

**City of Morro Bay and  
Cayucos Sanitary District**

**OFFSHORE MONITORING  
AND REPORTING PROGRAM**

**SEMIANNUAL EFFLUENT SAMPLING**

**CHEMICAL AND BIOASSAY  
ANALYSIS RESULTS**

**JANUARY 2008**



**Marine Research Specialists**

**3140 Telegraph Rd., Suite A  
Ventura, California 93003**

**Report to**

**City of Morro Bay and  
Cayucos Sanitary District**

**955 Shasta Avenue  
Morro Bay, California 93442  
(805) 772-6272**

**MONITORING  
AND  
REPORTING PROGRAM**

**SEMI-ANNUAL EFFLUENT REPORT**

**CHEMICAL AND BIOASSAY  
ANALYSIS RESULTS**

**JANUARY 2008**

**Prepared by**

**Douglas A. Coats and Bonnie Luke**

**Marine Research Specialists**

**3140 Telegraph Rd., Suite A  
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**February 2008**

# marine research specialists

3140 Telegraph Road, Suite A · Ventura, CA 93003 · (805) 644-1180

Mr. Bruce Keogh  
Wastewater Division Manager  
City of Morro Bay  
955 Shasta Avenue  
Morro Bay, CA 93442

7 February 2008

## Reference: Chemical and Bioassay Analysis Results for Effluent Samples Collected in January 2008

Dear Mr. Keogh:

Enclosed are the results of chemical analyses conducted on grab and composite effluent samples collected on 9 January 2008, a chronic bioassay on one composite effluent sample collected on 8 January 2008, and an acute bioassay conducted on four effluent samples collected daily from 7 January through 10 January 2008. All analyses were conducted in accordance with the requirements of Monitoring and Reporting Program Number 98-15<sup>1</sup> to assess compliance with effluent limitations specified in the Waste Discharge Requirements of the NPDES Discharge Permit.<sup>2</sup> Bioassay protocols conformed to the revised requirements specified by RWQCB<sup>3</sup> staff that eliminated techniques previously used to mitigate interference from ammonia toxicity.<sup>4</sup> All of the measured chemical concentrations and toxicity endpoints complied with the limitations promulgated by the current discharge permit. This includes acute-toxicity limitations that are no longer promulgated by the current version of the California Ocean Plan<sup>5</sup> because they were determined to be unnecessarily stringent. This cover letter summarizes the bioassay results and discusses the chemical compounds that were detected in the effluent samples. The full laboratory results as well as the pertinent QA/QC data and chains of custody are included as attachments.

### Chronic Bioassay

As summarized in Table 1, the chronic bioassays demonstrated that effluent toxicity was an order of magnitude lower than the limitations specified in the NPDES permit. Results were comparable to the low toxicities determined in tests conducted for more than a decade. Chronic bioassays provide a far more sensitive and accurate measure of toxic effects to marine organisms than do acute toxicity tests, which are plagued with interference from ammonia, as is described below. As with past bioassays, the chronic toxicity tests conducted in January 2008 measured spore germination and growth response in giant kelp (*Macrocystis pyrifera*) after exposure to a range of effluent dilutions. Toxic screening studies conducted in 1993<sup>6</sup>

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<sup>1</sup> Monitoring and Reporting Program No. 98-15 for City of Morro Bay and Cayucos Sanitary District Wastewater Treatment Plant, San Luis Obispo County promulgated by the State of California Regional Water Quality Control Board Central Coast Region and the United States Environmental Protection Agency Region IX, San Francisco California. 11 December 1998

<sup>2</sup> State of California Regional Water Quality Control Board Central Coast Region Waste Discharge Requirements Order No. 98-15 and United States Environmental Protection Agency Region IX, San Francisco California National Pollutant Discharge Elimination System Permit No. CA0047881 for City of Morro Bay and Cayucos Sanitary District Wastewater Treatment Plant, San Luis Obispo County

<sup>3</sup> California Regional Water Quality Control Board, Central Coast Division

<sup>4</sup> Letter from Roger W. Briggs, Executive Officer of the RWQCB to Mr. Bruce Keogh, City of Morro Bay WWTP, dated 14 March 2003: 2002 Annual Offshore monitoring Report, City of Morro Bay and Cayucos Sanitary District Wastewater Treatment Plant, San Luis Obispo County

<sup>5</sup> State Water Resources Control Board (SWRCB). 2001. Water quality control plan, ocean waters of California, California Ocean Plan. California Environmental Protection Agency. Effective December 3, 2001

<sup>6</sup> Table 2-4, Page 2-7 of the MBCSD 1993 Annual Monitoring Report to the City of Morro Bay and Cayucos Sanitary District. Prepared by Marine Research Specialists, 1994

**Table 1. Comparison of Measured Toxicity Levels with Permit Limitations**

Bioassay Test	End Point (%)	Toxicity Concentration (TU)	Permit Limitations (TU)		
			30-day Average	7-day Average	Instantaneous Maximum
Chronic: Giant Kelp ( <i>Macrocystis pyrifera</i> ) Chronic Germination	18 <sup>8</sup>	5.6			134
Chronic Growth	18 <sup>8</sup>	5.6			134
Acute: Fathead Minnow ( <i>Pimephales promelas</i> )	70.7 <sup>9</sup>	1.41	1.5	2.0	2.5

established that giant kelp (*M. pyrifera*) is substantially more sensitive to MBCSD<sup>7</sup> effluent than other species, such as the larvae of the inland silverside (*Menidia beryllina*) and bay mussel (*Mytilus edulis*).

The chronic bioassay results presented in Table 1 demonstrate the effluent's continuing low toxicity to this most-sensitive marine species. Both chronic-toxicity concentrations (5.6 TUc) were more than 20 times lower than the applicable permit limitation (134 TUc). The reported chronic toxic units (TUc) were based on a 'No Observable Effects Concentration' (NOEC), which is the highest effluent concentration that does not cause an adverse effect statistically different from a control sample. Chronic bioassays did not reveal adverse effects in marine organisms with effluent concentrations at or below 18%, while the permit allows adverse effects in concentrations as low as 0.75%.

As part of quality control, chronic bioassays were also conducted using a reference toxic chemical (copper chloride) to determine the sensitivity of this particular set of giant kelp spores (*M. pyrifera*) to toxins. Results demonstrated that the kelp specimens were susceptible to toxic exposure because they experienced a significant reduction in germination and growth in concentrations as low as 32 µg/L of the reference toxicant. The concomitant NOEC for the reference toxicant, at 18 µg/L, was lower than toxic concentrations found in reference tests conducted over the last several years.<sup>10</sup> This suggests that this particular batch of kelp spores was slightly more susceptible to toxic materials than previous batches. Nevertheless, they were only minimally affected by exposure to treatment-plant effluent.

### Acute Bioassay

In contrast to the chronic toxicity test, the results of the acute bioassay were confounded by toxic interference caused by the presence of ammonia in the test sample. Current bioassay protocols<sup>11</sup> limit the use of techniques that, in the past, have been widely applied to reduce the confounding influence of ammonia during acute bioassay tests. The acute bioassay test examined the mortality of the Fathead Minnow (*Pimephales promelas*) exposed to various concentrations of effluent. Historically, Fathead Minnow tests have reliably evaluated the toxicity of a broad range of freshwater, marine, and effluent samples. However, they are problematic when test samples contain ammonia, a constituent that is naturally elevated in sewage-derived wastewater. Under ambient ocean conditions, ammonia is not particularly toxic to marine organisms. This is reflected by the strikingly high limit for ammonia concentrations that is specified in the NPDES

<sup>7</sup> City of Morro Bay and the Cayucos Sanitary District, joint owners of the wastewater treatment and disposal facility

<sup>8</sup> NOEC or the No Observed Effects Concentration, which is the highest concentration of effluent that did not produce an adverse effect statistically different from the control experiment

<sup>9</sup> LC<sub>50</sub> or the effluent concentration that produces death of 50% of the test organisms exposed to the toxicants for 96 hours

<sup>10</sup> cf. The Giant Kelp Germ Tube Growth Laboratory Control Chart attached to this report

<sup>11</sup> Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, Fifth Edition. October 2002. U.S. Environmental Protection Agency, Office of Water (4303T), 1200 Pennsylvania Avenue, NW Washington, DC 20460. EPA-821-R-02-012

discharge permit (804 mg/L)<sup>12</sup> as compared to typical effluent ammonia concentrations ( $\leq 33$  mg/L).<sup>13</sup> This is because ammonia remains in a relatively benign, ionic ammonium<sup>14</sup> form in seawater and wastewater. However, in an acute bioassay, effluent remains static in the test chambers for an extended period of time, during which complex interactions among the organic constituents cause pH to increase. As pH increases, ammonium is converted into a deionized ammonia form<sup>15</sup> that is highly toxic to the test organisms. In contrast to the static conditions in the test chambers, the pH of the marine receiving waters is stabilized by the highly buffered oceanic carbonate system. Thus, the acute bioassay tests are not representative of the alkalinity conditions in the ocean environment and, as a result, the tests report artificially elevated toxic concentrations.

Various methods have been developed over the years to reduce the well-recognized artifactual toxicity that results from changes in wastewater ammonia during bioassay tests.<sup>16</sup> Ammonia interference in the acute bioassays conducted on MBCSD effluent samples has previously been successfully reduced through the use of zeolite pretreatment. As a result, in the 21 acute tests conducted since 1997, and prior to April 2003, the highest measured acute toxicity was 0.59 TUa. This practice was discontinued in April 2003 when the RWQCB staff specified the use of new EPA protocols in their comments on the 2002 Annual Monitoring Report for the MBSCD Wastewater Discharge.<sup>17</sup> Among other changes, the new protocols use much younger, smaller test specimens, and encourage the use of sample-renewal techniques to reduce moderate levels of ammonia interference, rather than chemical techniques. Based on this, the RWQCB staff further required that the acute toxicity tests no longer implement any form of chemical sample manipulation to reduce toxic ammonia interference.

Unfortunately, renewal methods, in which test chambers are periodically refreshed with new sample solutions, are significantly more complex and costly to implement than previous bioassay procedures. More importantly, they fall far short of eliminating significant artifactual toxicity arising from ammonia deionization. As a result, the acute toxicity reported here is conspicuously elevated compared to past tests, although it remained below the permitted limit. The apparent increase is not attributable to an actual change in the characteristic toxicity of the effluent itself. Instead, it is an artifact of changes in the protocols used to assess acute toxicity. This is obvious because there has been no commensurate increase in the accompanying chronic-toxicity measurements.

Because static renewal is only marginally effective in accommodating pH-induced ammonia interference, extraordinary measures were instituted in an attempt to reduce impacts from ammonia toxicity to the maximum extent possible. For example, the current bioassay protocols were implemented using daily grab effluent samples that were hand delivered to the testing facility in Ventura, California, shortly after collection at the MBCSD treatment plant. Extra care was also taken to remove all headspace in sample containers and to maintain a uniform sample temperature during transit to the bioassay laboratory. Finally, care was also taken during renewal in the laboratory to avoid physical impact to the extremely small larval-fish specimens.

Despite these extraordinary measures, the presence of ammonia toxicity was unmistakable during the tests. The artificially elevated acute toxicity that is reported in Table 1 is a direct result of this test-related toxicity.

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<sup>12</sup> Instantaneous maximum ammonia concentration specified in the NPDES waste-discharge requirements for the MBCSD effluent

<sup>13</sup> Marine Research Specialists (MRS). 2006. City of Morro Bay and Cayucos Sanitary District, Offshore Monitoring and Reporting Program, 2005 Annual Report. Submitted February 2006 to the City of Morro Bay and Cayucos Sanitary District, Morro Bay, CA

<sup>14</sup>  $\text{NH}_4^+$

<sup>15</sup>  $\text{NH}_3$

<sup>16</sup> Mercer, B.W., Ames, L.L., Touhill, C.J., Slyke, W.J., Dean, R.B. 1970. Ammonia removal from secondary effluents by selective ion exchange. *Journal of the Water Pollution Control Federation* 42 (2,Part 2), R95–R107.

<sup>17</sup> RWQCB. 2003 (Footnote 4) *op. cit.*

The test results incorrectly imply that the effluent acute toxicity was only 0.09 TUa below the permitted limit, or 94% of the permitted toxicity. In reality, the effluent discharge does not result in pH-induced ammonia toxicity, DO depletion, or physical stress on marine organisms upon discharge into receiving waters. Consequently, the reported results do not accurately reflect the toxicity that is experienced by marine organisms exposed to MBCSD effluent. Instead, ancillary measurements collected during the tests demonstrate that all of these confounding influences were present, and that they caused elevated measured toxicities that were close to the NPDES discharge permit limit.

The impact of unmitigated ammonia interference on the acute bioassay is evident in the water quality measurements reported in the attached raw test data. The increase in the toxic deionized form of ammonia can be computed from the changes in pH measured in the test chambers. On the first day of the test (January 8), pH increased from 7.2 to 7.9 in the test chamber containing 100% effluent, causing toxic deionized ammonia concentrations to increase five-fold from 0.2 mg/l to 1.1 mg/l. This, along with a precipitous drop in DO,<sup>18</sup> resulted in the mortality of just under half of the test specimens in the two test chambers containing 100% effluent on the first day of the test. A similar increase on the second day resulted in the demise of the remaining test specimens in the 100% effluent test chambers. In test chambers with lower effluent concentrations, daily static renewal was also only partially successful at ameliorating pH fluctuations. However, because the effluent was diluted, the concentrations of deionized ammonia were proportionally smaller, and despite the observed increases in pH, all the test organisms survived in the other test chambers. Nevertheless, the impacts apparent in the test chambers containing 100% effluent demonstrate that artifactual ammonia toxicity was not sufficiently accommodated by static renewal methods.

The foregoing discussion demonstrates that the apparent increase in acute toxicity, which was first measured in April 2003, and has continued into January 2008, is an artifact of the change in protocols rather than a true increase in marine toxicity. Additionally, chronic bioassays conducted over the past decade, including the one reported here, demonstrate that the MBCSD effluent has had a consistently low toxicity to marine organisms. Chronic bioassays are far more accurate and sensitive than the acute bioassays, particularly because the current acute bioassay protocols are confounded by interference from toxic ammonia artifacts.

As part of the quality control procedures, acute bioassay tests were also conducted using a reference toxic chemical<sup>19</sup> in order to determine the relative sensitivity of the test organisms. Results demonstrated that the batch of Fathead Minnows (*P. promelas*) used in the January 2008 bioassay were highly susceptible to toxic exposure. They experienced 100% mortality in concentrations as low as 8 mg/L of the reference toxicant.<sup>20</sup> The concomitant LC<sub>50</sub> for the reference toxicant was 5.3 mg/L, which was comparable to the average toxicant concentrations found in reference tests conducted in previous years.

