 3 \\ \textbf{final} \\ 8.00 \\ (a.2+b) \\ 27.6 \\ 27.6 \\ 19.6 \\ \textbf{ays} \\ 3 \\ \textbf{final} \\ 7.97 \\ 6.4 \\ 27.97 \\ \textbf{c}.9 \\ \textbf{c}.9$	Init. 8,21 6.9 29,4 19.5 * init. 7,1 28,9 19.0 7,1 19.0 * init. 7,3 6 7,1	final 8.00 5.8 29.7 $9.9.7$ $9.9.7$ $9.9.7$ $9.9.7$ $9.9.7$ 19.9 1	$\begin{array}{c} \text{mit}\\ 8,34\\ \text{G},8\\ 39,7\\ 19.0\\ 19.0\\ 39.7\\ 7.0\\ 3.9,7\\ 19.2\\ 1$	$\begin{array}{c} final \\ 9.03 \\ 5.7 \\ 29.9 \\ 20.0 \\ \hline \\ 5 \\ final \\ 7.98 \\ 6.1 \\ 30.2 \\ \hline \\ 30.2 \\ \hline \\ 30.2 \\ \hline \\ 5 \\ \hline \\ final \\ \hline \\ 7.98 \\ 6.0 \\ \hline \end{array}$	$\begin{array}{c} \text{init.} \\ 8.17 \\ 6.8 \\ 39.2 \\ 20.0 \\ \text{init.} \\ 7.92 \\ 7.0 \\ 39.2 \\ 19.8 \\ 19.8 \\ 19.8 \\ 19.8 \\ 19.8 \\ 7.38 \\ 7.6 \\ 7.58 \\ 7.6 \end{array}$	
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration <i>SO</i> pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration [<i>CO</i> pH	$\begin{array}{c} \text{(init)} \\ 8,06 \\ 7,0 \\ 2,9,1 \\ 19,2 \\ \hline \\ 7,90 \\ 7,90 \\ 7,0 \\ 3,9,1 \\ [a.0] \\ a.0 \\ \hline \\ \text{(init)} \end{array}$	final 7.90 5.7 3.94 19.1 0 (000 5.8 3.9.5 19.7 19.7 0 (100 19.7 0 7.85	8,14 8,14 6,9 29,7 20, 2 30, 2 1011, 7,4 29,5 20,0	$\begin{array}{c} \text{final} \\ 7.98 \\ 5.9 \\ 29.9 \\ 70.0 \\ 70.0 \\ 7.95 \\ 5.9 \\ 3.9.9 \\ 7.95 \\ 3.9.9 \\ 10.0 \\ 10 \\ 7.96 \\ 10 \\ 7.96 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 1$	$\frac{1000}{7.2}$ $\frac{39.6}{7.4}$ $\frac{7.90}{7.4}$ $\frac{7.90}{7.4}$ $\frac{29.6}{7.4}$ $\frac{19.6}{7.4}$	Final 7.98 6.0 3.10 19.1 2 (final) 7.96 6.0 30.6 19.5 2 (final) 7.97	$\begin{array}{c} \text{init.} \\ 8.12 \\ 6.9 \\ 2.9 \\ 19.1 \\ 19.1 \\ 19.1 \\ 19.2 \\ $	$\begin{array}{c} 3 \\ \textbf{final} \\ 8.00 \\ (a.2+b) \\ 27.6 \\ 27.6 \\ 19.6 \\ 3 \\ \textbf{final} \\ 7.97 \\ 6.4 \\ 247.9 \\ 19.4 \\ 3 \\ \textbf{final} \\ \textbf{s}.91 \\ \textbf{s}.01 \\ \end{array}$	inii. 8,21 6,9 29,4 19,5 inii. 7,94 7,1 28,9 12,2 inii.	final $8,00$ 5.8 29.7 $9.9.7$ $9.9.7$ $9.7.7$ $9.9.7$ $9.7.7$ $9.7.7$ $9.7.7$ $9.7.7$ $9.7.7$ 19.97 4 7.97 19.2 4 Final 7.97 4 Final 7.97	mit. 8,24 6,8 29,7 14.0 mit. 8,02 7,0 29,7 14.2	$\begin{array}{c} final \\ 9.03 \\ 5.7 \\ 29.9 \\ 20.0 \\ \hline \\ 5 \\ \hline \\ final \\ 7.98 \\ 6.1 \\ 30.2 \\ \hline \\ 30.2 \\ \hline \\ 20.0 \\ \hline \\ 5 \\ \hline \\ final \\ \hline \\ 7.98 \\ \hline \\ 9.8 \\ \hline \\ 7.98 \\ \hline \\ 30.3 \\ \hline \\ 20.0 \\ \hline \\ 5 \\ \hline \\ \hline \\ 7.98 \\ \hline \hline \\ 7.98 \\ \hline \hline \hline \\ 7.98 \\ \hline \hline \\ 7.98 \\ \hline \hline \hline \\ 7.98 \\ \hline \hline \hline \\ 7.98 \\ \hline \hline \hline \hline \\ 7.98 \\ \hline \hline \hline \hline \hline \\ 7.98 \\ \hline $	1011. 8.17 6.8 39.3 20.0 10.0 10.0 10.0 29.3 19.8 19.8	

	Control	MW-17		
Alkalinity*	10+6176	88		
Initial Chlorine†	-	0.12		
Ammonia †	<u> </u>	21.0		
*		laulas datasta	 ····	

* mg/L as CaCO3; † mg/L; ND: no chlorine detected

AMEC Earth & Environmental Northwest Bioassay Lab 5009 Pacific Hwy. E., Suite 2-0 Fife, WA 98424

Analysts:	MF	m	et	Sh
Reviewed:	K)		

Sample Descriptio	n:			
Animal Source:	ABS	Comments:		······································
Date Received:	5128/03			
Date of Hatch:	5 117/13			
	i an and		k •• #	

Client:
Sample ID:
Test No:

Unocal MW-103K 5-30NW/MW-103R

Initial and Final Chemistries

Seven Day Chronic Saltwater Bioassay

5/29/03 Start Date & Time: 163 Stop Date & Time: Test species: Atheninops appinis

1330

1445

														1
E1							Da	ys				т	6	
Concentration	0	T	1		2		3		4		5			final
CON		final	init.	final	init.	A CALIFORNIA PORTUGATION OF	init.	final	init.					3.10
pH	8.31		8.37	8.02	8.33 (8,08	8.35		8.45	7.95	5,45		2.20	
DO (mg/l)	6.8	6.0	6.8	5.4	7.0	5.9	6.8	10.3	70	5,8	6.8	5,8		56
Salinity (ppt)	29,0	29.3	29.6	30.2	29.7	5.9 310	29.4			29.8	39.3	29.5		39.7
	202			70.3	19.8	20.0	20.0	20,3	20.6	19.71	198	20.1	90.0	0.06
Temperature (°C)	av.or	<u> 10.et</u>	QUIT		11	<u> </u>	Da	ys						
	0	r	1		2		3	5	4				6	列支援的制度的
Concentration			-	final	init	final	init.	final			init.	final	2012/02/02/02/02/02/02/02/02/02/02/02/02/02	final
10:25	MR. Company of the state of the	793	8.21	707	8.25	8.07	8.26	8.01	8.33	8,04	<u>8.32</u>	9,04	8.27	8.12
рН	1 0101	1 100		- /2 54	7.0	C L	6.9	(e.2	6.9	5,9	7.0	6.1	6.7	5.5
DO (mg/l)	6.9	61	70	30,4	29.6	31.8	29.5	28.0	31.0	29.9	29.6	29.6		29.9
Salinity (ppt)	29.0	295	218			20.0	195	19.9	70.1	193	19.8	19.9	30.0	20.1
Temperature (°C)	19.0	19,5	a0,0	ZOI	10.0	20.0		ays				1. <u> </u>		
						<u> </u>		3	4			5	6	
Concentration	0			1		2 final		final	init.	final	init	final	init.	final
12.5	init.		init.	final	AUNSTRUCE THE AVE			8.03		8.03	8.21	8.03	8.14	8.08
pH	9.09	7,95	8,05	791	8.16	8.04	8.16	- ×	6,7	5.9	6.7	6.0	6.8	5.5
DO (mg/l)	6,8	6.3	7.0	6.0	17.1	6.0	6.9	6.1			29.5	29.7	29.0	29.4
Salinity (ppt)	29.0	29.5	29.7	30.0	29.7	30,9	29.5	MAK A	199	10.9	19 4	198	30.0	195
Temperature (°C)	198	19.7	19.7	19.9	17.5	19.8	19.4	19.9	19.9	19.1	1-1-0	11.0	10010	<u> </u>
Temperature (-)							D	ays		<u> </u>		5		5
Concentration		0	Τ	1		2		3		4	init	final	init.	final
25	init	final	init.	final	init.	final	init		init.	final		on the strange strain	1788	8.03
pH	7.89	793	77	797	8,00	8,04	7.93				7.99	8.03	123	5.4
	6,9	5.8	144	15.7	7.0	6.2	1.0	5,9	6.7	5.6	6.8	151	101	29.7
DO (mg/l)	27.0		29.9	20.2	29.6	30.2	29.4	127.5	29.3	30.0	24.6	29.7	39.2	
Salinity (ppt)		100	1800	70.0	19.3		A	20.0	19.5	19.5	20.9	120.1	20.0	19.8
Temperature (°C)	19.2	1/16	11.1	10.0	11	120-	علم المسلحة المسلحة المسلحة الم	ays	8.04					
	<u> </u>		-1	1	1	2	1	3	Т	4		5		6
Concentration								3					田田 经济的 经中心 医眼镜	final
		0			11 NO 2007 IN		-	-	init,	final	init.	fina		
50	inite	final	init.	final	init	final	init.	final	the structure of the structure of the	Final R.OZ		final F.OZ	7.56	8.05
		6mal	init.	final t 7,99	AND DISPACEMENTATIONS	final 8.00	WALL BUILDING ANY IS	final 28.05	the strength and the strength and the	8,02	init. 7.69 7.0	8.02	Child I Specific Web Sold Autor	4.9
50	init. 7,60 6,7	60nal 7,92 5,7	7.44	17.99	AND DISPACEMENTATIONS	final 8,06 6,0	7.60	final 28.05 5.9	7.73	8,02	7.69	8.02 5.7	7.56	49
50 pH	init. 7,60 6,7 29,1	6mal	7.44	17.99 5.7 30.5	AND DISPACEMENTATIONS	final 8,00 6,0 30,9	7.60	final 28.05 5.9 328.4	7.73 7.1 29,6	8,02	7.69 7.0 29.3	8.02 5.7 29.9	7.56	4.9
50 pH DO (mg/l) Salinity (ppt)	init. 7.60 6.7 29.1	60nal 7,92 5,7	7.44	17.99	AND DISPACEMENTATIONS	final 8,06 6,0	7.1	final 28.05 5.9 328.4 20-0	7.73 7.1 29,6	8,02	7.69	8.02 5.7 29.9	7.56	49
<u>50</u> pH DO (mg/l)	init. 7.60 6.7 29.1	60nal 7,92 5,7	7.44	17.99 5.7 30.5	AND DISPACEMENTATIONS	final 8,06 6,0 30,9 7 <i>I</i> o, 7	7.1	final 28.05 5.9 328.4 20~5 Days	7.73 7.1 29,6	8,02 5,8 30,2 19.9	7.69 7.0 29.3	8.02 5.7 29.9	7.56	49
50 pH DO (mg/l) Salinity (ppt) Temperature (°C	init. 7.60 6.7 29.1 9.2	000al 7 .9 2 5.7 29.0 .19.8	7.44	t 7,99 5.7 30,5 70.1	7.76	final 8,00 6,0 30,9 7 20,7	7.100 7.1 29.3 19.0 1	final 2 8, 05 5, 9 3 J 8, 9 2 20 2 Days 3	7.73 7.1 39,6 19.1	3,02 5,8 30,2 19.9 4	7.0 7.0 29.3 19.6	8.02 5.7 29.9 19.7	7,56	4.9 27.9 20,0 6
50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration	init. 7.60 6.7 29.1 9.2	60mal 7,92 5,7 2,9,6 .19,8	7.44	t 7,99 5,7 30,5 70,1 1	7.76 7.3 39.5 19.1	final 8,06 6,0 30,9 7 20,7 2 7 20,7 2 7 20,7	7.60 7.1 29.3 19.7 1	$\begin{array}{c c} final\\ \hline final\\ 2 & 0 \\ 5 & 0 \\ \hline 5 & 9 \\ \hline 3 & 0 \\ \hline 2 & 0 \\ \hline 3 \\ \hline \hline 1 & 0 \\ \hline 1 & 0$	7.73 7.1 29,6 19.1	3,02 5,8 30,2 19.9 4	7.69 7.0 29.3 19.6	8.02 5.7 29.9 19.7 5	7.56 7.0 3.29.1 20.0	4.9 27.9 20.0 6
50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration	init. 7,60 6,7 29,1 9 [9,2	60001 7792 5.7 29.6 19.8 0	7.44	t 7,99 5.7 30,5 70.1	7.76	final 8,06 6,0 30,9 7 20,7 2 7 20,7 2 7 20,7	7.60 7.1 29.3 19.7 1		7.73 7.1 39,6 19,1 19,1	8,02 5,8 30,2 19.9 4 4 (final 8,0	7.69 7.0 29.3 19.6 19.6 19.6 7.39	8.02 5.7 29.9 19.7 5 fina 2	7.56 7.0 3.29.1 30.0 1.0 5.7.18	4.9 299 20.0 6 fina 8.0
50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration [OO pH	init. 7.60 6.7 29.1 19.2 init. 7.39	600al 7,92 5,7 29,6 19,8 0 6 6 6 7,01	7.44	t 7,99 5,7 30,5 70,1 1	7.76 7.3 39.5 19.1	2 4,00 6,0 30,9 20,7 2 fina 2,06 5,7	7.60 7.1 29.3 19.0 19.0	$\begin{array}{c} \text{final} \\ \hline \\ 8.0 \\ 5.7 \\ \hline \\ 3.8 \\ 20 \\ \hline \\ 20 \\ \hline \\ 20 \\ \hline \\ 3 \\ \hline \\ 20 \\ \hline \\ 3 \\ \hline \\ 3 \\ \hline \\ 3 \\ \hline \\ 8 \\ 8.1 \\ \hline \\ 6.1 \\ \hline \\ 0.1 \\ \hline \end{array}$	7.73 7.1 29,6 19,1 19,1 19,1 19,1 7.36 7.36 7.7	8,02 5.8 30,2 19.9 4 6inal 8,0 5,6	7.69 7.0 19.6 19.6 19.6 19.6 7.39 7.39 7.39	8.02 5.7 19.7 19.7 5 6ina 7 8.05 5.6	7.56 7.0 3.29.1 30.0 1.00 5.7.18 5.7.18 5.7.5	4.9 279 20.0 6 fina 8.0 5.7
50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration [CO] pH DO (mg/l)	init. 7.60 6.7 29.1 19.2 init. 7.29 6.9	6inal 7.92 5.7 29.6 19.8	7.44 7.2 29.9 20.1 20.1 7.12 7.12	t 7.99 5.7 30.5 70.1 1 fina 8.0 5.6	7.76 7.3 39.5 19.1	2 4 (inal 5 9,00 6,0 30,9 7 20,7 7 20,7 7 20,7 7 20,7 1 30,9 1 30,9	7.60 7.1 29.2 19.0 19.0 1 19.0 1 19.0 1 19.0 1 19.0 1 1.2 2 7.2	final $ $	7.73 7.1 29,6 19,1 19,1 7.36 7.36 7.7 30.0	8,02 5.8 30,2 19.9 4 5.6 30,2 19.9 19.9 19.9 19.0 19.0 19.0 19.0 19.0	7.69 7.0 29.3 19.6 19.6 19.6 7.39	8.02 5.7 19.7 5 5 5 6 8.0 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	7.56 7.0 3.29.1 30.0 1.0 5.7.18	4.9 279 20,0 6 fina 8.07 5,7 30.2
50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration [OO pH	init. 7,60 6,7 2,9,1 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	6000 6000 6000 6000 6000 7,92 5,7 29.6 6000 7,01 5,7 30,2 600 7,92 6000 7,92 7,92 6000 7,92 7,92 6000 7,92 7,9	7.44 7.2 29.9 20.1	t 7.99 5.7 30.5 70.1 1 fina 8.0 5.6	7.76 7.3 5 29.5 19.1 19.1 19.1 19.1 19.1 19.1 19.1 1	 4inal 4,00 6,0 30,9 20,9 20,9 40,7 20,9 5,0 5,1 30,9 120,9 120,9 120,9 120,9 	7.00 7.1 29.3 19.7 1 19.7 1 19.7 1 19.7 1 19.7 1.2 2 3.29.1	$\begin{array}{c} \text{final} \\ \hline \\ 8.0 \\ 5.7 \\ \hline \\ 3.8 \\ 20 \\ \hline \\ 20 \\ \hline \\ 20 \\ \hline \\ 3 \\ \hline \\ 20 \\ \hline \\ 3 \\ \hline \\ 3 \\ \hline \\ 3 \\ \hline \\ 8 \\ 8.1 \\ \hline \\ 6.1 \\ \hline \\ 0.1 \\ \hline \end{array}$	7.73 7.1 29,6 19,1 19,1 7.36 7.36 7.7 30.0	8,02 5.8 30,2 19.9 4 5.6 30,2 19.9 19.9 19.9 19.0 19.0 19.0 19.0 19.0	7.69 7.0 19.6 19.6 19.6 19.6 7.39 7.39 7.39	8.02 5.7 19.7 19.7 5 6ina 7 8.05 5.6	7.56 7.0 3.29.1 30.0 1.00 5.7.18 5.7.18 5.7.5	4.9 279 20.0 6 fina 8.07 5.7

	Control	MW-103R	
Alkalinity*	176	392	
Initial Chlorine†		.05	
Ammonia †		5.7	l

* mg/L as CaCO3; † mg/L; ND: no chlorine detected

AMEC Earth & Environmental Northwest Bioassay Lab 5009 Pacific Hwy. E., Suite 2-0 Fife, WA 98424

Analysts:	NP	in	<u>}</u>	<u>Sm</u>
Reviewed:	-40-		<u> </u>	

Samp	le Description:
Anim	al Source:
Date	Received:

Date of Hatch:

	the second s
ABS	
5/28/03	
5117/03	

Comments:

Client:
Sample ID:
Test No:

Unocal #5 MW-129 D305-31NW Initial and Final Chemistries

Seven Day Chronic Saltwater Bioassay Start Date & Time: 5/29/03 1820

Stop Date & Time: 615/03

03 1800

Test species: Atherinops affinis

1												<u>ze uzy</u>			
	10							T	Days						
1	Concentration		0		1		2	^	3		4				_
	<u>CON</u>	init	fin		. Cine	l init.	fina	l Smith			final	S PAROSSY PARA	5	6	-200 10000000000000000000000000000000000
	pH	8.3	8,0		7.9	8.3			COMPANY OF SALES AND A SALES	8.45	8,08		final	WHI CHARLED COULD STORE TO THE STORE STORE THE	inal
	DO (mg/l)	6.8	6,3		6.6		5.9	6.8	10.3	7.0	5.8	8,45	8.11	8.388.	11
' ŀ	Salinity (ppt)	29.0	29.3		29.6		7 30,8	294	27.7	29.7	20.4	6.7	5,8	6,8 5,	9
,	Temperature (°C)	20.1	19.	1 19	1 199		19.9	20.0	70.0	90.0	198	29.2	29.8	29.0 29	1.0
	6		<u> </u>	8.37	0				Jays	$L^{0, \omega}$	11-18	19.8	20.0	19921	.0
	Concentration		0		1		2		3		4	1		T	
- -	6.25	init.	fina	l init	fina	le Sinte		init.	L Gast		4 final		5	6	No. Concernant
1	pH	8.11	7.9	5 8.22		3 8.18	8.00				8.03	and the second second second second	final	init. fi	CALCULATION OF A DESCRIPTION OF A DESCRIPTION OF A DESCRI
11	DO (mg/l)	6.9	6.3	6,8	1 Ĉ.T	7.0	6.2	10.7	1 3			18.27	8,04	17 21 11	09
	Salinity (ppt)	29.0	29.9		20.4				27.6	30,1	5,8	6.8	5.7	6.1 (e.	
	Temperature (°C)	19.0	19.9	20.2	20	a 10'a	19.9	70.5	19.8		30.3	29.6	<u>ay, 1</u>	29.1 29	
			<u></u>	<u> </u>		<u>~110</u>	1111/		ays	19.3	9.8	19.0	200	19520	.6
	Concentration		0		1		2		2	·	<u> </u>	r		<u> </u>	
Ľ	12.5	init.	N PAN	a infit	(internet		- final		final		4		5	6	
, L	pН	7.91	7.94	8.08	79-	18.04	a water and a water of	7.91				init.	final	init. fir	STORE ST
	DO (mg/l)	6.7	5.9	6.8	122	7.0	57	+ • • • •	8.01	8.26	8,00	8.1	1.99	8,18 8.0	80
3	Salinity (ppt)	29.0	29.7	129.8	30.2	129.7		10.7	41	6,9	6.0	67	<u>6. [</u>	6.6 5.	7
Γ	Temperature (°C)	190	19-7	20.1	19,8	100	30.8			29,0	30.1	29.6	30.0	29.2 28	.81
ήĒ				1000	11/10	119.5	117.1	20.1	19.7	19,4	145	19.2	19.8	A.5 20.	.4
	Concentration)	T	1	<u> </u>			ays		······				
4	25		final	init.	_		2		3	I COMPANY CALL STRATE STRATE	1	5		6	
	pH	7.59	794	and constant south and the parts of	7.98	init,	and the second second second	and the manufacture of the last	100 Contraction (10) Service (10) Service	inte	final	init,	final	init. fin	al
	DO (mg/l)	77	5.7	67	5.8		8.0	7.58	8.03	8,03	8.01	7.82	8.01	797 8.0	Xo
	Salinity (ppt)	29.2	795	298	30,3	6.9	5.6	6.1	leit	6.8	5.9		6.0	6.7 5.1	
	Temperature (°C)	19.1	10 0	20.0	197		31.0	29.5	28.0	29.0	30.0	29.50	5297	29.3 29.	2
		- - - 	410	<u>u.</u>	ΠL_{I}	19.3	11.8	70.0		19.3	19.2	19.0	19.5	19.0 20.	र्दे
	Concentration	0		1	1	T		Da						<u> </u>	~
1	5D	init			final		2	Second States and Second		4		5		6	
	pH		-704			In the state of the state of the	final	init.	sinal	· init.		init.	final	init, fin	al
-	DO (mg/l)	638	11-T	7,43	8.07	7,5.3	8.07	7.26	8.05	7.56	8.03	7.50	8.041	7.66 8.0	
-		0.0	2.6	6.5	6.0	6.9	5.8	6.6	leia	6,9	6.0	6.7	6.7	6.7 5.8	
-	Temperature (°C)		29.9	29.7	30,	29.7		29.7	27.9	28.2	29,9	29.4 2		29,5 29.2	
-	remperature (C)	19.1	Wip	120.0	20.1	114.1	19.9		19.4	12,4	19.Z	19.01	9.5	19.0 20 7	$\frac{2}{2}$
	Concentration							Da	ys		,				
	IDD	0				2		3		4		5		6	
			Ina	anit.	tinal	Cinit.*	Ginal	init.	final	ini <u>s</u> -	final	init.	i na l	inite Fifth	
Ļ		LUT .	<u> 0.07</u>	7,23	8.04	7,27	9,0g	7.03	8.051	7,08	8.01	709 -	796 -	7.39 8.0	1614075.07
-	DO (mg/l)	6.3 295 :	5.6	6.5	6,0	6S	6.0	6.5	6.3	7,1	5.9	636		7.3 5.5	
, <u> </u>	Salinity (ppt)	395	30,5	24.6	29.9	29.4	31.0	30,00	18.31	28,1	30.5	29.2 8	194 2	19.8 29.0	
L	Femperature (°C)	190	19.9	19.7	19,8	14.1	19.9	19,4					94	19.0 20.4	
1			'						<u> </u>				4-14	10/20/20/2	2
	r									A	AMEC E	arth & E	nviron	mental	
, r—		Cont		Mw-	29		1	<u> </u>		N	lorthwe	st Bioase	saviah	actual	
<u> </u>	Alkalinity*	176	>	74	00			/		5	009 Pac	ific Hwy	F C	to 2.0	
	nitial Chlorine†						$ \rightarrow $				ife, WA	08404	. Ľ., Jul	ue 2-0	
	Ammonia †	~		1.			~			ſ	10, WA	30424			

Ammonia † 2.6 * mg/L as CaCO3; † mg/L; ND: no chlorine detected

ample Description:

Animal Source: Date Received: Date of Hatch:

AKS 5/28/63 5/17/03

Comments:

Analysts:	
Reviewed :	

E & hu

AMEC Farth & Envi	ronmental - NW Bioassay Lab	Initial and Final Chemistries
AMEC Earth & Ehry		Seven Day Chronic Saltwater Bioassay Start Date & Time: 5/29/03 925
Client:	Unocal	Start Date & Time.
Sample ID:	Flo MW-W	Stop Date & Time: <u>6/5/03</u> 1730 Test species: <u>Athen nops allinis</u>
Test No:	1305-32NW	Test species: Africa rup upplus
)	<u></u>	Dura
no Generation		Days 3 4 5 6
		weit final mit, final init, final mit, final
CON	init final init final init final	12 25 8 0 2 8 45 8 13 8, 45 8.10 8.58 8.10
pH	831 118 001 00 100 107	1842 70 5,7 6,8 6, 6,9 5,8
	6.3 0.0 00 50 50 7 709	
Salinity (ppt)	27.0 27.3 260 200 10 7 198	20.0 10.6 20.5 9.8 9.8 9.0 19.1 11.0
Temperature (°C)	21.0 19.8 19.8 00,1 119,7 11.00	Days 5 6
	0 1 2	
Concentration	init. final init. final init. fina	millional million and a start was
0.25		8:20 8.01 7.21 00 - 100 59 67 58
pH	69 58 1.0 5.1	6.8 6.1 0,1
DO (mg/l)	790 29.2 29.7 30, 24.1 SU	24.2 27.4 01 01 109 199 190 197
Salinity (ppt) Temperature (°C)	19.0 19.7 20.2 19.8 20.2 12	
Temperature (C)		Days 5 6
Concentration		a init. final init. final init: final init: final
12.5	init final init sfinal init fina	12021801919191904 8,16 8.04 8,11 8.05
pH	8.08 7.98 8.00 7.92 8.09 8.0	6,7 6,0 6,9 5,9 6,7 6,0 6,9 2,4
DO (mg/l)	6.8 5.9 6.9 5.8 11 01	744273,291 295 29,5 24,7 24,7 24
Salinity (ppt)	270 29.1 21. 01. 01. 01. 19	8 20.0 19.8 20.0 19.1 19.9 19.9 19.0 19.6
Temperature (°C)	19.0 20.2 20,1 20.2 19.8 17.	Davs
	1 2	
Concentration		a mit final mit final fina trace of 792 403
25	mit 1111 1111 111 11 11 11 11 11 11 11 11	8 7.65 7.97 7.75 0.0 41 0.0 100 00 00
pH	7.84 1.12 6.10 3.00 6.0	8 6.7 6.3 6,8 5.7 6,1 34 7 795 79.7
DO (mg/l)	6,7 3.7 601 10 20 7 20	5 29.307.7 28.9 01.1 20 145 9.2197
Salinity (ppt)	370 213 10 10 0 199 70	20.0 9.9 9. 101.
Temperature (°C)	19.0 200 11.11, 4	Days 5 6
		3 -
Concentration	init. 20	nal mil 111a 1100 703 798 7.42 7.98
50	744 740 728 7.95 7.58 8.	Ja 1.44 T. 10 45 60 67 58 65 5.6
pH DO (mg/l)		13 10.0 4.1 38.7 29.4 29. 7 195 5 29.9 30-3
Salinity (ppt)	05 70 29.3 29.7 30.0 27.8 3	1 1 1 1 2 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2
Temperature (°C		Lave Contraction
Temperature	39.10	3 4 5
Concentration		
100		21 703 292 7 13 7.95 1.09 1.92 1.006 1.17
pH	101 101 010 010	1.5 19 65 5.1 6, 15.0 00 1.1
DO (mg/l)	0.019.0	10 29 p 27 2 287 27 3 21 0 2 1 10 2 1 10 0 1 1 1 1 1 1 1 1 1
Salinity (ppt)	210 210 20 140 19710	25 125 20.0 19.5 19.6 19.0 19.5 19.0 11.7
Temperature (°C	<u> 19.0 19.8 19.8 19.7 11.7 11.</u>	AMEC Earth & Environmental
		AMEC Earth & Environmental
1	Control MW-W	Northwest Bioassay Lab 5009 Pacific Hwy. E., Suite 2-0
Alkalinity*	NO	Fife, WA 98424
Initial Chlorine	1.4	Analysts: NF, M, Et
Ammonia †	; † mg/L; ND: no chlorine detected	Analysts: M-, the full of the
* mg/L as CaCO3	TIMEL, ME, NO CHROTHER THE	Reviewed. 4
Sample Descript	ion:	Companya in the second s
Animal Source:		Comments:
Animal Source:	0110-	

Animal Source: Date Received: Date of Hatch:

. 1

5/28/03	
5/17/03	

Mysidopsis bahia

	ì.
Client:	Ur
Sample ID:	#1
Test No:	020

Unocal #1 MW-146 0305-33NW

Initial and Final Chemistries

Seven Day Chronic Saltwater Bioassay

Start Date & Time:	5/29/0	3 1930	
Stop Date & Time:	6 134 0	13 1900	
Test species: <u>Pref</u>	ephate	prometas on	Mysidopsis Bahia

01							Da	iys						
Concentration	C)	1	t		2	3	-		4	-	5		6
CON	init.	final	init,	final	init	final	. init.	Simal	init.	final			init.	final
pH	8.3	8.07	8.37	8.07	3.33	1.98	8,35	7.89	8.45	8.07	8.45	8.04	8.38	8.07
DO (mg/l)	6.9	5.9	6.8	5.8	7.0	5.0	6,8	4.8	7.0	4.5	68	5.2	6.3	6.3
Salinity (ppt)	29.0	29.2	296	29.1	29.7	32.3	29.4	28.D	29.7	30.3	29.2	29,4	29.0	29.0
Temperature (°C)	25.5	25.2	25.5	25.0	25.5	25-3	25.5	as.7	25 <i>5</i>	25.0	25.2	25,9	25.4	268
							Da	iys						
Concentration	(0		1		2		3		4		5		6
Le.25	init.	final		final			init.	final	init.	final	init.	final	init.	final
pH	8.19	8,01	8,14	8.00	8,11	17.99	8.10	7.91	8.32	8.04	8.32	7.99	8.26	807
DO (mg/l)	7.0	5.7	6,8	5.4	6.8	53	6.8	5.4	6.9	4.5	6,8	51	6.6	(q.3
Salinity (ppt)	29.0	29.3	29.6	30.8	295	33.2	29.5	28.7	29.2	30.3	29,3	29,7	29.7	295
Temperature (°C)	25.3		26.2	25.0	26.0	25.6	25.5	256	25. 7	12A.T	15.6	25.0	25 3	26.8
								ays						
Concentration	(0		1		2		3		4		5	en la rector del timo a d	6
12.5		final	init.	final	sinit.		init.		init.	final	init.		, init.	final
pH	8.09	8.00	7,88	7.98	7.84	798	7,86	7.91	8.18	800	8.14	7.97	8.12	8.08
DO (mg/l)		5.7	6.8	5.4	6,9	5.1	6,7	5.2	6.8	4.5	6.7	5:1	6.6	6.5
Salinity (ppt)	6.8	29.4	29,6	30.8	27,5	32.8	29.5	28.7	29.3	30.3	29.4	29.6	39.2	29.2
Temperature (°C)	25.5	25.2	- 26.5	25.2	26.5	25.8	25.5	as 5	25.5	24.7	25.1	26.4	25.3	26.8
	Days													
Concentration		0		1		2		3		4		5		6
25	init.	final	init.	final	init.	final	linit	final	init.	 Bibb Group Manager Control 	init.	final	init.	final
pН	7.87	7.97	7.37	7.97	7.35	7.97	7,38	7.94	785	7.99	1.74	7.14	7.78	8.09
DO (mg/l)	6.7	5.8	6,5	5.5	6,8	4.9	6.7	5.1	6.6	9.5	6,6	5.0	6,6	6.1
Salinity (ppt)	29.0	29.5	29.5	30,9	29,5	327	29.5	28.1	29.2	30.2	29.3	29.5	29,3	30.0
Temperature (°C)	25.5	25.4	255	25.1	26.5	25.6	25.5	25.5	25.4	25.0	26.3	1263	25.5	26.8
								ays					T	
Concentration		0		1		2	1	3	124111111000000000000000000000000000000	4		5		6
50	init.	final	inita	final	init.	final	init	final	init.	final	init.	final	init.	final
	- · · · ·									1 / 0011.		7.94	7.22	8.08
pH	7.49	7.94	7,04	7.92	7.07	7.48	1.09	7.96	7.28	7.94	7.21	I I made and a second second		5 5
DO (mg/l)	6.5	5.6	6.6	4.7	6.7	4.8	6.7	4.9	6.3	4.1	6,5	5.7	6,2	dor
		the second s				48	6.7	4.9 Herz	6.3	4.1 32.0	6,5	I I made and a second second	6.2	288
DO (mg/l)	6.5	5.6	6.6	4.7	6.7	4.8	6.7 29.6 25.5	4.9 24e2 25.3	6.3	4.1	6,5	5.7	6,2 29.5 25.5	28.8 26.8
DO (mg/l) Salinity (ppt)	6.5	5.6	6.6	4.7 30,1	6.7	4.8	6,7 29,6 25,5 D	4.9 Her 25.3 ays	6.3	4.1 32.0 24.8	6,5 29,2 26.0	5.1 29.5 26.2		26.8
DO (mg/l) Salinity (ppt) Temperature (°C) Concentration	6,5 29,1 26,2	5.6 29.5 25.2	6.6 29.5 26.0	4.7 30,1	6.7	4.8 32.3 U.4 2	6,7 29,6 25,5 D	4.9 Her 25.3 ays 3	6.3 28.6 25.5	4. (32.0 24.8 4	6,5 2,9,2 26.0	5.7 29.5 26.2 5	25.5	6
DO (mg/l) Salinity (ppt) Temperature (°C)	6,5 291 26.2	5.6 29.5 25.2	6.6 29.5 26.0	4,7 30,1 25.0	6, 7 29.3 26.0	4.8 32.3 13.4 2	6, 7 29,6 25,5 D	4.9 24€3 25.3 ays 3 final	4.3 28.6 25.5	4. (32.0 24.8 4	6,5 2,9,2 26.0	5.7 29.5 26.2 5 final	as.s	726.8 6
DO (mg/l) Salinity (ppt) Temperature (°C) Concentration	6,5 29,1 26,2	5.6 29.5 25.2	6.6 29.5 26.0 init. 6,77	4,7 30,1 25.0	6.7 29.3 26.0	4.8 32.3 15.4 2 final 8.06	6,7 29,6 25,5 D	<u>4.9</u> <u>Hec</u> <u>as.</u> 3 final 8.03	6.3 28.6 25.5 mit. 6.95	4. (32 u 24.8 4 final 7.94	6,5 2,9,2 26.0	5.7 29.5 26.2 5 final 9.02	25.5 init. 6,89	6 6 8.11
DO (mg/l) Salinity (ppt) Temperature (°C) Concentration { びひ	6,5 29,1 26,2	5.6 29.5 25.2 0 final 7.9 5.7	6.6 29.5 26.0	4.7 30,1 25.0 1 7.99 5.4	6.7 29.3 26.0 mil. 6.82 6.7	4.8 32.3 U.4 final 8.06 4.5	6, 7 29,6 25,5 D init 6,85 6,7	$\frac{\sqrt{-9}}{2 \leq .3}$ $\frac{3}{6}$	6.3 28.6 25.5 Init. 6.95 6.3	$ \begin{array}{c} 4.1 \\ 32.0 \\ 24.8 \\ 4 \\ 6 \\ 194 \\ 4 \\ 7.94 \\ 4.3 \\ 4.3 \end{array} $	6,5 2,9,2 26.0 Simit: 6, 91 6,5	5.7 29.5 26.2 5 final 9.02 5.0	25.5 Init 6,89 6,6	6 6 6 6 6 6 6 6 11 5 .9
DO (mg/l) Salinity (ppt) Temperature (°C) Concentration くびフ pH	6,5 29,1 26,2	5.6 29.5 25.2 0	6.6 29.5 26.0 init. 6,77	4,7 30,1 25.0 1 final 7,99	6.7 29.3 26.0	4.8 32.3 15.4 2 final 8.06	6,7 29,6 25,5 D init 6,85	<u>4.9</u> <u>Hec</u> <u>as.</u> 3 final 8.03	6.3 28.6 25.5 mit. 6.95	4. (32 u 24.8 4 final 7.94	6,5 2,9,2 26.0	5.7 29.5 26.2 5 final 8.02	25.5 init. 6,89	6 6 8.11

]	Control	MW-146		
Alkalinity*	176	264		
Initial Chlorine†		ND		
Ammonia †		3.5		

* mg/L as CaCO3; † mg/L; ND: no chlorine detected

AMEC Earth & Environmental Northwest Bioassay Lab 5009 Pacific Hwy. E., Suite 2-0 Fife, WA 98424

Analysts: Reviewed:

KB Et m NF

 Sample Description:
 Comments:

 Animal Source:
 ABS

 Date Received:
 5/29/03

 Date of Hatch:
 5/22/03

AMEC Earth & Env	vironmental -	NW Bioassay	y Lab	Initial and Fina Seven Day Chr		Bioassav			
ł	Unocal			Seven Day Clu Start Date & Ti		7/03 1	8:00		
Client:				Stop Date & Time: <u>6/5/63</u> 1645					
Sample ID:		Иш-7		Test species:	M bahia				
Test No:	0305-34			1000 01					
				Days				シ	
Concentration	0	1	2	3	4	5	6		
CON	init. final	trife final.	andles stand	init. final	inte final	A STATE OF A	al init. final 4 8.38 8.12	8.45	
pH	831 787	8.37 8,06	8.33 809		8-37 8:02	8.45 8.0	01000000	7.0	
DO (mg/l)	68 4.9	6.8 5.5	7.0 5.2	6851	30, 5 30.6	29,2 30.	1		
Salinity (ppt)	27.0 29.6	29.6 30.2	29.7 31.6	29.4 27.9	26.0 25.0				
Temperature (°C)	352 25.6	25.0 25.2	13.8 23.	Days	10.0 Dit			l	
		1	2	3	4	5	6		
Concentration	0 init. final	Sinte funal	Contraction of the second s	mit. dital	Sint Ginal			4	
<u>6.25</u> pH	8.21 7.90	8.08 7.99	C ID MULTICATION CONTRACTOR	- 8,28 7.99	8.37 7.99			1	
DO (mg/l)	6.8 4.8	68 5.5	7.0 5.		6.9 4.0	6.8 4.7		1	
Salinity (ppt)	29.0 29.9	39.0 29.8	29.7 32.5		30.1 30.5			1	
Temperature (°C)	25.2 25.1	25,4 25.2	25.8 25.3	as.2 25.4	29.0 010	000,0 20]	
				Days 3	4	5	6]	
Concentration	0	1	2 init fina	i snit. final	Contraction of Party States and Party States and Party States	init. fii	nal init final		
125	init. final		8.16 8.00	ALL ALL	Cited States and an end of the state of the states of the	8,11 79	77 8.21 8.08	-	
рН	8.10 7.8		70 51	68 5.1	6.9 4.4	674	A	4	
DO (mg/l)	29.0 29.9	29,129.8	29.7 31.8			396 30	2.7 29.3 32.1	4	
Salinity (ppt)	29.0 29.9		26.2 25		- 25.5 25.1	26.2 25	5.5 25.5 25.7	-	
Temperature (°C)	3531610	12/2/010		Days		5	6	-	
Concentration	0	1	2	3	4		time to contract when all 250		
25	init a fina		init, fin	Same of the second s	3 8.03 7.9	sound in the second second second second	99 7.98 8.09	7	
pH	7.86 7.89	3 7,96 7.90		21-00 1.0	10.00 /11 10.8 4.Z	6.6 4	3 6,8 5.7]	
DO (mg/l)	6.9 47	69 5,5	72 5.5				99 29.3 30	1	
Salinity (ppt)	29.0 29.0		2 29.7 32.				55 25.0 26.0	_	
Temperature (°C)	25,1 25.1	6 25.7 US.	2 20 8 AD	Days	<u> </u>			-	
		1	2	3	4	5	6		
Concentration	0	i fina	i Smith Ston	at vinit. fina	l init fing				
50	7.49 7.8	0 771 7.9	9 7.71 80	5 7.34 7.9	17.24				
DO (mg/l)	6.9 4	7 72 5.5		2 71 47	L 6.9 4.0	1 29,4 3	t.3 6,7 5,6 20,2 27,5 31.5	न	
Salinity (ppt)	29.2 30.	2 295 29.	8 29.7 32	8 29.0 27.	2 28.2 30.	0 26.0 2	55 25.0 25.7	4	
Temperature (°C) 25.0 25.		2 26.6 25	2 25.3 25.	10.9 100				
				Days 3	4	5	6		
Concentration	0	1	2 al. ainit. fir		i sinte sin	al init. [[final interationa		
100	init. fin	Weiterbeit inningereiterner internet in der			97208111	21.017	45 112 81		
pH	7.09 7.8						4.3 7.1 5.3		
DO (mg/l)	714.			4 29,0 27.	4 28,1 29.		29.9 29.7 31.		
Salinity (ppt)					2 25.3 25	0 26.0 2	25.5 25.0 25.7	i	
Temperature (°C	1 (2), 1				43.4	EC Earth la E	Environmental		
						thwest Bioas			
	Control	MW-7				a Pacific Hun	y. E., Suite 2-0		
Alkalinity*	176	184				, WA 98424			
Initial Chlorine	the second s	.06				,			
A mania +		1,6] Ani	alysts:	KB, et NF		
* mg/L as CaCO3;	† mg/L; ND: n	o chlorine detec	tea			viewed:	KS		

Analysts:	K3. et MF
Reviewed :	KG

Sample Description:		Comments:	
Animal Source:	<u> </u>		
Date Received:	5/22/03		
Date of Hatch:	5/20105		

AMEC	Earth	&	Environmental	-	NW	Bioassay	Lab
------	-------	---	---------------	---	----	----------	-----

Client: Sample ID: Test No:

Unoral MW-17 0305-35NW

Initial and Final Chemistries

Seven Day Chronic Saltwater Bioassay 5/29/03 Start Date & Time: 1830 Stop Date & Time: しろ 1730 Test species: M

10 Concentration	<u> </u>	<u> </u>						~
Concentration	0	1	2	Days				1
CON	init. fine		L mit. fina	3	4	5	6	1
pН	8,31 7.9	8 8.37 8.0			An Crast Concerning a method to an internet of the second of the	init. final	init. final	
DO (mg/l)	6.8 5.4			2 8.35 7.91		8,45 8,00	8.38 8.09	1
Salinity (ppt)	39.0 29.2			6.8 4.8		6.8 4,5	6.8 5.5	1
Temperature (°C)	25.5 25,				29.7 29.9	29.2 30.0	29,0 22.4	
		0 26.0 25.4	6 260 25.2		25.5 25.3	25.5 25.0	25.5 26.5	
Concentration	0			Days				
6.25	init. fina	1	2	3	4	5	6	
	8.26 7.91	sector and an encourage and a contract of the sector of the		CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR	an ear of the second	init. Smale	init. final	
DO (mg/l)	3.00 1.010			8327.95	8.38 7.88	8.39 7.99	8.34 8.10	
Salinity (ppt)	6.8 5.0		7.0 4.8	6.9 5.9	69 4.5	6.8 4.4	6.7 5.6	
	27.0 29.9			5 29.5 29.9	30.1 30.3	29.6 30.2	29,0 30.0	
Temperature (°C)	20.5 25.	2 26.5 25.4	5 26.2 25.0	8.8 4.0		254 250	25 0 26.5	
C a a b				Days				
Concentration	0	1	2	3	4	5	6 ~	
12.5	init. fina	ting and a second s	init. final	init. final		init. final	init. final	~Çu
рН	8.19 7.95	8,27 8.05		HOLE ALL AND A SHOULD BE READING AND ALL PRIMARY AND ALL AND	and the second			đi
DO (mg/l)	6.9 5.5	70 52	7.1 50	6,9 5,3	7.0 4.4	6.7 4.7	8.29	
Salinity (ppt)	29.0 29.8		29.7 32.6	229.5 30.1	the second se		6.7	
Temperature (°C)	26.8 25.2		262764	25.5 25.1		29,7 30.6	29.2	
	101-	- ee I AI I	100.010.1	Days	25.4 25.4 2	25.5 247	255 265	
Concentration	0	1	2	Bays 3				
25	Shite Sine	Jinit Emai			4	5	<u>6 *</u>	-c.p
pH	8.06 7.92	. 8,14 8,03		8.127.92	Stuff Ghall	unite final	init. final	dry
DO (mg/l)	7.0 5.2	67 5.1				8.24 7.98	8.17	-
Salinity (ppt)	29.1 30.0	29.7 29.9		6.9 4.9	6.9 4.4	6.8 4.8	6.8	
Temperature (°C)	26.0 25.1			29.2 28.3		29.7 30,6	29.2	
<u></u>	~0.0 63.1	26.0 25.6	26.4 28.7		25.3 252 2	53 25.0	25.6265	
Concentration	0	1		Days				
50	init. final	^	2	3	4	5	6	
pH		and a second	sounde semal			init. final	init. final	
	7.80 7.92		7.90 8.00	7.81 7.96	7.94 7.90 8	1,02 7,77	792 8.08	
DO (mg/l)	7.0, 5.4		7.4 4.6	7,1 5.0		20 4.3	70 5.1	
Salinity (ppt)	29.1 30.1	295 304	a9.6 31.3	29.527.9	287310 2		29.2 30.0	
Temperature (°C)	25.6 25.2	26.0 25.4	26.425.1	759 25.3		C 12-	252 265	
0	· · · · · · · · · · · · · · · · · · ·		-	Days			C- C- W. J	
Concentration	0	1	2	3	4	5	6	
100	init. final	init. iinal	init. final	init. final	init. final	mit final	This Shall	
pH	435 1117	1 63 7 803	1 13 T X 12	113518 051	7.36 7.97 7	151 807	7 20 9 11	
DO (mg/l)	7.1 5.2	23 52	7.7 1855	7.5 5.3	7.1 4.6 -	7.7 4.6	7.6 5.1	
Salinity (ppt)	29.6 30.7	29.3 30.2	29.3 32.9	296 28/2		20,230.9		
Temperature (°C)	25.5 25.2	26.0 25.4	26.2753	25.415.(172	2012121		
· · · ·			1/1/7	WIET LJel	V1.7125.5 d	5.0 24.8 !	25.0 26.5	
					ለ አለር ርጉ ተን			
[Control	MW-17		1		rth & Environ		
Alkalinity*	176	88			ivortnwest	t Bioassay Lab		
Initial Chlorin at		08			5009 Pacif	ic Hwy. É., Sui	te 2-0	

41.0 * mg/L as CaCO3; † mg/L; ND: no chlorine detected

0.12

-

Г

Initial Chlorine[†]

Ammonia †

5009 Pacific Hwy. E., Suite 2-0 Fife, WA 98424

Analysts:	
Reviewed:	

& NF

ample Description: Animal Source: AB5 Comments: Date Received: 5 129/03 Pate of Hatch: 2/03

Initial and Final Chemistries

Client: Sample ID: Test No:

Imaga #4 0305-36NN Seven Day Chronic Saltwater Bioassay 5/29/03 Start Date & Time: Stop Date & Time: 615103

1900

1745

Test species: M. baha

$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	10
Temperature (°C) 25.5 15.2 16.5 25.0 26.0 25.8 25.5 25.4 25.5 25.2 25.0 26.0 25.0 26.0 26.0 26.0 26.0 25.8 25.5 25.4 25.5 25.2 25.0 26.0 25.0 26.0	
8,04) Days	mm
	4 Initial
Concentration 0 5.6 1 2 3 4 5 6	¥
19.25 init. final init. final mit. final init. final init. final init. final init. final init. final	
pH 8.21 8.03 8.21 8.08 9.25 8.05 8.26 8.31 8.02 8.32 8.03 8.27 8.09	8.33
DO (mg/l) 6.9 5.8 7.0 5.7 7.0 5.2 6.9 6.4 6.4 4.0 7.0 4.7 6.7 5.2	10.9
Salinity (ppt) 391 299 27.3 396 32 3 39.5 29.3 30.7 39.6 30.7 39.6 30.7 39.1 29.3	31.0
Temperature (°C) 26.0 25 2 26 2 25.0 26.5 25.5 26.3 25.5 25.1 25.3 26.0 26.0 26.8 20.8	ĺ
Days	
Concentration 0 1 2 3 4 5 6	$ \mathcal{I} $
12.5 init final init. final	0.00
pH 8.09 8.03 8.05 8.06 8.16 8.68 8.16 8.21 8.33 7.98 8.2/ 7.98 8.14 8.14	8.23
DO(mg/l) = 59 = 70 = 6.0 = 71 = 5.2 = 6.9 = 4.9 = 7.0 = 3.9 = 6.7 = 4.8 = 5.0	6.9
Salinity (ppt) 29.0 39.9 39.7 30.4 39.7 32.5 39.5 29.3 39.4 30.1 39.5 30.2 37.0 14 29.5	29.5
Temperature (°C) 26.5 25.3 24.2 25.0 26.5 25.5 26.0 25.3 25.8 25.0 26.2 25.6 21.0 26.3	-
Days	
Concentration 0 1 2 3 4 5 6	M
25 init. final	
pH 7.89 8.04 7.76 8.07 8.00 8.11 7.93 8.05 8.21 8.00 1.99 7.97 1.88 8.11	8.04
DO (mg/l) 6.9 6.1 7.1 5.6 7.0 0.5.6 7.0 4.7 5.9 6.9 4.8 6.7 5.7	Le. 7
Salinity (ppt) 39.0 30.4 39.9 30.8 39.6 32.2 29.4 25.7 24.4 30.5 39.6 30.8 37.2 24.7	29.3
Temperature (°C) 26.5 25.2 26.2 26.0 26.5 25.5 26.0 25.3 25.5 25.1 36.1 25.5 25.5 26.5	4
1 emperature (C) 26.5 05.0 00, 0 23.0 140.0 25.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12	· · · · · · · · · · · · · · · · · · ·
Temperature (C) 26.5 05.0 00, 0 23.0 AV. 5 23.0 Days	1 307
Temperature (C) Ze.3 Job (D) Job (D) <thjob (d)<="" th=""></thjob>	W
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	440 202
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	7.73
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	7.73
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	7.73
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	7.73
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	7.73
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	7.73
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	7.73 7.1 89
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	7.73 7.1 29.00
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	7.73 7.1 29.5 7.36 7.36 7.7
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	7.73 7.1 29.00

	Control	MW-CO3R	
Alkalinity*	176	392	
Initial Chlorine†		.05	 T
Ammonia †	_	5.7	

* mg/L as CaCO3; † mg/L; ND: no chlorine detected

AMEC Earth & Environmental Northwest Bioassay Lab 5009 Pacific Hwy. E., Suite 2-0 Fife, WA 98424

Analysts: Reviewed:

Et. SM NF

Sample Description: Animal Source: PH2 Date Received: Date of Hatch:

Comments:

Client:	Unocal	
Sample ID:	#5	MW-129
Test No:	0305-3	INW

Initial and Final Chemistries

Seven Day Chronic Saltwater Bioassay

16:45 Start Date & Time: 5/29/03 Stop Date & Time: 615/03 1500 Test species: <u>M</u>, 0 alua

0/0							Da	ys						
Concentration	1	0	1	1		2	3	3	4	1		5	6	
CON		final	init.			final	init	final		final		final	init.	
pH	8.31	7.76	8.37	8.05	8.33	8.02	8.35	and the state of the	8.45		9.45	8.04	8.38	8.14
DO (mg/l)	6.8	5.2	6,8	5,6	7.0	5.3	6.8	5.0	70	4.4	6,8	4,8		5.7
Salinity (ppt)	29.0	29.4	29.6	30,5		33.2	29.4	292	29.7	30.3	39.9	29.4	29.0	29.7
Temperature (°C)	252	25.0	25.8	25.0	25.5	<u>25.1</u>	<u>257</u>		<u>ass</u>	25.0	15.9	25.0	25,2	27.0
							Da				· · ·	-		
Concentration		0		L.		2	· · · · · · · · · · · · · · · · · · ·	3		1		5	6	
0.25	init.	final	and a second state of the second	final		final	init.	final	init.	final	Contract of the second s	final	init.	final
pH	8.1	7.94	8.33	8,08	8.18	8.07	83	8.00	8.26	8,03	8,36	7.99		8.10
DO (mg/l)	6.9	49	6.8	5.5	7,0	64	6.7	4.9	10 2	44	6,9	4.5	6.7	5.8 30.0
Salinity (ppt)	29.0	29.8	29.8	30.5	29.8	32.8		$d t \delta$	29.3	30.8	27.7	30:3	24.1	
Temperature (°C)	254	25.0	25.5	25.2	26.0	96.3	25.5	859	<u>as 7</u>	25.0	29.0	200	25.2	27.0
					1	<u> </u>		iys 3		4	r	5	6	
Concentration		0	· · ·	1		2		> final		-		final	Sint.	-
12.5	init.	final.	init.		1 President start description	final	7.91	8.01	8.176	S.J.L	8,29	8.02	-14.14 A5 45 46 40 61 7 + 01	8.17
pH	791	167d	8.08	8,08	8.04		61	4.8	the second	<u>003</u> 44	6.9	4.7	66	5.7
DO (mg/l)	6.1	4.8	6.8	5.6	7.0	5.2	6.	28.2		30.9	39.4	249		247
Salinity (ppt)	29.0	30,5	29.8	30,6	200	33.7	29.4	28.2	29.4	25.0	250	26.4	25.2	27.0
Temperature (°C)	254	25.0	25.5	25.0	26.5	125.0	25,5	1059	ass	27.0	10.0	1 40.7	112 6	41.01
				1=		19.1.0						L		
							Da	ays	·		I			
Concentration		0		1		2	Da	ays 3		4		5		6
25		0 final.	init.	1 final	init.	2 final	Da init.	ays 3 final	init	4 final	init.	5 final	init.	6 Final
25 pH		0		1 final 8.		2 final 8.12	Da	ays 3	init. 7.75	4	init. 8.11	5	init. 7.97	6 final 8,24
25 pH DO (mg/l)	Init 7,59 6,7	0 6inal 7.99 5.2	init. 7,80 6,7	1 final 8, 5,6	init. 78] 6.9	2 final 8.12 5.5	Da init. 7,58 6, 7	ays 3 final 8.05 4.7	init. 7.75 (e.8	4 final 8.03 4.3	init. 9.11 6.9	5 final 8.0 2 4.6	7.97 6.7	6 final 8,24 5,7
25 pH DO (mg/l) Salinity (ppt)	init. 7.59 6.7 29.2	0 1 final 7,99 5,2 30,4	init. 7,80 6.7 29,8	1 5,6 30,3	1111. 781 6.9 24.7	2 final 8.12 5.5 35.2	Di init. 7,58 6,7 29,5	ays 3 final 8.05 4.7 27.9	1111 7.75 6.8 29.3	4 final 8.03 4.3 30.4	init. 8.11 6.3 29.4	5 final 8.0.2 4.6 30.0	init: 7.97 6.7 29.3	6 Final 8:24 5,7- 22:4
25 pH DO (mg/l)	Init 7,59 6,7	0 6inal 7.99 5.2	init. 7,80 6,7	1 final 8, 5,6	init. 78] 6.9	2 final 8.12 5.5	D: init. 7,58 6,7 29,5 2,52	ays 3 (final) 8.05 4.7 27.9 27.9 2.5	init. 7.75 (e.8	4 final 8.03 4.3	init. 9.11 6.9	5 final 8.0.2 4.6 30.0	7.97 6.7	6 final 8,24 5,7
25 pH DO (mg/l) Salinity (ppt) Temperature (°C)	imit. 7.59 6.7 29.2 25.J	0 final 7,99 5,2 30,4 25.0	init. 7,80 6,7 29,8 25.8	1 final 8, 5, 6 30, 3 25.0	init. 781 6.9 24.7 240.5	2 final 8.12 5.5 35.2 35.2 25.0	D: init. 7,58 6,7 21,5 25,2 D:	ays 3 final 8.05 4.7 27.9 27.9 as.7 ays	1111 7.75 6.8 29.3 25.4	4 8.03 4.3 30.4 25.0	init. 8.11 6.3 29.4	5 final 8.0.2 4.6 30.0 26.4	init: 7.97 6.7 29.3 25.2	6 Final 8:24 5:7 22:4 27.0
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration	init. 7.59 6.7 29.2 25.1	0 final 7,99 5,2 30,4 25.0	init 7, 80 6, 7 29,8 25.8	1 (final) (8, 5,6 30,3 25.0 1	1011 7.81 6.9 2.4.7 2.6.5	2 (final) (8.12- (5.5) (35.2)	Di init. 7,58 6,7 29,5 25,2 Di	ays 3 final 8.05 9.7 27.9 2.7 3.7 ays 3	17.75 (1.8) 29.3 25.4	4 final 8.03 4.3 30.4 25.0 4	1nit. 9.11 6.9 29.4 25.0	5 final 8.0.4 7.6 30.0 2.6.4 5	1011 7.97 6.7 29.3 25.2	6 Final 8:24 5:7 22:4 27:0 6
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50	imit. 7.59 6.7 29.2 25.J	0 final 7,99 5,2 30,4 25.0 0 final	init. 7,80 6,7 29,8 25.8 init.	1 final 8. 5.6 30.3 25.0 1 final	init. 781 6.9 24.7 240.5	2 final 8.12 5.5 35.2 25.0 2 final	D: init. 7,58 6,7 21,5 25,2 D:	ays 3 final 8.05 4.7 27.9 27.9 25.7 ays 3 final	1011 7.75 (0.8 29.3 25.4 25.4 init	4 final 8.03 4.3 30.4 25.0 4 final	init. 8.11 6.3 29.4	5 final 8.0 A 4.6 30.0 2.6.4 5 final	1mit. 7.97 6.7 29.3 25.2 1mit.	6 final 8,24 5,7 22,4 27.0 6 final
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH	imit. 7.59 6.7 29.2 25.J imit. 7.38	0 final 7,99 5,2 30,4 25.0 0 0 final 8,06	init. 7,80 6,7 29,8 25.8 init. 7,43	1 5,6 30,3 25.0 1 final 8./4	1011 7.81 6.9 29.7 26.5 1015	2 final 8.12 5.5 35.2 2.5 2 2 final 8.15	Di init. 7,58 6,7 29,5 25,2 Di	$\begin{array}{c} \mathbf{ays} \\ \mathbf{final} \\ 8.05 \\ 4.7 \\ 27.7 \\ 27.7 \\ \mathbf{as.7} \\ \mathbf{ays} \\ 3 \\ \hline \mathbf{final} \\ 8.06 \end{array}$	1001 7:75 (e.8 29.3 29.3 25.4 1001 7:38	4 8.0.3 4.3 30.4 25.0 4 final 80 7	init. 9.11 6.9 29.4 25.0 init. 7.76	5 final 7.6 30.0 26.9 5 final 9.08	1011 7.97 6.7 29.3 25.2	6 final 5, 7 22, 4 27, 0 6 final 8.16
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l)	7.59 C .7 Q 9.2 Q 5.1 Unit . 7.28 6.0	$\begin{array}{c c} 0 \\ final \\ 7,99 \\ 5,2 \\ 30,4 \\ 25.0 \\ 0 \\ \hline 0 \\ final \\ 8,06 \\ 5,1 \\ \end{array}$	init 7, 80 6, 7 29,8 25.8 init 7,43 6,5	$ \begin{array}{c} 1 \\ \hline final \\ \hline S, [1] \\ \\ 5, 6 \\ 30, 3 \\ 25, 0 \\ \end{array} \begin{array}{c} 1 \\ \hline final \\ \hline \\ S, [4] \\ \\ S, 4 \\ \end{array} $	init. 781 6.1 29.7 240.5 init. 7.53 6.9	2 final 8.12 5.5 35.2 2.5 2 2 final 8.15 5.3	Di init. 7,58 6,7 29,5 2,52 Di init. 7,26 6,6	$\begin{array}{c} xys \\ final \\ 8.05 \\ 4.7 \\ 27.7 \\ 27.7 \\ as.7 \\ ays \\ 3 \\ final \\ 8.06 \\ 5.0 \end{array}$	1000 7.75 6.8 29.3 29.3 25.4 100 7.38 6.6	4 8.03 4.3 30.4 25.0 4 final 807 4.6	init. 9.11 6.3 27.4 25.0 init. 7.76 7.0	5 final 8.0-2 7.6 30.0 26.4 5 5 5 5 6 7 6 7 1 9.08 1 4.9 1 1 1 1 1 1 1 1 1 1 1 1 1	init 7.97 6.7 29.3 25.2 Init 7.66 6.7	6 6 5.7 22.4 27.0 6 6 6 6 5.6
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt)	imit. 7.59 6.7 29.2 25.J unit. 7.28 6.6 2.9.4	$ \begin{array}{c} 0 \\ final \\ 7,99 \\ 5,2 \\ 30,4 \\ 25.0 \\ 0 \\ \hline 1 \\ 1 \\ 30,5 \\ 30,5 \\ \end{array} $	init. 7,80 6,7 29,8 25.8 init. 7,43	1 final 8.11 5.6 30.3 25.0 1 final 8.14 5.4 30.7	1011 7.81 6.9 29.7 26.5 1015	2 final 8.12 5.5 35.2 2.5 0 2 final 8.15 5.3 5.2 732.4	Di init, 7,58 6,7 29,5 25,2 Di init, 7,26 6,6 29,7	$\begin{array}{c} xys \\ final \\ 8.05 \\ 4.7 \\ 27.9 \\ 27.9 \\ xs.7 \\ ays \\ 3 \\ final \\ 8.06 \\ 5.0 \\ 27.9 \end{array}$	7.75 (e.8 29.3 29.3 25.4 7.38 (e.6 29.1	$ \begin{array}{c} 4 \\ \hline final \\ 8.03 \\ 4.3 \\ 30.4 \\ 25.0 \\ 4 \\ \hline final \\ 807 \\ 4.6 \\ 30.6 \\ \end{array} $	init. 9.11 6.3 27.4 25.0 init. 7.76 7.0 27.3	5 final 9,0-1 4,6 30.0 264 5 final 9,08 4,9 14,9 29,5	Init 7.97 6.7 29.3 25.2 Init 7.66 6.7 29.5	$ \begin{array}{c} 6 \\ Final \\ 8.24 \\ 5.7 \\ 22.4 \\ 27.0 \\ 6 \\ Final \\ 8.16 \\ 5.6 \\ 29.2 \\ \end{array} $
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l)	7.59 C .7 Q 9.2 Q 5.1 Unit . 7.28 6.6	$\begin{array}{c c} 0 \\ final \\ 7,99 \\ 5,2 \\ 30,4 \\ 25.0 \\ 0 \\ \hline 0 \\ final \\ 8,06 \\ 5,1 \\ \end{array}$	init 7, 80 6, 7 29,8 25.8 init 7,43 6,5	$ \begin{array}{c} 1 \\ \hline final \\ \hline S, [1] \\ \\ 5, 6 \\ 30, 3 \\ 25, 0 \\ \end{array} \begin{array}{c} 1 \\ \hline final \\ \hline \\ S, [4] \\ \\ S, 4 \\ \end{array} $	init. 781 6.1 29.7 240.5 init. 7.53 6.9	2 final 8.12 5.5 35.2 2.5 2 2 final 8.15 5.3	Di init, 7,58 6,7 29,5 29,5 0,6 1,26 6,6 29,7 3,5 4	$\begin{array}{c} ays \\ 3 \\ final \\ 8.05 \\ 4.7 \\ 2.7 \\ 2.7 \\ 3.7 \\ 3.5 \\ 7 \\ 3.5 \\ 5.0 \\ 2.7 \\ 3.5 \\ 5.0 \\ 2.7 \\ 3.5 \\ 3.5 \\ 5.0 \\ 2.7 \\ 3.5 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ 3.5 \\ 5.0 \\ $	1000 7.75 6.8 29.3 29.3 25.4 100 7.38 6.6	4 8.03 4.3 30.4 25.0 4 final 807 4.6	init. 9.11 6.3 27.4 25.0 init. 7.76 7.0	5 final 9,0-1 4,6 30.0 264 5 final 9,08 4,9 14,9 29,5	Init 7.97 6.7 29.3 25.2 Init 7.66 6.7 29.5	6 6 5.7 22.4 27.0 6 6 6 6 5.6
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt) Temperature (°C)	1011 7.59 6.7 29.2 25.J 0011 7.28 6.6 2.9.4 2.5.0	$\begin{array}{c} 0 \\ final \\ 7.99 \\ 5.2 \\ 30.4 \\ 25.0 \\ \hline 25.0 \\ \hline 30.5 \\ 5.1 \\ 30.5 \\ 25.0 \\ \hline 30.5 \\ 25.0 \\ \hline \end{array}$	init. 7,80 6,7 29,8 25.8 25.8 Init. 7,43 6,5 2,7 25.6	$ \begin{array}{c c} 1 \\ final \\ 8, 1 \\ 5, 6 \\ 30, 3 \\ 25.0 \\ 1 \\ final \\ 8, 1 \\ 5, 4 \\ 30, 7 \\ 25.1 \\ \end{array} $	init. 781 6.1 29.7 240.5 init. 7.53 6.9	$ \begin{array}{c} 2 \\ $	Di init, 7,58 6,7 29,5 25,2 Di init, 7,26 6,6 29,7 25,4 0,5,4 0,5,4 0,5,4 0,5,4 0,5,4 0,5,4 0,5,4 0,5,4 0,5,4 0,5,4 0,5,4 0,5,4 0,5,4 0,5,5 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,8 0,7 0,5,9 0,7 0,5,9 0,7 0,5,9 0,7 0,7 0,7 0,5,9 0,7 0,7 0,5,9 0,7 0,7 0,7 0,7 0,7 0,7 0,7 0,7 0,7 0,7	$\begin{array}{c} ays \\ 3 \\ final \\ 8.05 \\ 4.7 \\ 27.7 \\ axs.7 \\ axs.7 \\ axs.7 \\ axs \\ 5.7 \\ 3 \\ final \\ 8.06 \\ 5.0 \\ 27.7 \\ axs \\ 5.0 \\ 27.9 \\ axs \\ xs \\ xs \\ xs \\ xs \\ xs \\ xs \\ x$	7.75 (4.8) 29.3 25.4 (4.6) 7.38 (4.6) 29.1 25.4	4 9.03 4.3 30.4 25.0 4 final 807 4.6 30.6 25.0	init. 9.11 6.3 27.4 25.0 init. 7.76 7.0 27.3	5 final 8.0-2 4.6 30.0 2.6.4 5 final 8.08 4.9 2.9.5 2.6.4	1011 7.97 6.7 29.3 25.2 1016 7.66 6.7 29.5 29.5 25.2	$\begin{array}{c} 6 \\ final \\ 8, 24 \\ 5, 7 \\ 29, 4 \\ 27, 0 \\ 6 \\ \hline final \\ 8, 16 \\ 5, 6 \\ 29, 2 \\ 27, 0 \\ \end{array}$
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration	1011 7.59 6.7 29.2 25.J 5.J 00111 7.28 6.6 2.9.4 2.5.0	$\begin{array}{c} 0 \\ final \\ 7.99 \\ 5.2 \\ 30.4 \\ 25.0 \\ \hline 25.0 \\ \hline 30.5 \\ 5.1 \\ 30.5 \\ 25.0 \\ \hline 0 \\ \hline \end{array}$	init 7,80 6,7 29,8 25.8 25.8 Init 7,43 6,5 2,7,7 25.6	$ \begin{array}{c} 1 \\ \hline final \\ \hline 8, 1 \\ \hline 5, 6 \\ 30, 3 \\ 25.0 \\ \end{array} $ $ \begin{array}{c} 1 \\ \hline 1 \\ \hline 30, 1 \\ \hline 5, 4 \\ \hline 30, 1 \\ \hline 25.1 \\ \end{array} $	init. 78/ 6.7 26.5 10:5 10:5 7.53 6.9 26.9 26.0	$ \begin{array}{c} 2 \\ \hline final \\ 8.12 \\ 5.5 \\ \overline{35.2} \\ \overline{32.4} \\ \overline{32.4} \\ \overline{25.3} \\ \overline{32.4} \\ \overline{35.3} \\ \overline{35.2} \\ \overline$	Di init, 7.58 6.7 29.5 25.2 D. init, 7.26 6.6 29.7 25.4 D. D. D. D. D. D. D. D. D. D.	$\begin{array}{c} ays \\ 3 \\ final \\ 8.05 \\ 4.7 \\ 2.7 \\ 2.7 \\ 3.7 \\ 3.5 \\ 7 \\ 3.5 \\ 5.0 \\ 5.0 \\ 2.7 \\ 3.5 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ $	7.75 4.8 29.3 25.4 7.38 4.4 7.38 4.4 29.1 25.4	$ \begin{array}{c} 4 \\ \$.03 \\ 4.3 \\ 30.4 \\ 25.0 \\ 4 \\ \$.01 \\ \$.01 \\ \$.01 \\ \$.01 \\ \$.01 \\ 1.6 \\ 30.6 \\ 25.0 \\ 4 \\ \end{array} $	init. 9.11 6.9 25.0 init. 7.76 7.0 25.0 25.0	5 final 8,0-1 4,6 30.0 26.4 5 final 9,08 4,9 29,5 26.4 3,08 4,9 29,5 26.4 5 26.4 5	imit 7.97 6.7 29.3 25.2 init 7.66 6.7 29.5 29.5 25.2	$\begin{array}{c} 6 \\ final \\ 8, 24 \\ 5, 7 \\ 22, 4 \\ 27, 0 \\ 6 \\ \hline final \\ 8, 16 \\ 5, 6 \\ 29, 2 \\ 27, 0 \\ \hline \end{array}$
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration [00	1011 7.59 6.7 29.2 25.J 0011 7.28 6.6 2.9.4 2.5.0	$ \begin{array}{c} 0 \\ final \\ 7,99 \\ 5,2 \\ 30,4 \\ 25,0 \\ 0 \\ final \\ 8,06 \\ 5,1 \\ 30,5 \\ 25,0 \\ 0 \\ final \\ 6 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1$	init 7,80 6,7 29,8 25.8 1011 7,4-3 6,5 2,9,7 25.5 1011	$ \begin{array}{c} 1 \\ \hline final \\ \hline 8.11 \\ \hline 5.6 \\ 30.3 \\ 25.0 \\ \end{array} $ $ \begin{array}{c} 1 \\ \hline 1 \\ \hline 30.1 \\ \hline 30.1 \\ \hline 30.1 \\ \hline 25.1 \\ \end{array} $ $ \begin{array}{c} 1 \\ \hline 1 \\ \hline final \\ \end{array} $	init. 7.8/ 6.7 3.9.7 26.5 init. 7.5.3 6.9 1.3.9.7 2.6.0	2 final 8.12 5.5 35.2 2.5 final 8.15 5.3 32.4 2.5 32.4 2.5 32.4 2.5 32.4 2.5 32.4 2.5 32.4 2.5 32.4 2.5 35.2 35.2 35.2 2.5 35.2 35.2 35.2 2.5 35.2 35.2 2.5 35.2 32.4 32.4 25.2 35.2 35.2 32.4 25.3 32.4 25.2 32.4 25.2 35.2 35.2 32.4 25.3 32.4 25.2 35.2	Di init, 7.58 6.7 29.5 25.2 D. init, 7.26 6.6 29.7 25.4 D. init, 7.26 5.4 29.7 D. init, 7.58 5.7 D. init, 7.58 5.7 D. init, 7.58 5.7 D. init, 7.58 5.7 D. init, 7.58 5.7 D. init, 7.58 5.7 D. init, 7.58 5.7 D. init, 7.26 5.6 29.7 D. init, 7.26 5.6 29.7 D. init, 7.26 5.4 29.7 D. init, 7.26 5.4 7.26 5.4 7.26 5.4 29.7 D. init, 7.26 5.4 29.7 D. init, 7.26 29.7 D. init, 7.26 29.7 D. init, 7.26 29.7 D. init, 7.26 D. init, D. D. D. D. D. D. D. D. D. D. D. D. D. D. D. D. D. D	ays 3 final 8.05 4.7 27.7 as.8 as.8	init 7.75 (u.8) 29.3 35 4 init 7.38 (u.6) 29.1 25.4 init	4 9.03 4.3 30.4 25.0 4 final 807 4.6 30.6 25.0	init. 9.11 6.9 25.0 init. 7.76 7.0 25.0 init. 7.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1	5 final 8.0.2 4.6 30.0 26.4 5 final 8.08 4.9 29.5 26.4 39.5 20.4 4.9 29.5 20.4 4.9 29.5 20.4 4.9 29.5 20.4 4.6 1.6	imit 7.97 6.7 29.3 25.2 Imit 7.66 6.7 29.5 25.2	$\begin{array}{c} 6 \\ final \\ 8, 24 \\ 5, 7 \\ 22, 4 \\ 27, 0 \\ 6 \\ \hline final \\ 8, 16 \\ 5, 6 \\ 29, 2 \\ 27, 0 \\ \end{array}$
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration [00 pH	$ \begin{array}{c} Init \\ 7.59 \\ \zeta.7 \\ 29.2 \\ 35.1 \\ \hline 1011 \\ \hline 7.28 \\ 6.6 \\ 29.4 \\ 3.5.0 \\ \hline 1011 \\ \hline 7.28 \\ 7.28 \\ 7.07 \\ \end{array} $	0 final 7.995.2 $30.425.00final8.065.130.525.00final8.08.125.0$	init 7,80 6,7 29,8 25.8 25.8 Init 7,43 6,5 2,7,7 25.6	$ \begin{array}{c} 1 \\ \hline final \\ \hline S.6 \\ 30.3 \\ 25.0 \\ \hline 1 \\ final \\ S.14 \\ S.4 \\ 30. \\ 25.1 \\ 1 \\ final \\ \overline{S.44} \\ 30. \\ 25.1 \\ 1 \\ \overline{S.44} \\ 30. \\ 25.1 \\ 1 \\ \overline{S.44} \\ S.$	init. 7.8/ 6.7 3.9.7 26.5 init. 7.5.3 6.9 3.9.7 26.0 init. 7.27	2 final 8.12 5.5 35.2 2.5 final 8.15 5.3 32.4 2.2 4.25.2 2.2 5.3 5.3 5.3 5.3 5.3 5.3 5.3 5.3	Di init, 7,58 ζ , 7 29,5 25,2 D. init, 7,26 ζ , 6 ζ , 7 29,7 29,7 25,7 D. init, 7,26 ζ , 7 29,5 D. init, 7,26 ζ , 7 D. init, 7,26 ζ , 7 D. init, 7,26 D. init, 7,20 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 1,03 D. i,13,0 D. i,13,0 D. i,13,0 D. i,13,0 D. i,1	$\begin{array}{c c} xys \\ \hline final \\ \hline 8.05 \\ \hline 4.7 \\ \hline 27.7 \\ \hline 27.7 \\ \hline xs.7 \\ \hline xs.7$	init 7:75 (2.8 29.3 25.4 init 7:38 (2.6 29.1 25.4 init 7:09	$ \begin{array}{c} 4 \\ $	init. 9.11 6.9 25.0 init. 7.76 7.0 25.0 25.0	5 final 3.0.2 4.6 30.0 26.4 5 final 9.08 4.9 29.5 26.4 3.08 4.9 29.5 26.4 5 5 6 6 6 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 7 6 7 7 7 7 7 7 7 7 7 7	init 7.97 6.7 29.3 25.2 init 7.6c 6.7 39.5 29.5 25.2 init 7.39	$ \begin{array}{c} 6 \\ \hline final \\ \hline 8, 24 \\ \hline 5, 7 \\ \hline 22.4 \\ \hline 27.0 \\ \hline 6 \\ \hline final \\ \hline 8.16 \\ \hline 5.6 \\ \hline 29.2 \\ \hline 27.0 \\ \hline 6 \\ \end{array} $
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration [00 pH DO (mg/l)	$ \begin{array}{c} Init \\ 7.59 \\ \overline{}.7 \\ \overline{}9.2 \\ \overline{}5.1 \\ \overline{}9.2 \\ \overline{}5.1 \\ \overline{}9.2 \\ \overline{}5.1 \\ \overline{}9.2 \\ \overline{}9.2 \\ \phantom$	$ \begin{array}{c c} 0 \\ final \\ 7,99 \\ 5,2 \\ 30,4 \\ 25,0 \\ 0 \\ final \\ 8,06 \\ 5,1 \\ 30,5 \\ 25,0 \\ 0 \\ final \\ 8,1 \\ 4,7 \\ 4,7 \\ \end{array} $	init 7,80 6,7 29,8 25.8 init. 7,43 6,5 29,7 25.6 init. 7,33 6,5	$ \begin{array}{c} 1 \\ final \\ 8, 1 \\ 5, 6 \\ 30, 3 \\ 25, 0 \\ 1 \\ final \\ 8, 14 \\ 5, 4 \\ 30, 14 \\ 5, 14 \\ 1 \\ final \\ 8, 14 \\ 5, 5 \\ \end{array} $	init. 7.8/ 6.9 3.9.7 26.5 init. 7.53 6.9 3.9.7 26.0 init. 7.27 6.5	$ \begin{array}{c} 2 \\ final \\ 8.12 \\ 5.5 \\ 35.2 \\ 2.5.0 \\ \hline 35.2 \\ 2.5.0 \\ \hline 35.2 \\ 2.5.3 \\ \hline 5.3 \\ \hline 5.$	Dial init, 7,58 $\zeta,7$ 29,5 29,5 Dial init, 7,26 $\zeta,6$ 29,7 25,7 Dial init, 7,26 $\zeta,6$ 29,7 25,7 Dial init, 7,58 5,7 Dial init, 7,26 $\zeta,6$ Dial init, 7,26 $\zeta,7$ Dial init, 7,26 $\zeta,6$ Dial init, 7,26 $\zeta,7$ Dial init, 7,26 $\zeta,7$ Dial init, 7,26 $\zeta,7$ Dial init, 7,26 $\zeta,6$ Dial init, 7,26 $\zeta,7$ Dial init, 7,26 $\zeta,7$ $\zeta,7$ Dial init, 7,26 $\zeta,7$ $\zeta,5$	$\begin{array}{c} ays \\ 3 \\ final \\ 8.05 \\ 4.7 \\ 2.7 \\ 2.7 \\ 3 \\ 5.7 \\ ays \\ 3 \\ 5.0 \\ 2.7 \\ 7 \\ 3 \\ 5.0 \\ 2.7 \\ 7 \\ 3 \\ 5.0 \\ 3 \\ 5.0 \\ $	init 7:75 (2.8) 29.3 25.4 init 7:38 (2.6) 29.1 25.4 init 7:09 5:9	$ \begin{array}{c} 4 \\ $	init. 9.11 6.9 27.4 25.0 init. 7.76 7.0 25.0 init. 7.25 7.4	5 final 3.0-3 4.6 30.0 26.4 5 final 9.08 4.9 29.5 29.5 26.4 5 final 9.04 4.9 29.5 26.4 4.9 29.5 26.4 4.9 29.5 26.4 4.9 29.5 26.4 4.9 29.5 26.4 4.9 29.5 26.4 4.9 29.5 26.4 4.9 29.5 26.4 4.9 29.5 26.4 4.9 29.5 26.4 4.9 29.5 26.4 4.9 29.5 26.4 4.9 29.5 26.4 4.9 29.5 26.4 4.9 20.0 4.9 20.0 4.9 5 5 5 5 5 5 5 5	init 7.97 6.7 23.3 25.2 init 7.6c 6.7 39.5 25.2 init 7.39 7.3	$ \begin{array}{c} 6 \\ \hline final \\ \hline 8, 24 \\ \hline 5, 7 \\ \hline 22.4 \\ \hline 27.0 \\ \hline 6 \\ \hline final \\ \hline 8.16 \\ \hline 5.6 \\ \hline 29.2 \\ \hline 27.0 \\ \hline 6 \\ \end{array} $
25 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration 50 pH DO (mg/l) Salinity (ppt) Temperature (°C) Concentration [00 pH	$ \begin{array}{c} Init \\ 7.59 \\ \zeta.7 \\ 29.2 \\ 35.1 \\ \hline 1011 \\ \hline 7.28 \\ 6.6 \\ 29.4 \\ 3.5.0 \\ \hline 1011 \\ \hline 7.07 \\ \end{array} $	$ \begin{array}{c c} 0 \\ final \\ 7,99 \\ 5,2 \\ 30,4 \\ 25,0 \\ 0 \\ final \\ 8,06 \\ 5,1 \\ 30,5 \\ 25,0 \\ 0 \\ final \\ 8,1 \\ 4,7 \\ 4,7 \\ \end{array} $	init 7,80 6,7 29,8 25.8 1011 7,4-3 6,5 2,9,7 25.5 1011	$ \begin{array}{c} 1 \\ \hline final \\ \hline S.6 \\ 30.3 \\ 25.0 \\ \hline 1 \\ final \\ S.14 \\ S.4 \\ 30. \\ 25.1 \\ 1 \\ final \\ \overline{S.44} \\ 30. \\ 25.1 \\ 1 \\ \overline{S.44} \\ 30. \\ 25.1 \\ 1 \\ \overline{S.44} \\ S.$	init. 7.8/ 6.7 3.9.7 26.5 init. 7.5.3 6.9 3.9.7 26.0 init. 7.27	2 final 8.12 5.5 35.2 2.5 final 8.15 5.3 32.4 2.2 4.25.2 2.2 5.3 5.3 5.3 5.3 5.3 5.3 5.3 5.3	Di init, 7,58 ζ , 7 29,5 25,2 D. init, 7,26 ζ , 6 ζ , 7 29,7 29,7 25,7 D. init, 7,26 ζ , 7 29,5 D. init, 7,26 ζ , 7 D. init, 7,26 ζ , 7 D. init, 7,26 D. init, 7,20 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 7,03 D. init, 1,03 D. i,13,0 D. i,13,0 D. i,13,0 D. i,13,0 D. i,1	$\begin{array}{c c} xys \\ \hline final \\ \hline 8.05 \\ \hline 4.7 \\ \hline 27.7 \\ \hline 27.7 \\ \hline xs.7 \\ \hline xs.7$	init 7:75 (2.8 29.3 25.4 init 7:38 (2.6 29.1 25.4 init 7:09	$ \begin{array}{c} 4 \\ $	init. 9.11 6.9 25.0 init. 7.76 7.0 25.0 init. 7.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1	5 final 3.0.2 4.6 30.0 26.4 5 final 9.08 4.9 29.5 20.4 5 20.4 5 final 9.04 14.9 29.5 20.4 14.9 29.5 20.4 14.9 29.5 20.4 14.9 29.5 20.4 14.9 29.5 20.4 14.9 29.5 20.4 14.9 29.5 20.4 14.9 29.5 20.4 14.9 20.4 14.9 20.4 14.9 20.4 14.9 20.4 14.9 20.4 14.9 20.4 14.9 20.4 14.9 20.4 14.9 20.4 14.9 20.4 14.9 20.4 14.9 20.4 14.9 20.5 20.4 14.9 20.5 20.4 14.9 20.5 20.4 14.9 20.5 20.4 14.9 20.5 20.4 14.9 20.5 20.4 14.9 20.5 20.4 14.9 20.5 20.4 14.9 20.5 20.4 14.9 20.5 20.4 14.9 20.5 20.4 14.9 20.5 20.4 14.9 20.5 20.4 14.9 20.5 20.4 14.9 20.5 20.4 14.9 20.1 15.01 15.01	init 7.97 6.7 29.3 25.2 init 7.6c 6.7 39.5 29.5 25.2 init 7.39	$ \begin{array}{c} 6 \\ final \\ 8,24 \\ 5,7 \\ 22,4 \\ 27,0 \\ 6 \\ final \\ 8.16 \\ 5.6 \\ 27,0 \\ 6 \\ final \\ 6 \\ final \\ 6 \\ \hline $

ſ	Control	MW-129	
Alkalinity*	176	>400	
Initial Chlorine†	-	ND	1
Ammonia †		2.6	

* mg/L as CaCO3; † mg/L; ND: no chlorine detected

MRS

AMEC Earth & Environmental Northwest Bioassay Lab 5009 Pacific Hwy. E., Suite 2-0 Fife, WA 98424

\$

Analysts:	et sm NF
Reviewed :	VAS

Sample Description: Animal Source: Date Received: 5~Y Date of Hatch:

11	1				
15	5	20	1	03	
5	2	2	c	3	

Comments:

AMEC Earth a	& Environmental - NW Bioassay Lab	Initial and Final Chemistries
Client:	Unocal	Seven Day Chronic Saltwater Bipassay Start Date & Time: 5/29/03 9430
1	unnal	Start Date & Time: <u>5/29/03</u> 9:30
Sample ID:	± 10 MW-W	Stop Date & Time: 6/5/03 1830
Test No:	0305-38NN	Test species:

	T													
J. Concentration			·		······	·····	T	ays	····					
	1	0	1	1		2	L	3		4		5		6
CON	init.	final	init.	final	init.		init.	final	init.	final	Spif			final
pH	8.31	8.02	8.37	8.09	3.33	7.95	8.35	7.92	8.45	8:04	3.45	7.92	8.38	8.15
DO (mg/l)	6.8	5.7	6.8	5,5	70	4.7	6.8	5.3	7.0	4.7	6,8	5,0	6.8	164
Salinity (ppt)	29.0	29.4	29.6	30.6	29,7	32.2	29.4	28,9	297	29.3	29,2	29.3	29.0	285
Temperature (°C)	as.s	25.4	26.5	25.4	25.6	253	25.0	25.2	253	25.4	26.5	253	25.1	Q6.S
	L							ays			F			
Concentration		0		1		2		3		4	5	5		6
(0.25	init.	final	init.	 Million and a standard stand Standard standard stand Standard standard stand Standard standard stand Standard standard stand Standard standard stand Standard standard stand Standard standard stand Standard standard stand Standard standard stand Standard standard standard standard standard standard standard standa	init.	final	init.	final	init.	final	Ainit.	final		final
pH	8.20	8.00	8.17	8,05	8,23	7.99	8.20	7.96	8.29	8.00	8.27	804	8.76	8.15
DO (mg/l)	6.7	5.7	69	15.7	7.0	49	6.8	5.1	6.9	4.7	68	5.1	6.7	6.3
Salinity (ppt)	29.0	29.2	297	30,8	29.7	31.9	29.2	27.9	29.2	29.5	223	29.8	2%3	29.1
Temperature (°C)	255	15.2	260	25.4	24.2	25.4	25.0	25.4	25.1	25.4	26.0	25.3	26.0	26.5
·····		- <u>(</u>		·	•		Da	ays		<u>12 - 1</u>		. <u> </u>		
Concentration		0	· ·	1	[2		3		4	5	5		6
125	init.	Shall	init.	final	s init.	final	init.	final	init.	final		final	init.	final
pH	8.03	8.00	8.00	8,04	8,09	8.00	8.02	7.98	8.17	8.05	8.16	8.00	8.11	8.2
DO (mg/l)	6.8	5.7	6.9	56	71	4.8	6.7	5.1	10.8	4.8	6.7	4.6	6,8	10.7
Salinity (ppt)	24.0	29.4	29.7	30,8	29.7	32.1	29.4	27.9	29.1	30.0	29.5	29.9	29.4	30.
Temperature (°C)	as. 3	26.0	26.0	25.5	25.8	117	2.0	25.2	25.8	255	2/. 2	25.3	26.0	26:
Temperature (C)		120.0		120.5	69.0	123. 1		ays	10 1.0	123.3	49.6		00.0	10-0-
Concentration		0	T	1	[2		3		4		5		6
25		final	milia	_	init.	- final		final	init.	final	init.	final	init	final
pH	7.84	7.99	6.90		7.86	8.05	7.65	801	795	8.05	7.92	8.01	7.83	815
DO (mg/l)	6.9	5.5	7.644		1.00	5.1	6.7	5.2	1.12	4.7	6.7	4.7	6.3	6.3
Salinity (ppt)	29.0	29.4	-97	30.7	29.7	32.1	293	28.1	28.9	30.1	39.7	30.1	000	29.1
Temperature (°C)	25.2	25.5	2:1	10,1	26	hed.	25.0	10/1	25.5	25.4	26.2	25.3	29.6	262
Temperature (C)	w.d	65.5	16.	123.2	61.8	1720		The second se	10.5	123.1	14.6	63.3	1.0.1	1265
		0			,			ays		A	,	5	Г	
Concentration		0		1	I	2		3		4	An a count difference Destroit		INTERNAL PROPERTY OF THE PROPERTY OF THE	6
50	init.	final	1 EHITEGIKANANG ANALING	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	7.44	7.99	7,28	8.05	7.58	8.08	7.97	8.07	7.56	8.01	7,53	8,00	7.42	8:2
DO (mg/l)	6.7	5.4	6.	5,4	7.0	5.0	6.6	4.9	6.9	4.4	6,7	4,3	6,5	6.7
Salinity (ppt)	29.1	29.4	297	30,5	27.8	31.9	39.7	J7.7	28.7	303	29.7	<u>30.7</u>	29.9	30.9
Temperature (°C)	25.3	25.4	26.6	25.5	25.8	12.4	26.5	26.5	25.0	175.4	14.2	25.3	25.1	26.0
					Days									
Concentration		0	L	1		2		3		4			1 .	6
100	init.	final		final	init.	final	init.		init	final	init,	final	init,	final
pН	7.81	8.04	6.98	8,06	7.19	8.15	7.03	8.15	7.13	8.15	7.09	8.04	7.06	8.24
DO (mg/l)	6.5	5.4	6,5	5,2	6.8	A.1	68	5.1	4.5	4.5	6,7	4.7	68	6.3
Salinity (ppt)	29,0	29.7	29.8	30.5	29.9	32.le	29.0	28.0	28.4	30.6	2.9.8	30,8	30,6	30.7
Temperature (°C)	354	25.3	26.4	25.0	25.4	723		25.2	25.5	25.3	260	25.3	250	26.0
r	L NEWY L					. V. w. f.		• • • • • •			7			
										AMEC	Earth &	Enviro	nmenta	1
	Cor	ntrol	MW	-w]	Northw	est Bioa	ssav La	b	
A 11 16 6. d.		, 1	-ww						1					

Control	MW-W		
176	>400		\square
	NO		
-	4.4	\langle	
	Control /76	$ \begin{array}{c cccc} Control & MW^{-}W \\ \hline 17b & > 400 \\ \hline - & ND \\ \hline - & 4.4 \\ \end{array} $	$ \begin{array}{c cccc} Control & M & \omega & \omega \\ \hline 176 & > 400 & \omega \\ \hline - & N0 & \omega \\ \hline - & 4.4 & \omega \\ \hline \end{array} $

7

* mg/L as CaCO3; † mg/L; ND: no chlorine detected

. . .

5009 Pacific Hwy. E., Suite 2-0 Fife, WA 98424

Analysts:	
Reviewed:	

KB SM, Et NF

Sample Description	:		
Animal Source:	ABS	Comments:	
Date Received:	5/29/03		
Date of Hatch:	5/22/03		

Pimephales promelas

AMEC Earth & Environmental Seven Days Caby inat Species: <u>Unaptivu(to prime/ac</u>) Sample ID. #11/2/6/1 Client: <u>1/2017/000000000000000000000000000000000</u>		1	Initial and Final Cher	nistries
Start Date & Time: 21/21/02 Total colspan="2">Start Date & Time: 21/21/02 Total colspan="2">Start Date & Time: 21/21/02 Total colspan="2">Total colspan="2" Client: Linking total Start Date & Time: 21/21/02 Total colspan="2" Client: Linking total Start Date & Time: 21/21/02 Total colspan="2" Client: Dispan="2" Start Date & Time: 21/21/02 Total colspan="2" Operation of the start of	AMEC Earth & Envi	ironmental	Seven Day Chronic F	reshwater Bioassay
Test Species: Drift PLACD prime late Sup Date & Time: $5/2/73$ D/32 Sample ID. #1 Autor 146 Date Strate Date Strate Sup Date & Time: $5/2/73$ D/32 Concentration 0 1 2 3 4 5 6 DO (mg/h) 76. 9.3 77.4 6.3 3.3 3.4 7.4 <th7.4< th=""> 7.4 7.4 <t< td=""><td>Northwest Bioassay</td><td>Lab</td><td>Start Date & Time:</td><td>5/29/03 1900</td></t<></th7.4<>	Northwest Bioassay	Lab	Start Date & Time:	5/29/03 1900
Clienti Unit(Cd1 Mu2-146 Test No: D20-5-21 NVX Sample ID. #1 Mu2-146 Test No: D20-5-21 NVX Concentration 0 1 20-5 4 6 6 Concentration 0 1 20-5 20-1 5 20-1 5 20-1 5 20-1 5 20-1 5 20-1 5 20-1 <	Fest Species:	Pinepriales prometas	Ston Date & Time:	
Simple Dr. Days 3 6 Concentration 0 1 2 3 4 3 6 3 6 3 6 3 6 3 6 3 6 7 <td>Client:</td> <td>Unocar</td> <td></td> <td>5-2INW</td>	Client:	Unocar		5-2INW
To O 1 2 3 4 Construction Total Struct Total	Sample ID	# MW-176		
1 2 3 1 2 3 1				
Concentration Total 12:3 Total 2:3 Total 2:3<	10		THE REPORT OF A DESCRIPTION OF A	Gnal init final init. final
$ \begin{array}{c} C(N) & T(2,1,2,2,7,7) \leq 7.5(2,3,7) \leq 7.5(2,3,7) \leq 7.5(2,3,7) \leq 5.7(3,2,7) \leq 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) < 7.7(3,2,7) <$	Concentration	init final init. final init.		1-7-72 794 7.65 7.83 1.41
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	0010	-93 723 793 7.58 8.1	1.1.2 001 10 00	
$ \begin{array}{c} \mbox{Cond} (mnbserm) 35.7 [-24, r] 32.4 [-32.6] 23.1 [-22.6] 12.5 [-35.3] 32.6 [-26.8] (25.0] 12.5 [-35.1] 12.5 [-35.3] 12.6 [-27.8] (25.1] 12.5 [-35.1 $	P**	76 9 79 69 69	3,7 1,1 2 2 2 21	33 370 328 26 201
Temperature (°C) 24, 2 24, 7 24, 7 24, 7 24, 7 24, 7 3 4 former strate s	Cond. (umhos-cm)	337 345 322 350 323		25.0 26.0 25.0 25.8 2.1
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$				5 6
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			2	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Concentration			759 748 7.67 7.46 7.53
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			1,10,10,1,00	5982 59 78 58
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			5.0 000000000	237 312 348 269 519
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	DO (mg/l)	241 348 324 351 325		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Cond. (µmnos-ciii)	1. 01 1 1 1 1 1 1 1 1 1		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Temperature (C)		3	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Concentration		dinal init. final in	1. 110 7.59
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	12.5		7777337.567.9	51 60 17 5.8
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	pH	1, 15 1.00 1,00	50 79 14.7 1X	1 0.0 0 245 274 335
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	DO (mg/l)	11 10 307 307 229	1462 332 343 31	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Cond. (µmhos-cm)	372 27 30 243 245	25.4 25.3 35.1 13	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Temperature (°C)	23.3 12 1.7 2		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		0 1	2 3	if final init final init hina
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Concentration	init final mit final init	1	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		716 719 713 7.75 6,1		D760 79 59 10 00
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		75 61 8. 5.9 1	0 0 0 212 21	9 558 500 - 066 559
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Cond. (umhos-cm	1) ST / M SS 24 21	J J V V J C I	5.0 25.0 25.5 25.1 20.0
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Temperature (°C	1 25.2 24.3 24.3 24.4 6		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			0 3	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Concentration			COCTO46 1911 d
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		100 C 90 780 C	85 7.87 6,81 7.01	2 6 30 5.4 7.1 4.6
Cond. (µmhos-cm) St. 7 24.5 24.2 34.5 25.0 29.4 36.8 10.200 10.200 Days Concentration 0 1 2 3.8 0.3 4 5 6 ICO init final		- 76 6 2 82 5.9 1.	0 0	12 - 23 - 23 - 20 (31 / 3/5
Cond. (minuseding 24.5) 24.5 24.2 67.5 25.0 120.0 120.0 Temperature (°C) 24.5 24.5 24.2 67.5 25.0 120.0 100.0 <t< td=""><td>DO (mg/l)</td><td>201 361 349 371 3</td><td></td><td>50 25.0 25.5 25.0 25.2 105 1</td></t<>	DO (mg/l)	201 361 349 371 3		50 25.0 25.5 25.0 25.2 105 1
Itemperature (°C) 2 Horizon 1 2 3 (8, 0) 4 5 0 Concentration 0 1 2 3 (8, 0) 4 5 0 ICO init final	Cond. (µmnos-c			6
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Temperature		3.8.00	4 5
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Concentration		Coan wange Winal	111 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			C 74 8.08 6. 77 40 Tun	27a 15 0 15 7 7 9 150
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			79 5.6 8.0 5,3	8.7 3.2 0.0 110 373 421
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$				356 106 20 21 9 74 8 25 7
Temperature (°C) $125.012.012.012.012.012.012.012.012.012.012$	Cond. (µmhos-	cm) 573 700 500 24 3 3	5.0 25.0 25.0 25.0	ds.v [69.0] 20.0 [21-
Control M_{W} -746Hardness* δv 7400Alkalinity* $\delta 0$ 244484 v3Initial Chlorine† \sim N pAmmonia† \sim 3.5 * mg/L as CaCO3; † mg/L; ND: no chlorine detectedDate Received: $5/29/03$ <24 hrs	Temperature (°C) [25.0] [29.9] [29.3] [21.3]		
Control M_{W} -746Hardness* δv 7400Alkalinity* $\delta 0$ 244484 v3Initial Chlorine† \sim N pAmmonia† \sim 3.5 * mg/L as CaCO3; † mg/L; ND: no chlorine detectedDate Received: $5/29/03$ <24 hrs				Analysts: 5M Rt KB
Hardness* 80 7400 Reviewed: 45 Alkalinity* 60 164484 vs Reviewed: 45 Initial Chlorine† $ ND$ $ 3.5$ $-$ Ammonia† $ 3.5$ $ -$,	Control Min -146		
Internet 60 $Li + Lg + \psi_3$ Alkalinity* 60 Np Initial Chlorine† Np Ammonia† 3.5 Ammonia† 3.5 * mg/L as CaCO3; † mg/L; ND; no chlorine detected Sample Description: Date Received: $5/29/03 < 24hr_2$ Animal Source: ABS	TI daoog*	80 7400		Reviewed: 45
Initial Chlorinet ND Ammonia † 3.5 * mg/L as CaCO3; † mg/L; ND: no chlorine detected Sample Description: Animal Source: ABS Date Received: <u>5/29/03 <24 hrs</u>	Alkalinity	· 60 264184 MS		_
Ammonia † Signal * mg/L as CaCO3; † mg/L; ND: no chlorine detected Sample Description: Animal Source: ABS Date Received: $5/29/03 < 24hr_2$	Initial Chlorin	net NP	/]
* mg/L as CaCO3; † mg/L; ND; no chlorine detector Sample Description: Animal Source: <u>ABS</u> Date Received: $5/29/03 < 24hr_{\odot}$	Ammonia	1 - 3.5		
Sample Description: Date Received: <u>5/29/03 <24hro</u>	* mg/L as CaCC)3; † mg/L; ND: no chlorine detected		_
Sample Description: Date Received: <u>772 178 2</u>	1			-120/22 ×24hra
Animal Source: ADS	Sample Descri	ption:	Date Received	DICIDO 20100
Comments:	Animal Source	: <u>Арэ</u>		
	Comments:			

}

Northwest Bioassay	Lab	

Test Species:	
Client:	
Sample ID.	

Pimephales promelas nocal Mw -7

Initial and Final Chemistries

Seven Day Chronic Fre	eshw	ater 1	Bioassa	у	
Start Date & Time:	5	129	103	1445	
		1-	1 - 2	1/115	
Stop Date & Time:	6		05	1193	
Test No: 0300	5-	221	VW		

							Da	ys						
7 o Concentration	0	T	1		2		3		4		5			, final
CON	init.	final	miles	final	init.	final	init.	final	init.	final	init.		init.	A MANY ALCOUNTY
	792	7.82	7.93	7,75	8.11	7.83	8.01	7.76	7.89	7/7	7.94	767	7,83	7.41
DO (mg/l)	40	62	8.0	6.3	7.8	6.0	7.7	4.0	S.d	51	8,1	<u>61</u>	7.8	388
	337	344	235	355		368	333	341	300	343	270	342	261	10
	26.0	244	248	25.0	25.2	25.5	25.6	25.7	<u>250</u>	25.0	24.5	24.6	26.0	26.C
Temperature (C)	0.0	P1.0	<u>/</u>	<u> </u>			Da	iys						6
Concentration	()		[2	2		3	4	1			init.	final
0.25	init.	final	init	final	init.	final	init.	final	init.	final	init.		7.63	7.44
Q.L.	751	775	7.82	777	7,69	7.79	7.56	7.66	7.74	7.1	7.60	7.62	79	4.9
pH	431	6,0	8,0	6.3	8.1	6,5	7.8	5.9	8.2	49	8.2	5.9	1 lul	311
DO (mg/l)	334	337	224	357	33	365	824	328	3010	351	309	213	261	26.0
Cond. (µmhos-cm)	25.4	24.7	242	24.8	25.5	25.5	26.0	25.8	25.2	25.1	25.0	24.8	24.6	20.0
Temperature (°C)	29.9	29.1	29.0	E 10	1	<u></u>		ays						
			T	1	1	2		3		4		5	a auroato tek	6
Concentration		0 final	inita	- final		final	init.	final	init.	final	init.	final		fina
12.5	init.	7.71	777	7.75	7.56	177<	7.52	7.63	7.54	7.72	7.49	7.64		7.42
pH	745			5.8	7.8	155	8,0	5,4	8.4	48	83	6.0	8,0	4.9
DO (mg/l)	7.1	6.0	8.0	354	209	351	319	324	305	353	299	334	258	312
Cond. (µmhos-cm)	332	335	331		1301	25.6	the second se	25.8	as.0	25.1	24.2	25.0	25.8	26.
Temperature (°C)	25.5	24.5	124.5	250	125.3	6.0		ays	1.50.00-3					
	L		-1	1	T	2	- <u>-</u>	3	1	4		5	and an interaction of the	6
Concentration		0	70 MAR 1997	1		final	Manit.	final	init,	final	init.	fina		to be seen to be and the
25	init.	final	1.0	final		-7 7L		77.60	A CONTRACTOR OF A CONTRACTOR	7.67	7.29	7,68	729	37.4
pH	727	7.72				1.1.	9,2	5.2	8.5	15 1	8,3	6,0	8,2	4.9
DO (mg/l)	7,9	6.0	8.2	6.2	80	5,8		338		357	1291	326	1260	31
Cond. (µmhos-cm)	324	330	Bag	349	301	356	1310			25.2	74.0	5 24.8	25.0	26.
Temperature (°C)	25.5	5 243	24.4	25.1	25.8	25.5		Days	1006		- fred to at			
								<u>3</u>		4	-1	5		6
Concentration		0		1		2	1917 (2012) - 2014C) (2	fina	E Sinit		init	fina	l init	. fin
50	init.	fina	init.					CORES CONTINUED AND ADDRESS	20100 000000000000000000000000000000000		7.09	1.0.0	4 7.0	1.5
pH	705	5 7.74	F 7.2	3 7.8		7.80					140	EC	8.5	4.0
DO (mg/l)	8.1	5.8	8.3	5,8	8,5	5.		5.3		344	Aai	319		
Cond. (µmhos-cm)		314		330	389	333		324		the second se	10.1	74	6 25	
Temperature (°C)	25.1			24.8	25.7	- 25.5			9 922	25.0	129.0		<u>V 62</u>	Marine Contraction
Temperature (C)		<u><u>v</u>1<u>2</u><u>-</u></u>						Days		4		5		6
Concentration		0	- <u>T</u>	1		2		3	ALC: 1 100 100 100 100	4 , fina	Y (1 100-107-1	. fina	ini	
100	init	fina	1 init	fina	1 init	. fin	al init	fina				57.8	HERE ALL AND	37.1
	6 9	7 7.4	5 7.0	8 8.0	56.9	7 7.9	769	27.8	6 69.	2 7.85				$\vec{1}$
pH	7.9		8.	5,9		3 S.	7 9.6	5.4	9.4	4.9		1.000 1.000	7 260	
DO (mg/l)			1 28				3 27	7 284	1 320		1966			
Cond. (µmhos-cm)		5 24.2						2 25.	7 as,s	5 24.	8 24.	0 24.9	5 25.	0 40
Temperature (°C)	149.	7147.1	127,	- 63										
														10
									コ	Anal	ysts:	SM	m	- 15
		Control	וייונ	U-7								•		

			and the second se	
	Control	MW-7		
Hardness*	80	7400		
Alkalinity*	60	184		
Initial Chlorine†		106		<u> </u>
Auroniat		1 1.6	-	

Reviewed:

4

Ammonia † /.6 * mg/L as CaCO3; † mg/L; ND: no chlorine detected

Sample Description:

Animal Source: Comments:

Date Received: 5/29/03 <24 hrs.

ABS

Northwest Bioassay	
Test Species:	Pinephales promelas
Client:	Unocal
Sample ID.	#3 MW-17

Initial and Final Chemistries

munal and rinal Cite.	misu	les		
Seven Day Chronic F	resh	water	Bioas	say
Seven Day Chronic F Start Date & Time:	5	29	03	15

7/03 1545 Stop Date & Time: 675/03 11:45 Test No: 0305-23NW

- ctm							Da	Ve	···					1
70 Concentration		0		I	2	, ,	<u> </u>		4	1		5	6	
Concentration CON	init	final		final		final	init.			final	init.	final	init.	final
pH	792	7.66	793	7.45	8.11	7,86	8.01	7.68	8.02	7.69	7.94	7,68	783	7.28
DO (mg/l)	76	6.0	80	6.3	7.8	6,6	77	5.7	8.4	5.6	8,1	5.9	7.8	5.4
Cond. (µmhos-cm)	337	346	325	342	325	399	333	318	331	243	270		261	31
Temperature (°C)	25.2	25.0	241		14.3		20.00	25.5	25.5	250	24.5	24.1	24.1	25.8
Temperature (C)	~J.F	10 10	1.1				25.0 Da							
Concentration		0		[2		3	5	4	1		5	6	
6.25	init.	Selmail	init.	final	init.	final	init	final	init.	final	init.	final	init.	final
pH	7.80	7.67	7.90	7.67	7.81	7.80	7.74	7.63	7.91	7.66	771	7.68	7.72	7.38
DO (mg/l)	7.8	5.9	8.2	6.7	8,1	6,4	8.0	5.6	8.3	5.6	8.3	6.3	8.0	5.8
Cond. (µmhos-cm)	326	333	317	344	306	353	312	310	294	327	298	322	354	305
Temperature (°C)	25.3	24.8	24.2	24.9	24.5	0-0	25.6	25.5	25.5	25.1	24.3	24.1	24.2	258
		<u></u>			· · · · · · · · · · · · · · · · · · ·		Ďa	lys						
Concentration		0		1		2	3	3		4		5		5
12.5	init	final	int.	final	inite	final	init:	final	init,	final		final	init.	final
pH	7.71	7.67	7.84	7.67	7.74	7.30	7.6.8	7.62	7.79	7.66	7.68	7.66	7.62	7.42
DO (mg/l)	8.0	6.1	8.1	6,3	8.0	6.7	8.	5.6	8.5	55	8.4	6.1	8.	5.4
Cond. (µmhos-cm)	316	338	314	344	298	330	306	305	287	320	288	313	249	298
Temperature (°C)	250	24.5	24.8	248	75.0	25.5	25.8	25.5	25.4	25.0	24.0	24.2	24.4	<u>as.9</u>
I chapter and ()			1 - 1.0		14		Da	iys				-		
Concentration	<u> </u>	0		1		2		3		4		5		6
25	. init .		init	final	init.	final	init.	final	init	final	init:	final	init.	final
pH	749	7.70	7.67	7.68	7.54	7,81	7.52	7.64	7.101	7,65	7.47	7.68	7.42	7.42
DO (mg/l)	-49	65.8	8.4	61	8.1	6,6	8.3	6.0	8.6	55	9,3	5.9	8.2	4,6
Cond. (µmhos-cm)	299	310	295	287	281	298	289	290	271	312	271	296	238	291
Temperature (°C)	25.5	243	24.8	24.7	25.1	25.8	25.2	25.4	26.0	25.0	24.2	25.0	24.7	as.7
Temperature (C)	2.2		12102		f		D	ays						
Concentration		0	1	1	1	2	1	3		4		5		6
50	init	final	init	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	719	or interesting the	SE IN A REPORT OF THE REPORT	7.69	7.24	7.82	7.21	7.66	7.39	-7.64	7.20	7.65	7.15	7.44
DO (mg/l)	8.0	5.9	8.6	6.0	8.3	6.7	8.5	6.0	9,1	5.8	8.6	5,9	8,4	4.8
Cond. (µmhos-cm)	264		256	282	1247	283	253	259	237	267	238	264	215	<u>262</u>
Temperature (°C)	25.4	24.3	25 0	249	250	25.6	24.8	25.3	25.8	25.1	24.5	24.9	24.1	as.6
1 emperature (C)	1021		<u>r</u>					ays					· · ·	
Concentration		0	1	1		2	1	3		4		5		6
IDO		final	init	Binaŭ	init.	final	init.	final	init.	final	init.		init.	final
рН	AND AND SOME AND ADDRESS	37.67		7.66	6.98		6,99	7.70	7.15	7.68	6.95		6.92	7.55
DO (mg/l)	177	5.9	9.1	5.8		6,3	19.2	5.8	9.8	5.4	9,0	6.0	9,1	47
Cond. (µmhos-cm)	1202	212	186	229	187	ais	194	200	178	207	180	205	176	316
Temperature (°C)	25.0		253	24.0	25,1	25.5		25.3		25.0	24.8	5 25 C	124.1	25.8
			103.0			<u></u>			r					
							1		_					
		ontrol	A I	U-17		<u></u>		\sim	7	Analy	sts:	Sm "	et NF	-
Hardness*		50		16	+		\sim		1					
Alkalinity*)))		18	1		1	<u></u>	1	Review	wed:	KS		
Initial Chlorine†	<u> </u>	-	_			/								
		<u> </u>	,	<u>.12</u> 2.9	+		+		-					
Ammonia † * mg/L as CaCO3; †	$\frac{1}{ma/t}$	JD: no c			` d		_1							
" mg/L as CaCO3; T	туr; г	ч. но с	monne	aciecie	~	:								
Romania Decasintian	•													
Sample Description		5					Date R	Received	: 512	9/03	270	Thrs.		
Animal Source:	AP						v I			4<u>-</u>0		•		

Animal Source: **Comments:**

AMEC Earth & Environmental	Initial and Final Chemistries
Northwest Bioassay Lab	Seven Day Chronic Freshwater Bioassay
Test Species: Pimephales prometas Client: Unocal Sample ID. #4 MW-103R	Start Date & Time: 5/29/03 1630 Stop Date & Time: 6/5/03 1400 Test No: 0305-24NW

T		Days												
10		<u> </u>	1	<u> </u>	2		3	· · · · · · · · · · · · · · · · · · ·	4		5	5	6	
Concentration	0			Ginal	init.	C C PROVING	-		Sinta	Gnais	Shanking.	Banal	init.	final
CON	init.	All synd a dial of the second	init.	Tinal		777	8.01	77<	8.02	7.59	7.74	7,54	7.83	7.43
pH	7.92	7.62	793	103	8.11	<u>112</u> <u><u> </u></u>	0,01	59	8.4	5.6	8.1	65	7.8	5.2
DO (mg/l)	7.6	5.5	8,0	5.7	-10	3.0	333	323	331	330	270	293	261	291
Cond. (µmhos-cm)	337	361	325	36.3	325	360	Sec. 1	nug	221	250	24.0	04.8	24.8	
Temperature (°C)	24.3	25.0	24-5	24.3	24.5	25.5	<u>25.6</u>	1.0	10.0	D.V	2110			
								iys 3	4	L		5	6	5
Concentration	(1	2			, Hinal,	-		Sinil (final	init	final
6.25	init.	final	init.	final	init		init		786	7.65	777	764	7.62	7 49
pH	7.81	7.72	7.86	7.72	7.80	7.7d	7.93	7.73	7.20	1:03	42	6.1	78	5.4
DO (mg/l)	7.7	5.7	8.2	6,0	8.0	5.8	8.1	5.8	221	200	295	333	797	328
Cond. (µmhos-cm)	373	391	367	398	349	387	356	359	254	201	213	717	24.7	25.9
Temperature (°C)	24.3	24.8	25.5	75.0	24.9	25.6	25.5	<u>124. /</u>	15.2	15.0	4.0	1-1	167.1	<u> </u>
				-				ays		<u> </u>	1	5	1	6
Concentration		0		1		2		3		4	init	final	inif.	final
12.5	init	final	init	final	. init.	final	init	final.		final			7.60	7.54
pH	7.83	7.77	7.73	7.87	7.72	7.81	7.79	7.80	7.81	1411	1.6 -	1613	1.00	
DO (mg/l)	8.0	5.4	8.0	6.1	7.9	5.6	8.	6.2	8.4	54	8,4	6.0	1-5F	5.1
Cond. (µmhos-cm)	405	423	403	435	385	440	391	405	367	401	333	201	24.2	25.9
		1111	256	7117	76.0	25.8	25.3	24.8	26.0	125:6	25.0	25.5	14.6	101
I I omnerature (*(.)	1/4/2	1/4.6	142.0	149.1	1110	20.0								
Temperature (°C)	24.2	124.0	122.0	129.1	1/1/0	20.0		ays			1	<u> </u>		6
		0	122.6	1	16100	2	D	ays 3		4		5	1	6
Concentration		-	init.	1 1 1 final		2 Sinal	D init.	ays 3 final	init.	final		final	init,	final
Concentration 25	vinik	final	init.	final	init. 7,51	2 final 7,92	D init. 7,59	ays 3 final 7.95	7.7	final 7,88	7.41	final 7.92	init . 7,43	-
Concentration 25 pH	init. 7.70	final 7.89	init. 7,49	Final 7.99		2 final 7.92 5.4	D init. 7.59 8.3	ays 3 final 7.95 6.2	7.7	final	7.41 8.3	final 7.92 6.1	init,	final 7.73 ik.9
Concentration 25 pH DO (mg/l)	init. 7.70 7.9	Final 7.89 5.5	init 7,49 8,2	final 7.99 6,2	7,51	2 final 7,92	D init. 7,59	ays 3 final 7.95 6.2 448	7.7 8.7 427	final 7,88	7.41	Final 7.92 6.1 445	init . 7,43	final 7.73 ik.9 442
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm)	init 7.70 7.9 479	Final 7.89 5.5	init. 7,49	Final 7.99	7,51	2 final 7.92 5.4	D init. 7.59 3.3 460	ays 3 final 7.95 6.2	7.7 8.7 427	final 7,88	7.41 8.3	final 7.92 6.1 445	init . 7,43	final 773 4.9
Concentration 25 pH DO (mg/l)	init. 7.70 7.9	Final 7.89 5.5	init 7,49 8,2	final 7.99 6,2	7,51	2 11nal 7.9 <u>3</u> 5,4 499	D init. 7.59 8.3 4 <u>60</u> 25.4	ays 3 final 7.95 4.2 4.48 24.4 Days	7.7 8.7 427	final 7.88 5,6 4-65 26.1	7.41 8.3 403	final 7.92 6.1 445 24.9	init . 7,43	final 7,73 14,9 442 25_8
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C)	init 7.70 7.9 479	Final 7.84 5.5 485 24.5	init 7,49 8,2	final 7.99 6,2	7,51	2 11nal 7.9 <u>3</u> 5,4 499	D init. 7.59 8.3 4 <u>60</u> 25.4	ays 3 7.95 (e.a 448 24.4	7.7 8.7 427 25.0	final 7,88 5,6 4,65 2,6.1	7,41 8.3 403 26.0	final 7.92 6.1 445 24.9	init. 7:43 8:3 401 24:2	$ \begin{array}{c} \text{final} \\ 7,73 \\ 4,9 \\ 4+2 \\ 25_8 \\ 6 \end{array} $
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration	7.70 7.9 479 24.2	final 7.84 5.5 485 .24.5	11111 7,49 8,2 470 25.6	final 7.99 6.2 490 5.24.4	7.51 9.1 449 24.3	2 11021 7.92 5.4 499 25.5	D init. 7.59 8.3 460 25.4 L	ays 3 final 7.95 4.2 4.48 24.4 Days	7.7 8.7 427 25.0	$ \begin{array}{c} \text{final} \\ 7,88 \\ 5,6 \\ 465 \\ 25.1 \\ 25.1 \\ 4 \\ \hline \text{final} \end{array} $	7,41 8.3 403 26.0	$ \begin{array}{c c} final\\ \hline 7.92\\ \hline 6.1\\ \hline 445\\ \hline 24.9\\ \hline 5\\ \hline 5\\ \hline final \end{array} $	init: 7:43 8:3 4:01 24:2	$\begin{array}{c} \text{final} \\ 7.73 \\ 4.9 \\ 4.42 \\ 25.8 \\ 6 \\ \hline \text{final} \end{array}$
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50	init. 7.70 7.9 478 24.2	final 7.89 5.5 485 24.5 0 final	init 7,49 8,2 470 25.6	final 7.99 6.2 4.90 5.24.4 1 1	7.51 9.1 449 24.3	2 5,4 5,4 499 25.5 2	D init. 7.59 8.3 460 25.4 L L init	ays 3 final 7.95 4.2 44.4 Days 3 final	7.7 8.7 427 25.0	final 7,88 5,6 4,65 2,6.1	7,41 8.3 403 26.0	final 7.92 6.1 445 24.9 5 5 final 5 8,08	init. 7:43 8.3 401 24.2 init. 7.32	
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH	nut 7.70 7.9 4.79 24.2 init	final 7.89 5.5 485 24.5 0 final 9.0%	init 7,49 8,2 470 25.6 init	final 7.99 6.2 4.90 5.24, 4 5.24, 4 1 final 3.3, 3, 3, 4	7,51 8,1 4,49 24,3 init + 7,39	2 final 7.92 5.4 499 25.5 2 2 fina 3.20	D init, 7,59 8,3 460 25.4 E init, 7,4]	$\begin{array}{c c} ays \\ \hline 3 \\ \hline final \\ \hline 7.95 \\ \hline 4.2 \\ \hline 4.48 \\ \hline 4.48 \\ \hline 24.48 \\ \hline 3 \\ \hline 8.14 \\ \hline 8.14 \\ \hline \end{array}$	7.7 8.7 427 25.0 init 7.56	$ \begin{array}{c} \text{final} \\ 7,88 \\ 5,6 \\ 465 \\ 25.1 \\ 25.1 \\ 4 \\ \hline \text{final} \end{array} $	7,41 8.3 403 26.0	$ \begin{array}{c c} final\\ \hline 7.92\\ \hline 6.1\\ \hline 445\\ \hline 24.9\\ \hline 5\\ \hline 5\\ \hline final \end{array} $	init. 7:43 8.3 401 24.2 init. 7.32	$\begin{array}{c} \text{final} \\ 7,73 \\ 14,9 \\ 14,42 \\ 25,8 \\ \hline \\ 6 \\ \hline \\ \text{final} \\ 7,99 \\ 12,45 \\ \hline \\ 12,45 \\ \hline \end{array}$
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l)	init 7.70 7.9 478 24.2 init 7.57 8.3	final 7.84 5.5 485 24.5 0 final 8.68 5.3	11111 7,49 8,2 470 25.6 8,4	final 7.99 6.2 490 524,4 1 final 39.24 6.0	7.51 9.1 449 24.9 init 7.39 8.3	2 final 7.92 5.4 499 25.5 2 fina 7.20 6.0	D init 7.59 8.3 460 25.4 E init 7.41 7.41 8,7	ays 3 final 7.75 4.2 4.4 24.4 Days 3 final 8.14 5.9	7.7 427 25.0 101 7.56 9,2	final 7,88 5,6 4,65 2,6 4 final 8,13 5,6	7.41 8.3 403 26.0 init	final 7.92 6.1 445 24.9 5 5 final 5 8,08	init: 7:43 8:3 4:01 24:3 14:01 24:3 14:010	$\begin{array}{c} \text{final} \\ 7.73 \\ 14.9 \\ 442 \\ 25.8 \\ \hline \\ 25.8 \\ \hline \\ 6 \\ \hline \\ 1.9 $
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l) Cond. (µmhos-cm)	init 7.70 7.9 479 24.2 init 7.51 8.3 611	4 mail 7.84 5.5 485 24.5 0 6 6 6 6 8.58 5.3 624	init 7,49 8,2 470 25.6 init	final 7.99 6.2 490 524,4 1 final 39.24 6.0	7.51 9.1 24.3 24.3 569	2 final 7,92 5,4 499 25.9 2 fina 3,20 6,0 690	D init, 7.59 8.3 460 25.4 1 1	ays 3 final 7.95 4.2 24.2 Days 3 final 8.14 5.9 404	7.7 8.7 427 25.0 init 7.56	final 7,88 5,6 4-65 26.1 4 final 8,13	7.41 8.3 403 26.0 7.2 8.6 5.4 5.4	final 7.92 6.1 945 24.9 5 final 5 8,08 5,8	init. 7:43 8.3 401 24.2 init. 7.32	$\begin{array}{c} \text{final} \\ 7.73 \\ 14.9 \\ 442 \\ 25.8 \\ \hline \\ 25.8 \\ \hline \\ 6 \\ \hline \\ \text{final} \\ 7.99 \\ 1.45 \\ 1.601 \\ \hline \end{array}$
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l)	init 7.70 7.9 478 24.2 init 7.57 8.3	final 7.84 5.5 485 24.5 0 final 8.68 5.3	11111 7,49 8,2 470 25.6 8,4	final 7.99 6.2 490 524,4 1 final 39.24 6.0	7.51 9.1 449 24.9 init 7.39 8.3	2 final 7.92 5.4 499 25.5 2 fina 7.20 6.0	D init, 7,59 8,3 460 25,4 E init, 7,4] 8,7 536 25,5	ays 3 7.95 4.24.2 24.2 24.2 24.2 24.2 3 8.14 5.9 124.9 2.14 5.9 2.14.9	7.7 427 25.0 550 550	final 7,88 5,6 4,65 2,6,1 4 final 8,13 5,6 633	7.41 8.3 403 26.0 init 7.2 9.6 54	final 7.92 6.1 945 24.9 5 final 5 8,08 5,8	init: 7:43 8:3 4:01 24:3 14:01 24:3 14:010	$\begin{array}{c} \text{final} \\ 7.73 \\ 14.9 \\ 442 \\ 25.8 \\ \hline \\ 25.8 \\ \hline \\ 6 \\ \hline \\ 1.9 $
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C)	init 7.70 7.9 479 24.2 init 7.51 8.3 611	$\begin{array}{c} \text{final} \\ 7.89 \\ 5.5 \\ 485 \\ 24.5 \\ 24.5 \\ \hline \\ 8.58 \\ 5.3 \\ \hline \\ 5.3 \\ \hline \\ 5.24 \\ 24.5 \\ \hline \end{array}$	11111 7,49 8,2 470 25.6 8,4	7.99 6.2 4.90 5.2 24.4 1 1 1 1 1 1 3.3.4 6.0 651 5.24.8	7.51 9.1 24.3 24.3 569	2 final 7.9 5.4 499 25.6 2 fina 3. 3. 6.0 6.0 6.0 125.4	D init, 7,59 8,3 460 25,4 E init, 7,4] 8,7 536 25,5	ays 3 7.75 4.24 24.4 24.4 Days 3 final 8.14 5.9 124.4 5.9 24.4 24.4 5.9 24.4 5.9 24.4 5.9 24.4 24.4 5.9 24.4 5.9 24.4 24.4 5.9 24.4 5.9 24.4 5.9 24.4 24.4 5.9 24.4 24.4 5.9 24.4 24.4 24.4 5.9 24.4 24.4 5.9 24.4 24.4 5.9 24.4 24.4 24.4 5.9 24.4 24.4 24.4 24.4 5.9 24.4 5.9 24.4 24.	7.7 427 25.0 550 550	final 7,88 5,6 4,65 2,6,1 4 final 8,13 5,6 633	7.41 8.3 403 26.0 init 7.2 9.6 54	final 7.92 6.1 945 24.9 5 final 5 8,08 5,8	init: 7:43 8:3 4:01 24:2 (init: 7:32 8:7 5:27 - 24:0	$\begin{array}{c} \text{final} \\ 7,73 \\ 4,9 \\ 442 \\ 25_8 \\ 6 \\ \hline \text{final} \\ 7,99 \\ 7,601 \\ 25.9 \\ 6 \\ \end{array}$
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C)	init 7.70 7.9 4778 24.2 5.1 7.57 8.3 611 24.4	Innal 7.89 5.5 485 24.5 0 1 8.08 5.3 6 5.3 624 24.5	init 7,49 8,2 470 25, 6 8,4 603 25,5	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	7,51 9,1 1,49 24.3 24.3 5,39 8,3 5,67 2,5,0	$ \begin{array}{c} 2 \\ 5, 4 \\ 7, 9 \\ 5, 4 \\ 499 \\ 25, 6 \\ 25, 6 \\ 3, 4 \\ 6, 0 \\ 6, 0 \\ 6, 0 \\ 25, 4 \\ 1, 25, 4 \\ 1, 25, 4 \\ 1, 25, 4 \\ 2, 2 \\ 2 \end{array} $	D init. 7.59 9.3 1460 25.4 E init. 7.41 8.7 586 25.9 I	ays 3 7.75 4.275 4.24 24.24 24.24 Days 3 final 8.14 5.9 4.04 5.9 24.4 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 3 3	7.7 8.7 427 25.0 25.0 7.56 9.2 557 24.5	final 7,88 5,6 4,65 2,5,1 4 final 5,6 63,3 2,5,0	7.41 8.3 403 26.0 7.2 8.6 54 54 25.7	tinal 7.92 6.1 945 24.9 5 5 5 5 5.8 2.09 2.25.2 5	init: 7:43 8:3 4:01 24:2 init: 7:32 8:7 2:24:0	$\begin{array}{c} \text{final} \\ 7,73 \\ 4,9 \\ 4,42 \\ 25_8 \\ 6 \\ \hline \text{final} \\ 7,99 \\ -2,45 \\ 7,601 \\ -2,59 \\ 6 \\ \hline \text{final} \\ \end{array}$
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration	init 7.70 7.9 4778 24.2 5.1 7.57 8.3 611 24.4	$\begin{array}{c} \text{final} \\ 7.89 \\ 5.5 \\ 485 \\ 24.5 \\ 24.5 \\ \hline \\ 8.08 \\ 5.3 \\ \hline \\ 5.3 \\ \hline \\ 5.3 \\ \hline \\ 5.4 \\ 24.5 \\ \hline \\ 0 \\ \hline \end{array}$	imit 7,49 8,2 470 25.6 10 10 10 10 10 10 10 10 10 10 10 10 10	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	7.51 9.1 9.1 24.4 7.39 8.3 5.67 2.5,0	2 final 7.9 <u>1</u> 5.4 499 25.9 2 fina 3.20 6.0 6.0 25.4 2 1.25.4 2 1.25.4 2 1.25.4 1.25	D init. 7.59 8.3 460 25.4 E init. 8.7 586 25.5 I I init.	ays 3 final 7.75 4.2 4.4 24.4 Days 3 final 8.14 5.9 4.04 5.9 24.4 5.9	7.7 8.7 427 25.0 100 7.50 7.8 557 24.5	final 7,88 5,6 4,65 2,6,1 4 final 8,1 2,6 6 3,3 2,5,0 4 fina	7.41 8.3 403 26.0 7.2 8.6 54 54 25.7	tinal 7.92 6.1 9445 24.9 5 5 5 5 5 2.25.2 5	init: 7:43 8:3 4:01 24:2 14:01 24:2 14:01 14:01 24:2 14:0 14:0 14:0 14:0 14:0 14:0 14:0 14:0	$\begin{array}{c} \text{final} \\ 7,73 \\ 4,9 \\ 4,42 \\ 25_8 \\ 6 \\ \hline \text{final} \\ 7,99 \\ 6 \\ 7,99 \\ 6 \\ 7,99 \\ 6 \\ 7,99 \\ 6 \\ 7,99 \\ 6 \\ 7,99 \\ 6 \\ 7,99 \\ 6 \\ 7,99 \\ 6 \\ 7,99 \\ 7,99 \\ 6 \\ 7,99 \\ 7,$
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration [OO pH	init 7.70 7.9 4.79 2.4.2 init 7.57 8.3 6.11 2.4.4 5.11 2.4.4 5.11 2.4.4	Imal 7.84 5.5 485 24.5 0 final 78.08 5.3 624 24.5 0 13.08 5.3 6 13.08 5.3 6 6 6 7 7 13.08 13.08 13.08 13.08 13.08 13.08 13.08 13.08 13.08 13.08 13.08 13.08 13.08 13.08 13.08 14.08 15.38 15.38 15.38 15.38 15.38 15.38 15.38 15.38 15.38 15.38 15.38 15.38 16.38 17.38 17.38 18.38 18.38 18.38 19.38 19.38 19.38 10.38 10.38 10.	imit 7,49 8,2 470 25.6 3,4 603 2,5.5 603 2,5.5	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	7.51 9.1 9.1 24.3 7.39 8.3 5.67 2.5,0 1.5,0	2 final 7,9 <u>2</u> 5,4 499 25.9 2 fina 5,0 6,0 6,0 6,0 25.4 2 2 fina 3,4 4 1 3,4 4 1 3,4	D init. 7.59 8.3 460 25.4 25.9 586 25.9 I 586 25.9 I 1 init. 7.2.0	ays 3 final 7.95 4.295 4.498 24.49 24.49 24.49 24.49 24.49 24.49 24.49 2.14 5.9 2.14 2.94.49 Days 3 final 8.14 5.9 2.94.9 2.94.9 2.95 5.9	7.7 8.7 427 25.0 7.50 7.50 7.50 24.5 24.5	final 7,88 5,6 4,65 2,6,1 4 final 8,1 2,6 6 3,3 2,5,0 4 fina	7.41 8.3 403 26.0 7.2 8.6 54 54 25.7	tinal 7.92 6.1 945 24.9 5 5 5 5 5 5 5	init: 7:43 8:3 4:01 24:2 14:01 24:2 14:01 14:01 24:2 14:0 14:0 14:0 14:0 14:0 14:0 14:0 14:0	$\begin{array}{c} \text{final} \\ 7,73 \\ 4,9 \\ 4,42 \\ 9 \\ 25 \\ 8 \\ 6 \\ \hline \text{final} \\ 7,99 \\ 7,99 \\ 7,97 \\ 6 \\ \hline 25.9 \\ 6 \\ \hline \text{final} \\ 3,35 \\ \end{array}$
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration [OO pH DO (mg/l)	init 7.70 7.9 4.79 4.79 2.4.2 init 7.57 8.3 6.1 2.4.4 init 2.4.4 init 2.4.4 8.3 5.7 7.6 1 8.4	final 7.84 5.5 485 24.5 0 final 8.08 5.3 6 5.3 6 7.84 9 10 11 124.5 0 13.08 5.3 6 7.32 0 13.32 0 5.5	imit 7,49 8,2 470 25.6 25.6 1011 7,39 8,4 603 25.5 603 25.5 8,4 8,4 8,4 8,4 8,4 8,4 8,4 8,4 8,4 8,4		7.51 9.1 9.1 24.9 24.9 8.3 5.69 3.50 1.50 1.50 1.7.26 7.36	$ \begin{array}{c} 2 \\ $	D init 7.59 9.3 460 25.4 1 init 7.41 5.36 25.5 1 1 init 7.30 1 7.30 1 7.30 1 1 7.30	ays 3 7.95 $e.a$ 4.95 24.4 24.4 ays 3 final 8.14 5.9 4.04 24.4 9.14 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 24.4 5.9 4.04 5.9 4.04 5.9 4.04 5.9 4.04 5.9 $7.4.4$ $7.4.4$ $7.4.4$ $7.4.4$ $7.4.4$ $7.4.4$ $7.4.4$ $7.4.4$ $7.4.4$ $7.4.4$ $7.4.4$ $7.4.4$ $7.4.4$ $7.4.4$ <td>7.7 8.7 427 25.0 7.50 7.50 7.50 24.5 24.5 24.5 24.5 24.5 24.5</td> <td>final 7,88 5,6 4,65 2,6,1 4 final 5,6 6,33 2,5,6 4 fina 5,6 5,6</td> <td>7.41 8.3 403 26.0 7.2 8.6 54 54 25.7</td> <td>tinal 7.92 6.1 924.9 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5</td> <td>$\begin{array}{c c} \text{init.} \\ 7.43 \\ 8.3 \\ 401 \\ 24.2 \\ 1101 \\ 24.2 \\ 1401 \\ 24.2 \\ 1401 \\ 24.2 \\ 152 \\ 152 \\ 24.0 \\ 152 \\ 152 \\ 155 \\ 1$</td> <td>$\begin{array}{c} \text{final} \\ 7,73 \\ 4,9 \\ 442 \\ 25_8 \\ \hline \\ 6 \\ \hline \\ 6 \\ \hline \\ 7,99 \\ -25_9 \\ \hline \\ 6 \\ \hline \\ 25_9 \\ \hline \\ 6 \\ \hline \\ 6 \\ \hline \\ 6 \\ \hline \\ 1 \\ 8,35 \\ \end{array}$</td>	7.7 8.7 427 25.0 7.50 7.50 7.50 24.5 24.5 24.5 24.5 24.5 24.5	final 7,88 5,6 4,65 2,6,1 4 final 5,6 6,33 2,5,6 4 fina 5,6 5,6	7.41 8.3 403 26.0 7.2 8.6 54 54 25.7	tinal 7.92 6.1 924.9 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	$\begin{array}{c c} \text{init.} \\ 7.43 \\ 8.3 \\ 401 \\ 24.2 \\ 1101 \\ 24.2 \\ 1401 \\ 24.2 \\ 1401 \\ 24.2 \\ 152 \\ 152 \\ 24.0 \\ 152 \\ 152 \\ 155 \\ 1$	$\begin{array}{c} \text{final} \\ 7,73 \\ 4,9 \\ 442 \\ 25_8 \\ \hline \\ 6 \\ \hline \\ 6 \\ \hline \\ 7,99 \\ -25_9 \\ \hline \\ 6 \\ \hline \\ 25_9 \\ \hline \\ 6 \\ \hline \\ 6 \\ \hline \\ 6 \\ \hline \\ 1 \\ 8,35 \\ \end{array}$
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration [OO pH	init 7.70 7.9 4.79 4.79 2.4.2 init 7.57 8.3 611 2.4.4 init 7.61 8.4 8.4 8.4 8.4	final 7.84 5.5 485 24.5 0 final 8.08 5.3 6 5.3 6 7.84 9 10 11 124.5 0 13.08 5.3 6 7.32 0 13.32 0 5.5	imit 7,49 8,2 470 25.6 3,4 603 2,5.5 603 2,5.5	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	7.51 9.1 9.1 24.3 7.39 8.3 5.67 2.5,0 1.5,0	$\begin{array}{c} 2 \\ \text{final} \\ 7,92 \\ 5,4 \\ 9,4 \\ 25,5 \\ 2 \\ \text{fina} \\ 3,20 \\ 6,0$	D init. 7.59 8.3 460 25.4 25.9 586 25.9 I 586 25.9 I 1 init. 7.2.0	ays 3 final 7.95 4.295 4.498 24.49 24.49 24.49 24.49 24.49 24.49 24.49 2.14 5.9 2.14 2.94.49 Days 3 final 8.14 5.9 2.4.9 2.4.9 2.4.9 5.3 5.9 5.3 5.9 5.3 5.9	7.7 8.7 427 25.0 7.50 7.50 7.50 24.5 24.5	$\begin{array}{c} \text{final} \\ 7,88 \\ 5,6 \\ 4 \\ 5,6 \\ 25,1 \\ 25,1 \\ 5,6 \\ 633 \\ 25,0 \\ 4 \\ \hline \\ 633 \\ 25,0 \\ 4 \\ \hline \\ 5,6 \\ 5,6 \\ 5,6 \\ 25,6 \\ 4 \\ \hline \\ 5,6 \\ 5,6 \\ 5,6 \\ 5,6 \\ 25,6 \\ 5$	7.41 8.3 403 26.0 7.2 8.6 54 54 25.7	tinal 7.92 6.1 945 24.9 5 5 5 5 5 5 5	$\begin{array}{c c} \text{init.} \\ 7.43 \\ 8.3 \\ 401 \\ 24.2 \\ 1101 \\ 24.2 \\ 1401 \\ 24.2 \\ 1401 \\ 24.2 \\ 152 \\ 152 \\ 24.0 \\ 152 \\ 152 \\ 155 \\ 1$	$\begin{array}{c} \text{final} \\ 7,73 \\ 4,9 \\ 4,42 \\ 9 \\ 25 \\ 8 \\ 6 \\ \hline \text{final} \\ 7,99$

ALL FLAT	
Control Mw-103R	
Hardness* 80 7400	\leq
Alkalinity* 60 392	······
Initial Chlorine† - 0-05	
Ammonia † 5.7	

Analysts:

Sm me, Et

1

Reviewed:

* mg/L as CaCO3; † mg/L; ND: no chlorine detected

ABS

Sample Description:

Animal Source: **Comments:**

<24 hrs Date Received: 5/29/03

Northwest Bioassay Lab

Test Species:	Pime
Client:	Un
Sample ID.	#5

Pimer	hales	prometas	
uno	cal	1	
#5	MU.	1 - 129	

Initial and Final Chemistries

Seven Day Chronic Freshwater Bioassay

Start Date & Time: Stop Date & Time: Test No:

5 29 03 615

103

145 1430 0305-25NW

1700

M 0		Days												
Concentration	0	T	1		2	:	3		4		Ę	-	6	
	-	final	Sinit al	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	7.92	747	7.93	773	8.11		801	7.74	8.02	7.68	7.94	7,84	7.83	753
DO (mg/l)		5.6	8.0	6,5	7.8	6.1	77	6.5	8.4	5.8	8.	6.3	7.8	6.2
		366	325	36	325	351	333	328	331	344	270	293		327
	24.1	249	24.1	25.0	25.0	25.5	25.8	24.3	24.0	25.0	26.0	24.7	24.0	25.7
Temperature (C)								iys					······	
Concentration	0)]	1	Ĺ	2	2		3	4	1		5	6	
(0.25	-	final		stinal	init.	final	init.	final	init.	final	init.,	final	init.	final
pH	767	7.67	7.76	7.81	7.71	7.8	7.83	783	7.78	7.69	7.64	7.74	7.48	7.67
	7.8		8.1	6.1	8,0	6,1	7.9	4.3	8.1	5.2	8.3	6.	[7,7]	5.8
DO (mg/l)	369	5.8 389	372	401	352	391	373	374	340	380	306	336	307	354
Cond. (µmhos-cm)	24.0	24.8	24.8	20.0	25.3	25.6	25.8	24.5	25.3	25.2	26.0	24.3	14.1	35,6
Temperature (°C)	24.0	14.D	27.3	12.50	0.0,0			ays	<u> </u>	·				~
		0		1	(2		3		4		5	(б
Concentration	init	final	init	final	2 init.	- final	init.	final	init.	final	init.	final	init.	final
12.5	Cabulty and an and the	-1 -10	771	8.00	7.64	7.91	7,68	792	7.109	7.77	1.57	7.84	7.41	7.76
pH	7.48	1.19	144		1.01	6.1	8.0	10.3	8.a	5.2	8.1	6.3	7.8	54
DO (mg/l)	8.0	5.9	8.1	6.	392	423	LEIY	400	379	412	347	379	349	408
Cond. (µmhos-cm)	410	421	409	443	25.0	25.5	25.3	245	25.8	25.2	76.0	24.4	148	356
Temperature (°C)	24.0	24.9	248	25.4	125.0	1200	1n n	1.01.7	0.0	1	100.0			
		1.1.1	61.0	1	1	100.0		ave						
		<u> </u>						ays	T	4	1	5	1	6
Concentration		0		1		2	D	3		4		5 Final		
Concentration 25	- 1-11	0 final	init	1 J.		2 Ainal		3 final		final	init.	final	inita	final
Concentration 25 pH		0 final 8.0D	init. 7.53	1 final 8,19	init. 7,47	2 final 73,08	D	3 final 8.1ス	7.54	final 8.02	7.44	final - 8,03	inita	final 8.11
Concentration 25	init. 7.33 7.7	0 final 8.00 5.6	5 mit. 7,53 8,2	1 Final 8,19 (18 C,	init. 7.47 7.8	2 final 8,08 5,8	D Init 7,5 7,8	3 final 8.1元 し、え	7.54	8.02 5,5	7.44	final 8,03 6.1	1nit. 7,27 7,9	final 8]] 5,9
Concentration 25 pH	init. 7.33	0 final 8.0D	init. 7.53	1 final 8,19 18 C 533	1mir 7,47 7,8 467	2 final 8.08 5.8 5.22	D Init. 7.5 7.8 487	3 final 8.12 (1.2 490	7.54 8.4 452	6inal 8.02 5.5 508	7.44	final 8,03 6.1 458	1nit. 7,27 7,9	final 8,1] 5,7 500
Concentration 25 pH DO (mg/l)	init. 7.33 7.7	0 final 8.00 5.6	5 mit. 7,53 8,2	1 final 8,19 (18 C.	init. 7.47 7.8	2 final 8,08 5,8	D 41111 7,5 7,8 7,8 487 25.0	3 final 8.12 (2.2 490 24.4	7.54	6inal 8.03 5,5 508	7.44	final 8,03 6.1 458	1nit. 7,27 7,9	final 8]] 5,9
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm)	init. 7.33 7.7 487	0 final 8.00 5.6 508	5 mit. 7,53 8,2	1 final 8,19 18 C 533	1mir 7,47 7,8 467	2 final 8.08 5.8 5.23 25.4	D 41111 7,5 7,8 7,8 487 25.0	$\begin{array}{c c} 3 \\ \hline final \\ 8.12 \\ 4.2 \\ 490 \\ 24.4 \\ 24.4 \\ \hline Pays \end{array}$	7.54 8.4 452	final 8.02 5.5 508 25.0	7.44	final 8,03 6.1 458 24.6	1nit. 7,27 7,9	final 8 11 5, 7 500 3, 7
Concentration 2-5 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C)	init. 7.33 7.7 487 24.0	0 final 8.00 5.6 508	5 mit. 7,53 8,2	$ \begin{array}{c c} 1 \\ \hline 1 \\ \hline 8,19 \\ \hline 1 \\ \hline 533 \\ \hline 25.0 \\ \hline 1 \end{array} $	7,47 7,47 7,8 467 24,9	2 final 8,08 5,8 5,20 25.4 25.4	D 17.5 7.8 7.8 487 25.0 D	$\begin{array}{c c} 3 \\ \hline \text{final} \\ \hline & \&.() \\ \hline & & 490 \\ \hline & 24.4 \\ \hline & ays \\ \hline & 3 \\ \end{array}$	7.54 8.4 452 26.0	final 8.04 5.5 508 25.0 4	7.44 8.3 423 26.0	Final 8,03 6.1 458 24.6	1991 1.27 1.9 4.31 246	final 8]] 55,9 500 Q.S.7 6
Concentration 2-5 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration	init. 7.33 7.7 487 24.0	0 final 8.00 5.6 508 24.9	5 mit. 7,53 8,2	1 $final 8.19 \frac{18}{533}2501final$	1nit 7,47 7,8 467 24,9	2 final 8,08 5,8 5,3 25.4 2 2 Final	D 41111 7,5 7,8 7,8 487 25.0	3 final 8.(2 (2,2 490 24.4 24.4 2ays 3 final	7.54 8.4 452 26.0	final 8.02 5.5 508 25.0 4 final	7.44 8.3 423 26.0	final 8,03 6.1 458 24.6 5 final	smit 7,27 7,9 4,9 4,31 24.6	final 8 1] 5, 7 500 Q.S. 7 6 final
Concentration 2-5 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50	init. 7.33 7.7 487 24.0	0 final 8.00 5.6 508 24.9 0 final	init. 7.53 8.2 489 24.2	$ \begin{array}{c c} 1 \\ \hline $	1111 7,47 7,8 467 29,9 1111 3 7,31	2 final 9,09 5,9 5,2 25,4 25,4 2 2 final 8,32	D (nut) 7,5 7,8 487 25.0 D (init) 7,37	3 final 8.12 490 24.4 24.4 3 3 final 8.32	7.54 8.4 452 26.0 5 init. 7.35	final 8.03 5.5 508 25.0 4 final 5 8.28	7.44 8.3 42 26.0	final 8,03 6.1 458 24.6 5 final 8,03 6,03 9,03 9,03 9,03 9,03 9,03 6,03 6,14 9,03 9,03 6,14 6,14 7	init. 7.27 7.9 7.9 4.3 246 init. 7.13	final 8 1] 5, 7 500 25, 7 6 final 8, 34
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH	init. 7.33 7.7 487 24.0	0 final 8.00 5.6 508 24.9 0	init. 7.53 8.2 489 24.2	$ \begin{array}{c c} 1 \\ \hline $	1nit 7,47 7,8 467 24,9	2 final 9,09 5,8 5,2 25.4 25.4 2 1 1 8,32 5,7 5,7	D 17.5 7.5 7.8 487 25.0 D 1001 7.37 8.3	3 6inal 8.12 4.2 4.4 24.4 24.4 24.4 24.5 3 6inal 7.3 4.5 6.5 6.5 6.5 6.5 6.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7	7.54 8.4 452 26.0 8.10 7.35 8.6	final 8.04 5.5 508 25.0 4 final 5.8	7.44 8.3 423 26.0	final 8,03 6.1 458 24.6 5 final 8,23 6.1	init: 7.27 7.9 7.9 431 246 init: 7.13 7.8	final 8.11 5.7 5.7 5.7 5.7 5.7 6 final 8.34 5.3
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l)	init. 7.33 7.7 487 24.0 init. 7.33	0 final 8.00 5.6 508 24.8 0 final 8.23 5.9	24.2 30.1 30.2 489 24.2 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10	$ \begin{array}{c c} 1 \\ \hline $	1111 7,47 7,8 467 29,9 1111 3 7,31	2 final 9,09 5,9 5,2 25,4 25,4 2 2 final 8,32	D vinit 7,5 7,8 487 25.0 D vinit 7,37 8,3	$ \begin{array}{r} 3 \\ \overline{6inal} \\ 8.1 \\ 2.4 \\ 4.9 \\ 24.4 \\ 24.4 \\ 3xs \\ \overline{3} \\ \overline{6inal} \\ 7.3 \\ 4.0 \\ 4$	7.54 8.4 452 26.0 8 59.3	final 8.03 5.5 508 25.0 4 final 5 8.28	7.44 8.3 42 26.0	final 8,03 6,1 458 24,6 5 final 8,33 6,1 5 5	init. 7.27 7.9 431 246 init. 7.13 7.8 590	final 8.11 5.7 5.7 5.7 5.7 6 final 8.24 5.3 669
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l) Cond. (µmhos-cm)	init 7.33 7.7 487 24.0 init 7.22 7.3 645	0 final 8.00 5.6 508 24.9 0 final 8.23 5.9 650 650	24.2 30.1 3.2 4.89 2.4.2 3.2 4.89 2.4.2 3.2 3.2 3.3 3.0 3.0 3.3 3.0	$ \begin{array}{c c} 1 \\ \hline $	1011 7.47 7.8 467 24.9 1011 3 7.31 7.8	2 final 9,09 5,8 5,2 25.4 25.4 2 1 1 8,32 5,7 5,7	D 17.5 7.5 7.8 487 25.0 D 1001 7.37 8.3	3 6inal 8.12 4.2 4.4 24.4 24.4 24.4 24.5 3 6inal 7.3 4.5 6.5 6.5 6.5 6.5 6.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7	7.54 8.4 452 26.0 8.10 7.35 8.6	final 8.04 5.5 508 25.0 4 final 5.8	7.44 8.3 42 26.0	final 8,03 6.1 458 24.6 5 final 8,23 6.1	init. 7.27 7.9 431 246 init. 7.13 7.8 590 26M	final 8.11 5.7 5.7 5.7 45.7 6 final 5.3 669 669 669
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l)	init 7.33 7.7 487 24.0 init 7.22 7.3 645	0 final 8.00 5.6 508 24.8 0 final 8.23 5.9 650	24.2 30.1 3.2 4.89 2.4.2 3.2 4.89 2.4.2 3.2 3.2 3.3 3.0 3.0 3.3 3.0	$ \begin{array}{c c} 1 \\ \hline $	1111 7.47 7.8 467 24.9 1111 7.31 7.31 7.8 612	2 final 9,09 5,8 5,20 25,4 25,4 2 5,7 7,32 5,7 7,03	D init 7,5 7,8 487 25.0 D init 7,37 8,2 6,33 25.4	3 final 8.12 490 24.4 Pays 3 final 8.32 4.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6	7.54 8.4 452 26.0 8 59.3	final 8.03 5.5 508 25.0 4 final 5.8 5.8 646 25.1	7.44 8.3 42 26.0	final 8,03 6.1 458 24.6 5 final 6.3 6.1 6.2 6.1 6.2 6.2 6.2 6.2 6.2 7 7 2 4.3	init. 7.27 7.9 431 246 init. 7.13 7.8 590	final $8 \parallel$ $5, 7$ $5, 7$ $35, 7$ $35, 7$ $45, 7$ $45, 7$ 6 $45, 7$ 6 $5, 3$ 669 $73, 5$ 669 $73, 5$ 669
Concentration 2-5 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C)	init 7.33 7.7 487 24.0 init 7.22 7.3 645	0 final 8.00 5.6 508 24.8 0 final 8.23 5.9 650	24.2 30.1 3.2 4.89 2.4.2 3.2 4.89 2.4.2 3.2 3.2 3.3 3.0 3.0 3.3 3.0	$ \begin{array}{c c} 1 \\ \hline $	1111 7.47 7.8 467 24.9 1111 7.31 7.31 7.8 612	2 final 9,09 5,8 5,20 25,4 25,4 2 5,7 7,32 5,7 7,03	D 1011 7,5 7,8 487 25.0 D 1011 7,37 8,2 6,33 25.4 1	$\begin{array}{c c} 3 \\ \hline final \\ \hline 8 \\ (2, 2) \\ \hline 4 \\ (2, 2) \\ \hline 4 \\ \hline 4 \\ \hline 9 \\ \hline 2 \\ 2 \\ 4 \\ \hline 9 \\ 2 \\ 4 \\ \hline 9 \\ 2 \\ 4 \\ 5 \\ \hline 9 \\ 3 \\ \hline 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\$	7.54 8.4 452 26.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 1	$\begin{array}{c c} \text{final} \\ 8,01 \\ 5,5 \\ 508 \\ 25.0 \\ 4 \\ \hline 8,28 \\ 5,8 \\ 5,8 \\ 5,8 \\ 5,8 \\ 5,8 \\ 5,9 \\ 25.1 \\ 4 \\ \end{array}$	7.44 8.3 423 2400 7.32 8.2 5.7 5.7 5.7 5.7	final 8,03 6,1 458 24,6 5 5 final 6,3 6,1 6,21 0,24,3 7 5	init. 7,27 7,9 7,9 431 246 init. 7,13 7,8 7,8 590 261 24.0	final 8 II 5, 7 $5, 7$ $5, 7$ $35, 7$ $35, 7$ $35, 7$ $35, 7$ 6 tinal $5, 3$ 669 $25, 5$ 6
Concentration 2-5 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration	init. 7.33 7.7 487 24.0 	0 final 8.00 5.6 508 24.9 0 final 8.23 5.9 600 24.5 0	imit. 7.5 3 8.3 489 24.2 imit. 7.39 8.0 649 25.2	$ \begin{array}{c} 1 \\ \hline final \\ \hline S.(9) \\ \hline S.33 \\ S.33 \\ \hline S.33 \\ \hline S.33 \\ S.33 \\ S.33 \\ \hline S.33 \\ S.33 \\$	1111 7.47 7.8 467 24.9 24.9 1111 7.31 7.31 7.8 612 612	2 final 9,09 5,8 5,30 25.4 25.4 2 5,7 703 25.5	D Vinit 7,5 7,8 487 25.0 D U U U U U U U U U U U U U U U U U U	$\begin{array}{c c} 3 \\ \hline final \\ \hline 8, 1 \\ \hline 2, 2 \\ \hline 4 \\ \hline 4 \\ \hline 9 \\ \hline 24, 4 \\ \hline 24, 4 \\ \hline 24, 3 \\ \hline 3 \\ \hline 3 \\ \hline 4 \\ \hline 3 \\ \hline 5 \\ \hline 24, 4 \\ \hline 24, 3 \\ \hline 3 \\ \hline 3 \\ \hline 5 \\ \hline 100 \\ \hline 100$	7.54 8.4 452 260 500 59.3 24.5	$\begin{array}{c c} \text{final} \\ 8,01 \\ 8,02 \\ 5,5 \\ 508 \\ 25.0 \\ 4 \\ 6 \\ 5.8 \\ 5.8 \\ 6 \\ 4 \\ 5.8 \\ 6 \\ 25. \\ 125$	7.44 8.3 423 2400 init 7.32 8.2 5.75 25.0	final 8,03 6.1 458 24.6 5 final 8.33 6.1 6.2 7 24.3 5 7 14.3	init. 7,27 7,9 7,9 431 246 init. 7,13 7,8 7,8 590 261 24.0	final 811 $5,7$ $5,7$ 500 $35,7$ $35,7$ 6 final $7,34$ $5,3$ 669 $25,5$ 6 final 6 final
Concentration 2.5 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration	init. 7.33 7.7 487 24.0 init. 7.22 7.3 645 24.0 init.	0 final 8.00 5.6 508 24.9 0 final 8.23 5.9 650 24.5 0 final	24.2 30.1 3.2 4.89 2.4.2 3.2 4.89 2.4.2 3.2 3.2 3.3 3.0 3.0 3.3 3.0	$ \begin{array}{c c} 1 \\ \hline final \\ \hline $	init 7.47 7.8 467 24.9 init 7.31 7.8 612 612 249 init	2 final 9,09 5,9 5,3 25,9 25,9 25,9 25,9 70,3 25,5 2 1 1 1 1 1 1 1 1 1 1 1 1 1	D Vinit 7,5 7,8 487 25.0 D Vinit 7,37 8,3 (33) 25.4 L Vinit	$\begin{array}{c c} 3 \\ \hline final \\ \hline 8 \\ (2, 2) \\ \hline 4 \\ (2, 2) \\ \hline 4 \\ \hline 4 \\ \hline 9 \\ \hline 2 \\ 2 \\ 4 \\ \hline 9 \\ 2 \\ 4 \\ \hline 9 \\ 2 \\ 4 \\ 5 \\ \hline 9 \\ 3 \\ \hline 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\$	7.54 8.4 452 260 500 59.3 24.5	$\begin{array}{c c} \text{final} \\ 8,01 \\ 8,02 \\ 5,5 \\ 508 \\ 25.0 \\ 4 \\ 6 \\ 5.8 \\ 5.8 \\ 6 \\ 4 \\ 5.8 \\ 6 \\ 25. \\ 125$	7.44 8.3 423 2400 init 7.32 5.75 25.0 init	final 8,03 6.1 458 24.6 5 final 6.2 6.1 6.2 6.1 6.2 7 7 8.2 7 7 8.2 7 7 7 8.2 7 7 8.2 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	init. 7,27 7,9 7,9 431 246 init. 7,13 7,8 7,8 590 261 24.0	Final 811 $5,7$ 500 $35,7$ $35,7$ 6 final $8,34$ $5,3$ 669 $25,5$ 6 final 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 8.30
Concentration 2.5 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration [OO pH	init. 7.33 7.7 487 24.0 	0 final 8.00 5.6 508 24.9 0 final 8.23 5.9 600 24.5 0	imit. 7.5 3 8.3 489 24.2 imit. 7.39 8.0 649 25.2	$ \begin{array}{c} 1 \\ \hline final \\ \hline S.(9) \\ \hline S.33 \\ S.33 \\ \hline S.33 \\ \hline S.33 \\ S.33 \\ S.33 \\ \hline S.33 \\ S.33 \\$	1011 7.47 7.8 467 24.9 1011 37.31 7.31 7.31 7.31 7.31 7.31 7.31 7	2 5,9 5,9 5,3 25,9 25,9 25,9 25,7 70,3 25,5 2 11111 8,3,9 11111 8,3,9 11111 11111 11111 1111 1111 1111 1111 1111 11111 11111 11111 1111	D Vinit 7,5 7,8 487 25.0 D Vinit 7,37 8,3 (33) 25.4 L Vinit	$\begin{array}{c c} 3 \\ \hline final \\ \hline 8, 1 \\ \hline 2, 2 \\ \hline 4 \\ \hline 4 \\ \hline 9 \\ \hline 24, 4 \\ \hline 24, 4 \\ \hline 24, 3 \\ \hline 3 \\ \hline 3 \\ \hline 4 \\ \hline 3 \\ \hline 5 \\ \hline 24, 4 \\ \hline 24, 3 \\ \hline 3 \\ \hline 3 \\ \hline 5 \\ \hline 100 \\ \hline 100$	7.54 8.4 452 260 500 59.3 24.5	$\begin{array}{c c} \text{final} \\ 8.03 \\ 5.5 \\ 508 \\ 25.0 \\ 25.0 \\ 4 \\ \hline \text{final} \\ 5.8 \\ 5.8 \\ 5.8 \\ 5.4 \\ 5.8 \\ 5.4 \\ 5.8 \\ 5.4 \\ 5.8 \\ 5.4 \\ 5.8 \\ 5.4 \\ 5.8 \\ 5.4 \\ 5.8 \\ 5.8 \\ 5.4 \\ 5.8 \\ 5.$	7.44 8.3 422 2400 init 7.32 8.2 5.75 25.0 init 7.35 25.0	final 8,03 6.1 458 24.6 5 final 8.33 6.1 6.2 7 24.3 5 7 14.3	init. 7,27 7,9 431 246 init. 7,3 7,3 7,3 7,3 7,3 590 240 24.0 init. 6,97 7,6	final 311 $5,7$ $5,7$ 500 $35,7$ $35,7$ 6 final $7,34$ $5,3$ 669 $25,5$ 6 final 6 final
Concentration 2.5 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration [OO pH DO (mg/l)	init 7.33 7.7 487 24.0 7.3 7.3 7.3 645 24.0 init 7.03 7.5	0 final 8.00 5.6 508 24.9 0 final 8.23 0 final 0 final 0 6.0 0 final 0 6.0 0 6.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1	init. 7.5 3 8.2 489 24.2 init. 9 7.31 8.9 6.49 2.6,2 2.6,2 init. 7.19 7.7 8	1 final 8.19 1 5.33 25.0 1 final 8.35 6.0 681 2.550 1 final 8.35 5.9	1011 7.47 7.8 467 24.9 1011 37.31 7.31 7.31 7.31 7.31 7.31 7.31 7	2 5,8 5,8 5,3 25,4 25,4 2 5,7 2 5,7 703 25,5 2 5,4 5,4 5,4	D Sinit 7,5 7,8 487 25.0 D 1011 7,37 8,3 25.4 1011 7,33 8,3 25.4 1011 7,37 8,3 25.4 1011 1011 7,37 8,3 25.4 1011 101 1011 1	$\begin{array}{c c} 3 \\ \hline final \\ 8 \\ 4 \\ 4 \\ 9 \\ 24 \\ 4 \\ 9 \\ 24 \\ 4 \\ 9 \\ 24 \\ 4 \\ 9 \\ 24 \\ 3 \\ \hline final \\ 8 \\ 3 \\ 2 \\ 24 \\ 3 \\ \hline 6 \\ 6 \\ 4 \\ 5 \\ 9 \\ 5 \\ 4 \\ 5 \\ 9 \\ 5 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1$	7.54 8.4 452 26.0 54.3 54.3 24.5 1011	$\begin{array}{c c} \text{final} \\ 8.03 \\ 5.5 \\ 508 \\ 25.0 \\ 25.0 \\ 4 \\ \hline \text{final} \\ 5.8 \\ 5.8 \\ 5.8 \\ 5.4 \\ 5.8 \\ 5.4 \\ 5.8 \\ 5.4 \\ 5.8 \\ 5.4 \\ 5.8 \\ 5.4 \\ 5.8 \\ 5.4 \\ 5.8 \\ 5.8 \\ 5.4 \\ 5.8 \\ 5.$	7.44 8.3 423 2400 init 7.32 5.75 25.0 init	final 8,03 6.1 458 24.6 5 final 8.33 6.1 6.2 7 24.3 5 7 14.3	init. 7,27 7,9 431 246 init. 7,13 7,8 590 240 240 240 init.	Final 811 $5,7$ 500 35.7 35.7 6 final $5,3$ 669 25.5 6 final 6 6 6 6 6 6 6 6 6 6 6 6
Concentration 25 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 50 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration [DO] pH	init 7.33 7.7 487 24.0 7.3 7.3 7.3 645 24.0 init 7.03 7.5	0 final 8.00 5.6 508 24.3 0 final 8.23 0 final 0 6.24 5.9 0 final 8.28 6.1 8.28 6.1 8.13	imit. 7.5 3 8.3 489 24.2 imit. 7.39 8.0 649 25.2	$ \begin{array}{c c} 1 \\ \hline final \\ 8,19 \\ \hline 5,33 \\ \hline 5,33 \\ \hline 5,33 \\ \hline 6,0 \\ \hline 7,0 \\ \hline 1 \\ \hline 1 \\ \hline 8,3 \\ \hline 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\$	1011 7.47 7.8 467 24.9 1011 37.31 7.31 7.31 7.31 7.31 7.31 7.31 7	2 5,8 5,8 5,22 2,4 2,5,7 2,5,7 7,03 2,5,7 7,03 2,5,7 7,03 2,5,7 1,10 8,32 2,5,5 2 1,10 1,1	D Vinit 7,5 7,8 487 25.0 D Vinit 7,37 8,3 6,33 25.4 I I I I I I I I I I I I I I I I I I I	$\begin{array}{c c} 3 \\ \hline final \\ 8 \\ 4 \\ 4 \\ 7 \\ 24 \\ 4 \\ 9 \\ 24 \\ 4 \\ 9 \\ 24 \\ 4 \\ 9 \\ 24 \\ 3 \\ \hline final \\ 8 \\ 3 \\ 6 \\ 6 \\ 4 \\ 3 \\ 8 \\ 5 \\ 4 \\ 5 \\ 4 \\ 8 \\ 5 \\ 4 \\ 8 \\ 5 \\ 4 \\ 8 \\ 7 \\ 8 \\ 7 \\ 8 \\ 7 \\ 8 \\ 7 \\ 8 \\ 7 \\ 8 \\ 7 \\ 8 \\ 7 \\ 8 \\ 7 \\ 8 \\ 7 \\ 7$	7.54 8.4 452 26.0 54.3 54.3 24.5 1011	$\begin{array}{c c} final \\ 8.03 \\ 5.5 \\ 508 \\ 25.0 \\ 25.0 \\ 4 \\ final \\ 5.3 \\ 6.4 \\ 5.8 \\ 6.4 \\ 6.2 \\ 1.5 $	7.44 8.3 42.2 24.0 1011 7.3 5.7 5.7 5.7 5.7 5.7 5.7 5.1 25.1 25.1 25.1 25.1 25.1 25.1 25.1	final 8,03 6.1 458 24.6 5 final 8,33 6.1 5 final 8,33 6.1 5 final 5 7 5 1 6,33 6,1 5 5 1 7 8,0 5 1 8,0 2 9,7	init. 7,27 7,9 431 246 init. 7,3 7,3 7,3 7,3 7,3 590 240 24.0 init. 6,97 7,6	final 8.11 5.7 500 35.7 500 35.7 6 final 8.24 5.3 669 6 6 6 6 6 6 6 7.35 6 9.30 5.8 9.30 5.8 9.75