### Quantifiable Chemical Constituents

The nontoxic character of the MBCSD effluent was confirmed by the general absence of detectable concentrations of chemical contaminants within the grab and composite samples collected on 9 January 2008. The samples were tested for the presence of 145 chemical compounds. Table 2 shows that only seven compounds were detected in quantifiable amounts in the January 2008 effluent samples. These compounds were ammonia, copper, lead, zinc, chloroform, xylene, and a commonly occurring phthalate compound (bis 2-ethylhexyl phthalate). Table 2 also shows that the concentrations measured for these seven compounds were all well below the discharge limitations promulgated by the NPDES permit. The permit limits were

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<sup>18</sup> DO concentrations in the test chamber with 100% effluent dropped from 9.0 mg/L to 6.1 mg/L on the first day of the test

<sup>19</sup> Sodium dodecyl sulfate

<sup>20</sup> cf. The Larval Fathead Minnow Juvenile Acute Laboratory Control Chart attached to this report

**Table 2. Comparison of Effluent Chemical Concentrations with NPDES Permit Limitations**

Constituent	Concentration		
	Units	Measured	Limitation <sup>24</sup>
Copper	µg/L	16.	140.
Lead	µg/L	2.1	270.
Zinc	µg/L	60.	1,620.
Bis (2-ethylhexyl) phthalate	µg/L	12.	470. <sup>25</sup>
Chloroform	µg/L	0.93	17,400. <sup>25</sup>
Xylene	µg/L	0.79	— <sup>26</sup>
Ammonia (as N)	mg/L	20.	80.4

derived from the receiving-water objectives stated in Table B of the California Ocean Plan,<sup>21</sup> and a critical initial dilution ratio of 133:1 computed from a conservative oceanic dispersion model applied to the MBCSD outfall.<sup>22</sup> Because the PQL's<sup>23</sup> for nearly all undetected compounds were well below their respective permit limits, the chemical analyses were sensitive enough to detect potentially toxic levels of compounds in the effluent. All analyses were conducted in accordance with EPA protocols.

### ***Ammonia***

Most of the compounds in Table 2 have been routinely detected at low but quantifiable concentrations within effluent<sup>27</sup> and biosolid<sup>28</sup> samples collected over the past decade. Ammonia as nitrogen<sup>29</sup> is measured in grab effluent samples that are collected on a monthly basis. It has always been present in detectable concentrations that are well below the most-stringent permit limit of 80.4 mg/L, which applies to a 6-month median. The ammonia concentration of 20 mg/L measured in the January 2008 sample was slightly lower than the historical average concentration of 25 mg/L. This difference may reflect the increased contribution of inflow and infiltration of rainwater and groundwater into the collection system that often occurs during winter months. This contribution dilutes the proportion of wastewater of sewage origin that contains most of the ammonia.

### ***Metals***

Similarly, the presence of copper, lead, and zinc at low concentrations in the January effluent sample is not indicative of any significant new contaminant sources within the influent stream. Unlike synthetic organic compounds, these metals occur naturally within the mineralogy of sediments along the central California

<sup>21</sup> State Water Resources Control Board (SWRCB). 1997. California Ocean Plan, Water Quality Control Plan Ocean Waters of California. State Water Resources Control Board, California Environmental Protection Agency. Effective July 23, 1997.

<sup>22</sup> See the discussion beginning on Page III-1 in: Supplement to the 2003 Renewal Application for Ocean Discharge under NPDES Permit No. CA0047881. Prepared for the City of Morro Bay, Morro Bay, CA, July 2003.

<sup>23</sup> The Practical Quantification Limit is the smallest quantifiable concentration based on the sample size and analytical technique.

<sup>24</sup> 6-month median limitation unless otherwise indicated.

<sup>25</sup> 30-Day Average

<sup>26</sup> Limit not specified in the NPDES discharge permit.

<sup>27</sup> Table 14 (Page III-20) in: Supplement to the 2003 Renewal Application for Ocean Discharge under NPDES Permit No. CA0047881. Prepared for the City of Morro Bay, Morro Bay, CA. July 2003.

<sup>28</sup> Table 22 (Page III-78) *op. cit.*

<sup>29</sup> NH<sub>3</sub>-N

coast. They enter the wastewater collection system through erosion of natural mineral deposits. All three compounds also frequently enter the wastewater collection system through internal corrosion of household plumbing systems. Lead can also be introduced to the system from the illegal dumping of lead-based paints, gasoline, or fuel-contaminated dusts. Regardless, given the history of consistently low, but detectable, lead concentrations within MBCSD effluent, these latter methods of lead introduction are probably not a common occurrence, and are not likely to have contributed tangibly to the concentrations measured in the January 2008 effluent sample.

In addition, the measured concentrations of lead (2.1 µg/L), copper (16 µg/L), and zinc (60µg/L) were low, and only slightly above their respective PQLs (1 µg/L, 10 µg/L, and 50 µg/L). The measured lead concentration was more than 100 times lower than the limit specified in the NPDES discharge permit for 6-month median concentrations, while the measured concentration of zinc was 27 times lower. Similarly, the copper concentration was almost an order of magnitude lower than its 6-month median limit.

### ***BEHP***

The phthalate compound, bis (2-ethylhexyl) phthalate (BEHP), is another ubiquitous compound that has also been consistently detected at low levels in effluent and biosolid samples collected over the past decade.<sup>30</sup> Phthalate esters, such as BEHP, are components of synthetic dyes, resins, plasticizers, insecticides, and, pharmaceuticals. Nearly 2.7 million metric tons (6 billion pounds) of phthalate esters are produced each year, of which more than half is BEHP. BEHP is a physical plasticizer that is added to plastic resins to soften them, providing increased flexibility. It is not, however, covalently bound to the resin, which allows it to slowly leach out of the plastic and into the environment over time through evaporation or dissolution. Because of their mobility, high vapor pressure, and the massive scale at which they are produced, phthalate esters, and BEHP in particular, have become pervasive in the environment. However, although this phthalate compound can negatively affect human health, concentrations would have to be 39 times higher than those measured in January 2008 to be of a human-health concern.

### ***Xylene***

The gasoline-related compound xylene was also detected in the January 2008 sample at a relatively-low concentration of 0.79 µg/L. Xylene is one of four aromatic hydrocarbon compounds that are collectively known as BTEX (benzene, toluene, ethyl benzene, and xylene). These compounds were historically detected within the MBCSD effluent in conjunction with the infiltration of gasoline-contaminated groundwater in 1999 and 2000.<sup>31</sup> However, in the January 2008 sample, the low concentration of xylene, and the general absence of other gasoline-related compounds, indicates that the gasoline contamination was probably an isolated event rather than a significant new chronic discharge into the sewer system. Regardless, xylene has a low potential for accumulation in aquatic life, and the detected concentration was three orders of magnitude lower than the limit of 1750 µg/L set in the Basin Plan for municipal drinking-water supply.

### ***Chloroform***

Chloroform was the only other compound detected in measurable concentrations within the January 2008 effluent sample. Chloroform is a typical by-product of drinking-water and wastewater chlorination programs, and has been detected at low levels in about half of the effluent samples over the past decade. At 0.93 µg/L, the measured concentration measured concentration in the January 2008 sample was only slightly above the

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<sup>30</sup> Table 3 (Page II-9) in: Supplement to the 2003 Renewal Application for Ocean Discharge under NPDES Permit No. CA0047881. Prepared for the City of Morro Bay, Morro Bay, CA. July 2003.

<sup>31</sup> Marine Research Specialists (MRS). 2000. City of Morro Bay and Cayucos Sanitary District, Offshore Monitoring and Reporting Program, 1999 Annual Report. Submitted February 2000 to the City of Morro Bay and Cayucos Sanitary District, Morro Bay, CA

detection limit (PQL= 0.5 µg/L) and was over four orders of magnitude lower than levels considered harmful to human health. Because chloroform rapidly volatilizes in water, low concentrations are not of ecological concern in the marine environment. At the low measured concentration and flow rates comparable to 2007, the mass emission of chloroform will remain well below the stringent mass-loading goal of 5 kg/yr identified in the NPDES permit.

### Detectable Chemical Constituents

In addition to the seven compounds detected in the effluent at quantifiable levels, nine other constituents were detected at levels too minute to be accurately quantified by standard laboratory procedures. These compounds are listed in Table 3 along with their estimated concentrations. They include five naturally occurring metals, a gasoline-related compound, a cleaning agent, a solvent, and a chlorination by-product. All of the estimated concentrations are more than an order of magnitude less than their respective limiting concentrations. As such, the presence of these compounds in the effluent cannot be considered a threat to human health or the marine environment.

**Table 3. Non-Quantifiable Effluent Constituent Detects**

Constituent	Units	Concentration			
		MDL	Estimated <sup>32</sup>	PQL	Limitation <sup>24</sup>
Arsenic	µg/L	.37	1.2	2.0	670.
Chromium	µg/L	.89	1.1	10.	270.
Nickel	µg/L	1.8	4.7	10.	670.
Mercury	µg/L	0.022	0.025	0.2	5.
Selenium	µg/L	0.47	0.91	2.0	2010.
Toluene	µg/L	0.12	0.24	0.5	11400000. <sup>25</sup>
Methylene chloride	mg/L	0.16	.19	1.0	— <sup>26</sup>
1,4 Dichlorobenzene	µg/L	0.12	0.16	0.5	2410. <sup>25</sup>
Dibromochloromethane	µg/L	0.12	0.13	0.5	17400. <sup>25</sup>

Similar to xylene, toluene is BTEX constituent indicative of low-level gasoline concentrations. Methylene chloride is used as an industrial solvent and paint stripper, while the volatile organic chemical, 1,4-dichlorobenzene, is used to control moths, molds, and mildew, and to deodorize restrooms and waste containers. Both have been occasionally detected in quantifiable concentrations in effluent samples collected in prior years. However, because methylene chloride was also detected in the travel blank, it is not clear that this compound was actually present in the effluent sample, at least at the reported concentration.

Dibromochloromethane is a halomethane which forms during the chlorine disinfection process when organic substances are present. At this low concentration, it is not clear whether the presence of this compound is the result of wastewater disinfection within the treatment plant, or is the result of the chlorination of drinking water that is subsequently discharged into the collection system.

### Conclusions

The comprehensive chemical and bioassay analyses conducted on effluent samples collected in January 2008 augment data collected over the last two decades. Together, these measurements demonstrate the consistently benign nature of the discharge from the MBSCD treatment plant. The absence of heavy industry within the collection area and the high performance of the treatment process are reflected in the general lack of toxicity

<sup>32</sup> Not detected at levels above the indicated practical quantification (detection) limit

*Mr. B. Keogh*  
*7 February 2008*

*Page 8*

and chemical contaminants within the effluent samples. The concentrations of the few chemical compounds that were detected in the January 2008 samples were typical of wastewater derived from domestic sources, and all were far below limits specified in the NPDES discharge permit. All measurements fully complied with the requirements and limitations specified in the current NPDES discharge permit.

Please contact the undersigned if you have questions regarding these results.

Sincerely,

Douglas A. Coats, Ph.D.  
Program Manager

Enclosure (Four Report Copies)

***CHEMICAL ANALYSIS RESULTS***

Marine Research Specialists  
 3140 Telegraph Road, Suite A  
 Suite A  
 Ventura, CA 93003-3238

Project: Semi-annual eff  
 Project Number: (none)  
 Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Water Analysis (Metals)

BCL Sample ID: 0800458-02      Client Sample Name: COMP EFF, 1/9/2008 12:00:00AM

Constituent	Result	Units	PQL	MDL	Method	Prep	Run	Analyst	Instru- ment ID	Dilution	QC	MB Bias	Lab Quals
						Date	Date/Time				Batch ID		
Total Antimony	ND	ug/L	100	16	EPA-200.7	01/15/08	01/16/08 15:06	ARD	PE-OP1	1	BRA0833	ND	
Total Beryllium	ND	ug/L	10	0.72	EPA-200.7	01/15/08	01/16/08 15:06	ARD	PE-OP1	1	BRA0833	ND	
Total Cadmium	ND	ug/L	10	3.3	EPA-200.7	01/15/08	01/16/08 15:06	ARD	PE-OP1	1	BRA0833	ND	
Total Chromium	1.1	ug/L	10	0.89	EPA-200.7	01/15/08	01/16/08 15:06	ARD	PE-OP1	1	BRA0833	ND	J
Total Copper	16	ug/L	10	2.6	EPA-200.7	01/15/08	01/16/08 15:06	ARD	PE-OP1	1	BRA0833	ND	
Total Mercury	0.025	ug/L	0.20	0.022	EPA-245.1	01/14/08	01/15/08 14:50	MEV	CETAC1	1	BRA0690	0.052	J
Total Nickel	4.7	ug/L	10	1.8	EPA-200.7	01/15/08	01/16/08 15:06	ARD	PE-OP1	1	BRA0833	ND	J
Total Silver	ND	ug/L	10	9.4	EPA-200.7	01/15/08	01/16/08 15:06	ARD	PE-OP1	1	BRA0833	ND	
Total Zinc	60	ug/L	50	8.2	EPA-200.7	01/15/08	01/16/08 15:06	ARD	PE-OP1	1	BRA0833	ND	
Total Recoverable Arsenic	1.2	ug/L	2.0	0.37	EPA-200.8	01/15/08	01/16/08 18:17	PPS	PE-EL1	1	BRA0829	ND	J
Total Recoverable Lead	2.1	ug/L	1.0	0.057	EPA-200.8	01/15/08	01/16/08 18:17	PPS	PE-EL1	1	BRA0829	ND	
Total Recoverable Selenium	0.91	ug/L	2.0	0.47	EPA-200.8	01/15/08	01/16/08 18:17	PPS	PE-EL1	1	BRA0829	ND	J
Total Recoverable Thallium	ND	ug/L	1.0	0.016	EPA-200.8	01/15/08	01/16/08 18:17	PPS	PE-EL1	1	BRA0829	ND	

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Project: Semi-annual eff  
 Project Number: [none]  
 Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Water Analysis (General Chemistry)

BCL Sample ID: 0800458-01	Client Sample Name: GRAB EFF, 1/9/2008 12:00:00AM
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Constituent	Result	Units	PQL	MDL	Method	Prep Date	Run Date/Time	Analyst	Instru- ment ID	Dilution	QC Batch ID	MB Bias	Lab Quals
Ammonia as N (Distilled)	20	mg/L	1.0	0.50	EPA-350.1	01/17/08	01/17/08 15:57	VH1	SC-1	10	BRA0942	ND	A01

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 Ventura, CA 93003-3238

Project: Semi-annual eff  
 Project Number: [none]  
 Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Water Analysis (General Chemistry)

BCL Sample ID: 0800458-02      Client Sample Name: COMP EFF, 1/9/2008 12:00:00AM

Constituent	Result	Units	PQL	MDL	Method	Prep	Run	Analyst	Instru- ment ID	Dilution	QC	MB	Lab
						Date	Date/Time				Batch ID	Bias	Quals
Total Cyanide	ND	mg/L	0.0050	0.0032	EPA-335.4	01/15/08	01/15/08 13:37	TDC	KONE-1	1	BRA0558	ND	

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 Project Number: (none)  
 Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Organochlorine Pesticides and PCB's (EPA Method 608)