			 ······································
ſ	Control	MW-129	
Hardness*	80	7400	
Alkalinity*	60	7400	
Initial Chlorine		ND	
Ammonia †		4.4	

* mg/L as CaCO3; † mg/L; ND: no chlorine detected

Sample Description: ABS

Animal Source:

Date Received: 52903 <24 hrs

Comments:

Analysts: **Reviewed:**

KS Et N SM.

Northwest Bioassay Lab

Test Species:	Pimephales promelas
Client:	Unocal
Sample ID.	#(0 M - w)

Initial and Final Chemistries

Seven Day Chronic Freshwater Bioassay

Start Date & Time: Stop Date & Time: Test No:

5/29/03 1715 103 1530 0305-26NW

e/	1		•							<u> </u>				,
Concentration	<u>├</u> ────	0	T	1	1	2		ays 3	r	A	r <u> </u>	-		
CON		final	init.	final		2 finals		final	init.	4 final		5 final		5
pH	7.92	7.82	7.93	7.51	8.11	7.75	301	7.62	7.99	7.63	7.74	7.84		final
DO (mg/l)	7.6	6.4	80	6.3	7.89	5.9	77	5.6	8.2	5,5	8.17	47T	<u>7.83</u> 7.8	7.17
Cond. (µmhos-cm)	337	345	325	348	325	305	233	327	300	330	270	282		295
Temperature (°C)	24.2	25.0	24.2	25.2	750	26.0	245	25,8	351	25.3	248	24.0	24 8	169
					105.0	1-0.0		ays	<u> </u>	2	6.0		29.8	12.7
Concentration		0		1		2	1	3	r	4		5		5
6.25	init.	final	init.	final	init.	final	init.	final	init.	final	init.	-		final
pH	7.56	7.78	7.72	7.70	7.61	7,72	7.71	7.66	7.73	754	7.74	7,80	MONTHER PRIME	7.72
DO (mg/l)	7.6	6.2	3,1	6.3	8.0	59	7.8	5.8	8.2	5.3	8.1	6.3	77	5.9
Cond. (µmhos-cm)	383	397	371	399	372	402	370	359	354	377	319	336	314	336
Temperature (°C)	25.D	25.0	24.3	25.3	25.3	26.0	24.5	35.9	250	25.0	253	24.8	25.1	25.5
						•		iys	L					
Concentration		0		1		2		3		4		5	(5
12.5	init.	final	init.	final	(init,	final	init.	final	init.	final	init.	final	init.	final
pН	7.39	7.85	7.66	7.77	7,50	7,77	7,59	7.72	7.54	7.68	7.55	7.82	7.46	7.72
DO (mg/l)	7.8	6.5	8.0	6,2	7.8	5,8	7,9	Le.1	8.2	5.4	8.3	6.8	7.9	5.8
Cond. (µmhos-cm)	431	445	422	447	421	451	40%	406	401	430	368	406	358	386
Temperature (°C)	24.7	24.8	24.2	25.3		25.8	24.5	25,8	25.0	25.2	29.0	240	25.0	25.1
					·		Dá	iys			¥	•	<u> </u>	
Concentration		0		1		2		3	4	4		5	6	5
25	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	7.26	7.89	7.54	8.02	7.36	7.93	7.41	7.88	7.37	782	7.39	7.91	7.30	791
DO (mg/l)	7.6	59	8,3	6.3	7.8	5.9	6.	3,9	8.4	5.4	8.2	6.9	8.0	5.0
Cond. (µmhos-cm)	525	533	516	557	514	573	484	498	486	523	454	470	458	492
Temperature (°C)	25.0	24.8	24.3	25.3	25.7	26.0	242	25.8	25.0	25.3	25.0	2A6	248	25.4
							Da	iys					. <u>e_1:u</u> .	
Concentration	(0		l		2		3	4	1	Į	5	e	,
50	init, ·	final	init.	final	binit.	final	init. 1	final	init.	final	init.	final	init.	final
pН	7.13	8.05	7,43	8.08	7.20	8.12	7,29	7.98	7.23	797	7.21	8.04	7.14	8,24
DO (mg/l)	7.4	6.0	8,5	5,9	7.7	6,2	8.3	5.3	8.4	5.1	8.5	6.4	79	10.5
Cond. (µmhos-cm)	704	722	690	760	7.01	783	625	699	1051		628	689	637	716
Temperature (°C)	25.0	24.6	24.1	25.4	25.2	25.8		25,5			25.2	226	24.8	25.9
							Da	iys						
Concentration)]			2		3	_	Ł	Ę		6	;
100		final	iniț,	final	init.	final	init, ,	final	init.	final	init.	final	init.	final
pН	6.96	8.17	731	8,06	7.09	8.11	7,18	8.22	7.09	8,09	7.09	8.11	6.97	8.19
DO (mg/l)	7.2	5.9	9.2	5.4	7,8	5,7	8.7	5.4	8.4	5.2	8.7	6.4		5.2
Cond. (µmhos-cm)	1056	1077	1015	1161	1052	1182	973	1054	964	1097	921	1063	959	1099
Temperature (°C)	25.0	24.6	24.2	21.3	24.8	25.8	24.0	25,8	25,0		25.2	25.0		75.8
	Con	trol	MW-	$-\omega$						Analyst	s:	Om Ki	3,27	im
Hardness*	8	6		106			/			-		~		······
Alkalinity*	60			440						Review	ed:	X)-		
Initial Chlorine†			N											···
Ammonia †	-	-	ý.		/									
t man / an CaCOl tan	-/1 . 311	<u> </u>	/.					·····						

Sample Description: ABS

Animal Source: **Comments:**

Date Received:	5	29	03	<24	hr	5
----------------	---	----	----	-----	----	---

Ceriodaphnia dubia

N	ort	hw	est	Bi	oass	ay	Lab	

Thortmwest Bioassa	
Test Species:	<u>Ceriodaphnia</u> dubia
Client:	Unocal
Sample ID.	#1 MW-146

Initial and Final Chemistries

Seven Day Chronic F	reshwater Bioass	sav	
Start Date & Time:	5/29/03	1430	
Stop Date & Time:	6/5/03	1530	
Test No:	15-15NW		

					— <u>,.</u>			ays						
Concentration		0		1	Г	2	T	3	Т	4	T	<u></u>		
CON	init.	final	init.	final	-	final	init	final		- Final	a a conservation	5 final		6
pH	8,01	8.43	7.95	8.27	8.08	8,30	790	8.30	8.01	8.23	7.82		init.	final
DO (mg/l)	7.9	8.1	7.9	8.6	7.7	82	8.1	8.2	8.2	8.3	8.2	8,23	7.99	8.46
Cond. (µmhos-cm)	169	1171	170	209	at 179		179	123	164	1-70		8.7	8,1	8.3
Temperature (°C)	28.0	25.4	250	as.1	25.0	25,1	242	1 35 4	24.	25.2	162	210	$\left \zeta \right $	176
					12			ays		192.0	125.0	25.3	25,0	10.1
Concentration		0		1		2	T	3	1	4	Γ	5		6
6.25		final	init.	final	init.	final	- init.	final	init.	final	init.		init.	
pH	7.80	8.48	7.80	8.30	7.72	8,35	7.68	8.25	7.83	8.26	7,68	8.23	7.3.7	final
DO (mg/l)	8.1	8.3	8.6	8.5	7.9	8.4	8.2	8.3	8.1	8.3	8.2	8.9		8.41
Cond. (µmhos-cm)	179	187	182	180	191	203	185	184	1102	184	182	190	8,0	8.2
Temperature (°C)	20	25.3	25.0		25.0	24.8	243		hA D	25.4	710	25.2	35.0	178
					<u> </u>			ays	14.0	0,3,4	14.0	125-1	0.5.0	<u> <u> </u></u>
Concentration		0		1		2		3	5	4		5 1	6	
12.5	init.	final	init.	final	init.	final	binits.	final	init.	final		final	init.	
pH	7.60		7.66	8.25	7.45	8.32	7.46	8.21	7.810	8.26	7.51	8.2.5	Panets Spatter and Car	8.42
DO (mg/l)	8,4	8.3	8.5	8.6	8.0	8.3	8.0	8.3	8.2	8,5	8.1	8.8	8.1	8.2
Cond. (µmhos-cm)	195	197	194	180	205	218	201	196	200	196	188	1-39		211
Temperature (°C)	25.0	28.2	250	as T	24.8	24.7	24.0		0 1		149	563	250	31
					- 11 -		····	ays	05.0	<u>(</u>		9371	2301	11
Concentration		0		1		2		3	4	1	1	5	6	
25	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	-	final
pH	7.45	8.35	7.48	8.31	7.24	8.16	7.29	8.25	7.51	8,26	7.31	8.26	714	8.38
DO (mg/l)	8.3	8,0	8.5	8.7	7.7	8.0	8.0	8.5	8.2	8.5	8,2	8,8	79	8.2
Cond. (µmhos-cm)	224	225	221	185	247	249	230	223	151	221	214			2,29
Temperature (°C)	210	25.3	210	25.1	25.2	25.2	24.0	25.4	24 9	25	26.0			2+1
							Da	vs	<u> </u>	0.0,1		a J	<u>(A.J.</u>)	217
Concentration		0		1		2		3	4	L		5	6	
50	init.	final	init	dinal	init.	final	init.	final	linit.	final	anit.	final	init.	
pH	7,26	8,40	7.25	8.30	6.99	8.38	701	and an	7.26	8.32	714			8.44
DO (mg/l)	7.9	7.9	8.4	8,4	7.2	8.	74		8.1	8.4	44	8.7		8.1
	279	274	279	191	301	303	290				227	270		285
Temperature (°C)	No	25.3	24.0	25.0	25.D	25.0	163	75.1	25 0	251	$\frac{2}{2}$	254	<u> </u>	152
						<u></u>	Da	vs	PIO		050	0.1	<u>au ()</u>	67.
Concentration	(1	L I		2	3		4	L	5	;	6	
	init.	final	init.	final	init.	final	init.	Sinal	init.		sinit.	final	-	final
pН	701	8.48	7.07	8.35	6.83	8.45		8.38	7.10	8.45	7.13	8.40	21 - 17 IV AVALADA A A A A A A A A A A A A A A A A A	8.54
DO (mg/l)	7.0	8.0	8.0	8.7	7.0	7.9	ΖŐ	8.0	7.8	8.2	77	3,4		8.1
Cond. (µmhos-cm)	393	373	389	209	414	405	386	375	120		384	271	272	282
											< 1 ^ 1	S 11		¬ ∧ ¬¬
	250	25.0	25.0	252	140		7A 3	701	7A.8		24.0	251	31.1 +	1000 - 1/

Control	MW-146]
80	7400		
60	264		
~	KS. AZNO		f
/	3.0		
	Control 80 60 	80 7400 60 264	80 7400 60 264

Analysts:

Reviewed:

Et NE B m

* mg/L as CaCO3; † mg/L; ND: no chlorine detected

Sample Description:		
Animal Source: Comments:	ABS	Date Received: 5/29/03
Commence.		

Northwest Bioassay Lab

Test Species:	Ceriodaphnia dubia
Client:	Unocal
Sample ID.	#2 MW-7

Initial and Final Chemistries Seven Day Chronic Freshwater Bioassay

Start Date & Time: Stop Date & Time: Test No:

5/29/03 6

103 '5 0305-16NW

1400

1500

Concentration							Ī	Days	<u></u>					
Concentration	12121044532455	0		1	0.000	2		3		4	1	5	1	6
pH		final	the state of the second southers	and the state of t	init,	1951 SUSSICIAL SUSSICIAL SUSSICIAL	init.	11 Constitution of the second second second		final	init.	final	Smit	_
DO (mg/l)	8.01	8.2	1 7.95		8,08	8.20		8.08	7.99	813	7.82		7.99	
Cond. (µmhos-cm)	7.9	7.9	$\frac{1}{17}$	8.7	7.7	7,8	8.1	7.9	8.2	8.4	8.2	8.9	8,7	128
Temperature (°C)	169	174	110	\$#9.17	179	1 193	179	174	149	185	62	170	161	278
remperature (C)	21,0	25.4	25.0	, 92'9	24.8	9.2.3	25-1	35.1	124.0	25.1	14:	251	25.2	25.0
Concentration		0	T	1			<u>Ľ</u>	Days						
10.25	init.		Sintle	<u> </u>		2	CH ROMAN AND AN AND AND AND AND AND AND AND AN	3		4		5		6
pH	7.90			final	init	22.5	init.	final	init.	final	init	final	init.	final
DO (mg/l)	8.2	8.1		8.31	7.82	18.18	771	8.07	17.90	10110	7.65	5 8,13	7,66	8.17
Cond. (µmhos-cm)	175	180	8.6	8,4	80	8.0	8.1	7.7	8.3	8.4	8,2	8,8	8,2	8.0
Temperature (°C)	250	25.3	181	186	181	198	183	179	174	187	173	172	63	184
remperature (C)	270	127.3	21.0	a5.3	24.8	as.a	24.0		124 c	2 25.2	24.8	25.3	252	250
Concentration		0	T	1	T			Days						
12.5	init	final	inita	-		2		3		4		5		6
pH		8,23	7.39	8.33		final	init.		init.	in housenamentalisteralist	zinit.	final	init,	
DO (mg/l)	8,4	8.0	8.5		7.73	8,22	1.70	8.09	7.68	8.33	7.58	8.18	7,57	8,26
Cond. (µmhos-cm)	183	187	184	8,6	8.	8,1	8.2	7.9	8.4	87	8.2	8.8	8.2	8.1
Temperature (°C)	250	25.3	25.0	20,5	189 25.0	<u>Jair</u>	187	186	189	207	175	179	170	190
		21.9	127.5	00,5	25.0	25.3	124.5	253	14.0	1229	24.8	25.5	<u>235</u>	22(
Concentration		0	1	1	·	2		ays 3	r		r			
25	mit	final			init	 final	init.	•	1979 - XI. S.	4	United Rosenson and the	5		6
рН	7.62	8.26		8,28	7.51	8.20	7.57	A BURGERS MEET SCHEMENEN	init.	final	init.	final	init.	final
DO (mg/l)	8.4	8.0	85	9.5	8.1	8.0	8.5	8.15	7.41	831	14	8.96	7.43	8.29
Cond. (µmhos-cm)	198	201	197		203	1213	200	7.8 203	8,2	8.7	8,3		8.1	8.1
Temperature (°C)	750	25.0	25.0		25.1	25.0	24.1	252	207	all a	193	193	192	205
	01-		2		27.1			ays	14.7	25.1	25.0	255	as,	25,1
Concentration		0	1	1		2		ays 3		4	r			
50	init	final		final	init.	2 final	init.	final		4		5		6
pH	7.47	8.27	7.40	8,32	7.31	8.26	A STOLEY AN A STOLEY OF A STOL		init.	final	init.	final	init.	final
DO (mg/l)	8.1	8.0	8.7	8.4	8,1	7.9	7,36 8,2	8.21 8.D	<u>7.22</u>	831	7,20	8.38	7.2.3	8.39
Cond. (µmhos-cm)	231	230	224	234	334	249		230	2.2	8,6	8.4	8.8	8.3	8.0
Temperature (°C)	200	24.9	25,0	20.1	25.1	249	<u>230</u> 242	250	237	272	332	333		233
<u></u>			23,0	MUI I	F.J.	LOT /	0		14.0	25.2	14.9	25,4	<u>25,1</u>	5.1
Concentration	()	-	1 1		2		ays 3		4				
	init	final	init.				init.	- 1		1		5		6
pH	7.12	8.42	7.25	8.42	7.27	8,38	7,13		init.	final	init.	final	init.	final
DO (mg/l)	8,0	7.8	8,5	8.3	8.0	7.9	8.4	8.36 7.9	<u>6.98</u> 8.9	8,40	703	8,36	1.01	B.y 8
Cond (umbas and)	200	1.0		01-1	<u>~~</u> ~	1.1	Tis	1.7	8,9	2.C	8.5	8.9	8,2	0.8

DC Cond. (µmhos-cm) 288 280 277 382 268 302 Temperature (°C) 25, 25.3 25.9 20.3 25.9 25.3 9 24.2 25

	Control	M41-7	
Hardness*	80	7400	
Alkalinity*	60	184	
Initial Chlorine†		0.06	
Ammonia †	~	1.6	

Analysts:

Reviewed:

+ NF

* mg/L as CaCO3; † mg/L; ND: no chlorine detected

Sample Description:		
Animal Source: Comments:	ABS	Date Received: 5/29/03

Northwest Bioassay			
Test Species:	Cerioda	phnia	dubia
Client:	Unocal	1	
Sample ID.	#3	Min	-17

Initial and Final Chemistries Seven Day Chronic Freshwater Bioassay 5/29/03 1500 Start Date & Time: 1600

Stop Date & Time: Test No: 0305-

Days

E, 63 5

						Da	×						
Concentration	0		1		2	3		4			5	6	
CON	init: fir	State of the second	lefinal	init	final.	init	final	, init.	final	init.	final	jinit.	final
pН	8.01 8.		8.33	8,08	8,25	7.90	3.15	7.8.03	8.14	7.85	8.99	7.98	832
DO (mg/l)	7.9 7.	7.9	8.4	7,7	7,8	8.1	8.2	8.	8.5	8,2	8.7	8,	8.1
Cond. (µmhos-cm)	169 17		182	179	200	179	179	151	86	62	173	161	190
Temperature (°C)	25.0 24	5 250	25.3	25.0	25,2	14.0	25.4	25.0	25.1	24.0	JS. 3	25.0	25.5
						Da	ys						
Concentration	0		1		2	3		4	Ļ	Į	5	6	,
6.25	Sinik. Bu	al init.	final	jinit.	final	init.	final	init.	Sinal	init.	final	init.	final
pН	7.86 8.1	× 7.33	8,33	7.92	8.26	7.81	8.16	8.03	8°0	777	8,20	7.88	8.33
DO (mg/l)		9 8.7	8,4	7.9	8.0	8.2	8.1	8.2	8,4	8.1	8.8	8.1	8.0
Cond. (µmhos-cm)	167 17		191	178	196	175	175	165	177	179	166	160	182
Temperature (°C)	210 25.		25.5	251	25.0	222	264	25.0	351	25.0	25.3		25.0
t t						Da						•	
Concentration	0		1		2	3			1	ļ	5	6	5
12.5	init. Git	ar same	final	init	Samal.	init.	Stimal	init.	final	init.	final	·init.2	final
pH	7.79 8.	TO CONTRACT CARGO CONTRACT CARGO	8,29	7.81	8.28	7.82	8.14	7.92	827	7.69	8.21	7.76	8.30
DO (mg/l)	8,5 8-	- Marine Contractor State	8.5	8.1	8.2	8.2	80	8.2	8.7	52	8.9	8.3	8.0
Cond. (µmhos-cm)	168 17		201	177	196	176	176	166	181	162	172	160	189
Temperature (°C)	25,0 25		25.2	26.1	24.9	25.2	25.4	24.7	251	26.0	25.3	250	75.2
Temperature (C)	Die Li		100000	<u>- / / _</u>	<u>19. 11 </u>	Da							
Concentration	0		1		2	3			4		5	(5
			-		_								
	_	al inf	final	init	final	init.	finelle	an estimation	final	inif.	final	Smith	final
-25	init. sta	particulation management of a president	final	init. 763	final SJ3	init. 771	final	init. 770	final SZI	init . 749	final 8.24	init.	final 8.28
<u>25</u> рн	init. 11	4 7.44	8.27	7.63	8.23	7.71	final 8.14 8.14	7.70	8.31	7.49	8.24	7.60	8.28
25 	init. fi 7.65 S. 8.6 S.	14 7.44 0 8.7	8.27	7.63 88181	8.23	7.71 8.4	8.14 8.1	7.70 8.5	831 86	7.49	ALL COMPLY THE PARTY	7.60 7.3	8.28 8.1
рН DO (mg/l) Cond. (µmhos-cm)	init, 560 765 8. 8.6 8. 170 19	14 7.44 0 8.7 0 174	8.27 8.4 223	7.63 8 81 81 181	8.23 8.1 198	7.71	final 8.14 8.1 780	7.70 8.5 169	831 86 181	7.49 9.5 165	8.24 8.9 171	7.60 7.3 160	8.28 8.1 188
25 	init. fi 7.65 S. 8.6 S.	14 7.44 0 8.7 0 174	8.27	7.63 88181	8.23	7.71	8.14 81 780 25.4	7.70 8.5	831 86	7.49	8.24 8.9 171	7.60 7.3	8.28 8.1
PH DO (mg/l) Cond. (μmhos-cm) Temperature (°C)	init, the 7.65 B. 8.6 S. 170 19 24.0 25	14 7.44 0 8.7 0 174	8.27 8.4 223 25.2	7.63 58181 181 25.1	8.23 8.1 198 24.7	7.71 8.4 179 24.8 Di	8.14 8.1	7.70 8.5 149 25.1	831 86 181	7.49 9.5 165 26.0	8.24 8.9 171	7.60 7.3 160 250	8.28 8.1 188
DO (mg/l) Cond. (μmhos-cm) Temperature (°C) Concentration	init. 14 7.65 8. 8.6 8. 170 19 24.0 25	14 744 0 8.7 0 174 2 250	8,27 8,4 223 25.2 1	7.63 88181 181 25.1	8.23 8.1 198 24.7 2	7.71 8.4 179 24.8 Di	8.14 8.1 780 204 iys 3	7.70 8.5 149 25.1	8.31 8.6 181 25.2 4	7.49 9.5 165 26.0	8,24 8,9 171 25.3 5	7.60 7.3 1.60 2.50	8.28 8.1 188 21.2 21.2
DO (mg/l) Cond. (μmhos-cm) Temperature (°C) Concentration ΞΟ	init	14 7.44 0 8.7 0 174 2 250 1al init.	8,27 8,4 223 252 1	7.63 58181 181 25.1	8.23 8.1 198 24,7 2	7.71 8.4 179 24.8 Di	8.14 8.1 780 25.4 ys	7.70 8.5 149 25.1	8.3] 8.6 [8] (35,2) (4) (final)	7.49 9.5 765 26.0	8.24 8.9 17! 35.3 5 final	7.60 7.3 160 250	8.28 8.1 188 21.3 5 5 6
DO (mg/l) Cond. (μmhos-cm) Temperature (°C) Concentration <i>⊆</i> Ω pH	init	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	8.27 8,4 223 252 1 final 8,34	7.63 68481 181 25.1 init: 7.38	8.23 8.1 148 24.7 2 final 8.30	7.71 8.4 179 24.8 Di Di Di Di T.50	8.14 8.1 25.4 195 3 6inal 8.17	7.70 8.5 149 25.1 init. 7.48	8.3 78 78 25,2 4 final 8.28	7.49 8.5 765 26.0	8.24 8.9 17! 25.3 5 final 8.25	7.60 7.3 160 250 Init.	8.28 8.1 188 V.2 5 Final 8.34
PH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration ⊖ PH DO (mg/l)	init. fit 7.65 8. 8.6 8. 170 19 24.0 25 0 inite fit 7.43 8. 8.3 8.	14 7.44 p 8.7 o 174 v 2.5.0 14 17 17 17 17 17 17 17 17 17 17	8.27 8.4 223 252 1 final 8.34 8.1	7.63 58+81 181 25.1 init. 7.38 8.0	8.23 9.1 198 24.7 2 final 8.30 8.0	7.71 9.4 179 24.8 Da Da Da Da Da Da Da	8.14 8.1 25.4 195 3 Final 8.17 8.2	7.70 8.5 149 25.1 init. 7.48 8.6	8.31 8.6 18 25.2 4 final 8.28 8.6	7.49 8.5 165 26.0 init. 7.28 8.6	8.24 8.9 171 35.3 5 final	7.60 7.3 160 250	$ \begin{array}{r} $
pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration GO pH DO (mg/l) Cond. (µmhos-cm)	init. fil 7.65 8. 8.6 8. 170 19 24.0 25 0 init. fil 7.43 8. 8.3 8. 179 18	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	8.27 8.4 223 252 1 final 8.34 8.1 269	7.63 68481 181 25.1 init: 7.38	8.23 9.1 198 24,7 2 (final) 8.30 8,0 206	7.71 8.4 179 24.8 Dz Dz Dz Dz Dz Dz Dz Dz Dz Dz 185	8.14 8.1 180 25.4 ys 3 6inal 8.17 8.2 8.2 (85	7.70 8.5 149 25.1 init. 7.48	8.31 8.6 181 25.2 4 final 8.28 5.6 188	7.49 8.5 765 26.0 165 76.0 8.6 170	8.24 8.9 171 25.3 5 final 8.25 8,8 177	7.60 7.3 160 250 Init.	8.28 8.1 188 V.2 5 Final 8.34
PH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration ⊖ PH DO (mg/l)	init. fit 7.65 8. 8.6 8. 170 19 24.0 25 0 inite fit 7.43 8. 8.3 8.	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	8.27 8.4 223 252 1 final 8.34 8.1	7.63 58+81 181 25.1 init. 7.38 8.0	8.23 9.1 198 24.7 2 final 8.30 8.0	7.71 8.4 179 24.8 Da Da Da Da Da Da Da Da Da Da Da Da Da	8.14 8.1 25.4 ys 5 final 8.17 8.2 18.5 25.4	7.70 8.5 149 25.1 init. 7.48 8.6	8.31 8.6 18 25.2 4 final 8.28 8.6	7.49 8.5 165 26.0 init. 7.28 8.6	8.24 8.9 17! 25.3 5 final 8.25 8.8 177	7.60 7.3 160 250 Init.	$ \begin{array}{r} $
pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration \bigcirc pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C)	init. 19 7.65 8. 8.6 8. 170 19 24.0 25 0 inite 19 7.43 8. 8.3 8. 179 18 25.9 25.	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	8,27 8,4 223 252 1 final 8,34 8,1 269 25,1	7.63 59181 181 26.1 5.1 7.38 8.0 188 24.6	8.23 8.1 198 24,7 2 (final) 8.30 8.0 206 206 2.1	7.71 8.4 179 24.8 Di 179 24.8 Di 179 0 3.4 7.50 8.4 185 24.0 Di	8.14 780 25.4 ys final 8.17 8.2 185 25.4 ys	7.70 8.5 149 25.1 init. 7.48 8.6	8.3 8.6 18 25,2 4 Final 8.28 5.6 188 25,1	7.49 9.5 165 26.0 26.0 170 26.0 26.0	8,24 8,9 171 25.3 5 final 8,25 8,8 177 25.3	7.60 7.3 160 250 Sinit 7.37 8.5 170 250	8.28 8.1 188 24.2 5 6 6 8.1 193 15.0
pH DO (mg/l) Cond. (μmhos-cm) Temperature (°C) Concentration = PH DO (mg/l) Cond. (μmhos-cm) Temperature (°C) Concentration	init. 11 7.65 8. 8.6 8. 170 19 24.0 25 0 inite 11 7.43 8. 8.3 8. 179 18 25 9 25, 0	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	8,27 8,4 223 252 1 final 8,34 8,1 269 25,1 1	7.63 59181 181 26.1 181 26.1 7.38 8.0 188 24.6	8.23 8.1 198 24,7 2 (final) 8.30 8,0 206 206 2.5.1	7.71 8.4 179 24.8 Di 179 7.50 8.4 185 24.0 Di	8.14 8.1 25.4 195 3 final 8.17 8.2 185 25.4 25.4 25.4 195 3	7.70 8.5 149 25.1 7.48 8.4 174 25.0	8.3 8.6 18 25,2 4 100 8.28 8.6 188 2.5,1 4	7.49 9.5 165 26.0 26.0 7.29 8.6 170 26.0	8,24 8,9 171 25.3 5 final 8,25 8,8 177 2253 5	7.60 7.3 160 250 Sinit 7.37 8.5 170 250	8.28 8.1 188 21.2 5 5 6 6 8.34 8.1 193 15.0 6
рН DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration ЭО рН DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration (OD	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	8,27 8,4 223 252 1 final 8,34 8,1 269 25,1 1 final	7.63 58-81 181 26.1 init. 7.38 8.0 188 24.8 init.	$\begin{array}{c} 8.23 \\ 8.1 \\ 198 \\ 24,7 \\ \hline \\ 198 \\ 24,7 \\ \hline \\ 198 \\ 24,7 \\ \hline \\ 206 \\ 206 \\ 25.1 \\ \hline \\ 2 \\ \hline \\ 2 \\ \hline \\ 100 \\ $	7.71 8.4 179 24.8 Da Da Da Da 179 7.50 8.4 185 24.0 Da Da Da	$\frac{8}{8}$.14 $\frac{780}{254}$ $\frac{254}{33}$ final $\frac{8.17}{8.2}$ $\frac{785}{25}$ $\frac{25}{4}$ $\frac{785}{3}$ final	7.70 8.5 149 25.1 25.1 8.4 8.4 17-4 25.6	8.3 8.6 18 25.2 4 final 8.28 8.6 188 2.5,1 4 final	7.49 9.5 165 26.0 26.0 7.29 8.6 170 26.0 26.0	8, 24 8, 9 171 25. 3 5 final 8, 25 8, 8 177 25. 3 5 final	7.60 7.3 160 250 Sinit 7.37 8.5 170 250	8.28 8.28 188 24.2 5 188 8.34 8.34 193 193 15.2 6 [final]
рН DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration © PH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration (OD pH	init. fil 7,65 8. 8.6 8. 170 19 24.0 25 0 init. fil 7,43 8. 8,3 8. 179 18 24.2 25. 0 init. fil 7,13 8-	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} 8.27 \\ 8.4 \\ 223 \\ 252 \\ 1 \\ \hline 1 \\ 8.34 \\ 8.1 \\ 8.1 \\ 8.1 \\ 8.1 \\ 8.1 \\ 8.1 \\ 8.7 \\ 8.7 \\ 1 \\ 1 \\ 8.4 \\ 8.7 \\ 8.4 \\ 8.7 \\ 8.4 \\ 8.7 \\ 8.4 \\ $	7.63 58/8/ 18/ 26.1 init. 7.38 8.0 188 24.9 init. 7.14	$\begin{array}{c} 8.23 \\ 8.1 \\ 198 \\ 24,7 \\ \hline \\ 9.30 \\ 24,7 \\ \hline \\ 9.30 \\ 206 \\ 206 \\ 25.1 \\ \hline \\ 2 \\ \hline \\ 9.35 \\ \hline \\ 2 \\ \hline \\ 9.35 \\ \hline \end{array}$	7.71 8.4 179 24.8 Da Da Da Da 179 7.50 8.4 185 24.0 Da 185 24.0 Da 185 24.0 Da	8.14 780 2(4) 2(4) 8.17 8.2 785 2(4) 8.2 785 2(4) 8.2 785 2(4) 8.2 785 2(4) 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2	7.70 8.5 149 25.1 7.48 8.4 174 25.0	8.3] 8.6 18 25,2 4 final 8.28 25,1 4 final 8,32	7.49 9.5 165 26.0 1nit. 7.29 8.6 170 26.0 170 26.0	8,24 8,9 171 35.3 5 final 8,25 8,8 177 25.3 5 final 8,25	7.60 7.3 160 250 3.5 7.34 8.5 170 250 170 250	8.28 8.1 188 2.3 5 Final 8.34 8.1 193 150 6 6 6 6 6 6 6 6 6
pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration $= 0$ pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Cond. (µmhos-cm) Temperature (°C) Concentration (OO pH DO (mg/l)	init. ifi 7,65 8. 8.6 8. 170 19 24.0 25 0 init. fti 7,43 8. 8,3 8. 179 18 24 9 25. 0 init. fti 7,13 8- 8.0 8	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} $	7.63 58/8/ 18/ 26.1 init. 7.38 8.0 188 24.9 init. 7.14 8.1	8.23 8.1 198 24,7 2 $8.308,02063.53.58,1$	7.71 8.4 179 24.8 Di Di Di Di Di 179 7.50 8.4 185 24.0 Di 185 24.0 Di 185 24.0 Di 185 24.0 Di	$\frac{8}{8}$.14 $\frac{780}{254}$ $\frac{254}{33}$ final $\frac{8.17}{8.2}$ $\frac{785}{25}$ $\frac{25}{4}$ $\frac{785}{3}$ final	7.70 8.5 149 25.1 25.1 8.4 8.4 17-4 25.6	$ \begin{array}{c} 8.3 \\ 7.6 \\ 7.6 \\ 7.1 \\ 7.2 \\ 7.2 \\ 7.5 \\ 7.$	7.49 9.5 165 26.0 1nit. 7.28 8.6 1.70 26.0 26.0 26.0 26.0 26.0 26.0 26.0 26.	8, 24 8, 9 171 25. 3 5 final 8, 25 8, 8 177 25. 3 5 final	7.60 7.3 160 250 160 250 160 7.34 8.5 170 250 170 250 170 250	8.28 8.1 188 21.2 5 Final 8.34 8.1 193 15.0 6 6 6 6 6 8.36 8.36 8.36 8.36
рН DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration = 0 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration (0 D pH	init. fil 7,65 8. 8.6 8. 170 19 24.0 25 0 init. fil 7,43 8. 8,3 8. 179 18 24 2 25. 0 init. fil 7,13 8-	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} 8.27 \\ 8.4 \\ 223 \\ 252 \\ 1 \\ \hline 1 \\ 8.34 \\ 8.1 \\ 8.1 \\ 8.1 \\ 8.1 \\ 8.1 \\ 8.1 \\ 8.7 \\ 8.7 \\ 1 \\ 1 \\ 8.4 \\ 8.7 \\ 8.4 \\ 8.7 \\ 8.4 \\ 8.7 \\ 8.4 \\ $	7.63 59181 181 26.1 181 26.1 7.38 8.0 188 24.6 188 24.6 188 24.6 188 24.6 188 24.6 187 24.6 187 24.6 187 24.0 198 24.0 198 24.0 198 24.0 197 24.0 197 24.0 197 24.0 197 24.0 197 24.0 197 24.0 197 24.0 197 24.0 197 24.0 197 24.0 197 24.0 197 24.0 197 24.0 197 207 197 197 197 197 197 197 197 19	$\begin{array}{c} 8.23 \\ 8.1 \\ 198 \\ 24,7 \\ \hline \\ 9.30 \\ 24,7 \\ \hline \\ 9.30 \\ 206 \\ 206 \\ 25.1 \\ \hline \\ 2 \\ \hline \\ 9.35 \\ \hline \\ 2 \\ \hline \\ 9.35 \\ \hline \end{array}$	7.71 8.4 179 24.8 Da Da Da Da 179 7.50 8.4 185 24.0 Da 185 24.0 Da 185 24.0 Da	8.14 780 2(4) 2(4) 8.17 8.2 785 2(4) 8.2 785 2(4) 8.2 785 2(4) 8.2 785 2(4) 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2 780 8.2	7.70 8.5 149 25.1 25.1 8.4 8.4 17-4 25.6	8.3] 8.6 18 25,2 4 final 8.28 25,1 4 final 8,32	7.49 9.5 165 26.0 1nit. 7.29 8.6 170 26.0 170 26.0	8,24 8,9 771 25.3 5 final 8,25 8,8 177 25.3 5 final 8,25 8,9 191	7.60 7.3 160 250 3.5 7.34 8.5 170 250 170 250	$ \begin{array}{r} 8.28 \\ 8.28 \\ 7.2 \\ 188 \\ 24.2 \\ 7.3 \\ $

ſ	Control	MW77		
Hardness*	80	116		
Alkalinity*	60	88		P
Initial Chlorine†		0.12		
Ammonia †	~	41.0	1	

Analysts: **Reviewed:**

* mg/L as CaCO3; † mg/L; ND: no chlorine detected

Sample Description:

Animal Source: ABS Comments:

Date Received: 5/29/03

AMEC Earth & Environmental

Northwest Bioa
Test Species:
Client:
Sample ID.

say Lab		1.1.1	
Cerioda	onna	and	<u>a</u>
Unoca	1		
Anoca		1-103R	
I14	ML		

	#4 MW-103R Restrict	
Sample ID.		
	Days 5 6	
Concentration	tinal init tinal init ina 22/2 7733 8.19 798 8.55	
CON	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
pH		
DO (mg/l)	7.9 8.9 1.41 1.96 1.79 1.85 1.79 1.82 1.40 1.13 1.9 . 555 250 121 9	
Cond. (umhos-cm)	167 117 115 DIL 7 125 D 125 D 124 8 05. TEL, 100-112-12	
Temperature (°C)	7×10 248 25.0 24.7 25.0 200 Dro 1000 Days 5 6	
A Children of Chil		
Concentration	0 1 init final init final init $224 \frac{9}{24}$	
6.25	1111 1111 1111 1111 1111 1111 1111 1111 1111	
pH	79 8.18 7.33 8.35 415 9.5 49 83 9.5 8.2 8.3	
	186 9.0 8.5 8.5 1.0 11 10 20 220 202 217 202 210 100 110 0015	
DO (mg/l)	8.5 221 al 7 als al 7 242 250 200 and 200 24.9 ass 25.0 24.8	
Cond. (µmhos-cm)	1 26 1 24 1 26 0 24 9 25.5 12.0 12 10 1 25 1 25 1 25 1 25 1 25 1 25 1	
Temperature (°C)		
Concentration		
12.5	1.16 8.21 7.10 8.31 7.16 8.21 7.10 9.01 7.7 8.1	
pH	1,78 8:30 1,19 20 35 8: 19:3 0,000 0,45 33 257	1
DO (mg/l)	8.5 7.8 0 129 1282 263 0194 1997 0 10 10 10 10 10 10 10 10 10 10 10 10 1	
Cond. (µmhos-cm	1) 257 232 352 352 352 352 156 243 333 152 353 125	1
Temperature (°C	$Days = \frac{5}{14.6} \frac{1}{24.6} \frac{1}{14.6} $	
	2 3 final mit final	1
Concentration	0 1 final init final init and g 33 760 8 70	
25	inite final and a classical 1772 342 7. 88 8447 4.67 13-24 4 88	
pH	795 8.38 7.18 8,15 6,10 840 425 81 8.10 8.20 8.3 8.3 01 1 124 9	1
DO (mg/l)	9577 86 25 00 97 250 274 314 255 313 530 00 0 0	オ
Cond. (µmhos-c	- 1-144 340 345 346 36 J10	4
Temperature (°	0 760 24.6 25.0 d4.8 25.0 CV P	-
Temperature	4 5	633
a substantion		(all the second
Concentration	" init final init final init final init and a second at 955 7.55 9.50 7.47 8.8	쾨
50		-
pH		$\langle \rangle$
DO (mg/l)	101 21 201 255 668 1515 642 791 1378 370 66 10 60 104	9
Cond. (µmhos-	cm) 516 708 501 019 269 256 740 053 24 0 051 725 0 100 12	4
Temperature ($^{\circ}$ C) 23.0 24.3 23.0 $(3.10 + 2.$	
		87 W.
Concentratio	on 0 final mit final mit final mit final	
-100	mill timal mill think the first of 745 \$ 19 1 4 18 77 7.21 8.68 7.36 8.6	
pH	7.7418.68 1.T 1 p/ 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	e
DO (mg/l)	86 30 7. 86 23 7.2 100 149 201 844 823 816 791 87	5
Cond. (µmhos	m 978 831 8.71 755 915 912 331 346 361 36 92 35 350 25	2
Temperature		
Temperature		

Initial and Final Chemistries

Start Date & Time:

Stop Date & Time:

Test No:

Seven Day Chronic Freshwater Bioassay

1)3

5/29/03

6/5/63 5-18NW

1625

•		
[Control	MWTUSR
Hardness*	80	2400
Alkalinity*	60	392
Initial Chlorine†		0.05
Ammonia †		5.7

Analysts:

Reviewed:

NFet \mathbb{Z}

* mg/L as CaCO3; † mg/L; ND: no chlorine detected

Sample Description: Animal Source:	ABS Date Received: 5/29/03
Comments:	

	Lab Ceriodaph Unocal		5 5	Seven Day Chro Start Date & Ti Stop Date & Tin	onic Freshwater Bioas me: <u>5/29/03</u> ne: 6/5/03	1550 1640	、 [,] ,
ſ <u>-</u>				Days		· · · · · · · · · · · · · · · · · · ·	
Concentration				3 Wr			Final
							8.16
	7.9 8.1		77 81				7.8,
							170
Temperature (°C)	21.0 25.6	25.0 25.2	29.8 456	14-8 20 G	1418 as 0 124.1	135.5 125.0 125.0	
Concentration	0	1	2	3	4 mail init	5 6	
	STORE						8.27
				and the second se			
Temperature (C)	21.0121.7	29.0 07.1	67.0 200				
Concentration	0	1	2	3	4	5 6	
		-	init. final	Thile Cinals	init. final init.	final init. final	
	TEMPERATURA CONTRACTOR AND			PUBLICATION AND DESCRIPTION OF A DESCRIP			8.37
					8.59.18.4	9.1 8.0 8.0	8.1
		278 273	290 295	282 38	262 274 260	261 261 284	288
		23.0 247	25.5 25.10	25.2 25.6		-25,5 2,55 250	
10mp02mm20(-/				Days			
Concentration	0	1	2	3	4	5 6	
25	init. final	init. final	init. final				9.10
pH	7.51 8.56	7.42 8,54	7.56 8.59				
DO (mg/l)	8.3 8.1	8,0 8.6			8.3 4.0 8.3		A.L
Cond. (µmhos-cm)	381 366	382 367	401 394				202
Temperature (°C)	25.0 25.4	25.0 24.8	25.725.6		14.9 as.5 26.0	1-5.6 22.1 24.9	-
							-
							-
	CARDON CONTRACTOR STATE	A PERSONAL RECOVER CONSISTENT ACTION AND	A STANDARD WATER AND THE READ A	and of the second s			862
				<u>151 X49</u>	7.47 8.10 1.4		
							Dig.
						503 55 7 31	596
Temperature (°C)	25.0 25.3	25. 0 ds. 2	24.8 25.6	and the second s	222 23.5 25.0	Sand drad berto	
		1	<u> </u>		A	5 6	-
	-	-					和
	Selbergerteren en selbergerteren en selbergerteren er se						
							8.2
						X 728 911 769	
							5
remperature (C)	01.01.10		60.0 60.0				_
				L			
	Control	Main -129			Analysts:	NF &t	_
Hardness*	and the second	7 400				110	_
					Reviewed:	18	
Support & Time: $\frac{1/2}{2}/2/3$, $1/2/4$. Support & Time: $\frac{1/2}{2}/2/3$, $1/2/4$. Support & Time: $\frac{1/2}{2}/2/3$, $1/2/4$. Concentration One of the terms of term							
Ammonia †		2.6					
* mg/L as CaCO3; †	mg/L; ND: no cl	nlorine detected	1				
-							
Animal Source:	ABS			Date Received:	5/24/03		_
Comments:							-

AMEC Earth & Environmental

Northwest Bioassay Lab **Test Species:** Client: Sample ID.

Cerioc	taphnia dubia
Unoca	/
#6	MW-W

Initial and Final Chemistries Seven Day Chronic Freshwater Bioassay

Start Date & Time: Stop Date & Time: Test No:

Days

T 6 0303

03 W

29/03

1615

700

Concentration		0	1 2			3 4				5 6				
CON	init.	final	init.	Binel	Binit.	final				final	init,	-		final
pH	8.01	8.32	7.95	8.33	8.08	8.24	7.90	8.23	8.D0	8.20	7.82	8,15	7.98	8.45
DO (mg/l)	7.9	8.1	7.9	8.3	7.7	8.3	8.1	8.1	8.3	8.1	8,2	8.4	8.1	8.0
Cond. (µmhos-cm)	169	175	170	184	179	205	179	192	1101	185	62	173	161	182
Temperature (°C)	25.0	25.5	25.0	24.9	24.8	25.6	14.0	254	24.7	as.3	247	25.5	25.0	281
							Da	ys	,				L _{(A}	
Concentration		0		1		2	3	3	4	1	Į į	5		6
6.25	init	CONTRACTOR DESCRIPTION	All of the second s	final;	- dyik.	Simelly	jinik.	final	init.	final	init.	final	init.	final
pH	7.83	8.27	7.38	8.30	7,88	\$.42	7,93	8.30	7.93	8.23	7719	18.58.r	7.88	8.35
DO (mg/l)	8.4	8.1	8.	8.4	7.8	8.2	8.2	8.9	8.3	8,1	8,2	8.8	8.1	7.8
Cond. (µmhos-cm)	227	232	232	238	248	240	225	235	219	235	274	#730	225	241
Temperature (°C)	25.0	25.5	25.0	25.2	25.2	25.6	24.1	254	24.0'	253	25.1	25.3	<u>as.0</u>	250
							Da	ys				2230		······
Concentration		0		1	-	2	с.,			1		5		6
12.5	init.	final	init	final	init.	final		final	init.	final	init.	final	init,	final
pH	7,69	8.30	7,48	8,32	7.79	841	7,80	8.35	7.80	8.25	7.63	8,24	7,69	8.33
DO (mg/l)	H-83	8.2	8.3	8,4	7.9	\$4	8.4	8.3	8	8.2	8.2	8.5	8,2	7.9
Cond. (µmhos-cm)	385	288	287	294	307	318	285	288	275	294	279	278	267	299
Temperature (°C)	25.0	25.4	25.0	24.7	25.5	25.6	24.6	25.Y	24.0	∂SI	25.6	25, Z	25.0	25.6
							Da	ys						
Concentration		0				2	3	5		1	Ę			6
25	init,	final	init	final	init.	final	init.	final		final	init,	5 final	jinit.	6 final
<u>25</u> рН	init, 7.57	final 8-39	<u>。 1110</u> 7,47	final 8,41	init. 7.61	final 849	init. 7.69	final. 8.46	init. 7.65	final 8,33	init. 7.49	final 8,3나	7,6()	-
<u>25</u> pH DO (mg/l)	init. 7.57 8.3	Final 8-39 8.1	init. 7.47 8.1	final 8,41 8,5	init: 7.61 7,9	final 849 8.5	3 init. 7,69 8,4	final. 8.46 8.4	1111 7.65 8.4	final <u>8,33</u> 8,1	init. 7.49 8.4	final 8,34 8,5	init. 7,60 8,3	final 8.49 8.0
<u>2-5</u> pH DO (mg/l) Cond. (μmhos-cm)	inii. 7.57 8.3 398	Final 8.39 8.1 399	init 7.47 8.1 402	final 8,41 8,5 409	init. 7.61	final 849 8.5 439	3 init. 7,69 8,4 397	final 8.46	init. 7.65	final 8,33	init. 7.49	final 8,3나	7,6()	final
<u>25</u> pH DO (mg/l)	init. 7.57 8.3	Final 8-39 8.1	init. 7.47 8.1	final 8,41 8,5	init: 7.61 7,9	final 849 8.5	397 24.3	final 8.46 8.4 414 26.4	1nit 7.65 8.4	final <u>8,33</u> 8,1	init. 7.49 8.4	final 8,34 8,5	init. 7,60 8,3	final 8.49 8.0
<u>2-5</u> pH DO (mg/l) Cond. (μmhos-cm) Temperature (°C)	init. 7.57 8.3 398 25.0	final 8-39 8.1 399 25.2	init. 7.47 8.1 402 27.0	final 8,41 8,5 409 25.0	init 7.61 7.1 430 25.8	final 849 8.5 439 256	3 init. 7,69 8,4 397	final 8.46 8.4 414 26.4	Init. 7.65 8.4 3 85	final <u>8,33</u> 8,1	init. 7.49 8.4	final 8,34 8,5	mit. 7,60 8,3 347	final 8.49 8.0 398
<u>2-5</u> pH DO (mg/l) Cond. (μmhos-cm) Temperature (°C) Concentration	init. 7.57 8.3 398 25.0	Final 8.39 8.1 399	init. 7.47 8.1 402 27.0	8,41 8,5 409 25.0	init 7.61 7.1 430 25.8	final 849 8.5 439 256	397 24.3	final 8.46 8.4 414 21.4 ys	7.65 7.65 8.4 385 24.0	final 8,33 8,1 407 as,1	init. 7.49 8.4	61,34 8,34 3,5 3,88 2,5 2,5 2,5 2,5 2,5 2,5 2,5 2,5 2,5 2,5	init 7,6() 8,3 347 25,0	final 8.49 8.0 398
<u>2-5</u> pH DO (mg/l) Cond. (μmhos-cm) Temperature (°C) Concentration 5 O	init. 7.57 8.3 398 25.0	final 8-39 8.1 399 25.2	init. 7.47 8.1 402 27.0	6mal 8,41 8,5 409 25.0	init 7.61 7.1 430 25.8	final 849 8.5 439 256	3 init. 7,69 8,4 397 24,3 Da	final 8.46 8.4 414 21.4 ys	Init. 7.65 8.4 385 24.0	final 8.33 8.1 407 25,1	init. 7,49 8,4 384 25,7 25,7	61,34 8,34 3,5 3,88 2,5 2,5 2,5 2,5 2,5 2,5 2,5 2,5 2,5 2,5	init 7,60 8,3 347 25,0 init	final 8.49 8.0 3.78 24.5
<u>2-5</u> pH DO (mg/l) Cond. (μmhos-cm) Temperature (°C) Concentration 5 O pH	init. 7.57 8.3 378 25.0 (minit. 741	final 8-39 8.1 399 25.2 0 final 8.50	init 7.47 8.1 402 27.0 init	6111al 8.41 8.5 409 2.50 2.50	1mit 7.61 7.9 430 25.8	final 849 8.5 439 256	; init. 7,69 8,4 397 24,3 Da	final 8.46 8.4 414 25.4 ys final 8.5a	7.65 8.4 385 24.0	final 8,33 8,1 407 as,1	init 7.49 8.4 384 25.7	8,34 8,5 388 388 25 25 25 25 25 25 25 25 25 25 25 25 25	init 7,60 8,3 347 25,0 init 7,34	final 8.49 8.0 3.78 24.5 6
<u>2-5</u> pH DO (mg/l) Cond. (μmhos-cm) Temperature (°C) Concentration <u>5 O</u> pH DO (mg/l)	init 7.57 8.3 378 27.0 init 7.41 8.0	$ \begin{array}{c} \text{Final.} \\ \overline{8}, 39\\ \overline{5}, 1\\ \overline{5}, 99\\ 25, \nu\\ \hline 0\\ \text{Final.} \\ \overline{8}, 50\\ \overline{7}, 8\\ \end{array} $	init 7.47 8.1 402 24.0 init 7.47 5.1	611 811 814 814 814 814 814 814 8	init: 7.61 7.9 430 25.8 mit: 7.41 7.7	final 849 85 434 256 2 final 859 859	3 init. 7.69 8.4 397 24.3 Da Da Da 0 init. 7.54 8.5	final 8.46 8.4 414 21.4 ys	Init. 7.65 8.4 385 24.0	final 9,33 8,1 407 25,1 1 final	init. 7,49 8,4 384 25,7 25,7	61nal 8,34 3,5 3,5 3,88 2,5 2,5 2,5 5 61nal	init 7,60 8,3 347 25,0 init	final 8.47 8.0 378 24.5 6 final
$\frac{2.5}{\text{pH}}$ DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration $\frac{5.0}{\text{pH}}$ DO (mg/l) Cond. (µmhos-cm)	init. 7.57 8.3 398 25.0 init. 7.41 8.0 6.32	final 8-39 8.1 399 25.2 0 final 8.50	init 7.47 8.1 402 27.0 init	6111al 8.41 8.5 409 2.50 2.50	1mit 7.61 7.9 430 25.8	final 849 85 439 256 2 final 859	3 init. 7.69 8.4 397 24.3 Da 24.3 Da 0 3 init. 7.54 8.5 589	final 8.46 8.4 414 25.4 ys final 8.5a	Init. 7.65 8.4 385 24.0	final 9,33 8,1 407 25,1 1 final 8,47	init 7.49 8.4 384 25.7	final 8,34 3,5 388 2,5 388 2,5 388 2,5 388 2,5 5 5 6 10 10 10 10 10 10 10 10 10 10 10 10 10	init 7,60 8,3 347 25,0 init 7,34	
<u>2-5</u> pH DO (mg/l) Cond. (μmhos-cm) Temperature (°C) Concentration <u>5 O</u> pH DO (mg/l)	init. 7.57 8.3 378 25.0 (init. 7.41 8.0 6.33	$ \begin{array}{c} \text{Final.} \\ \overline{8}, 39\\ \overline{5}, 1\\ \overline{5}, 99\\ 25, \nu\\ \hline 0\\ \text{Final.} \\ \overline{8}, 50\\ \overline{7}, 8\\ \end{array} $	init 7.47 8.1 402 24.0 init 7.47 5.1	611 811 814 814 814 814 814 814 8	init: 7.61 7.9 430 25.8 mit: 7.41 7.7	final 849 85 434 256 2 final 859 859	3 init. 7.69 8.4 397 24.3 Da Da Da 0 init. 7.54 8.5	final 8.46 8.4 414 25.4 ys final 8.5a	Init. 7.65 8.4 385 24.0	final 9,33 8,1 407 25,1 1 final 8,47	init 7,49 8,4 384 25,7 1 1011 7,34 8,4	tinal 8,3+ 8,5-	init. 7,60 8,3 3+7 25,0 init. 7,34 8,3	final 8.49 8.0 378 24.5 6 final 8.58 8.1
2-5 pH DO (mg/l) Cond. (μmhos-cm) Temperature (°C) Concentration 5 O pH DO (mg/l) Cond. (μmhos-cm) Temperature (°C)	init. 7.57 8.3 398 25.0 init. 7.41 8.0 6.32	Email 8-39 8,1 399 25.2 0 Email 8.50 7.8 616	init 7.47 8.1 402 27.0 init 7.47 4.1 5.3	8-1 8-1 8-1 8-1 8-1 8-1 8-1 8-1 8-1 8-1	init 7.61 7.9 430 25.% Init 7.41 7.7 665	final 849 85 434 256 2 final 859 859	3 init. 7.69 8.4 397 24.3 Da 24.3 Da 0 3 init. 7.54 8.5 589		Init. 7.65 8.4 385 24.0	final 8.33 8.1 407 25,1 1 final 8.47 8.2 6.31	1011 7.49 8.4 384 25.7 25.7 1011 7.34 8.4 5.58	tinal 8,34 8,5 388 2,5 388 2,5 388 2,5 388 2,5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	init. 7,60 8,3 347 25,0 init. 7,34 8,3 570	
<u>pH</u> DO (mg/l) Cond. (μmhos-cm) Temperature (°C) Concentration <u>ζ</u> O pH DO (mg/l) Cond. (μmhos-cm) Temperature (°C)	init. 7.57 8.3 378 25.0 () () () () () () () () () () () () ()	$\begin{array}{c} \text{Final} \\ 8 \cdot 39 \\ 8 \cdot 1 \\ 399 \\ 25 \cdot 2 \\ 25 \cdot 2 \\ \hline \\ 9 \\ 8 \cdot 50 \\ \hline \\ 7 \cdot 8 \\ 6 \\ 16 \\ 25 \cdot 2 \\ \hline \\ 0 \\ \hline \end{array}$	init 7.47 8.1 402 27.0 init 7.47 8.1 6.31 25.0	8.51 8.51 409 250 409 250 400 8.52 8.52 8.52 6.38 6.38 6.38 6.38 6.38 6.38 6.38 6.38 6.52	init 7.61 7.9 430 25.8 7.41 7.41 7.7 665 265	111111 849 9.5 439 256 2 1111 8.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0	3 1,69 8,4 3,97 24,3 Da 24,3 1,54 7,54 8,55 5,89 24,0		$\begin{array}{c} 1 \text{nit.} \\ \hline 7.405 \\ \hline 8.4 \\ \hline 385 \\ \hline 240 \\ \hline 385 \\ \hline 240 \\ \hline 385 \\ \hline 240 \\ \hline 599 \\ \hline 24. \\ \hline 24. \\ \hline \end{array}$	final 8.33 8.1 407 25,1 1 final 8.47 8.2 6.31	min 7.49 9.4 384 25.7 25.7 5.57 25.9 25.0	tinal 8,34 8,5 388 2,5 388 2,5 2,5 2,5 5 6 12 2,5 2,2 5 5	init. 7,60 8,3 3+7 25,0 init. 7,37 8,3 570 25.0	final $\$.47$ $\$.5$ 378 24.5 6 final $\$.58$ $\$.58$ $\$.1$ 6.71 25.3 6
2-5 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 5 0 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration	init. 7.5.7 8.3 378 25.0 () () () () () () () () () () () () ()	Final $8 - 39$ $8 - 1$ 29 $25.\nu$ 0 Final $8 - 50$ 7.8 916 $25.\nu$ 0 final	$\begin{array}{c} \text{init.} \\ 7, 47 \\ 8, 1 \\ 40 \\ 27.0 \\ 27.0 \\ 27.0 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 2 \\ 3, 0 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 2 \\ 3, 1 \\ 3, 2 \\ 3, 2 \\ 3, 1 \\ 3, 2 \\$	Ainal 8,41 8,41 8,4 409 409 2,0 40 8,5 0 8,5 0 3,5 0 3,5 0 1 6 1 6 1 1 1 1 1 1 1 1 1 1 1 1 1	init 7.61 7.9 430 25.8 7.41 7.41 7.7 665 265	final 849 9.5 439 256 2 final 8.5 981 25.6 2 final	3 init 7,69 8,4 397 24,3 Da 24,3 init 7,54 8,5 589 24,0 Da		$\begin{array}{c} 1 \text{nit.} \\ \hline 7.405 \\ \hline 8.4 \\ \hline 385 \\ \hline 240 \\ \hline 385 \\ \hline 240 \\ \hline 385 \\ \hline 240 \\ \hline 599 \\ \hline 24. \\ \hline 24. \\ \hline \end{array}$	final 9.33 8.1 407 25.1 final 8.47 8.2 6.31 35.3	min 7.49 9.4 384 25.7 25.7 5.57 25.9 25.0	tinal 8,34 8,5 388 2,5 388 2,5 388 2,5 5 tinal 846 9,6 612 2,5 2,2 5 tinal	init. 7,60 8,3 3+7 25,0 init. 7,37 8,3 570 25.0	final $\$.47$ $\$.5$ 378 24.5 6 final $\$.58$ $\$.58$ $\$.1$ 6.71 25.3 6
2-5 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 5 O pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Cond. (µmhos-cm) Temperature (°C) Concentration 1 O (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 1 O (mg/l) PH	init. 7.57 8.3 378 25.0 () () () () () () () () () () () () ()	Final $8 - 39$ $8 - 1$ 29 $25.\nu$ 0 Final 8.50 7.8 916 $25.\nu$ 0 final $8, 63$	init. 7.47 8.1 402 27.0 init. 7.47 4.1 6.31 24.0 1 7.51	4 5 5 5 5 5 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 7 7 7 7 7 7 7 7 7 7 7 7	init 7.61 7.9 430 25.8 7.41 7.41 7.7 665 26.5 26.5	111111 849 9.5 439 256 2 1111 8.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0	3 init 7,69 8,4 397 24,3 Da 24,3 init 7,54 8,5 589 24,0 Da		$\begin{array}{c} \text{Init.} \\ \hline +.65 \\ \hline 8.4 \\ \hline 385 \\ \hline 24.0 \\ \hline 1011 \\ \hline 7.93 \\ \hline 7.33 \\ \hline \end{array}$	final 9.33 8.1 407 a5.1 1 6.31 35.3 1 final 9.63	min 7.49 9.4 384 25.7 25.7 5.57 25.9 25.0	tinal 8,34 8,5 388 2,5 387 2,5 388 2,5 6 9,6 612 2,5 7 8,60 8,60	init. 7,60 8,3 347 25,0 init. 7,34 8,3 5,70 25.0 25.0 init. 7,12	final $\$.47$ $\$.5$ 378 24.5 6 final $\$.58$ $\$.58$ $\$.1$ 6.71 25.3 6
2-5 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 5 C pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 1 Cond. (µmhos-cm) Temperature (°C) Concentration 1 O (mg/l) DO (mg/l)	init. 7.57 8.3 378 27.0 init. 7.41 6.32 7.41 6.32 7.40 7.20 7.3	8.39 8.1 399 25.2 7.8 91 25.2 7.8 916 25.2 7.8 916 25.2 7.8 916 25.2 25.2 7.8 916 25.2 25.2 916 25.2 25.2 916 916 925.2 916 916 925.2 916 916 925.2 916 916 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 <td>$\begin{array}{c} \text{init.} \\ 7, 47 \\ 8, 1 \\ 40 \\ 27.0 \\ 27.0 \\ 27.0 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 2 \\ 3, 0 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 2 \\ 3, 1 \\ 3, 2 \\ 3, 1 \\ 3, 2 \\ 3, 2 \\ 3, 1 \\ 3, 2 \\$</td> <td>1 第 4 5 4 4 1 4 1 4 5 5 5 5 5 5 5 5 5 5 5 5 5</td> <td>Init 7.61 7.9 430 25.8 1010 7.41 7.7 665 265 265 265 7.4</td> <td>1111al 849 9.5 439 256 2 1 1256 2 1 1256 2 1 1256 2 1 1 1 1 1 1 1 1 1 1 1 1 1</td> <td>3 init. 7.69 8.4 397 24.3 Da 24.3 init. 7.54 7.54 8.5 589 24.0 Da</td> <td></td> <td>$\begin{array}{c} 1 \text{nit.} \\ \hline + .65 \\ \hline 8.4 \\ \hline 385 \\ \hline 24.0 \\ \hline \\ 1 \text{nit.} \\ \hline \hline 7.42 \\ \hline \\ 8.4 \\ \hline \\ 24.4 \\ \hline \\ 24.4 \\ \hline \\ 24.4 \\ \hline \\ 24.4 \\ \hline \\ 1 \text{nit.} \\ \hline \end{array}$</td> <td>final 9.33 8.1 407 35.1 final 8.47 8.3 6.31 35.3 final 9.63 8.3 1</td> <td>init 7,49 8,4 384 25,7 1,384 25,7 1,34 5,58 25,2 1,558 25,2 25,2 1,558 25,2 25,2 25,2 25,2 25,2 25,2 25,2</td> <td>tinal 8,34 8,5 388 2,5 388 2,5 388 2,5 4 6 12 2,5 2 5 final 8,60 8,60 8,4</td> <td>init. 7,60 8,3 3+7 25,0 init. 7,37 8,3 570 25.0</td> <td>final 8.47 8.5 378 24.5 6 final 8.58 8.58 8.58 8.47 24.5 8.58 8.58 8.1 6.91 25.3 6 final 8.58 8.</td>	$\begin{array}{c} \text{init.} \\ 7, 47 \\ 8, 1 \\ 40 \\ 27.0 \\ 27.0 \\ 27.0 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 2 \\ 3, 0 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 1 \\ 3, 2 \\ 3, 1 \\ 3, 2 \\ 3, 1 \\ 3, 2 \\ 3, 2 \\ 3, 1 \\ 3, 2 \\$	1 第 4 5 4 4 1 4 1 4 5 5 5 5 5 5 5 5 5 5 5 5 5	Init 7.61 7.9 430 25.8 1010 7.41 7.7 665 265 265 265 7.4	1111al 849 9.5 439 256 2 1 1256 2 1 1256 2 1 1256 2 1 1 1 1 1 1 1 1 1 1 1 1 1	3 init. 7.69 8.4 397 24.3 Da 24.3 init. 7.54 7.54 8.5 589 24.0 Da		$\begin{array}{c} 1 \text{nit.} \\ \hline + .65 \\ \hline 8.4 \\ \hline 385 \\ \hline 24.0 \\ \hline \\ 1 \text{nit.} \\ \hline \hline 7.42 \\ \hline \\ 8.4 \\ \hline \\ 24.4 \\ \hline \\ 24.4 \\ \hline \\ 24.4 \\ \hline \\ 24.4 \\ \hline \\ 1 \text{nit.} \\ \hline \end{array}$	final 9.33 8.1 407 35.1 final 8.47 8.3 6.31 35.3 final 9.63 8.3 1	init 7,49 8,4 384 25,7 1,384 25,7 1,34 5,58 25,2 1,558 25,2 25,2 1,558 25,2 25,2 25,2 25,2 25,2 25,2 25,2	tinal 8,34 8,5 388 2,5 388 2,5 388 2,5 4 6 12 2,5 2 5 final 8,60 8,60 8,4	init. 7,60 8,3 3+7 25,0 init. 7,37 8,3 570 25.0	final 8.47 8.5 378 24.5 6 final 8.58 8.58 8.58 8.47 24.5 8.58 8.58 8.1 6.91 25.3 6 final 8.58 8.
2-5 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 5 C pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 1 Cond. (µmhos-cm) Temperature (°C) Concentration 1 O (mg/l) Cond. (µmhos-cm)	init. 7.57 8.3 378 27.0 init. 7.41 6.32 7.41 6.32 7.41 7.20 init. 7.20 7.3 1069	Final $8 - 39$ $8 - 1$ 29 $25.\nu$ 0 Final 8.50 7.8 916 $25.\nu$ 0 final $8, 63$	$\begin{array}{c} \text{init.} \\ 7.47 \\ 8.1 \\ 402 \\ 27.0 \\ 27.0 \\ 3.1$	4 5 5 5 5 5 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 7 7 7 7 7 7 7 7 7 7 7 7	init 7.61 7.9 430 25.8 7.41 7.41 7.7 665 26.5 26.5	tinal \$49 \$.5 491 256 2 final \$.59 2 \$.59	3 init. 7.69 8.4 397 24.3 Da 24.3 init. 7.54 589 24.0 Da 3 init. 7.50		$\begin{array}{c} \text{Init.} \\ \hline +.65 \\ \hline 8.4 \\ \hline 385 \\ \hline 24.0 \\ \hline \\ 1000 \\ \hline \\ 7.43 \\ \hline \\ 8.4 \\ \hline \\ 7.33 \\ \hline \\ \hline \\ 7.33 \\ \hline \end{array}$	final 9.33 8.1 407 a5.1 1 6.31 35.3 1 final 9.63	init 7,49 8,4 384 25,7 1 1011 7,34 558 25,0 1 558 25,0 1 1011 7,23	tinal 8,34 8,5 388 2,5 387 2,5 388 2,5 6 9,6 612 2,5 7 8,60 8,60	init. 7,60 8,3 347 25,0 init. 7,34 8,3 5,70 25.0 25.0 init. 7,12	final $\$.47$ $\$.0$ 3.78 24.5 6 final $\$.58$ $\$.58$ $\$.58$ $\$.58$ $\$.58$ $\$.58$ $\$.58$ $$.58$
2-5 pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 5 C pH DO (mg/l) Cond. (µmhos-cm) Temperature (°C) Concentration 1 Cond. (µmhos-cm) Temperature (°C) Concentration 1 C V pH DO (mg/l)	init. 7.57 8.3 378 27.0 init. 7.41 6.32 7.41 6.32 7.40 7.20 7.3	8.39 8.1 399 25.2 7.8 91 25.2 7.8 916 25.2 7.8 916 25.2 7.8 916 25.2 25.2 7.8 916 25.2 25.2 916 25.2 25.2 916 916 925.2 916 916 925.2 916 916 925.2 916 916 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 925.2 <td>$\begin{array}{c} \text{init.} \\ 7.47 \\ 8.1 \\ 402 \\ 27.0 \\ 27.0 \\ 3.1$</td> <td>1 第 4 5 4 4 1 4 1 4 5 5 5 5 5 5 5 5 5 5 5 5 5</td> <td>Init 7.61 7.9 430 25.8 1010 7.41 7.7 665 265 265 265 7.4</td> <td>1111al 849 9.5 439 256 2 1 1256 2 1 1256 2 1 1256 2 1 1 1 1 1 1 1 1 1 1 1 1 1</td> <td>3 init. 7.69 8.4 397 24.3 Da 24.3 init. 7.54 24.0 Da 24.0 Da 3 init. 7.50 8.7</td> <td></td> <td>Init 7.65 8.4 385 240 Init 7.93 8.5 8.5</td> <td>final 9.33 8.1 407 35.1 6.31 8.47 8.47 6.31 25.3 1 final 9.63 8.2 1</td> <td>init 7,49 8,4 384 25,7 1,384 25,7 1,34 5,58 25,2 1,558 25,2 25,2 1,558 25,2 25,2 25,2 25,2 25,2 25,2 25,2</td> <td>tinal 8,34 8,5 388 2,5 388 2,5 388 2,5 4 6 12 384 6 12 2,5 2 5 final 8,60 8,60 8,4</td> <td>init. 7,60 8,3 3,47 25,0 init. 7,34 8,3 5,70 25,0 25,0 init. 7,12 8,0</td> <td>final 8.47 9.0 378 24.5 6 final 8.58 9.1 6.91 25.3 6 final 8.73 7.8</td>	$\begin{array}{c} \text{init.} \\ 7.47 \\ 8.1 \\ 402 \\ 27.0 \\ 27.0 \\ 3.1$	1 第 4 5 4 4 1 4 1 4 5 5 5 5 5 5 5 5 5 5 5 5 5	Init 7.61 7.9 430 25.8 1010 7.41 7.7 665 265 265 265 7.4	1111al 849 9.5 439 256 2 1 1256 2 1 1256 2 1 1256 2 1 1 1 1 1 1 1 1 1 1 1 1 1	3 init. 7.69 8.4 397 24.3 Da 24.3 init. 7.54 24.0 Da 24.0 Da 3 init. 7.50 8.7		Init 7.65 8.4 385 240 Init 7.93 8.5 8.5	final 9.33 8.1 407 35.1 6.31 8.47 8.47 6.31 25.3 1 final 9.63 8.2 1	init 7,49 8,4 384 25,7 1,384 25,7 1,34 5,58 25,2 1,558 25,2 25,2 1,558 25,2 25,2 25,2 25,2 25,2 25,2 25,2	tinal 8,34 8,5 388 2,5 388 2,5 388 2,5 4 6 12 384 6 12 2,5 2 5 final 8,60 8,60 8,4	init. 7,60 8,3 3,47 25,0 init. 7,34 8,3 5,70 25,0 25,0 init. 7,12 8,0	final 8.47 9.0 378 24.5 6 final 8.58 9.1 6.91 25.3 6 final 8.73 7.8