BCL Sample ID: 0800458-02      Client Sample Name: COMP EFF, 1/9/2008 12:00:00AM

Constituent	Result	Units	PQL	MDL	Method	Prep Date	Run Date/Time	Analyst	Instru- ment ID	Dilution	QC Batch ID	MB Bias	Lab Quals
Aldrin	ND	ug/L	0.0050	0.0014	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
alpha-BHC	ND	ug/L	0.0050	0.0017	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
beta-BHC	ND	ug/L	0.0050	0.0037	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
delta-BHC	ND	ug/L	0.0050	0.00090	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
gamma-BHC (Lindane)	ND	ug/L	0.0050	0.0017	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
Chlordane (Technical)	ND	ug/L	0.50	0.38	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
4,4'-DDD	ND	ug/L	0.0050	0.0024	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
4,4'-DDE	ND	ug/L	0.0050	0.0015	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
4,4'-DDT	ND	ug/L	0.0050	0.0019	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	V11
Dieldrin	ND	ug/L	0.0050	0.0021	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
Endosulfan I	ND	ug/L	0.0050	0.0016	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
Endosulfan II	ND	ug/L	0.0050	0.0031	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
Endosulfan sulfate	ND	ug/L	0.0050	0.0019	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	V11
Endrin	ND	ug/L	0.0050	0.0022	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
Endrin aldehyde	ND	ug/L	0.010	0.0022	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
Heptachlor	ND	ug/L	0.0050	0.0044	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
Heptachlor epoxide	ND	ug/L	0.0050	0.0019	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
Methoxychlor	ND	ug/L	0.0050	0.0036	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	V11
Toxaphene	ND	ug/L	2.0	0.42	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
PCB-1016	ND	ug/L	0.20	0.048	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
PCB-1221	ND	ug/L	0.20	0.089	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
PCB-1232	ND	ug/L	0.20	0.090	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	

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## Organochlorine Pesticides and PCB's (EPA Method 608)

BCL Sample ID: 0800458-02      Client Sample Name: COMP EFF, 1/9/2008 12:00:00AM

Constituent	Result	Units	PQL	MDL	Method	Prep Date	Run Date/Time	Analyst	Instru-ment ID	Dilution	QC Batch ID	MB Bias	Lab Quals
PCB-1242	ND	ug/L	0.20	0.095	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
PCB-1248	ND	ug/L	0.20	0.025	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
PCB-1254	ND	ug/L	0.20	0.042	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
PCB-1260	ND	ug/L	0.20	0.024	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
Total PCB's (Summation)	ND	ug/L	0.20	0.10	EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852	ND	
TCMX (Surrogate)	72.9	%	72 - 129 (LCL - UCL)		EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852		
Dibutyl chlorendate (Surrogate)	60.5	%	82 - 177 (LCL - UCL)		EPA-608	01/14/08	01/15/08 20:57	JRS	GC-1	1.010	BRA0852		S09

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 Project Manager: Doug Coats

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## Volatile Organic Analysis (EPA Method 624)

BCL Sample ID: 0800458-02      Client Sample Name: COMP EFF, 1/9/2008 12:00:00AM

Constituent	Result	Units	PQL	MDL	Method	Prep Date	Run Date/Time	Analyst	Instru- ment ID	Dilution	QC Batch ID	MB Bias	Lab Quals
Benzene	ND	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Bromodichloromethane	ND	ug/L	0.50	0.13	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Bromoform	ND	ug/L	0.50	0.22	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Bromomethane	ND	ug/L	1.0	0.31	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Carbon tetrachloride	ND	ug/L	0.50	0.089	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Chlorobenzene	ND	ug/L	0.50	0.11	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Chloroethane	ND	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Chloroform	0.93	ug/L	0.50	0.098	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Chloromethane	ND	ug/L	0.50	0.14	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Dibromochloromethane	0.13	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	J
1,2-Dichlorobenzene	ND	ug/L	0.50	0.13	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
1,3-Dichlorobenzene	ND	ug/L	0.50	0.14	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
1,4-Dichlorobenzene	0.16	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	J
1,1-Dichloroethane	ND	ug/L	0.50	0.11	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
1,2-Dichloroethane	ND	ug/L	0.50	0.098	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
1,1-Dichloroethene	ND	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
trans-1,2-Dichloroethene	ND	ug/L	0.50	0.14	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
1,2-Dichloropropane	ND	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
cis-1,3-Dichloropropene	ND	ug/L	0.50	0.086	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
trans-1,3-Dichloropropene	ND	ug/L	0.50	0.11	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Ethylbenzene	ND	ug/L	0.50	0.13	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Methylene chloride	0.19	ug/L	1.0	0.16	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	J

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## Volatile Organic Analysis (EPA Method 624)

BCL Sample ID: 0800458-02		Client Sample Name: COMP EFF, 1/9/2008 12:00:00AM											
Constituent	Result	Units	PQL	MDL	Method	Prep Date	Run Date/Time	Analyst	Instru-ment ID	Dilution	QC Batch ID	MB Bias	Lab Quals
Methyl t-butyl ether	ND	ug/L	0.50	0.13	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
1,1,2,2-Tetrachloroethane	ND	ug/L	0.50	0.22	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	V11
Tetrachloroethene	ND	ug/L	0.50	0.11	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Toluene	0.24	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	J
1,1,1-Trichloroethane	ND	ug/L	0.50	0.27	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
1,1,2-Trichloroethane	ND	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Trichloroethene	ND	ug/L	0.50	0.13	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Trichlorofluoromethane	ND	ug/L	0.50	0.14	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	ug/L	0.50	0.13	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Vinyl chloride	ND	ug/L	0.50	0.14	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Total Xylenes	0.79	ug/L	0.50	0.33	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
Acrolein	ND	ug/L	20	3.7	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	V11
Acrylonitrile	ND	ug/L	5.0	2.0	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	
p- & m-Xylenes	0.47	ug/L	0.50	0.21	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	J
o-Xylene	0.32	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843	ND	J
1,2-Dichloroethane-d4 (Surrogate)	90.9	%	76 - 114 (LCL - UCL)		EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843		
Toluene-d8 (Surrogate)	91.5	%	88 - 110 (LCL - UCL)		EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843		
4-Bromofluorobenzene (Surrogate)	94.1	%	86 - 115 (LCL - UCL)		EPA-624	01/16/08	01/16/08 20:05	MGC	MS-V7	1	BRA0843		

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 Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Base Neutral and Acid Extractables Organic Analysis (EPA Method 625)

BCL Sample ID: 0800458-01      Client Sample Name: GRAB EFF, 1/9/2008 12:00:00AM

Constituent	Result	Units	PQL	MDL	Method	Prep	Run	Analyst	Instru- ment ID	Dilution	QC	MB	Lab
						Date	Date/Time				Batch ID	Bias	Quals
4-Chloro-3-methylphenol	ND	ug/L	5.0	0.67	EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810	ND	
2-Chlorophenol	ND	ug/L	2.0	0.65	EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810	ND	
2,4-Dichlorophenol	ND	ug/L	2.0	0.60	EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810	ND	
2,4-Dimethylphenol	ND	ug/L	2.0	0.52	EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810	ND	
4,6-Dinitro-2-methylphenol	ND	ug/L	10	2.2	EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810	ND	
2,4-Dinitrophenol	ND	ug/L	10	2.4	EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810	ND	
2-Methylphenol	ND	ug/L	2.0	0.57	EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810	ND	
3- & 4-Methylphenol	ND	ug/L	2.0	0.83	EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810	ND	
2-Nitrophenol	ND	ug/L	2.0	0.42	EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810	ND	
4-Nitrophenol	ND	ug/L	2.0	1.7	EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810	ND	
Pentachlorophenol	ND	ug/L	10	0.45	EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810	ND	
Phenol	ND	ug/L	2.0	0.37	EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810	ND	
2,4,5-Trichlorophenol	ND	ug/L	5.0	0.93	EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810	ND	
2,4,6-Trichlorophenol	ND	ug/L	5.0	0.43	EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810	ND	
2-Fluorophenol (Surrogate)	42.1	%	39 - 96 (LCL - UCL)		EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810		
Phenol-d5 (Surrogate)	36.0	%	16 - 79 (LCL - UCL)		EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810		
Nitrobenzene-d5 (Surrogate)	65.2	%	64 - 131 (LCL - UCL)		EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810		
2-Fluorobiphenyl (Surrogate)	71.9	%	53 - 123 (LCL - UCL)		EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810		
2,4,6-Tribromophenol (Surrogate)	95.7	%	56 - 141 (LCL - UCL)		EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810		
p-Terphenyl-d14 (Surrogate)	63.5	%	47 - 145 (LCL - UCL)		EPA-625	01/14/08	01/22/08 14:59	SKC	MS-B1	1.020	BRA0810		

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Project: Semi-annual eff  
Project Number: [none]  
Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Base Neutral and Acid Extractables Organic Analysis (EPA Method 625)

BCL Sample ID: 0800458-02      Client Sample Name: COMP EFF, 1/9/2008 12:00:00AM

Constituent	Result	Units	PQL	MDL	Method	Prep	Run		Analyst	Instru- ment ID	Dilution	QC	MB	Lab
						Date	Date/Time	Batch ID				Bias	Quals	
Acenaphthene	ND	ug/L	2.0	0.48	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
Acenaphthylene	ND	ug/L	2.0	0.64	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
Aldrin	ND	ug/L	2.0	0.80	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
Aniline	ND	ug/L	5.0	0.46	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
Anthracene	ND	ug/L	2.0	0.79	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
Benzidine	ND	ug/L	20	4.7	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
Benzo[a]anthracene	ND	ug/L	2.0	0.52	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
Benzo[b]fluoranthene	ND	ug/L	2.0	0.66	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
Benzo[k]fluoranthene	ND	ug/L	2.0	0.80	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
Benzo[a]pyrene	ND	ug/L	2.0	0.73	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
Benzo[g,h,i]perylene	ND	ug/L	2.0	0.94	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
Benzoic acid	ND	ug/L	10	6.1	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
Benzyl alcohol	ND	ug/L	2.0	0.67	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
Benzyl butyl phthalate	ND	ug/L	2.0	0.59	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
alpha-BHC	ND	ug/L	2.0	0.50	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
beta-BHC	ND	ug/L	2.0	0.48	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
delta-BHC	ND	ug/L	2.0	0.60	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
gamma-BHC (Lindane)	ND	ug/L	2.0	0.56	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
bis(2-Chloroethoxy)methane	ND	ug/L	2.0	0.58	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
bis(2-Chloroethyl) ether	ND	ug/L	2.0	0.52	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
bis(2-Chloroisopropyl)ether	ND	ug/L	2.0	0.73	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	
bis(2-Ethylhexyl)phthalate	12	ug/L	5.0	1.1	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810	ND	

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Ventura, CA 93003-3238

Project: Semi-annual eff  
Project Number: [none]  
Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Base Neutral and Acid Extractables Organic Analysis (EPA Method 625)

BCL Sample ID: 0800458-02      Client Sample Name: COMP EFF, 1/9/2008 12:00:00AM

Constituent	Result	Units	PQL	MDL	Method	Prep			Run			Instru- ment ID	QC Batch ID	MB Bias	Lab Quals
						Date	Date/Time	Analyst	Date	Date/Time	Analyst				
4-Bromophenyl phenyl ether	ND	ug/L	2.0	0.69	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
4-Chloroaniline	ND	ug/L	2.0	0.87	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
2-Chloronaphthalene	ND	ug/L	2.0	0.50	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
4-Chlorophenyl phenyl ether	ND	ug/L	2.0	0.68	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
Chrysene	ND	ug/L	2.0	0.73	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
4,4'-DDD	ND	ug/L	2.0	0.50	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
4,4'-DDE	ND	ug/L	3.0	0.58	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
4,4'-DDT	ND	ug/L	2.0	0.27	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
Dibenzo[a,h]anthracene	ND	ug/L	3.0	0.92	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
Dibenzofuran	ND	ug/L	2.0	0.81	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
1,2-Dichlorobenzene	ND	ug/L	2.0	0.58	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
1,3-Dichlorobenzene	ND	ug/L	2.0	0.66	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
1,4-Dichlorobenzene	ND	ug/L	2.0	0.53	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
3,3-Dichlorobenzidine	ND	ug/L	10	0.88	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
Dieldrin	ND	ug/L	3.0	0.52	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
Diethyl phthalate	ND	ug/L	2.0	0.85	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
Dimethyl phthalate	ND	ug/L	2.0	0.55	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
Di-n-butyl phthalate	ND	ug/L	2.0	0.74	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
2,4-Dinitrotoluene	ND	ug/L	2.0	0.99	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
2,6-Dinitrotoluene	ND	ug/L	2.0	0.74	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
Di-n-octyl phthalate	ND	ug/L	2.0	0.85	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			
1,2-Diphenylhydrazine	ND	ug/L	2.0	0.70	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND			

Marine Research Specialists  
 3140 Telegraph Road, Suite A  
 Suite A  
 Ventura, CA 93003-3238

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 Project Number: [none]  
 Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Base Neutral and Acid Extractables Organic Analysis (EPA Method 625)

BCL Sample ID: 0800458-02		Client Sample Name: COMP EFF, 1/9/2008 12:00:00AM											
Constituent	Result	Units	PQL	MDL	Method	Prep Date	Run Date/Time	Analyst	Instru-ment ID	Dilution	QC Batch ID	MB Bias	Lab Quats
Endosulfan I	ND	ug/L	10	2.7	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Endosulfan II	ND	ug/L	10	2.4	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Endosulfan sulfate	ND	ug/L	3.0	0.58	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Endrin	ND	ug/L	2.0	0.54	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Endrin aldehyde	ND	ug/L	10	0.86	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Fluoranthene	ND	ug/L	2.0	0.70	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Fluorene	ND	ug/L	2.0	0.73	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Heptachlor	ND	ug/L	2.0	0.60	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Heptachlor epoxide	ND	ug/L	2.0	0.63	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Hexachlorobenzene	ND	ug/L	2.0	0.71	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Hexachlorobutadiene	ND	ug/L	2.0	0.59	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Hexachlorocyclopentadiene	ND	ug/L	2.0	0.26	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Hexachloroethane	ND	ug/L	2.0	0.52	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Indeno[1,2,3-cd]pyrene	ND	ug/L	2.0	0.92	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Isophorone	ND	ug/L	2.0	0.51	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
2-Methylnaphthalene	ND	ug/L	2.0	0.51	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Naphthalene	ND	ug/L	2.0	0.62	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
2-Naphthylamine	ND	ug/L	20	6.5	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
2-Nitroaniline	ND	ug/L	2.0	0.80	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
3-Nitroaniline	ND	ug/L	2.0	0.82	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
4-Nitroaniline	ND	ug/L	5.0	1.1	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Nitrobenzene	ND	ug/L	2.0	0.55	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	

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Reported: 01/28/2008 9:50

## Base Neutral and Acid Extractables Organic Analysis (EPA Method 625)

BCL Sample ID: 0800458-02    Client Sample Name: COMP EFF, 1/9/2008 12:00:00AM

Constituent	Result	Units	PQL	MDL	Method	Prep	Run		Instru- ment ID	Dilution	QC Batch ID	MB Bias	Lab Quals
						Date	Date/Time	Analyst					
N-Nitrosodimethylamine	ND	ug/L	2.0	0.45	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
N-Nitrosodi-N-propylamine	ND	ug/L	2.0	0.59	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
N-Nitrosodiphenylamine	ND	ug/L	2.0	0.80	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Phenanthrene	ND	ug/L	2.0	0.60	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Pyrene	ND	ug/L	2.0	0.62	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
1,2,4-Trichlorobenzene	ND	ug/L	2.0	0.67	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
4-Chloro-3-methylphenol	ND	ug/L	5.0	0.67	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
2-Chlorophenol	ND	ug/L	2.0	0.65	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
2,4-Dichlorophenol	ND	ug/L	2.0	0.60	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
2,4-Dimethylphenol	ND	ug/L	2.0	0.52	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
4,6-Dinitro-2-methylphenol	ND	ug/L	10	2.2	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
2,4-Dinitrophenol	ND	ug/L	10	2.4	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
2-Methylphenol	ND	ug/L	2.0	0.57	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
3- & 4-Methylphenol	ND	ug/L	2.0	0.83	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
2-Nitrophenol	ND	ug/L	2.0	0.42	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
4-Nitrophenol	ND	ug/L	2.0	1.7	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Pentachlorophenol	ND	ug/L	10	0.45	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
Phenol	ND	ug/L	2.0	0.37	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
2,4,5-Trichlorophenol	ND	ug/L	5.0	0.93	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
2,4,6-Trichlorophenol	ND	ug/L	5.0	0.43	EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810	ND	
2-Fluorophenol (Surrogate)	40.2	%	39 - 96 (LCL - UCL)		EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810		
Phenol-d5 (Surrogate)	35.2	%	16 - 79 (LCL - UCL)		EPA-625	01/14/08	01/22/08 15:27	SKC	MS-B1	1.020	BRA0810		

Marine Research Specialists  
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## Base Neutral and Acid Extractables Organic Analysis (EPA Method 625)

BCL Sample ID: 0800458-02      Client Sample Name: COMP EFF, 1/9/2008 12:00:00AM

Constituent	Result	Units	PQL	MDL	Method	Prep	Run		Analyst	Instru- ment ID	Dilution	QC	MB	Lab
						Date	Date/Time	Batch ID				Bias	Quals	
Nitrobenzene-d5 (Surrogate)	62.2	%	64 - 131	(LCL - UCL)	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810		S09
2-Fluorobiphenyl (Surrogate)	68.3	%	53 - 123	(LCL - UCL)	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810		
2,4,6-Tribromophenol (Surrogate)	85.6	%	56 - 141	(LCL - UCL)	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810		
p-Terphenyl-d14 (Surrogate)	59.1	%	47 - 145	(LCL - UCL)	EPA-625	01/14/08	01/22/08	15:27	SKC	MS-B1	1.020	BRA0810		

***ACUTE AND CHRONIC BIOASSAY RESULTS***

# LABORATORY REPORT



**Aquatic  
Testing  
Laboratories**

*"dedicated to providing quality aquatic toxicity testing"*

4350 Transport Street, Unit 107  
Ventura, CA 93003  
(805) 650-0546 FAX (805) 650-0756  
CA DOHS ELAP Cert. No.: 1775

**Date:** January 12, 2008

**Client:** Marine Research Specialists  
3140 Telegraph Road, Suite A  
Ventura, CA 93003  
Attn: Doug Coats

**Laboratory No.:** A-08010801  
**Sample I.D.:** Morro Bay Effluent

**Sample Control:** The samples were received by ATL within the recommended hold time, in a chilled state, and with the chain of custody records attached.

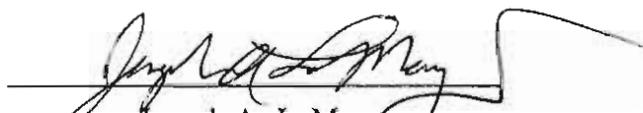
Date Sampled: 01/07, 01/08, 01/09, 01/10/08  
Date Received: 01/08, 01/08, 01/10, 01/11/08  
Temp. Received: 2°C, 2°C, 2°C, 1°C  
Chlorine (TRC): 0.0 mg/l, 0.0 mg/l, 0.0 mg/l, 0.0 mg/l  
Dates Tested: 01/08/08 to 01/12/08

**Sample Analysis:** The following analyses were performed on your sample:  
Fathead Minnow 96hr Acute Static-Renewal Toxicity Test (EPA Method 2000.0),  
Giant Kelp Germination and Growth Short-Term Toxicity Test (EPA Method 1009.0).  
Attached are the test data generated from the analysis of your sample.

## Result Summary:

<u>Sample ID.</u>	<u>Test</u>	<u>LC50</u>	<u>TUa</u>
Grab Effluent	Fathead Minnow	70.7%	1.41
Comp Effluent	Kelp Germination:	<u>NOEC</u> 18%	<u>TUc</u> 5.56
	Kelp Growth:	18%	5.56

**Quality Control:** Reviewed and approved by:

  
Joseph A. LeMay  
Laboratory Director

# FATHEAD MINNOW ACUTE NPDES TEST



Lab No.: A-08010801-001  
 Client/ID: MRS - Morro Bay

Start Date: 01/08/2008

## TEST SUMMARY

Species: *Pimephales promelas*.  
 Age: 12 (1-14) days.  
 Regulations: NPDES.  
 Test solution volume: 250 ml.  
 Feeding: prior to renewal at 48 hrs.  
 Aeration: None, unless DO drops below 4.0 mg/l.  
 Number of replicates: 2.  
 Dilution water: Moderately hard reconstituted water.  
 QA/QC Batch No.: RT-080103.

Source: In-laboratory Culture.  
 Test type: Static-Renewal.  
 Test Protocol: EPA-821-R-02-012.  
 Endpoints: Percent Survival at 96 hrs.  
 Test chamber: 500 ml beakers.  
 Temperature: 20 +/- 1°C.  
 Number of fish per chamber: 10.  
 Photoperiod: 16/8 hrs light/dark.

## INITIAL WATER QUALITY PARAMETERS

Additional Parameters	Control	100% Sample			
		Day 1	Day 2	Day 3	Day 4
Temperature (°C)	20.0	2 <sup>0</sup>	2 <sup>0</sup>	2 <sup>3</sup>	1 <sup>0</sup>
DO (mg/l)	9.1	9.0	8.9	9.1	9.2
pH	7.7	7.2	7.3	7.3	7.4
Total Res. Chlorine (mg/l)	0	0	0	0	0
Ammonia (mg/l NH <sub>3</sub> -N)**	<0.2	36	33	34	44
Alkalinity (mg/l CaCO <sub>3</sub> )	62	267	280	294	291
Hardness (mg/l CaCO <sub>3</sub> )	97	212	328	323	334
Conductivity (umhos)	290	1060	1700	1665	1800

### Comments:

\* Chlorine neutralized with sodium thiosulfate (one drop per liter of 10% solution).

\*\* Ammonia reading by Hach Kit - only approximate indication.

Concentration-response relationship acceptable? (see attached computer analysis):

Yes (response curve normal)

No (dose interrupted indicated or non-normal)

**Acute Fish Test-96 Hr Survival**

Start Date: 1/8/2008 11:00    Test ID: 8010801    Sample ID: CA0047881-Morro Bay SD  
 End Date: 1/12/2008 11:30    Lab ID: CAATL-Aquatic Testing Labs    Sample Type: EFF1-POTW  
 Sample Date: 1/7/2008    Protocol: ACUTE-EPA-821-R-02-012    Test Species: PP-Pimephales promelas  
 Comments:

Conc-%	1	2
D-Control	1.0000	1.0000
6.25	1.0000	1.0000
12.5	1.0000	1.0000
25	1.0000	1.0000
50	1.0000	1.0000
100	0.0000	0.0000

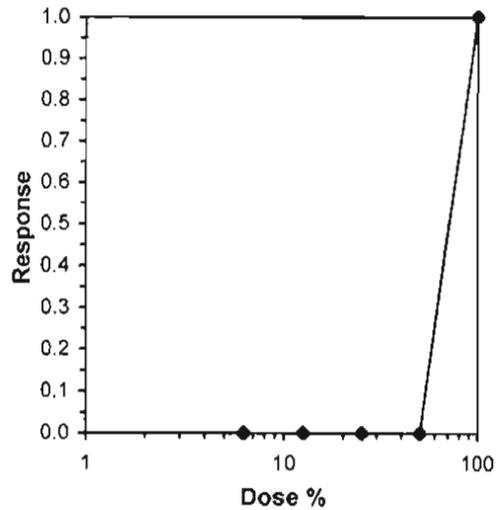
Conc-%	Transform: Arcsin Square Root							Number Resp	Total Number
	Mean	N-Mean	Mean	Min	Max	CV%	N		
D-Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
6.25	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
12.5	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
25	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
50	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
100	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	2	20	20

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Graphical Method	
Trim Level	EC50
0.0%	70.711

70.711

$TU_a = 1.411$



# FATHEAD MINNOW ACUTE NPDES TEST



Lab No.: A-08010801-001

Client/ID: MRS - Morro Bay

Start Date: 01/08/2008

## RAW TEST DATA

		DAY 1		DAY 2		DAY 3		DAY 4		
		0 hr	24hr							
<b>Analyst Initials:</b>		<i>Rm</i>								
<b>Time of Readings:</b>		11:00	13:00	13:00	12:00	12:00	11:30	11:30	11:30	
Control	DO	9.1	7.2	8.9	8.7	9.0	9.0	9.1	8.7	
	pH	7.7	7.3	7.7	7.5	7.7	7.5	7.7	7.6	
	Temp	20.0	19.8	20.1	19.8	20.3	19.8	20.6	19.6	
	# Alive	Rep A	---	10	---	10	---	10	---	10
		Rep B	---	10	---	10	---	10	---	10
6.25%	DO	9.5	7.4	8.9	8.1	9.1	9.1	9.1	8.6	
	pH	7.6	7.0	7.7	7.4	7.6	7.6	7.6	7.6	
	Temp	19.9	19.8	20.1	19.8	20.3	19.8	20.5	19.6	
	# Alive	Rep A	---	10	---	10	---	10	---	10
		Rep B	---	10	---	10	---	10	---	10
12.5%	DO	9.7	7.0	8.9	6.6	9.1	9.1	9.1	8.7	
	pH	7.5	7.4	7.6	7.3	7.6	7.7	7.6	7.7	
	Temp	19.9	19.8	20.0	19.9	20.3	19.9	20.3	19.6	
	# Alive	Rep A	---	10	---	10	---	10	---	10
		Rep B	---	10	---	10	---	10	---	10
25%	DO	9.3	7.1	8.9	7.2	9.0	9.1	9.1	8.6	
	pH	9.5	7.6	7.5	7.4	7.5	7.8	7.5	7.9	
	Temp	19.9	19.8	20.0	19.9	20.2	19.9	20.1	19.7	
	# Alive	Rep A	---	10	---	10	---	10	---	10
		Rep B	---	10	---	10	---	10	---	10
50%	DO	9.2	6.4	8.9	6.7	9.0	8.6	9.1	8.4	
	pH	7.3	7.7	7.5	7.5	7.4	7.9	7.4	8.0	
	Temp	19.8	19.8	19.9	19.9	20.0	19.9	19.8	19.7	
	# Alive	Rep A	---	10	---	10	---	10	---	10
		Rep B	---	10	---	10	---	10	---	10
100%	DO	9.0	6.1	8.9	5.7	-	-	-	-	
	pH	7.2	7.9	7.3	7.8	-	-	-	-	
	Temp	19.6	19.8	19.6	20.0	-	-	-	-	
	# Alive	Rep A	---	5	---	0	---	-	---	-
		Rep B	---	6	---	0	---	-	---	-



# *Giant Kelp Germination and Germ Tube Growth Short-Term Toxicity Test*

- *Test and Result Summary*
- *Data Summary and Statistical Analysis*
- *Raw Test Data: Water Quality &  
Test Organism Measurements*

# GIANT KELP GERMINATION AND GROWTH SHORT-TERM TOXICITY TEST



Lab No.: A-08010801-002  
Client/ID: MRS - Morro Bay Comp. Effluent

Date Tested: 01/09/08 - 01/11/08

## TEST SUMMARY

Species: *Macrocystis pyrifera*.  
Protocol: EPA Method 1009.0.  
Test type: Static.  
Test chamber: glass beaker.  
Temperature: 15 +/- 1°C.  
Number of spores per ml: 7,500 (approx.).  
QA/QC Batch No.: RT-080109 (ran concurrently).

Source: Field collected.  
Dilution water: Lab seawater.  
Endpoints: NOEC, IC25 at 48 hrs.  
Test volume: 200 ml.  
Aeration: None.  
Number of replicates: 5.

## RESULTS SUMMARY

Sample Concentration	Percent Germination		Mean Germ Tube Length ( $\mu\text{m}$ )	
Control (Brine)	86.6%		15.95	
Control (Dilution)	86.5%		15.60	
5.6%	87.5%		16.35	
10%	86.7%		16.25	
18%	83.9%		15.30	
32%	47.8%	*	10.65	*
56%	21.7%	*	6.85	*

\* Statistically significantly less than control at P = 0.05 level

## CHRONIC TOXICITY

END POINT	GERMINATION	GERM TUBE LENGTH
NOEC	18%	18%
TUc (100/NOEC)	5.56	5.56

## QA/QC TEST ACCEPTABILITY

Parameter	Result
Mean control germination $\geq 70\%$	Yes (86.6%)
Mean control germination tube length $> 10 \mu\text{m}$	Yes (15.95 $\mu\text{m}$ )
Please see RT-080109 report for additional test acceptability criteria.	