	Control	MUSUS	
Hardness*	80	7406	
Alkalinity*	60	7400	
Initial Chlorine†		ND	······································
Ammonia †	~	4.4	

Analysts:

Reviewed:

8+, KB

* mg/L as CaCO3; † mg/L; ND: no chlorine detected

Sample Description:

Animal Source: ABS **Comments:**

Date Received: 5 29 03

Appendix G

Statistical Analyses

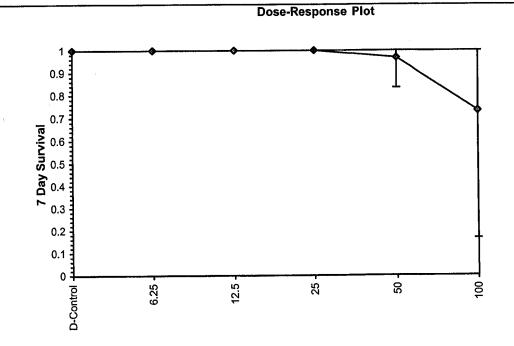
Atherinops affinis

			La	rval Fish C	Growth and	Surviv	al Test-7 Day Su	irvival
Start Date:	5/29/03		Test ID:	0305-27N	W		Sample ID:	UNOCAL GW
End Date:	6/5/03		Lab ID:	WAAEE-A	MEC NW Bi	oassa	Sample Type:	GR-Groundwater
Sample Date:	5/28/03		Protocol:	EPAW 95	-EPA West 0	Coast	Test Species:	AA-Atherinops affinis
comments:	MW-146							
Conc-%	1	2	3	4	5			
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000			
6.25	1.0000	1.0000	1.0000	1.0000	1.0000			
12.5	1.0000	1.0000	1.0000	1.0000	1.0000			
25	1.0000	1.0000	1.0000	1.0000	1.0000			
50	1.0000	1.0000	1.0000	1.0000	0.8333			

ł

				Tra	ansform:	Arcsin Sc	uare Root	Rank	1-Tailed		
	Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	Ν	Sum	Critical	
_	D-Control	1.0000	1.0000	1.3652	1.3652	1.3652	0.000	5			
	6.25	1.0000	1.0000	1.3652	1.3652	1.3652	0.000	5	27.50	16.00	
	12.5	1.0000	1.0000	1.3652	1.3652	1.3652	0.000	5	27.50	16.00	
	25	1.0000	1.0000	1.3652	1.3652	1.3652	0.000	5	27.50	16.00	
	50	0.9667	0.9667	1.3222	1.1503	1.3652	7.271	5	25.00	16.00	
	100	0.7333	0.7333	1.0513	0.4205	1.3652	37.266	5	20.00	16.00	

ļ	Auxiliary Tests					Statistic	Critical	Skew	Kurt
	Shapiro-Wilk's Test indicates nor	n-normal dis	stribution (p <= 0.01)		0.59773	0.9	-2.1291	11.7165
	Equality of variance cannot be co	onfirmed							
	Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
'	Steel's Many-One Rank Test	100	>100		1				

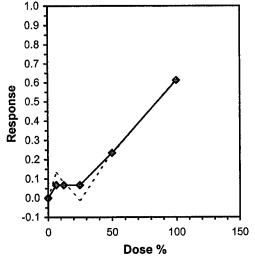


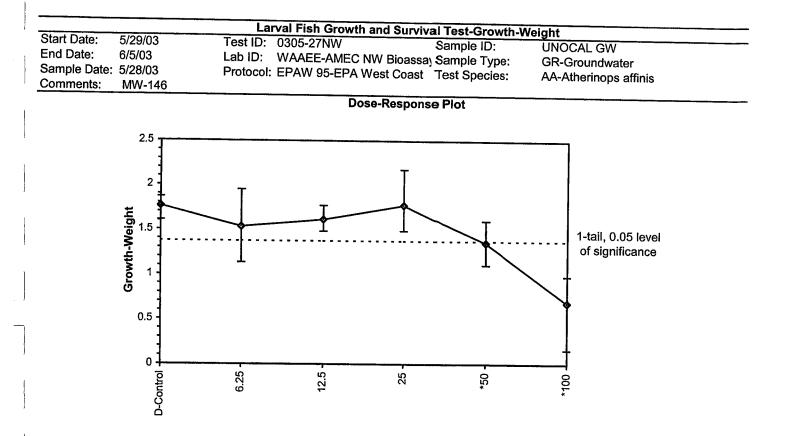
							I Test-Growth-	
Start Date:	5/29/03		Test ID:	0305-27N\	N		Sample ID:	UNOCAL GW
End Date:	6/5/03		Lab ID:	WAAEE-A	MEC NW E	Bioassay	Sample Type:	GR-Groundwater
Sample Date:	5/28/03		Protocol:	EPAW 95-	EPA West	Coast	Test Species:	AA-Atherinops affinis
Comments:	MW-146							
Conc-%	1	2	3	4	5			
D-Control	1.6017	1.7183	1.7683	1.8267	1.8617			
6.25	1.4967	1.8983	1.1300	1.9450	1.1700			
12.5	1.7700	1.6367	1.5850	1.4817	1.5867			
25	1.8433	2.1767	1.6083	1.7483	1.4883			
50	1.2467	1.5950	1.0983	1.5617	1.2250			
100	0.6633	0.1567	0.9783	0.9017	0.7033			

				Transform	n: Untran	sformed	-	1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	1.7553	1.0000	1.7553	1.6017	1.8617	5.806	5				1.7553	1.0000
6.25	1.5280	0.8705	1.5280	1.1300	1.9450	25.317	5	1.406	2.360	0.3815	1.6377	0.9330
12.5	1.6120	0.9183	1.6120	1.4817	1.7700	6.501	5	0.887	2.360	0.3815	1.6377	0.9330
25	1.7730	1.0101	1.7730	1.4883	2.1767	14.833	5	-0.109	2.360	0.3815	1.6377	0.9330
*50	1.3453	0.7664	1.3453	1.0983	1.5950	16.385	5	2.536	2.360	0.3815	1.3453	0.7664
*100	0.6807	0.3878	0.6807	0.1567	0.9783	47.198	5	6.648	2.360	0.3815	0.6807	0.3878

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distribu	ition (p >	0.01)		0.97628		0.9		-0.136	-0.1186
Bartlett's Test indicates equal var			·		9.3871		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	25	50	35.3553	4	0.3815	0.21734	0.83271	0.06533	4.1E-06	5, 24

	Linear Interpolation (200 Resamples)									
Point	%	SD	95% CL	.(Exp)	Skew					
IC05*	4.662	11.545	0.644	44.669	0.5932					
IC10	29.949	12.005	0.000	45.586	-0.8852					
IC15	37.454	8.260	0.000	58.464	-1.5413	1.0				
IC20	44.960	6.645	28.647	62.730	-0.8482	0.9				
IC25	52.169	6.021	36.548	68.693	0.0595					
IC40	71.976	6.317	55.760	93.263	0.3359	0.8 -				
IC50	85.181					0.7 -				





#1

MW-146

Client Name: UNDCal

Sample ID:

Raw Data Sheet Pacific Topsmelt (Atherinops affinis) Larval Survival and Growth Test

Test Date: 5/29/03 1945

Test No.: 0305-27NW

Client:	Uni	ocal
Sample ID:	#	MW-146

Raw Data Sheet Fish Weights Seven Day Chronic Bioassay

Test Date: 5/29/03

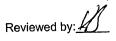
Species: <u>A. affinis</u>

Test No: <u>0305-27NW</u>

10	cont.		pan wt.	pan + fish	fish wt.	#	avg. per fish	avg. per conc.
Conc.	#	rep.	(gm)	(gm)	(mg)	fish	(mg)	(mg)
CON	23	1	0.04326	0.05287		6		
	16	2	0.04375	0.05406		6		and an
		3	0.04267	0.05328		6		
	12	4	0.04353	0.05449		6	· · · · · · · · · · · · · · · · · · ·	
	27	5	0.04290	0.05407		6		
6.25	19	1	0.04430	0.05328		6		
	30	_ 2	0.04165	0.05304		6		
	4	3	0.04408	0.05086		6		
	3	4	0.04416	0,05583		6		
	10	5	0.04411	0.05113		6		
12.5	14	1	0.04379	D.05441		6		
	6	2		0.05428		10		
	28	3	0.04240	0.05191		6		
	8	4	0.04325	0.05214		6		
	7	5		0.05394		(o		
25	9	1	0.04153	0.05259		le		
	11	2	0.04377	0.05683		6		
	20	3	0.04374	0.05339		10		
	25	4	0.04273	0.0532a		6		
		5	0.04171	0.05064		6		
50	29	1	0.04274	0.05022		6		
	5	2	0.04399	0.05356		10		
	15	3	0.04345	0.05004		G		
	2	4	0.04392	0.05329		6		
	24	5	0.04327	D.D5 Dua		5		
100	26	1	0.04326	0.04724.		4		
·	21	2	0.04197	0.04291				
	11	3		D.D4993		6		
	13	4	0.04365	0.04906		le		
	22	5	0.04391	0.04813		5		

Tare: <u>SM</u> Total: <u>Mm</u> Date/Time in: $\frac{6/5}{03} \frac{200}{2000}$ Date/Time out: $\frac{11112003}{12115} \frac{12115}{6} \frac{6}{6} \frac{16}{63} \frac{2000}{2000}$ Oven temp. (°C): <u>60</u>

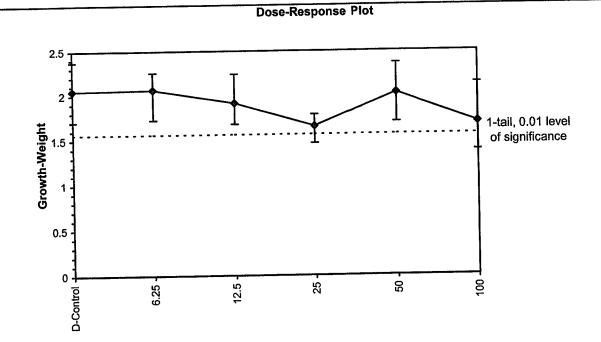
Start Data	5/29/03		Lar Lost ID: (0305-28NV	N	d Surviva l Sa	ample ID:	. 1	UNOCAL-Unoc	al Groundwater	Study
	6/5/03		ab ID:	WAAFF-A	MEC NW I	Bioassay Sa		-	GR-Groundwate		
End Date: Sample Date:		r r	Protocol:	FPAW 95-	FPA West	Coast Te	est Speci	es:	AA-Atherinops	affinis	
Comments:	MW-7	,	1010001. 1								
Conc-%	1	2	3	4	5						
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000						
6.25	1.0000	1.0000	1.0000	1.0000	1.0000						
12.5	1.0000	1.0000	1.0000	1.0000	1.0000						
25	1.0000	1.0000	1.0000	1.0000	1.0000						
50	1.0000	1.0000	1.0000	1.0000	1.0000						
100	1.0000	1.0000	1.0000	1.0000	1.0000						
							1	Rank	1-Tailed		
		-		and the second se		uare Root	NI	Sum	Critical		
Conc-%	Mean	N-Mean	Mean	<u>Min</u>	Max	CV%	<u>N</u> 5	Juil	JILIUU		
D-Control	1.0000	1.0000	1.3652	1.3652 1.3652	1.3652 1.3652	0.000	5	27.50	16.00		
6.25	1.0000	1.0000	1.3652	1.3652	1.3652	0.000	5	27.50	16.00		
12.5		1.0000	1.3652 1.3652	1.3652	1.3652	0.000	5	27.50	16.00		
25		1.0000 1.0000	1.3652		1.3652	0.000	5	27.50	16.00		
50 100			1.3652		1.3652	0.000	5	27.50	16.00		
100	1.0000	1.0000									
A	<u></u>			<u></u>			Statistic		Critical	Skew	Kur
Auxiliary Tes Shapiro-Wilk's	ts Tost indi	cates norn	al distrib	ution (p > (0.01)		1		0.9		
Equality of val	riance can	not be cor	firmed								
Hypothesis T	est (1-tai	. 0.05)	NOEC	LOEC	ChV	TU					
Steel's Many-	One Rank	Test	100	>100		1					
		<u> </u>			Dose	-Response	Plot				
	1 🧲	·			•			•			
	0.9										
	0.8										
	0.7 T										
	7 Day Survival										
	n 0.5										
	Š.	1									
	0.4	1									
	~ 0.3 ·	1									
	0.2	3									
		1									
	0.1	1						١			
	0	1						50 -	100		
		D-Control	6.25		12.5	25		сı	10		
		~	9		•						



			Lar	val Fish G	rowth and	Survival Test-Growth-V	Veight
Start Date:	5/29/03			0305-28N\		Sample ID:	UNOCAL-Unocal Groundwater Study
End Date:	6/5/03		Lab ID:	WAAEE-A	MEC NW E	Bioassay Sample Type:	GR-Groundwater
Sample Date:	5/28/03		Protocol:	EPAW 95-	EPA West	Coast Test Species:	AA-Atherinops affinis
Comments:	MW-7						
Conc-%	1	2	3	4	5		·····
D-Control	2.0067	1.7000	2.3733	1.8550	2.2950		
6.25	1.9850	2.2533	2.2017	2.1300	1.7233		
12.5	1.9533	1.7900	1.6800	1.9017	2.2383		
25	1.7583	1.5267	1.7067	1.4567	1.7767		
50	2.1283	1.6933	2.3583	1.7483	2.1567		
100	1.8000	1.7117	2.1317	1.3783	1.4233		

				Transform	n: Untrans	sformed	_	1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	2.0460	1.0000	2.0460	1.7000	2.3733	13.972	5			
6.25	2.0587	1.0062	2.0587	1.7233	2.2533	10.342	5	-0.081	3.110	0.4868
	1.9127	0.9348	1.9127	1.6800	2.2383	10.999	5	0.852	3.110	0.4868
12.5			1.6450	1.4567	1.7767	8.781	5	2.562	3.110	0.4868
25	1.6450			1.6933	2.3583	14.140	5	0.185	3.110	0.4868
50	2.0170		2.0170				5	2.281	3.110	0.4868
100	1.6890	0.8255	1.6890	1.3783	2.1317	18.150	0	2.201	5.110	0.4000

ļ	A 111					Statistic		Critical		Skew	Kurt
	Auxiliary Tests Shapiro-Wilk's Test indicates norr	mal distribu	(n > 0)	01)		0.95374		0.9		0.06598	-0.9427
1	Shapiro-Wilk's Test indicates non		· 0 77)			2.56138		15.0863			
	Bartlett's Test indicates equal vari	lances (p -	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Ş	Hypothesis Test (1-tail, 0.01)	NOEC		GIIV		0.48678		0 16972	0.06125	0.04103	5, 24
	Dunnett's Test	100	>100		I	0.40070	0.20102	00072			•



1

#2 MW-7

Raw Data Sheet Pacific Topsmelt (*Atherinops affinis*) Larval Survival and Growth Test

Unocal **Client Name:**

Sample ID:

Test Date: 5/29/03 1800

Test No.: <u>0305-28 N W</u>_____

0)0						Day	ys				Percent	Average
Conc.	Cont.	Rep.	0	1.	2	3	4	<u>Su</u>	6	7	Survival	Survival
CON	17	1	6	6	6	6	6	6	6	6		
	9	2	6	6	Ĺ.	k	6	4	4	6		
······································	12	3	6	6	4	6	4	4	Ģ			
	16	4	6	6	4	6	k	Ģ	6	6		1000
	20	5	6	6	4	6	6	6	6	6		100%
6:25	13	1	6	6	6	k	Ŀ¢_	6	2.6	6		
	23	2	6	6	4	6	4	4	10			
	30	3	Q	6	4	6	<u>↓</u> ↓	6_	6	6	<u> </u>	
	7	4	6	6	6	6	6	6	6	6	 	1007.
	4	5	6	6	4	6	1	$ \psi $	6	6		10010
12.5	22	1	6	6	<u> </u>	6	G	10	<u> 6</u>	6		
	1	2	6	6	16	6	6	6	6			
	18	3	6	6	4	6	6	6	6	6		
	0	4	Q	6	<u> </u>	6	þ	6	6	<u>e</u>		100%
	21	5	. (e	6	4	6	12	1/2-	6	6		
250sm	6	1	6	6	16	6	1/2	6	1p	6		
	19	2	Ý	6	4	6		16	6		+	
	29	3	6	6	6	6	6	6	6	6		-
	21	4	G	6	16	6	6	6		6		100%
	25	5	G	6	6	6	<u>_ (e</u> _	6	6			
50	5 8	1	6	6	6	6	6	-4-	6	6		
		2	6	6	<u> </u>	6	- 6-	6	6	6		-
	24	3	6	6	<u> </u>	6	6	6	6	6		
	28	4	<u> </u>	6	6	6	+ 4-	6	+	6		100%
	2	5	6	6	4	6	4	6		6		
100	20		Ģ	6	6	Ĺ	6	6	6			
	3	2	G	<u> </u>	4	6	- 4		6	6		
		3	<u> </u>	ŝ		6	6	6	6	6	-	
	14	4	G	6	6	6		6	$+\frac{\varphi}{k}$	6		100%
		5 5	<u> </u>	6	4	6	m		Im	let		1 10010
Tech Initi	als		NF	ધ	mi	m	m	ME		<u> </u>		
Feeding T	limes:	0 <u>21(</u>	<u>0</u> 1 <u>0</u>	<u>130</u> 2 815	0800	3 <u>0890</u> 1730	<u>407</u> 160	<u>30 50</u> 00 1	<u>130</u> 6. 130	<u>0730</u> 1730		

Comments:

Analysts: MF M_

Client:	Unocal	
Sample ID:	#2	Mw-7

Raw Data Sheet Fish Weights Seven Day Chronic Bioassay

Test Date: 5/29/03

Species: <u>A. affinis</u>

Test No: 0305-28NW

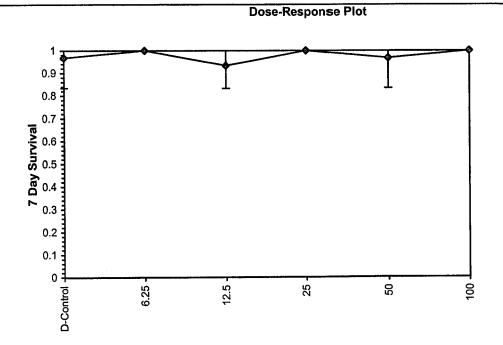
							Foils dried are	in and neweighed
	r		in any sust	pan + fish	fish wt.	#	avg. per fish	avg. per conc.
00	cont.		pan wt.	(gm)	(mg)	fish	(mg)	(mg)
Conc.	#	rep.	(gm) 0.04311	.05515		6	.05510	
CON	17	1				6	105429	
	9	2	0.04398	.05822		6	.05810	
	12	3	0.04285	.05398		6	.05400	
	14	4 5	0.07200	.05600		6	.05606	
	20		0.04220	.05474		6	.05485	
0.25	13	2	0.04289	.05641		16	.05641	
	23	$\frac{2}{3}$	0.04387	.05708		6	.05713	
	30	4	0.04200	1 0 1 0 M		6	.05649	
	4	5	0.04310	OFUNI		6	:05413	
			0.04185	05057		4	105365	
12.5	22	2	0.04285	05359		6	.65360	
	18	$\frac{2}{3}$	0.0434	.05349		6	. 05341	
	10	$\frac{3}{4}$	0.04400	05541		6	, 15541	
	127	5	0.0470	1 05652	B	6	.05657	
05			0.0439	3 054489	\$ 105448	6	,05476	
25	19	$\frac{1}{2}$	0.0430	05222	= 322.052	22 6	,05238	
	$\frac{1}{20}$		0.04412	-05486	- 105436	4		
	$\frac{2}{21}$	4	0.0436	9,05243	343.0521			
	125		0.04299	0536+	461,053	61 6		12000年代的10月10日1月11日1月1日日本市场市场市场市场市场市场市场市场市场市场市场市场市场市场市场市场市场市场市
20	5	$\frac{2}{1}$	0.0438	.05658		- 6		
50	18	$\frac{1}{2}$	0.0434	1.05363			6 7 6 /	
	24			1.05749		- 4	,05755	
	28			6.05395		4	0 05399	
	$\frac{1}{2}$							
100	20			1.05421		¥	0 .05440	P\$P\$14199614-014994-025197666-4211119-2227-29962-44-0-5-954119-45492-222-2423-2
100	$\frac{2}{3}$			1.05194			1,05217	
	-+7		the second s	8.05667			0 ,05674	
	14			0,05147			0 .0516	
		5		8.05182			0 ,05200	/
		<u> </u>	10.0 102					

Tare: Sm Total: Sm Date/Time in: $\frac{6}{5}/03$ 1530 Date/Time out: $\frac{6}{6}/03$ 1600 Oven temp. (°C): 60

			Lai	val Fish G	rowth and	d Survival Test-7 Day Su	ırvival
Start Date:	5/29/03		Test ID:	0305-29N	N	Sample ID:	UNOCAL-Unocal Groundwater Study
End Date:	6/5/03		Lab ID:	WAAEE-A	MEC NW	Bioassa Sample Type:	GR-Groundwater
Sample Date:	5/28/03					t Coast Test Species:	AA-Atherinops affinis
Comments:	MW-17					·	
Conc-%	1	2	3	4	5		
D-Control	1.0000	1.0000	1.0000	0.8333	1.0000	······	
6.25	1.0000	1.0000	1.0000	1.0000	1.0000		
12.5	0.8333	1.0000	0.8333	1.0000	1.0000		
25	1.0000	1.0000	1.0000	1.0000	1.0000		
50	1.0000	1.0000	0.8333	1.0000	1.0000		
100	1.0000	1.0000	1.0000	1.0000	1.0000		

			Tra	ansform:	Arcsin Sc	uare Root	Rank	1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	
D-Control	0.9667	1.0000	1.3222	1.1503	1.3652	7.271	5			
6.25	1.0000	1.0345	1.3652	1.3652	1.3652	0.000	5	30.00	16.00	
12.5	0.9333	0.9655	1.2792	1.1503	1.3652	9.204	5	25.00	16.00	
25	1.0000	1.0345	1.3652	1.3652	1.3652	0.000	5	30.00	16.00	
50	0.9667	1.0000	1.3222	1.1503	1.3652	7.271	5	27.50	16.00	
100	1.0000	1.0345	1.3652	1.3652	1.3652	0.000	5	30.00	16.00	

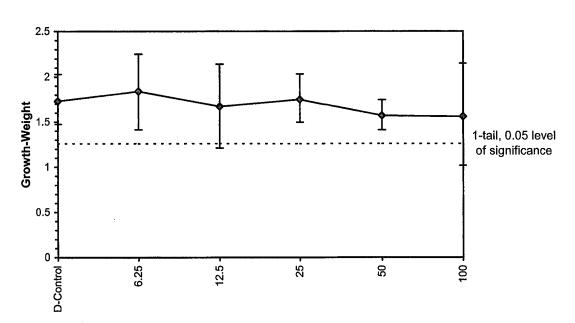
Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	n-normal dis	stribution (p <= 0.01)		0.76012	0.9	-1.4778	1.97749
Equality of variance cannot be co	onfirmed							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	100	>100		1				



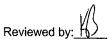
			Lar	val Fish G	rowth and S	urvival Test-Growth-W	Veight
Start Date:	5/29/03		Test ID:	0305-29N	N	Sample ID:	UNOCAL-Unocal Groundwater Study
End Date:	6/5/03		Lab ID:	WAAEE-A	MEC NW Bic	assay Sample Type:	GR-Groundwater
Sample Date:	5/28/03					oast Test Species:	AA-Atherinops affinis
Comments:	MW-17					•	
Conc-%	1	2	3	4	5		
D-Control	1.6700	1.7450	1.7200	2.0267	1.4717		·····
6.25	1.9817	1.7483	1.4133	1.8017	2.2500		
12.5	1.2150	2.0783	1.3017	1.6250	2.1433		
25	2.0350	1.6433	1.5000	1.6483	1.9333		
50	1.5750	1.6317	1.4067	1.4717	1.7417		
100	1.0133	2.1467	1.7183	1.6400	1.2633		

				Transforr	n: Untran	sformed			1-Tailed	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	1.7267	1.0000	1.7267	1.4717	2.0267	11.533	5			
6.25	1.8390	1.0651	1.8390	1.4133	2.2500	16.762	5	-0.573	2.360	0.4626
12.5	1.6727	0.9687	1.6727	1.2150	2.1433	25.635	5	0.275	2.360	0.4626
25	1.7520	1.0147	1.7520	1.5000	2.0350	12.732	5	-0.129	2.360	0.4626
50	1.5653	0.9066	1.5653	1.4067	1.7417	8.423	5	0.823	2.360	0.4626
100	1.5563	0.9014	1.5563	1.0133	2.1467	28.052	5	0.869	2.360	0.4626

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distribu	ution $(p > 0)$).01)		0.98327		0.9		0.10737	-0.3622
Bartlett's Test indicates equal var	iances (p =	: 0.22)			7.02755		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100		1	0.46258	0.2679	0.06097	0.09605	0.6752	5, 24



Dose-Response Plot



Client Name:

Sample ID:

Unocal

#3 MW-17

Raw Data Sheet Pacific Topsmelt (Atherinops affinis) Larval Survival and Growth Test

Test Date: 5 29 03 1445

Test No.: 0305-29NW

Comments:

Analysts: Mr un 8m

Client: Unocal Sample ID: #3 Mw-7 Raw Data Sheet Fish Weights Seven Day Chronic Bioassay

Test Date: 5/29/03

Species: A. affinis

Test No: 0305-29NW

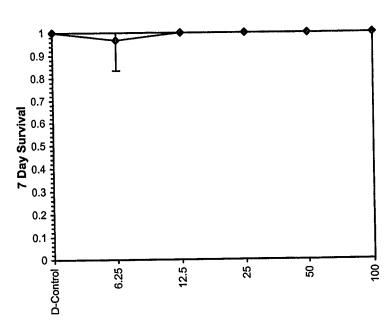
				10				
			0.042					
010	cont.		pan wt.	pan + fish	fish wt.	#	avg. per fish	avg. per conc.
Conc.	#	rep.	(gm) /	(gm)	(mg)	fish	(mg)	(mg)
CON	7	1	0.0435m	.05281		6		
	9	2	0.04402			(¢		
	23 5	3	0.04308	.05340		6		
	5	4	0.04311	.05527		5		
	10	5	0.04349	.05232		6		
10.25	25	1	0.04320	.05509		<u> </u>		
	18	2	0.04295	.05344		6		
	22	3	0.04296	.05144		4		
	3	4	0.04353		-05434	6		
		5	0.04361	.05711		4		网络国际保护保护保护官门保证保守保证 的
12.5	16	1	0.04289	.05018		5		
	29	2	0.04394	1.05641		65		
	27	3	0.04295	.05076		<u> </u>		
	24	4	0.04357	.05332		4		
	19	5	<u> 0.04201</u>	.05487		4		
25	30	1	0.04412	.05633		14		
	15	2	0.04274	.05260		<u> </u>		
	11	3	0.04307	.05207				-
	20	4	004200	1.05224		<u>↓ </u>		
		5	0.04273			6		
50	12	1	0.04356	1.05301		4		
	26	2	0.04405	.05384		5		
	8	3	0.04368	05212				
	1 G	4	0.04383	.05266		4		
1.5.5	14	5	0.04347	.05392		6		
100	2	1	0.04246	1.04904		6		
	4	2	0.04405	.05693		4		
	28	3	0.04315	.05346		6		
	13	4	004223	1.05207		6		
	2	5	0.04362	.05120		6	1	<u></u>

Tare: SM Total: SM Date/Time in: $\frac{6|5|03}{1430}$ $\frac{1315}{1430}$ kg Date/Time out: $\frac{6}{5|03}$ $\frac{1600}{1600}$ Oven temp. (°C): 100

Start Date:	5/29/03		the second s			ival Test-7 Day Su Sample ID:	UNOCAL GW
End Date:	6/5/03		Lab ID:	WAAEE-A	MEC NW Bioass	a) Sample Type:	GR-Groundwater
Sample Date:	5/28/03		Protocol:	EPAW 95-	EPA West Coas	Test Species:	AA-Atherinops affinis
Comments:	MW-103R						
Conc-%	1	2	3	4	5		
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000		
6.25	1.0000	1.0000	1.0000	1.0000	0.8333		
12.5	1.0000	1.0000	1.0000	1.0000	1.0000		
25	1.0000	1.0000	1.0000	1.0000	1.0000		
50	1.0000	1.0000	1.0000	1.0000	1.0000		
100	1.0000	1.0000	1.0000	1.0000	1.0000		

-				Tra	ansform:	Arcsin Sc	uare Root		Rank	1-Tailed	
	Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	
	D-Control	1.0000	1.0000	1.3652	1.3652	1.3652	0.000	5			
	6.25	0.9667	0.9667	1.3222	1.1503	1.3652	7.271	5	25.00	16.00	
	12.5	1.0000	1.0000	1.3652	1.3652	1.3652	0.000	5	27.50	16.00	
	25	1.0000	1.0000	1.3652	1.3652	1.3652	0.000	5	27.50	16.00	
	50	1.0000	1.0000	1.3652	1.3652	1.3652	0.000	5	27.50	16.00	
	100	1.0000		1.3652	1.3652	1.3652	0.000	5	27.50	16.00	

	Auxiliary Tests	·····				Statistic	Critical	Skew	Kurt
	Shapiro-Wilk's Test indicates nor	n-normal dis	stribution (p <= 0.01))	0.41613	0.9	-3.8705	19.8512
1	Equality of variance cannot be co								
	Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	<u></u>				
,	Steel's Many-One Rank Test	100	>100		1				

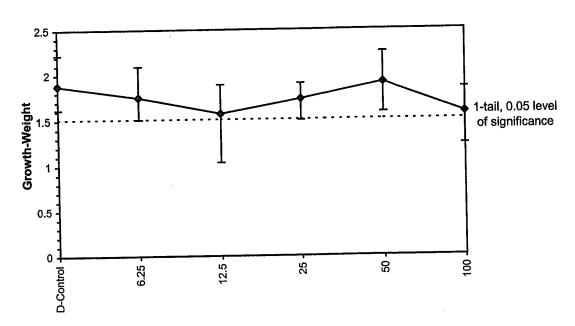


Dose-Response Plot

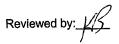
			Lar	val Fish G	rowth an	d Survival Test-Gro		eight	
Start Date:	5/29/03			0305-30N\		Sample ID		UNOCAL GW	
End Date:	6/5/03					Bioassay Sample Ty		GR-Groundwater	
Sample Date:			Protocol:	EPAW 95-	EPA Wes	st Coast Test Speci	ies:	AA-Atherinops affinis	
Comments:	MW-103R								
Conc-%	1	2	3	4	5				
D-Control	1.7717	1.9783	1.6200	1.8100	2.2233				
6.25	2.0967	1.5117	1.5417	1.9467	1.6650				
12.5	1.7983	1.5833	1.5450	1.0400	1.8933				
25	1.7517	1.5000	1.8350	1.6500	1.9017				
50	1.9250	1.7850	2.0000	1.5833	2.2500				
100	1.2367	1.5817	1.6167	1.8550	1.6200				

			Transform: Untransformed					_	1-Tailed	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	1.8807	1.0000	1.8807	1.6200	2.2233	12.235	5			
	1.7523		1.7523	1.5117	2.0967	14.723	5	0.823	2.360	0.3681
6.25			1.5720	1.0400	1.8933	21.059	5	1.979	2.360	0.3681
12.5	1.5720				1.9017	9.163	5	0.981	2.360	0.3681
25	1.7277	0.9186	1.7277	1.5000			5	-0.180	2.360	0.3681
50	1.9087	1.0149	1.9087	1.5833	2.2500	13.000	-			0.3681
100	1.5820	0.8412	1.5820	1.2367	1.8550	14.008	5	1.915	2.360	0.3081

					Statistic		Critical		Skew	Kurt
Auxiliary Tests Shapiro-Wilk's Test indicates nor	mal distribu	tion (n > 0)	01)		0.96829		0.9		-0.2686	-0.296
Bartlett's Test indicates equal var	iances (n =	0.85)	,		1.99245		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100		1	0.36805	0.1957	0.10168	0.06081	0.17966	5, 24



Dose-Response Plot



Client Name:

Sample ID:

Unocal

MW 103R

#4

Raw Data Sheet Pacific Topsmelt (Atherinops affinis) Larval Survival and Growth Test

Test Date: 5/29/03

Test No.: 0305-30NW

010						Da	ys				Percent	Average
Conc.	Cont.	Rep.	0	1.	2	3	4	5	6	7	Survival	Survival
CON	4	1	10	6	ſ.	6	6	6	6	6		
	28	2	6	6	6	6	4	6	6	6		
	6	3	6	6	6	10	6	6	6	6		
	8	4	6	6	q	6	4	6	6	6		
	19	5	Q	6	Ģ	6	6	10	6	6		
6:25	2	1	6	6	6	6	Ũ	18	10	6		
	14	2	Q	6	b	Ļ	6	0	4	6		- 2010 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010
	22	3	6	6	6	6	E	10	6	6		
	35	4	<u></u>	6	6	6	6	10_	6	6		07.1
	5	5	6	5	165	65	5	5	5	5		977.
12.5	29	1	Ý	6	6	6	6	6	6	6		
	25	2	6	6	6	6	6	<u>v</u>	4	6		
	15	3	<u>i</u>	6	<u> </u>	6	6	16	4	6		
	7	4	6	6	4	6	6	10	1.4	6		1007.
	12	5	φ	6	6	6	6	<u>v</u>	19		<u> </u>	10010
25	13	1	<u>[e</u>	6	6	14	6	$ \varphi $	6	6		
	23		4	6	6	1/2	6	6	Ŷ	6		
	24	3	6	6	6	6	16	4	6	6		
	21	4	<u></u>	\downarrow	6	6	6	6	6	6		10070
	9	5	6	S	6	4	14-	6	0			
50	16	1	4	6	18	6	6	10	6	6		
	17	2	6	6	6	6	6	<u>(e</u>	4			-
	30	3	<u> </u>	6	6	-6-	þ	<u> </u> [e_	10	6		
1		4	4		6	<u> k</u>	6	4	14			10070
	24		6	6		<u> </u>	b	6	6	6		
100	20) 1	16	6	6	6	6	16	0	6		
		2	4	6	6	6	6	<u>(e</u>	6	6		
	10		4	6	6	6		4	$+\frac{\varphi}{6}$	6		
	21	4	φ	+->-	6	6	6	6	$- \psi$			100%
	18	5	6	6	6	<u> e_</u>	6	4		6	_	1 100 10
Tech Initi	als		MF	ध	m	m	- m	-INF	- GW	187		
Feeding T	'imes:	0 <u>200</u>	0_1 <u>01</u> 18	30 2 15 1	0800_1 830	3 <u>0830</u> 1730	4 <u>073</u> 160	0 5 <u>0</u> 0 1	<u>130</u> 6 130	0730 1730	A	. W. NK PI S
Comment	: S:							_				: Mr et Si

Client: Unocal Sample ID: #4 MW 103R Raw Data Sheet Fish Weights Seven Day Chronic Bioassay

Test Date: 52903

Species: A. affinis

Test No: 0305-30NW

Conc.	cont.		pan wt.	pan + fish	fish wt.	#	avg. per fish	avg. per conc.
Conc.	#	rep.	(gm)	(gm)	(mg)	fish	(mg)	(mg)
CON	4	1		0.05446		6		
	28	2		0.05232		6		
	6	3	0.04352			6		
	200	4	0.04300			6		
	19	5	0.042.82	0.05616		6		
0.25	2	1	0.04244	0.05502		4		
	14	2	0.04145	0.05052		6		
	22	3		0.05265		<u>l</u>		
	2235	4	0.04381	0.05549		6		
		5	0.04338	0.05331		5		
12.5	29	1	0.04275	0.05354		<u> </u>		
	25	2	0.04240	0.05190		4		
	15	3	0.04231	0.05158		6		
	7	4	0.04399	0.05023		Į Į	1	
	12	5	0.04252	0.05388		10		
25	13	1	0.04218	0.05269		6		
	23	2	0.04260	0.05160		V		
	24	3	0.04334			<u>v</u>		
	21	4		0.05303		4		
	9	5	0.04328	0.05469		6		
50	16	1	0.04247	0.05402		10		
	17	2	0.04326		<u> </u>			
	30	3	0.04336	0.05536		4		
		4	0.04515			4		
	26	5	0.04338		<u> </u>	$ \psi $		
100_	120	1	0.04281	0.05023				
	$+ \mathbf{u}$	2	0.04286	0.05235				
	10	3	0.04340		<u> </u>	10		
	27	4	0.04294	0.05407		16	<u> </u>	
	18	5	0.04301	0.05273				

Tare: <u>BM</u> Total: <u>BM</u> Date/Time in: $(25/03 \ 1330)$ Date/Time out: $(25/03 \ 1600)$ Oven temp. (°C): 100
 Start Date:
 5/29/03

 End Date:
 6/5/03

 Sample Date:
 5/28/03

Larval Fish Growth and Survival Test-7 Day Survival Test ID: 0305-31NW Sample ID: UN

 Test ID:
 0305-31NW
 Sample ID:
 UNOCAL GW

 Lab ID:
 WAAEE-AMEC NW Bioassay Sample Type:
 GR-Groundwater

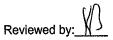
 Protocol:
 EPAW 95-EPA West Coast
 Test Species:
 AA-Atherinops affinis

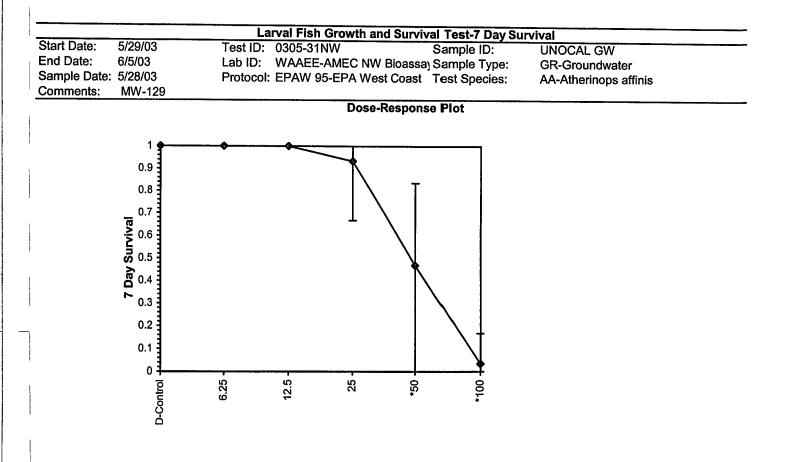
	Sample Date: Comments:	5/28/03 MW-129					Coast Test Species:	AA-Atherinops affinis	
	Conc-%	1	2	3	4	5			
÷	D-Control	1.0000	1.0000	1.0000	1.0000	1.0000			
	6.25	1.0000	1.0000	1.0000	1.0000	1.0000			
ļ	12.5	1.0000	1.0000	1.0000	1.0000	1.0000			
	25	1.0000	0.6667	1.0000	1.0000	1.0000			
1	50	0.0000	0.3333	0.3333	0.8333	0.8333			
	100	0.0000	0.0000	0.0000	0.0000	0.1667			

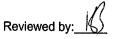
				Tra	ansform:	Arcsin So	uare Root		Rank	1-Tailed	Number	Total
	Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
1	D-Control	1.0000	1.0000	1.3652	1.3652	1.3652	0.000	5			0	30
	6.25	1.0000	1.0000	1.3652	1.3652	1.3652	0.000	5	27.50	16.00	0	30
1	12.5	1.0000	1.0000	1.3652	1.3652	1.3652	0.000	5	27.50	16.00	0	30
	25	0.9333	0.9333	1.2832	0.9553	1.3652	14.285	5	25.00	16.00	2	30
!	*50	0.4667	0.4667	0.7474	0.2056	1.1503	54.058	5	15.00	16.00	16	30
	*100	0.0333	0.0333	0.2486	0.2056	0.4205	38.677	5	15.00	16.00	29	30

ļ	Auxiliary Tests					Statistic	Critical	Skew	Kurt
	Shapiro-Wilk's Test indicates non	-normal dis	stribution	(p <= 0.01)		0.78649	0.9	-0.4718	4.64768
I	Equality of variance cannot be co	nfirmed							
	Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
1	Steel's Many-One Rank Test	25	50	35.3553	4				

)					M	aximum Likeliho	od-Probit					
	Parameter	Value	SE	95% Fidu	cial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
	Slope	5.53995	0.89255	3.79055	7.28934	0	0.07302	7.81472	0.99	1.67814	0.18051	3
1	Intercept	-4.2968	1.50589	-7.2483	-1.3452							
	TSCR						1.0 T					
ļ	Point	Probits	%	95% Fidu	cial Limits		0.9			1		
	EC01	2.674	18.1223	11.2605	23.5723		4			/		
	EC05	3.355	24.0563	16.8383	29.576		0.8 -					
	EC10	3.718	27.9774	20.7885	33.5042		0.7			 		
'	EC15	3.964	30.978	23.9037	36.5384		"					
,	EC20	4.158	33.5906	26.6521	39.2286		9 .0.6 0.5 Buds 0.4		l			
	EC25	4.326	36.007	29.2017	41.7778		Q 0.5 -		ſ	1		
ļ	EC40	4.747	42.8949	36.3349	49.5346		5 0.4					
	EC50	5.000	47.6581	41.0059	55.4599		- 1		/ 			
1	EC60	5.253	52.9502	45.8671	62.6493		0.3 -		/]			
	EC75	5.674	63.0793	54.3157	78.0496		0.2		/ /			
1	EC80	5.842	67.6169	57.8255	85.5453		1		///			
	EC85	6.036	73.3196	62.0638	95.4106		0.1 -					
	EC90	6.282	81.1831	67.6654	109.739		0.0 -		····•			
ļ	EC95	6.645	94.4157		135.521		1	l	10	100	1000	
	EC99	7.326	125.331	96.1226	202.706				Dose	%		





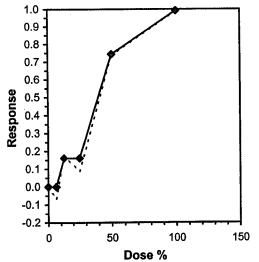


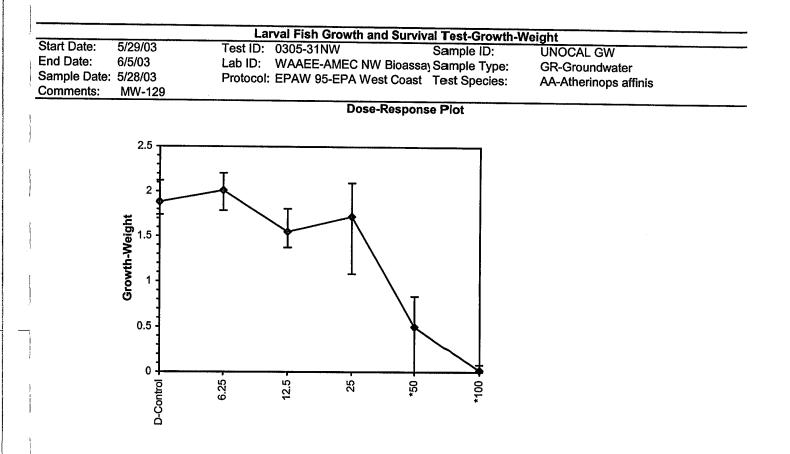
			Lar	val Fish G	rowth and S	Survival Test-Grow	h-Weight
Start Date:	5/29/03	•	Test ID:	0305-31N	N	Sample ID:	UNOCAL GW
End Date:	6/5/03		Lab ID:	WAAEE-A	MEC NW Bi	oassa) Sample Type	: GR-Groundwater
Sample Date:	5/28/03		Protocol:	EPAW 95-	EPA West C	Coast Test Species	: AA-Atherinops affinis
Comments:	MW-129						-
Conc-%	1	2	3	4	5		
D-Control	1.9667	2.1217	1.7617	1.7400	1.8100		
6.25	2.0400	1.9750	2.2000	1.7817	2.0300		
12.5	1.4433	1.8033	1.3700	1.7433	1.3683		
25	1.6800	1.0767	1.7700	1.9567	2.0933		
50	0.0000	0.6883	0.1500	0.8183	0.8350		
100	0.0000	0.0000	0.0000	0.0000	0.0783		

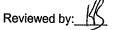
			•	Transform	n: Untran	sformed		Rank	1-Tailed	Isot	onic
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
D-Control	1.8800	1.0000	1.8800	1.7400	2.1217	8.594	5			1.9427	1.0000
6.25	2.0053	1.0667	2.0053	1.7817	2.2000	7.507	5	34.00	16.00	1.9427	1.0000
12.5	1.5457	0.8222	1.5457	1.3683	1.8033	13.657	5	18.00	16.00	1.6305	0.8393
25	1.7153	0.9124	1.7153	1.0767	2.0933	22.827	5	24.00	16.00	1.6305	0.8393
*50	0.4983	0.2651	0.4983	0.0000	0.8350	79,100	5	15.00	16.00	0.4983	0.2565
*100	0.0157	0.0083	0.0157	0.0000	0.0783	223.607	5	15.00	16.00	0.0157	0.0081

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor Bartlett's Test indicates unequal					0.95049 17.4403	0.9 15.0863	-0.736	0.8755
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	25	50	35.3553	4				

				Linea	r Interpolation	n (200 Resamples)		
Point	%	SD	95% CL	.(Exp)	Skew			
IC05	8.195	1.519	6.671	12.903	6.7853			
IC10	10.139	4.906	7.975	34.731	2.4250			
IC15	12.084	7.474	9.015	36.774	0.2385	1.0		
IC20	26.686	5.897	3.607	32.262	-1.4458	0.9		
IC25	28.831	3.804	5.670	34.378	-2.5743	0.8		
IC40	35.266	2.369	27.505	41.633	-0.4520		\$ me	
IC50	39.555	2.525	33.068	47.060	0.1495	0.7		
						0.6 -		
						% 0.5	ŀ	







Client Name:

Sample ID:

Unocal

#5 MW-129

Raw Data Sheet Pacific Topsmelt (Atherinops affinis) Larval Survival and Growth Test

Test Date: 5/29/03 1820

Test No.: 0305-31NW

တို Conc.						Da	ys		· · · ·		Percent	Average
		Rep.	0		2	3	4	5.	6	7	Survival	Survival
CON	22	1	6	6	6	G	6	6	6	6		
}		2	6	6	6	6	6	6	6	6		
	16	3	4	4	6	6	6	6	6	6		
	13	4	Q	<i>b</i>	6	6	4	0	6	6		
	19	5	6	þ	C	6	6	œ	6	6		100%
6.25	23	1	4	6	6	6	þ	Q	6	6		
	6	2	6	6	6	6	6	10	6	6		
	30	3	Ģ	Ģ	6	6	6	Ø	6	6		
	20	4	6	6	6	6	6	0	6	4		
	25	5	6	6	6	6	6	0	6	Ŵ		10070
12.5	26	1	6	6	6	la	6	10	6	Q	·	
	10	2	6	b	6	6	6	6	6	6		
	11	3	6	6	6	6	6	Ý	6	Q		
	28	4	Ģ	6	¢	4	6	6	6	Ý		
17.1	12	5	6	6	6	90	6	le	6	Q		1007.
25	14	1	Ģ	6	6		6	6	6	Ý		
	5	2	Q	6	<u> </u>	6	4	4	4	4		
		3	6	-le-	6	6	6	6	6	Ý		
	27	4	6	_6	6	6	6	6	6	Q		
	21	5	6	يا _	6	6	6	6	6	φ		9370
50	15	1	6	6	Z		0					
	18	2	Ģ	6	5	3	MLw	V	2	2		
	8	3	6	b	3	3 5	$\frac{\nu}{\nu}$	2	2	\mathcal{V}		
	2	4	Ģ	6	65		5	5	5	50		
	24	5	Q	6		As	Ful	5	5	5		47%
100	3	1	6	5	4	4		0				
	9	2	<u> </u>	5	5	3	2	0				
	4	3	Ģ	4	9			0				
		4	Q	-/	0							
	29	5	6	6	5	4			1,			37.
Tech Initials	3		M	m	Et	m	m	M	<u>µ</u> 3	SM		
Feeding Tim	ies: () 2100	1 <u>073</u> 1819	5 183	<u>00</u> 3(30 1	<u>)830</u> 730	1600	5 <u>073</u> 1730	<u>0</u> 6 <u>0</u> 7 1			K O-
Comments:	-										Analysts:)	JF JM

Raw Data Sheet Fish Weights Seven Day Chronic Bioassay

Unocal Client:

Sample ID: #5 MW-129

Test Date: 5/29/03

Species: <u>A. affinis</u>

Test No: 0305-31NW

no Conc.	cont.		pan wt.	pan + fish	fish wt.	#	avg. per fish	avg. per conc.
	#	rep.	(gm)	(gm)	(mg)	fish	(mg)	(mg)
CON	22	1	0.04284	.05464		6		
	1	2	0.04253	.05526		6		
	16	3	0.04407	.05464		φ		
	13	4	0.04382	.05426		\bigcirc		
	19	5	0.04414	.05500		6		
(1.25	23	1	0.04400	.05624		$\left(\right)$		
	6	2	0.04339	.05524		Q		
	30	3	0.04240	.05560		6		
	20	4	0.04466	.05535		6		
	25	5	0.04405	.05 6 23		6		
12.5	26	1	0.04325	.05191		6		
	10	2	0.04322	.05404		6		
	17	3	0.04243	.05065		6		
	28	4	0.04333	.05379		Q		
	12	5	0.04406	.05227		6		
25	14	1	0.04607	.05615		6		
	5	2	0.04372	,05018		4		
	1		0.04060	.05122		6		
	27	4	0.04350	.05524		Q		
	21	5	0.04414	.05670		4		
50	15	1	0.04324	Ør				
	18	2	0.04228	.04641		2		
	82		0.04321	.04411		25		
			0.04322	.04813	· · · · · · · · · · · · · · · · · · ·	5		
1.00	24		0.04430	.04931		5		
100	3			*Ø				
				rØ				
	4			<u>TO</u>				
	29	4		10				
	47	5	0.04405	.04452				

Tare: SM Total: <u>NF</u>

 Date/Time in:
 b/5/03 1800

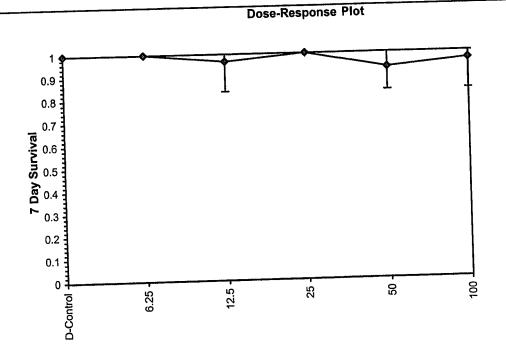
 Date/Time out:
 b/b/03 1800

 Oven temp. (°C):
 400 b0

ļ						Survival Test-7 Day Su	rvival UNOCAL-Unocal Groundwater Study
Start Date:	5/29/03	Т	est ID:	0305-32NV	V	Sample ID:	GR-Groundwater
End Date:	6/5/03	L	.ab ID:	WAAEE-A	MEC NW B	ioassay Sample Type:	AA-Atherinops affinis
Sample Date:	5/28/03	F	Protocol:	EPAW 95-	EPA West	Coast Test Species:	AA-Autennops annis
Comments:	MW-W						
Conc-%	1	2	3	4	5		
D-Control	1.0000	1.0000	1.0000		1.0000		
6.25	1.0000	1.0000	1.0000	1.0000	1.0000		
12.5	1.0000	0.8333	1.0000	1.0000	1.0000		
25	1.0000	1.0000	1.0000	1.0000	1.0000		
50	1.0000	1.0000	1.0000	0.8333	0.8333		
100		1.0000	1.0000	1.0000	1.0000		

			Tra	ansform:	Arcsin So	uare Root		_	1-Tailed	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum_	Critical	
D-Control	1.0000	1.0000	1.3652	1.3652	1.3652	0.000	5	27.50	16.00	
6.25	1.0000	1.0000	1.3652	1.3652	1.3652	0.000	5 5	27.00	16.00	
12.5	0.9667	0.9667	1.3222	1.1503	1.3652	7.271	5	27.50	16.00	
25	1.0000		1.3652	1.3652	1.3652	0.000 9.204	5	22.50	16.00	
50	0.9333		1.2792	1.1503	1.3652	9.204 7.271	5	25.00	16.00	
100	0.9667	0.9667	1.3222	1.1503	1.3652	1.211	U	20100		

ļ	Auxiliary Tests				Statistic	Critical 0.9	Skew Kurt -1.4778 1.97749
}	Shapiro-Wilk's Test indicates non Equality of variance cannot be co	-normal dis	stribution (p <= 0.01)	0.76012	0.0	
)	Hypothesis Test (1-tail, 0.05)	NOEC	>100	ChV	TU		
	Steel's Many-One Rank Test	100	>100		•		



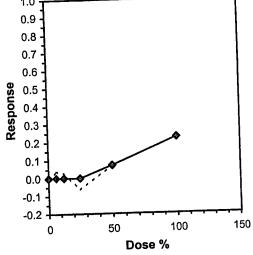
1

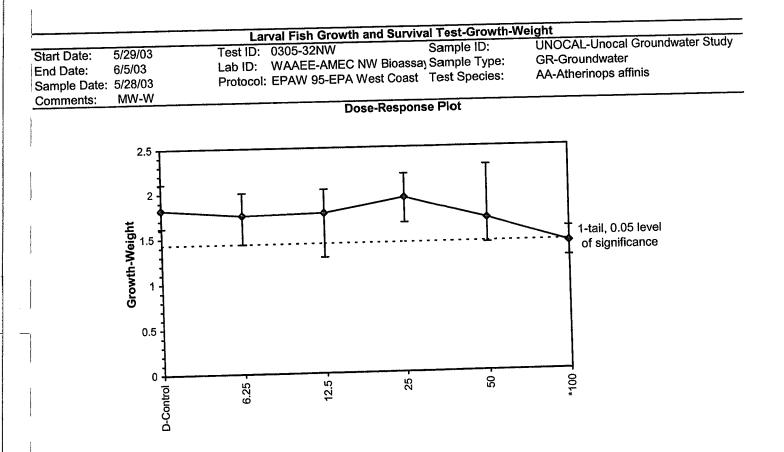
Ļ				Larv	al Fish Gr	rowth and	Survival Test-Growth-W	Veight
E		5/29/03 6/5/03 5/28/03	5	est ID: (0305-32NV WAAEE-A	N MEC NW	Sample ID: Bioassa) Sample Type: t Coast Test Species:	UNOCAL-Unocal Groundwater Study GR-Groundwater AA-Atherinops affinis
	Comments: Conc-%	<u>MW-W</u>	2	3	4	5		
}	D-Control 6.25 12.5 25 50 100	1.8617 1.9150 1.9883 2.2900	2.1100 1.4300 1.6400 2.1167 1.5617 1.4833	1.6200 1.5867 1.9800 1.6533 1.7250 1.3983	1.7083	1.7833 1.8683 2.0350 2.2000 1.4167 1.3350		

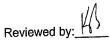
						11	formed			1-Tailed		Isoto	onic
					Franstorn	n: Untrans			- t-Stat	Critical	MSD	Mean	N-Mean
	Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	<u>N</u>	l-Stat	Gritical		1.8213	1.0000
	D-Control	1.8213	1.0000	1.8213	1.6183	2.1100	11.970	5	0 404	2.360	0.3864	1.8179	
	6.25	1.7503	0.9610	1.7503	1.4300	2.0050	13.416	5	0.434 0.314	2.360	0.3864	1.8179	0.9981
	12.5	1.7700	0.9718	1.7700	1.2800	2.0350	17.694	5	-0.684	2.360	0.3864	1.8179	0.9981
-1	25	1.9333	1.0615	1.9333	1.6533	2.2000	12.584	5	-0.004	2.360	0.3864	1.6913	
	50	1.6913	0.9286	1.6913	1.4167	2.2900	20.983	5	2.504	2.360	0.3864	1.4113	
ļ	*100	1.4113		1.4113	1.2567	1.5833	9.010	5	2.504	2.000	0.0001		

ļ			Statistic		Critical		Skew	Kurt
	Auxiliary Tests $(n \ge 0.01)$		0.97569		0.9		0.21944	0.04785
ļ	Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)		3.90852		15.0863			df
	Battlett's Test indicates equal variances (p = 0.56) Battlett's Test indicates equal variances (p = 0.56)	TU	MSDu	MSDp	MSB	MSE	F-Prob 0.07572	5.24
<i>'</i>	Hypothesis lest (1-tail, 0.03) 1020 100 70 7107	2	0.38638	0.21214	0.15474	0.06701	0.07572	5, 24
	Dunnett's Test							

				Linea	ar Interpola	tion (200 Resamples)	
Point	%	SD	95% CL	(Exp)	Skew		
1C05	42.309	18.102	0.000	71.225	-0.2683		
IC10	59.310	15.901	0.000	82.446	-0.5181	1.0	
IC15	75.571					0.9	
IC20	91.833					0.8	
IC25	>100					0.7	
IC40	>100 >100					4	
IC50	>100					0.6	
						% 0.5	l l







Client Name:

Sample ID:

Unocal

#6 Mw-W

Raw Data Sheet Pacific Topsmelt (Atherinops affinis) Larval Survival and Growth Test

Test Date: 5/29/03 1925

Test No.: 0305 - 32 NW

Comments:

Analysts: NF m &

Unocal _____ Client: Sample ID: $\frac{40}{M\omega-\omega}$

Raw Data Sheet Fish Weights Seven Day Chronic Bioassay

Test Date: 5/29/03

Species: A. affinis

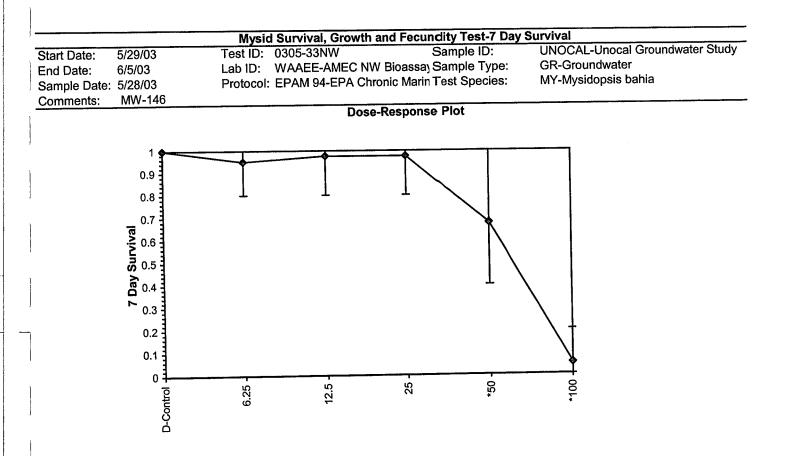
Test No: 0305-32NW

A t	cont.		pan wt.	pan + fish	fish wt.	#	avg. per fish	avg. per conc.
Conc.	#	rep.	(gm)	(gm)	(mg)	fish	(mg)	(mg)
CON.	14	1	0.04328	0.05299		<u>(e</u>		
	3	2	0.04424	0.05700		1e_		
	27	3	0.04218	0.05190		<u>le</u>		
	19	4	0.04330	0.05515		6		
	22	5	0.04350	0.05420		4		
6.25	26	1	0.04183	0.05300		6		
	13	2	0.04462	0.05320		6		
	5	3	0.04486	0.05438	<u> </u>	6	+	
	9	4	0.0435			4	+	And the second
	12	5	0.04329			le		
2.5	18	1	0.04326			5		
	29	2	0.04336			6		
	16	3	0.04390			6		
	25	4	0.0435	10.05122		6		
	15	5	0.04288			- Č		
25	8	1	0.0433	10.05530 20.05622		4		
	20	2	0.04355	and the second distance of the second distanc		16		
			0.0445			6		
	30	4 5	0.0440	30.0572	3	6		
	++		0.0410.	0.05845	<u> </u>	6		
50	+10	$\frac{1}{2}$	0.0436			6		
	-124	3	0.0444	00.05475		ie ie		
	21	4				5		
	28					5		
100	$\frac{1}{2}$)	5		
<u> 100</u>	4	2				<u> </u>		
	22				1	(q		
	-17	4	and the second se	0 0.05104		6		
		5	the second design of the secon		9	6		

Tare: <u>SM</u> Total: Mm Date/Time in: 6/5/03 1730 Date/Time out: (14/03 17:15 Oven temp. (°C): 60

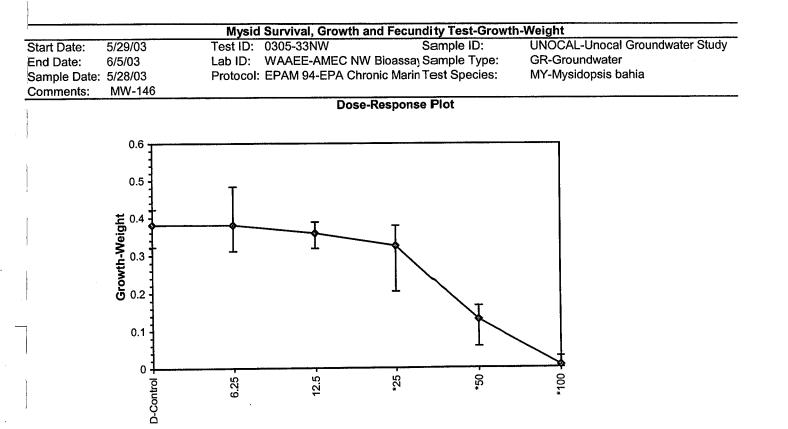
Mysidopsis bahia

						d Fecuno	lity Test-7	Day Su	vival			Chudu
Start Date:	5/29/03	Т		305-33NV			ample ID:		JNOCAL-U		undwater	Study
End Date:	6/5/03	L	ab ID: W	/AAEE-AI	MEC NW I	Bioassa) S	ample Ty		GR-Ground			
Sample Date:	5/28/03	P	Protocol: E	PAM 94-E	EPA Chror	nic Marin T	est Specie	es: I	MY-Mysido	psis barlia		
Comments:	MW-146											
Conc-%	1	2	3	4	5	6	7	8 1.0000	<u> </u>			
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000				
6.25	0.8000	1.0000	1.0000	1.0000	1.0000	1.0000	0.8000	1.0000				
12.5	1.0000	1.0000	1.0000	1.0000	0.8000	1.0000	1.0000	1.0000				
25	0.8000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000 0.6000	0.8000				
50	0.6000	0.6000	0.4000	0.8000	1.0000	0.6000	0.0000	0.0000				
100	0.2000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000				
								Donk	1-Tailed		lumber	Total
		_	Tra			uare Roo		Rank	Critical	•		Numbe
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Gillical		0	4
D-Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	~~ ~~	46.00		2	4
6.25		0.9500	1.2857	1.1071	1.3453	8.574	8	60.00	46.00		1	4
12.5		0.9750	1.3155	1.1071	1.3453	6.400	8	64.00			1	4
25		0.9750	1.3155	1.1071	1.3453	6.400	8	64.00 40.00			13	4
*50		0.6750	0.9736	0.6847	1.3453	20.831	8 8	36.00			38	2
*100	0.0500	0.0500	0.2850	0.2255	0.4636	38.672	o	30.00	40.00			
											A 1	1/
The second second							Statistic		Critical		Skew	
Auxiliary Tes	sts	eates non-	normal dis	tribution (p <= 0.01)	Statistic 0.91982		Critical 0.929		Skew 0.19979	
Shapiro-Wilk	s Test indic	ates non-	normal dis	tribution (p <= 0.01)							
Shapiro-Wilk' Equality of va	s Test indic riance can	not be cor	firmea	tribution (p <= 0.01) ChV) TU_						
Shapiro-Wilk' Equality of va	s Test indic riance can Test (1-tail	not be con , 0.05)	normal dis firmed NOEC 25									
Shapiro-Wilk' Equality of va	s Test indic riance can Test (1-tail	not be con , 0.05)	NOEC	LOEC	ChV 35.3553	<u>TU</u> 4	0.91982					
Shapiro-Wilk Equality of va	s Test indic riance can Test (1-tail	not be cor , 0.05) Test	NOEC 25	LOEC 50	ChV 35.3553 Maximun	TU 4 n Likeliho	0.91982 od-Probit	Critical	0.929		0.19979	
Shapiro-Wilk Equality of va	s Test indio iriance can Test (1-tail -One Rank Value	not be con 0.05) Test SE	NOEC 25 95% Fidu	LOEC 50	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 ood-Probit Chi-Sq	Critical	0.929 	Mu		lter
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter	s Test indic iriance can Test (1-tail -One Rank Value 3.14912	not be con 0.05) Test <u>SE</u> 2.09225	NOEC 25 95% Fidu -3.5094	LOEC 50 Icial Limi 9.8076	ChV 35.3553 Maximun ts	TU 4 n Likeliho	0.91982 od-Probit	Critical	0.929	Mu	0.19979 Sigma	2.8041
Shapiro-Wilk Equality of va Hypothesis Steel's Many	s Test indic iriance can Test (1-tail -One Rank Value 3.14912	not be con 0.05) Test SE	NOEC 25 95% Fidu -3.5094	LOEC 50 Icial Limi 9.8076	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 ood-Probit Chi-Sq 73.423	Critical	0.929 	Mu	0.19979 Sigma	2.8041
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope	s Test indic ariance can Test (1-tail -One Rank Value 3.14912 -0.462	not be con 0.05) Test 2.09225 3.51896	NOEC 25 95% Fidu -3.5094 -11.661	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 ood-Probit Chi-Sq 73.423 1.0 -	Critical	0.929 	Mu	0.19979 Sigma	2.8041
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept	s Test indic ariance can Test (1-tail -One Rank Value 3.14912 -0.462 Probits	not be con 0.05) Test 2.09225 3.51896 %	NOEC 25 95% Fidu -3.5094 -11.661 95% Fidu	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 ood-Probit Chi-Sq 73.423	Critical	0.929 	Mu	0.19979 Sigma	2.8041
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point	s Test indic ariance can Test (1-tail -One Rank Value 3.14912 -0.462 Probits 2.674	not be con 0.05) Test 2.09225 3.51896 % 9.90234	95% Fidu -3.5094 -11.661	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 ood-Probit Chi-Sq 73.423 1.0 - 0.9 -	Critical	0.929 	Mu	0.19979 Sigma	2.8041
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point EC01	s Test indic ariance can Test (1-tail -One Rank 3.14912 -0.462 Probits 2.674 3.355	not be con 0.05) Test 2.09225 3.51896 % 9.90234 16.2984	95% Fidu -3.5094 -11.661	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 od-Probit <u>Chi-Sq</u> 73.423 1.0 - 0.9 - 0.8 -	Critical	0.929 	Mu	0.19979 Sigma	2.8041
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point EC01 EC05	s Test indic ariance can Test (1-tail -One Rank 3.14912 -0.462 Probits 2.674 3.355 3.718	SE 2.09225 3.51896 % 9.90234 16.2984 21.2575	95% Fidu -3.5094 -11.661	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 ood-Probit Chi-Sq 73.423 1.0 - 0.9 -	Critical	0.929 	Mu	0.19979 Sigma	2.8041
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point EC01 EC05 EC10	s Test indic ariance can Test (1-tail -One Rank Value 3.14912 -0.462 Probits 2.674 3.355 3.718 3.964	SE 2.09225 3.51896 % 9.90234 16.2984 21.2575 25.4302	95% Fidu -3.5094 -11.661 95% Fidu	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 od-Probit <u>Chi-Sq</u> 73.423 1.0 - 0.9 - 0.8 - 0.7 -	Critical	0.929	Mu	0.19979 Sigma	2.8041
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15	s Test indic ariance can Test (1-tail -One Rank Value 3.14912 -0.462 Probits 2.674 3.355 3.718 3.964	SE 2.09225 3.51896 % 9.90234 16.2984 21.2575	95% Fidu -3.5094 -11.661 95% Fidu	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 od-Probit <u>Chi-Sq</u> 73.423 1.0 - 0.9 - 0.8 - 0.7 -	Critical	0.929	Mu	0.19979 Sigma	2.8041
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20	s Test indic riance can Test (1-tail -One Rank 3.14912 -0.462 Probits 3.718 3.964 4.158 4.326	SE 2.09225 3.51896 % 9.90234 16.2984 21.2575 25.4302 3.3.1348	95% Fidu -3.5094 -11.661 95% Fidu	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 od-Probit <u>Chi-Sq</u> 73.423 1.0 - 0.9 - 0.8 - 0.7 -	Critical	0.929	Mu	0.19979 Sigma	2.8041
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25	s Test indic riance can Test (1-tail -One Rank 3.14912 -0.462 Probits 3.718 3.964 4.158 4.326	SE 2.09225 3.51896 % 9.90234 16.2984 21.2575 25.4302 3.3.1348	95% Fidu -3.5094 -11.661 95% Fidu	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 od-Probit <u>Chi-Sq</u> 73.423 1.0 - 0.9 - 0.8 - 0.7 -	Critical	0.929	Mu	0.19979 Sigma	2.804 ⁻
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC20 EC25 EC40	s Test indic riance can Test (1-tail -One Rank Value 3.14912 -0.462 Probits 3.718 3.964 4.158 4.326 4.74	SE 2.09225 3.51896 % 9.90234 16.2984 21.2575 25.4302 3.3.1348 745.0836	95% Fidu -3.5094 -11.661 95% Fidu	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 od-Probit <u>Chi-Sq</u> 73.423 1.0 0.9 0.8 0.7 0.8 0.7 0.6 0.5 0.5 0.4	Critical	0.929	Mu	0.19979 Sigma	2.804 ⁻
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40 EC25 EC40 EC50	s Test indic riance can Test (1-tail -One Rank 3.14912 -0.462 Probits 3.718 3.964 4.158 4.326 4.74 5.000	SE 2.09225 3.51896 % 9.90234 16.2984 21.2575 25.4302 3.3.1348 7 45.0836 54.2586	95% Fidu -3.5094 -11.661 95% Fidu	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 od-Probit <u>Chi-Sq</u> 73.423 1.0 - 0.9 - 0.8 - 0.7 -	Critical	0.929	Mu	0.19979 Sigma	2.804 ⁻
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40 EC25 EC40 EC50 EC60	s Test indic riance can Test (1-tail -One Rank 3.14912 -0.462 Probits 2.674 3.355 3.718 3.964 4.158 4.326 4.74 5.000 5.25	SE 2.09225 3.51896 % 9.90234 16.2984 21.2575 25.4302 3.3.1348 7 45.0836 54.2586 365.3006	95% Fidu -3.5094 -11.661 95% Fidu	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 od-Probit <u>Chi-Sq</u> 73.423 1.0 0.9 0.8 0.7 0.8 0.7 0.6 0.5 0.5 0.4	Critical	0.929	Mu	0.19979 Sigma	2.804 ⁻
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40 EC25 EC40 EC50 EC60 EC75	s Test indic riance can Test (1-tail -One Rank 3.14912 -0.462 Probits 2.674 3.355 3.718 3.964 4.158 4.326 4.74 5.000 5.25 5.674	SE 2.09225 3.51896 % 9.90234 16.2984 21.2575 25.4302 3.3.1348 7 45.0836 54.2586 365.3004 488.8488	95% Fidu -3.5094 -11.661 95% Fidu	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 od-Probit <u>Chi-Sq</u> 73.423 1.0 - 0.9 - 0.8 - 0.7 - 0.8 - 0.7 - 0.8 - 0.5 - 0.4 - 0.3 - 0.3 - 0.3 - 0.2 -	Critical	0.929	Mu	0.19979 Sigma	2.804 ⁻
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40 EC25 EC40 EC50 EC60 EC75 EC80	s Test indic riance can Test (1-tail -One Rank 3.14912 -0.462 Probits 2.674 3.355 3.718 3.964 4.158 4.326 4.74 5.000 5.25 5.67 5.84	SE 2.09225 3.51896 % 9.90234 16.2984 21.2575 25.4302 3.31348 745.0836 54.2586 365.3004 488.8488 2100.391	95% Fidu -3.5094 -11.661 95% Fidu -3.5094 -11.661 95% Fidu -3.5094 -11.661 95% Fidu -3.5094 -11.661 95% Fidu -3.5094	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 od-Probit <u>Chi-Sq</u> 73.423 1.0 - 0.9 - 0.8 - 0.7 - 9 0.6 - 0.5 - 9 0.4 0.3	Critical	0.929	Mu	0.19979 Sigma	2.8041
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40 EC25 EC40 EC50 EC60 EC75 EC80 EC85	s Test indic riance can Test (1-tail -One Rank 3.14912 -0.462 Probits 2.674 3.355 3.718 3.964 4.158 4.326 4.74 5.000 5.255 5.67 5.84 6.03	SE 2.09225 3.51896 % 9.90234 16.2984 21.2575 25.4302 3.31348 7 45.0836 54.2586 65.3006 488.8488 2100.39 6115.76	95% Fidu -3.5094 -11.661 95% Fidu -3.5094 -11.661 95% Fidu -3.5094 -11.661 95% Fidu -3.5094 -11.661 95% Fidu -3.5094	LOEC 50 icial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 od-Probit <u>Chi-Sq</u> 73.423 1.0 - 0.9 - 0.8 - 0.7 - 0.8 - 0.7 - 0.8 - 0.5 - 0.4 - 0.3 - 0.3 - 0.3 - 0.2 -	Critical	0.929	<u>Mu</u> 1.73447 ♦	0.19979 Sigma 0.31755	2.8041
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC20 EC25 EC40 EC50 EC60 EC50 EC60 EC75 EC80 EC85 EC90	s Test indic riance can Test (1-tail -One Rank 3.14912 -0.462 Probits 2.674 3.355 3.718 3.964 4.158 4.326 4.747 5.000 5.255 5.677 5.84 6.03 6.28	SE 2.09225 3.51896 % 9.90234 16.2984 21.2575 25.4302 3.31348 7 45.0836 5 4.2586 3 65.3006 4 88.8488 2 100.396 6 115.76 2 138.49	95% Fidu -3.5094 -11.661 95% Fidu -3.5094 -11.661 95% Fidu -3.5094 -11.661 95% Fidu -3.5094 -11.661 95% Fidu -3.5094	LOEC 50 Incial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 od-Probit <u>Chi-Sq</u> 73.423 1.0 - 0.9 - 0.8 - 0.7 - 0.8 - 0.7 - 0.8 - 0.7 - 0.6 - 0.5 - 0.4 0.3 0.2 0.1	Critical	0.929	Mu	0.19979 Sigma	2.804 ²
Shapiro-Wilk Equality of va Hypothesis Steel's Many Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40 EC25 EC40 EC50 EC60 EC75 EC80 EC85	s Test indic riance can Test (1-tail -One Rank 3.14912 -0.462 Probits 2.674 3.355 3.718 3.964 4.158 4.326 4.74 5.000 5.255 5.67 5.84 6.03 6.28 6.64	SE 2.09225 3.51896 % 9.90234 16.2984 21.2575 25.4302 3.31348 7 45.0836 5 4.2586 3 65.3006 4 88.8488 2 100.396 6 115.76 2 138.49	95% Fidu -3.5094 -11.661 95% Fidu -3.5094 -11.661 95% Fidu -3.5094 -11.661 95% Fidu -3.5094 -11.661 95% Fidu -3.5094	LOEC 50 Incial Limi 9.8076 10.7369	ChV 35.3553 Maximun ts	TU 4 n Likeliho Control	0.91982 od-Probit <u>Chi-Sq</u> 73.423 1.0 - 0.9 - 0.8 - 0.7 - 0.8 - 0.7 - 0.8 - 0.7 - 0.6 - 0.5 - 0.4 0.3 0.2 0.1	Critical 7.81472	0.929 P-value 2 7.9E-16	Mu 1.73447 ♦ ♦	0.19979 Sigma 0.31755	2.804 ⁴



Reviewed by:

<u> </u>	F 100 100		Mysid	Survival,	Growth a				veignt	line cal O	•••••••••••••••••	Church .
Start Date:	5/29/03			0305-33N			Sample ID		UNOCAL-		roundwate	er Study
End Date:	6/5/03			WAAEE-A					GR-Groun			
Sample Date:			Protocol:	EPAM 94-	EPA Chro	nic Marin	rest spec	ies:	MY-Mysid	opsis bani	а	
Comments:	MW-146	~	3	4	5	6	7	8				
Conc-%	<u> </u>	2 0.3220	0.4020	0.3680	0.3840	0.3820	0.4220	0.4060			· · · · · · · · · · · · · · · · · · ·	
D-Control 6.25		0.3220	0.4020	0.3780	0.3840	0.3820	0.3120	0.3580				
12.5		0.3040	0.3600	0.3880	0.3440	0.3620	0.3640	0.3700				
25		0.3760	0.3500	0.3780	0.3140	0.3480	0.2920	0.3280				
20 50		0.1560	0.0580	0.1320	0.1660	0.1100	0.1480	0.1560				
100		0.0000	0.0000	0.0000	0.0180	0.0000	0.0000	0.0000				
				Transform	n: Untran	sformed		Rank	1-Tailed			
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical		Mean	N-Mea
D-Control	0.3810	1.0000	0.3810	0.3220	0.4220	8.161	8				0.3810	0.000
6.25		0.9987	0.3805	0.3120	0.4840	14.967	8	62.50			0.3805	0.001
12.5		0.9390	0.3578	0.3180	0.3880	5.689	8	50.50			0.3578	0.061
*25		0.8497	0.3238	0.2040	0.3780	17.477	8	45.00			0.3238	0.150
*50	0.1293	0.3392	0.1293	0.0580	0.1660	27.803	8	36.00			0.1293	0.660
*100		0.0157	0.0060	0.0000	0.0300	192.725	8	36.00	46.00		0.0060	0.984
Shapiro-Wilk'	s Test indic	ates norm	nal distribu	ition (p > C).01)	<u></u>	Statistic 0.96133		Critical 0,929		Skew -0.4433	
Shapiro-Wilk' Bartlett's Test	s Test indic indicates u	unequal va	ariances (o = 1.60E-	03)							
Shapiro-Wilk' Bartlett's Test Hypothesis 1	s Test indic indicates u f est (1-tail ,	unequal va , 0.05)	nal distribu ariances (j NOEC 12.5	ition (p > 0 5 = 1.60E- LOEC 25	0.01) 03) ChV 17.6777	TU 8	0.96133		0.929			
Shapiro-Wilk' Bartlett's Test Hypothesis 1	s Test indic indicates u f est (1-tail ,	unequal va , 0.05) Test	ariances (j NOEC 12.5	o = 1.60E- LOEC 25	03) ChV 17.6777 Maximun	8 n Likeliho	0.96133 19.424 od-Probit		0.929 15.0863		-0.4433	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis 1 Steel's Many- Parameter	s Test indic indicates u rest (1-tail, One Rank Value	unequal va 0.05) Test SE	noec (j NOEC 12.5 95% Fidu	0 = 1.60E- LOEC 25	03) ChV 17.6777 Maximun	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq	Critical	0.929 15.0863 P-value	Mu 1 61056	-0.4433 Sigma	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis T Steel's Many- Parameter Slope	s Test indic indicates u fest (1-tail, One Rank Value 4.78396	unequal va 0.05) Test SE 0.95682	ariances (<u>NOEC</u> 12.5 95% Fidu 2.90858	25 LOEC 25 Icial Limit 6.65933	03) ChV 17.6777 Maximun	8 n Likeliho	0.96133 19.424 od-Probit Chi-Sq		0.929 15.0863 P-value		-0.4433	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis T Steel's Many- Parameter Slope Intercept	s Test indic indicates u fest (1-tail, One Rank Value 4.78396	unequal va 0.05) Test SE	ariances (<u>NOEC</u> 12.5 95% Fidu 2.90858	0 = 1.60E- LOEC 25	03) ChV 17.6777 Maximun	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis T Steel's Many- Parameter Slope Intercept TSCR	s Test indic indicates u fest (1-tail, One Rank Value 4.78396 -2.7048	unequal va 0.05) Test 0.95682 1.55495	ariances (j NOEC 12.5 95% Fidu 2.90858 -5.7525	25 Icial Limit 6.65933 0.34288	03) ChV 17,6777 Maximun s	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis 1 Steel's Many- Parameter Slope Intercept TSCR Point	s Test indic indicates u est (1-tail, One Rank Value 4.78396 -2.7048 Probits	unequal va 0.05) Test 0.95682 1.55495 %	ariances (j NOEC 12.5 95% Fidu 2.90858 -5.7525 95% Fidu	25 Icial Limit 6.65933 0.34288 Icial Limit	03) ChV 17,6777 Maximun s	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis 1 Steel's Many- Parameter Slope Intercept TSCR Point EC01	s Test indic indicates u est (1-tail, One Rank 4.78396 -2.7048 Probits 2.674	unequal va 0.05) Test 0.95682 1.55495 % 13.3129	ariances () NOEC 12.5 95% Fidu 2.90858 -5.7525 95% Fidu 6.26622	25 Icial Limit 6.65933 0.34288 Icial Limit 18.7157	03) ChV 17,6777 Maximun s	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472 1.0 0.9	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis 1 Steel's Many- Parameter Slope Intercept TSCR Point EC01 EC05	s Test indic indicates u est (1-tail, One Rank 4.78396 -2.7048 Probits 2.674 3.355	unequal va 0.05) Test 0.95682 1.55495 % 13.3129 18.4811	ariances () NOEC 12.5 95% Fidu 2.90858 -5.7525 95% Fidu 6.26622 10.6644	a = 1.60E- LOEC 25 acial Limit 6.65933 0.34288 acial Limit 18.7157 23.8735	03) ChV 17,6777 Maximun s	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472 1.0 0.9 0.8	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis 1 Steel's Many- Parameter Slope Intercept TSCR Point EC01 EC05 EC10	s Test indic indicates of rest (1-tail, One Rank Value 4.78396 -2.7048 Probits 2.674 3.355 3.718	unequal va 0.05) Test 0.95682 1.55495 % 13.3129 18.4811 22.0125	ariances () NOEC 12.5 95% Fidu 2.90858 -5.7525 95% Fidu 6.26622 10.6644 14.1188	a = 1.60E- LOEC 25 acial Limit 6.65933 0.34288 acial Limit 18.7157 23.8735 27.2594	03) ChV 17,6777 Maximun s	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472 1.0 0.9	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis 1 Steel's Many- Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15	s Test indic indicates (indicates (iest (1-tail, One Rank 4.78396 -2.7048 Probits 2.674 3.355 3.718 3.964	SE 0.955682 1.55495 % 13.3129 18.4811 22.0125 24.769	ariances (NOEC 12.5 95% Fidu 2.90858 -5.7525 95% Fidu 6.26622 10.6644 14.1188 17.0242	25 Icial Limit 6.65933 0.34288 Icial Limit 18.7157 23.8735 27.2594 29.8765	03) ChV 17.6777 Maximun Is	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472 1.0 0.9 0.8 0.7	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis 1 Steel's Many- Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20	s Test indic indicates (indicates (iest (1-tail, One Rank 4.78396 -2.7048 Probits 2.674 3.355 3.718 3.964 4.158	SE 0.955682 1.55495 % 13.3129 18.4811 22.0125 24.769 27.2038	ariances () NOEC 12.5 95% Fidu 2.90858 -5.7525 95% Fidu 6.26622 10.6644 14.1188 17.0242 19.7132	25 Icial Limit 6.65933 0.34288 Icial Limit 18.7157 23.8735 27.2594 29.8765 32.2012	03) ChV 17.6777 Maximun s	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472 1.0 0.9 0.8 0.7	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis 1 Steel's Many- Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25	s Test indic indicates (fest (1-tail, One Rank 4.78396 -2.7048 Probits 2.674 3.355 3.718 3.964 4.158 4.326	SE 0.955682 1.55495 % 13.3129 18.4811 22.0125 24.769 27.2038 29.4826	ariances (NOEC 12.5 95% Fidu 2.90858 -5.7525 95% Fidu 6.26622 10.6644 14.1188 17.0242 19.7132 22.3067	25 Icial Limit 6.65933 0.34288 Icial Limit 18.7157 23.8735 27.2594 29.8765 32.2012 34.4154	03) ChV 17.6777 Maximun s	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472 1.0 0.9 0.8 0.7	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis T Steel's Many- Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40	s Test indic indicates u fest (1-tail, One Rank 4.78396 -2.7048 Probits 2.674 3.355 3.718 3.964 4.158 4.326 4.747	SE 0.95682 1.55495 % 13.3129 18.4811 22.0125 24.769 27.2038 29.4826 36.1075	ariances (NOEC 12.5 95% Fidu 2.90858 -5.7525 95% Fidu 6.26622 10.6644 14.1188 17.0242 19.7132 22.3067 29.9562	D = 1.60E- LOEC 25 acial Limit 6.65933 0.34288 acial Limit 18.7157 23.8735 27.2594 29.8765 32.2012 34.4154 41.3748	03) ChV 17.6777 Maximun Is	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472 1.0 0.9 0.8 0.7 0.8 0.7	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis T Steel's Many- Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40 EC50	s Test indic indicates (fest (1-tail, One Rank 4.78396 -2.7048 Probits 2.674 3.355 3.718 3.964 4.158 4.326 4.747 5.000	se 0.95682 1.55495 % 13.3129 18.4811 22.0125 24.769 27.2038 29.4826 36.1075 40.7902	ariances (NOEC 12.5 95% Fidu 2.90858 -5.7525 95% Fidu 6.26622 10.6644 14.1188 17.0242 19.7132 22.3067 29.9562 35.0598	D = 1.60E- LOEC 25 Icial Limit 6.65933 0.34288 Icial Limit 18.7157 23.8735 27.2594 29.8765 32.2012 34.4154 41.3748 47.1585	03) ChV 17,6777 Maximun Is	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472 1.0 0.9 0.8 0.7 0.7 9 0.8 0.7 0.5 0.6 0.5 0.5 0.5	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis T Steel's Many- Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40 EC50 EC50 EC60	s Test indic indicates (est (1-tail, One Rank 4.78396 -2.7048 Probits 2.674 3.355 3.718 3.964 4.158 4.326 4.747 5.000 5.253	se 0.95682 1.55495 % 13.3129 18.4811 22.0125 24.769 27.2038 29.4826 36.1075 40.7902 46.0801	ariances (NOEC 12.5 95% Fidu 2.90858 -5.7525 95% Fidu 6.26622 10.6644 14.1188 17.0242 19.7132 22.3067 29.9562 35.0598 40.1906	D = 1.60E- 25 Icial Limit 6.65933 0.34288 Icial Limit 18.7157 23.8735 27.2594 29.8765 32.2012 34.4154 41.3748 47.1585 54.8773	03) ChV 17,6777 Maximun Is	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472 1.0 0.9 0.8 0.7 0.8 0.7 0.8 0.7 0.8 0.7 0.8 0.7 0.5 0.5 0.5 0.5 0.3	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis T Steel's Many- Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40 EC25 EC40 EC50 EC60 EC75	s Test indic indicates u est (1-tail, One Rank 4.78396 -2.7048 2.674 3.355 3.718 3.964 4.158 4.326 4.747 5.000 5.253 5.674	se 0.95682 1.55495 % 13.3129 18.4811 22.0125 24.769 27.2038 29.4826 36.1075 40.7902 46.0801 56.4346	ariances (NOEC 12.5 95% Fidu 2.90858 -5.7525 95% Fidu 6.26622 10.6644 14.1188 17.0242 19.7132 22.3067 29.9562 35.0598 40.1906 48.5959	D = 1.60E- LOEC 25 Icial Limit 6.65933 0.34288 Icial Limit 18.7157 23.8735 27.2594 29.8765 32.2012 34.4154 41.3748 47.1585 54.8773 73.2742	03) ChV 17,6777 Maximun Is	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472 1.0 0.9 0.8 0.7 0.7 9 0.8 0.7 0.5 0.6 0.5 0.5 0.5	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819
Shapiro-Wilk' Bartlett's Test Hypothesis T Steel's Many- Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40 EC25 EC40 EC50 EC60 EC75 EC80	s Test indic indicates (est (1-tail, One Rank 4.78396 -2.7048 2.674 3.355 3.718 3.964 4.158 4.326 4.747 5.000 5.253 5.674 5.842	se 0.95682 1.55495 % 13.3129 18.4811 22.0125 24.769 27.2038 29.4826 36.1075 40.7902 46.0801 56.4346 61.1619	ariances () NOEC 12.5 95% Fidu 2.90858 -5.7525 95% Fidu 6.26622 10.6644 14.1188 17.0242 19.7132 22.3067 29.9562 35.0598 40.1906 48.5959 51.9981	D = 1.60E- LOEC 25 Icial Limit 6.65933 0.34288 Icial Limit 18.7157 23.8735 27.2594 29.8765 32.2012 34.4154 41.3748 47.1585 54.8773 73.2742 82.8175	03) ChV 17,6777 Maximun s	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472 1.0 0.9 0.8 0.7 0.8 0.7 0.6 0.5 0.5 0.4 0.5 0.4 0.3 0.2	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819
Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40 EC50 EC50 EC60 EC75 EC80 EC85	s Test indic indicates (est (1-tail, One Rank 4.78396 -2.7048 2.674 3.355 3.718 3.964 4.158 4.326 4.747 5.000 5.253 5.674 5.842 6.036	se 0.95682 1.55495 % 13.3129 18.4811 22.0125 24.769 27.2038 29.4826 36.1075 40.7902 46.0801 56.4346 61.1619 67.1743	ariances () NOEC 12.5 95% Fidu 2.90858 -5.7525 95% Fidu 6.26622 10.6644 14.1188 17.0242 19.7132 22.3067 29.9562 35.0598 40.1906 48.5959 51.9981 56.0954	D = 1.60E- 25 Icial Limit 6.65933 0.34288 Icial Limit 18.7157 23.8735 27.2594 29.8765 32.2012 34.4154 41.3748 47.1585 54.8773 73.2742 82.8175 95.8108	03) ChV 17,6777 Maximun s	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472 1.0 0.9 0.8 0.7 0.9 0.8 0.7 0.8 0.7 0.5 0.6 0.5 0.4 0.5 0.4 0.3 0.3 0.2 0.1	Critical	0.929 15.0863 P-value		-0.4433 Sigma	lter
Shapiro-Wilk' Bartlett's Test Hypothesis T Steel's Many- Parameter Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40 EC25 EC40 EC50 EC60 EC75 EC80	s Test indic indicates (est (1-tail, One Rank 4.78396 -2.7048 2.674 3.355 3.718 3.964 4.158 4.326 4.747 5.000 5.253 5.674 5.842 6.036	se 0.95682 1.55495 % 13.3129 18.4811 22.0125 24.769 27.2038 29.4826 36.1075 46.0801 56.4346 61.1619 67.1743 75.5859	ariances () NOEC 12.5 95% Fidu 2.90858 -5.7525 95% Fidu 6.26622 10.6644 14.1188 17.0242 19.7132 22.3067 29.9562 35.0598 40.1906 48.5959 51.9981	D = 1.60E- LOEC 25 Icial Limit 6.65933 0.34288 Icial Limit 18.7157 23.8735 27.2594 29.8765 32.2012 34.4154 41.3748 47.1585 54.8773 73.2742 82.8175 95.8108 115.441	03) ChV 17.6777 Maximun Is	8 n Likeliho Control	0.96133 19.424 od-Probit Chi-Sq 0.78472 1.0 0.9 0.8 0.7 0.8 0.7 0.6 0.5 0.5 0.4 0.5 0.4 0.3 0.2	Critical	0.929 15.0863 P-value		-0.4433 Sigma	2.2819



Raw Data Sheet Mysid Shrimp (Mysidopsis bahia) Survival and Growth Test

5/29/03

Client:

Inocal)

Test Number: 035-33NW

Test Date:

Sample ID:

#1 MW-146

Conc'n or	Cont.	Rep.						Percent			
		1	0	1	2	3	4	5	6	7	Survival
CON	15	1	5	5	5	5	5 5	5	5	5	
- Colo	33	2	5	5	5	5		S	5	5	
	25	3	5	5	5	5	5	5	5	5	
	23	4	5	Ś	5	<	5	6	<u>S</u>	5	
	4	5	5	5	5	5	5	5	5	5	
·	6	6	5	5	5	5		5	5	5	
	14	7	5	5	5	<	5	5	5	5	100%
	19	8	5	5	5	5	S	5	5	5	100%
10.25	16	1	5	4	4	4	4	14	4	4	
19.00	26	2	5	5	5	5	5	5	5	5	
	44	3	5	5	5	5	5	5	5	5	
	i1	4	5	5	5	<	5	5	5	5	
	10	5	6	5	5	5	5 5 5	5	S	5	
	22	6	5	5	5	<		5	S	5	
	48	7	5	5	5	4	4	4	4	4	059
	38	8	5	S	5	5	5	5	5	5	952
12.5	13	1	5	5	5	5	5	5	5	5	- Reprint to the second second
100	43	2	5	5	5	5	5	5 5	5	5	
	46	3	5	5	5	5	5	5	5	5	
	40	4	5	S	5	5	5	54	5		
	47	5	5	S	4	4	4	4	4	4	
	9	6	5	S	5	4	1×M	55	5	5	
	36	7	5	S	5	5	5	5	5	5	97.52
		8	5	5	5	5	5	5	5	15	11.06
Technician	Initials		Sm	KB	SM	m	184	NF	1B	_ <u>_</u>	
Feeding Tin		2000_10 1	<u>730</u> 2 <u>(</u> 830	<u>)830</u> 3 1830	<u>0830</u> 4 1730	0730 1600	5 <u>0730</u> 1730	6 <u>0730</u> 1730			
Analysts:		<u>B</u> M	<u>- 8m</u>		<u></u>						<u> </u>
Comments	•		<u></u>				. <u></u>			<u></u>	

Raw Data Sheet Mysid Shrimp (Mysidopsis bahia) Survival and Growth Test

Client:

							,	
at Numbor	h	305	•	2	2	11	11	ł

5/29/03

Sample ID:

#1 MW-146

Unocal

Test Number: 0305-33NW

Test Date:

Conc'n or	Cont.	Rep.			CHICKNESS CONTRACTOR	Percent					
	Com	1.	0	1.4	+2	3	4	5	6	7	Survival
25	31	1	5	5	5	5	4	Ч	4	4	
- 09	42	2	5	5	5	۲	5	5	4	5	
	17	3	5	5	5	<	5	5	5	5	
	3	4	5	5	5	٢	5	5	5	5	
	5	5	5	5	5	ζ	55	5	5	5	
	45	6	5	5	5	5	5	5	5	5	
	41	7	5	5	5	5	5	5	<u>s</u>	5	0-1-0
	35	8	5	5	5	5	5	5	5	5	97.5%
50	28	1	5	5	5 4	5	5 3	3	3	33	
50	21	2	5	5	4	4		3	3	3	
	29	3	5	5	5	4	3	3	3	2	
·	39	4	5	5	5	5	5	35	4	4	
	30	5	5	5	5	5	5	5	5	5	
	$\frac{1}{2}$	6	5	5	6	4	4	43	3	3	
	37	7	5	4	\$4	4	45	3	3	3	
	32	8	5	4	5	5	5	5	5	4	67.5%
100	12	1	5	5	3	3			1	_/	
	34	2	5	5	3	1	0				
	21	3	5	4	2	0					
·····	20	4	5	5	4	\mathcal{V}	0	VP	,		
	24	5	5	5	3	2	2	KB+2	· _ (1	
	17	6	5	5	3		0			_	
	8	7	5	5	3	1	0				
	18	8	5	5	3	2	G				
Technician	Initials		Sm		Sm	hav	lit	ME	KB	14/5	
Feeding Ti		2000 1() <u>130</u> 2 830	0830 3 1830	0830 4 1730	10730 1600	<u>5 0130</u> 1730	6 <u>0130</u> 1130			
Analysts:		<u>XB</u>	Sm	<u></u>			<u></u>			<u> </u>	
Comments	:	<u></u>									

lient:

}

Sample ID:

HI MW-146

Raw Data Sheet Mysid Weights Seven Day Chronic Bioassay

Test Date: <u>5/29/03</u>

Species: M. bahia

Test Number: <u>0305-33NW</u>

90	Cont.	Rep.	pan wt. (gm)	pan + mysid (gm)	mysid wt. (mg)	# mysids	avg. per mysid (mg)	avg. per conc. (mg)
Conc.	15	1 1	.04310	D. 04491		5		
CON	33	2	.04160	0.04321		5		
	25	3	.04264	0.04465		5		
}	23	4	.04105	0.04289		5		
}	4	5	.04348	0.04540		5_		
}	6	6	.04397	0.04588		5		
	14	7	.04355	0.0456le		5_		
	19	8	.04274	0.04477		5		
19.25	16	1	.04281	0.04444		4		
	26	2	.04282	0.04464		5		
	44	3	.04246	0.04466		55		
		4	.04438	0.04627		5		
	10	5	1.04578	0.04820		5		
) 	22	6	.04187	0.04378		4	-	
l	48	7	.04408	0.04319		5		
	38		.04387	0.04565		5		
12.5		$\frac{1}{2}$.04268	0.04565		5		
	43	3	.04298	0.04478		5		
	46	4	.04249	0.04443		5		
l	47	5	04328	0.04500		4		
}	$\frac{1}{q}$	6	.04434	0.04615		5		
	36	7	.04185	0.04367		5	`	
		8	.04404	0.04589		5		

Tare Initials: Total Initials: Sm_____

Date/Time in: $\frac{b}{5}/03$ 18∞ Date/Time out: $\frac{b(b)}{3}$ 18%Oven temp. (°C):b0

Client:

Sample ID:

Unocal 廿1 MW-146

Raw Data Sheet Mysid Weights Seven Day Chronic Bioassay

Test Date: 5/29/03

Species: <u>M. bahia</u>

Test Number: 05/29/03

% Conc.	Cont.	Rep.	pan wt. (gm)	pan + mysid (gm)	mysid wt. (mg)	mysids	avg. per mysid (mg)	avg. per conc. (mg)
25	31	1	.04224	0.04326		4		
	42	2	.04248	0.04436		5		
<u></u>	11	3	.04320	0.04495		5		
	3	4	.04189	0.04378		5_		
	5	5	.04364	0.04521	ļ	5		
	45	6	.042.81	0.04455	<u> </u>	5		
	41	7	.04253	0.04399	<u> </u>	5		
	35	8	.04215	D.04379		5		
50	28	1	.04303	0.04357		3		
	27	2	.04291	0.04369		3		
	29	3	.04213	0.04242		2		
	39	4	.04230	0.04296				- Alexandra and a second s
	30	5	.04127	0.04210		5		
<u></u>	2	6	.04272	0.04327		3		
	31	7	.04130	0.04204		3		
	32	8	.04222	0.04300		4		
100	12	1	.04494	0.04509		<u>1</u>		
	34	2	.04208	0.0419/2		<u>+</u> <u></u>		
	21	3	.04226	0.01224		0		
	20	4	.04168	0.04166		$\left \begin{array}{c} 0 \\ 1 \end{array} \right $		
	24	5	.04067	0.04076		1		
	1	6	,04429	0.04432		10		
	8	7	.04345			0		
	18	8	.042107	0.04265		0		

Tare Initials: Total Initials:

SM MN

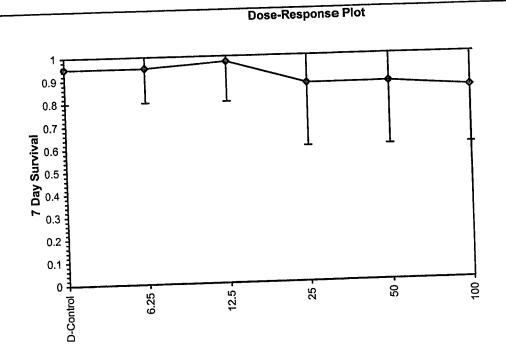
Date/Time in: Date/Time out: **Oven temp. (°C):** (,)

6151031800 6/6/03 1815

	Mysid Survival, Growth and Fecundity Test-7 Day Survival													
End Date: 6 Sample Date: 5		i	est ID: 0	305-34NV	V MEC NW	S Bioassa)	Sample ID: Sample Ty	UNOCAL-Unocal Groundwater Study GR-Groundwater MY-Mysidopsis bahia						
Oommond.	<u>MW-7</u>	2	3	4	5	6	7	8						
Conc-% D-Control 6.25 12.5 25 50 100	0.8000 1.0000 1.0000 0.6000 0.8000 0.8000	1.0000 1.0000 1.0000 0.8000 0.6000 1.0000	1.0000 1.0000 1.0000 1.0000 0.8000 0.6000	1.0000 0.8000 0.8000 1.0000 1.0000 0.8000	1.0000 0.8000 1.0000 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 1.0000 1.0000 0.8000	0.8000 1.0000 1.0000 0.6000 0.8000 0.8000						

			Tra	ansform:	Arcsin Sq	uare Root		Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	<u>N</u>	Sum	Critical
D-Control 6.25 12.5	0.9500 0.9500 0.9750	1.0000 1.0000 1.0263	1.2857 1.2857 1.3155 1.2007	1.1071 1.1071 1.1071 0.8861	1.3453 1.3453 1.3453 1.3453 1.3453	8.574 8.574 6.400 17.562	8 8 8 8	68.00 72.00 62.00	46.00 46.00 46.00
25 50 100	0.8750 0.8750 0.8500	0.9211	1.1986 1.1688	0.8861 0.8861	1.3453 1.3453	14.410 14.043	8 8	59.00 55.00	

		<u></u>			Statistic	Critical	Skew Kurt
Auxiliary Tests	normal dis	tribution (r	$x \le 0.01$		0.87912	0.929	-0.8346 -0.1698
Shapiro-Wilk's Test indicates non- Bartlett's Test indicates equal vari	ances (n =	0.18)	,,		7.54301	15.0863	
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU			
Steel's Many-One Rank Test	100	>100		1			

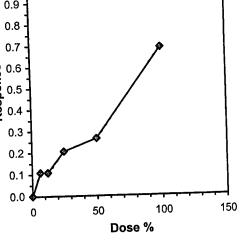


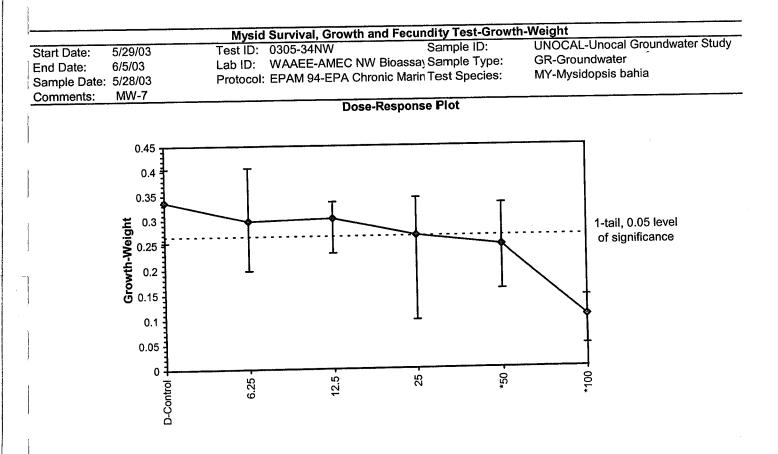
<u> </u>			Mysid S	Survival, G	Neight Study				
End Date: Sample Date:		1	est ID: 0)305-34NV NAAEE-A EPAM 94-1	V MEC NW	S Bioassa	UNOCAL-Unocal Groundwater Study GR-Groundwater MY-Mysidopsis bahia		
Comments:	MW-7	2	3	4	5	6	7	8	
Conc-% D-Control 6.25 12.5 25 50 100	0.0980 0.2240	0.3720 0.4060 0.3080 0.2960 0.1580 0.1320	0.3060 0.3380 0.2920 0.2900 0.2780 0.0460	0.3160 0.1980 0.2320 0.3400 0.2760 0.1040	0.3600 0.3200 0.2980 0.2720 0.2780 0.1200	0.4040 0.2000 0.3340 0.3440 0.3320 0.1140	0.3980 0.3060 0.3000 0.3220 0.2160 0.0780	0.2540 0.3840 0.3360 0.1720 0.2120 0.0940	

				Transform: Untransformed				1-Tailed			Isotonic		
				•	Transform	n: Untrans			-	• • • • • • • • •	MSD	Mean	N-Mean
	Cano %	Mean	N-Mean	Mean	Min	Max	CV%	<u>N</u>	t-Stat	Critical	WOD	0.3358	1.0000
	Conc-%			0.3358	0.2540	0.4040	16.683	8					
	D-Control	0.3358				0.4060	27.162	8	1.256	2.306	0.0702	0.2996	0.8924
J	6.25	0.2975	0.8861	0.2975	0.1980			-	1.116	2.306	0.0702	0.2996	0.8924
	12.5	0.3018	0.8987	0.3018	0.2320	0.3360	10.760	8			0.0702	0.2668	0.7945
				0.2668	0.0980	0.3440	32.701	8	2.266	2.306			
	25	0.2668		•••••	÷ • • •	0.3320	21.998	8	2.922	2.306	0.0702	0.2468	
1	*50	0.2468	0.7349	0.2468	0.1580			8	7.610	2.306	0.0702	0.1040	0.3098
	*100	0.1040	0.3098	0.1040	0.0460	0.1440	30.145	0	7.010	2.000			

	·····			<u> </u>	Statistic		Critical		Skew	Kurt
Auxiliary Tests		11	0.01)		0.96332		0.929		-0.6369	0.39234
Shapiro-Wilk's Test indicates norm	nal distribu	(p > 0.05)	0.01)		11.28		15.0863			
Bartlett's Test indicates equal varia	ances (p =	0.05)	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Hypothesis Test (1-tail, 0.05)	NOEC		35.3553		0.07022	0.20914	0.0535	0.00371	3.2E-08	5, 42
Dunnett's Test	25	50	33.3333	T						

						(200 Resamples)	
Point	%	SD	95%		Skew		
C05*	2.904	7.581	1.478	28.556	2.3786		
C10*	5.809	9.638	2.957	38.159	1.4188		
	17.913	11.904	4.435	50.038	0.6350	1.0	
C15	24.297	13.264	5.913	55.475	0.2383	0.9	
IC20	43.672	13.094	17.445	60.625	-0.4166	4	
C25		6.036	51.882	74.363	-0.6906	0.8	
					-0.3877	0.7	\$
IC40 IC50	65.867 77.627	4,763	67.246	85.088	-0.3877	0.7	p
* indicates	IC estimate le	ss man m		onconduc		9 , 0.6 -	
						0.6 - 0.5 - 0.4 -	
						8 . 4]	





Raw Data Sheet Mysid Shrimp (Mysidopsis bahia) Survival and Growth Test

Test Date: <u>5/29/03</u>

Client:

Unocal

#2 <u>Mw-7</u>

Sample ID:

Test Number: 0305-34NW

						Day	· G				Percent
Conc'n or	Cont.	Rep.	Libert States and States and States				4	6	¹ 6	7	Survival
0/0			0		2	5	5	4	4	4	
CON	9	1	5	5	5	5	5	5	5	5	
	39	2	5	5	5	5	5	5	5	5	
	21	3	5	5	5	2	5	$\frac{1}{\zeta}$	5	5	
	17	4	5	5	5	5	5	5	the second se	5	
	26	5	5	5	$\frac{1}{c}$	5	5	5	55	5	
	28	6	5	5	15-	5	5	5	5	5	
	33	7	5	5_		\$5-4		4	4	4	95%.
	48	8	5	5	4		1 É	15	5	5	
6.25	8	1	5	-5	5	5	55	5	5	5	
	41	2	5	5	<u> </u>	5	15	5	5	5	
	25	3		5	$\frac{1}{1}$	14	4	4	4	4	
	2Å	4	5	4	4	15	5	5	4	14	
	30	5	5	3		5	5	5	15	5	
	32	6	5	5	15	$\frac{3}{5}$	5	5	5	5	
	43	7	5	5	13	5	5	5	5	5	95%
	1	8	5	5		5	15	15	5	5	
125	29	1	5	5	5	S	15	5	5	5	
	23	2	5	15	5	$\frac{1}{5}$	5	5	5	5	
	31	3	5	-15-	15	S	15	TE	4	4	
	46	4	5	-5	$\frac{3}{5}$	13		5	5	5	
	27	5	5		$-\frac{3}{7}$	15	55	5	5	5	
	1	6	5	5	$-\frac{3}{c}$	-5	5	the second se	5	5	
	42	7	5	15		+	15	7	5	5	97.5%
	45	8	5			15	51		- 8n	1 27	
Technicia	n Initials	8	<u></u>	mi	, <u></u>						
Feeding T	'imes: ();			3 <u>0830</u> 1730	40730	50730	6073	0		
Analysts:		43	m	SM							
Commen	ts:										

Raw Data Sheet Mysid Shrimp (Mysidopsis bahia) Survival and Growth Test

Test Number: 0305-34NW

Test Date: 5/29/03

Client:

Unocal	
#2	Μω-7

Sample ID:

Percent Days Survival Rep. Conc'n or Cont. 4 5 6 (%) С ¥ S ζ S 87.5% (Ż < S 87.5% if S ζ प ų Б ζ Q Ś Ц 157. ٩t 3m t SM نسلا ß m **Technician Initials** U Feeding Times: $0_{1815} \frac{10730}{1815} \frac{20675}{1830} \frac{30630}{1730} \frac{40730}{1600} \frac{50730}{1730} \frac{60730}{1730}$ KB ML SM Analysts: **Comments:**

lient:

Sample ID:

Unocal #2 MW-7

Raw Data Sheet **Mysid Weights** Seven Day Chronic Bioassay

Test Date: 5/29/03 Species: <u>M. bahia</u> Test Number: <u>5/29/03</u>

%			pan wt.	pan + mysid	mysid wt. (mg)	# mysids	avg. per mysid (mg)	avg. per conc. (mg)
Conc.	Cont.		(gm)	(gm)	(1115)	4		
CON	19	1	.04264	.04402		5		
۱	39	2	.04356	.04542		5		
	21	3	.04401	.04554		5		
,	17	4	.04259	.04417		5		
	26	5	.04233	.04413				
	28	6	.04230	.04432		5		
	33	7	.04267	1.04466		4		
	48	8	.04245	.04372				
6.25	8	1	.04224	.04338		555		
} ₩₽	47	2	.04336	.04539		5		
	25	3	.04241	.04410				
<u></u>	24	4	5-043.042	1.04376		4		 A second state of the second stat
 	36	5	.04313	.04473				-
	32	6	.04165	504312.0	1/2/05	5		
	43	7	.04041	.04194		5		
	17	8	.04234	.04426		5		
12.5	29	1	.04118	.04275		5		
	23	2	.04316	.04470		5	_	
	31	3	04255	.04401		5		
	46	4	04317	.04433		4		
	27	5	.04291	.04440		5		
J	1	6	.04391	.04558		5		
	42	7	.04304	,04454		5		
	45	8	.04262	04430		5		

Tare Initials: Total Initials:

SM SM

Date/Time in: Date/Time out: 6/5/03 1845 **Oven temp. (°C):** (00)

6/5/03 1645

lient:

Unocal	

Sample ID:

#2 MW-7

Raw Data Sheet Mysid Weights Seven Day Chronic Bioassay

Test Date: <u>5/29/03</u> Species: <u>M. bahia</u>

Test Number: 0305-34 NW

Olo Conc.	Cont.	Rep.	pan wt. (gm)	pan + mysid (gm)	mysid wt. (mg)	mysids	avg. per mysid (mg)	avg. per conc. (mg)
25	40	1	.04294	.04343		3		
	44	2	.04322	.04470		4		
	11	3	.04285	.04430		55		
	3	4	.04163	.04333				
<u> </u>	15	5	.04247	.04383		5		
	34	6	.04346	,04518		5		
	12	7	.04276	.04437	<u> </u>	5	l	
	13	8	.04207	,04293		3		
50	16	1	.04148	.04260	<u> </u>	4 3		
	22	2	.04267	.04346				
	4	3	.04331	.04470		4		
	10	4	.04244	,04382_		5		
	14	5	.04248	.04387		5		
	20	6	.04140	.04306		5		
	2	7	.04275			5		
	9	8	.04366	.04472				
100	41	1	.04369	.04441		4		
	31	2	.04297	.04363		5		
	38	3	.04319	.04342		3		The second s The second sec
	35	4	.04302			4		
	6	5	.04224			5		
	5	6	.04320		_	5		
	18	7	.04311	.04350		4		
	30	8	.04219	.04266		4		

Tare Initials: Total Initials:

SM SMA

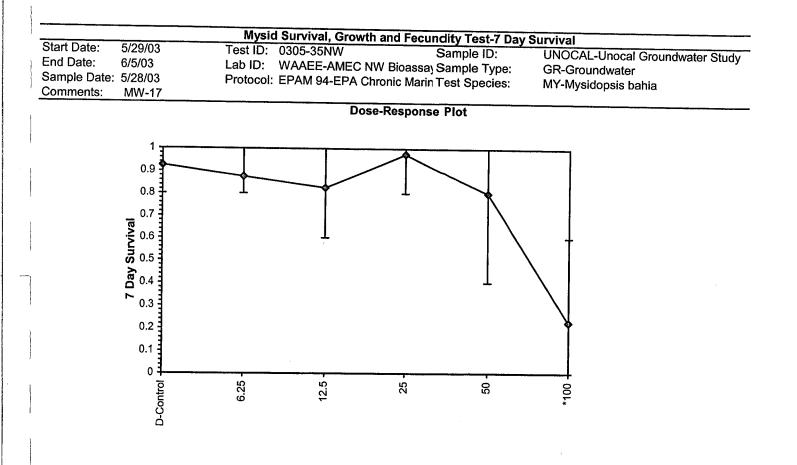
6/5/03 1645 6/5/03 1845 Date/Time in: Date/Time out: **Oven temp. (°C):** 100

ł	•			Mysid	Survival,	Growth a	and Fecu	ndity Test-	7 Day Si	Invival
	Start Date: End Date: Sample Date:	5/29/03 6/5/03 5/28/03		Test ID: Lab ID:	0305-35N WAAEE-A	W MEC NW	Bioassa	Sample ID Sample Ty Test Spec): /pe:	UNOCAL-Unocal Groundwater Study GR-Groundwater MY-Mysidopsis bahia
1	Comments:	MW-17								in a mysicopsis barna
	Conc-%	1	2	3	4	5	6	7	8	
	D-Control	1.0000	0.8000	1.0000	1.0000	1.0000	0.8000	1.0000	0.8000	
1	6.25	1.0000	0.8000	0.8000	0.8000	1.0000	1.0000	0.8000	0.8000	
	12.5	0.6000	0.8000	1.0000	1.0000	0.8000	1.0000	0.6000	0.8000	
1	25	0.8000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
	50	1.0000	0.6000	0.4000	1.0000	1.0000	1.0000	0.4000	1.0000	
)	100	0.0000	0.6000	0.4000	0.0000	0.0000	0.4000	0.2000	0.2000	

		_	Tra	ansform:	Arcsin So	quare Root	t	Rank	1-Tailed	Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	- Sum	Critical	Resp	Number
D-Control	0.9250	1.0000	1.2560	1.1071	1.3453	9.813	8		······	3	40
6.25	0.8750	0.9459	1.1964	1.1071	1.3453	10.301	8	60.00	46.00	5	40
12.5	0.8250	0.8919	1.1412	0.8861	1.3453	16.843	8	57.00	46.00	7	40
25	0.9750	1.0541	1.3155	1.1071	1.3453	6.400	8	76.00	46.00	1	40
50	0.8000	0.8649	1.1227	0.6847	1.3453	27.910	8	63.50	46.00	8	40
*100	0.2250	0.2432	0.4824	0.2255	0.8861	52.176	8	36.00	46.00	31	40

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor Bartlett's Test indicates unequal					0.9571 1 5.1642	0.929 15.0863	-0.3756	-0.243
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				······
Steel's Many-One Rank Test	50	100	70.7107	2			·····	

				Max	kimum Likeliho	od-Probit	t				
Parameter	Value	SE	95% Fidu	cial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	lter
Slope	6.39043	1.52604	3.39939	9.38148	0.075	5.28551	7.81472	0.15	1.89385	0.15648	7
Intercept	-7.1025	2.93497	-12.855	-1.3499							
TSCR	0.1004	0.02392	0.05351	0.1473		1.0 -					
Point	Probits	%	95% Fidu	cial Limits						í	
EC01	2.674	33.8696	14.7899	46.4238		0.9 -			1/		
EC05	3.355	43.2965	23.2766	55.3227		0.8 -					
EC10	3.718	49.3519	29.5646	60.9045		0.7			11		
EC15	3.964	53.9089	34.6757	65.1073		-					
EC20	4.158	57.829	39.2955	68.7681		esponse 0.5 0.4					
EC25	4.326	61.4185	43.6723	72.1944		5 0.5					
EC40	4.747	71.4827	56.3215	82.5683		ds i			11		
EC50	5.000	78.3152	64.7301	90.764		a 0.4			///		
EC60	5.253	85.8007	73.2035	101.396		0.3 -			/ 		
EC75	5.674	99.8602	86.4574	126.628		0.2 -		/			
EC80	5.842	106.059	91.4374	139.697		0.2 -			1		
EC85	6.036	113.771	97.1641	157.354		0.1 -			Y		
EC90	6.282	124.276	104.393	183.632		0.0	•		2		
EC95	6.645	141.657	115.436	232.206		0.0 7	 - -	10	100	1000	
EC99	7.326	181.085	138.108	364.013			I			1000	
								Dose	‰		

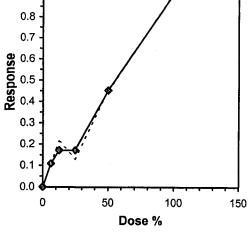


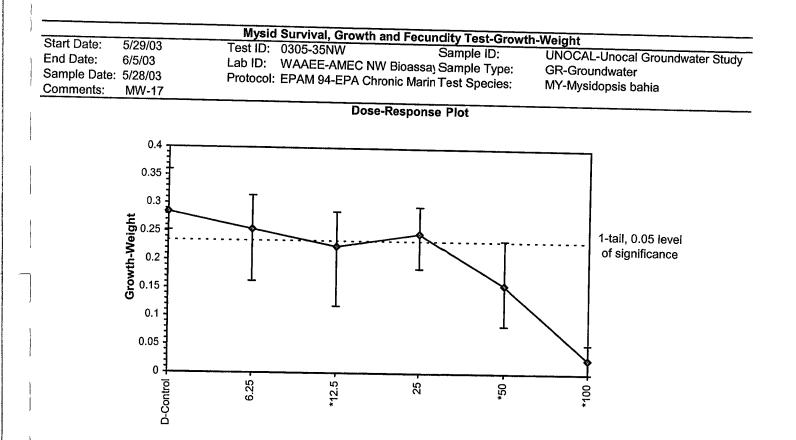
01.15			Mysid	Survival,	Growth a	nd Fecun	dity Test-	Growth-	Weight
Start Date:	5/29/03		Test ID:	0305-35N	W		Sample ID		UNOCAL-Unocal Groundwater Study
End Date:	6/5/03		Lab ID:	WAAEE-A	MEC NW	Bioassav	Sample T	vno [.]	GR-Groundwater
Sample Date:	5/28/03		Protocol:	EPAM 94-	EPA Chro	nic Marin	Test Spec	ype.	
Comments:	MW-17						rest opec	les.	MY-Mysidopsis bahia
Conc-%	1	2	3	4	5	6	7	8	
D-Control	0.2520	0.2700	0.3080	0.3600	0.2780	0.2820	0.2680	0.2580	
6.25	0.2520	0.1620	0.2160	0.2540	0.3140	0.2800	0.2460	0.3060	
12.5	0.2320	0.2380	0.2860	0.2160	0.2120	0.2640	0.1180	0.2280	
25	0.2000	0.2460	0.2840	0.2960	0.2500	0.1860	0.2420	0.2760	
50	0.2220	0.1140	0.0840	0.1500	0.2360	0.1580	0.0960	0.1880	
100	0.0000	0.0500	0.0520	0.0000	0.0000	0.0360	0.0380 0.0380	0.0260	

			-		Transforr	n: Untran	sformed			1-Tailed		Isot	onic
`ı —	<u>Conc-%</u>	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
1	D-Control	0.2845	1.0000	0.2845	0.2520	0.3600	12.279	8				0.2845	1.0000
	6.25	0.2538	0.8919	0.2538	0.1620	0.3140	19.395	8	1.417	2.306	0.0500	0.2538	0.8919
	*12.5	0.2243	0.7882	0.2243	0.1180	0.2860	22.081	8	2.776	2.306	0.0500	0.2359	0.8291
)	25	0.2475	0.8699	0.2475	0.1860	0.2960	15.703	8	1.705	2.306	0.0500	0.2359	0.8291
ļ.	*50	0.1560	0.5483	0.1560	0.0840	0.2360	36.236	8	5.921	2.306	0.0500	0.1560	0.5483
i	*100	0.0253	0.0888	0.0253	0.0000	0.0520	88.803	8	11.946	2.306	0.0500	0.0253	0.0888

Auxiliary Tests				· · · · · · · · · · · · · · · · · · ·	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distribu	ition (p >	0.01)		0.97666		0.929			0.26627
Bartlett's Test indicates equal var	iances (p =	0.29)			6.18531		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	25	50	35.3553	4	0.05004	0.17588	0.07254	0.00188	1.2E-14	5, 42

				Line	ar Interpolati	ion (200 Resamples)	
Point	%	SD	95%	CL	Skew	· · · ·	
IC05*	2.891	2.693	1.444	8.537	3.1247		
IC10*	5.783	5.264	2.888	27.193	2.5500		
IC15	10.420	8.966	4.332	31.013	0.7811	1.0	
IC20	27.590	9.372	5.776	35.420	-0.5583	-	•
IC25	32.042	7.091	11.352	40.763	-1.3622	0.9	ا هر
IC40	45.399	5.506	36.783	56.237	0.4402	0.8 -	
IC50	55.258	6.088	44.374	65.329	0.0136	0.7	
* indicates IC	estimate les	s than the	e lowest c	oncentrat	ion	-	
						9 , 0.6 -	
						9.0.6 0.5 Since 1	
							\$





Clien

Client:	Unoca	l	
Sample ID:	#3	M40-17	

Raw Data Sheet Mysid Shrimp (Mysidopsis bahia) Survival and Growth Test

Test Date:

29/03

Test Number: <u>0305-35</u>NW

	Conc'n or	Cont.	Rep.				Da	iys				Percent
╷┝	<u> </u>			0	1	2	3	4	5	6	7	Survival
-	CON	28	1	5	5	5	5	8	5	5	5	
' ┣		43	2	5	4	4	4	4	4	4		
		38	3	5	5	Ś	5	5	5	5	4	
-		22	4	5	5	5	5	5	S	5	5	
┝		26	5	5	5	5	5	٢	S	5	5	
-		21	6	5	4	4	4	4	4	4	4	
╵┝		2		5	5	5	5	5	5	5	5	
	1015	35	8	5	4	4	4	4	4	4	4	92.52
	Q.25	8	1	5	5	5	5	5	S	5	5	
┢		23	2	5	4	4	4	4	4	4	4	
i		41	3	5	5	5	4	4	4	4	4	
╎┝─		13	<u>4</u> 5	5	5	5	+	4	4	Ϋ́	4	
				5	5	S	5	5	5	5	5	
		25	<u>6</u> 7	5	5	Ś	5	5	S	5	5	
′ ├─	······	<u>44</u> 3	8	5	5	5	4	4	4	4	4	
	12.5	a			4	4	4	4	4	4	4	87.5%
	12:5	24	1 2	5	5	4	4	4	3	3	3	
_		14	3	5	5	5	5	5	5	4	4	
		46	4	5	5	5	5	5	5	5	-5	
'		5	5	5	<u> </u>	4	5	<u>۲</u>	S	5	3	
		30	6	5	5	5	4	4	4	4	4	
		21	7	5	5	5	5	4	<u>ر</u> ح	5	$\frac{5}{2}$	
		42	8	5	5	7	5	4	<u>5</u> 4	3	3	0259
Te	echnician In			3m	<u>I</u>	K/3	me	m		4	4	82.5%
J -		······				<u></u>		<u> </u>	Et	ME	KS	
Fe	eding Time	s: 0 <u>210</u>	<u>D</u> 1073 1814	10 20%	$\frac{50}{30}$ 3.08	30 40	130 5 <u>0</u>	730 6_	0730			
Aı	nalysts:	KG			SM	16		194	. 190			
Cc	omments:											

Client:

Sample ID:

Unoca	l
#3	Mw-17

Raw Data Sheet Mysid Shrimp (Mysidopsis bahia) Survival and Growth Test

Test Date:

5/29/03

Test Number: 0305 - 35NW

Conc'n or	Cont.	Rep.				Da	iys				Percent
0/0			D		2	3	4	5	6	7	Survival
25	47	1	5	5	5	5	5	CARLE LOCACOMONDALISACIÓN	5	4	Guivivai
	57	2	5	5	5	5		5	5	5	
1	1	3	5	5	5	145	5	5	5	5	
	6	4	5	5	5	5	5	5	5	5	
, <u> </u>	40	5	5	5	5	5	5	5	5	5	
	32	6	5	S	S	5	5	S	5	5	
ļ 	36	7	5	5	5	5	5	5	5	5	
	45	8	5	S	5	5	5	S	5	5	97.52
50	3	1	5	5	5	5	5		5		11.06
· [2	5	5	KJut -5	13	3	5	3	53	
1	34	3	5	5	3	V	2	a	2	2	
	48	4	5	5	5	5	<	5	5	5	
	29	5	5	5	5	5	٢	5	5	5	a an
	15	6	5	5	S	5	4	5	5	5	
]	18	7	5	r	5	3	V	2		2	
	11	8	5	5	5	5	۶ ۲	5	25	5	Ch 9
160	16	1	5	5	1	<i>`</i> 0	<u> </u>	<u> </u>	·		80%
, 	39	2	<u>s</u> 5	5	4	B	GA+3	3	3	2	
	10	3	5	5	4	12m	2	2	2	32	
	4	4	5	5	2	1	Y	0			
	17	5	5	5	2	1	Ö				
	19	6	5	5	4	V	2	2	2	2	
	12	7	5	5	3	1	1	Ĩ			
	20	8	5	5	4	1	1		1		22.5%
Technician In	itials		5m	KS I	X3	ML	m	\$t	NET	KB	4-41760
Feeding Time Analysts:	s: 0 <u>210</u> 14	D_1 <u>07</u> *	<u>80</u> 5 18:						_1~1		
Comments:											······

۲,

Client:

Sample ID:

#3 MW-17

Raw Data Sheet Mysid Weights Seven Day Chronic Bioassay

Test Date: <u>5/29/03</u>

Species: <u>M.bahía</u>

Test Number: <u>0305-35</u>NW

olo Conc.	Cont.	Rep.	pan wt. (gm)	pan + mysid (gm)	-	# mysids	avg. per mysid (mg)	avg. per conc. (mg)
CON	28	1	0.03991	0.04117	(8)	.5	(1116)	(mg)
	43	2		0,04555		<u> </u>		
	38	3	0.04371			5		
[22	4	0.04416	0.04596		5		
)	26	5		0.047.04		5		
	21	6	0.04385	0.04526		4		
	2	7	0.04206	0.04340		5		
	35	8	0.04101	0.04230		4		
6.25	8	1	0.04233	0.04359		5		
\	23	2		0.04479		4		
	41	3	0.03878	0.03986		4		
, 	13	4	0.04298	0.04425		4	1. 1	
<u> </u>	33	5	0.04191	0.04348		5		
	25	6	0.04512	0.04652		5		
	44	7	0.04349	0.04472		4		
	3	8	0.04309	0.04462		4		
12.5	9	1	0.04270	D. D4386		3		
	24	2		0.04588		Ч		
]	14	3	0.04139	0.04282		5		
	46	4	0.043558	0.04466		5		
	5	5	0.04290	0.04396		4		
J	30	6	0.04158	0.04290		5		
<u> </u>	27		0.04480			3		
	42	8	0.04354	0.04468		4		

T re Initials: 1 Jtal Initials:

5m mm

Date/Time in: Date/Time out: **Oven temp. (°C):** <u>60</u>

6/5/03 1800 61612003 18:30

Client:

Sample ID:

Unocal #3 MW-17

Raw Data Sheet Mysid Weights Seven Day Chronic Bioassay

Test Date: 5/29/03 Species: M. babia Test Number: 0305-35NW

lu		_	pan wt.	pan + mysid	-		avg. per mysid	avg. per conc.
Conc.	Cont.	Rep.	(gm)	(gm)	(mg)	mysids	(mg)	(mg)
25	41	1	0.04304	0.04404		4		
	37	2	0.04160	0.04283		5		
	1	3	0.04276	0.04418		5		
!	6	4	0.04214	0.04362		<u> ち</u> ろ		
}	40	5		0.04238				an de la service de la serv La service de la service de
	32	6	0.04235	0.04328		5		
	36 45	7	0.04056	0.04177		5		
	45	8	0.04350	0.04488		5		
50	3	1	0.04133	0.04244		5		
×	1	2	0.04213	0.04270		3		
	34	3	0.04330	0.04372		2		
1	48	4	0.04325	0.04400		5		(1) A supervised of the second secon second second sec
1	29	5	0.04418	0.04536		5		
ļ	15	6	0.04347			5		
	18	7	0.04355	0,04403		ನ		
		8	0.04383	0.04477		5		
100	16	1	0.04258	0.04241		D		
Į	39	2	0.04435	0.04460		3		
	10	3		0.0441.3		2		a an
	4	4		0.04207		0		
	11	5		0.04353		D		
]	19	6		0.04385		a		
······	12	7	0.04371	0.04390		1		
	20	8		0,04426		1	·····	and a second

are Initials: btal Initials:

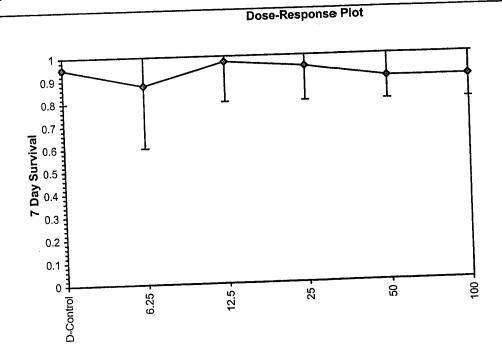
SM Mn Date/**T**ime in: Date/**T**ime out: **Oven temp. (°C):** _____

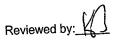
6/5/03 1806 6/6/03 1830

1			Mysid	Survival.	Growth a	nd Fecur	ndity Test-	7 Day Su	Irvival
Start Date: End Date: Sample Date:	5/29/03 6/5/03 5/28/03		Test ID:	0305-36NV WAAEE-A	V MEC NW	Bioassay	Sample ID Sample Ty Test Speci	; pe:	UNOCAL-Unocal Groundwater Study GR-Groundwater MY-Mysidopsis bahia
Comments:	<u>MW-103R</u> 1	2	3	4	5	6	7	8	
D-Control 6.25 12.5 25 50	5 1.0000 5 1.0000 5 1.0000 0 0.8000	0.8000 1.0000 1.0000 0.8000 1.0000 0.8000	1.0000 0.8000 1.0000 1.0000	1.0000 0.6000 1.0000 1.0000 0.8000 1.0000	1.0000 0.8000 1.0000 1.0000 1.0000 0.8000	1.0000 0.8000 1.0000 1.0000 0.8000 0.8000	1.0000 1.0000	1.0000 0.8000 1.0000 0.8000 0.8000 0.8000	

			Tra	insform:	Arcsin Sq	uare Root		Rank	1-Tailed	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	<u>N</u>	Sum	Critical	
D-Control	0.9500	1.0000	1.2857	1.1071	1.3453	8.574	8	59.00	46.00	
6.25	0.8750	0.9211	1.1986	0.8861	1.3453	14.410 6.400	8 8	72.00	46.00	
12.5	0.9750	1.0263	1.3155	1.1071	1.3453 1.3453	6.400 8.574	8	68.00		
25	0.9500	1.0000	1.2857	1.1071 1.1071	1.3453	10.381	8	60.00	46.00	
50	0.9000		1.2262 1.2262	1.1071	1.3453	10.381	8	60.00	46.00	
100	0.9000	0.9474	1.2202	1.1011	1.0100					

Auxiliary						Statistic	Critical 0.929	 urt 5998
Shapiro-W	ilk's Test indicates non	-normal dis	stribution (p <= 0.01)		0.8782 3.75449	15.0863	
Hypothes	est indicates equal var is Test (1-tail, 0.05)	NOEC	LOEC >100	ChV	TU			
Steel's Ma	ny-One Rank Test	100	>100		•			



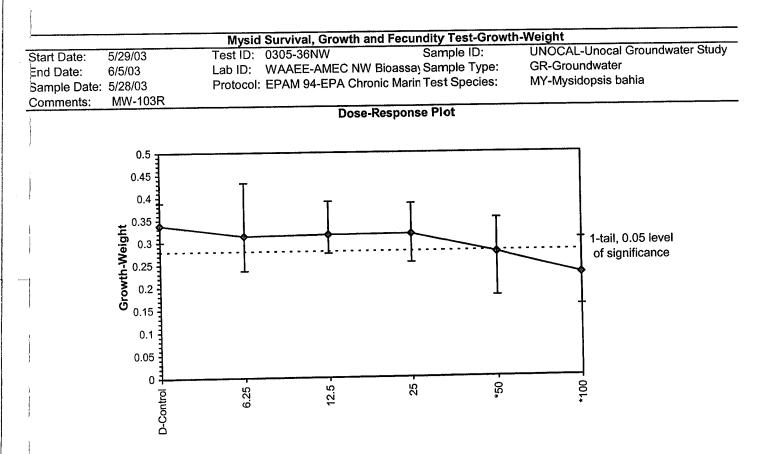


	Mysid Survival, Growth and Fecundity Test-Growth-Weight												
Start Date:	5/29/03			0305-36NV			Sample ID		UNOCAL-Unocal Groundwater Study				
1	6/5/03		_ab ID: ∖	NAAEE-A	MEC NW	GR-Groundwater							
Sample Date:	5/28/03	l	Protocol: E	EPAM 94-I	EPA Chro	nic Marin 1	Fest Speci	es:	MY-Mysidopsis bahia				
Comments:	MW-103R												
Conc-%	1	2	3	4	5	6	7	8					
D-Control	0.3000	0.3020	0.3880	0.3500	0.3680	0.3100	0.3800	0.3040					
6.25	0.3780	0.4320	0.3020	0.2760	0.2360	0.2780	0.3140	0.2900					
12.5		0.2920	0.2740	0.2860	0.3200	0.3900	0.3420	0.2760					
25	0.2960	0.2540	0.3440	0.3860	0.3320	0.3360	0.3200	0.2700	1				
23 50	0.2300	0.3520	0.2700	0.2000	0.3340	0.2860	0.3320	0.1780	l de la construcción de la constru				
100	0.2400	0.2340	0.2340	0.2980	0.1940	0.1800	0.3060	0.2100					

-					Transform	n: Untrans	sformed		_	1-Tailed				
··,	Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean 0.3378	N-Mean 0.0000	
} -	D-Control 6.25 12.5	0.3378 0.3133 0.3158	1.0000 0.9275 0.9349	0.3378 0.3133 0.3158	0.3000 0.2360 0.2740	0.3880 0.4320 0.3900	11.184 20.031 13.062	8 8 8	0.954 0.856	2.306 2.306	0.0592	0.3133 0.3158	0.0725 0.0651	
	25 *50 *100	0.3173 0.2748 0.2265	0.9393 0.8135	0.3173 0.2748 0.2265	0.2540 0.1780 0.1560	0.3860 0.3520 0.3060	13.428 23.297 23.603	8 8 8	0.798 2.453 4.331	2.306 2.306 2.306	0.0592 0.0592 0.0592	0.3173 0.2748 0.2265	0.1865	

ſ						Statistic		Critical		Skew	Kurt
	Auxiliary Tests	1 11 1.11	tion (m >	0.01)		0.97067		0.929	<u></u>	0.31088	-0.4665
	Shapiro-Wilk's Test indicates norm	nal distribu		0.01)		3.37691		15.0863			
}	Bartlett's Test indicates equal varia	ances ($p =$	0.64)	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
	Hypothesis Test (1-tail, 0.05)	NOEC	LOEC			0.05923		0.01304	0.00264	0.0012	5, 42
	Dunnett's Test	25	50	35.3553	4	0.00020	0.11000	0.0			

				Ma	ximum Likeliho	od-Probit					14
Parameter	Value	SE	95% Fidu		Control	Chi-Sq	Critical	P-value	Mu	Sigma	<u> ter</u>
the second s	1.33716	0.53716	And in case of the local division of the loc		0	0.98252	7.81472	0.81	2.35329	0.74785	'
Slope	1.85327	0.97045									
Intercept	1.00027	0.07040	0.0100			1.0 -			,		
TSCR	Drobito	%	95% Fidu	cial Limits		0.9		11			
Point	Probits		the second se			-		11			
EC01	2.674					0.8					
EC05	3.355	13.2796		28.6818		0.7 -		11			
EC10	3.718	24.8246	0.74994	43.3516		% 0.6 -	1	11	1		
EC15	3.964	37.8612	4.86307	61.6281		6 0.5					
EC20	4.158	52.9524	17.9793	97.4082		ğ. 0.5	1	 	1	1	
	4.326		38.3599	207.603		9.0.6 0.5 0.4	1			1	
EC25	4.747			4294.41		0.3 -		1			
EC40				31699.1		0.2	1				
EC50	5.000						-				
EC60	5.253	348.948		239943		0.1	1	496			
EC75	5.674	720.632		7088047		0.0		· fring ···		n	
EC80	5.842	960.956		2.7E+07		0.0	001 0.1	100	100000 1E	+08 1E+11	
EC85	6.036		3 328.232	1.3E+08							
	6.282			4.9E+08							
EC90	6.645			4.9E+08							
EC95				4.9E+08				Dos	0 %		
EC99	7.326	5 12389.	/ 1100.02	4.31-100				DOS	C /0		



Raw Data Sheet Mysid Shrimp (Mysidopsis bahia) Survival and Growth Test

Test Date: <u>5/29/03</u>

Test Number: 0305 - 36 NW

Client:

Unocal	
世日	MW-103R

Sample ID:

Percent Days Rep. Cont. 5 6 7 Survival Conc'n or 3 4 0 1 2 (%) ち CON (ø 12.25 AA C <u>E</u> ΥÂ A2 Ś 12.5 Ś \$45 97.5% Ъ0 C; SM NP 8m SM R SM 8M Swi **Technician Initials** Feeding Times: $02000 \ 10730 \ 1830 \ 20830 \ 1800 \ 30830 \ 1730 \ 40730 \ 50730 \ 1730 \$ B. SM. Analysts: **Comments:**

Client:

Unoca	l	
	1	 and the second se

Sample ID:

#4 MW-103R

Raw Data Sheet Mysid Shrimp (Mysidopsis bahia) Survival and Growth Test

Test Date:

5/29/03

Test Number: 0305-36NW

Percent Davs Cont. Rep. Conc'n or Survival - 4 $\langle n \rangle$ 0 1 (%) Ú <u>15|5|</u> S 95% H Ś G Ś -1 H 90% F Ĺ U Ц 90% Ś SM SM MF 8M R SM SM SM **Technician Initials** Feeding Times: $0 \ \frac{2000}{1830} \ 1 \ \frac{0730}{1830} \ \frac{20830}{1800} \ \frac{3}{1715} \ \frac{40730}{1600} \ \frac{5}{1730} \ \frac{6}{1730} \ \frac{0730}{1730} \ \frac{6}{1730} \ \frac{0730}{1730} \ \frac{1}{1730} \ \frac{1}{1730} \ \frac{1}{1} \ \frac{1}{$ KS SM Analysts: **Comments:**

Client:

Sample ID:

Unocal #4 MW-103R

Raw Data Sheet Mysid Weights Seven Day Chronic Bioassay

Test Date: 5/29/03 Species: M. bohia

Test Number: <u>0305 - 36 NW</u>

20			pan wt.	pan + mysid	mysid wt.	#	avg. per mysid	
Conc.	Cont.	Rep.	(gm)	(gm)	(mg)	mysids	(mg)	(mg)
CON	12	1	0.04280	0.04430		4		
	18	2	0.04271	0.04422		4		
	26	3	0.04350	0.04544		5		
	3	4	0.04180	0.04355		5		
	6	5	0.04322	0.04506		5		
	21	6	0.04270	0.04425		5		
	20	7		0.04.39.3		5		
	9	8		0.04515		5		
6.25	13	1	0.04435	0.04624		S		
	44	2	0.04310	0.04526		5		
	39	3	0.04348	0.04499		5		
	42	4	0.04324	0.04462		3		
	36	5	0.04264	004382		4		
	10	6	0.04395	0.04534	<u></u>	4		
· · · · · · · · · · · · · · · · · · ·	33	7		0.04369		5		
	38	8	0.04345	0.04490		4		
12.5	40	1	0.04192	0.043105		5		
	16	2	0.04251	0.04397		5		
	14	3	0.04373	0.04510		4		-
	11	4	0.04304	0.04447		5		
	19	5	the second s	0.04678		5		
	4	6	and the second se	0.04.551		5		
	30	7	0.04314	0.04485		5		
	4	8	0.04295	90.04433	M	5		

10.04400

Tare Initials: Total Initials:

<u>SM</u> mm

Date/Time in: Date/Time out: Oven temp. (°C): <u>60</u>

45103 1800 6/6/03 18:00

Client:

Sample ID:

HA MW-103R

Raw Data Sheet Mysid Weights Seven Day Chronic Bioassay

Test Date: 5/29/03 Species: M. bahia

Test Number: <u>0305-36</u>NW

~70			pan wt.	pan + mysid		#	avg. per mysid	avg. per conc.
Conc.	Cont.	Rep.	(gm)	(gm)	(mg)	mysids	(mg)	(mg)
25	34	1	0.04314	0.04462		.5		
	46	2	0.04295			4		
	31	3	0.04274			5		
	48	4	0.04328	0.04521		5		
	11	5	0.04372			5		
	41	6	0.04361	0.04529		5		
<u></u>	28	7	0.042.79	10.04439		5		
	31	8	0.04319	D.04454		4		
50	27	1	0.04317	0.04440		4		
	22	2	0.04340	0.04516		5		
	2	3		0.04459		5		
	1	4	0.04383	0.04483		4		
	47	5	0.04364	0.04531		5_		
	15	6	0.04341	0.04484		4		
·······	45	7	0.04321	0.04487	-	5		
	32	8	0.04331	0.04420		4		
100	I	1	0.04285			5		
	25	2	0.04366	0.04483		<u>4</u>		
	29	3	0.04348	0.04465		5		
<u> </u>	5	4	0.04419		IA	5		
	23	5	0.04297	0.04394		4		
	35	6	0.04245	0.04335		4		
	24	7	0.04440	0.04593		5		
	43	8	0.04379	0.04484		4		
				\$0.04568			hicken 11	*

6/5/03 (800 Date/Time in: **Tare Initials:** ЭM 6/6/03 1800 Date/Time out: **Total Initials:** MM Oven temp. (°C): ______

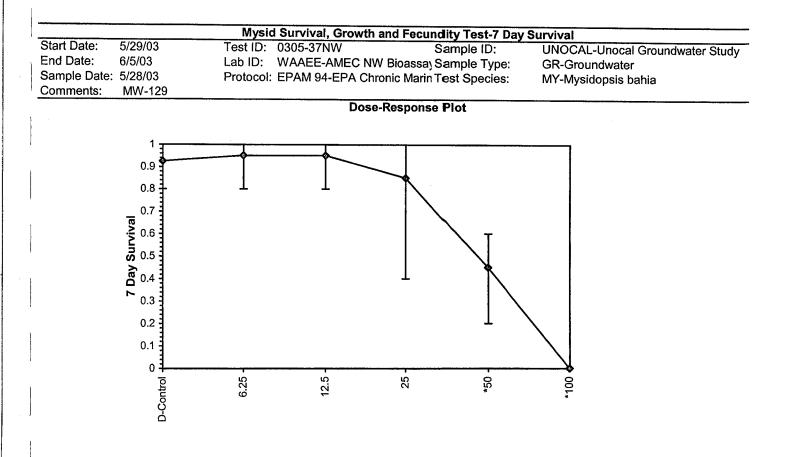
1 -				Mysic	Survival,	Growth a	and Fecu	ndity Test	7 Day S	undivel
	Start Date: End Date: Sample Date: Comments:	5/29/03 6/5/03 5/28/03 MW-129		Lab ID:	0305-37N WAAEE-A	W MEC NW	Bioassay	Sample II Sample T Test Spec): ype:	UNOCAL-Unocal Groundwater Study GR-Groundwater MY-Mysidopsis bahia
	Conc-%	1	2	3	4	5	6	7	8	
	D-Control 6.25 12.5 25 50 100	0.8000 1.0000 0.8000 0.4000 0.4000 0.0000	1.0000 1.0000 1.0000 1.0000 0.6000 0.0000	0.8000 1.0000 1.0000 0.8000 0.4000 0.0000		1.0000 0.8000 1.0000 0.8000 0.6000 0.0000	1.0000 1.0000 0.8000 1.0000 0.6000 0.0000	0.0000	1.0000 1.0000 1.0000 0.8000 0.2000 0.0000	

	_		_	Tra	ansform:	Arcsin So	uare Roo	t	Rank	1-Tailed	Number	Total
3	Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
	D-Control	0.9250	1.0000	1.2560	1.1071	1.3453	9.813	8		ontiour		
	6.25	0.9500	1.0270	1.2857	1.1071	1.3453	8.574	8	72.00	46.00	3	40
	12.5	0.9500	1.0270	1.2857	1.1071	1.3453	8.574	8	72.00	46.00	2	40
1	25	0.8500	0.9189	1.1734	0.6847	1.3453	19.597	8	62.50	46.00	2	40
ļ	*50	0.4500	0.4865	0.7326	0.4636	0.8861	20.126	8	36.00	46.00	6	40
}	*100	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	-			22	40
		0.0000	0.0000	0.2200	0.2200	0.2200	0.000	8	36.00	46.00	40	40

Auxiliary Tests			· · · · · · · · · · · · · · · · · · ·		Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor Equality of variance cannot be co		stribution	(p <= 0.01)		0.89421	0.929		2.95139
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	25	50	35.3553	4		197 da - 1977, and an a n an		

_					ximum Likeliho	od-Probit	t				
Parameter	Value	SE	95% Fidu	icial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	lter
Slope	6.44159	1.34328	3.80876	9.07442	0.075	2.36764		0.5	1.6702	0.15524	11
Intercept	-5.7588	2.30657	-10.28	-1.2379						0.10021	• •
TSCR	0.06665	0.02209	0.02336	0.10994		1.0 -					
Point	Probits	%	95% Fidu	cial Limits		4			1		
EC01	2.674	20.3732	10.3408	27.4372		0.9 -			Π		
EC05	3.355	25.9929	15.5004	32.8535		0.8 -			///		
EC10	3.718	29.5975	19.1918	36.2435		<u>,</u>					
EC15	3.964	32.3078	22.1344	38.7834		0.7			1		
EC20	4.158	34.6378	24.7603	40.9802		% 0.6 -					
EC25	4.326	36.7702	27.2263	43.017		• 0.6 • 0.5 • 0.5 • 0.4					
EC40	4.747	42.7439	34.3041	49.0077		ି କ ^{0.0} 1		/[
EC50	5.000	46.7955	39.0584	53.4973		2 0.4 -		///			
EC60	5.253	51.2311	43.9936	59.0327		0.3		/ 			
EC75	5.674	59.5542	52.1001	71.5526		-		/ /			
EC80	5.842	63.2205	55.2288	77.9106		0.2		///			
EC85	6.036	67.7799	58.8472	86.4278		0.1 -					
EC90	6.282	73.9867	63.4258	98.9649		0.0	•	27			
EC95	6.645	84.2467	70.4274	121.738		· · ·		₩ ₽ ₩1₩1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-			
EC99	7.326	107.485	84.8296	181.406		1		10	100	1000	
····								Dose 9	%		

- Contraction

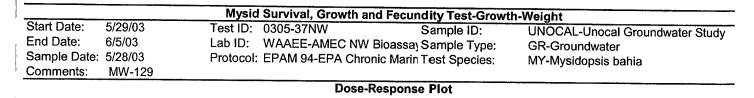


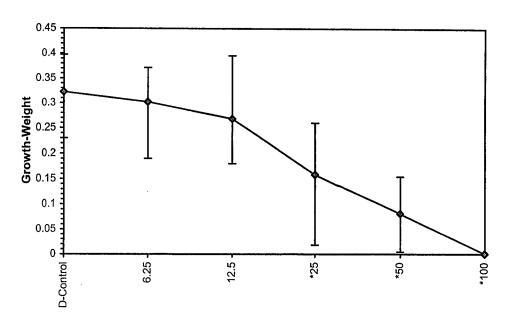
Reviewed by:

			Mysid	Survival,	Growth a	nd Fecun	dity Test-	Growth-	Weight		·····
Start Date:	5/29/03			0305-37N			Sample ID		UNOCAL-Unoc	al Groundwat	er Study
End Date:	6/5/03		Lab ID:	WAAEE-A	MEC NW				GR-Groundwat		
Sample Date:	5/28/03		Protocol:	EPAM 94-					MY-Mysidopsis		
Comments:	MW-129									Jana	
Conc-%	1	2	3	4	5	6	7	8			
D-Control	0.2660	0.3400	0.2500	0.3860	0.3980	0.3540	0.2300	0.3540	·····		
6.25	0.2620	0.3520	0.3720	0.3260	0.1900	0.3040	0.3380	0.2740			
12.5	0.3040	0.3520	0.2080	0.2220	0.2840	0.1800	0.1980	0.3960			
25	0.0180	0.2360	0.1920	0.1340	0.1100	0.2600	0.1620	0.1520			
50	0.0960	0.1100	0.1160	0.0140	0.1120	0.1540	0.0040	0.0420			
100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			
				Transform	n: Untran	sformed		Rank	1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mea
D-Control	0.3223	1.0000	0.3223	0.2300	0.3980	19.983	8			0.3223	0.000
6.25	0.3023	0.9379	0.3023	0.1900	0.3720	19.455	8	60.00	46.00	0.3023	0.06
12.5	0.2680	0.8317	0.2680	0.1800	0.3960	29.364	8	53.00	46.00	0.2680	0.16
*25	0.1580	0.4903	0.1580	0.0180	0.2600	47.949	8	39.00	46.00	0.1580	0.50
*50	0.0810	0.2514	0.0810	0.0040	0.1540	66.843	8	36.00	46.00	0.0810	0.74
*100	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	8	36.00	46.00	0.0000	1.00
					+ -						

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distribu	ition (p >	0.01)		0.98039	0.929	-0.2036	-0.1747
Equality of variance cannot be co	nfirmed							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	12.5	25	17.6777	8				

				Ma	aximum Likeliho	od-Probit					
Parameter	Value	SE	95% Fidu	cial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	lter
Slope	2.80716	0.57847	1.67335	3.94097	0	0.8038	7.81472	0.85	1.41224	0.35623	3
Intercept	1.03562	0.82944	-0.5901	2.66133							
TSCR						ד 1.0					
Point	Probits	%	95% Fidu	cial Limits		0.9			111		
EC01	2.674	3.83281	1.01693	6.86688		0.8		/	/		
EC05	3.355	6.70328	2.56296	10.3632		0.8 -			[/		
EC10	3.718	9.0304	4.17389	12.9715		0.7		//	♥ /		
EC15	3.964	11.0414	5.77724	15.1528		-		/ /	/		
EC20	4.158	12.9546	7.45201	17.2104		0.6 0.5 Secouse 0.4		/ / /	, 		
EC25	4.326	14.858	9.23253	19.2766		5 0.5		4			
EC40	4.747	20.9887	15.3472	26.4765		Si d		/ /_			
EC50	5.000	25.8366	20.0504	33.3006		Ž ^{0.4}]		_/ 			
EC60	5.253	31.8043	25.2128	43.5153		0.3 -		///			
EC75	5.674	44.9273	34.6224	72.3509		0.2		/ //			
EC80	5.842	51.5285	38.7773	89.6416		0.2	/				
EC85	6.036	60.4569	44.0416	115.632		0.1 -		II		Ì	
EC90	6.282	73.9204	51.4461	160.054		0.0		<u> </u>			
EC95	6.645	99.5827	64.3931	260.661		1		10	100	1000	
EC99	7.326	174.162	97.1776	656.959				Dose			





Client:	Unocal	
Sample ID:	± 5	MW-129

Raw Data Sheet Mysid Shrimp (Mysidopsis bahia) Survival and Growth Test

Test Date:

5/29/03

Test Number: 0305-37NW

ĺ	Conc'n or	Cont.	Rep.				Da	ys				Percent
	(%)			0	~ 1.5	12	3	4	5	6	7	Survival
	CON	7	1	55	5	5	5	5	5	5	4	
		31	2		5	5	2	5	5	5	5	
		11	3	5	5	5	5	5	5	4	4.	
		46	4	5	5	5	S	5	55	5	5	
		48	5	5	5	5	S	S	5	5	5	
		43	6	5	5	5	5	S	5	5		
		41	7	5	5	5	5	S	5	5	4	
		32	8	5	5	5	5	S	5	5	5	92.5%
	6.25	15	1	5	5	5	5	5	5	5	55	
		22	2	5	5	5	5	5	5	5	5	
		27	3	5	5	5	5	S	5	5	5	
		5	4	5	5	5	5	S	5	5	4	
		34	5	5	5	5	4	4	4	4	4	
		42	6	5.	5	5	5	S	5	5	5	
		20	7	5	5	5	5	5	3	5	5	
		19	8	5	5	5	5	S	5	5	5	95%
	12.5	33	1	5	5	5	S	5	5	5.	4	
		6	2	5	5	5	5	S	5	5	5	
		31	3	5	5	5	S	S	5	5	5	
		28	4	5	5	5	5	5	5	5	5	
		47	5	5	5	5	5	S	5	5	5	
		35	6	5	4	4	4	4	4	4	4	
		17	7	5	5	5	5	5	5	Ś	5	
		23	8	5	5	5	S	5	5	5	54:00	95%
	Technician II	nitials		ŝţ	SM	Sm	۲.	et .	MP	R	SM	
	Feeding Time	es: 0 <u>200</u>	<u>)0</u> 1 <u>07</u> 18				<u>)730</u> 5_ 600					
	Analysts:		8M,									
	Comments:											·····

Raw Data Sheet Mysid Shrimp (Mysidopsis bahia) Survival and Growth Test

Client:

Unocal	2	

Sample ID:

#5 MW-129

Test Date: <u>5/29/03</u>

Test Number: <u>0305-37NW</u>

Conc'n or	Cont.	Rep.				Da			······································		Percent
٩̈́			0	1	2	3	4	5	6	7	Survival
25	40	1	5	5	3	3	3	3	3	2	
	26	2	5	5	5	5	5	5	5	25	
	10	3	5	5	5	4 5	4	4	4	4	
	1	4	5	5	5	5	5	5	5	5	
	2	5	5	5	5	4	4	4	4	4	
	8	6	555	5	5	5	5	Ś	Ś	5 5	
	3	7	5	5	5	S	5	5	5		
	44	8	5	5	5	4	4	4	4	4	852
50	39	1	5	5	4	~< 1 1	13	2	2	20220	
	25	2	5	5	5	5		4	3	3	
	<u>38</u> 4	3	5	5	4	3	3	3	3	2	
	4	4	5	5 5	5	3	9	2	ス	2	
	9	5	5		5	4	3	3	3	3	
	24	6	5	5	5	4	4		3	3	
	45	7	5	5	4	4	3	3	2	2	
	36	8	5	5	5	4	4	3	1	}	45204070m
100	29	1	5	ヮ	323	2	0				
	13	2	5	4	2	0					
	30	3	5	5	3		0				
	12	4	5	5					0		
	16	5	5	5	3		0				
	21	6	5	5	3	3	0				
	18	7	5	5	3			D			ndi ogunasi.
	14	8	ς	5	2		0				0
Technician I	nitials		U U	Sm	SM	87	54	MF	KB	SM	
Feeding Tim	es: 0 <u>2(</u>	15	130 206 330 18	<u>30</u> 30 30 1	<u>830</u> 40 730 10	1730 5 000 1	0730 6	0730			
Analysts:		8M1									
Comments:											

Client:

| Sample ID:

Unocal #5 Mu -129

Raw Data Sheet Mysid Weights Seven Day Chronic Bioassay

Test Date: 5/29/03

Species: <u>M. bahia</u>

Test Number: <u>0305-37NW</u>

0/0			pan wt.	pan + mysid	mysid wt.	#	avg. per mysid	avg. per conc.
Conc.	Cont.	Rep.	(gm)	(gm)	(mg)	mysids	(mg)	(mg)
CON	1	1	0.04382	.04515		4		2 and 2 by 2
	31	2	0.04344	.04514		5		
	11	3	0.04376	.04501		4		
}	Ale	4	0.04217	.04410		5		
 	48	5	0.04367	.04566		5		
	43	6	0.04271	.04448		5		
	41	7	0.04300	.04415		4		
	32	8	0.04221	.04398		5		
6.25	15	1	0.04349	.04480		5		
)	22	2	0.04402	.04578		5		 Subgrade special states of the second states of the second
	27	3	0.04360	.04546		5		
	5	4	0.04315	.04478		4		
I 	34	5	0.04353	.04448		4		
 	42	6	0.04254			5		
L	20	7		.04538		5		
	19	8	0.04344	.04481		5		
12.5	33	1	0.04446	.04598		4		
	6	2	0.04119	.04295		5		n Les Charles de La Constantin de la Const
<u></u>	31	3	0.04356	.04460		5		
	28	4	0.04329	.04440		5		
	47	5	0.04320	.04462		5		
) 	35	6	0.04353	.04443		4		
1	17	7	0.04325	.04424		5		
	23	8	0.04297	.04495		5		

Tare Initials: Total Initials: SM SM

 Date/Time in:
 6|5|03 1500

 Date/Time out:
 6|5/03|1700

 Oven temp. (°C):
 100

Client:

Sample ID:

Unocal #5 MW-129

Raw Data Sheet Mysid Weights Seven Day Chronic Bioassay

Test Date: <u>5/29/03</u> Species: <u>M. bahia</u>

Test Number: 0305-

5-	3	1	N	W	
	_	_			

ു Conc.	Cont.	Rep.	pan wt. (gm)	pan + mysid (gm)		# mysids	avg. per mysid (mg)	avg. per conc. (mg)
25	A0	1 1	0.04350		(116)	2	(8/	
10	26	2	0.04318	.04436		5		
	10	3	0.04302			4		
		4	0.04323			5		
<u> </u>	2	5	0.04372	.04427		4		
	8	6	0.04330	.04460		5		
	3	7	0.04334	.04415		5		
	44	8	0.04388	.04464		4		
50	39	1	0.04374	.04422		23		
	25	2	0.04301	.04356				
	38	3	0.04279	.04337		2	·	
	4	4	0.04450	.04457		2		
	9	5	0.04326			3		
	24	6	0.04373	.04450		3		
	45	7	0.04289	.04291	<u> </u>	2		
	36	8	0.04390	.04411				
100	29	1	0.04213					
	13	2	0.04338			-		
	30	3	0.04210			+		
	12	4	0.04328	<u> </u>				
	16	5	0.04314					
	21	6	0.04302	· [
	18	7	0.04201					

Tare Initials: **Total Initials:**

SM. SWA

Date/Time in: Date/Time out: Oven temp. (°C): / / ს ა

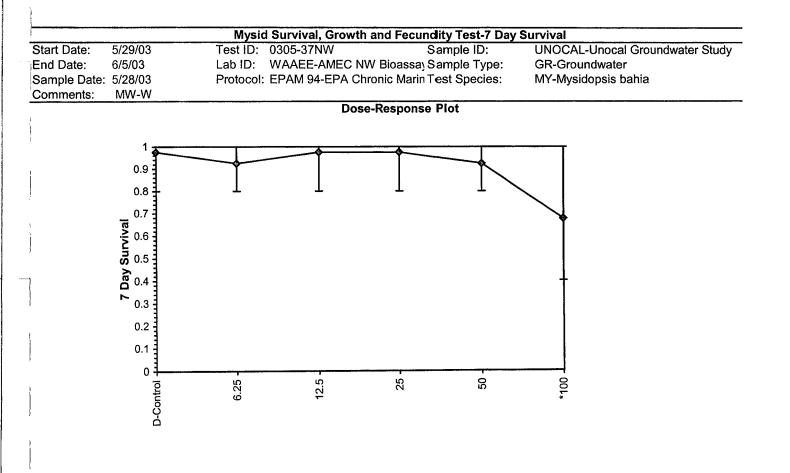
6/5/03 1500 615/03 1700

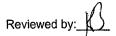
			Mysid	Survival,	Growth a	nd Fecur	idity Test-	7 Day Su	
Start Date:	5/29/03	-	Test ID:	0305-37N	N		Sample ID	:	UNOCAL-Unocal Groundwater Stud
End Date:	6/5/03	[Lab ID:	WAAEE-A	MEC NW	Bioassay	Sample Ty	/pe:	GR-Groundwater
Sample Date:	5/28/03		Protocol:	EPAM 94-	EPA Chro	nic Marin	Test Spec	ies:	MY-Mysidopsis bahia
Comments:	MW-W								
Conc-%	1	2	3	4	5	6	7	8	
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.8000	
6.25	1.0000	1.0000	1.0000	1.0000	1.0000	0.8000	0.8000	0.8000	
0.20				4 0 0 0 0	0 0000	1.0000	1.0000	1.0000	
12.5	1.0000	1.0000	1.0000	1.0000	0.8000	1.0000	1.0000	1.0000	
		1.0000 1.0000	1.0000	1.0000 1.0000	0.8000	1.0000	1.0000	1.0000	
12.5	1.0000								

				Tra	ansform:	Arcsin Sc	uare Root		Rank	1-Tailed	Number	Total	
	Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number	
T	D-Control	0.9750	1.0000	1.3155	1.1071	1.3453	6.400	8			1	40	
	6.25	0.9250	0.9487	1.2560	1.1071	1.3453	9.813	8	60.00	46.00	3	40	
3	12.5	0.9750	1.0000	1.3155	1.1071	1.3453	6.400	8	68.00	46.00	1	40	
	25	0.9750	1.0000	1.3155	1.1071	1.3453	6.400	8	68.00	46.00	1	40	
	50	0.9250	0.9487	1.2560	1.1071	1.3453	9.813	8	60.00	46.00	3	40	
ļ	*100	0.6750		0.9757	0.6847	1.3453	24.439	8	45.00	46.00	13	40	

Auxiliary Tests			<u></u>		Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor Bartlett's Test indicates equal var			(p <= 0.01)		0.86643 13.349	0.929 15.0863	0.36172	1.80253
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	50	100	70.7107	2				

				Ma	aximum Likeliho	od-Probit					
Parameter	Value	SE	95% Fidu	cial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	4.21094	2.01276	0.26594	8.15595	0.025	1.92455	7.81472	0.59	2.12485	0.23748	5
Intercept	-3.9476	3.94162	-11.673	3.77794							
TSCR	0.0376	0.01542	0.00737	0.06783		^{1.0} J		1			
Point	Probits	%	95% Fidu	cial Limits		0.9 -					
EC01	2.674	37.3594	5.5E-05	59.6222		0.8					
EC05	3.355	54.2299	0.01959	73.8161		0.7			/	1	
EC10	3.718	66.1476	0.44158	84.2851							
EC15	3.964	75.6352	3.50203	95.1049							
EC20	4.158	84.1371	16.7557	113.447		0 0.5					
EC25	4.326	92.1886	48.0618	176.24		esuods 0.5 0.4		1			
EC40	4.747	116.062	92.4702	3955.02		0.3 -		* /			
EC50	5.000	133.307	103.604	34000.8		0.2 -					
EC60	5.253	153.115	113.515	298902		0.1					
EC75	5.674	192.765	130.002	1.1E+07		0.0					
EC80	5.842	211.212	136.841	4.8E+07			-05 0.01	10	10000 1E	+07 1E+10)
EC85	6.036	234.953		2.6E+08			00 0.01				
EC90	6.282	268.653		4.9E+08							
EC95	6.645	327.693	173.65	4.9E+08							
EC99	7.326	475.67	<u>211.529</u>	4.9E+08				Dose	e %		



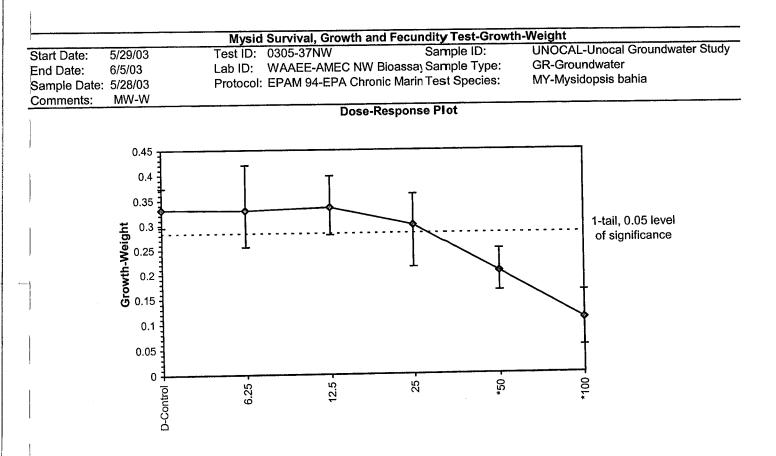


	<u></u>		Mysid	Survival, (Prowth at	ad Fecun	dity Tost.	Growth-	Neight
Start Date:	5/29/03			0305-37N			Sample ID		UNOCAL-Unocal Groundwater Study
End Date:	6/5/03		Lab ID:	WAAEE-A	MEC NW	Bioassay	Sample Ty	/pe:	GR-Groundwater
Sample Date:	5/28/03	MY-Mysidopsis bahia							
Comments:	MW-W								
Conc-%	1	2	3	4	5	6	7	8	
D-Control	0.3480	0.3180	0.3400	0.3160	0.3740	0.3180	0.3420	0.2960	
6.25	0.3380	0.3320	0.4200	0.3800	0.3560	0.2900	0.2560	0.2640	
12.5	0.3140	0.3980	0.3240	0.2860	0.2800	0.3780	0.3520	0.3500	·
25	0.3520	0.2580	0.3620	0.2640	0.2140	0.3000	0.3320	0.3120	
50	0.1940	0.2500	0.1780	0.2320	0.1740	0.1640	0.1940	0.2420	
100	0.1640	0.1000	0.0980	0.1140	0.0820	0.0920	0.1560	0.0540	

			Transform: Untransformed 1-Tailed									
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	0.3315	1.0000	0.3315	0.2960	0.3740	7.324	8				0.3315	0.0000
6.25	0.3295	0.9940	0.3295	0.2560	0.4200	17.311	8	0.095	2.306	0.0486	0.3295	0.0060
12.5	0.3353	1.0113	0.3353	0.2800	0.3980	12.513	8	-0.178	2.306	0.0486	0.3353	-0.0113
		0.9027	0.2993	0.2140	0.3620	17.024	8	1.531	2.306	0.0486	0.2993	0.0973
25	0.2993	0.00-	• • • • • •	0.1640	0.2500	16.317	8	6.075	2.306	0.0486	0.2035	0.3861
*50	0.2035	0.6139	0.2035				-	10.631	2.306	0.0486	0.1075	0.6757
*100	0.1075	0.3243	0.1075	0.0540	0.1640	34.244	8	10.031	2.300	0.0400	0.1070	0.0101

					Statistic		Critical		Skew	Kurt
Auxiliary Tests Shapiro-Wilk's Test indicates norr	0.01)		0.98362		0.929		0.03717	-0.5061		
Bartlett's Test indicates equal vari	iances (n =	: 0.33)	0.017		5.79895		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	25	50	35.3553	4	0.04858	0.14656	0.06917	0.00178	1.0E-14	5, 42

Maximum Likelihood-Probit											
Parameter	Value	SE	95% Fidu	cial Limits		Chi-Sq	Critical	P-value	Mu	Sigma	Ite
Slope	2.85044	0.68967	1.49867	4.2022	0	0.32982	7.81472	0.95	1.82459	0.35082	5
Intercept	-0.2009	1.23736	-2.6261	2.22434							
TSCR						^{1.0} T			1	~	
Point	Probits	%	95% Fidu	cial Limits		0.9					
EC01	2.674	10.1966	1.98431	18.642							
EC05	3.355	17.6824	5.58075	27.4357		0.8 -			/		
EC10	3.718	23.7135	9.63082	33.9013		0.7 -			/		
EC15	3.964	28.906	13.8514	39.2894		% 0.6 -		/ [/			
EC20	4.158	33.8324	18.3989	44.394		9.0 9.0 9.0 9.0 9.0		/ /_			
EC25	4.326	38.7228	23.3371	49.5863		Q 0.5 -		/ I /			
EC40	4.747	54.4 144	40.3742	68.9501		8 0.4 -					
EC50	5.000	66.7719	52.6341	89.6827				/1/			
EC60	5.253	81.9359	65.0317	123.08		0.3 -		///			
EC75	5.674	115.139	86.6028			0.2 -		/ //			
EC80	5.842	131.782	96.0289	284.074		0.1 -		/]			
EC85	6.036	154.241	107.927	379.363		0.1 -		J			
EC90	6.282	188.015	5 124.572			0.0 -		5			
EC95	6.645	252.143	3 153.419				1 10) 100	1000	10000	
EC99	7.326	437.252	2 225.164	2675.16				Dose	%		



Client:	Unoca	Q	
Sample ID:	#6	Mu-w	

Raw Data Sheet Mysid Shrimp (Mysidopsis bahia) Survival and Growth Test

5/29/03 Test Date:

Test Number: 0305-38 NW

Conc'n o	or Cont.	Rep.		Days								
(%)			 0	1	2	3	4	5	6	7	Percent Survival	
CON	9	1	5	5	5	5	5	5	5	5		
)	25	2	5	5	5	5	. 5	5	5	5		
	4	3	5	5	5	5	55	5	5	5		
	32	4	5	5	S	5	5	5	5			
	8	5	5	5	S	5	55	5	5	5		
	21	6	5	5	Ś	5		<u> </u>	5	5		
	14	7	5	5	5	5	5	5	5	5		
	3	8	5	4	4	4	_4	Ч	4	4	97.5%	
0.25	36	1	5	5	5	5	5	5	5	5		
ĺ	19	2	_5_	5	5	5	5	5	5	5		
	28	3	5	5	5	5	5	5	5	5		
	15	4	5	5	5	5	55	5	5	5		
ļ	26	5	5	5	5	5	5	5	5	5		
	13	6	5	5	5	5	5	4	4	4		
	33	7	5	5	5	5	5	5	5	4		
	46	8	5	5	5	5	5	4	4	4	92.5%	
12.5	12	1	5	5	5	5	5	5	5	55		
	45	2	5	5	5	5		5	5		n en Sternard	
	6	3	5	5	5	5	55	5	5	Ŝ		
	31	4	_5	5	5	5	5	5	5	5		
	39	5	5	5	5	5	പറ	ſ	5	84	\mathcal{M}	
	20	6	5	5	5	5	5	5	5	2		
	43	7	5	S	5	5	5	5	5	5		
	34	8	5	<u></u>	5	5	5	5	5	5	97.5%	
Techniciar	n Initials		स	ß		m	SM	LKS_	KS	h		
Feeding Ti		18	15 18	300 <u>30</u> 30 F	1 <u>830</u> 4(130 1	<u>5730</u> 50 1600 1	1 <u>730</u> 6	<u>5730</u> 1730				
Analysts:		<u>B</u> 8n	<u>۸</u>									
Comments	:	***										

Client:	Unocal	
Sample ID:	_#6	MWW

Raw Data Sheet Mysid Shrimp (Mysidopsis bahia) Survival and Growth Test

Test Date:

<u>5/2a/03</u>

Test Number: 0305-33 NW

	Conc'n or	Cont.	Rep.	Days								Percent
	(%)			0	1,	2	3	4	5	6	7	Survival
	25	22	1	5	5	5	5	5	5	5		
		3B	2	5	5	5	5	5	5	5	55	
		1	3	5	5	5	5	5	5	5	5	
		16	4	5	5	5	5	5	5	5	5	
			5	5	5	5	5	4	4	4	4	
		48	6	_5	5	5	5	5	5	5		
4		41	7	5	5	S	<	5	5	5	5	
1		47	8	5	5	s	5	55	5	5	5	97.5%
	50	23	_1	5	5	5	5	5	5	5	5	
		1	2	5	5	5	5	5	5	5	5	
┓		18	3	5	5	5	5	5	5	5	Ŝ	
ļ		5	4	л П	5	S	<u>र</u>	5	5	5	5	
ļ		35	5		5	5	5	5	5	S	4	
ŀ		30	6	555	5	5	5	5		5	5	
ĺ		27	7	5	4	4	4	4	4	4	4	
-		24	8		5	5	5	5	5		4	92.52
-	100	17	1	5	5	5	5	5	5	5	5	
ŀ		2	2	5 5	5	5	4	4	4	÷	3	
╞		37	3	5	5	S	4	4	4	4	3	
\mathbf{F}		40	4	5	5	3	3	3	3	in v	3	
		29	5 6	5	5	5	\$3-		3		200	
+		42	7	55	5	5	5	201	3	3	3	
$\left \right $	· · · · · · · · · · · · · · · · · · ·	$\frac{10}{44}$	8	5		<u>5</u> 5	\$45	1545	5	5		17-5
-	Technician In			u	5	$\frac{3}{\sqrt{2}}$	\mathcal{V}	2	2	2	8	67.5%
Ŀ				4	<u>45</u>	<u> </u>	inc	Sm	KS_	R	શ્	
)	Feeding Time	es: 0 <u>200</u>	<u>D</u> 1 <u>079</u> 181 B SN	5 18	00 300 330 1	<u>830</u> 4() 130 II 11) <u>730</u> 5 <u>(</u> 730sm [600	0730 6 130 1	<u>0730</u> 730			
	J		/ 01	•							·····	
	Comments:	-										Teatro - 14 - 19 - 19 - 19 - 19 - 19 - 19 - 19

lient:

Sample ID:

Unocer	₽
世化	Mrw-w

Raw Data Sheet Mysid Weights Seven Day Chronic Bioassay

Test Date: <u>5/29/03</u> Species: <u>M. bahia</u> Test Number: <u>0305-38</u>W

ီ Conc.	Cont.	Rep.	pan wt. (gm)	pan + mysid (gm)	mysid wt. (mg)	# mysids	avg. per mysid (mg)	avg. per conc. (mg)
CON	9	1	0.042.74	.04448		5		
	25	2	0.04310	.04469		5		and the second secon
	4	3	0.04253	.04423		5		ener 10 - Arathia age Martin 11
	32	4	0.04229	.04387		5		
	8	5	0.04268	,04455		555		
	21	6	0.04336	.04495		5		
	14	7	0.04386	.04557				
	3	8	0.04342	.04490		4		10040001000000000000000000000000000000
10.25	36	1	0.04209	.04378		5		
	19	2	0.04271	.04437		5		
	28	3	0.04284	.04494		5		
	15	4	0.04397	.04587		5		
	26	5	0.04324	.04502		5		
	13	6	0.04336			4		
	33	7	0.04244	.04372		4		
	46	8	0.04337	.04469		4		
12.5	12-	1	0.04263			5		
	45	2	0.04343	.04542		5		
	6	3	0.04268	the second s		5		
	31	4	0.04254	.04397		5		
	39	5	0.04365			4		
	20	6	0.04298	.04487		5		
	43	7	0.04292	.04468	<u> </u>	5		
	2,4 4 3,4	8	0.04252	04427		6		

Tare Initials: Total Initials:

SW1

Date/Time in: Date/Time out: Oven temp. (°C):

6/5/03 1830 1830 6/6/03 60___

lient:

Sample ID:

thocal #6 Mus-w

Raw Data Sheet Mysid Weights Seven Day Chronic Bioassay

Test Date: 5/29/03 Species: <u>M. bahia</u>

- coj	T		pan wt.	pan + mysid	mysid wt.	#	avg. per mysid	
\dashv Conc.	Cont.	Rep.	(gm)	(gm)	(mg)	mysids	(mg)	(mg)
25	22	1	0.04331	.04507		5		
	293	2	0.04216	.04345		5		
	1	3	0.04269	.04450		5		
	10	4	0.04301	.04433		5		
	11	5	0.04304	.04411		4		a and a second balance in the
	43	6	0.04448	.04698		5		
	4	7	0.04403	.04569		5		
	47	8	0.04422	.04578		5		
50	23	1	0.04379	.04476		55		
	11_	2	0.04368		<u> </u>	5		
	18	3	0.04243			5	1	
	15	4	0.04204			4		
	125	5	0.04253			5		
) 	0	6	0.04485		<u> </u>	4		
 	27	7	0.04370			$+\frac{1}{4}$		
	<u>24</u>	8	0.04296					
[100]	11	1	0.04410			53		
		2	0.0433C			3		
		3	0.04225	1.04274	_ <u></u>	3	-	
	<u> </u>	4	0.04401			3		
	19	5	0.04278			3		
ļ	12	6	0.04395	1.04441		ŤĔ		
	10	7	0.04213		-	12		29 milliof Conservation (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (19
	4	8	0.04360	.04387		1		

Tare Initials: Total Initials:

BM.

Date/Time in: Date/Time out: Oven temp. (°C): 60

6/5/03 1830 6161113 1830

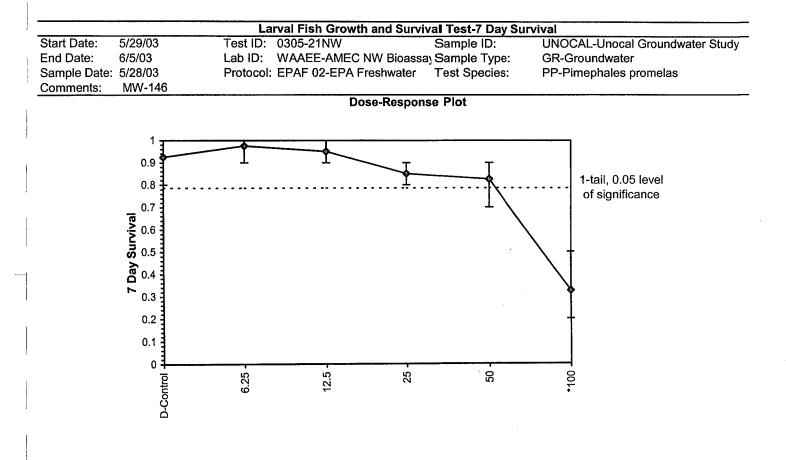
Pimephales promelas

<u></u>			La	rval Fish Gi	rowth and Survi	val Test-7 Day Su	urvival
Start Date:	5/29/03		Test ID:	0305-21NV	V	Sample ID:	UNOCAL-Unocal Groundwater Study
End Date:	6/5/03		Lab ID:	WAAEE-AN	MEC NW Bioass	ay Sample Type:	GR-Groundwater
Sample Date:	5/28/03		Protocol:	EPAF 02-E	PA Freshwater	Test Species:	PP-Pimephales promelas
Comments:	MW-146						
Conc-%	1	2	3	4			
D-Control	1.0000	0.9000	0.8000	1.0000			
6.25	1.0000	0.9000	1.0000	1.0000			
12.5	1.0000	1.0000	0.9000	0.9000			
25	0.8000	0.9000	0.9000	0.8000			
50	0.7000	0.9000	0.8000	0.9000			
100	0.4000	0.5000	0.2000	0.2000			

-				Tra	ansform:	Arcsin Sc	uare Root	ł	_	1-Tailed		Number	Total
	Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
-	D-Control	0.9250	1.0000	1.2951	1.1071	1.4120	11.347	4				3	40
	6.25	0.9750	1.0541	1.3713	1.2490	1.4120	5.942	4	-0.902	2.410	0.2036	1	40
,	12.5	0.9500	1.0270	1.3305	1.2490	1.4120	7.072	4	-0.420	2.410	0.2036	2	40
	25	0.8500		1.1781	1.1071	1.2490	6.954	4	1.385	2.410	0.2036	6	40
		0.8250	0.8919	1.1491	0.9912	1.2490	10.856	4	1.728	2.410	0.2036	7	40
	50		0.00.0	0.5994	0.4636	0.7854	27.029	4	8.237	2,410	0.2036	27	40
	*100	0.3250	0.3514	0.5994	0.4030	0.7004	21.020	-1	0.207		0.2000		

A. Williams Tooto					Statistic		Critical		Skew	Kurt
Auxiliary Tests Shapiro-Wilk's Test indicates norr		0.9308	· · · · · · · · · · · · · · · · · · ·	0.884		-0.2054	-1.2208			
Bartlett's Test indicates equal vari	ances (n =	0.80)			2.35171		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	50	100	70.7107	2	0.13854	0.14963	0.3252	0.01427	3.3E-07	5, 18

				M	aximum Likeliho	od-Probit					
Parameter	Value	SE	95% Fidu	cial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	<u>Iter</u>
Slope	4.76602	1.25475	2.30671	7.22532	0.075	4.83307	7.81472	0.18	1.92535	0.20982	24
Intercept	-4.1762	2.38901	-8.8587	0.50623							
TSCR	0.07027	0.02108		0.11159		^{1.0} T			11	and the second se	
Point	Probits	%		cial Limits		0.9					
EC01	2.674	27.3675	8.37318	40.6531		-			-11/		
EC05	3.355	38.0387	16.3574	51.054		0.8 -					
EC10	3.718	45.3371	23.2739	57.8968		0.7 -					
EC15	3.964	51.0369	29.4223	63.2463		9 0.6			19		
EC20	4.158	56.0737	35.3238	68.0865		Su o.o -					
EC25	4:326	60.7892	41.1584	72.8209		0 .5 -					
EC40	4.747	74.5059	58.6	89.0586		9 .0.6 0.5 9 .0 0.4			///		
EC50	5.000		69.7255	104.49		•	4		///		
EC60	5.253	95.1709	80.1397	126.915		0.3 -	1		/ []		
EC75	5.674		96.1768	184.141		0.2 -		/	[•]		
EC80	5.842		102.505	215.309			1		1		
EC85	6.036	138.935	5 110.057	259.183		0.1 •			r ij		
EC90	6.282	156.402	2 119.976	328.334		0.0 ·	<u> </u>	>			
EC95	6.645	186.41	135.821	467.978			1	10	100	1000	
EC99	7,326		5 170.318	915.569				Dose	e %		

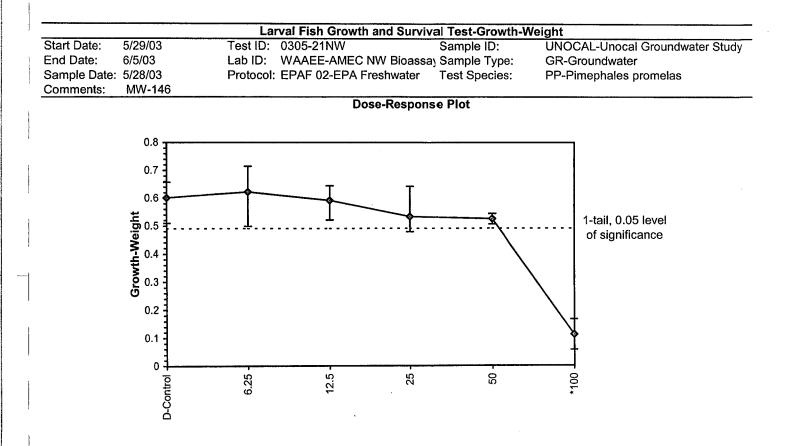


ļ				Lar	val Fish Grov	vth and Surviva	al Test-Growth-	Weight
	Start Date:	5/29/03		Test ID:	0305-21NW		Sample ID:	UNOCAL-Unocal Groundwater Study
1	End Date:	6/5/03		Lab ID:	WAAEE-AME	C NW Bioassa	Sample Type:	GR-Groundwater
İ.	Sample Date:	5/28/03		Protocol:	EPAF 02-EPA	A Freshwater	Test Species:	PP-Pimephales promelas
1	Comments:	MW-146						
	Conc-%	1	2	3	4			
	D-Control	0.6440	0.5100	0.5930	0.6580			
	6.25	0.4980	0.6600	0.7140	0.6160			
	12.5	0.5210	0.6360	0.6440	0.5630			
	25	0.4780	0.6420	0.5030	0.5090			
	50	0.5050	0.5310	0.5430	0.5190			
1	100	0.1580	0.1660	0.0570	0.0650			

 			•	Transform	n: Untran	sformed		_	1-Tailed			
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
 D-Control	0.6013	1.0000	0.6013	0.5100	0.6580	11.133	4				0.6013	0.0000
6.25	0.6220	1.0345	0.6220	0.4980	0.7140	14.770	4	-0.449	2.410	0.1113	0.6220	-0.0345
12.5	0.5910	0.9830	0.5910	0.5210	0.6440	10.019	4	0.222	2.410	0.1113	0.5910	0.0170
25	0.5330	0.8865	0.5330	0.4780	0.6420	13.864	4	1.478	2.410	0.1113	0.5330	0.1135
50	0.5245		0.5245	0.5050	0.5430	3.104	4	1.663	2.410	0.1113	0.5245	0.1277
*100	0.1115	0.1854	0.1115	0.0570	0.1660	52.462	4	10.609	2.410	0.1113	0.1115	0.8146

Auxiliary Tests		·			Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates nor		0.98182		0.884		-0.1504	-0.3472			
Bartlett's Test indicates equal variances (p = 0.32)					5.87449		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	50	100	70.7107	2	0.11126	0.18504	0.14879	0.00426	1.2E-08	5, 18

				Max	imum Likeliho	od-Probit					
Parameter	Value	SE	95% Fidu	cial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	6.68729	1.393	3.95701	9.41757	0	2.90525	7.81472	0.41	1.86688	0.14954	7
Intercept	-7.4844	2.63242	-12.644	-2.3248							
TSCR						^{1.0} T			111		
Point	Probits	%	95% Fidu	cial Limits		0.9					
EC01	2.674	33.0371	18.009	43.2978					4/		
EC05	3.355	41.7745	26.5242	51.63		0.8 -			Ĩľ/		
EC10	3.718	47.3411	32.5061	56.8813		0.7					
EC15	3.964	51.5102	37.2078	60.8519							
EC20	4.158	55.0839	41.3488	64.3225		9 .0 -					
EC25	4.326	58.3468	45.1853	67.5791		8.0 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0					
EC40	4.747	67.4518	55.8605	77.42		isa 0.4					
EC50	5.000	73.6001	62.7141	85.0196							
EC60	5.253	80.3088	69.5963	94.4549		0.3 -			/ []		
EC75	5.674	92.841	80.7556	115.289		0.2 -		1			
EC80	5.842	98.3405	85.1196	125.578		-			6		
EC85	6.036	105.163	90.2266	139.164		0.1 -		- Ť,	[]		
EC90	6.282	114.424	96.7622	158.901		0.0 -	q	Anne (, , , ,	/		
EC95	6.645	129.672	106.847	194.294			1	10	100	1000	
EC99	7.326	163.966	127.681	285.551				Dose	%		



Raw Data Sheet Fathead Minnow (Pimephales promelas) Larval Survival and Growth Test

Client Name:	Unocal

Test Date: 5/29/03 Test No.: 0305-21NW

Sample ID:

#1 MW-146

10	T					Da	ys				Percent	Average
Conc.	Cont.	Rep.	0.	1.1	2	3	4	5	6	7	Survival	Survival
CON	117	1	10	10	10	10	10	10	10	<u>jo</u>		
	1	2	10	9	9	9	9	9	9	1		
	12	3	10	9	8	8	8 10	8	8	8		00-00
	3	4	10	D	10	10			10	0		92.5%
6:25	16	1	10	10	10	10	10	10	10	10		
	13	2	10	9	9	9		9	9	9		a da esta directoria. A secondaria de la companya d
	23	3	10	10	10	10	10	10	10	0		97.57.
	18	4	10	10	10	10	10	<u>io</u>	1D	10		91.510
12.5	10	1	10	10	10	10_	10	10	10	0		
	4	2	10	10	10	10	10	10	10	HY-		
	22	3	10	10	10	10	$\frac{1}{9}$	9	d	9		95%
<u>م</u> ش	19	4	10	10	10	10	5	9	8	8		
25		2	10	10		9	4	9	a	9		
	5	3	10	10	10	4	4	+g-	9	4		
	14	4	10	10	8	8	8	8	8	8		85%
50	15		10	a	8	1-	1-7	17	1Ť	7		
- 50	17	2	10	q	9	4	9	9	9	ġ		
	8	3	10	10	9	9	9	9	8	8		
	21	4	10	g	9	9	9	9	ġ	9		82.5%
100	24	1	10	Tio	10	1	6	4	4	4		
	20	2	10	9	8	6	6	6	6	5		
	20 2	3	10	9	6	24	a 3	2	622	a		
	6	4	10	10	10	4	3	3	2	a		32.5%
		1										and the first first of the second sec
		2								<u> </u>		
		3				ļ				ļ		
		4										TERMINER AND
		1			ļ						<u> </u>	
		2				<u> </u>						
		3		<u> </u>								
		4				<u> </u>	- <u>-</u>		<u> </u>			
Tech Initia	als		15m	Sm	18m	190M	Q-	15M	15ann	40		
Feeding T	imes:	0 <u>:2000</u>)_1 <u>073</u> 181	30 20 15 4	830 3	0800 1730	4 <u>073</u> 160	0 5 <u>07</u> 0 173	<u>30</u> 6_0	5730 1730		
Comment	s:			1	300						_Analysts:	Sm, th

Client:	Uni	scal
Sample ID:	#	Mw-146

Raw Data Sheet Fish Weights Seven Day Chronic Bioassay

Test Date: 5 29 03

Species: P. promelas

Test No: 0305-21NW

e/0	cont	rep	pan wt.	pan + fish	fish wt.	#	avg. per fish	avg. per conc.
Conc.	#	#	(gm)	(gm)	(mg)	fish	(mg)	(mg)
CON	17	1	.04308	0.04952		10		
	1	2	.04285	0.04795		9		
	12	3	.04266	0.04859		8		
	3	4	.04328	D.D4986		10		
(0.25	16	1	.04256	0.047-54		10		
	13	2	.04308	0.04968		9		
	23	3	.04273	0.04987		10		
L	18	4	.04058	n.04674		10		
12.5	10	1	04299	0.04820		10		
	4	2	.04209	0.04845		10		- All and a second s
	22	3	.04260	0.04904		9		
	19	4	.04242	0.04825				
25	9	1	.04165			8		
	5	2	.04.306	0.04948		9		
	11	3	.04304 .04208 .0421 mm	0.04807		9		
	14	4	,04208 . 0421 mm			8		
50	15	1	.04261	0.04766		7-		
	1	2	.04108	0.04639				
	8	3	.04117	0.04665	2	89		
	21	4	.04112	0.04631				
100	24	1	.04147	0.04305		4		
	20 2	2	.04267	0.04433		5		
		3	.04282	0.04339		12	-	
	6	4	.04/23	0.04188		2	_	
		1						
		2						
		3						
		4						

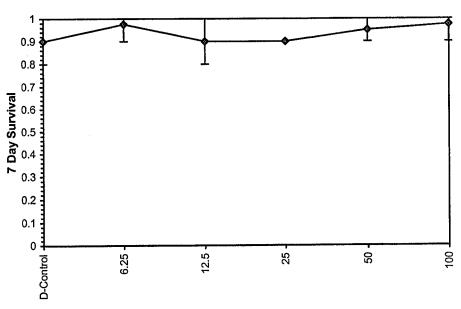
Tare: <u>MM</u> Total: <u>MM</u>

Date/Time in:	G/S/03	10:45
Date/Time out:	615103	15:30
Oven temp. (°C):	100	

			La	rval Fish Gr	owth and Surviv	al Test-7 Day S	urvival
Start Date:	5/29/03		Test ID:	0305-22NW	1	Sample ID:	UNOCAL-Unocal Groundwater Study
End Date:	6/5/03		Lab ID:	WAAEE-AM	IEC NW Bioassa	Sample Type:	GR-Groundwater
Sample Date:	5/28/03		Protocol:	EPAF 02-EF	PA Freshwater	Test Species:	PP-Pimephales promelas
Comments:	MW-7						
Conc-%	1	2	3	4			
D-Control	1.0000	0.9000	0.8000	0.9000			
6.25	1.0000	1.0000	0.9000	1.0000			
12.5	1.0000	0.9000	0.8000	0.9000			
25	0.9000	0.9000	0.9000	0.9000			
50	1.0000	0.9000	1.0000	0.9000			
100	1.0000	1.0000	1.0000	0.9000			

-				Tra	ansform:	Arcsin Sc	uare Root	Rank	1-Tailed		
	Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	
_	D-Control	0.9000	1.0000	1.2543	1.1071	1.4120	9.935	4			
	6.25	0.9750	1.0833	1.3713	1.2490	1.4120	5.942	4	22.50	10.00	
	12.5	0.9000	1.0000	1.2543	1.1071	1.4120	9.935	4	18.00	10.00	
	25	0.9000	1.0000	1.2490	1.2490	1.2490	0.000	4	18.00	10.00	
	50	0.9500	1.0556	1.3305	1.2490	1.4120	7.072	4	21.00	10.00	
	100	0.9750	1.0833	1.3713	1.2490	1.4120	5.942	4	22.50	10.00	

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distribu	ution ($p > 0$).01)		0.92425	0.884	-0.1459	-0.1333
Equality of variance cannot be co	nfirmed							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	100	>100		1				



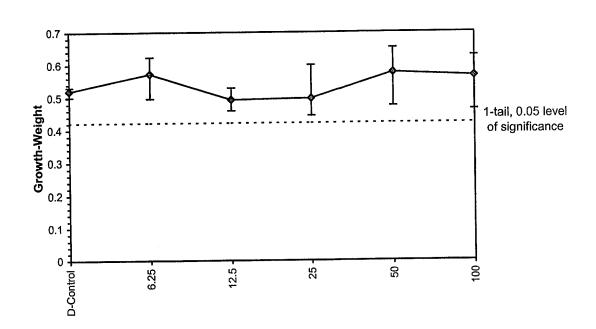
Dose-Response Plot

ļ				Lar	val Fish Gro	owth and Surviv	al Test-Growth-	Weight
	Start Date:	5/29/03		Test ID:	0305-22NW	1	Sample ID:	UNOCAL-Unocal Groundwater Study
ì		6/5/03		Lab ID:	WAAEE-AM	IEC NW Bioassa	y Sample Type:	GR-Groundwater
1	Sample Date:	5/28/03		Protocol:	EPAF 02-EF	PA Freshwater	Test Species:	PP-Pimephales promelas
	Comments:	MW-7						
	Conc-%	1	2	3	4			
	D-Control	0.5320	0.5290	0.5020	0.5190			
1	6.25	0.5890	0.4970	0.5780	0.6240			
	12.5	0.4710	0.5290	0.4590	0.5110			
1	25	0.4440	0.4860	0.6000	0.4570			
{	50	0.5940	0.6520	0.4740	0.5840			
	100	0 4630	0.6280	0.6070	0.5610			

				Transform	n: Untran	sformed			1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	
D-Control	0.5205	1.0000	0.5205	0.5020	0.5320	2.599	4				
6.25			0.5720	0.4970	0.6240	9.390	4	-1.258	2.410	0.0987	
12.5			0.4925	0.4590	0.5290	6.692	4	0.684	2.410	0.0987	
25			0.4968	0.4440	0.6000	14.300	4	0.580	2.410	0.0987	
			0.5760	0.4740	0.6520	12.902	4	-1.356	2.410	0.0987	
50 100			0.5648	0.4630	0.6280	12.993	4	-1.081	2.410	0.0987	

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distribu	ution ($p > 0$).01)		0.97382		0.884		-0.2557	0.13204
Bartlett's Test indicates equal var					7.43864		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100		1	0.09865	0.18953	0.00591	0.00335	0.1713	5, 18

Dose-Response Plot



Raw Data Sheet Fathead Minnow (*Pimephales promelas*) Larval Survival and Growth Test

Client Name:	Unocal
CHCIRTIGATION	

Test Date: 5/29/03_____

Sample ID:

#2 MW-7

Test No.: 0305-22NW

010						Day					Percent Survival	Average Survival
Conc.	Cont.	Rep.	Û.	1	2	3	4	5.0	CARD CONTRACTOR OF CONTRACT	7	Survival	Surviva
CON	22	1	10	10	10	10	10	10	10	10		
CON	19	2	10	10	10	1D	Ÿ	9	<u>q</u>	9		
	11	3	10	10	10	ID.	9	8	8	90		90%
	17	4	10	10	10	10	10	10	10			40%
6.25	+	1	10	10	10	10	0	10	10	10		
	3	2	10	1D	10	10	10	10	10	10		
	20	3	10	9	9	9	9	9	9	9		97.51
	112	4	10	10	10	10	10	10	10	10		1 9 1.50
12.5	10	1	10	10	10	10	0	10	10	10		
10.0	15	2	10	9	9	9	9	9	9	1 1		
	8	3	110	10	9	9	9	8	8	8	<u> </u>	907
	18	4	10	9	9	9	9	9	9			1 107
25	10	1	10	0	9	9	9	9	9	9		
	13	2	10	9	9	9	9	9	9	9		
	19	3	10	10	10	9	9	9	9	9	<u> </u>	000
	10	4	10	10	10	9	9	9	9	9		907.
50	21	1	10	10	10	ΙO	10	10	10	10		_
.)0	14	2	10	10	10	10	10	9	9	9		
	4	3	10	10	10	10	10	10	10	10		1000
	5	4	10	10	9	9	19	9	9	9		95°
100	$\frac{1}{2}$	$\frac{1}{1}$	10	10	10	10	0	10	10	10		
100	23		10	10	10	10	0	10	10	10)	
		3	10	10	10	10	10	10	10	lic)	ant
	24		tiō	10	9	9	1	q	9	9		97.5
	-e		_ <u>_</u>		_					_		
<u> </u>		2		-							_	
		3										
		4										STREAM STREAM STREAM
		$+\overline{1}$										
					-							
		3										
		4										
Tech Init	tials		Sm	551	A 43	SW	n Et	81	1 Son	1 551	1	
I COIL IIII								•				
Feeding	Times	0 <u>20</u>	<u>00</u> 1 <u>0</u>	730 2	OKOU	30800	_4 <u>073</u>	30 5 <u>0</u> 10 1	130 6	1730		
Ũ			ł	015	1900	1100	10 ^c			11.00	Amalara	10. Qu. 1/
Commer	ste.									. <u></u>	Analys	Du 1

Client: Unocal	-
Client: Unocal	-

Sample ID: <u>#2</u> MW-7

Raw Data Sheet Fish Weights Seven Day Chronic Bioassay

Test Date: 5/29/03

Species: P. promelas

Test No: <u>0305-22NW</u>

7.	cont	rep	pan wt.	pan + fish	fish wt.	#	avg. per fish	avg. per conc.
Conc.	#	#	(gm)	(gm)	(mg)	fish	(mg)	(mg)
CON	22	1	.04283	.04815		10		
	19	2	,04279	.04808	·	9		
		3	.04252	.04754		8		
	17	4	.04292	.04811		┉┉┉┉		
6.25		1	.04282	.04871		10		
	3	2	.04442	.04939	<u> </u>	10 9		
	20	3	.04246	.04824				
	12	4	.04214	.04838		10		
12.5	16	1	,04286	.04757		10		
	15	2	.04252	.04781		8		
	8	3	.04221	.04680		18		
	18	4	.04298	.04809		9		
25	4	1	,04336	.04780		4		
	13	2	.04298	.04815		g		
	9	3	.04215	.04815		4		Shingashingan series of the
	10	4	04280	04151		10		
50	21	1	.04381	.04875		19		
	14	2	.04248	.04900		10		
	4	3	,04383	.04920	4	1ġ		
		4	.04336	.04781		10		
	2 23	$\frac{1}{2}$.04318	1001		Tic		
	$\frac{122}{1}$	2	.04298			10		
	24	$\frac{3}{4}$.04293	-04811		19		
	- 14	$\frac{4}{1}$.04250					
		2						
		3						
		$\frac{3}{4}$						

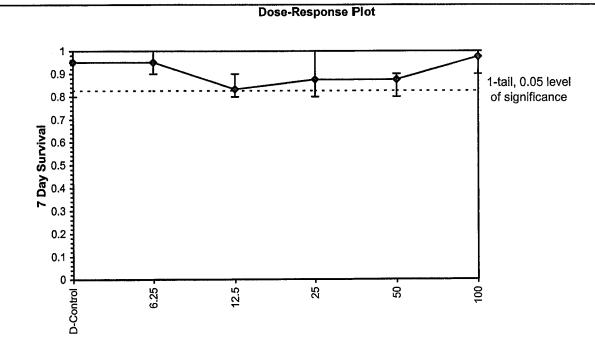
Tare: <u>______</u>___ Total: <u>______</u>

Date/Time in: 65031 Date/Time out: 65031401 **Oven temp.** (°C): 100

			La	rval Fish Gro	wth and Survi	val Test-7 Day S	urvival
Start Date:	5/29/03		Test ID:	0305-23NW		Sample ID:	UNOCAL GW
End Date:	6/5/03		Lab ID:	WAAEE-AME	EC NW Bioassa	N Sample Type:	GR-Groundwater
Sample Date:	5/28/03			EPAF 02-EP/		Test Species:	PP-Pimephales promelas
Comments:	MW-17						
Conc-%	1	2	3	4	····		
D-Control	1.0000	1.0000	0.8000	1.0000			
6.25	0.9000	1.0000	1.0000	0.9000			
12.5	0.9000	0.8000	0.8000				
25	0.9000	0.8000	0.8000	1.0000			
50	0.9000	0.8000	0.9000	0.9000			
100	1.0000	0.9000	1.0000	1.0000			

		_	Tra	ansform:	Arcsin Sc		1-Tailed			
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.9500	1.0000	1.3358	1.1071	1.4120	11.411	4			
6.25	0.9500	1.0000	1.3305	1.2490	1.4120	7.072	4	0.067	2.567	0.2007
12.5	0.8333	0.8772	1.1544	1.1071	1.2490	7.096	3	2.147	2.567	0.2168
25	0.8750	0.9211	1.2188	1.1071	1.4120	11.906	4	1.496	2.567	0.2007
50	0.8750	0.9211	1.2136	1.1071	1.2490	5.846	4	1.563	2.567	0.2007
100	0.9750	1.0263	1.3713	1.2490	1.4120	5.942	4	-0.454	2.567	0.2007

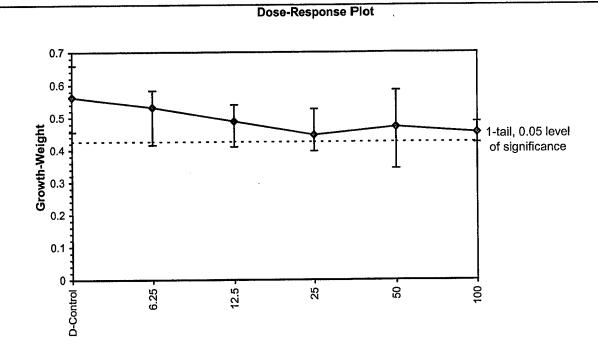
Auxiliary Tests		Statistic		Critical		Skew	Kurt			
Shapiro-Wilk's Test indicates nor		0.93134		0.881		-0.4464	0.0018			
Bartlett's Test indicates equal var			·		2.72477					
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	100	>100		1	0.12392	0.13103	0.0271	0.01223	0.10028	5, 17



			Lar	val Fish Growth	n and Survi	val Test-Growth-V	Veight
Start Date:	5/29/03		Test ID:	0305-23NW		Sample ID:	UNOCAL GW
End Date:	6/5/03		Lab ID:	WAAEE-AMEC	NW Bioass	ay Sample Type:	GR-Groundwater
Sample Date:	5/28/03		Protocol:	EPAF 02-EPA F	reshwater	Test Species:	PP-Pimephales promelas
Comments:	MW-17						
Conc-%	1	2	3	4			
D-Control	0.6590	0.6190	0.4560	0.5170			
6.25	0.4160	0.5650	0.5630	0.5840			
12.5	0.5410	0.5160	0.4110				
25	0.3980	0.4270	0.4370	0.5280			
50	0.5850	0.3440	0.5080	0.4500			
100	0.4360	0.4710	0.4890	0.4240			

				Transform: Untransformed					1-Tailed	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.5628	1.0000	0.5628	0.4560	0.6590	16.516	4			
6.25	0.5320	0.9454	0.5320	0.4160	0.5840	14.645	4	0.576	2.567	0.1369
12.5	0.4893	0.8695	0.4893	0.4110	0.5410	14.097	3	1.274	2.567	0.1479
25	0.4475		0.4475	0.3980	0.5280	12.549	4	2.160	2.567	0.1369
50	0.4718		0.4718	0.3440	0.5850	21.525	4	1.706	2.567	0.1369
100	0.4550	+	0.4550	0.4240	0.4890	6.635	4	2.020	2.567	0.1369

Auxiliary Tests	<u> </u>				St atistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non	mal distribu	ution $(p > 0)$.01)		0.96341		0.881		-0.3615	-0.5262
Bartlett's Test indicates equal var			•	3.85774			15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	100	>100		1	0.13695	0.24335	0.00829	0.00569	0.25529	5, 17



Raw Data Sheet Fathead Minnow (Pimephales promelas) Larval Survival and Growth Test

Client Name:	Unocal
--------------	--------

Sample ID:

#3 MW-17

Test No.: 0305 - 23 NW

Test Date: 5/29/03

010				et. 825 marterier			ays				Percent	Average
Conc.	Cont.		CONTRACTOR OF CO		2		4		6	7.1	Survival	Survival
CON	22	1	10	10	10	10	10	10	10	10		
	$\frac{20}{13}$	2	10	10	10	10	10	10	10	0		na ^{na}
	6	<u> </u>	10	10	10	9	9	8	8	8		
6.25	12	+ 1		10	10	10	10	10	10	10	_	95%
0.60	14	2	10	10 10		10	10	10	9	9	······································	
	17	3	10	10	10	10	10	10	10	10		
	19	4	10	Hă-	10	9	9	4	9	10		0.00
12.5	24	1	tiŏ	10	a	9	9	a	a a	9	· · · · · · · · · · · · · · · · · · ·	952
		2	tõ		#2	2	2	2	2	à		
	14	3	io	10	9	8	8	8	8	13		
	15	4	10	q	9	9	- a	9	8	8		
25	23	1	10	ġ	9	9	9	9	à	9		
	16	2	10	10	9	8	8	8				
	7	3	10	10	9	9	9	\$	8	8		
	8	4	10	10	10	10	10	In	10	10		87.57.
50	21	1	10	10	9	9	ă	9	a	9		01.010
	2	2	10	10	9	8	8	8	8	8		
	5	3	10	10	9	9	9	9	a	19		
	4	4	0	iD	9	9	9	9	9	9		87.5%
100	9	1	0	10	10	10	10	10	10	10		
	3	2	_10_	10	10	10	9	9	9	9		
	18	3	10	10	10	0	10	10	10	10		
	10	4	10	10	10	10	10	lD	10	10		97.5%
		1										
		2										
		3										
		4										
· · · ·		1										
		2										
		3										
ech Initials		4		<u></u>			<u> </u>					
							5M (
eding Tim	es: 0_	2000	1 <u>013</u> 1815	2 <u>70 2</u> 19	500 3 <u>0</u> 505 1	<u>850</u> 4 130	1600	50750	<u>60</u>	130 730		Mm 1
omments	X	· /10 +	+ 1 < D1	r// En.	all N	1 1 1	1.4		Cert			n. Jan 1

Client:	lini	ocal
Sample ID:	#3	MW-17

Raw Data Sheet Fish Weights Seven Day Chronic Bioassay

Test Date: 5/29/03

Species: <u>P. promelas</u>

Test No: 0305-23NW

9°	cont	rep	pan wt.	pan + fish	fish wt.	#	avg. per fish	avg. per conc.
Conc.	#	#	(gm)	(gm)	(mg)	fish	(mg)	(mg)
CON	22	1	.04343	.05002		10		
	20	2	,04361	.04980		10		
	13	3	.04289	,04745		8	······································	
	6	4	.04270	.04787		ID		aanaa dooxaanaa ahaa ahaa ahaa ahaa ahaa ahaa aha
6.25	12	1	.04197	,04613		9		
	11	2	.04288	.04853		D		
	17	3	.04431	.04994		10		
	19	4	104232	.04816		9		
12.5	24	1	,04402	.04943		9		
		2	.04177	,04380		2		
	14	3	.04282	.04798		8		
	15	4	,D4237			8		
25	23	1	,04458			9		
	16	2	.04374	.04801		8		
		3	-043179	.04746		8		
	8	4	.04320	.04848		ID		
50	21	1	,04404			9		
	2	2	.04116	.04460		8	-	
	5	3	.0436le	.04874	······	9		
	4	4	.04384	.04834		9		
100	9	1	.04232	.04608		10		
	3	2	.04089	.04560		9		
	18	3	.04385	.04874		10		
	10	4	.04208	.04632		10		a Provincipal del calegaria companya de la construcción de la companya de la companya de la companya de la comp
		1						
		2						
		3						
		4						

Tare: MM Total: SM

 Date/Time in:
 6/5/03 11:45

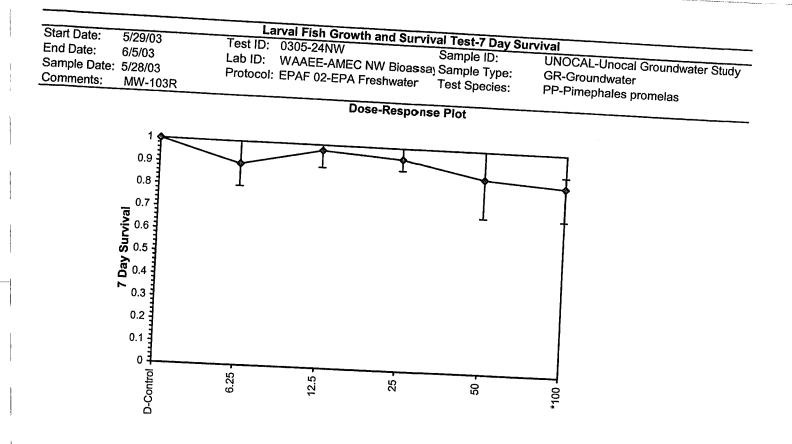
 Date/Time out:
 b/b/03 1400

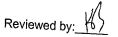
 Oven temp. (°C):
 IDD

Start Date:	5/29/03		La	arval Fish	Growth	and Surv	ival Test-	7.Dev.C		_	
End Date:	6/5/03		Test ID:	0305-24	NW		Sample	/ Day Sul	rvival		
Sample Date:	5/28/03		Lab ID:	WAAEE	-AMEC N	W Bioass	Sample a) Sample	ID; Turr	UNOCAL-U	nocal Groundw	ator Stud
Comments:	MW-10	38	Protocol:	EPAF 02	-EPA Fre	shwater	Toot So	iype:			
Conc-%	1	2					Test Sp	ecies:	PP-Pimepha	ales promelas	
D-Control	1.0000		3	4					-	1.	
6.25	0.9000		1.0000	1.0000							
12.5	1.0000		0.8000	0.9000							
25	0.9000	0.0000	1.0000	1.0000							
50	0.7000		1.0000	0.9000							
100			0.8000	1.0000							
100	0.7000	0.9000	0.9000	0.9000							
Conc-%	Mean	N-Mean	Tra	insform: ,	Arcsin S	quare Ro	of	Rank			
D-Control	1.0000	1.0000	mean		Max	CV%	N		1-Tailed	Number	Total
6.25	0.9000	0.9000	1.4120	1.4120	1.4120	0.000	4	Sum	Critical	Resp	Number
12.5	0.9750		1.2543	1.1071	1.4120	9.935	4	10.00		0	40
	0.9500	0.9750	1.3713	1.2490	1.4120	5.942	4	12.00	10.00	4	40
		0.9500	1.3305	1.2490	1.4120	7.072	4	16.00	10.00	1	40
	0.8750	0.8750	1.2306	0.9912	1.4120	17.454		14.00	10.00	2	40
100	0.8500	0.8500	1.1846	0.9912	1.2490	10.885	4	14.00	10.00	5	40
					1,2-100	10.000	4	10.00	10.00	6	40
										Ŭ	40
uxiliary Tests											
apiro-Wilk's To	et indicat						otatistic		<u> </u>		
napiro-Wilk's Te	st indical	les normal	distributio	n (p > 0.0	1)		0.95397		Critical	Skew	Kurt
uality of varian pothesis Test			ned		•				0.884	-0.385	-0.1774
eel's Many-One	Rank Ta	. <u>us)</u> N			ChV	TU					
s many one	Nalik 16	SL	50	100 70).7107	2					
			the second s			ikelihood					

- urameter	value	SE	069/ Etal.			00-21001					
Slope	0.40023		95% FIGU	cial Limits	Control	Chi-Sq	Critical	P-value			
Intercept			-0.1873	0.98773	0	the second se	7.81472			Sigma	iter
TSCR	0.00000	0.45954	2.17968	3.98108			1.01472	0.29	4.79626	2.49855	3
Point	Probits	%	95% Eidu	cial Limits		1.0 -					
EC01	2.674	0.09633	5578 Fluu	cial Limits		0.9			~		
EC05										1	
EC10	-	39.2863				0.8			/	1	
EC15		160.946				0.7			/		
EC20		493.661				0.6 0.5 0.5 0.4 0.6 0.4 0.6 0.5 0.4 0.6 0.5 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6				1	
EC25		1291.27				8 0.5					
EC40						8 0.4				1	
EC50		14563.4				й _{0.3}					
EC60		62554.9				-		/		1	
EC75	5.253	268697				0.2		/			
EC80		3030455				0.1 -	0.00				
EC85		7926732				0.0 🖵					
EC90		2.4E+07				0.01	10	10000 1F		******	
	6.282	1E+08				0.01	.0	10000 1E	+07 1E+1	0 1E+13	
EC95	6.645 8	3.1E+08									
<u>EC99</u>	7.326 4	.1E+10									

Dose %

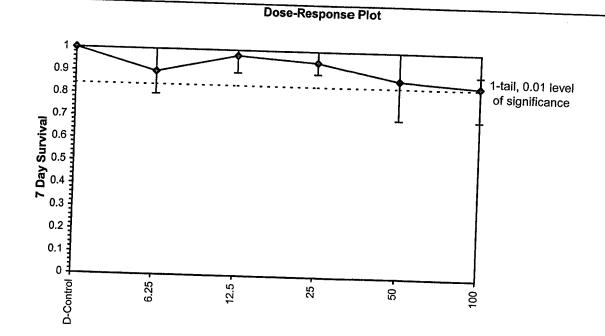




Start Date: End Date: Sample Date: Comments:	5/29/03 6/5/03 5/28/03 MW-103R		Lab ID:	WAAEE-	AMEC NW Bioassa	Some In	
Conc-% D-Control	1	2	3	4			
6.25 12.5 25 50 100	1.0000 0.9000 1.0000 0.9000 0.7000 0.7000	1.0000 1.0000 0.9000 1.0000 1.0000 0.9000		1.0000 0.9000 1.0000 0.9000 1.0000 0.9000			

Conc %			Tr	ansform:	Arcsin Se	quare Roo	f		4 Talled	
Conc-% D-Control 6.25	Mean 1.0000 0.9000	N-Mean 1.0000 0.9000	Mean 1.4120	<u>Min</u> 1.4120	Max 1.4120	CV%	<u>N</u> 4	t-Stat	1-Tailed Critical	MSD
12.5 25 50 100	0.9750 0.9500 0.8750 0.8500	0.9000 0.9750 0.9500 0.8750 0.8500	1.2543 1.3713 1.3305 1.2306 1.1846	1.1071 1.2490 1.2490 0.9912 0.9912	1.4120 1.4120 1.4120 1.4120 1.2490	9.935 5.942 7.072 17.454 10.885	4 4 4 4	1.784 0.461 0.922 2.052 2.573	3.210 3.210 3.210 3.210 3.210 3.210	0.2838 0.2838 0.2838 0.2838 0.2838 0.2838

	Auxiliary Tests			
	Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	Statistic	Critical	Skew Kurt
	Equality of variance cannot be confirmed	0.95397	0.884	-0.385 -0.1774
	Hypothesis Test (1-tail,(0.01)) NOEC LOEC Chy TU	MSDu MSD		
,	Dunnett's Test 100 >100 1	mod		
1		0.1584 0.1624	46 0.03099 0.0156	63 0.13015 5, 18

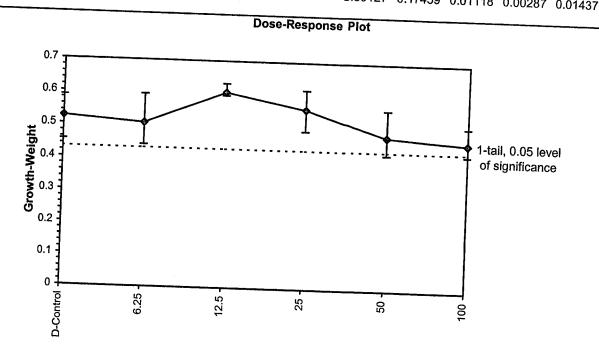


Page 1

Sample Date: Comments:	5/29/03 6/5/03 5/28/03 MW-103R		Lab ID:	WAAEE-A	MEC NW Bioassa	Weight UNOCAL-Unocal Groundwater Study GR-Groundwater PP-Pimephales promelas
Conc-% D-Control 6.25 12.5 25 50 100	0.5310 0.5930 0.4900 0.4220	2 0.4530 0.5940 0.5950 0.6150 0.5570 0.4580	3 0.4950 0.4400 0.6300 0.5950 0.4520 0.5090			

ļ	Conc-%	Mean			Transfor	m: Untran	sformed			4 7	
-	D-Control	0.5228	N-Mean 1.0000	Mean 0.5228	<u>Min</u>	Max	CV%	N	t-Stat	1-Tailed Critical	MSD
	6.25 12.5 25 50 100	0.5055 0.6028 0.5550 0.4758 0.4590	0.9670 1.1530 1.0617 0.9101 0.8780	0.5228 0.5055 0.6028 0.5550 0.4758 0.4590	0.4530 0.4400 0.5930 0.4900 0.4220 0.4240	0.5870 0.5940 0.6300 0.6150 0.5570 0.5090	11.514 14.046 3.018 10.735 12.177 7.877	4 4 4 4 4 4	0.456 -2.113 -0.852 1.241 1.683	2.410 2.410 2.410 2.410 2.410 2.410	0.0913 0.0913 0.0913 0.0913 0.0913 0.0913

J	Auxiliary Tests						
	Shapiro-Wilk's Test indicates normal distribution (p > 0.01) Bartlett's Test indicates annual		Statistic	Critical		Skew	Kund
			0.95265	0,884		0.30478	Kurt
	Typodiesis lest (1-tail 0.05) NOCO 1.000		4.71972	15.0863		0.00470	-0.928
}	Dunnett's Test 100 >100	TU	MSDu	MSDp MSB	MSE	F-Prob	
	100 >100	1	0.09127	0.17459 0.01118	0.00287	0.01427	<u>df</u>
					0.00207	0.01437	5, 18



Γ

Raw Data Sheet Fathead Minnow (Pimephales promelas) Larval Survival and Growth Test

Client Name:	Uni	cal
Sample ID:	#4	MW-103R

Test Date: <u>5/29/03</u>

Test No.: 0305-24 NW

ή _ο Conc.	Cont.	Rep	0		2	D.	ays 4		6		Percent	Average
CON	10	1	0	10	10	10	10		THE REPORT OF THE REPORT OF THE	A CALIFORNIA DA	Survival	Survival
	24	2	10	10	10	10	10	$+10 \\ +10$	10	16		
	21	3	110	10	10	10	$\frac{10}{10}$	+10	10	10		
	14	4	10	10	10	10	10	10	10			
10.25	13	1	10	10	10	9105		9	10	10		100%
	23	2	10	110	10	10	10	10		9		
	15 18	3	10	ġ	9	9	8	8	10 8	8		-
	18	4	10	10	10	10	10	10	9	9		(100
12.5	8	1	10	10	10	10	10	10	10	10		90%.
	4	2	10	10	10	10	10	ġ	q	9		
ļ	12	3	10	10	10	10	10	10	10	10		
		4	10	ID	10	10	10	10	10	10		97.5%
25	22	1	D	10	10	10	10	10	9	q		
	9	2	10	10	10	10	10	10	10	10		
	20	3	10	10	10	10	10	10	10	10		
F -0		4	0	10	10	9	9	9	9	9		957.
50	16	1	10	9	7	7	7	7	1	7		
	2	2	10	10	10	10	10	10	10	10		lander og som
	3	3	10	10	9	9	9	Ŷ	8	8		
100		4	10	10	10	10	10	10	10	10		87.5%
100	19	1	10	10	8	8	1	7	1	7		
		2	10	10	9	9	9	9	9	ÿ		
	25	3 4	10	10	10	10	9	9	à	9		
	2	$\frac{4}{1}$	10	10	10	10	9	9	9	_q		857.
		$\frac{1}{2}$	<u> </u>									
		3										
		4		——								
		1										
		2										
		3										
		4										
Fech Initials			3M 8	3M	my	Qu 9	m	3m		m		
Feeding Time	es: 0 <u>2</u>	<u>DOD</u> 1	1815	•		<u>830</u> 4 (30 1						

Comments:

Analysts: Smm

Client:	Un	ocal	
Sample ID:	#4	MW-103R	

Raw Data Sheet Fish Weights Seven Day Chronic Bioassay

Test Date: 52903

Species: <u>P. promelas</u>

Test No: 0305-24 NW

010	cont	rep	pan wt.	pan + fish	fish wt.	#	avg. per fish	
Conc.	#	#	(gm)	(gm)	(mg)	fish	(mg)	01.01
CON	10	1	,03799	.04386		10	((mg)
	24	2	,04321	.04774		10		
	21	3	,04267			10		
	14	4	.04367	.04923		10	· · · · · · · · · · · · · · · · · · ·	
0.25	13	1	.04240	.04771		9		
	23	2	,04383	.04977		10		
	15	3		.05005		8		
10	18	4	104314	.04771		9		
12.5	8	1	,04150 1047947	.04743		10		
	4	2				9		
	12	3	.04380			10		
	11	4		.04817		10		
25	22	1	,04364			9		
	9	2	.04227	.04842		10		
	20	3	,04196			10 9		
	17	4		.04881				
50	10	1	,04117 .	.04539		7		
		2	,04348			10		
	3	3		.04688		8		
10.0		4		.04789		10		an a
100	18-	1	.04348	04772		7		
	19	2	.04402.	04860		9		
	25	3	.04317	.04826		9		
	5		.04322	.04767		9		and a generation of the second sec
		1						
		2						
		3						
		4					R a	

Tare: <u>m</u> Total: <u>Sm</u>

Date/Time in: 615/03 1400 Date/Time out: U/S/031600 Oven temp. (°C):___ 100

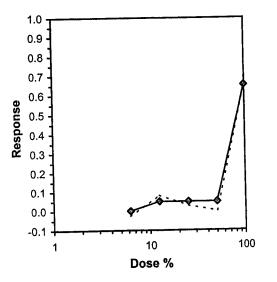
•	<u></u>			La	val Fish Gr	owth and Surviva	al Test-7 Day Su	urvival
' •	Start Date:	5/29/03			0305-25NW		Sample ID:	UNOCAL-Unocal Groundwater Study
	End Date:	6/5/03				AEC NW Bioassay		GR-Groundwater
1	Sample Date:	5/28/03		Protocol:	EPAF 02-E	PA Freshwater	Test Species:	PP-Pimephales promelas
1	Comments:	MW-129						
	Conc-%	1	2	3	4			
} '	D-Control	1.0000	0.9000	0.9000				
ŀ	6.25	0.9000	1.0000	0.9000				
1	12.5	0.9000	0.9000	0.9000				
	25	0.8000	0.9000	0.9000				
	50	1.0000	0.8000					
J	100	0.5000	0.2000	0.5000	0.1000			

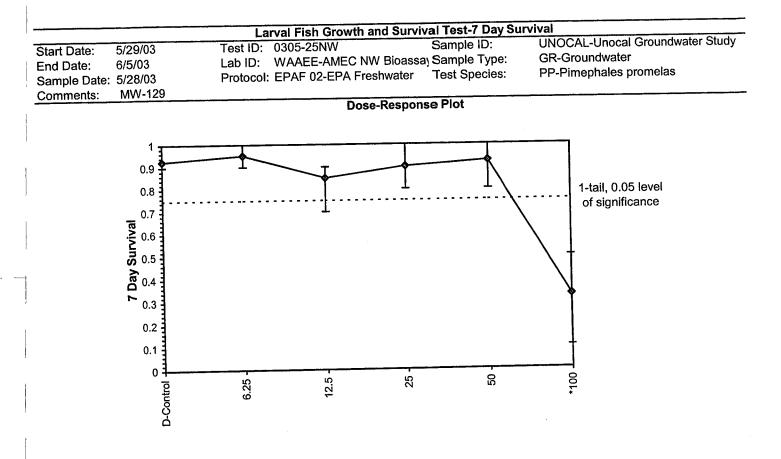
-				Tra	ansform:	Arcsin So	uare Root			1-Tailed		Number	Total
	Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
-	D-Control	0.9250	1.0000	1.2898	1.2490	1.4120	6.318	4				3	40
	6.25	0.9500	1.0270	1.3305	1.2490	1.4120	7.072	4	-0.401	2.410	0.2450	2	40
5	12.5	0.8500		1.1846	0.9912	1.2490	10.885	4	1.035	2.410	0.2450	6	40
	25	0.9000		1.2543	1.1071	1.4120	9.935	4	0.349	2.410	0.2450	4	40
	50	0.9250		1.2951	1.1071	1.4120	11.347	4	-0.052	2.410	0.2450	3	40
	*100	0.3250		0.5890	0.3218	0.7854	39.727	4	6.893	2.410	0.2450	27	40