**Macrocystis Germination and Growth Test-Proportion Germinated**

Start Date: 1/9/2008 13:00 Test ID: 8010801-2 Sample ID: CA0047881-Morro Bay SD  
 End Date: 1/11/2008 13:00 Lab ID: CAATL-Aquatic Testing Labs Sample Type: EFF1-POTW  
 Sample Date: 1/8/2008 Protocol: MBP 90 Test Species: MP-Macrocystis pyrifera  
 Comments:

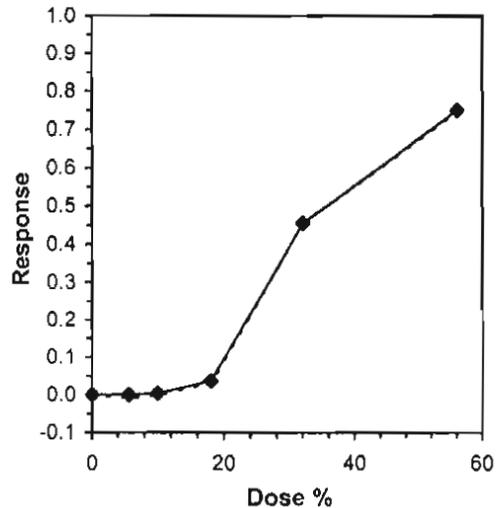
Conc-%	1	2	3	4	5
B-Control	0.8462	0.8868	0.8400	0.8529	0.9038
D-Control	0.8846	0.8529	0.9029	0.8317	0.8515
5.6	0.8738	0.8627	0.8911	0.8952	0.8529
10	0.8932	0.8400	0.9038	0.8641	0.8317
18	0.8529	0.8558	0.8515	0.8235	0.8119
32	0.3889	0.2364	0.6346	0.6038	0.5238
56	0.1607	0.3333	0.1481	0.3394	0.1048

Conc-%	Transform: Arcsin Square Root							Rank Sum	1-Tailed Critical	Isotonic	
	Mean	N-Mean	Mean	Min	Max	CV%	N			Mean	N-Mean
B-Control	0.8659	1.0014	1.1975	1.1593	1.2555	3.501	5	*	0.8708	1.0000	
D-Control	0.8647	1.0000	1.1957	1.1481	1.2539	3.557	5				
5.6	0.8752	1.0121	1.2104	1.1772	1.2412	2.263	5	31.50	16.00	0.8708	1.0000
10	0.8666	1.0021	1.1988	1.1481	1.2555	3.938	5	27.00	16.00	0.8669	0.9956
18	0.8391	0.9704	1.1586	1.1222	1.1812	2.331	5	22.50	16.00	0.8392	0.9638
*32	0.4775	0.5522	0.7604	0.5077	0.9217	22.455	5	15.00	16.00	0.4747	0.5451
*56	0.2173	0.2513	0.4749	0.3296	0.6220	28.398	5	15.00	16.00	0.2183	0.2508

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ( $p > 0.05$ )	0.94411	0.927	-0.4767	1.85922
Bartlett's Test indicates unequal variances ( $p = 5.41E-04$ )	21.9234	15.0863		
The control means are not significantly different ( $p = 0.95$ )	0.0658	2.30601		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	18	32	24	5.55556
Treatments vs B-Control				

Point	%	SD	Linear Interpolation (200 Resamples)		
			95% CL(Exp)	Skew	
IC05	18.461	0.887	14.863	19.350	-3.9634
IC10	20.133	0.553	19.002	21.920	0.4216
IC15	21.805	0.840	20.146	24.722	0.6383
IC20	23.477	1.172	21.334	27.406	0.7069
IC25	25.149	1.519	22.385	30.273	0.7388
IC40	30.165	2.680	25.729	39.040	0.6819
IC50	35.679	3.966	27.407	44.801	-0.0753



**Macrocystis Germination and Growth Test-Growth-Length**

Start Date: 1/9/2008 13:00    Test ID: 8010801-2    Sample ID: CA0047881-Morro Bay SD  
 End Date: 1/11/2008 13:00    Lab ID: CAATL-Aquatic Testing Labs    Sample Type: EFF1-POTW  
 Sample Date: 1/8/2008    Protocol: MBP 90    Test Species: MP-Macrocystis pyrifera

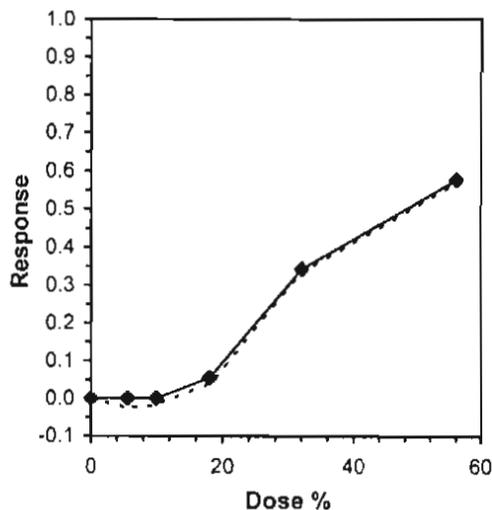
Comments:

Conc-%	1	2	3	4	5
B-Control	15.750	16.500	15.750	16.750	15.000
D-Control	15.000	15.750	15.750	16.000	15.500
5.6	16.250	15.500	17.000	16.500	16.500
10	16.250	16.000	17.500	16.000	15.500
18	14.750	16.000	15.750	15.250	14.750
32	9.250	9.000	12.750	10.500	11.750
56	7.000	6.500	6.500	7.750	6.500

Conc-%	Mean	N-Mean	Transform: Untransformed					N	t-Stat	1-Tailed Critical	MSD	Isotonic	
			Mean	Min	Max	CV%	Mean					N-Mean	
B-Control	15.950	1.0224	15.950	15.000	16.750	4.349	5	*			16.183	1.0000	
D-Control	15.600	1.0000	15.600	15.000	16.000	2.430	5						
5.6	16.350	1.0481	16.350	15.500	17.000	3.350	5	-0.726	2.360	1.300	16.183	1.0000	
10	16.250	1.0417	16.250	15.500	17.500	4.615	5	-0.545	2.360	1.300	16.183	1.0000	
18	15.300	0.9808	15.300	14.750	16.000	3.726	5	1.180	2.360	1.300	15.300	0.9454	
*32	10.650	0.6827	10.650	9.000	12.750	15.086	5	9.623	2.360	1.300	10.650	0.6581	
*56	6.850	0.4391	6.850	6.500	7.750	7.996	5	16.523	2.360	1.300	6.850	0.4233	

Auxiliary Tests	Statistic	Critical	Skew	Kurt						
Shapiro-Wilk's Test indicates normal distribution ( $p > 0.05$ )	0.97895	0.927	0.37369	0.76803						
Bartlett's Test indicates equal variances ( $p = 0.15$ )	8.13159	15.0863								
The control means are not significantly different ( $p = 0.35$ )	0.98995	2.30601								
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	18	32	24	5.55556	1.29979	0.08149	77.2521	0.75833	2.3E-15	5, 24
Treatments vs B-Control										

Point	%	SD	Linear Interpolation (200 Resamples)		
			95% CL(Exp)	Skew	
IC05	17.328	1.664	12.125	19.624	-0.5139
IC10	20.213	0.758	18.281	21.972	-0.2434
IC15	22.649	0.881	20.477	25.454	0.3235
IC20	25.085	1.153	22.492	28.828	0.7346
IC25	27.522	1.490	24.589	32.633	0.9030
IC40	37.937	2.985	29.664	44.364	-0.3793
IC50	48.158	1.652	43.526	51.995	-0.4269



# GIANT KELP GERMINATION AND GROWTH SHORT-TERM TOXICITY TEST



Lab No.: A-08010801-002

Start Date: 01/09/2008

Dish No.	Sample Conc.	Total Number Counted	Number Germin.	Number Non-Germin.	Germ Tube Lengths (micrometer units)									
					A	B	C	D	E	F	G	H	I	J
1	56	110 <del>3</del>	18	94	2	3	2	4	4	2	3	4	2	2
2	B	104	88	16	6	7	6	7	7	6	5	7	6	6
3	32	108	42	66	4	3	6	4	2	4	3	4	4	3
4	5.6	103	90	13	8	5	6	7	7	4	6	7	8	7
5	18	102	87	15	6	7	6	6	4	5	6	6	7	6
6	10	103	92	11	7	6	5	7	7	6	8	7	6	6
7	B	106	94	12	8	7	5	6	5	7	8	7	6	7
8	10	100	84	16	9	7	6	7	4	6	7	7	5	6
9	32	110	26	84	3	4	3	2	4	8	3	3	4	2
10	5.6	102	88	14	6	7	5	6	6	7	7	5	6	7
11	18	104	89	15	8	7	6	7	5	4	7	7	7	6
12	56	111	37	74	2	2	3	4	2	2	4	2	2	3
13	10	104	94	10	8	7	6	7	6	7	7	8	7	7
14	B	100	84	16	4	8	7	6	6	7	5	7	6	7
15	18	101	86	15	4	7	8	7	6	6	7	5	7	6
16	56	108	16	92	2	4	3	2	2	4	2	2	3	2
17	5.6	101	90	11	6	7	8	7	6	6	7	8	7	6
18	32	104	66	38	6	7	5	3	4	3	4	6	6	7
19	56	109	37	72	3	4	2	2	4	3	2	4	3	4
20	B	102	87	15	7	7	6	6	5	8	7	6	7	8

Comments:

Micrometer conversion factor: 1 unit = 2.5 um at 400X power

# GIANT KELP GERMINATION AND GROWTH SHORT-TERM TOXICITY TEST



Lab No.: A-08010801-002

Start Date: 01/09/2008

Dish No.	Sample Conc.	Total Number Counted	Number Germin.	Number Non-Germin.	Germ Tube Lengths (micrometer units)									
					A	B	C	D	E	F	G	H	I	J
21	18	102	84	18	7	6	5	7	6	6	4	7	7	6
22	5.6	105	94	11	6	7	7	7	8	7	5	6	6	7
23	10	103	89	14	8	7	6	7	7	6	5	7	6	5
24	32	106	64	42	3	6	5	6	4	5	2	4	3	4
25	10	101	84	17	7	4	7	6	5	7	6	7	7	6
26	13	104	94	10	9	8	6	2	2	6	8	7	6	6
27	32	105	55	50	5	7	7	4	4	6	5	4	3	2
28	5.6	102	87	15	7	5	6	7	7	6	7	8	7	6
29	18	101	82	19	6	5	7	6	5	5	7	6	5	7
30	56	105	11	94	3	2	2	4	2	2	3	4	2	2
31														
32														
33														
34														
35														
36														
37														
38														
39														
40														

Comments:

Micrometer conversion factor: 1 unit = 2.5 um at 400X power

# GIANT KELP GERMINATION AND GROWTH SHORT-TERM TOXICITY TEST



Lab No.: A-08010801-002  
Client ID: MRS - Morro Bay Effluent

Start Date: 01/09/2008

## WATER QUALITY READINGS

Sample	Initial Readings				Final Readings			
	Temp (°C)	DO (mg/l)	pH	Salinity (o/oo)	Temp (°C)	DO (mg/l)	pH	Salinity (o/oo)
Control	15.4	7.6	8.1	34	15.5	7.6	8.1	34
Brine Control	15.1	7.7	8.1	34	15.3	7.5	8.1	34
5.6%	14.4	7.8	8.1	34	15.4	7.5	8.1	34
10%	15.2	7.7	8.1	34	15.3	7.6	8.1	34
18%	15.2	7.8	8.1	34	15.0	7.6	8.1	34
32%	15.4	7.6	8.1	34	15.4	7.6	8.2	34
56%	15.6	7.6	8.1	34	15.5	7.6	8.2	34

Sample as received: Chlorine: 0.0 mg/l; pH: 7.3; Salinity: 0 ppt; Temp: 2°C;  
DO: 8.9 mg/l; NH<sub>3</sub>-N: 33 mg/l.

Brine Control contains equivalent amount of artificial sea salts as highest effluent concentration.

Initial readings: Analyst: [Signature] Date: 1-9-08 Time: 13:00

Final readings: Analyst: [Signature] Date: 1-11-08 Time: 13:00

# GIANT KELP GERMINATION AND GROWTH SHORT-TERM TOXICITY TEST



Lab No.: A-08010801-002  
Client ID: MRS - Morro Bay Effluent

Start Date: 01/09/2008

## RANDOMIZATION WORKSHEET

Beaker No.	Sample Conc.	Notes						
1	5.6	11	18	21	18	31		<p>Need 7500/ml x 50 ml = 375,000 spores.</p> <p>Add 0.25 ml spore stock of 6 spores per 5x5 hemacytometer grid</p> <p>or</p> <p>Need 7500/ml x 200 ml = 1,500,000 spores.</p> <p>Add 1.0 ml spore stock of 6 spores per 5x5 hemacytometer grid</p>
2	B	12	5.6	22	5.6	32		
3	3.2	13	10	23	10	33		
4	5.6	14	B	24	3.2	34		
5	18	15	18	25	10	35		
6	10	16	5.6	26	B	36		
7	B	17	5.6	27	3.2	37		
8	10	18	3.2	28	5.6	38		
9	3.2	19	5.6	29	18	39		
10	5.6	20	B	30	5.6	40		

Analyst:   *JK*   Date:   1-9-8   Time:   1100

**QA/QC REPORTS & CHAINS OF CUSTODY**

Marine Research Specialists  
3140 Telegraph Road, Suite A  
Suite A  
Ventura, CA 93003-3238

Project: Semi-annual eff  
Project Number: (none)  
Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Water Analysis (Metals)

### Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits	
										RPD	Percent Recovery Lab Quals
Total Mercury	BRA0690	Duplicate	0800221-03	0.030000	0.030000		ug/L	0		20	J
		Matrix Spike	0800221-03	0.030000	1.0375	1.0000	ug/L		101		70 - 130
		Matrix Spike Duplicate	0800221-03	0.030000	1.0300	1.0000	ug/L	1.0	100	20	70 - 130
Total Recoverable Arsenic	BRA0829	Duplicate	0800537-01	3.6760	3.8290		ug/L	4.1		20	
		Matrix Spike	0800537-01	3.6760	53.434	50.000	ug/L		99.5		70 - 130
		Matrix Spike Duplicate	0800537-01	3.6760	51.100	50.000	ug/L	4.8	94.8	20	70 - 130
Total Recoverable Lead	BRA0829	Duplicate	0800537-01	1.2000	1.1080		ug/L	8.0		20	
		Matrix Spike	0800537-01	1.2000	54.115	50.000	ug/L		106		70 - 130
		Matrix Spike Duplicate	0800537-01	1.2000	50.859	50.000	ug/L	6.5	99.3	20	70 - 130
Total Recoverable Selenium	BRA0829	Duplicate	0800537-01	ND	ND		ug/L			20	
		Matrix Spike	0800537-01	ND	48.345	50.000	ug/L		96.7		70 - 130
		Matrix Spike Duplicate	0800537-01	ND	46.242	50.000	ug/L	4.4	92.5	20	70 - 130
Total Recoverable Thallium	BRA0829	Duplicate	0800537-01	ND	ND		ug/L			20	
		Matrix Spike	0800537-01	ND	20.746	20.000	ug/L		104		70 - 130
		Matrix Spike Duplicate	0800537-01	ND	19.438	20.000	ug/L	6.8	97.2	20	70 - 130
Total Antimony	BRA0833	Duplicate	0800408-01	ND	ND		ug/L			20	
		Matrix Spike	0800408-01	ND	349.54	400.00	ug/L		87.4		75 - 125
		Matrix Spike Duplicate	0800408-01	ND	365.87	400.00	ug/L	4.6	91.5	20	75 - 125
Total Beryllium	BRA0833	Duplicate	0800408-01	ND	ND		ug/L			20	
		Matrix Spike	0800408-01	ND	210.23	200.00	ug/L		105		75 - 125
		Matrix Spike Duplicate	0800408-01	ND	216.29	200.00	ug/L	2.8	108	20	75 - 125
Total Cadmium	BRA0833	Duplicate	0800408-01	ND	ND		ug/L			20	
		Matrix Spike	0800408-01	ND	202.66	200.00	ug/L		101		75 - 125
		Matrix Spike Duplicate	0800408-01	ND	214.03	200.00	ug/L	5.8	107	20	75 - 125
Total Chromium	BRA0833	Duplicate	0800408-01	3.6543	2.9923		ug/L	19.9		20	J
		Matrix Spike	0800408-01	3.6543	207.81	200.00	ug/L		102		75 - 125
		Matrix Spike Duplicate	0800408-01	3.6543	219.09	200.00	ug/L	5.7	108	20	75 - 125