					Statistic		Critical		Skew	Kurt
Auxiliary Tests	al diatribu	tion (n > 1)	2.01)	·	0.96452		0.884		-0.3121	-0.6514
Shapiro-Wilk's Test indicates norm	nai distribu	(1000 (p > 1))	5.01)		3.89951		15.0863			
Bartlett's Test indicates equal varia	ances (p =	10.56)	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Hypothesis Test (1-tail, 0.05)	NOEC				0.17517			0.02067	5.7E-06	5, 18
Dunnett's Test	50	100	70.7107	2	0.17517	0.10070	0.01000	0102000		,

Trimmed Spearman-Karber

Trim Level	EC50	95%	<u>CL</u>	
0.0%				
5.0%				
10.0%				
20.0%				
Auto-34.7%	83.876	73.627	95.550	



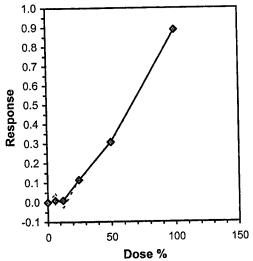


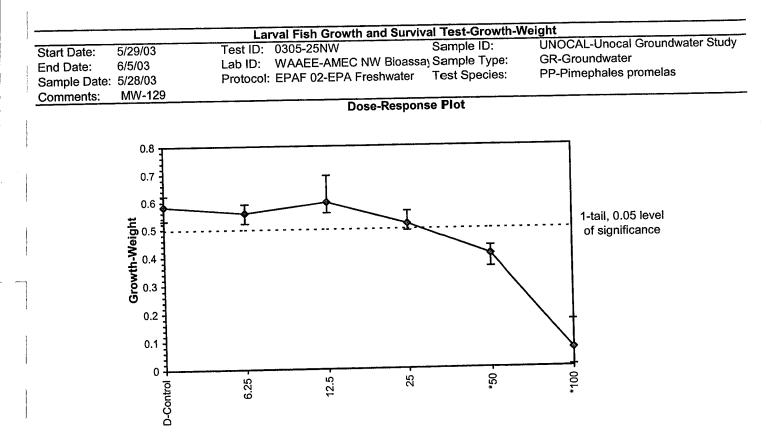
)	Larval Fish Growth and Survival Test-Growth-Weight												
	5/29/03 6/5/03 5/28/03 MW-129		Test ID: Lab ID:	0305-25NV WAAEE-AM		Sample ID:	UNOCAL-Unocal Groundwater Study GR-Groundwater PP-Pimephales promelas						
Conc-%	1	2	3	4									
D-Control	0.6220	0.5640	0.6110	0.5300									
6.25	0.5900	0.5860	0.5190	0.5310									
12.5	0.5720	0.6940	0.5570	0.5600									
, 25	0.5060	0.5000	0.5620	0.4910									
50	0.4340	0.4320	0.3910	0.3590									
100	0.0580	0.0310	0.1670	0.0050									

! -					Transform	n. Untran	sformed			1-Tailed		Isoto	onic
	Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
			1.0000	0.5818	0.5300	0.6220	7.339	4				0.5818	1.0000
	D-Control	0.5818	0.9566	0.5565	0.5190	0.5900	6.602	4	0.717	2.410	0.0849	0.5761	0.9903
1	6.25 12.5	0.5958	1.0241	0.5958	0.5570	0.6940	11.048	4	-0.397	2.410	0.0849	0.5761	0.9903
	25	0.5148	0.8848	0.5148	0.4910	0.5620	6.236	4	1.902	2.410	0.0849	0.5148	
	*50	0.4040	0.6945	0.4040	0.3590	0.4340	8.899	4	5.045	2.410	0.0849	0.4040	0.6945
1	*100	0.0653	0.1122	0.0653	0.0050	0.1670	109.120	4	14.659	2.410	0.0849	0.0653	0.1122

					Statistic		Critical		Skew	Kurt
Auxiliary Tests	nal diatribu	tion (n >	0.01)		0.90471		0.884		0.89105	0.2301
Shapiro-Wilk's Test indicates norr	nai distribu	(0,0)	0.01)		3.1348		15.0863			
Bartlett's Test indicates equal vari	ances (p =	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Hypothesis Test (1-tail, 0.05)	NOEC			- 10	0.08491		0.16338	0.00248	6.2E-11	5, 18
Dunnett's Test	25	50	35.3553	4	0.00431	0.14000	0.10000			·

				Linea	ar Interpolatio	n (200 Resamples)		
Point	%	SD	95% CL	.(Exp)	Skew			
IC05	17.279	5.191	0.000	24.970	-0.9005			
IC10	23.203	3.854	11.038	33.890	-0.5340			
IC15	29.574	3.718	18.268	40.446	0.0548	1.0		
IC20	36,140	3.652	24.673	45.671	0.0112	0.9	\$	
IC25	42.706	3.699	31.019	53.063	0.1592	0.8		
IC40	58,111	2.520	48.486	64.944	-0.1397			
IC50	66.697	2.470	57.783	75.352	0.1885	0.7 -		
						<mark>س</mark> 0.6 -		





Raw Data Sheet Fathead Minnow (*Pimephales promelas*) Larval Survival and Growth Test

Client Name:	Unocal	Test Date: 5 29 03
Sample ID:	#5 MW-129	Test No.: 0305 - 25NW

8 1						Day	vs				Percent	Average
۳, Conc.	Cont.	Rep.	60	1	2		4	5	新达中国动物的公司	7.4	Survival	Survival
CON	24	1	10	10	10	0	10	0	16	0		
CON	17	2	10	10	10	10	10	9	9	3		
	3	3	10	9	9	9	9_	9	9			92.5%
	9	4	10	(D	10	10	ID_	9	9	9		92.510
6.25	21	1	10	9	9	9	9	9	9			- The second second
	2	2	10	10	16	10	10	10	10	10		
	17	3	10	10	16	10	9	9		10	<u> </u>	952
	18	4	10	10	10	1D g	10	10	10	9		
12.5		1	10	10	9		9	9	9	13-		- 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997
	19	2	10	19	9	9	9	4	9	4	1	
	8	3	10	10	10	8		8	8	++-		852
	4	4	10	9		- Yes	8	9		18		
25	12	1	10	10	10	10	1-3	9	8	19		
	14	2	10	9	9	19	9	19	a	19		
	20	3	10	9		10	10	10	10	10		90%
	5	4	10	10	01	10	10	10	10	lõ		
50	11	1	10	10		19	18	8	8	18		
	13	$\frac{2}{3}$	10	$\frac{10}{10}$	10	10	10	10	10	1g		
	22	$\frac{3}{4}$	$\frac{10}{10}$	10	9	19	19	9	9	19		92.5%
1-0	_		$\frac{10}{10}$	110	8	5	5		5	5		
00		/	10	19	6	2	2	525	5	a		
		3			9	5	5	5	5	5		
				18	15	12	12	2	1			32.5%
		$\frac{1}{1}$			+_							
		2										
		3										
		4										
		$+\overline{1}$			-	_						
		2										
		- 3			_							
		4										
Tech Initials on sm KI Sm om Sm M M Ct												
Feeding Times: $0 \underline{1000} \ 10730 \ 20800 \ 300 \ 1730 \ 1000 \ 1730 \ 50730 \ 60730 \ 1730 $												
Commen	ts:											

Client:	Uno	cal
Sample ID:	#5	MW-129

Raw Data Sheet Fish Weights Seven Day Chronic Bioassay

Test Date: 52903

Species: <u>P. promelas</u>

Test No: 0305-25NW

90	cont	rep	pan wt.	pan + fish	fish wt.	#	avg. per fish	avg. per conc.
Conc.	#	#	(gm)	(gm)	(mg)	fish	(mg)	(mg)
CON	24	1	0.04459	.05081		10		
	17	2	0.04266	.04830		9		
	3	3	0.04296	.04907				
	9	4	0.04216	.04746		9		
10.25	21	1	0.04223	.04813		9		
	2	2	0.04495	.05081		10		
	7	3	0.04476	.04995		9		
	18	4	0.04285	.04816		10		
12.5		1	0.04443	.05015		9		
	19	2	0.04310	.05004	ļ	9		
	8	3	0.04233	.04790	L	9		
	4	4	0.04307	2049.048	<u>a</u> 1			
25	12	1	0.04380	.04886		8		
	14	2	0.04348	.04848		9		
	20	3	0.04296	.04858		9		
	5	4	0.04271	.04762		D		
50	11	1	0.04308	.04742		10		- And Andreas and Andreas
	13	2	0.04288					
	23	3	0.04315			10		
	22	4	0.04494	0.04855		9		
100	16	1	0.04268	.04326		5		
	10	2	0.04369			2		
	10	3	0.04292			5		
	15	4	0.04448	-04403				
		1		.04453'				
		2						
		3						
	_	4						

Tare: <u>- &w/</u>_____ Total: &M______

 Date/Time in:
 6/5/03 1430

 Date/Time out:
 6/5/03 1430

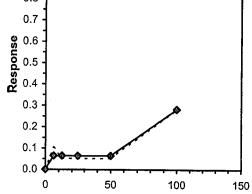
 Oven temp. (°C):
 100

Start Date:	5/29/03	······	La	rval Fish G	rowth and Surviv		
End Date: Sample Date: Comments:	6/5/03		Lab ID:	0305-26NV WAAEE-A EPAF 02-E	MEC NW Bioassa	Sample ID: Sample Type: Test Species:	UNOCAL-Unocal Groundwater Study GR-Groundwater PP-Pimephales promelas
Conc-%	1	2	3	4			
D-Control	0.9000	1.0000	1.0000	1.0000			
6.25	1.0000	0.9000	0.9000	0.7000			
12.5	1.0000	0.9000	0.8000	1.0000			
25	1.0000	1.0000	0.8000	0.9000			
50	0.9000	1.0000	0.9000	0.9000			
100	0.6000	0.8000	0.6000	0.8000			

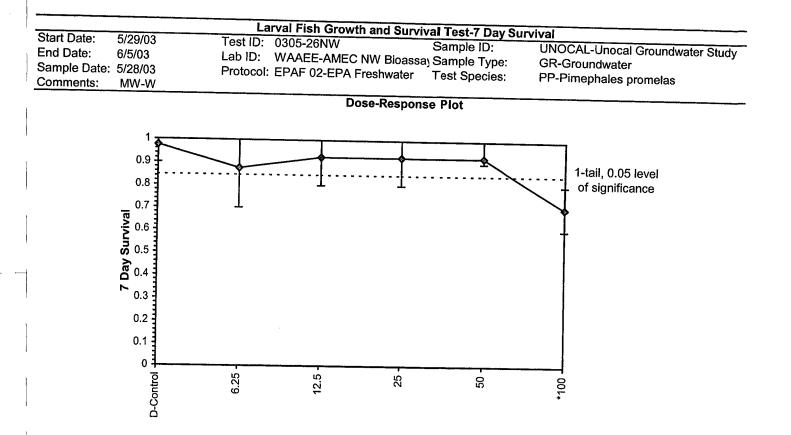
			-	Tra	ansform:	Arcsin Sc	uare Root			1-Tailed		Isot	onic
	Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	- t-Stat	Critical	MSD	Mean	N-Mean
	D-Control	0.9750	1.0000	1.3713	1.2490	1.4120	5.942	4		ornour	mod		
1	6.25	0.8750	0.8974	1.2253	0.9912	1.4120	14.199	4	1.575	0.440	0.0000	0.9750	1.0000
	12.5	0.9250	0.9487	1.2951	1.1071	1.4120	11.347	:		2.410	0.2233	0.9125	0.9359
	25	0.9250	0.9487					4	0.823	2.410	0.2233	0.9125	0.9359
Ì				1.2951	1.1071	1.4120	11.347	4	0.823	2.410	0.2233	0.9125	0.9359
	50	0.9250	0.9487	1.2898	1.2490	1.4120	6.318	4	0.879	2.410	0.2233	0.9125	0.9359
I	*100	0.7000	0.7179	0.9966	0.8861	1.1071	12.807	4	4.043	2.410	0.2233	0.7000	0.7179

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distribu	ition (p >	0.01)		0.93704		0.884		-0.407	-0.7673
Bartlett's Test indicates equal var	iances (p =	0.78)			2.46392		15.0863		0.407	-0.1015
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	50	100	70.7107	2	0.1291	0.13438	0.06804	0.01717	0.01342	

	Linear Interpolation (200 Resamples)									
Point	%	SD	95% Cl		Skew					
IC05*	4.875	20.029	1.519	88.420	1.2001		· · · · · · · · · · · · · · · · · · ·			
IC10	58.235	18.498	0.000	80.279	-1.5990					
IC15	69.706					1.0				
IC20	81.176					4				
IC25	92.647					0.9 -				
IC40	>100					0.8				
C50	>100					4				
	IC estimate les	ss than the	e lowest c	oncentrat	<u></u>	0.7 -				
				oncontrat	011	9 0.6				
						9 .0.6 - 1				



Dose %

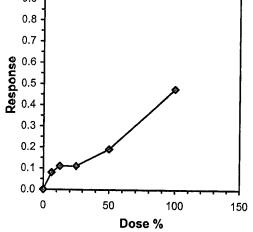


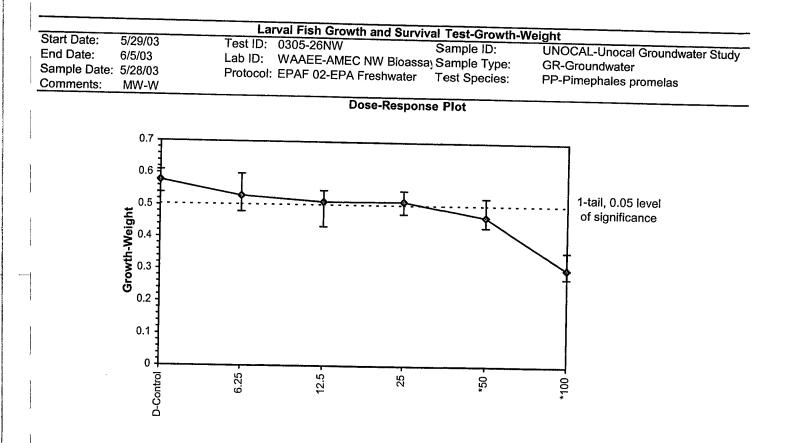
Start Date:	5/29/03		La	rval Fish Gr	owth and Surviv	val Test-Growth-	Weight
End Date: Sample Date: Comments:	6/5/03		Lab ID:	0305-26NW WAAEE-AN EPAF 02-E		Sample ID: a) Sample Type: Test Species:	UNOCAL-Unocal Groundwater Study GR-Groundwater PP-Pimephales promelas
Conc-%	1	2	3	4			
D-Control	0.5390	0.5600	0.5980	0.6090		······································	
6.25	0.5200	0.5990	0.5220				
12.5	0.5420	0.5480	0.4340	0.5250			
25	0.5480	0.4750	0.4850	0.5470			
50	0.4390	0.4340	0.5260	0.4660			
100	0.2800	0.3570	0.2740	0.2980			

	-				Transforr	n: Untran	1-Tailed			Isotonic			
_	Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	- t-Stat	Critical	MSD	Mean	N-Mean
\neg	D-Control	0.5765	1.0000	0.5765	0.5390	0.6090	5,663	4		ontiour	MOD		
	6.25	0.5305	0.9202	0.5305	0.4810	0.5990	9.314	4	1.514	0.440	0.0700	0.5765	1.0000
)	12.5	0.5123	0.8886	0.5123	0.4340	0.5480				2.410	0.0732	0.5305	0.9202
	25	0.5138					10.360	4	2.114	2.410	0.0732	0.5130	0.8899
1			0.8912	0.5138	0.4750	0.5480	7.628	4	2.065	2.410	0.0732	0.5130	0.8899
	*50	0.4663	0.8088	0.4663	0.4340	0.5260	9.060	4	3.628	2.410	0.0732	0.4663	0.8088
	*100	0.3023	0.5243	0.3023	0.2740	0.3570	12.539	4	9.026	2.410	0.0732	0.3023	0.5243

Auxiliary Tests				· · · · ·	Statistic		Critical		Skew	Kunt
Shapiro-Wilk's Test indicates nor	mal distribu	tion (p >	0.01)		0.96723	· · · · · · · · · · · · · · · · · · ·	0.884			Kurt -0.7007
Bartlett's Test indicates equal var	iances (p =	0.97)			0.8458		15.0863		0.00043	-0.7007
	Hypothesis Test (1-tail, 0.05) NOEC LOEC ChV							MSE	F-Prob	df
Dunnett's Test	25	50	35.3553	4	0.07323	0.12703	0.0366	0.00185		

				Linea	ar Interpolatio	n (200 Resamples)
Point	%	SD	95% CL		Skew	(
IC05*	3.916	4.623	1.246	38.143	3.2088	······
IC10	10.411	11.230	0.944	55.547	0.9192	
IC15	37.286	12.329	0.000	65.301	-0.3320	1.0
'IC20	51.540	7.621	25.746	68.162	-0.8917	4
IC25	60.328	5.486	41.096	75.387	-0.2482	0.9 -
IC40	86.692					0.8
IC50	>100					0.7





AMEC Earth & Environmental Northwest Bioassay Lab 5009 Pacific Hwy. E., Suite 2 Fife, WA 98424

Raw Data Sheet Fathead Minnow (Pimephales promelas) Larval Survival and Growth Test - an english provide the second state of the second

Client Name:	Unocal	Test Date: 5/29/03
Sample ID:	#6 MW-W	Test No.: 0305 - 26NW

€1₀ Conc.		1				D	ays		•••		Percent	Average
		Rep.	0	1.0	2	3	4	5	6.	7	Survival	Survival
CON	20	1	10	109	9	9	19	9	9	9		
ļ	2	2	10	10	10	10	10	10	10	lo		
	13	3	10	10	10	10	10	10	10	10		
	14	4	10	10	10	10	10	10	10	10		97.5%
0.25	\prod	1	10	10	10	10	0	10	10	0		
	22	2	10	10	10	10	10	10	ġ	9		
	16	3	10	10	10	10	9	9	9	9		
12 0		4	10	9	9	9		1	7	1		87.5%
12.5	23	1	10	10	10	10	ļŎ	10	10	10		
	8	2 3	10	10	10	10	2	<u>19</u>	84			
	15	<u> </u>	10	10	10	9	9	9	8	8		and an
25	12	1	10	10	10	10	10	10	10	10		92.5%
	19	2	10	10 10	10	10	10 10	10	10	10		
	21	3	10	10	10 10	10	a	10	10	0		
<u> </u>	3	4	10	ID	10	9	8	8	8	8		0000
50	10	1	10	10	10	9	4-	9	9	9		92.5%
	18	2	10	10	10	10	10	10	10	10		
· · · · · · · · · · · · · · · · · · ·	5	3	10	10	10	9	9	9	9	9		
	6	4	10	10	_(()	10	10	9	9	4	2	92.5%
100	4	1	10	10	10	9	r	7	7	7	2	<u> </u>
	24	2	10	01	10	9	9	8	Ś	8		a se des pr
	17	3	10	9	7	6	6		6			
	9	4	ID	1Ö	9	9	9	69	9	ie 8		70%
		1										
		2										
		3			. <u></u>			 				
		4									_	
		1										
		2						L				
		3 4			<u></u>							
Tech Initials			~		170		0.1	~				
reen initials	.	6	ŝm	SM	KS	814	W	8M	PE !	k.		
Feeding Times: $0.2000 = 1.073 \circ 2.0800 = 3.0870 = 40730 = 5.0730 = 6.0730$												

1815 1300 1730 1600 1730 1730

Comments:

Analysts: Sm, m

AMEC Earth & Environmental Northwest Bioassay Lab 5009 Pacific Hwy. E., Suite 2 Fife, WA 98424

Client:	Unocal
---------	--------

Sample ID: $\#(0 \quad M \cup - \cup)$

Raw Data Sheet Fish Weights Seven Day Chronic Bioassay

Test Date: 5 101 03

Species: P. promelas

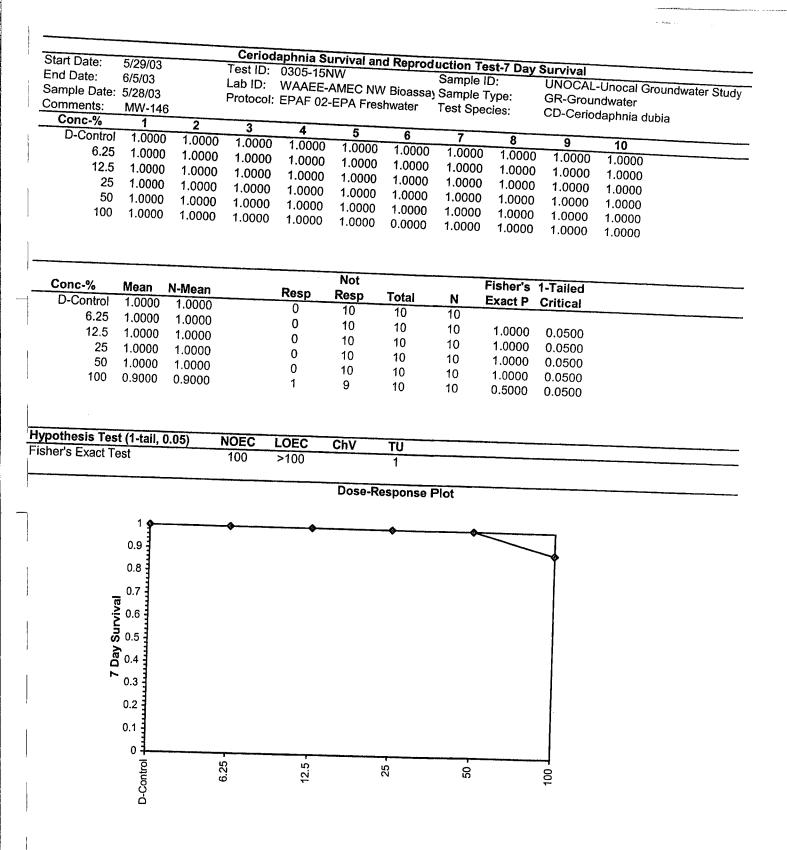
Test No: <u>0305-26NW</u>

90	cont	rep	pan wt.	pan + fish	fish wt.	#	avg. per fish	avg. per conc.
Conc.	#	#	(gm)	(gm)	(mg)	fish	(mg)	(mg)
CON	20	1	0.04164	.04703		9		
	2	2	0.04359	.04919		10		
	13	3	0.04186	.04784		10		
	14	4	0.04230	.04839		10		annan an ann an a' ann a'
6.25		1	0.04202	.04722		10		
	22	2	0.04556			9		
	16	3	0.04416	.04938		9		
	7	4	0.04414	.04895		7		
12.5	23	1	0.04402	.04944		10		
		2	0.04378	.04926		9		
	8	3	0.04420	.04854		8		
	15	4	0.04375	.04900		10		
25	12	1	0.04423	.04971		10		
	19	2	0.04611	.05086		10		
	21	3	0.04117	.04602		8		
	3	4		.04797		9		
50	10	1	0.04408	.04847		9		
	18	2	0.04616	.05050		10		
	5	3	0.04121	.04647		9		
	6	4	0.04364	.04830		ģ		
100	4	1		.04628		68		
	24	2	0.04453	the second s				
	17		0.04640			6 8		
	9	4	0.04377	.04675		8		
		1						
		2						
		3						
		4						and the second

Tare: SM Total: SM

6/5/03 1530 1600 Date/Time in: Date/Time out: 6/6/03 1830 **Oven temp. (°C):** 100

Ceriodaphnia dubia



Start Date:	5/29/03		Test ID	0205 45	urvival a	nd Repro	duction	Test-Repr	oduction			
End Date:	6/5/03		Lab ID:	0305-15	NW		Sampl	e ID.	UNIOCA	1.1.		
Sample Date:	5/28/03		Protoco	WAAEE	AMEC NV	V Bioassa	Sample	e Type	GP Cm	L-Unocal	Groundwa	ater Stuc
Comments:	MW-146	3 /	0 a /	EPAF 02	-EPA Free	shwater	Test S	Decies		unuwaler		
Conc-%	1	2	<u>Day 6</u>	*******					CD-Ceri	odaphnia	dubia	
D-Control	17.000		20.000	4	5	6	7	8	9			
6.25				=		20.000	17.00	0 22.00		10		
12.5	20.000			=		23.000	14.00					
25	16.000				17.000	20.000	22.00					
50	9.000				19.000	13.000	20.00		-0.000			
100	3.000	1.000			13.000	14.000	19.00	0 14.000				
	-		~ 2.000	2.000	1.000	0.000	0.00					
									0.000	2.000	1	
				Transform	n: Untran	sformed				<u>.</u>		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%		Rank	1-Tailed			
D-Control	20.300	1.0000	20.300	16.000	29.000	20.777	<u>N</u>	Sum	Critical		Mean	N-Mea
6.25	21.000	1.0345	21.000	14.000	24.000	20.777 15.058	10				20.300	0.000
12.5	21.300	1.0493	21.300	17.000	26.000	12.332	10	114.00	75.00		21.000	
25	20.300	1.0000	20.300	13.000	29.000	23.111	10	117.00	75.00		21.300	-0.049
*50	14.900	0.7340	14.900	9.000	20.000		10	104.50	75.00		20.300	0.000
*100	1.300	0.0640	1.300	0.000	3.000	22.693	10	69.00	75.00		14.900	0.266
uxiliary Tests						81.488	10	55.00	75.00		1.300	
olmogorov D T	est indica	tes norma	al distribut			9	Statistic	55.00	Critical		1.300 Skew	0.936(Kurt
olmogorov D T artlett's Test in ypothesis Tes	est indica dicates ur t (1-tail, 0	1equal val 0.05)	al distribut riances (p	on (p > 0.0 = 5.40E-0	01) 3)	S 1	Statistic		Critical		1.300 Skew	0.936(Kurt
olmogorov D T artlett's Test in ypothesis Tes	est indica dicates ur t (1-tail, 0	1equal val 0.05)	al distribut riances (p NOEC	ion (p > 0.(= 5.40E-0; LOEC)1) 3) ChV	S () 1 TU	Statistic).76946		Critical		1.300 Skew	0.9360 Kurt
olmogorov D T artlett's Test in ypothesis Tes	est indica dicates ur t (1-tail, 0	1equal val 0.05)	al distribut riances (p	ion (p > 0.(= 5.40E-0; LOEC	01) 3)	S 1	Statistic).76946		Critical		1.300 Skew	0.9360 Kurt
olmogorov D T artlett's Test in ypothesis Tes teel's Many-On arameter	est indica dicates ur t i (1-tail, (e Rank Te Value	nequal val 0.05) est SE 9	al distribut riances (p NOEC 25	ion (p > 0.(= 5.40E-0; LOEC 50 3	01) 3) ChV 5.3553 aximum L	S C 1 TU 4 ikelihooc	6.5659 I-Probit		Critical		1.300 Skew	0.936(Kurt
olmogorov D T artlett's Test in ypothesis Tes teel's Many-On arameter ope 7	est indica dicates ur t i (1-tail, (e Rank Te Value	nequal val 0.05) est SE 9	al distribut riances (p NOEC 25	ion (p > 0.(= 5.40E-0; LOEC 50 3	01) 3) ChV 5.3553 aximum L	TU 4 ikelihooc	6tatistic 0.76946 16.5659 1-Probit Chi-Sq	Critical	Critical		1.300 <u>Skew</u> 0.30405	0.936(<u>Kurt</u> 0.68251
colmogorov D T artlett's Test in ypothesis Tes teel's Many-On arameter ope 7 tercept	est indica dicates ur t i (1-tail, (e Rank Te Value	SE 9 .28472	al distribut riances (p NOEC 25	on (p > 0.(= 5.40E-0; LOEC 50 3 ial Limits 0.65557	01) 3) ChV 5.3553 aximum L	TU 4 ikelihooc	6tatistic 0.76946 16.5659 1-Probit Chi-Sq		Critical 1.035 15.0863 P-value	Mu	1.300 Skew	0.936(
olmogorov D T artlett's Test in ypothesis Tes teel's Many-On arameter ope 7 tercept SCR Dint P	est indica dicates ur t (1-tail, C e Rank Te Value .13752 1 7.7518 2 robits	SE 9 .28472 .23523 % 9	al distribut riances (p NOEC 25 5% Fiduc -12.133 5% Fiduc	on (p > 0.(= 5.40E-0; LOEC 50 3 ial Limits 0.65557 -3.3708	01) 3) ChV 5.3553 aximum L	TU 4 ikelihooc	6.5659 6.5659 6.76946 6.5659 6.76255 1.0	Critical	Critical 1.035 15.0863 P-value	Mu	1.300 <u>Skew</u> 0.30405 Sigma	0.936(Kurt 0.68251
olmogorov D T artlett's Test in ypothesis Tes teel's Many-On arameter ope 7 tercept SCR Dint P CO1	est indica dicates ur tt (1-tail, 0 e Rank Te Rank Te Value 7.13752 1 7.7518 2 robits 2.674 2	SE 9 .28472 .23523 % 9 8.8838 2	al distribut riances (p NOEC 25 5% Fiduc -12.133 5% Fiduc 20.1268	on (p > 0.(= 5.40E-0; LOEC 50 3 ial Limits 0.65557 -3.3708 al Limits 4.5923	01) 3) ChV 5.3553 aximum L	TU 4 ikelihooc	Statistic 0.76946 16.5659 1-Probit Chi-Sq 0.76255	Critical	Critical 1.035 15.0863 P-value	Mu	1.300 <u>Skew</u> 0.30405 Sigma	0.936(Kurt 0.68251
olmogorov D T artlett's Test in ypothesis Tes teel's Many-On arameter ope 7 tercept - SCR - Dint P C01 C05	est indica dicates ur tt (1-tail, 0 e Rank Te Value .13752 1 7.7518 2 robits 2.674 2 3.355 3	SE 9 .28472 .23523 % 9 8.8838 2 5.9861 2	al distribut riances (p NOEC 25 5% Fiduc -12.133 5% Fiduc 20.1268 3 28.0743 4	on (p > 0.(= 5.40E-0; 50 3 ial Limits 0.65557 -3.3708 al Limits 14.5923 0 9782	01) 3) ChV 5.3553 aximum L	TU 4 ikelihooc	Statistic 0.76946 16.5659 I-Probit Chi-Sq .76255 1.0 0.9	Critical	Critical 1.035 15.0863 P-value	Mu	1.300 <u>Skew</u> 0.30405 Sigma	0.9360 Kurt 0.68251
olmogorov D T artlett's Test in ypothesis Tes teel's Many-On arameter ope 7 tercept - SCR bint P C01 C05 C10	est indica dicates ur tt (1-tail, 0 e Rank Te Value .13752 1 7.7518 2 robits 2.674 2 3.355 3 3.718 4	SE 9 .28472 .23523 % 9 8.8838 2 5.9861 2 0.4609 3	al distribut riances (p NOEC 25 5% Fiduc -12.133 5% Fiduc 20.1268 3 28.0743 4 33.4153 4	on (p > 0.0 = 5.40E-00 LOEC 50 3 Maial Limits 0.65557 -3.3708 al Limits 14.5923 0.9782 4.9975	01) 3) ChV 5.3553 aximum L	TU 4 ikelihooc	6.5659 1-Probit 2hi-Sq .76255 1.0 0.9 0.8	Critical	Critical 1.035 15.0863 P-value	Mu	1.300 <u>Skew</u> 0.30405 Sigma	0.936(Kurt 0.68251
olmogorov D T artlett's Test in ypothesis Tes teel's Many-On arameter ope 7 tercept - SCR - Dint P 201 205 210 215	est indica dicates ur t (1-tail, 0 e Rank Te .13752 1 7.7518 2 robits 2.674 2 3.355 3 3.718 4 3.964 4:	SE 9 .28472 .23523 % 9 8.8838 2 5.9861 2 0.4609 3 3.7903 3	al distribut riances (p NOEC 25 5% Fiduc 4.61947 9 -12.133 5% Fiduc 20.1268 3 28.0743 4 33.4153 4 37.4772 4	on (p > 0.0 = 5.40E-03 LOEC 50 3 Mi ial Limits 0.65557 -3.3708 al Limits 14.5923 0.9782 4.9975 8.0635	01) 3) ChV 5.3553 aximum L	TU 4 ikelihooc	Statistic 0.76946 16.5659 I-Probit Chi-Sq .76255 1.0 0.9	Critical	Critical 1.035 15.0863 P-value	Mu	1.300 <u>Skew</u> 0.30405 Sigma	0.936(Kurt 0.68251
olmogorov D T artlett's Test in ypothesis Tes teel's Many-On arameter ope 7 tercept - SCR bint P 201 205 210 215 220	est indica dicates ur t (1-tail, 0 e Rank Te .13752 1 7.7518 2 robits 2.674 2 3.355 3 3.718 4 3.964 4 4.158 40	SE 9 .28472 .28472 .28472 .23523 % 9 8.8838 2 5.9861 2 0.4609 3 3.7903 3 6.6307 4	al distribut riances (p NOEC 25 5% Fiduc 4.61947 20.1268 28.0743 4 33.4153 4 0.9394 5 5 4 0.9394 5	ial Limits 0.65557 -3.3708 al Limits 0.9782 4.9975 8.0635 0.7912	01) 3) ChV 5.3553 aximum L	TU 4 ikelihooc ontrol C 0 1	i-Probit i-Probit i-Probit i-Probit i-Probit i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-D i-P i-D i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq 	Critical	Critical 1.035 15.0863 P-value	Mu	1.300 <u>Skew</u> 0.30405 Sigma	0.936(Kurt 0.68251
Colmogorov D T Cartlett's Test in Iypothesis Test teel's Many-On arameter lope 7 tercept - SCR Dint P CO1 CO5 C10 C15 C20 C25	est indica dicates ur t (1-tail, 0 e Rank Te Rank Te 13752 1 7.7518 2 7.7518 2 2.674 2 3.355 3 3.718 4 3.964 4 4.158 40 4.326 45	SE 9 .28472 .23523 % 9 8.8838 2 5.9861 2 0.4609 3 3.7903 3 6.6307 4 9.2139 4	al distribut riances (p NOEC 25 25 25 25 25 25 25 25 25 25 25 25 25	ial Limits 0.65557 -3.3708 al Limits 0.65557 -3.3708 al Limits 0.9782 4.9975 8.0635 0.7912 3.4182	01) 3) ChV 5.3553 aximum L	TU TU 4 ikelihooc ontrol C 0 1	i-Probit i-Probit i-Probit i-Probit i-Probit i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-D i-P i-D i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq 	Critical	Critical 1.035 15.0863 P-value	Mu	1.300 <u>Skew</u> 0.30405 Sigma	0.936(Kurt 0.68251
colmogorov D T artlett's Test in ypothesis Tes teel's Many-On arameter ope 7 tercept - SCR Dint P CO1 CO5 C10 C15 C20 C25 C40	est indica dicates ur t (1-tail, 0 e Rank Te 2.674 2 3.355 3 3.718 4 3.964 4 4.158 40 4.326 45 4.747 56	SE 9 .28472 4 .23523 9 % 9 8.8838 2 5.9861 2 0.4609 3 3.7903 3 6.6307 4 9.2139 4 3.757 5	al distribut riances (p NOEC 25 5% Fiduc 25 5% Fiduc 20.1268 3 28.0743 4 33.4153 4 33.4153 4 0.9394 5 4.0281 5 1.8547 6	ion (p > 0.0 = 5.40E-03 LOEC 50 3 Mainits 0.65557 -3.3708 al Limits 0.65557 -3.3708 al Limits 0.9782 4.9975 8.0635 0.7912 3.4182 1.8607	01) 3) ChV 5.3553 aximum L	TU TU 4 ikelihooc ontrol C 0 1	i-Probit i-Probit i-Probit i-Probit i-Probit i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-Sq i-P i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq	Critical	Critical 1.035 15.0863 P-value	Mu	1.300 <u>Skew</u> 0.30405 Sigma	0.9360 Kurt 0.68251
Colmogorov D T Cartlett's Test in In the sis Test teel's Many-On Carameter Cope 7 tercept 5 CR Cont P Cont Cont Cont br>Cont Cont Cont Cont Cont Cont Cont Cont Cont	est indica dicates ur t (1-tail, 0 e Rank Te Rank Te 7.7518 2 7.7518 2 7.7518 2 7.7518 2 7.7518 2 7.7518 2 7.7518 2 7.7518 2 7.7518 2 7.7518 4 3.355 3 3.718 4 3.964 4 4.158 4 4.326 4 4.326 4 5.000 61	SE 9 2.28472 4 2.23523 9 % 9 8.8838 2 5.9861 2 0.4609 3 3.7903 3 6.6307 4 9.2139 4 3.3757 5 1.1768 5	al distribut riances (p NOEC 25 5% Fiduc 25 5% Fiduc 20.1268 3 28.0743 4 33.4153 4 37.4772 4 0.9394 5 4.0281 5 1.8547 6 6.3379 6	ion (p > 0.0 = 5.40E-03 LOEC 50 3 Maial Limits 0.65557 -3.3708 al Limits 0.9782 4.9975 8.0635 0.7912 3.4182 1.8607 8.6253	01) 3) ChV 5.3553 aximum L	TU TU 4 ikelihooc ontrol C 0 1	i-Probit i-Probit i-Probit i-Probit i-Probit i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-Sq i-P i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq	Critical	Critical 1.035 15.0863 P-value	Mu	1.300 <u>Skew</u> 0.30405 Sigma	0.936(Kurt 0.68251
Colmogorov D T Cartlett's Test in In the sis Test teel's Many-On Carameter Ope 7 tercept SCR Dint P CO1 CO5 C10 C15 C20 C25 C25 C20 C25 C25 C20 C25 C25 C25 C25 C25 C25 C25 C25 C25 C25	est indica dicates ur t (1-tail, 0 e Rank Te Rank Te 7.7518 2 7.7518 2 7.75	SE 9 2.28472 2 2.23523 9 % 9 8.8838 2 5.9861 2 0.4609 3 3.7903 3 6.6307 4 9.2139 4 3.3757 5 1.1768 5 3.868 6	al distribut riances (p 25 25 5% Fiduc 4.61947 § -12.133 5% Fiduc 20.1268 3 28.0743 4 33.4153 4 33.4153 4 33.4153 4 0.9394 5 4.0281 5 1.8547 6 6.3379 6 0.6841 7	ion (p > 0.0 = 5.40E-03 LOEC 50 3 ial Limits 0.65557 -3.3708 al Limits 0.9782 4.9975 8.0635 0.7912 3.4182 1.8607 8.6253 3.7877	01) 3) ChV 5.3553 aximum L	TU TU 4 ikelihooc ontrol C 0 1	Statistic 0.76946 16.5659 I-Probit Chi-Sq .76255 1.0 0.9 0.8 0.7 0.8 0.7 0.8 0.7 0.8 0.7 0.8 0.7 0.4	Critical	Critical 1.035 15.0863 P-value	Mu	1.300 <u>Skew</u> 0.30405 Sigma	0.936(Kurt 0.68251
lope 7 tercept - SCR - Dint P C01 - C05 - C10 - C15 - C20 - C25 - C40 - C50 - C60 - C75 -	est indica dicates ur t (1-tail, 0 e Rank Te Rank Te 7.7518 2 7.7518 2 7.75	SE 9 2.28472 2 2.23523 9 % 9 8.8838 2 5.9861 2 0.4609 3 3.7903 3 6.6307 4 9.2139 4 3.3757 5 1.1768 5 3.8688 6 3.0477 6	al distribut riances (p 25 25 25 25 25 25 25 25 25 25 25 25 25	ion (p > 0.0 = 5.40E-03 LOEC 50 3 ial Limits 0.65557 -3.3708 al Limits 0.9782 4.9975 8.0635 0.7912 3.4182 1.8607 8.6253 3.7877	01) 3) ChV 5.3553 aximum L	TU 4 ikelihooc ontrol C 0 1	i-Probit i-Probit i-Probit i-Probit i-Probit i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-P i-Sq i-P i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq i-Sq	Critical	Critical 1.035 15.0863 P-value	Mu	1.300 <u>Skew</u> 0.30405 Sigma	0.936(Kurt 0.68251

0.1

0.0

1

10

Dose %

100

1000

EC85 090 095

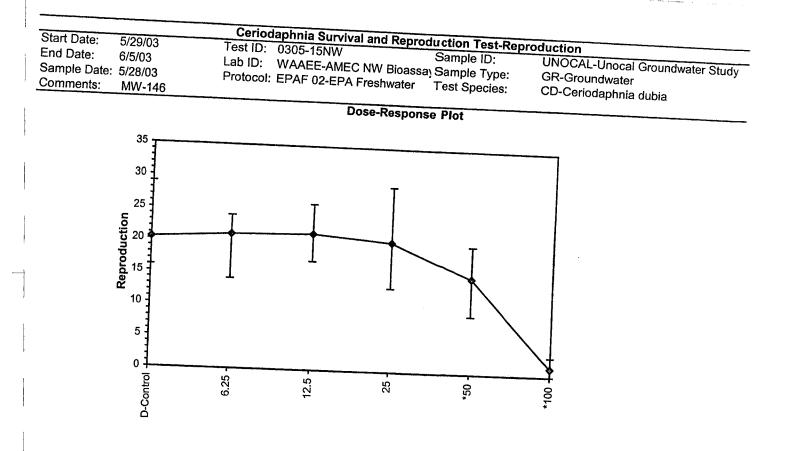
EC99

6.036 85.4665 74.5281 111.344

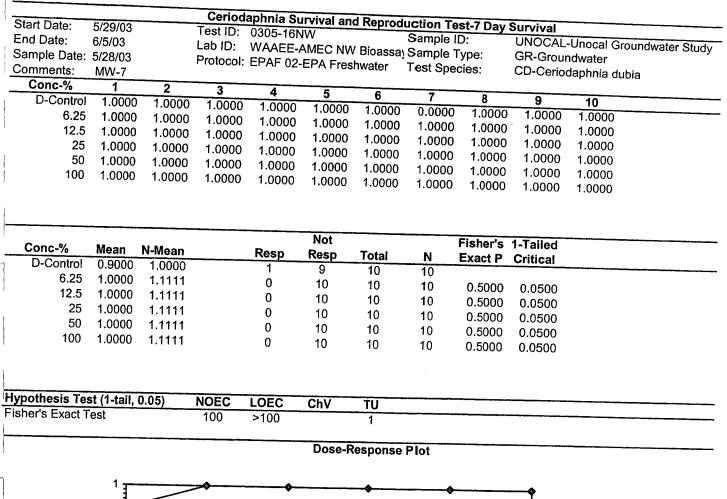
6.282 92.4992 79.2319 125.469 6.645 104.001 86.6575 149.934

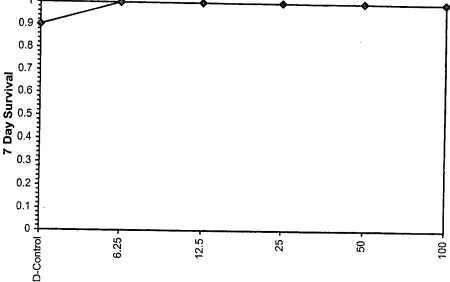
209.85

7.326 129.574 102.307



27-1-20-22-1-6 27-1-20-22-2-6 5-20-22-2-6-28 27-20-22-2-6-28 27-20-22-2-6-28 27-20-22-2-6-28 27-20-22-2-6-28 27-20-22-2-6-28 27-20-22-2-6-28 27-20-22-2-6-28 27-20-22-2-6-28 27-20-22-2-6-28 27-20-22-2-6-28 27-20-22-2-6-28 27-20-22-2-6-28 27-20-22-28 27-20-22-28 27-20-22-28 27-20-22-28 27-	Numerical Nation 12 12 12 12 12 12 12 12 12 12 12 12 12
5 0 7 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	and Environment Bioasse
	AMEC Earth AMEC E
2000 10 10 10 10 10 10 10 10 10 10 10 10	8 N N N N N N N N N N N N N N N N N N N
I Reproduction and Time: 0/2 M Time: 0/2 22 22 22 22 22 22 22 23 23 23 22 22 22	Bake Cotitate Big House Barate Bate
a 7-Day Chronic Survival and Reproduction Start Date and Time: 5/2 Stop Date and Time: 6/5 Stop Date and Time: 6/5 Page 22 11 AB 171 24 20 32 3 22 11 AB 120 32 4 47 20 32 5 39 10 44 12 20 32 5 39 25 39 25 39 26 28 8 60 28 9 7 30 10 44	Conc. Rep Cont. 50 1 144 3 4 5 3 4 5 9 5 3 10 2 24 10 2 24 10 2 24 10 2 24 10 2 24 10 2 24 10 2 24 10 2 24
y Chronic Su dayle dayle dayl 29 29 29 29 29 29 29 29 29 29 29 29 29	Et tt di la El di la Contra de Contr
-146 -146 -146 -146 -146	520040010101010 5200400101010 5200400101010 5200400101010 5200400101010 5200400101010 5200400101010 520040010101010 520040010101010 52004001010100 5200400100100 520040000000000000000000000000000000000
Ceriodaphni $M_{U} - /4$ $M_{U} - /4$ R R R R R R R R	0 20 511 ACC 0- 01 1 2 201 200 00 00 00 00 00 00 00 00 00 00 00 00
Mn. C.a. (# Cerio 05-15NW Daily Reproduction 2 3 4 5 4 7 8 4 7 8 10 4 4 7 8 10 4 4 7 8 10 4 7 8 10 10 10 10 10 10 10 10 10 10 10 10 10	4444 W 44WWW 24444 4 4 C 2016 2 C 2 C 2 C
HI HERE CARE	23 23 7 7 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
Client/Sample ID: Test Number: Conc. Rep Cont (0N 1 46 3 24 5 44 5 44 6 57 9 8 8 46 9 8 10 37 Analyst W.	Conc. Rep Conc. [0.15] 1 - 3 3 5 5 7 7 6 5 10 10 3 10 10 3 10 10 3 10 8 4 10 6 7 10 10 3 10 9 6 2 10 3 10 9 6 2 10 3 10 9 6 2 10 3 10 9 6 2 10 3 10





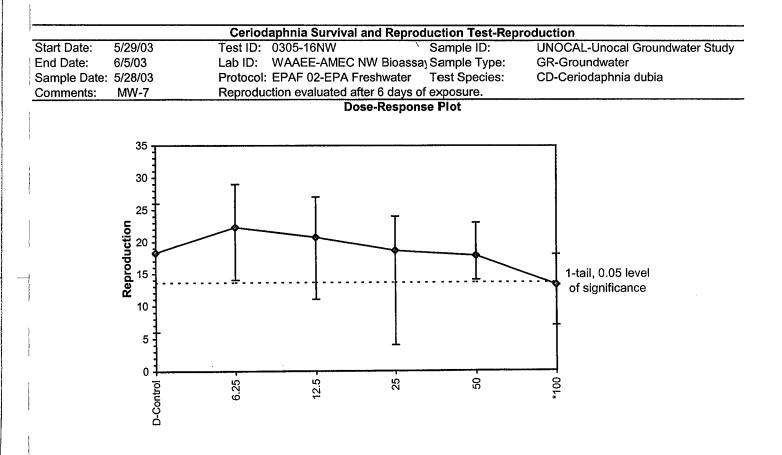
			Cerioda	aphnia Sur	vival and	Reprodu	iction Tes	t-Repro	duction	
Start Date: End Date: Sample Date:	5/29/03 6/5/03 5/28/03	l	Гest ID: _ab ID: Protocol:	0305-16NV WAAEE-A EPAF 02-E	V MEC NW PA Fresh	Bioassay water	Sample ID Sample Ty Test Speci	: ′pe:	UNOCAL-I GR-Groun	Unocal Groundwater Study dwater laphnia dubia
Comments:	MW-7		Reproduc	tion evalua	ted after (exposure.			10
Conc-%	1	2	3	4	5	6	7	8	9	and the second
D-Control	20.000	22.000	17.000	20.000	22.000	19.000	6.000	26.000		14.000
6.25		24.000	22.000	29.000	22.000	21.000	23.000	26.000	22.000	14.000
		16.000	25.000	24.000	22.000	20.000	11.000	17.000	27.000	18.000
12.5				20.000	23.000	22.000	16.000	16.000	4.000	24.000
25		19.000	20.000			17.000	22.000	16.000	17.000	17.000
50	16.000	20.000	23.000	14.000	16.000					18.000
100	18.000	13.000	9.000	12.000	15.000	16.000	12.000	12.000	7.000	10.000

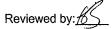
) 					Transform	n: Untrans	sformed			1-Tailed		N. Maan	
Conc-	%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	<u>N-Mean</u> 0.0000
D-Co		18.300	1.0000	18.300	6.000	26.000	29.713	10				18.300	
	6.25	22.300	1.2186	22.300	14.000	29.000	17.566	10	-1.940	2.287	4.715	22.300	
	12.5	20.700	1.1311	20.700	11.000	27.000	25.364	10	-1.164	2.287	4.715	20,700	
)	25	18.600	1.0164	18.600	4.000	24.000	31.164	10	-0.145	2.287	4.715	18.600	
		17.800	0.9727	17.800	14.000	23.000	16.282	10	0.242	2.287	4.715	17.800	
ļ	50			13.200	7.000	18.000	27.385	10	2.473	2.287	4.715	13.200	0.2787
	*100	13.200	0.7213	13.200	1.000	10.000							

1						Statistic		Critical		Skew	Kurt
	Auxiliary Tests	1.17.6.1.	tion (n > l	2.01)		0.84948		1.035		-0.9834	1.7284
	Kolmogorov D Test indicates norm	nai distribu	tion (p > 0	5.01)		5.98213		15.0863			
	Bartlett's Test indicates equal varia	ances (p =	0.31)	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
<i>.</i>	Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV		4.71491			21,2574	0.00166	5, 54
	Dunnett's Test	50	100	70.7107	2	4.7 (49)	0.20100	00.0101	_ ,, _ ,,		

					Ma	ximum Likeliho	od-Probit					
1	Deservedar	Value	SE	95% Fidu	cial Limits	Control	Chi-Sq	Critical		Mu	Sigma	Iter
	Parameter	and the second	8.15506	the second s	30.4444	0	33.5959	7.81472	2.4E-07	2.13058	0.22265	3
	Slope	4.49131	16.2375		47.1058							
	Intercept	-4.5691	10.2375	-30.244	41.1000		1 .0 т				7	
	TSCR		%	05% Eidu	cial Limits		1			/		
,	Point	Probits			Clar Ennico		0.9 -			/		
	EC01	2.674	40.9835				0.8 -					
ļ	EC05	3.355					07					
	EC10	3.718					0.7 -					
ł	EC15	3.964					• 0.6 • 0.5 • 0.5 • 0.4					
{	EC20	4.158					Ĕ.			1	1	
J.	EC25	4.326					ġ. U.S .			1	i	
	EC40	4.747	118.623	3			ö 0.4 -	ł				
1	EC50	5.000	135.075	5			0.3					
1	EC60	5.253					0.0 -			Ÿ		
'	EC75	5.674	190.876	3			0.2 ·				1	
	EC80	5.842	207.953	3			0.1	1			1	
	EC85	6.036	229.79	5			0.1	4		6	1	
	EC90	6.282		5			0.0	┼──┲──┲╼┲	@ ~~+\$+-	f i m	4000	
	EC95	6.645		1				1	10	100	1000	
ī	EC99		445.18	7					Dose	e %		

EC99 7.326 445.187 Significant heterogeneity detected (p = 2.41E-07)





	a npo	8 Total	27	90	22	23	22	16	94	24			Total	6)	20	23	4	9	L	27	10		Total	8	3	0	12	S	10	77	1 2	18
				0 14] [4	0 13	8 15	2	3 =	- -		6 2 2 8		Oll	0 13	~	212	_	C1 0	4 13	201	5	4	10		8		0		t-f	+
1407	duction		5		8 8	δ	8			8	7			Ś		80	<u>'</u>	Ś	$\frac{1}{2}$	9				8	9		9	, "		5 L	n±	6 8
0	Daily Reproduction	T S	4 h			η		9		m			15 S.		- N26		4				70	-10	1		4	B	9			_	'n	
ction 5/29/b \$/5/0	Dai	10 C			~		4		4				2.		Į	¥)		4	2	9	60		2					2	61	5		4
aphnia 7-Day Chronic Survival and Reproduction $\frac{-7}{-7}$ Start Date and Time: $\frac{5/2}{6/5}$		Cont 1	31		7	10	_	20	20	In In			Cont 1	/	6	28	\mathcal{N}^{\prime}	<u> </u>				25	Cont 7	、		0	3		7	4		2
rvival and Reprod Start Date and Time: Stop Date and Time:		Rep				5	6 <u>/(</u>	5	0	10			Rep	1 2	2 29					27	2 0	Ť_	Rep Co	7 1 2	2 24	3 20		5 //	5	4.	0 0 0 0 0 0	
burviva Start 1 Stop 1		Conc.	25										Conc.	50										001								
ronic S	TWOD 0		7.2		С 20	31			7 <u>7</u>	12		g	17		_				-T		<u> </u>		F		- 1		T					T-J
Day Ch	anto		26		20	22	g	X A C		4		dayle	製品	20	77	22	24	27	2	23	200	4	Total	11	9	25	24	122	120		12	28
nnia 7-I		8 2	v t	14	0	Ň	e			N	~		8 22	15	2	2	5	2	±	<u> </u>	25	5	8 2	٩		0		13	<u>_</u>	27		1
Ceriodapł M W ~ 7	uo	9	8=	101	6	2	8			0/	な		9.6	6	6/		<u>e</u>	6	9		ne	25	<u>6 6 5</u>	re	_	3	3	0	5-1			10
	producti	<u> 90</u>	4 L	+	8	8		0	_		F 24		1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	8		-	6	, q					4.2 2.5	0		6	_		+	4		
6 MW	Daily Reproduction	3.4	44	4 3	4	4	<u>}</u>	$\overline{\mathbf{A}}$	24	4	NE N			3 5		4	4		4		44 20	\	2 3 3 4	<i>S</i>		A	4	<u>A</u>	4		410 2	3
Unocal #		2											2.2												_					2 	<u> </u>	
		Cont 1	n t	7	2	40	3	8			m		Cont 1	36	4	2	~	v	38		7	2	Cont 1	. 91	0	7	. 0.	4		-	10	
Client/Sample ID: Test Number:		a	10	1		-		20	-	10 7	t V		Rep Co	-	2		4	7	+	L .	x 0 2/2	10 4	Rep Co	$1 \frac{46}{6}$		n V			0 0	<u>6</u> 1 2		10 ک
Client/Sample Test Number:		-	CUN								Analyst		Conc.	6. ک									onc.	12.5								

AMEC Earth and Environmental Northwest Bioassay Lab

			Cerioda	phnia Sur	vival and	Reproduc	sample ID	t-7 Day S	INOCAL-L	Jnocal Groundwater Stud
	5/29/03		est ID: ()305-17N\ NAAEE-A				-	GR-Ground	
	6/5/03	L	ab ID: \			Bloassa) c	est Spec	1		aphnia dubia
ample Date:	5/28/03	F	rotocol: 1	EPAF 02-E	EPA Flesh	water	esi opco			
Comments:	<u>MW-17</u>		3	4	5	6	7	8	9	10
Conc-%	1	2	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
D-Control	1.0000	1.0000	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	1.0000
100	1.0000	1.0000	1.0000	1.0000	1.0000					
					Not			Fisher's		
Conc-%	Mean	N-Mean		Resp	Resp	Total	<u>N</u>	Exact P	Untital	·····
D-Control	1.0000	1.0000		0	10	10	10	1.0000	0.0100	
6.25		1.0000		0	10	10	10	1.0000	0.0100	
12.5		1.0000		0	10	10	10	1.0000	0.0100	
25		1.0000		0	10	10	10	1.0000		
50				0	10	10	10 10	1.0000		
100	1.0000	1.00 00		0	10	10	10	1.0000	0.0100	
Hypothesis 1 Fisher's Exac		, 0.017	NOEC 100	LOEC >100	Dece	1 -Respons	e Plot			
	<u> </u>				Dose	-Kespons				
	1 🛛		_		>			~		
	1									
	0.9									
	0.8									
	:									
	0.7 18									
	Š 0.6									
	7 Day Survi									
	e0 0.4									
	۲ _{0.3}									
		3								i.
	0.2	1							l	
	0.1	3								
]								
	0	+ 	ي بو		12.5 -	25 .		50	100	
		D-Control	6.25		12	- •			N P P P	
		ដ								
		7								

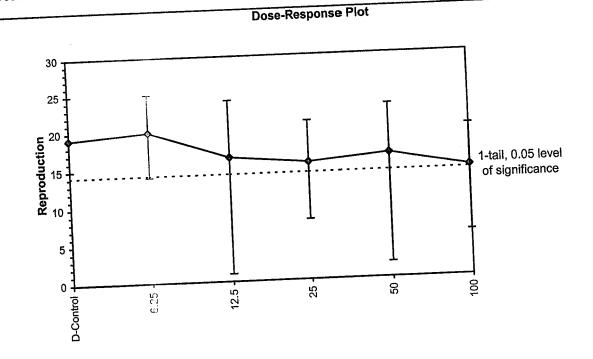
!

÷

				- hain Cur	vival and	Reprodu	uction Test	t-Reproc	luction		
End Date: Sample Date:	5/29/03 6/5/03 5/28/03	T	est ID: 0 ab ID: 1	0305-17NV WAAEE-AI	V MEC NW DA Fresh	Bioassay water	Sample ID: Sample Ty Test Speci- oduction thr	pe: es:	GR-Ground	aphnia dubia	water Study
Comments: Conc-%	MW-17 1	2	3	4	5 23.000	6 16.000		8 17.000		<u>10</u> 23.000	
D-Control 6.25		17.000 14.000	15.000 18.000	15.000	21.000	21.000	22.000	20.000	19.000 1.000	25.000 17.000	
12.5	18.000	13.000 15.000	20.000 21.000		12.000 8.000 23.000	21.000 13.000 9.000	17.000	11.000	17.000	19.000 20.000	
50 100		20.000 16.000	20.000 20.000	16.000 12.000	23.000 16.000	17.000		18.000	6.000	12.000	

				ransform	. Untrans	formed			1-Tailed		
 		N Moon	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	
Conc-% D-Control 6.25 12.5 25 50 100	Mean 19.100 19.900 16.400 15.500 16.400 14.500	1.0419 0.8586 0.8115 0.8586	19.100 19.900 16.400 15.500 16.400	15.000 14.000 1.000 8.000 2.000 6.000	25.000	19.189 17.798 39.538 25.672 38.906 27.249	10 10 10 10 10 10	-0.370 1.249 1.665 1.249 2.128	2.287 2.287 2.287 2.287 2.287 2.287	4.943 4.943 4.943 4.943 4.943	

		Statistic	Critical	Skew	Kurt 2.0184
	Auxiliary Tests Kolmogorov D Test indicates normal distribution (p > 0.01)	0.83908	1.035 15.0863	-1.1818	2.0104
	Portlett's Test indicates equal variances (p = 0.2.1)	<u>7.11371</u> MSDu		ISE F-Prob	df
ļ	Hypothesis Test (1-tail, 0.05) NOEC LOLO		0.25879 44.0667 23	.363 0.11198	5, 54
	Dunnett's Test 100 >100	_			



	9 1									tal		C			3	-1	ar		_0		otal				0	<u>r-k</u>	0D	do	П	imental say Lab
			22	24	143		F	61				10	12	51	2	5	캭	+	12			13	12				شامتر +			I Enviror st Bioass
							-1-	5				2	2 1						2											Earth and Northwe
				=		\vdash		5	-				╉──	3	101	0			- Je	- > >	1993002 1993002	1		~			4		-6	AMEC E
1600	action		17			00								5		S			2		2	0	-~	٦v	0	Ŷ	4	۲	2	
	eprodu	1			5		4	2			۲. ر	1	7 e		s	ţ	9	90/	2,	3	Ŧ		7	0	9			7		
103	aily R(21/2	47	16	14	7	N4	5			0	-	+	#4	S		N		- X		C.	n r	1-	#	4	4	N	40	JM	
tion 5/29 6/5/	D	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $																												
Ceriodaphnia 7-Day Chronic Survival and Reproduction Start Date and Time: $\frac{S/2}{6/5}$ Stop Date and Time: $\frac{6/5}{6}$		1268			_									-							nt 1	+		+					1	
rvival and Reprod Start Date and Time: Stop Date and Time:			87	32	86	4	72	<u>-</u>			_	0- 0-	ΞĮ	10		-	1-			-			+	217	3/3	17	\uparrow	4		1 1
al an t Date Date		- Kep	0 0	4	רי ה 		∞ <	10				- Ba	2 0	<u>ار</u>		9	7	8	6		nc. Re			<u> </u>						
uurviv Starl Stop		<u>9</u> 8								l	<u>.</u>	\mathcal{S}									Ű	9		1772						
onic S	day'		2	<u>8</u>	9 C 6 C	18	3	25	2	Å					- <u>-</u>	_		T	7	7	le I							ГŢ		ן ר
/ Chr	τ./	1.221	Ξī	50	с! : ці :	2	<u> </u>	26	2	day	Tota	2	<u>7</u> 6	<u>/</u>	2	10	10	19	67	2	Tot	8	<u></u>	8:	75		12	12	-12	
7-Day		2									8									_	1998				_	+	+			
hnia		$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$																												
iodap	uo	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$																												
Cer	oducti	9		10		24		6	1		9:5			5-1	+		+-													- 0
ms	/ Repr	T Ġ	┼╌┼	-+	┼─┝		11			$\frac{1}{2}$								+											$\left \cdot \right $	
#	Daily	<u>nu</u>	10	<u>1 N</u>		<u> 0]</u>	η M	M.		-	2	4		ব	ίν]	4	1	1	1 14	7	S10017	322	-	7	V		1		┝─┼	
Unocal #3							+		3	Å							+	╀												
		ont a	-0-			2011	$\frac{1}{1}$	5		2	ont	1	9	0	Ŭ L	0	4	17	t C	24	-		10	5	_	6	1		2	107
Client/Sample ID:Tt. Niumber	IDGI.				-	-	7											-						10		S	0	\ α	6	10
Client/Sample Toot Number										IGLIAN		-	2									_								
Cli	ย เ	SK	3						總 -		C	2										<u> - -</u>	-182							

End Date:	5/29/03 6/5/03 5/28/03		Test ID: 0	phnia Surv 0305-18NV WAAEE-AI EPAF 02-E	V MEC NW I	e Bioassay	sample ID.	pe: (GR-Ground	aphnia dubia
Comments: Conc-% D-Control 6.25 12.5 25 50 100	1.0000 1.0000 1.0000 1.0000	2 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000	3 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000		5 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000	6 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000	7 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000	8 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000	9 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000	10 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
Conc-% D-Contro 6.2		N-Mean 1.0000 1.0000))	Resp 0 0	Not Resp 10 10 10	Total 10 10 10	N 10 10 10	Fisher's Exact P 1.0000 1.0000	0.0500	

1.0000

1.0000

1.0000

0.0500

0.0500

0.0500

10

10

10

10

10

10

10

TU

1

10

10

10

10

ChV

0

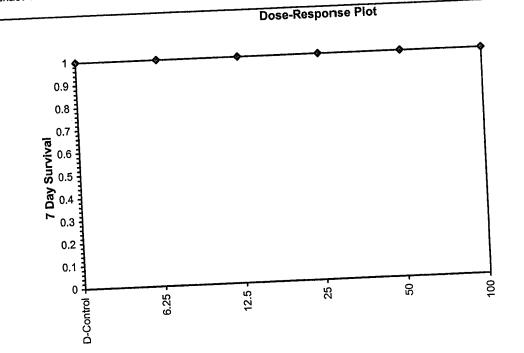
0

0

0

LOEC

>100



12.5

25

50

100

Hypothesis Test (1-tail, 0.05) Fisher's Exact Test

1.0000

1.0000

1.0000

1.0000

1.0000

1.0000

1.0000

1.0000

NOEC

100

			Ceriod	aphnia Su	rvival and	Reproc	uction Tes	st-Repro	duction	
Start Date:	5/29/03		Test ID:	0305-18N			Sample ID			Unocal Groundwater Study
End Date:	6/5/03		Lab ID:	WAAEE-A	MEC NW	Bioassa	Sample Ty		GR-Groun	
Sample Date:	5/28/03			EPAF 02-I			Test Spec			laphnia dubia
Comments:	MW-103R		Reproduc	tion throug	h Day 6					
Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	19.000	20.000	19.000	18.000	21.000	26.000	17.000	17.000	23.000	16.000
6.25	24.000	22.000	24.000	19.000	15.000	22.000	16.000	23.000	21.000	21.000
12.5	16.000	15.000	16.000	20.000	21.000	19.000	20.000	22.000	18.000	21.000
25	16.000	18.000	14.000	16.000	9.000	12.000	20.000	16.000	9.000	25.000
50	10.000	13.000	14.000	14.000	17.000	16.000	6.000	12.000	10.000	4.000
100	13.000	6.000	5.000	6.000	12.000	13.000	26.000	22.000	12.000	19.000

		_		Transform	n: Untran	sformed			1-Tailed		Isot	onic
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	19.600	1.0000	19.600	16.000	26.000	15.624	10				20.150	1.0000
6.25	20.700	1.0561	20.700	15.000	24.000	15.115	10	-0.558	2.287	4.504	20.150	1.0000
12.5	18.800	0.9592	18.800	15.000	22.000	12.981	10	0.406	2.287	4.504	18.800	0.9330
25	15.500	0.7908	15.500	9.000	25.000	31.643	10	2.082	2.287	4.504	15.500	0.7692
*50	11.600	0.5918	11.600	4.000	17.000	35.937	10	4.062	2.287	4.504	12.500	0.6203
*100	13.400	0.6837	13.400	5.000	26.000	52.675	10	3.148	2.287	4.504	12.500	0.6203

Auxiliary Tests					Statistic		Critical	·····	Skew	Kurt
Kolmogorov D Test indicates nor	mal distribu	ition (p >	0.01)		0.60123		1.035		0.32661	0.71017
Bartlett's Test indicates equal var	iances (p =	0.02)			13.308		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	25	50	35.3553	4	4.50378	0.22978	134.2	19.3963	4.7E-05	5, 54

				Linea	ar Interpolatio	n (200 Resamples	s)
Point	%	SD	95%		Skew	. ,	
IC05	10.914	3.295	4.213	18.429	0.7325		
IC10	15.019	3.866	9.794	24.628	0.9366		
IC15	18.835	4.742	12.261	30.693	0.9142	1.0	······································
IC20	22.652	5.719	16.376	36.801	0.9270	0.9	
IC25	28.229					-	
IC40	>100					0.8 -	
IC50	>100					0.7	
					·	0.6	
						% 0.5	
						5 0.4	a
						1 H H	
						0.2 -	¥

0.1 0.0

-0.1 -0.2 0

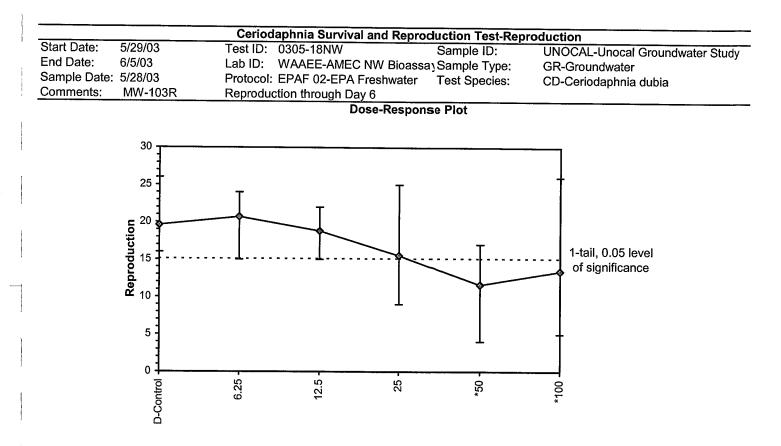
50

Dose %

100



150



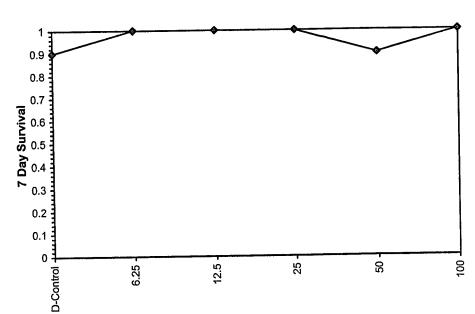
Reviewed by:

103 1525 201 1555 201 15555 201 15555 201 15555 201 15555 201 15555 201 15555 201 10	Nr. Shill alive Mr. Shill alive Mr. Shill alive Mr. Shill alive Mr. Shill alive
Ceriodaphnia 7-Day Chronic Survival and Reproduction Ayu Ju3-K Start Date and Time: Tart Date an	
1 01 622 7,6666 8 W1 2012 # 4	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
	9 7 9 7 9 7 10 48 7 10 28 7 10 23 55 13 7 10 23 55 23 55 23 55 23 55 23 55 23 55 23 55 25 23 55 25 <th25< th=""> <th26< th=""> <th26< th=""></th26<></th26<></th25<>

ì				Cerioda	phnia Sur	vival and	Reprodu	ction Test	t-7 Day S	Survival	
1	Start Date:	5/29/03		Fest ID: 0	0305-19NV	N		Sample ID	:		Jnocal Groundwater Study
	End Date:	6/5/03	l	.ab ID: \	NAAEE-A	MEC NW	Bioassay	Sample Ty		GR-Groun	
	Sample Date:	5/28/03	F	Protocol: E	EPAF 02-E	EPA Fresh	water	Test Speci	es:	CD-Ceriod	aphnia dubia
1	Comments:	MW-129									
	Conc-%	1	2	3	4	5	6	7	8	9	
	D-Control	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000
1	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
	25	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
,	50	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
j.	100		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

			<u> </u>	Not			Fisher's	1-Tailed	
Conc-%	Mean	N-Mean	Resp	Resp	Total	N	Exact P	Critical	
D-Control	0.9000	1.0000	1	9	10	10			
6.25	1.0000		0	10	10	10	0.5000	0.0500	
12.5	1.0000		0	10	10	10	0.5000	0.0500	
	1.0000		Õ	10	10	10	0.5000	0.0500	
25			1	9	10	10	0.7632	0.0500	
50	0.9000		1	-	10	10	0.5000	0.0500	
100	1.0000	1.1111	U	10	10	10	0.0000	0.0000	

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



Dose-Response Plot

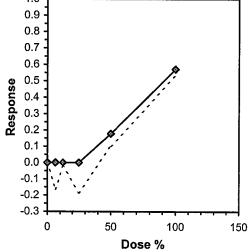
Reviewed by: 10

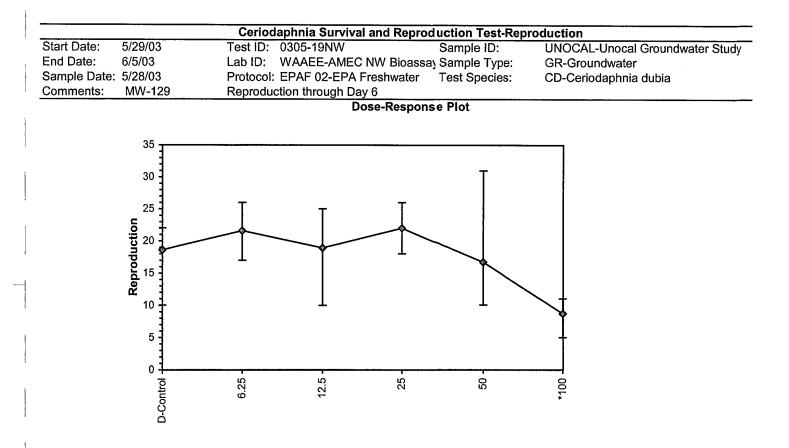
			Cerioda	aphnia Su	rvival and	Reprod	uction Tes	st-Repro	duction	
Start Date:	5/29/03			0305-19N			Sample ID			Unocal Groundwater Study
End Date:	6/5/03		Lab ID:	WAAEE-A	MEC NW	Bioassay	Sample Ty	/pe:	GR-Groun	
Sample Date:	5/28/03			EPAF 02-I			Test Spec	•		laphnia dubia
Comments:	MW-129		Reproduc	tion throug	h Day 6					
Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	10.000	21.000	18.000	19.000	19.000	21.000	19.000	18.000	22.000	
6.25	17.000	24.000	20.000	26.000	22.000	17.000	19.000	24.000	22,000	25.000
12.5	25.000	21.000	15.000	15.000	10.000	21.000	24.000	24.000	20.000	14.000
25	26.000	21.000	19.000	24.000	20.000	21.000	25.000	26.000	18.000	20.000
50	14.000	17.000	10.000	31.000	19.000	12.000	18.000	16.000	13.000	
100	8.000	9.000	9.000	5.000	9.000	10.000	8.000	10.000	8.000	11.000

		_		Transform	n: Untran	sformed		Rank	1-Tailed	Isot	onic
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
D-Control	18.556	1.0000	18.556	10.000	22.000	18.884	9			20.264	1.0000
6.25	21.600	1.1641	21.600	17.000	26.000	14.994	10	120.50	71.00	20,264	1.0000
12.5	18.900	1.0186	18.900	10.000	25.000	26.915	10	105.50	71.00	20.264	1.0000
25	22.000	1.1856	22.000	18.000	26.000	13.552	10	123.50	71.00	20.264	1.0000
50	16.667	0.8982	16.667	10.000	31.000	36,742	9	66.00	59.00	16.667	0.8225
*100	8.700	0.4689	8.700	5.000	11.000	18.809	10	57.00	71.00	8.700	0.4293

Auxiliary Tests		•			Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates norr	mal distribu	ition (p >	0.01)		0.68248	1.035	0.47869	2.66043
Bartlett's Test indicates unequal v	ariances (o = 9.09E	-03)		15.3178	15.0863		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	······	······································		
Wilcoxon Rank Sum Test	50	100	70.7107	2		······································		

				Linea	ar Interpolation	(200 Resamples)	
Point	%	SD	95%	CL	Skew	,	
IC05	32.042	10.834	9.944	54.187	-0.0406	·····	
IC10	39.083	9.183	27.872	58.478	0.3164		
IC15	46.125	8.662	34.182	62.716	0.2361	1.0	·····
IC20	52.859	8.584	39.390	66.955	-0.0090	0.9	
IC25	59.218	8.652	43.182	71.353	-0.2505	0.8	
IC40	78.295	6.592	62.772	85.929	-1.1954	•	
IC50	91.013	4.152	82.094	96.759	-1.0801	0.7 -	
						0.6 -	۵





	8 Total CC CC CC CC CC
$\overline{n}\overline{c}\overline{v}\overline{s}\overline{s}\overline{s}\overline{s}\overline{b}\overline{v}\overline{s}\overline{c}$	6 7 8 Total 4 8 70tal 5 13 8 70tal 6 7 8 70tal 7 7 8 70tal 7 7 8 70tal 7 7 8 70tal 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
1661 1640 16 16 16 16 16 16 16 16 16 16 16 16 16	
t-1 8t-1 e 7e 80 7e 80000	- 2 pp 32 april 2
eld state and added -x wat dat dat	
Ceriodaphnia 7-Day Chronic Survival and Reproduction $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	6 3286 33 = 1 Cont
Rep 6 4	Rep 4 1 1 1 1 2 2 2 7 7 6 6 9 9 8 8 10 10
Stop L Stop L Conc.	(00)
T ZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ	
Chronic Si	TOT JUN JUN
in The server of	NJECTOF NC
the second seco	
Ceriodal Mu 23 Ceriodal Mu 23 Ceriodal Mu 23 Ceriodal 23 Ceriod	2 1 8 8 8 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
2 - Decor L- DE COLLECTLE	- LMMAL L
$\frac{21 \pm 5}{12} \frac{21 \pm 5}{12} $	144 M44414
	2: 22 - 22 - 22 - 20 - 11 - Cont
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Rep Cont 1 1 1 2 2 4.3 5 3 5 14 5 6 7 7 2 8 16 5 1 10 5 7 2
ClientySample ID: Test Number: $\frac{Conc. Rep Cont}{2}$ $\frac{1}{6}$ $\frac{41}{3}$ $\frac{1}{3}$ $\frac{41}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{2}$ $\frac{6}{6}$ $\frac{9}{3}$ $\frac{1}{5}$ $\frac{1}{2}$	Conc. R

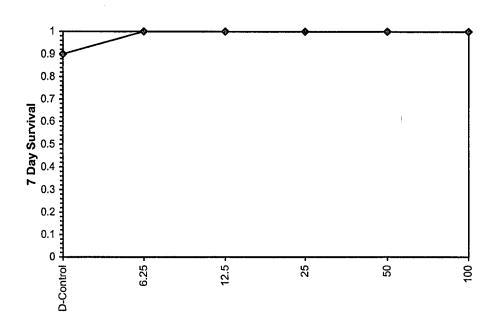
Northwest Bioassay Lab

				Cerioda	phnia Su	rvival and	Reprod	uction Tes	t-7 Day	Survival	
	Start Date:	5/29/03		Test ID:	0305-20N	W		Sample ID	:		Unocal Groundwater Study
1	End Date:	6/5/03		Lab ID:	WAAEE-A	MEC NW	Bioassay	Sample Ty	/pe:	GR-Groun	
	Sample Date:			Protocol:	EPAF 02-8	EPA Frest	water	Test Spec	ies:	CD-Cerioo	laphnia dubia
I	Comments:	MW-W						•			
	Conc-%	1	2	3	4	5	6	7	8	9	10
1	D-Control	0.0000	1.0000	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	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

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

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

Dose-Response Plot



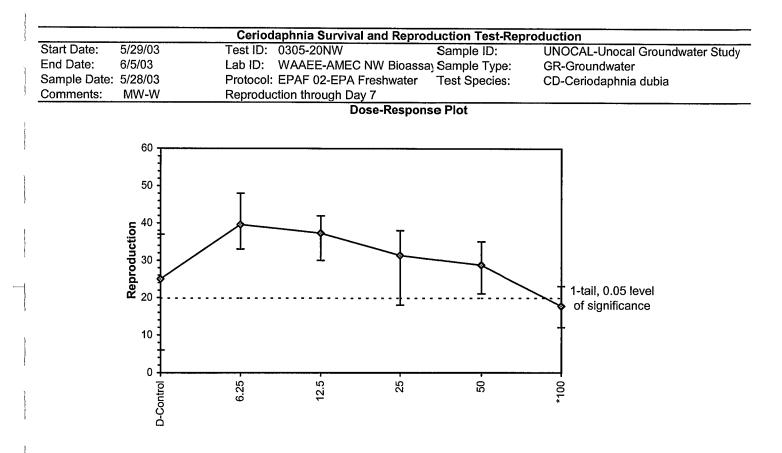
Ceriodaphnia Survival and Reproduction Test-Reproduction												
Start Date:	5/29/03	•	Test ID:	0305-20N	UNOCAL-Unocal Groundwater Study							
End Date:	6/5/03	1	_ab ID:	WAAEE-A	MEC NW	Bioassay	Sample Ty	/pe:	GR-Groun			
Sample Date:	5/28/03	1	Protocol: EPAF 02-EPA Freshwater Test Species: CD-Ceriodaphnia dubia									
Comments: MW-W Reproduction through Day 7												
Conc-%	1	2	3	4	5	6	7	8	9	10		
D-Control	6.000	29.000	29.000	25.000	37.000	21.000	22.000	28.000	25.000	28.000		
6.25	48.000	40.000	45.000	37.000	38.000	38.000	42.000	36.000	39.000	33.000		
12.5	40.000	42.000	38.000	34.000	30.000	37.000	37.000	34.000	41.000	40.000		
25	36.000	31.000	33.000	31.000	36.000	29.000	27.000	18.000	38.000	34.000		
50	28.000	27.000	27.000	28.000	29.000	31.000	32.000	29.000	21.000	35.000		
100	17.000	23.000	12.000	20.000	18.000	14.000	15.000	19.000	21.000	18.000		

					Transforn	n: Untran	sformed			1-Tailed	Isotonic		
	Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
_	D-Control	25.000	1.0000	25.000	6.000	37.000	32.111	10				33.967	1.0000
	6.25	39.600	1.5840	39.600	33.000	48.000	11.116	10	-6.405	2.287	5.212	33.967	1.0000
	12.5	37.300	1.4920	37.300	30.000	42.000	10.035	10	-5.396	2.287	5.212	33.967	1.0000
	25	31.300	1.2520	31.300	18.000	38.000	18.449	10	-2.764	2.287	5.212	31.300	0.9215
	50	28.700	1.1480	28.700	21.000	35.000	12.834	10	-1.623	2.287	5.212	28.700	0.8449
	*100	17.700	0.7080	17.700	12.000	23.000	18.84 2	10	3.203	2.287	5.212	17.700	0.5211

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Kolmogorov D Test indicates norn	0.01)		0.85982		1.035		-1.0647	3.68266		
Bartlett's Test indicates equal vari			10.7859		15.0863					
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	50	100	70.7107	2	5.21217	0.20849	650.187	25.9778	5.9E-13	5, 54

,			Linear Interpolation (200 Resample							
Point	%	SD	95%	CL	Skew					
IC05	20.461	6.645	15.893	36.441	1.0861					
IC10	32.019	9.726	19.286	52.332	0.3770					
IC15	48.349	10.559	22.678	59.668	-0.7462	1.0				
IC20	56.939	7.146	.39.884	65.971	-1.2240	0.9]				
IC25	64.659	5.583	52.087	72.952	-0.5052	0.8				
IC40	87.818					0.7 - 0.6 -				
IC50	>100					0.5				

1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.2 0.1 -0.2 -0.3 -0.4 -0.2 -0.3 -0.4 -0.2 -0.3 -0.4 -0.2 -0.3 -0.4 -0.5 -0.5 -0.4 -0.5 -0.5 -0.4 -0.5 -0.