Marine Research Specialists  
 3140 Telegraph Road, Suite A  
 Suite A  
 Ventura, CA 93003-3238

Project: Semi-annual eff  
 Project Number: [none]  
 Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Water Analysis (Metals)

### Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits	
										RPD	Percent Recovery Lab Quals
Total Copper	BRA0833	Duplicate	0800408-01	50.429	49.184		ug/L	2.5		20	
		Matrix Spike	0800408-01	50.429	250.55	200.00	ug/L		100		75 - 125
		Matrix Spike Duplicate	0800408-01	50.429	265.45	200.00	ug/L	7.7	108	20	75 - 125
Total Nickel	BRA0833	Duplicate	0800408-01	4.4554	4.5854		ug/L	2.9		20	J
		Matrix Spike	0800408-01	4.4554	441.87	400.00	ug/L		109		75 - 125
		Matrix Spike Duplicate	0800408-01	4.4554	472.12	400.00	ug/L	7.1	117	20	75 - 125
Total Silver	BRA0833	Duplicate	0800408-01	ND	ND		ug/L			20	
		Matrix Spike	0800408-01	ND	103.14	100.00	ug/L		103		75 - 125
		Matrix Spike Duplicate	0800408-01	ND	108.62	100.00	ug/L	5.7	109	20	75 - 125
Total Zinc	BRA0833	Duplicate	0800408-01	103.25	94.620		ug/L	8.7		20	
		Matrix Spike	0800408-01	103.25	327.01	200.00	ug/L		112		75 - 125
		Matrix Spike Duplicate	0800408-01	103.25	330.10	200.00	ug/L	0.9	113	20	75 - 125

Marine Research Specialists  
 3140 Telegraph Road, Suite A  
 Suite A  
 Ventura, CA 93003-3238

Project: Semi-annual eff  
 Project Number: [none]  
 Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Water Analysis (General Chemistry) Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits	
										RPD	Percent Recovery Lab Quals
Total Cyanide	BRA0558	Duplicate	0800635-04	ND	ND		mg/L			10	
		Matrix Spike	0800635-04	ND	0.11974	0.10000	mg/L		120		90 - 110 Q03
		Matrix Spike Duplicate	0800635-04	ND	0.11533	0.10000	mg/L	4.3	115	20	90 - 110 Q03
Ammonia as N (Distilled)	BRA0942	Duplicate	0800235-01	0.082500	0.15480		mg/L	60.9		20	A02
		Matrix Spike	0800235-01	0.082500	0.97340	1.0000	mg/L		89.1		80 - 120
		Matrix Spike Duplicate	0800235-01	0.082500	1.0095	1.0000	mg/L	4.0	92.7	20	80 - 120

Marine Research Specialists  
3140 Telegraph Road, Suite A  
Suite A  
Ventura, CA 93003-3238

Project: Semi-annual eff  
Project Number: [none]  
Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Organochlorine Pesticides and PCB's (EPA Method 608)

### Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits		Lab Quals
										RPD	Percent Recovery	
Aldrin	BRA0852	Matrix Spike	0712930-97	ND	0.24236	0.25000	ug/L		96.9		80 - 136	
		Matrix Spike Duplicate	0712930-97	ND	0.23789	0.25000	ug/L	1.8	95.2	20	80 - 136	
gamma-BHC (Lindane)	BRA0852	Matrix Spike	0712930-97	ND	0.18577	0.25000	ug/L		74.3		60 - 126	
		Matrix Spike Duplicate	0712930-97	ND	0.17791	0.25000	ug/L	4.3	71.2	24	60 - 126	
4,4'-DDT	BRA0852	Matrix Spike	0712930-97	ND	0.17873	0.25000	ug/L		71.5		61 - 128	V11
		Matrix Spike Duplicate	0712930-97	ND	0.17249	0.25000	ug/L	3.6	69.0	19	61 - 128	V11
Dieldrin	BRA0852	Matrix Spike	0712930-97	ND	0.23222	0.25000	ug/L		92.9		76 - 132	
		Matrix Spike Duplicate	0712930-97	ND	0.22595	0.25000	ug/L	2.7	90.4	18	76 - 132	
Endrin	BRA0852	Matrix Spike	0712930-97	ND	0.23383	0.25000	ug/L		93.5		76 - 143	
		Matrix Spike Duplicate	0712930-97	ND	0.22627	0.25000	ug/L	3.3	90.5	19	76 - 143	
Heptachlor	BRA0852	Matrix Spike	0712930-97	ND	0.23898	0.25000	ug/L		95.6		81 - 138	
		Matrix Spike Duplicate	0712930-97	ND	0.23589	0.25000	ug/L	1.3	94.4	18	81 - 138	
TCMX (Surrogate)	BRA0852	Matrix Spike	0712930-97	ND	0.32470	0.30000	ug/L		108		72 - 129	
		Matrix Spike Duplicate	0712930-97	ND	0.32447	0.30000	ug/L		108		72 - 129	
Dibutyl chlorendate (Surrogate)	BRA0852	Matrix Spike	0712930-97	ND	0.74724	0.75000	ug/L		99.6		82 - 177	
		Matrix Spike Duplicate	0712930-97	ND	0.73410	0.75000	ug/L		97.9		82 - 177	

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Project: Semi-annual eff  
Project Number: [none]  
Project Manager: Doug Coats

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## Volatile Organic Analysis (EPA Method 624)

### Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits	
										RPD	Percent Recovery Lab Quals
Benzene	BRA0843	Matrix Spike	0800736-02	ND	24.570	25.000	ug/L		98.3		70 - 130
		Matrix Spike Duplicate	0800736-02	ND	25.890	25.000	ug/L	5.6	104	20	70 - 130
Bromodichloromethane	BRA0843	Matrix Spike	0800736-02	ND	20.950	25.000	ug/L		83.8		70 - 130
		Matrix Spike Duplicate	0800736-02	ND	22.030	25.000	ug/L	5.0	88.1	20	70 - 130
Bromoform	BRA0843	Matrix Spike	0800736-02	ND	22.570	25.000	ug/L		90.3		70 - 130
		Matrix Spike Duplicate	0800736-02	ND	23.470	25.000	ug/L	3.9	93.9	20	70 - 130
Bromomethane	BRA0843	Matrix Spike	0800736-02	ND	20.240	25.000	ug/L		81.0		70 - 130
		Matrix Spike Duplicate	0800736-02	ND	22.900	25.000	ug/L	12.3	91.6	20	70 - 130
Carbon tetrachloride	BRA0843	Matrix Spike	0800736-02	ND	25.870	25.000	ug/L		103		70 - 130
		Matrix Spike Duplicate	0800736-02	ND	27.330	25.000	ug/L	5.7	109	20	70 - 130
Chlorobenzene	BRA0843	Matrix Spike	0800736-02	ND	26.020	25.000	ug/L		104		70 - 130
		Matrix Spike Duplicate	0800736-02	ND	27.680	25.000	ug/L	6.5	111	20	70 - 130
Chloroethane	BRA0843	Matrix Spike	0800736-02	ND	24.650	25.000	ug/L		98.6		70 - 130
		Matrix Spike Duplicate	0800736-02	ND	25.710	25.000	ug/L	4.4	103	20	70 - 130
Chloroform	BRA0843	Matrix Spike	0800736-02	ND	23.640	25.000	ug/L		94.6		70 - 130
		Matrix Spike Duplicate	0800736-02	ND	24.460	25.000	ug/L	3.3	97.8	20	70 - 130
Chloromethane	BRA0843	Matrix Spike	0800736-02	ND	28.300	25.000	ug/L		113		70 - 130
		Matrix Spike Duplicate	0800736-02	ND	29.420	25.000	ug/L	4.3	118	20	70 - 130
Dibromochloromethane	BRA0843	Matrix Spike	0800736-02	ND	21.370	25.000	ug/L		85.5		70 - 130
		Matrix Spike Duplicate	0800736-02	ND	23.030	25.000	ug/L	7.4	92.1	20	70 - 130
1,2-Dichlorobenzene	BRA0843	Matrix Spike	0800736-02	ND	24.700	25.000	ug/L		98.8		70 - 130
		Matrix Spike Duplicate	0800736-02	ND	26.060	25.000	ug/L	5.1	104	20	70 - 130
1,3-Dichlorobenzene	BRA0843	Matrix Spike	0800736-02	ND	24.610	25.000	ug/L		98.4		70 - 130
		Matrix Spike Duplicate	0800736-02	ND	26.540	25.000	ug/L	7.4	106	20	70 - 130
1,4-Dichlorobenzene	BRA0843	Matrix Spike	0800736-02	ND	25.170	25.000	ug/L		101		70 - 130
		Matrix Spike Duplicate	0800736-02	ND	25.880	25.000	ug/L	2.9	104	20	70 - 130

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## Volatile Organic Analysis (EPA Method 624)

### Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits		Lab Quals
										RPD	Percent Recovery	
1,1-Dichloroethane	BRA0843	Matrix Spike	0800736-02	ND	25.000	25.000	ug/L		100		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	26.360	25.000	ug/L	4.9	105	20	70 - 130	
1,2-Dichloroethane	BRA0843	Matrix Spike	0800736-02	ND	22.840	25.000	ug/L		91.4		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	23.230	25.000	ug/L	1.6	92.9	20	70 - 130	
1,1-Dichloroethene	BRA0843	Matrix Spike	0800736-02	ND	26.130	25.000	ug/L		105		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	27.490	25.000	ug/L	4.7	110	20	70 - 130	
trans-1,2-Dichloroethene	BRA0843	Matrix Spike	0800736-02	ND	25.220	25.000	ug/L		101		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	25.840	25.000	ug/L	2.0	103	20	70 - 130	
1,2-Dichloropropane	BRA0843	Matrix Spike	0800736-02	ND	22.380	25.000	ug/L		89.5		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	23.660	25.000	ug/L	5.5	94.6	20	70 - 130	
cis-1,3-Dichloropropene	BRA0843	Matrix Spike	0800736-02	ND	20.910	25.000	ug/L		83.6		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	21.920	25.000	ug/L	4.8	87.7	20	70 - 130	
trans-1,3-Dichloropropene	BRA0843	Matrix Spike	0800736-02	ND	20.050	25.000	ug/L		80.2		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	21.010	25.000	ug/L	4.6	84.0	20	70 - 130	
Ethylbenzene	BRA0843	Matrix Spike	0800736-02	ND	24.920	25.000	ug/L		99.7		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	26.810	25.000	ug/L	7.1	107	20	70 - 130	
Methylene chloride	BRA0843	Matrix Spike	0800736-02	ND	23.820	25.000	ug/L		95.3		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	24.560	25.000	ug/L	3.0	98.2	20	70 - 130	
Methyl t-butyl ether	BRA0843	Matrix Spike	0800736-02	ND	20.390	25.000	ug/L		81.6		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	21.080	25.000	ug/L	3.3	84.3	20	70 - 130	
1,1,2,2-Tetrachloroethane	BRA0843	Matrix Spike	0800736-02	ND	21.370	25.000	ug/L		85.5		70 - 130	V11
		Matrix Spike Duplicate	0800736-02	ND	21.880	25.000	ug/L	2.3	87.5	20	70 - 130	V11
Tetrachloroethene	BRA0843	Matrix Spike	0800736-02	0.19000	25.630	25.000	ug/L		102		70 - 130	
		Matrix Spike Duplicate	0800736-02	0.19000	27.570	25.000	ug/L	7.5	110	20	70 - 130	
Toluene	BRA0843	Matrix Spike	0800736-02	ND	24.130	25.000	ug/L		96.5		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	25.530	25.000	ug/L	5.5	102	20	70 - 130	

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## Volatile Organic Analysis (EPA Method 624)

### Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits		Lab Quals
										RPD	Percent Recovery	
1,1,1-Trichloroethane	BRA0843	Matrix Spike	0800736-02	ND	24.860	25.000	ug/L		99.4		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	25.540	25.000	ug/L	2.6	102	20	70 - 130	
1,1,2-Trichloroethane	BRA0843	Matrix Spike	0800736-02	ND	20.830	25.000	ug/L		83.3		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	21.490	25.000	ug/L	3.2	86.0	20	70 - 130	
Trichloroethene	BRA0843	Matrix Spike	0800736-02	ND	23.870	25.000	ug/L		95.5		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	25.120	25.000	ug/L	4.6	100	20	70 - 130	
Trichlorofluoromethane	BRA0843	Matrix Spike	0800736-02	ND	26.840	25.000	ug/L		107		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	27.480	25.000	ug/L	2.8	110	20	70 - 130	
1,1,2-Trichloro-1,2,2-trifluoroethane	BRA0843	Matrix Spike	0800736-02	ND	26.410	25.000	ug/L		106		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	27.320	25.000	ug/L	2.8	109	20	70 - 130	
Vinyl chloride	BRA0843	Matrix Spike	0800736-02	ND	29.070	25.000	ug/L		116		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	30.420	25.000	ug/L	5.0	122	20	70 - 130	
Total Xylenes	BRA0843	Matrix Spike	0800736-02	ND	79.390	75.000	ug/L		106		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	83.610	75.000	ug/L	4.6	111	20	70 - 130	
p- & m-Xylenes	BRA0843	Matrix Spike	0800736-02	ND	53.770	50.000	ug/L		108		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	57.060	50.000	ug/L	5.4	114	20	70 - 130	
o-Xylene	BRA0843	Matrix Spike	0800736-02	ND	25.620	25.000	ug/L		102		70 - 130	
		Matrix Spike Duplicate	0800736-02	ND	26.550	25.000	ug/L	3.8	106	20	70 - 130	
1,2-Dichloroethane-d4 (Surrogate)	BRA0843	Matrix Spike	0800736-02	ND	9.2300	10.000	ug/L		92.3		76 - 114	
		Matrix Spike Duplicate	0800736-02	ND	9.0700	10.000	ug/L		90.7		76 - 114	
Toluene-d8 (Surrogate)	BRA0843	Matrix Spike	0800736-02	ND	9.4500	10.000	ug/L		94.5		88 - 110	
		Matrix Spike Duplicate	0800736-02	ND	9.3100	10.000	ug/L		93.1		88 - 110	
4-Bromofluorobenzene (Surrogate)	BRA0843	Matrix Spike	0800736-02	ND	9.3300	10.000	ug/L		93.3		86 - 115	
		Matrix Spike Duplicate	0800736-02	ND	9.0300	10.000	ug/L		90.3		86 - 115	

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## Base Neutral and Acid Extractables Organic Analysis (EPA Method 625)

### Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits	
										RPD	Percent Recovery Lab Quals
Acenaphthene	BRA0810	Matrix Spike	0712930-61	ND	60.168	80.000	ug/L		75.2		46 - 138
		Matrix Spike Duplicate	0712930-61	ND	59.995	80.000	ug/L	0.3	75.0	16	46 - 138
1,4-Dichlorobenzene	BRA0810	Matrix Spike	0712930-61	ND	46.977	80.000	ug/L		58.7		49 - 114
		Matrix Spike Duplicate	0712930-61	ND	43.559	80.000	ug/L	7.6	54.4	23	49 - 114
2,4-Dinitrotoluene	BRA0810	Matrix Spike	0712930-61	ND	55.627	80.000	ug/L		69.5		50 - 125
		Matrix Spike Duplicate	0712930-61	ND	55.936	80.000	ug/L	0.6	69.9	16	50 - 125
Hexachlorobenzene	BRA0810	Matrix Spike	0712930-61	ND	62.460	80.000	ug/L		78.1		55 - 135
		Matrix Spike Duplicate	0712930-61	ND	61.451	80.000	ug/L	1.7	76.8	18	55 - 135
Hexachlorobutadiene	BRA0810	Matrix Spike	0712930-61	ND	51.634	80.000	ug/L		64.5		36 - 120
		Matrix Spike Duplicate	0712930-61	ND	44.596	80.000	ug/L	14.6	55.7	27	36 - 120
Hexachloroethane	BRA0810	Matrix Spike	0712930-61	ND	42.673	80.000	ug/L		53.3		43 - 112
		Matrix Spike Duplicate	0712930-61	ND	38.973	80.000	ug/L	9.0	48.7	27	43 - 112
Nitrobenzene	BRA0810	Matrix Spike	0712930-61	ND	46.293	80.000	ug/L		57.9		55 - 124
		Matrix Spike Duplicate	0712930-61	ND	42.591	80.000	ug/L	8.5	53.2	19	55 - 124 Q03
N-Nitrosodi-N-propylamine	BRA0810	Matrix Spike	0712930-61	ND	42.641	80.000	ug/L		53.3		45 - 109
		Matrix Spike Duplicate	0712930-61	ND	40.211	80.000	ug/L	5.8	50.3	19	45 - 109
Pyrene	BRA0810	Matrix Spike	0712930-61	ND	51.022	80.000	ug/L		63.8		27 - 163
		Matrix Spike Duplicate	0712930-61	ND	50.657	80.000	ug/L	0.8	63.3	18	27 - 163
1,2,4-Trichlorobenzene	BRA0810	Matrix Spike	0712930-61	ND	52.972	80.000	ug/L		66.2		52 - 112
		Matrix Spike Duplicate	0712930-61	ND	47.515	80.000	ug/L	10.8	59.4	23	52 - 112
4-Chloro-3-methylphenol	BRA0810	Matrix Spike	0712930-61	ND	64.448	80.000	ug/L		80.6		43 - 141
		Matrix Spike Duplicate	0712930-61	ND	59.114	80.000	ug/L	8.7	73.9	16	43 - 141
2-Chlorophenol	BRA0810	Matrix Spike	0712930-61	ND	49.664	80.000	ug/L		62.1		47 - 111
		Matrix Spike Duplicate	0712930-61	ND	45.866	80.000	ug/L	8.0	57.3	20	47 - 111
2-Methylphenol	BRA0810	Matrix Spike	0712930-61	ND	49.395	80.000	ug/L		61.7		48 - 112
		Matrix Spike Duplicate	0712930-61	ND	44.390	80.000	ug/L	10.6	55.5	17	48 - 112

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## Base Neutral and Acid Extractables Organic Analysis (EPA Method 625) Quality Control Report - Precision & Accuracy

Constituent	Batch ID	QC Sample Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits	
										RPD	Percent Recovery Lab Quals
3- & 4-Methylphenol	BRA0810	Matrix Spike	0712930-61	ND	73.691	80.000	ug/L		92.1		78 - 199
		Matrix Spike Duplicate	0712930-61	ND	67.192	80.000	ug/L	9.2	84.0	17	78 - 199
4-Nitrophenol	BRA0810	Matrix Spike	0712930-61	ND	44.329	80.000	ug/L		55.4		13 - 86
		Matrix Spike Duplicate	0712930-61	ND	41.778	80.000	ug/L	5.9	52.2	15	13 - 86
Pentachlorophenol	BRA0810	Matrix Spike	0712930-61	ND	76.363	80.000	ug/L		95.5		32 - 148
		Matrix Spike Duplicate	0712930-61	ND	72.419	80.000	ug/L	5.4	90.5	38	32 - 148
Phenol	BRA0810	Matrix Spike	0712930-61	ND	25.171	80.000	ug/L		31.5		14 - 75
		Matrix Spike Duplicate	0712930-61	ND	23.114	80.000	ug/L	8.6	28.9	18	14 - 75
2,4,6-Trichlorophenol	BRA0810	Matrix Spike	0712930-61	ND	61.948	80.000	ug/L		77.4		47 - 130
		Matrix Spike Duplicate	0712930-61	ND	59.717	80.000	ug/L	3.7	74.6	18	47 - 130
2-Fluorophenol (Surrogate)	BRA0810	Matrix Spike	0712930-61	ND	42.842	80.000	ug/L		53.6		39 - 96
		Matrix Spike Duplicate	0712930-61	ND	38.480	80.000	ug/L		48.1		39 - 96
Phenol-d5 (Surrogate)	BRA0810	Matrix Spike	0712930-61	ND	27.252	80.000	ug/L		34.1		16 - 79
		Matrix Spike Duplicate	0712930-61	ND	25.482	80.000	ug/L		31.9		16 - 79
Nitrobenzene-d5 (Surrogate)	BRA0810	Matrix Spike	0712930-61	ND	57.480	80.000	ug/L		71.8		64 - 131
		Matrix Spike Duplicate	0712930-61	ND	54.236	80.000	ug/L		67.8		64 - 131
2-Fluorobiphenyl (Surrogate)	BRA0810	Matrix Spike	0712930-61	ND	56.726	80.000	ug/L		70.9		53 - 123
		Matrix Spike Duplicate	0712930-61	ND	55.187	80.000	ug/L		69.0		53 - 123
2,4,6-Tribromophenol (Surrogate)	BRA0810	Matrix Spike	0712930-61	ND	81.311	80.000	ug/L		102		56 - 141
		Matrix Spike Duplicate	0712930-61	ND	78.475	80.000	ug/L		98.1		56 - 141
p-Terphenyl-d14 (Surrogate)	BRA0810	Matrix Spike	0712930-61	ND	26.951	40.000	ug/L		67.4		47 - 145
		Matrix Spike Duplicate	0712930-61	ND	26.988	40.000	ug/L		67.5		47 - 145

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## Water Analysis (Metals)

### Quality Control Report - Laboratory Control Sample

Constituent	Batch ID	QC Sample ID	QC Type	Result	Spike Level	PQL	Units	Percent Recovery	RPD	Control Limits		Lab Quals
										Percent Recovery	RPD	
Total Mercury	BRA0690	BRA0690-BS1	LCS	1.0175	1.0000	0.20	ug/L	102		85 - 115		
Total Recoverable Arsenic	BRA0829	BRA0829-BS1	LCS	46.680	50.000	2.0	ug/L	93.4		85 - 115		
Total Recoverable Lead	BRA0829	BRA0829-BS1	LCS	50.810	50.000	1.0	ug/L	102		85 - 115		
Total Recoverable Selenium	BRA0829	BRA0829-BS1	LCS	46.086	50.000	2.0	ug/L	92.2		85 - 115		
Total Recoverable Thallium	BRA0829	BRA0829-BS1	LCS	19.609	20.000	1.0	ug/L	98.0		85 - 115		
Total Antimony	BRA0833	BRA0833-BS1	LCS	354.99	400.00	100	ug/L	88.7		85 - 115		
Total Beryllium	BRA0833	BRA0833-BS1	LCS	192.99	200.00	10	ug/L	96.5		85 - 115		
Total Cadmium	BRA0833	BRA0833-BS1	LCS	200.80	200.00	10	ug/L	100		85 - 115		
Total Chromium	BRA0833	BRA0833-BS1	LCS	191.76	200.00	10	ug/L	95.9		85 - 115		
Total Copper	BRA0833	BRA0833-BS1	LCS	185.11	200.00	10	ug/L	92.6		85 - 115		
Total Nickel	BRA0833	BRA0833-BS1	LCS	415.36	400.00	10	ug/L	104		85 - 115		
Total Silver	BRA0833	BRA0833-BS1	LCS	108.50	100.00	10	ug/L	108		85 - 115		
Total Zinc	BRA0833	BRA0833-BS1	LCS	206.36	200.00	50	ug/L	103		85 - 115		

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 Project Manager: Doug Coats

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## Water Analysis (General Chemistry)

### Quality Control Report - Laboratory Control Sample

Constituent	Batch ID	QC Sample ID	QC Type	Result	Spike Level	PQL	Units	Percent Recovery	RPD	Control Limits		Lab Quals
										Percent Recovery	RPD	
Total Cyanide	BRA0558	BRA0558-BS1	LCS	0.10377	0.10000	0.0050	mg/L	104		90 - 110		
Ammonia as N (Distilled)	BRA0942	BRA0942-BS1	LCS	0.89560	1.0000	0.10	mg/L	89.6		85 - 115		

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## Organochlorine Pesticides and PCB's (EPA Method 608)

### Quality Control Report - Laboratory Control Sample

Constituent	Batch ID	QC Sample ID	QC Type	Result	Spike Level	PQL	Units	Percent Recovery	RPD	Control Limits		Lab Quals
										Percent Recovery	RPD	
Aldrin	BRA0852	BRA0852-BS1	LCS	0.24004	0.25000	0.050	ug/L	96.0		77 - 142		
gamma-BHC (Lindane)	BRA0852	BRA0852-BS1	LCS	0.17767	0.25000	0.050	ug/L	71.1		62 - 125		
4,4'-DDT	BRA0852	BRA0852-BS1	LCS	0.17315	0.25000	0.10	ug/L	69.3		64 - 130		V11
Dieldrin	BRA0852	BRA0852-BS1	LCS	0.22774	0.25000	0.10	ug/L	91.1		79 - 133		
Endrin	BRA0852	BRA0852-BS1	LCS	0.22982	0.25000	0.10	ug/L	91.9		82 - 139		
Heptachlor	BRA0852	BRA0852-BS1	LCS	0.23405	0.25000	0.050	ug/L	93.6		76 - 143		
TCMX (Surrogate)	BRA0852	BRA0852-BS1	LCS	0.33073	0.30000	0.20	ug/L	110		72 - 129		
Dibutyl chlorendate (Surrogate)	BRA0852	BRA0852-BS1	LCS	0.76180	0.75000	0.20	ug/L	102		82 - 177		

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Project Number: [none]  
Project Manager: Doug Coats

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## Volatile Organic Analysis (EPA Method 624)

### Quality Control Report - Laboratory Control Sample

Constituent	Batch ID	QC Sample ID	QC Type	Result	Spike Level	PQL	Units	Percent Recovery	RPD	Control Limits		Lab Quals
										Percent Recovery	RPD	
Benzene	BRA0843	BRA0843-BS1	LCS	24.610	25.000	0.50	ug/L	98.4		70 - 130		
Bromodichloromethane	BRA0843	BRA0843-BS1	LCS	21.290	25.000	0.50	ug/L	85.2		70 - 130		
Bromoform	BRA0843	BRA0843-BS1	LCS	22.640	25.000	0.50	ug/L	90.6		70 - 130		
Bromomethane	BRA0843	BRA0843-BS1	LCS	23.490	25.000	1.0	ug/L	94.0		70 - 130		
Carbon tetrachloride	BRA0843	BRA0843-BS1	LCS	25.990	25.000	0.50	ug/L	104		70 - 130		
Chlorobenzene	BRA0843	BRA0843-BS1	LCS	26.630	25.000	0.50	ug/L	107		70 - 130		
Chloroethane	BRA0843	BRA0843-BS1	LCS	24.480	25.000	0.50	ug/L	97.9		70 - 130		
Chloroform	BRA0843	BRA0843-BS1	LCS	23.350	25.000	0.50	ug/L	93.4		70 - 130		
Chloromethane	BRA0843	BRA0843-BS1	LCS	28.010	25.000	0.50	ug/L	112		70 - 130		
Dibromochloromethane	BRA0843	BRA0843-BS1	LCS	22.620	25.000	0.50	ug/L	90.5		70 - 130		
1,2-Dichlorobenzene	BRA0843	BRA0843-BS1	LCS	24.390	25.000	0.50	ug/L	97.6		70 - 130		
1,3-Dichlorobenzene	BRA0843	BRA0843-BS1	LCS	24.930	25.000	0.50	ug/L	99.7		70 - 130		
1,4-Dichlorobenzene	BRA0843	BRA0843-BS1	LCS	25.050	25.000	0.50	ug/L	100		70 - 130		
1,1-Dichloroethane	BRA0843	BRA0843-BS1	LCS	24.930	25.000	0.50	ug/L	99.7		70 - 130		
1,2-Dichloroethane	BRA0843	BRA0843-BS1	LCS	22.510	25.000	0.50	ug/L	90.0		70 - 130		
1,1-Dichloroethene	BRA0843	BRA0843-BS1	LCS	26.550	25.000	0.50	ug/L	106		70 - 130		
trans-1,2-Dichloroethene	BRA0843	BRA0843-BS1	LCS	24.840	25.000	0.50	ug/L	99.4		70 - 130		
1,2-Dichloropropane	BRA0843	BRA0843-BS1	LCS	23.390	25.000	0.50	ug/L	93.6		70 - 130		
cis-1,3-Dichloropropene	BRA0843	BRA0843-BS1	LCS	21.300	25.000	0.50	ug/L	85.2		70 - 130		
trans-1,3-Dichloropropene	BRA0843	BRA0843-BS1	LCS	20.700	25.000	0.50	ug/L	82.8		70 - 130		
Ethylbenzene	BRA0843	BRA0843-BS1	LCS	24.350	25.000	0.50	ug/L	97.4		70 - 130		
Methylene chloride	BRA0843	BRA0843-BS1	LCS	23.800	25.000	1.0	ug/L	95.2		70 - 130		
Methyl t-butyl ether	BRA0843	BRA0843-BS1	LCS	20.840	25.000	0.50	ug/L	83.4		70 - 130		

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## Volatile Organic Analysis (EPA Method 624)