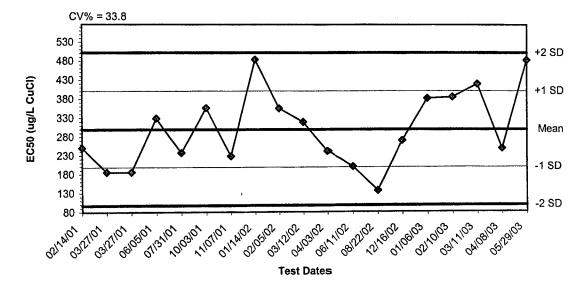
1615 1700 <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>1700</u> <u>17000000000000000000000000000000000000</u>	AMEC Earth and Environmental Total Total AMEC Earth and Environmental 0 1 0 0 0 0 0 0 0 0 0 0 1 0
7-Day Chronic Survival and Reproduction Start Date and Time: $5/29/63$ [6]5 Storp Date and Time: $5/29/63$ [6]5 Storp Date and Time: $5/29/63$ [6]5 Storp Date and Time: $5/29/63$ [6]5 1/12 20 1/2 22 1/2	Conc Rep Cont 1 2 3 3 1 3 3 3 3 4 3 7 7 3 3 5 3 4 3 7 4 5 3 4 3 7 4 6 3 7 7 7 4 9 7 7 7 7 3 7 7 7 4 3 7 7 7 6 7 7 3 4 6 7 7 3 4 7 7 7 3 4 7 7 7 3 4 7 7 7 3 4 9 4 8 7 7 9 4 8 7 7 9 9 7 7 7 9 9 7 7 7 9 9 7 7 7
$#b$ Ceriodaphnia $2b$ NW $Nu^{-}u$ $2b$ NW $Nu^{-}u$ $2b$ NW $Nu^{-}u$ $2b$ NW $Nu^{-}u$ 4 K2 8 K2 2 K3 8 K2 2 K3 8 K2 2 K3 8 K3 2 K3 10 K3<	8/0 1
Client/Sample ID: Mno.Cal Test Number: 0305- Conc. Rep Cont 1 2 2 /2 2 /2 5 /3 4/ 6 49 6 49 9 38 9 38 10 29 10 29 Mulyst Mu m. M.	Conc. Rep Cont A 2 50 2 3 333 333 4 52 23 5 23 9 9 45 1 10 20 1 2 55 1 2 5 1 10 20 1 10 20 1 10 4 7 10 4 7 5 7 4 7 4 7 9 47 1 10 4 7 10 4 7 9 42 1 10 4 7 9 42 1 9 42 1 9 47 7 9 47 4 10 4 20 5 10 4

Appendix H

Reference Toxicant Tests

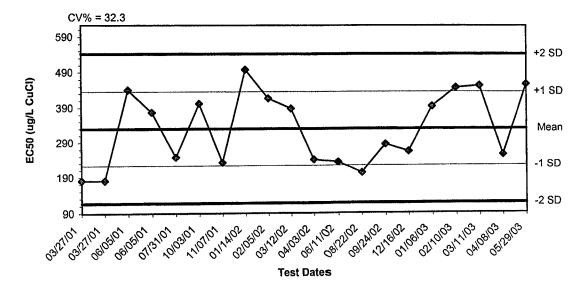
Atherinops affinis





Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
02/14/01	250,5039	299.5336	198.3053	97.0771	400.7618	501.9900
03/27/01	185.2787	299.5336	198.3053	97.0771	400.7618	501.9900
03/27/01	185.2787	299.5336	198.3053	97.0771	400.7618	501.9900
06/05/01	328,5079	299.5336	198.3053	97.0771	400.7618	501.9900
07/31/01	236.9808	299.5336	198.3053	97.0771	400.7618	501.9900
10/03/01	356,3646	299.5336	198.3053	97.0771	400.7618	501.9900
11/07/01	228.0437	299.5336	198.3053	97.0771	400.7618	501.9900
01/14/02	483.5422	299.5336	198.3053	97.0771	400.7618	501.9900
02/05/02	354,8769	299.5336	198.3053	97.0771	400.7618	501.9900
03/12/02	319,1384	299.5336	198.3053	97.0771	400.7618	501.9900
04/03/02	241.1836	299.5336	198.3053	97.0771	400.7618	
06/11/02		299.5336	198.3053	97.0771	400.7618	501.9900
08/22/02		299.5336	198.3053	97.0771	400.7618	
12/16/02		299.5336	198.3053	97.0771	400.7618	
01/06/03		299.5336	198.3053	97.0771	400.7618	
02/10/03		299.5336	198.3053	97.0771	400.7618	
03/11/03			198.3053	97.0771	400.7618	
04/08/03		299.5336	198.3053	97.0771	400.7618	
05/29/03		299.5336	198.3053	97.0771	400.7618	501.9900





Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
03/27/01	180,4179	329.4792	223.0672	116.6552	435.8913	542.3033
03/27/01	180.4179	329.4792	223.0672	116.6552	435.8913	542.3033
06/05/01	440,5936	329,4792	223.0672	116.6552	435.8913	542.3033
06/05/01	376,9499	329.4792	223.0672	116.6552	435.8913	542.3033
07/31/01	247.5874	329.4792	223.0672	116.6552	435.8913	542.3033
10/03/01	402.1123	329.4792	223.0672	116.6552	435.8913	542.3033
11/07/01	231.9856	329.4792	223.0672	116.6552	435.8913	542.3033
01/14/02	497.7609	329.4792	223.0672	116.6552	435.8913	542.3033
02/05/02	416.7067	329.4792	223.0672	116.6552	435.8913	542.3033
03/12/02	387.7426	329.4792	223.0672	116.6552	435.8913	542.3033
04/03/02	239.8788	329.4792	223.0672	116.6552	435.8913	542.3033
04/03/02	232.5774	329,4792	223,0672	116.6552	435.8913	542.3033
08/22/02	202.1067	329.4792	223.0672	116.6552	435.8913	542.3033
09/24/02	284,1359	329.4792	223.0672	116.6552	435.8913	542.3033
12/16/02	263.7032	329.4792			435.8913	542.3033
01/06/03	394.2657	329.4792			435.8913	542.3033
02/10/03	447.0627	329.4792			435.8913	542.3033
03/11/03	453.1027	329.4792			435.8913	542.3033
04/08/03	253.6458	329.4792			435.8913	542.3033
05/29/03	456.8309	329.4792			435.8913	542.3033

 Start Date:
 5/29/03

 End Date:
 6/5/03

 Sample Date:
 5/29/03

Comments:						
Conc-ug/L	1	2	3	4	5	
D-Control	0.8333	1.0000	1.0000	1.0000	1.0000	
37.5	1.0000	1.0000	1.0000	1.0000	1.0000	
75	1.0000	1.0000	1.0000	1.0000	1.0000	
150	1.0000	0.8333	1.0000	0.8333	1.0000	
300	1.0000	1.0000	1.0000	0.8333	1.0000	
600	0.1667	0.1667	0.1667	0.0000	0.1667	

Test ID: RT052903AA

			Tra	ansform:	Arcsin Sc	uare Root	Rank	1-Tailed	Number	Total	
Conc-ua/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
D-Control	0.9667	1.0000	1.3222	1.1503	1.3652	7.271	5			1	30
37.5	1.0000	1.0345	1.3652	1.3652	1.3652	0.000	5	30.00	16.00	0	30
75	1.0000	1.0345	1.3652	1.3652	1.3652	0.000	5	30.00	16.00	0	30
150	0.9333		1.2792	1.1503	1.3652	9.204	5	25.00	16.00	2	30
300	0.9667	1.0000	1.3222	1.1503	1.3652	7.271	5	27.50	16.00	1	30
*600	0.1333	0.1379	0.3775	0.2056	0.4205	25.464	5	15.00	16.00	26	30

Larval Fish Growth and Survival Test-7 Day Survival

Lab ID: WAAEE-AMEC NW Bioassay Sample Type:

Protocol: EPAW 95-EPA West Coast Test Species:

Sample ID:

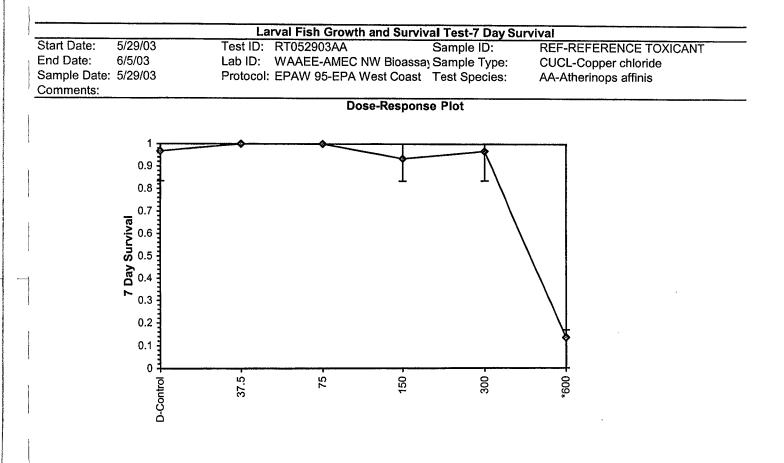
REF-REFERENCE TOXICANT

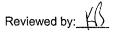
CUCL-Copper chloride

AA-Atherinops affinis

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non Equality of variance cannot be co		stribution	(p <= 0.01)		0.75189	0.9	-1.4191	1.02293
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	300	600	424.264					

					М	aximum Likelihoo	od-Probit					
ļ	Parameter	Value	SE	95% Fidu	cial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
	Slope	11.5593	5.30491	1.1617	21.957	0.03333	3.67522	7.81472	0.3	2.68342	0.08651	7
	Intercept	-26.019	14.6786	-54.789	2.75153							
ļ	TSCR	0.025	0.01425	-0.0029	0.05293		^{1.0} T			1		
	Point	Probits	ug/L		cial Limits		0.9					
1	EC01	2.674	303.506	0.81608	419.267		-			/¶/		
	EC05	3.355	347.635	3.1419	451.55		0.8 -			/ /		
]	EC10	3.718	373.726		470.073		0.7 -					
	EC15	3.964	392.426	10.4523	483.202		0.06					
	EC20	4.158	407.954	15.3505	494.069		se v.o]					
	EC25	4.326	421.764	21.3389	503.754		0 .5 -					
,	EC40	4.747	458.673	48.8295	530.167		6.0 Sestimate 6.0 Sestimate 8.0 Sestimate		/			
1	EC50	5.000	482.414	80.1249	548.212				/			
	EC60	5.253	507.385	130.899	569.38		0.3 -					
	EC75	5.674	551.786	286.941	625.532		0.2					
	EC80	5.842	570.465	377.29	674.289		-					
1	EC85	6.036	593.038	476.51	801.712		0.1 -					
	EC90	6.282	622.712	547.787	1163.17		0.0 -					
J	EC95	6.645	669.448	597.904	2274.58		0	.1 1	10	100 100	0 10000	
	EC99	7.326	766.784	658.584	8562.44				Dose ι	ıg/L		



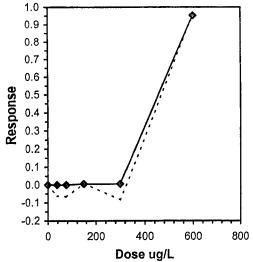


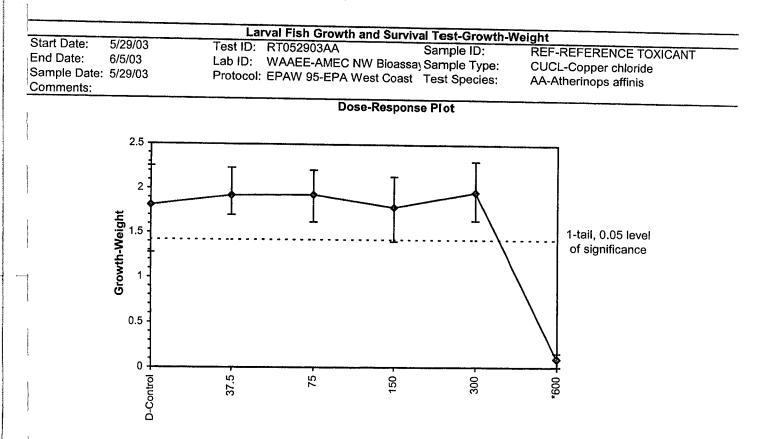
Start Date:	F (00)00		Lar	val Fish G	irowth and S	urvival Test-Growth-V	Veight
End Date: End Date: Sample Date: Comments:	5/29/03 6/5/03 5/29/03		Lab ID:	RT052903 WAAEE-A EPAW 95	MEC NW Bid	Sample ID: bassaySample Type: oast Test Species:	REF-REFERENCE TOXICANT CUCL-Copper chloride AA-Atherinops affinis
Conc-ug/L	1	2	3	4	5		
D-Control	1.2733	1.8850	1.7033	1.9283	2.2533		
37.5	2.0117	1.8433	1.8133	2.2383	1.7033		
75	2.1867	1.6217	1.8867	2.2117	1.7500		
150	2.1433	1.4033	2.0467	1.7533	1.6183		
300	2.1017	2.3150	1.7083	1.6400	2.0433		
600	0.1433	0.0817	0.0767	0.0000	0.1550		

				Transform: Untransformed					1-Tailed			Isotonic	
	Conc-ug/L	Mean	N-Mean	Mean	Min	Max	CV%	Ň	t-Stat	Critical	MSD	Mean	N-Mean
	D-Control	1.8087	1.0000	1.8087	1.2733	2.2533	19.849	5				1.8873	1.0000
}	37.5	1.9220	1.0627	1.9220	1.7033	2.2383	10.849	5	-0.679	2.360	0.3936	1.8873	1.0000
	75	1.9313	1.0678	1.9313	1.6217	2.2117	13.565	5	-0.735	2.360	0.3936	1.8873	1.0000
1	150	1.7930	0.9913	1.7930	1.4033	2.1433	16.985	5	0.094	2.360	0.3936	1.8773	0.9947
	300	1.9617	1.0846	1.9617	1.6400	2.3150	14.391	5	-0.917	2.360	0.3936	1.8773	0.9947
)	*600	0.0913	0.0505	0.0913	0.0000	0.1550	67.953	5	10.296	2.360	0.3936	0.0913	0.0484

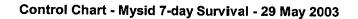
Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates nor	0.98352	0.9		-0.1316	-0.4057					
Bartlett's Test indicates equal var		8.51434		15.0863						
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	300	600	424.264		0.39363	0.21764	2.69972	0.06955	9.7E-11	5, 24

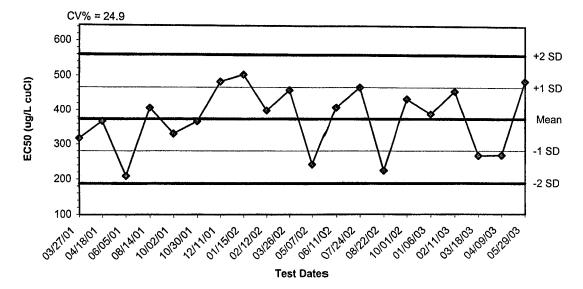
	Linear Interpolation (200 Resamples)										
Point	ug/L	SD	95% CL	.(Exp)	Skew						
IC05	314.17	98.76	0.00	316.97	-1.2271						
C10	330.02	54.31	25.46	333.10	-3.5450						
C15	345.87	28.32	286.99	349.23	-7.8369	1.0					
IC20	361.72	23.03	305.99	365.36	-9.7262	0.9	8				
IC25	377.58	10.96	325.69	381.49	-1.5932	0.8					
C40	425.13	8.83	384.22	429.88	-1.4963	4					
1C50	456.83	7.48	421.28	462.14	-1.3655	0.7 -					
						0.6 -	li li				
						8 0.5	<i> </i> :				



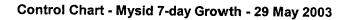


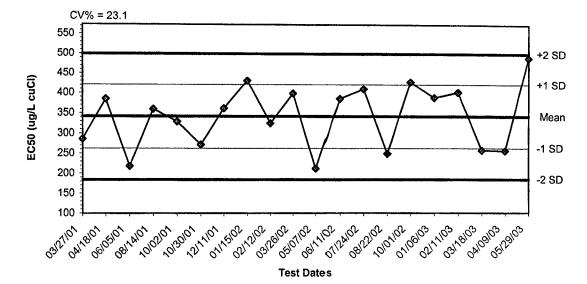
Mysidopsis bahia





Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
03/27/01	317.0925	373.6200	280.4460	187.2720	466.7941	559.9681
04/18/01	366.7758	373.6200	280.4460	187.2720	466.7941	559.9681
06/05/01	208.3945	373.6200	280.4460	187.2720	466.7941	559.9681
08/14/01	406.0594	373.6200	280.4460	187.2720	466.7941	559.9681
10/02/01	330.4267	373.6200	280.4460	187.2720	466.7941	559.9681
10/30/01	366.5167	373.6200	280.4460	187.2720	466.7941	559.9681
12/11/01	482.4718	373.6200	280.4460	187.2720	466.7941	559.9681
01/15/02	503.2507	373.6200	280.4460	187.2720	466.7941	559.9681
02/12/02	398.3546	373.6200	280.4460	187.2720	466.7941	559.9681
03/26/02	458.3692	373.6200	280.4460	187.2720	466.7941	559.9681
05/07/02	241.9284	373.6200	280.4460	187.2720	466.7941	559.9681
06/11/02	407.3106	373.6200	280.4460	187.2720	466.7941	559.9681
07/24/02	466.7756	373.6200	280.4460	187.2720	466.7941	559.9681
08/22/02	223.8779	373.6200	280.4460	187.2720	466.7941	559.9681
10/01/02	432.7500	373.6200	280.4460	187.2720	466.7941	559.9681
01/06/03	387.6680	373.6200	280.4460	187.2720	466.7941	559.9681
02/11/03	455.3662	373.6200	280.4460	187.2720	466.7941	559.9681
03/18/03		373.6200	280.4460	187.2720	466.7941	559.9681
04/09/03	267.7790	373.6200	280.4460	187.2720	466.7941	559.9681
05/29/03		373.6200	280.4460	187.2720	466.7941	559.9681





Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
03/27/01	285.7251	341.6162	262.6861	183.7559	420.5464	499.4765
04/18/01	384.4340	341.6162	262.6861	183.7559	420.5464	499.4765
06/05/01	217.8049	341.6162	262.6861	183.7559	420.5464	499.4765
08/14/01	359.1623	341.6162	262.6861	183.7559	420.5464	499.4765
10/02/01	328.3414	341.6162	262.6861	183.7559	420.5464	499.4765
10/30/01	271.1047	341.6162	262.6861	183.7559	420.5464	499.4765
12/11/01	360.8934	341.6162	262.6861	183.7559	420.5464	499.4765
01/15/02	430.2927	341.6162	262.6861	183.7559	420.5464	499.4765
02/12/02	324.3569	341.6162	262.6861	183.7559	420.5464	499.4765
03/26/02	398.0565	341.6162	262.6861	183.7559	420.5464	499.4765
05/07/02	211.5815	341.6162	262.6861	183.7559	420.5464	499.4765
06/11/02	384.8619	341.6162	262.6861	183.7559	420.5464	499.4765
07/24/02	408.9427	341.6162	262.6861	183.7559	420.5464	499.4765
08/22/02	249.0047	341.6162	262.6861	183.7559	420.5464	499.4765
10/01/02	427.1217	341.6162	262.6861	183.7559	420.5464	499.4765
01/06/03	387.8457	341.6162	262.6861	183.7559	420.5464	499.4765
02/11/03	400.6579	341.6162	262.6861	183.7559	420.5464	499.4765
03/18/03	257.3116	341.6162	262.6861	183.7559	420.5464	499.4765
04/09/03	256.0484	341.6162	262.6861	183.7559	420.5464	499.4765
05/29/03	488.7765	341.6162	262.6861	183.7559	420.5464	499.4765

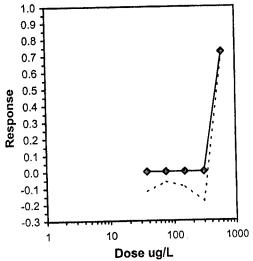
			Mysid	Survival,	Growth a	nd Fecun	dity Test-	7 Day Sι	
Start Date:	5/29/03			RT052903			Sample ID		REF-REFERENCE TOXICANT
End Date:	6/5/03			WAAEE-A					CUCL-Copper chloride
Sample Date:	5/28/03	F	Protocol:	EPAM 94-I	EPA Chro	nic Marin	Test Speci	ies:	MY-Mysidopsis bahia
Comments:									
Conc-ug/L	1	2	3	4	5	6	7	8	
D-Control	1.0000	0.6000	0.8000	0.8000	0.8000	0.8000	0.8000	1.0000	
37.5	1.0000	1.0000	1.0000	1.0000	0.8000	1.0000	1.0000	0.6000	
75	1.0000	1.0000	0.6000	1.0000	1.0000	1.0000	0.8000	0.6000	
150	1.0000	0.8000	1.0000	1.0000	1.0000	0.8000	1.0000	0.6000	
300	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.8000	
600	0.4000	0.2000	0.4000	0.0000	0.2000	0.2000	0.4000	0.2000	

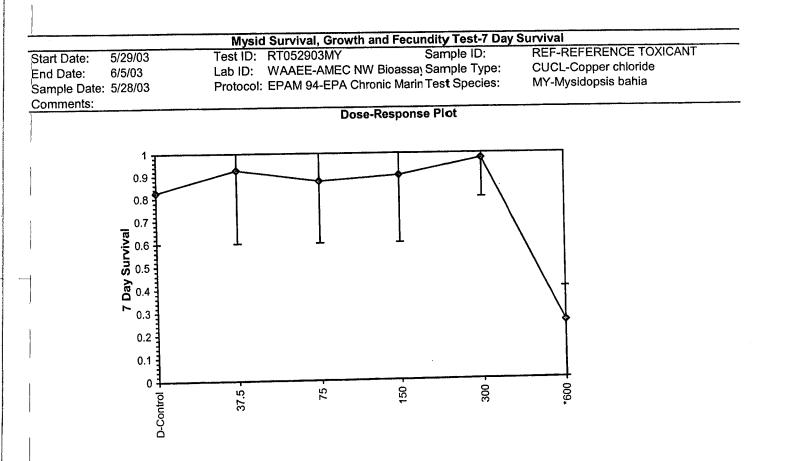
_				Tra	ansform:	Arcsin So	uare Root		Rank	1-Tailed	Number	Total
	Conc-ug/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
-	D-Control	0.8250	1.0000	1,1390	0.8861	1.3453	13.028	8			7	40
I			1.1212	1.2581	0.8861	1.3453	13.661	8	82.00	46.00	3	40
	37.5	0.9250			0.8861	1.3453	17.562	8	75.50	46.00	5	40
1	75	0.8750	1.0606	1.2007	-		14.264	8	78.50	46.00	4	40
	150	0.9000	1.0909	1.2283	0.8861	1.3453		+	88.50	46.00	1	40
	300	0.9750	1.1818	1.3155	1.1071		6.400	8			30	40
	*600	0.2500	0.3030	0.5168	0.2255	0.6847	31.093	8	36.00	46.00	50	40

					Statistic	Critical	Skew	Kurt
Auxiliary Tests		tribution	(n < -0.01)		0.89299	0.929	-0.929	0.05744
Shapiro-Wilk's Test indicates non-	normal dis		(p <= 0.01)		5.17544	15.0863		
Bartlett's Test indicates equal vari		0.39)		TU	0.17044			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	10				
Steel's Many-One Rank Test	300	600	424.264					

Steel's Many-One Rank Test

			Trimmed Spearman-Karber
Trim Level	EC50	95% CL	
0.0%			
5.0%			1.0
10.0%			1.0 - 0.9 -
20.0%			
Auto-27.8%	484.76	441.22 532.60	0.8 -
			0.7





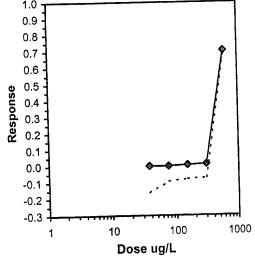
Reviewed by:

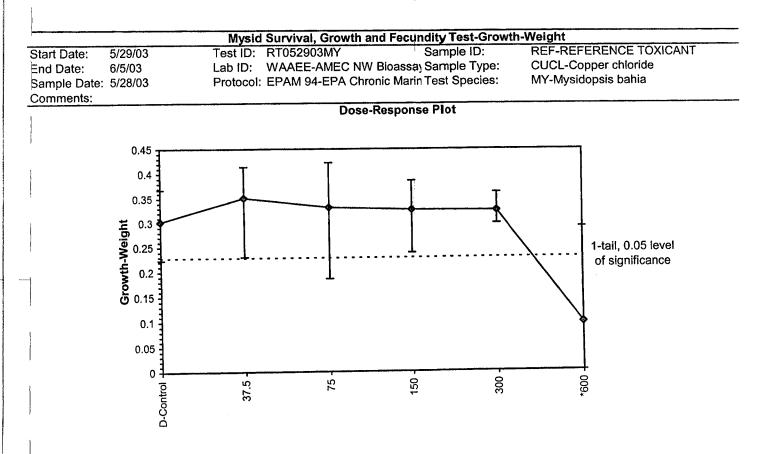
			Mysid S	Survival, C	Growth ar	d Fecuno	lity Test-(Growth-	Neight
End Date: Sample Date:	5/29/03 6/5/03 5/28/03	l	Fest ID: F	RT052903 WAAEE-A EPAM 94-1	MY MEC NW	Sioassa)	Sample ID Sample Ty	: pe:	REF-REFERENCE TOXICANT CUCL-Copper chloride MY-Mysidopsis bahia
Comments: Conc-ua/L	1	2	3	4	5	6	7	8	
D-Control	0.3380	0.2240	0.3680	0.2460	0.3580	0.3140	0.3120	0.2580	
37.5	0.3760	0.2920	0.4140	0.3420	0.3660	0.3960	0.3940	0.2300	
75	0.3360	0.4200	0.1860	0.4220	0.3480	0.3700	0.3500	0.2140	
150	0.3720	0.2700	0.3320	0.2960	0.3620	0.3540	0.3860	0.2380	
	0.3460	0.3000	0.3620	0.3180	0.3020	0.3620	0.3060	0.2980	
300 600	0.3460	0.0700	0.0980	0.0000	0.0660	0.0560	0.1180	0.2900)

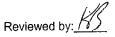
1				Transforn	n: Untrans	sformed			1-Tailed			N
 Conc-ug/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean 0.3023	<u>N-Mean</u> 0.0000
D-Control	0.3023	1.0000	0.3023	0.2240	0.3680	17.767	8		0.000	0 0747	0.3023	-0.1621
37.5	0.3513	1.1621	0.3513	0.2300	0.4140	17.647	8	-1.513	2.306	0.0747 0.0747	0.3308	-0.0943
75	0.3308	1.0943	0.3308	0.1860	0.4220	26.336	8	-0.880	2.306 2.306	0.0747	0.3263	-0.0794
150	0.3263	1.0794	0.3263	0.2380	0.3860	16.224	8	-0.741	2.306	0.0747	0.3243	
300	0.3243	1.0728	0.3243	0.2980	0.3620	8.619	8	-0.679	2.300	0.0747	0.0967	0.6799
*600	0.0967	0.3201	0.0967	0.0000	0.2900	88.147	8	6.346	2.300	0.0747	0.0007	0.0700

]					Statistic		Critical		Skew	Kurt
Auxiliary Tests	1 . 12 . 4 . 14	tion (n >	0.01)		0.97277		0.929		0.08425	1.40311
Shapiro-Wilk's Test indicates norm	nal distribu	(p > 1)	0.01)		9.31212		15.0863			
Bartlett's Test indicates equal varia	ances (p =	0.10)	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	and the second se		0.07467		0.07261	0.00419	2.8E-09	5, 42
Dunnett's Test	300	600	424.264		0.07401	0.21.07	••••			

			Trimmed Spearman-Karber	
Trim	Level EC50	95% CL		
	0.0% 5.0% 10.0% 20.0% 5-29.5% 488.78	3 389.09 614.00	1.0 0.9 0.8 0.7 0.6 0.5	¢

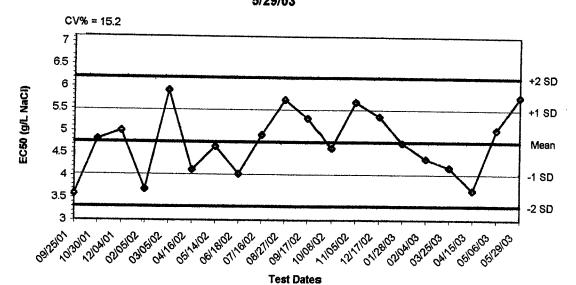




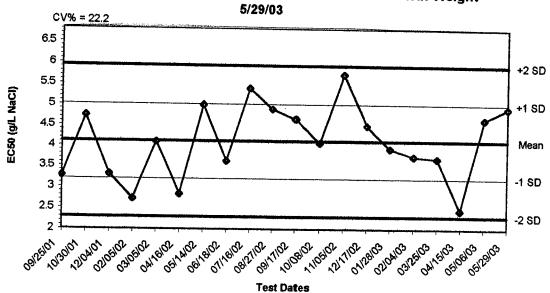


Pimephales promelas

Reference Toxicant Control Chart- Fathead Minnow 7 Day Survival 5/29/03



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
09/25/01	3.5877	4.7591	4.0341	3.3091	5.4841	6.2091
10/30/01	4.8178	4.7591	4.0341	3.3091	5.4841	6,2091
12/04/01	5.0108	4.7591	4.0341	3.3091	5.4841	6,2091
02/05/02	3.6907	4.7591	4.0341	3.3091	5.4841	6.2091
03/05/02	5.9134	4.7591	4.0341	3.3091	5.4841	6.2091
04/16/02	4.1310	4.7591	4.0341	3.3091	5.4841	6.2091
05/14/02	4.6588	4.7591	4.0341	3.3091	5.4841	6.2091
06/18/02	4.0381	4.7591	4.0341	3.3091	5.4841	6.2091
07/16/02	4.9180	4.7591	4.0341	3.3091	5.4841	6.2091
08/27/02	5.7098	4.7591	4.0341	3.3091	5.4841	6.2091
09/17/02	5.2951	4.7591	4.0341	3.3091	5.4841	6.2091
10/08/02	4.6260	4,7591	4.0341	3.3091	5.4841	6.2091
11/05/02	5.6570	4.7591	4.0341	3.3091	5.4841	6.2091
12/17/02	5.3359	4.7591	4.0341	3.3091	5.4841	6.2091
01/28/03	4.7398	4.7591	4.0341	3.3091	5.4841	6.2091
02/04/03	4.3808	4.7591	4.0341	3.3091	5.4841	6.2091
03/25/03	4.1887	4.7591	4.0341	3.3091	5,4841	6.2091
04/15/03	3.6659	4.7591	4.0341	3.3091	5.4841	6.2091
05/06/03	5.0405	4.7591	4.0341	3.3091	5.4841	6.2091
05/29/03	5.7755	4.7591	4.0341	3.3091	5.4841	6.2091



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
09/25/01	3.2659	4.1117	3.1992	2.2867	5.0242	5.9366
10/30/01	4.7405	4.1117	3.1992	2.2867	5.0242	5.9366
12/04/01	3.3054	4.1117	3.1992	2.2867	5.0242	5.9366
02/05/02	2.7202	4.1117	3.1992	2.2867	5.0242	5.9366
03/05/02	4.0948	4.1117	3.1992	2.2867	5.0242	5.9366
04/16/02	2.8280	4.1117	3.1992	2.2867	5.0242	5.9366
05/14/02	5.0011	4.1117	3.1992	2.2867	5.0242	5.9366
06/18/02	3.6221	4.1117	3.1992	2.2867	5.0242	5.9366
07/16/02	5.3974	4.1117	3.1992	2.2867	5.0242	5.9366
08/27/02	4.8972	4.1117	3.1992	2.2867	5.0242	5.9366
09/17/02	4.6612	4.1117	3.1992	2.2867	5.0242	5.9366
10/08/02	4.0708	4.1117	3.1992	2.2867	5.0242	5.9366
11/05/02	5.7310	4.1117	3.1992	2.2867	5.0242	5.9366
12/17/02	4.5031	4.1117	3.1992	2.2867	5.0242	5.9366
01/28/03	3.9327	4.1117	3.1992	2.2867	5.0242	5,9366
02/04/03	3.7418	4.1117	3.1992	2.2867	5.0242	5.9366
03/25/03	3.6901	4.1117	3.1992	2.2867	5.0242	5.9366
04/15/03	2.4442	4.1117	3.1992	2.2867	5.0242	5.9366
05/06/03	4.6530	4.1117	3,1992	2.2867	5.0242	5.9366
05/29/03	4.9331	4.1117	3.1992	2.2867	5.0242	5.9366

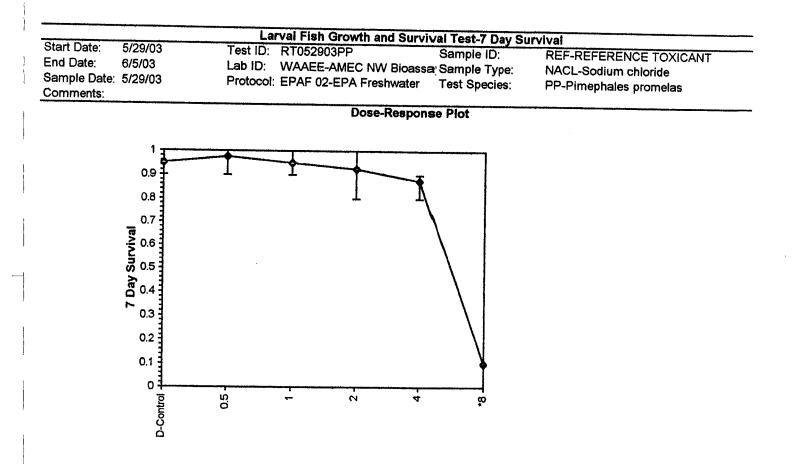
Reference Toxicant Control Chart- Fathead Minnow Growth-Weight

			Lai	val Fish Grov	vth and Surviv	al Test-7 Day Si	urvival
Start Date: End Date: Sample Date: Comments:	5/29/03 6/5/03 5/29/03		Test ID: Lab ID:	RT052903PP	C NW Bioassa	Sample ID: Sample Type: Test Species:	REF-REFERENCE TOXICANT NACL-Sodium chloride PP-Pimephales promelas
Conc-gm/L	1	2	3	4		······	
D-Control	0.9000	1.0000	1.0000	0.9000			
0.5	1.0000	1.0000	0.9000	1.0000			
1	0.9000	0.9000	1.0000	1.0000			
2	0.9000	1.0000	0.8000	1.0000			
4	0.9000	0.9000	0.9000	0.8000			
8	0.1000	0.1000	0.1000	0.1000			

		_	Tra	ansform:	Arcsin Se	uare Roo	t	Rank	1-Tailed	Number	Total
Conc-gm/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
D-Control	0.9500	1.0000	1.3305	1.2490	1.4120	7.072	4			2	40
0.5	0.9750	1.0263	1.3713	1.2490	1.4120	5.942	4	20.00	10.00	1	40
1	0.9500	1.0000	1.3305	1.2490	1.4120	7.072	4	18.00	10.00	2	40
2	0.9250	0.9737	1.2951	1.1071	1.4120	11.347	4	17.00	10.00	3	40
4	0.8750	0.9211	1.2136	1,1071	1.2490	5.846	4	13.00	10.00	5	40
*8	0.1000	0.1053	0.3218	0.3218	0.3218	0.000	4	10.00	10.00	36	40

Auxiliary Tests			177. initi dava se		Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distrib	ution (p >	0.01)		0.93694	0.884	-0.5448	-0 4428
Equality of variance cannot be co			,				0.0110	0.112.0
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	4	8	5.65685			*****		·······

3.355	SE 1.57739 1.27857 0.01723 gm/L 3.15259 3.76435	5.75631 -4.2446 0.01621 95% Fidu	0.08376 Icial Limits	0.05	1.05182	Critical 7.81472	P-value 0.79	Mu 0.76159	Sigma 0.11302	lter 5
-1.7386 0.04998 Probits 2.674 3.355	1.27857 0.01723 gm/L 3.15259	-4.2446 0.01621 95% Fidu	0.76743 0.08376 Icial Limits	0.05	1.05182				and the second	
0.04998 Probits 2.674 3.355	0.01723 gm/L 3.15259	0.01621 95% Fidu	0.08376 Icial Limits		1.0 T			11/		-
Probits 2.674 3.355	gm/L 3.15259	95% Fidu	icial Limits					11/		
2.674 3.355	3.15259				. 1				1	
3.355		2.10554	3 88129							
	3 76435				0.9 -			19/		
0 7 4 0	0.70-700	2.74443	4.46023		0.8 -			 		
3.718	4.13762	3.15462	4.81287		<u> </u>			 		
3.964	4.41015	3.46119	5.07269		1					
4.158	4.6395	3.7223	5.29434		% 0.6 -					
4.326	4.84574		5.49708		5 ₀₅ 1			///		
4.747	5.40702	4.5986	6.07385		g					
5.000	5.77552	5.00819	6.48097		₽ 0.4 -			1		
5.253	6.16914	5.42801	6.94882		Т			1		
5.674	6.8837	6.13055	7.89745		4					
5.842	7.18971	6.40799	8.34251		0.2					
6.036	7.56361	6.73068	8.91496		0.1					
6.282	8.0618	7.13776	9.72139				. 1			
6.645	8.8612	7.75058	11.1045			······································	1 9 - 7 - 7 - 7 - 7	·····	hanner -	
7.326	10.5807	8.96442	14.3807		0.1		1	10	100	
	3.964 4.158 4.326 4.747 5.000 5.253 5.674 5.842 6.036 6.282 6.645	3.9644.410154.1584.63954.3264.845744.7475.407025.0005.775525.2536.169145.6746.88375.8427.189716.0367.563616.2828.06186.6458.8612	3.9644.410153.461194.1584.63953.72234.3264.845743.958444.7475.407024.59865.0005.775525.008195.2536.169145.428015.6746.88376.130555.8427.189716.407996.0367.563616.730686.2828.06187.137766.6458.86127.75058	3.9644.410153.461195.072694.1584.63953.72235.294344.3264.845743.958445.497084.7475.407024.59866.073855.0005.775525.008196.480975.2536.169145.428016.948825.6746.88376.130557.897455.8427.189716.407998.342516.0367.563616.730688.914966.2828.06187.137769.721396.6458.86127.7505811.1045	3.964 4.41015 3.46119 5.07269 4.158 4.6395 3.7223 5.29434 4.326 4.84574 3.95844 5.49708 4.747 5.40702 4.5986 6.07385 5.000 5.77552 5.00819 6.48097 5.253 6.16914 5.42801 6.94882 5.674 6.8837 6.13055 7.89745 5.842 7.18971 6.40799 8.34251 6.036 7.56361 6.73068 8.91496 6.282 8.0618 7.13776 9.72139 6.645 8.8612 7.75058 11.1045	3.964 4.41015 3.46119 5.07269 0.7 4.158 4.6395 3.7223 5.29434 0.6 4.326 4.84574 3.95844 5.49708 0.5 4.747 5.40702 4.5986 6.07385 0.5 5.000 5.77552 5.00819 6.48097 0.4 5.253 6.16914 5.42801 6.94882 0.3 5.674 6.8837 6.13055 7.89745 0.2 6.036 7.56361 6.73068 8.91496 0.1 6.282 8.0618 7.13776 9.72139 0.0 6.645 8.8612 7.75058 11.1045 0.1	3.964 4.41015 3.46119 5.07269 0.7 4.158 4.6395 3.7223 5.29434 9 0.6 4.326 4.84574 3.95844 5.49708 0.5 4.747 5.40702 4.5986 6.07385 0.4 5.000 5.77552 5.00819 6.48097 0.4 5.253 6.16914 5.42801 6.94882 0.3 5.674 6.8837 6.13055 7.89745 0.2 6.036 7.56361 6.73068 8.91496 0.1 6.282 8.0618 7.13776 9.72139 0.0 6.645 8.8612 7.75058 11.1045 0.1	3.964 4.41015 3.46119 5.07269 0.7 4.158 4.6395 3.7223 5.29434 9 0.6 4.326 4.84574 3.95844 5.49708 0.5 4.747 5.40702 4.5986 6.07385 0.5 5.000 5.77552 5.00819 6.48097 0.4 5.253 6.16914 5.42801 6.94882 0.3 5.674 6.8837 6.13055 7.89745 0.2 5.842 7.18971 6.40799 8.34251 0.2 6.036 7.56361 6.73068 8.91496 0.1 6.282 8.0618 7.13776 9.72139 0.0 6.645 8.8612 7.75058 11.1045 0.1 7.326 10.5807 8.96442 14.3807 0.1 1	3.964 4.41015 3.46119 5.07269 4.158 4.6395 3.7223 5.29434 90.6 4.326 4.84574 3.95844 5.49708 0.5 4.747 5.40702 4.5986 6.07385 0.5 5.000 5.77552 5.00819 6.48097 0.4 5.253 6.16914 5.42801 6.94882 0.3 5.674 6.8837 6.13055 7.89745 0.2 6.036 7.56361 6.73068 8.91496 0.1 6.282 8.0618 7.13776 9.72139 0.0 6.645 8.8612 7.75058 11.1045 0.1 1 7.326 10.5807 8.96442 14.3807 0.1 1 10	3.964 4.41015 3.46119 5.07269 4.158 4.6395 3.7223 5.29434 4.326 4.84574 3.95844 5.49708 4.747 5.40702 4.5986 6.07385 5.000 5.77552 5.00819 6.48097 5.253 6.16914 5.42801 6.94882 0.3 5.674 6.8837 6.13055 7.89745 0.2 6.036 7.56361 6.73068 8.91496 0.1 6.282 8.0618 7.13776 9.72139 0.0 6.645 8.8612 7.75058 11.1045 0.1

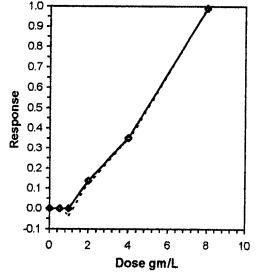


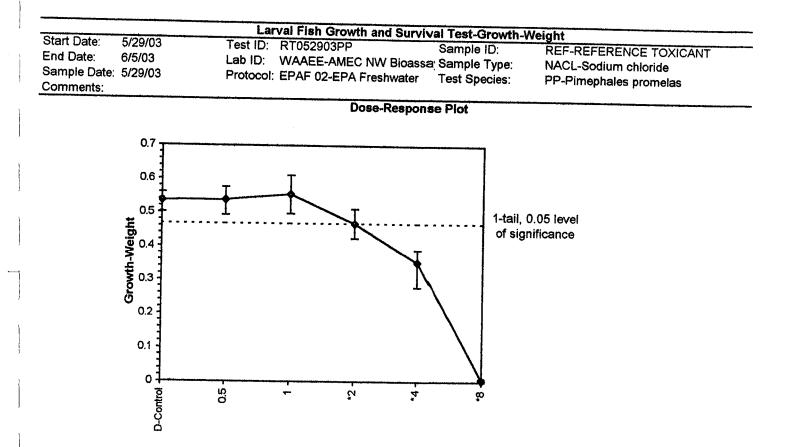
01 1 0 1			Lar	val Fish Growth and Su	rvival Test-Growth-	Weight
Start Date: End Date: Sample Date: Comments:	5/29/03 6/5/03 5/29/03		Test ID: Lab ID:	RT052903PP WAAEE-AMEC NW Bio EPAF 02-EPA Freshwat	Sample ID: assa: Sample Type:	REF-REFERENCE TOXICANT NACL-Sodium chloride PP-Pimephales promelas
Conc-gm/L	1	2	3	4		
D-Control	0.5600	0.5020	0.5510	0.5320		
0.5	0.5760	0.5700	0.5140	0.4930		
1	0.5610	0.5460	0.4970	0.6110		
2	0.4240	0.5110	0.4300	0.5070		
4	0.3600	0.3840	0.2770	0.3890		
8	0.0090	0.0050	0.0000	0.0050		

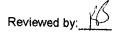
				•	Transform	n: Untran	sformed			1-Tailed		Isot	onic
<u>Conc-g</u>	<u>m/L</u>	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Co	ontrol	0.5363	1.0000	0.5363	0.5020	0.5600	4.782	4				0.5428	1.0000
	0.5	0.5383	1.0037	0.5383	0.4930	0.5760	7.637	4	-0.071	2.410	0.0678	0.5428	1.0000
	1	0.5538	1.0326	0.5538	0.4970	0.6110	8.477	4	-0.622	2.410	0.0678	0.5428	1.0000
	*2	0.4680	0.8727	0.4680	0.4240	0.5110	10,136	4	2.425	2,410	0.0678	0.4680	0.8623
	*4	0.3525	0.6573	0.3525	0.2770	0.3890	14,724	4	6.528	2.410	0.0678	0.3525	0.6495
	*8	0.0047	0.0089	0.0047	0.0000	0.0090	77.591	4	18.882	2.410	0.0678	0.0020	0.0088

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distrib	ution (p >	0.01)		0.96041		0.884		-0.425	-0.5983
Bartlett's Test indicates equal var	iances (p =	= 0.04)			11.5895		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	1	2	1.41421		0.06784	0.1265	0.17915	0.00158	6.0E-13	5, 18

				Line	ar Interpolation	(200 Resamples)	
Point	gm/L	SD	95% CI	.(Exp)	Skew		
IC05	1.3630	0.2128	0.4022	2.1642	-0.2946		
IC10	1.7261	0.2412	1.0540	2.6862	0.4811		
IC15	2.1154	0.2755	1.3829	2.9776	0.3081	1.0	
IC20	2.5853	0.3084	1.5144	3.3486	-0.2042		
IC25	3.0552	0.2869	2.0520	3.8288	-0.0899	0.9 -	
IC40	4.3088	0.2340	3.4007	4.8108	-0.7711	0.8 -	
IC50	4.9331	0.1989	4.1470	5.3500	-0.9228	0.7	
						06	

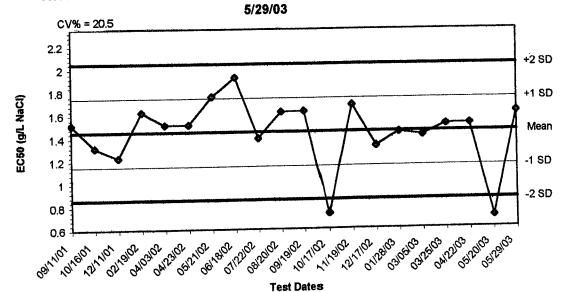






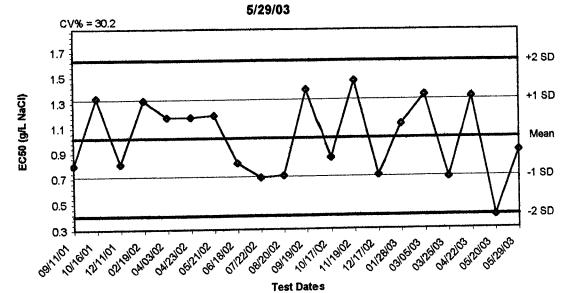
Ceriodaphnia dubia





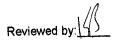
	Maluna	Mean	-1 SD	-2 SD	+1 SD	+2 SD
Dates	Values	1.4510	1.1538	0.8567	1.7481	2.0452
09/11/01	1.5174	1.4510	1.1538	0.8567	1.7481	2.0452
10/16/01	1.3195	1	1,1538	0.8567	1.7481	2.0452
12/11/01	1.2311	1.4510	1,1538	0.8567	1.7481	2.0452
02/19/02	1.6245	1.4510		0.8567	1.7481	2.0452
04/03/02	1.5157	1.4510	1.1538		1.7481	2.0452
04/23/02	1.5157	1.4510	1.1538		1.7481	2.0452
05/21/02	1,7608	1.4510	1.1538		1.7481	2,0452
06/18/02	1.9296	1.4510	1.1538		1.7481	2.0452
07/22/02	1,3974	1.4510	1.1538			2.0452
08/20/02	1.6245	1.4510	1,1538		1.7481	2.0452
09/19/02	1.6303	1.4510	1,1538	1	1.7481	2.0452
10/17/02	0.7368	1.4510	1.1538		1.7481	2.0452
11/19/02	1.6843	1.4510	1.1538		1.7481	2.0452
12/17/02	1.3241	1.4510	1.1538		1.7481	1 1
	1.4444	1.4510	1	0.8567		2.0452
01/28/03	1.4142	1.4510	1	0.8567	1.7481	1
03/05/03	1	1.4510			1.7481	
03/25/03	1.5106	1.4510		1	1.7481	
04/22/03	1.5157	1.4510				
05/20/03	0.7024		1			2.0452
05/29/03	1.6200	1.4510	1.7000	1		

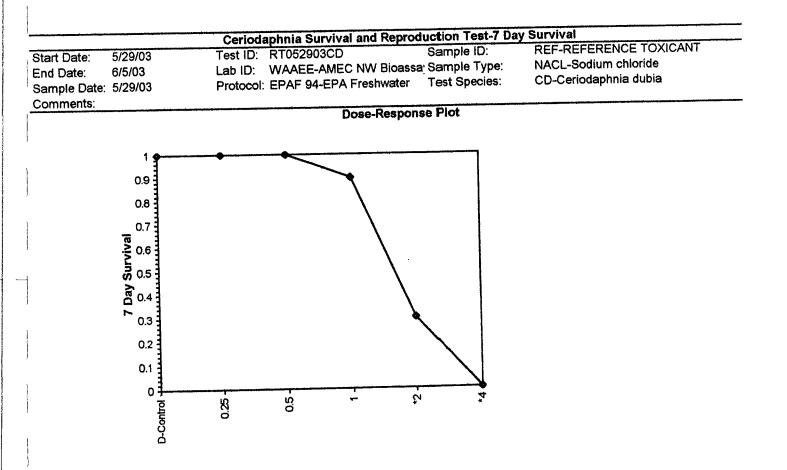
Reference Toxicant Control Chart- Ceriodaphnia dubia Reproduction

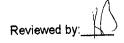


Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
09/11/01	0.8019	1.0186	0.7114	0.4042	1.3257	1.6329
10/16/01	1.3379	1.0186	0.7114	0.4042	1.3257	1.6329
12/11/01	0.8128	1.0186	0.7114	0.4042	1.3257	1.6329
02/19/02	1.3191	1.0186	0.7114	0.4042	1.3257	1.6329
02/19/02	1.1844	1.0186	0.7114		1.3257	1.6329
04/03/02	1,1844	1.0186	0.7114	0.4042	1.3257	1.6329
05/21/02	1.1992	1.0186	0.7114	0.4042	1.3257	1,6329
06/18/02	0.8191	1.0186	0.7114	0.4042	1.3257	1.6329
07/22/02	0.7022	1.0186	0.7114	0.4042	1.3257	1.6329
08/20/02	0.7166	1.0186	0.7114	0.4042	1.3257	1.6329
09/19/02	1.4011	1.0186	0.7114	0.4042	1.3257	1.6329
10/17/02	0.8609	1.0186	0.7114	0.4042	1.3257	1.6329
11/19/02	1.4710	1.0186	0.7114		1.3257	1.6329
12/17/02	0.7183	1.0186	0.7114		1.3257	1.6329
01/28/03	1.1259	1.0186		1	1.3257	1.6329
03/05/03	1.3585	1.0186		1	1.3257	1.6329
	0.7029	1.0186			1.3257	1.6329
03/25/03	1,3434	1.0186			1.3257	1.6329
04/22/03	0,4000	1.0186			1.3257	1.6329
05/20/03	0.9118	1.0186		1	1.3257	1.6329
05/29/03	0.9110	1.0100				

			Cerioda	hnia Sur	vival and	Reprodu	iction Tes	t-7 Day S	urvival	OFNOT	TOVIOANT	
Start Date:	5/29/03		Test ID: F	RT052903	CD		Sample ID	-	REF-REFE			
End Date:	6/5/03		Lab ID: \	VAAEE-A	MEC NW	Bioassa	Sample Ty		NACL-Sod			
Sample Date:	5/29/03		Protocol: E	PAF 94-E	EPA Fresh	water	Test Spec	es:	CD-Ceriod	aprinia u	Juia	
Comments:						6	7	8	9	10		
Conc-gm/L	1	2	3	4	5 1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		
D-Control	1.0000	1.0000	1.0000	1.0000 1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		
0.25	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1,0000	1.0000	1.0000		
0.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000		
1	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000		
2		0.0000	0.0000 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0,0000	0.0000		
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						
					Not			Fisher's	1-Tailed		Number	Total
A	Mean	N-Mean		Resp	Resp	Total	Ν	Exact P	Critical		and the second se	Number
Conc-gm/L D-Control		1.0000		0	10	10	10				0	10
0.25		1.0000		Õ	10	10	10	1.0000	0.0500		0	10
0.20		1.0000		0	10	10	10	1.0000	0.0500		0	1(
0.0		0.9000		1	9	10	10	0.5000	0.0500		1	1(
*2		0.3000		7	3	10	10	0.0015	0.0500		7	1
*4		0.0000		10	0	10	10	0.0000	0.0500		10	1
Hypothesis Fisher's Exac	f est (1-tail t Test	, 0.05)	NOEC 1	LOEC 2	ChV 1.41421	TU						
					Maximun	Likelih	ood-Probi	t			01	ltor
									DVALUA	Mu	Sigma	lter
Parameter	Value	SE		icial Limi	ts	Contro	Chi-Sq	Critical	F-Value			
and the second secon	Value 6.41177	1.89162	2.7042	10.1193	ts	Contro 0	Chi-Sq	Critical 7.81472	0.99	0.2095	0.15596	3
Parameter Slope	6.41177	1.89162	2.7042	10.1193	<u>ts</u>		0.10062	Critical 7.81472	0.99			3
Slope Intercept	6.41177	1.89162	2.7042 2.65156	10.1193 4.66187	_		Chi-Sq	Critical 7.81472	0.99			3
Slope Intercept TSCR	6.41177 3.65671 Probits	1.89162 0.51283 gm/L	2.7042 2.65156 95% Fid	10.1193 4.66187 Jcial Lim	its		0.10062	Critical 7.81472	0.99			3
Slope Intercept TSCR Point	6.41177 3.65671 Probits 2.674	1.89162 0.51283 gm/L 0.70255	2.7042 2.65156 95% Fide 0.21231	10.1193 4.66187 Jcial Lim 1.00551	its		I <u>Chi-Sq</u> 0.10062 1.0 - 0.9	Critical 7.81472	0.99			3
Slope Intercept TSCR Point EC01	6.41177 3.65671 Probits 2.674	1.89162 0.51283 gm/L 0.70255	2.7042 2.65156 95% Fid 5 0.21231 5 0.37195	10.1193 4.66187 Jcial Lim 1.00551 1.19736	its		1.0 - 0.10062 1.0 - 0.9 - 0.8 -	Critical 7.81472	0.99			3
Slope Intercept TSCR Point EC01 EC05	6.41177 3.65671 Probits 2.674 3.355	1.89162 0.51283 gm/L 0.70255 0.89736 1.02242	2.7042 2.65156 95% Fide 0.21231 0.37195 2 0.4982	10.1193 4.66187 Icial Lim 1.00551 1.19736 1.32299	its		I <u>Chi-Sq</u> 0.10062 1.0 - 0.9	Critical 7.81472	0.99			3
Slope Intercept TSCR Point EC01 EC05 EC10	6.41177 3.65671 Probits 2.674 3.355 3.718 3.964	1.89162 0.51283 gm/L 0.70255 0.89736 1.02242 1.1165	2.7042 2.65156 95% Fid 5 0.21231 5 0.37195 2 0.4982 5 0.60391	10.1193 4.66187 	its		1.0 - 0.10062 1.0 - 0.9 - 0.8 - 0.7 -	Critical 7.81472	0.99			3
Slope Intercept TSCR Point EC01 EC05	6.41177 3.65671 Probits 2.674 3.355 3.718 3.964 4.158	1.89162 0.51283 gm/L 0.70255 0.89736 1.02242 1.1165 1.1974	2.7042 3.65156 95% Fid 5.0.21231 5.0.37195 2.0.4982 5.0.60391 1.0.70078	10.1193 4.66187 1.00551 1.19736 1.32299 1.42186 1.51196	its		1.0 - 0.10062 1.0 - 0.9 - 0.8 - 0.7 -	Critical 7.81472	0.99			3
Slope Intercept TSCR Point EC01 EC05 EC10 EC15	6.41177 3.65671 Probits 2.674 3.355 3.718 3.964 4.158 4.326	1.89162 0.51283 gm/L 0.70255 0.89736 1.02242 1.1165 1.1974 1.27143	2.7042 3.2.65156 95% Fid 5.0.21231 5.0.37195 2.0.4982 5.0.60391 1.0.70078 7.0.79294	10.1193 4.66187 1.00551 1.19736 1.32299 1.42186 1.51196 1.6003	its		1.0 - 0.10062 1.0 - 0.9 - 0.8 - 0.7 -	Critical 7.81472	0.99			3
Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20	6.41177 3.65671 Probits 2.674 3.355 3.718 3.964 4.158 4.326 4.747	1.89162 0.51283 gm/L 0.70255 0.89736 1.02242 1.1165 1.1974 1.27143 7.1.47905	2.7042 3.2.65156 95% Fid 5.0.21231 5.0.37195 2.0.4982 5.0.60391 1.0.70078 7.0.79294 8.1.05536	10.1193 4.66187 1.00551 1.19736 1.32299 1.42186 1.51196 1.6003 1.89406	its		1.0 - 0.10062 1.0 - 0.9 - 0.8 - 0.7 -	Critical 7.81472	0.99			3
Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25	6.41177 3.65671 Probits 2.674 3.355 3.718 3.964 4.158 4.326 4.747 5.000	1.89162 0.51283 0.70255 0.89736 1.02242 1.1165 1.1974 1.27143 1.27143 1.47900 0.161990	2.7042 2.65156 95% Fid 0.21231 0.37195 0.4982 5 0.60391 1 0.70078 7 0.79294 8 1.05538 6 1.22283	10.1193 4.66187 1.00551 1.19736 1.32299 1.42186 1.51196 1.6003 1.89406 2.14858	its		Chi-Sq 0.10062 1.0 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.7 0.7 0.7 0.5 0.5 0.5 0.4	Critical 7.81472	0.99			3
Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40	6.41177 3.65671 Probits 2.674 3.355 3.718 3.964 4.158 4.326 4.747 5.000 5.253	1.89162 0.51283 0.51283 0.70255 0.89736 1.02242 1.1165 1.1974 1.1974 1.27143 1.27143 1.27143 1.27143 1.1990 1.61990 3.1.7742	2.7042 2.65156 95% Fid 5 0.21231 5 0.37195 2 0.4982 5 0.60391 1 0.70078 7 0.79294 8 1.05536 6 1.22283 5 1.38635	10.1193 4.66187 1.00551 1.19736 1.32299 1.42186 1.51196 1.6003 1.89406 2.14858 2.49089	its B		Chi-Sq 0.10062 1.0- 0.9 0.8 0.7 0.8 0.7 0.6 0.5 0.6 0.5 0.4 0.3	Critical 7.81472	0.99			3
Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40 EC50	6.41177 3.65671 2.674 3.355 3.718 3.964 4.158 4.326 4.747 5.000 5.253 5.674	1.89162 0.51283 0.70255 0.89736 1.02242 1.1165 1.19747 1.47906 1.61999 3.1.7742 4.2.0639	2.7042 2.65156 95% Fide 5 0.21231 5 0.37195 2 0.4982 5 0.60391 1 0.70078 7 0.79294 8 1.05536 6 1.22283 5 1.38639 5 1.63978	10.1193 4.66187 1.00551 1.19736 1.32299 1.42186 1.51196 1.6003 1.89406 2.14858 2.49089 3.31747			Chi-Sq 0.10062 1.0 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.7 0.7 0.7 0.5 0.5 0.5 0.4	Critical 7.81472	0.99			3
Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC20 EC25 EC40 EC50 EC60 EC75 EC80	6.41177 3.65671 2.674 3.355 3.718 3.964 4.158 4.326 4.747 5.000 5.253 5.674 5.842	1.89162 0.51283 0.70255 0.89736 1.02242 1.1165 1.19747 1.47906 1.61996 1.7742 1.27143 1.17742 1.61996 1.7742 2.06396 2.1916	2 2.7042 2.65156 95% Fide 0.21231 0.37195 0.4982 0.12283 0.12283 0.13863 0.12283 0.13863 0.12283 0.13863 0.12283 0.13863 0.12382 0.13863 0.12383 0.13863 0.12383 0.13863 0.12383 0.13863	10.1193 4.66187 1.00551 1.19736 1.32299 1.42186 1.51196 1.6003 1.89406 2.14858 2.49089 3.31747 3.75438			Chi-Sq 0.10062 1.0 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.7 0.7 0.7 0.5 0.5 0.5 0.4 0.3 0.2	Critical 7.81472	0.99			3
Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC20 EC25 EC40 EC50 EC50 EC60 EC75	6.41177 3.65671 2.674 3.355 3.718 3.964 4.158 4.326 4.747 5.000 5.253 5.674 5.842 6.036	1.89162 0.51283 0.51283 0.89736 0.89736 1.02242 1.1165 1.19747 1.47906 1.27141 1.19747 1.47906 1.61999 3.1.7742 4.2.0639 2.2.1916 5.2.3504	2 2.7042 2.65156 95% Fide 5 0.21231 3 0.37195 2 0.4982 5 0.60391 1 0.70078 7 0.79294 8 1.05536 6 1.22283 5 1.38639 5 1.63978 2 1.7353 4 1.84495	10.1193 4.66187 1.00551 1.19736 1.32299 1.42186 1.51196 1.6003 1.89406 2.14858 3.31747 3.75438 4.35725	its		Chi-Sq 0.10062 1.0 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0	Critical 7.81472	0.99			3
Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC40 EC25 EC40 EC50 EC60 EC75 EC80 EC85 EC90	6.41177 3.65671 2.674 3.355 3.718 3.964 4.158 4.326 4.747 5.000 5.253 5.674 5.842 6.036 6.282	1.89162 0.51283 0.51283 0.89736 0.89736 1.02242 1.1165 1.19747 1.47906 1.27141 1.19747 1.47906 1.61999 3.1.7742 4.2.0639 2.2.1916 5.2.3504 2.2.5667	2 2.7042 2.65156 95% Fide 5 0.21231 3 0.37195 2 0.4982 5 0.60391 1 0.70078 7 0.79294 8 1.05536 6 1.22283 5 1.38639 5 1.38639 5 1.63976 2 1.7353 4 1.84499 2 1.98263	10.1193 4.66187 1.00551 1.19736 1.32299 1.42186 1.51196 2.14858 9.3.31747 3.3.75439 4.35725 2.5.28242	its		Chi-Sq 0.10062 1.0 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0	7.81472	0.99	0.2095	0.15596	3
Slope Intercept TSCR Point EC01 EC05 EC10 EC15 EC20 EC25 EC20 EC25 EC40 EC50 EC60 EC75 EC80 EC85	6.41177 3.65671 2.674 3.355 3.718 3.964 4.158 4.326 4.747 5.000 5.253 5.674 5.842 6.036 6.282 6.644	1.89162 0.51283 0.51283 0.89736 0.89736 1.02242 1.1165 1.19747 1.47906 1.27141 1.19747 1.47906 1.61999 3.1.7742 4.2.0639 2.2.1916 5.2.3504 2.2.5667	2.7042 2.65156 95% Fid 5 0.21231 5 0.37195 2 0.4982 5 0.60391 1 0.70078 7 0.79294 8 1.05536 6 1.22283 5 1.38639 5 1.63978 2 1.7353 4 1.84499 2 1.98265 2 2.1903	10.1193 4.66187 1.00551 1.19736 1.32299 1.42186 1.51196 2.14858 9.3.31747 3.3.75439 4.35725 2.5.28242	its 		Chi-Sq 0.10062 1.0 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0	Critical 7.81472	0.99	0.2095		3





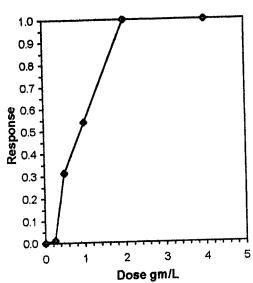


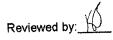
			Cerioda	aphnia Sur	vival and	Reprod	uction Tes	t-Repro	duction	DENOE TOY	CANIT
Start Date:	5/29/03		Test ID:	RT052903	CD		Sample ID	:	KEL-KELL	ERENCE TOXI	CANT
End Date:	6/5/03		ab ID:	EPAF 94-E	MEC NVV FPA Frest	water	Sample Ty Test Speci	r		laphnia dubia	
Sample Date: Comments:	5/29/03	·	-1080001.							40	
Conc-gm/L	1	2	3	4	5	6	7	8	9 16.000	<u>10</u> 21.000	
D-Control	13.000	7.000	1.000	15.000	22.000	26.000		10.000		19.000	
0.25		20.000	15.000		14.000	12.000		17.000		4.000	
0.5	4.000	13.000	17.000		13.000	7.000		0.000		15.000	
1	3.000	10.000	8.000		0.000	10.000		0.000		0.000	
2	0.000	0.000	0.000		0.000	0.000 0.000		0.000		0.000	
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			

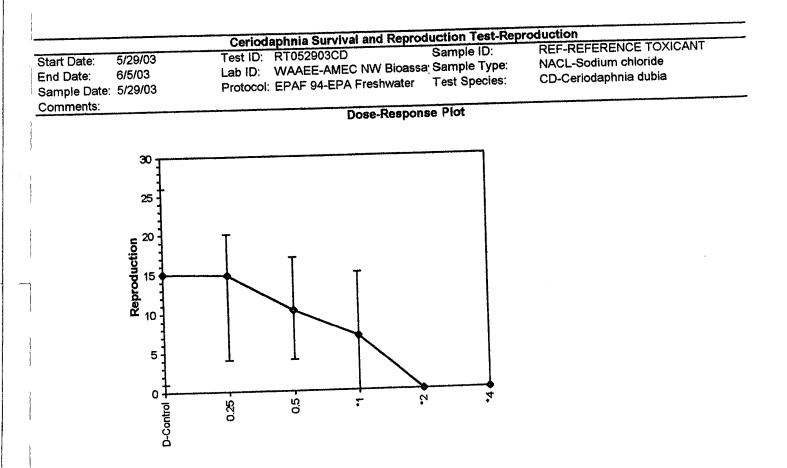
1						11.4	-formed		Rank	1-Tailed	Isoto	onic		
	مربر با من مربق مربق میند. مربر این مربق مربق میند این منطق این ماهند این ماهند این مربق میند. مربر این مربق مربق میند این ماهند این م					rm: Untransformed		NI	Sum	Critical	Mean	N-Mean		
7	Conc-gm/L	Mean	N-Mean	Mean	Min	Max	<u>CV%</u>	<u>N</u>	Juin	Oritiou	15,000	1.0000		
ļ	D-Control	15.000	1.0000	15.0000	1.0000	26.0000	50.283	10	404 50	75.00	14.800	0.9867		
	0.25	14.800	0.9867	14,8000	4.0000	20.0000	32.295	10	101.50		10.300	0.6867		
,	0.20	10.300	0.6867	10.3000	4.0000	17.0000	48.662	10	84.00	75.00	6.900	0.4600		
Í	*1	6.900		6,9000	0.0000	15.0000	73.408	10	73.00	75.00	0.000	0.0000		
1	*2	0.000		0.0000	0.0000	0.0000	0.000	10	55.00		0.000	0.0000		
	2 *4		0.000			0.0000	0.0000		0.000	10	55.00	75.00	0.000	0.0000

					Statistic	Critical	Skew	Kurt
Auxiliary Tests					1.6999	1.035	-0.528	1.32857
Kolmogorov D Test indicates non	-normal di	stribution	(p <= 0.01)		1.0999	1.000		
Equality of variance cannot be co	nfirmed							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU		ومجاورة والمتقاربين والمتقارين والمناجر والمتقارب والمتني		
Steel's Many-One Rank Test	0.5	1	0.70711					
Oldor o mainly								

		Linear Interpolation (200 Resamples)											
Point	gm/L	SD	95%		Skew								
1C05	0.2806	0.1211	0.0436	0.4940	0.1714								
IC05	0.3222	0.1204	0.0872	0.5518	0.5332	_							
IC10	0.3639	0.1258	0.1308	0.6181	0.8773	1.0							
	0.4056	0.1364	0.1744	0.6980	0.9450	0.9							
IC20 IC25	0.4472	0.1613	0.2180	0.8010	1.1536	4 /							
	0.6912	0.2137	0.3993	1.1544	0.6009	0.8							
IC40 IC50	0.9118	0.2189	0.4727	1.2953	-0.0711	0.7							
1000						¥ 06							
						8, 0.6 5, 0.5							
						8 0.5 /							







Appendix I

Chain-of-Custody Form

Chain of Custody	Date 5/3% 03 Page of 1	Mu. V. T O	PROJECT MANAGER	42 482 - 3318 OCUMBER		S	(4) 20 Liter Cubitainers 4	t	<u>d</u>	t	p : 20/1kr cubitainers 5	4		RELINQUISHED BY		(Time)	Name) (Date)	uy)	BY (LABORATORY) 08	P/12 Frick 5/29/00	ne) ne) ec a bove	AMEC Bioassay Lab Log-in No.	DISTRIBUTION: WHITE. CANARY - AMEC Bioassay Lab. PINK - Orininator
	isdop!	S ANALYSIS REQUIRED	<u> </u>	6-7-/~	temp which	B veccipt togin #	0 03-0186	V 2.5 03-0 87	8810-20188	V 4:3 03-6 89	1.2 03-0196 15	V 4.8 03-091		RELINQUISHED BY // / SHITCO RELINC	Henne Way \$15	itan Haust Sestado	(Printed Name)	(Company) SHT C (Company)		(Signature) (Signature) (Signature)	(Printed Name) (Date) (Printed Name)	(Company) AMEC B	DISTRIBUTION: V
+~!+	5009 Pacific Highway East, Suite 2 0 4 2 53-922-4296 0 5	קבצ	PAKKWAY SUITE N 8		0466 1/600	TIME MATRIX CONTAINER AT LE LE	0935 WATER V V V	Sportos 0936 unter VVV	1325 water VVV	1700 under VVV	1520 water VVV	1940 walar VVV		SAMPLE RECEIPT RE	TOTAL NO. OF CONTAINERS	CHAIN OF CUSTODY SEALS	RECEIPT TEMP		NTS: Semples for NCA labs.	t agreement.	on sample cubes	14 dested 5/31/03	
amec Earth & AMEC Northw	5009 Pacific H. Fife, WA 98424 253-922-4296	COMPANY SAZC	ADDRESS BZOG N. CREEK	E NO. 425 452-3	ATTN: WARK	-1	5/ 4/03	1	28/23	5/20/03	5/28/03	MET-MW-W # 5/2803		PROJECT INFORMATION	CLIENT ,	P.O. NO.		SHIPPED VIA:	SPECIAL INSTRUCTIONS/COMMENTS: prepare chemical samp	pre-contract	conord-det indrated	for WET-WW-146 in correct	Additional disposal charges may apply.