### Quality Control Report - Laboratory Control Sample

Constituent	Batch ID	QC Sample ID	QC Type	Result	Spike Level	PQL	Units	Percent Recovery	RPD	Control Limits		Lab Quals
										Percent Recovery	RPD	
1,1,2,2-Tetrachloroethane	BRA0843	BRA0843-BS1	LCS	19.360	25.000	0.50	ug/L	77.4		70 - 130		
Tetrachloroethene	BRA0843	BRA0843-BS1	LCS	26.080	25.000	0.50	ug/L	104		70 - 130		
Toluene	BRA0843	BRA0843-BS1	LCS	24.450	25.000	0.50	ug/L	97.8		70 - 130		
1,1,1-Trichloroethane	BRA0843	BRA0843-BS1	LCS	24.330	25.000	0.50	ug/L	97.3		70 - 130		
1,1,2-Trichloroethane	BRA0843	BRA0843-BS1	LCS	21.420	25.000	0.50	ug/L	85.7		70 - 130		
Trichloroethene	BRA0843	BRA0843-BS1	LCS	25.950	25.000	0.50	ug/L	104		70 - 130		
Trichlorofluoromethane	BRA0843	BRA0843-BS1	LCS	26.000	25.000	0.50	ug/L	104		70 - 130		
1,1,2-Trichloro-1,2,2-trifluoroethane	BRA0843	BRA0843-BS1	LCS	26.200	25.000	0.50	ug/L	105		70 - 130		
Vinyl chloride	BRA0843	BRA0843-BS1	LCS	29.060	25.000	0.50	ug/L	116		70 - 130		
Total Xylenes	BRA0843	BRA0843-BS1	LCS	79.510	75.000	0.50	ug/L	106		70 - 130		
p- & m-Xylenes	BRA0843	BRA0843-BS1	LCS	54.560	50.000	0.50	ug/L	109		70 - 130		
o-Xylene	BRA0843	BRA0843-BS1	LCS	24.950	25.000	0.50	ug/L	99.8		70 - 130		
1,2-Dichloroethane-d4 (Surrogate)	BRA0843	BRA0843-BS1	LCS	9.0600	10.000		ug/L	90.6		76 - 114		
Toluene-d8 (Surrogate)	BRA0843	BRA0843-BS1	LCS	9.6400	10.000		ug/L	96.4		88 - 110		
4-Bromofluorobenzene (Surrogate)	BRA0843	BRA0843-BS1	LCS	8.9100	10.000		ug/L	89.1		86 - 115		

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## Base Neutral and Acid Extractables Organic Analysis (EPA Method 625)

### Quality Control Report - Laboratory Control Sample

Constituent	Batch ID	QC Sample ID	QC Type	Result	Spike Level	PQL	Units	Percent Recovery	Control Limits		Lab Quals
									RPD	Percent Recovery	
Acenaphthene	BRA0810	BRA0810-BS1	LCS	59.755	80.000	2.0	ug/L	74.7		48 - 138	
1,4-Dichlorobenzene	BRA0810	BRA0810-BS1	LCS	47.639	80.000	2.0	ug/L	59.5		47 - 119	
2,4-Dinitrotoluene	BRA0810	BRA0810-BS1	LCS	55.282	80.000	2.0	ug/L	69.1		53 - 123	
Hexachlorobenzene	BRA0810	BRA0810-BS1	LCS	61.532	80.000	2.0	ug/L	76.9		62 - 131	
Hexachlorobutadiene	BRA0810	BRA0810-BS1	LCS	50.174	80.000	2.0	ug/L	62.7		36 - 122	
Hexachloroethane	BRA0810	BRA0810-BS1	LCS	43.260	80.000	2.0	ug/L	54.1		42 - 116	
Nitrobenzene	BRA0810	BRA0810-BS1	LCS	46.047	80.000	2.0	ug/L	57.6		58 - 122	L01
N-Nitrosodi-N-propylamine	BRA0810	BRA0810-BS1	LCS	42.579	80.000	2.0	ug/L	53.2		53 - 105	
Pyrene	BRA0810	BRA0810-BS1	LCS	49.884	80.000	2.0	ug/L	62.4		34 - 158	
1,2,4-Trichlorobenzene	BRA0810	BRA0810-BS1	LCS	53.020	80.000	2.0	ug/L	66.3		50 - 116	
4-Chloro-3-methylphenol	BRA0810	BRA0810-BS1	LCS	62.017	80.000	5.0	ug/L	77.5		48 - 138	
2-Chlorophenol	BRA0810	BRA0810-BS1	LCS	49.231	80.000	2.0	ug/L	61.5		49 - 110	
2-Methylphenol	BRA0810	BRA0810-BS1	LCS	47.818	80.000	2.0	ug/L	59.8		51 - 109	
3- & 4-Methylphenol	BRA0810	BRA0810-BS1	LCS	72.384	80.000	2.0	ug/L	90.5		92 - 181	L01
4-Nitrophenol	BRA0810	BRA0810-BS1	LCS	42.857	80.000	2.0	ug/L	53.6		15 - 81	
Pentachlorophenol	BRA0810	BRA0810-BS1	LCS	72.896	80.000	10	ug/L	91.1		41 - 137	
Phenol	BRA0810	BRA0810-BS1	LCS	25.017	80.000	2.0	ug/L	31.3		27 - 56	
2,4,6-Trichlorophenol	BRA0810	BRA0810-BS1	LCS	59.433	80.000	5.0	ug/L	74.3		50 - 128	
2-Fluorophenol (Surrogate)	BRA0810	BRA0810-BS1	LCS	42.591	80.000		ug/L	53.2		39 - 96	
Phenol-d5 (Surrogate)	BRA0810	BRA0810-BS1	LCS	27.069	80.000		ug/L	33.8		16 - 79	
Nitrobenzene-d5 (Surrogate)	BRA0810	BRA0810-BS1	LCS	58.487	80.000		ug/L	73.1		64 - 131	
2-Fluorobiphenyl (Surrogate)	BRA0810	BRA0810-BS1	LCS	56.874	80.000		ug/L	71.1		53 - 123	
2,4,6-Tribromophenol (Surrogate)	BRA0810	BRA0810-BS1	LCS	77.460	80.000		ug/L	96.8		56 - 141	

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## Base Neutral and Acid Extractables Organic Analysis (EPA Method 625)

### Quality Control Report - Laboratory Control Sample

Constituent	Batch ID	QC Sample ID	QC Type	Result	Spike Level	PQL	Units	Percent Recovery	RPD	Control Limits		Lab Quals
										Percent Recovery	RPD	
p-Terphenyl-d14 (Surrogate)	BRA0810	BRA0810-BS1	LCS	25.818	40.000		ug/L	64.5		47 - 145		

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## Water Analysis (Metals)

### Quality Control Report - Method Blank Analysis

Constituent	Batch ID	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
Total Mercury	BRA0690	BRA0690-BLK1	0.052500	ug/L	0.20	0.022	J
Total Recoverable Arsenic	BRA0829	BRA0829-BLK1	ND	ug/L	2.0	0.37	
Total Recoverable Lead	BRA0829	BRA0829-BLK1	ND	ug/L	1.0	0.057	
Total Recoverable Selenium	BRA0829	BRA0829-BLK1	ND	ug/L	2.0	0.47	
Total Recoverable Thallium	BRA0829	BRA0829-BLK1	ND	ug/L	1.0	0.016	
Total Antimony	BRA0833	BRA0833-BLK1	ND	ug/L	100	16	
Total Beryllium	BRA0833	BRA0833-BLK1	ND	ug/L	10	0.72	
Total Cadmium	BRA0833	BRA0833-BLK1	ND	ug/L	10	3.3	
Total Chromium	BRA0833	BRA0833-BLK1	ND	ug/L	10	0.89	
Total Copper	BRA0833	BRA0833-BLK1	ND	ug/L	10	2.6	
Total Nickel	BRA0833	BRA0833-BLK1	ND	ug/L	10	1.8	
Total Silver	BRA0833	BRA0833-BLK1	ND	ug/L	10	9.4	
Total Zinc	BRA0833	BRA0833-BLK1	ND	ug/L	50	8.2	

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## Water Analysis (General Chemistry)

### Quality Control Report - Method Blank Analysis

Constituent	Batch ID	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
Total Cyanide	BRA0558	BRA0558-BLK1	ND	mg/L	0.0050	0.0032	
Ammonia as N (Distilled)	BRA0942	BRA0942-BLK1	ND	mg/L	0.10	0.050	

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## Organochlorine Pesticides and PCB's (EPA Method 608)

### Quality Control Report - Method Blank Analysis

Constituent	Batch ID	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
Aldrin	BRA0852	BRA0852-BLK1	ND	ug/L	0.050	0.0014	
alpha-BHC	BRA0852	BRA0852-BLK1	ND	ug/L	0.050	0.0017	
beta-BHC	BRA0852	BRA0852-BLK1	ND	ug/L	0.050	0.0037	
delta-BHC	BRA0852	BRA0852-BLK1	ND	ug/L	0.050	0.00090	
gamma-BHC (Lindane)	BRA0852	BRA0852-BLK1	ND	ug/L	0.050	0.0017	
Chlordane (Technical)	BRA0852	BRA0852-BLK1	ND	ug/L	0.50	0.38	
4,4'-DDD	BRA0852	BRA0852-BLK1	ND	ug/L	0.10	0.0024	
4,4'-DDE	BRA0852	BRA0852-BLK1	ND	ug/L	0.10	0.0015	
4,4'-DDT	BRA0852	BRA0852-BLK1	ND	ug/L	0.10	0.0019	V11
Dieldrin	BRA0852	BRA0852-BLK1	ND	ug/L	0.10	0.0021	
Endosulfan I	BRA0852	BRA0852-BLK1	ND	ug/L	0.050	0.0016	
Endosulfan II	BRA0852	BRA0852-BLK1	ND	ug/L	0.10	0.0031	
Endosulfan sulfate	BRA0852	BRA0852-BLK1	ND	ug/L	0.10	0.0019	V11
Endrin	BRA0852	BRA0852-BLK1	ND	ug/L	0.10	0.0022	
Endrin aldehyde	BRA0852	BRA0852-BLK1	ND	ug/L	0.10	0.0022	
Heptachlor	BRA0852	BRA0852-BLK1	ND	ug/L	0.050	0.0044	
Heptachlor epoxide	BRA0852	BRA0852-BLK1	ND	ug/L	0.050	0.0019	
Methoxychlor	BRA0852	BRA0852-BLK1	ND	ug/L	0.50	0.0036	V11
Toxaphene	BRA0852	BRA0852-BLK1	ND	ug/L	2.0	0.42	
PCB-1016	BRA0852	BRA0852-BLK1	ND	ug/L	0.20	0.048	
PCB-1221	BRA0852	BRA0852-BLK1	ND	ug/L	0.20	0.089	
PCB-1232	BRA0852	BRA0852-BLK1	ND	ug/L	0.20	0.090	
PCB-1242	BRA0852	BRA0852-BLK1	ND	ug/L	0.20	0.095	
PCB-1248	BRA0852	BRA0852-BLK1	ND	ug/L	0.20	0.025	

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## Organochlorine Pesticides and PCB's (EPA Method 608)

### Quality Control Report - Method Blank Analysis

Constituent	Batch ID	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
PCB-1254	BRA0852	BRA0852-BLK1	ND	ug/L	0.20	0.042	
PCB-1260	BRA0852	BRA0852-BLK1	ND	ug/L	0.20	0.024	
Total PCB's (Summation)	BRA0852	BRA0852-BLK1	ND	ug/L	0.20	0.10	
TCMX (Surrogate)	BRA0852	BRA0852-BLK1	95.9	%	72 - 129 (LCL - UCL)		
Dibutyl chlorendate (Surrogate)	BRA0852	BRA0852-BLK1	111	%	82 - 177 (LCL - UCL)		

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## Volatile Organic Analysis (EPA Method 624)

### Quality Control Report - Method Blank Analysis

Constituent	Batch ID	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
Benzene	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.12	
Bromodichloromethane	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.13	
Bromoform	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.22	
Bromomethane	BRA0843	BRA0843-BLK1	ND	ug/L	1.0	0.31	
Carbon tetrachloride	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.089	
Chlorobenzene	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.11	
Chloroethane	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.12	
Chloroform	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.098	
Chloromethane	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.14	
Dibromochloromethane	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.12	
1,2-Dichlorobenzene	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.13	
1,3-Dichlorobenzene	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.14	
1,4-Dichlorobenzene	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.12	
1,1-Dichloroethane	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.11	
1,2-Dichloroethane	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.098	
1,1-Dichloroethene	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.12	
trans-1,2-Dichloroethene	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.14	
1,2-Dichloropropane	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.12	
cis-1,3-Dichloropropene	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.086	
trans-1,3-Dichloropropene	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.11	
Ethylbenzene	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.13	
Methylene chloride	BRA0843	BRA0843-BLK1	ND	ug/L	1.0	0.16	
Methyl t-butyl ether	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.13	
1,1,2,2-Tetrachloroethane	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.22	

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## Volatile Organic Analysis (EPA Method 624)

### Quality Control Report - Method Blank Analysis

Constituent	Batch ID	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
Tetrachloroethene	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.11	
Toluene	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.12	
1,1,1-Trichloroethane	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.27	
1,1,2-Trichloroethane	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.12	
Trichloroethene	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.13	
Trichlorofluoromethane	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.14	
1,1,2-Trichloro-1,2,2-trifluoroethane	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.13	
Vinyl chloride	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.14	
Total Xylenes	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.33	
Acrolein	BRA0843	BRA0843-BLK1	ND	ug/L	20	3.7	
Acrylonitrile	BRA0843	BRA0843-BLK1	ND	ug/L	5.0	2.0	
p- & m-Xylenes	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.21	
o-Xylene	BRA0843	BRA0843-BLK1	ND	ug/L	0.50	0.12	
1,2-Dichloroethane-d4 (Surrogate)	BRA0843	BRA0843-BLK1	89.5	%	76 - 114 (LCL - UCL)		
Toluene-d8 (Surrogate)	BRA0843	BRA0843-BLK1	95.4	%	88 - 110 (LCL - UCL)		
4-Bromofluorobenzene (Surrogate)	BRA0843	BRA0843-BLK1	90.1	%	86 - 115 (LCL - UCL)		

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## Base Neutral and Acid Extractables Organic Analysis (EPA Method 625)

### Quality Control Report - Method Blank Analysis

Constituent	Batch ID	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
Acenaphthene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.48	
Acenaphthylene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.64	
Aldrin	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.80	
Aniline	BRA0810	BRA0810-BLK1	ND	ug/L	5.0	0.46	
Anthracene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.79	
Benzidine	BRA0810	BRA0810-BLK1	ND	ug/L	20	4.7	
Benzo[a]anthracene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.52	
Benzo[b]fluoranthene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.66	
Benzo[k]fluoranthene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.80	
Benzo[a]pyrene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.73	
Benzo[g,h,i]perylene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.94	
Benzoic acid	BRA0810	BRA0810-BLK1	ND	ug/L	10	6.1	
Benzyl alcohol	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.67	
Benzyl butyl phthalate	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.59	
alpha-BHC	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.50	
beta-BHC	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.48	
delta-BHC	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.60	
gamma-BHC (Lindane)	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.56	
bis(2-Chloroethoxy)methane	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.58	
bis(2-Chloroethyl) ether	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.52	
bis(2-Chloroisopropyl)ether	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.73	
bis(2-Ethylhexyl)phthalate	BRA0810	BRA0810-BLK1	ND	ug/L	5.0	1.1	
4-Bromophenyl phenyl ether	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.69	
4-Chloroaniline	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.87	

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Project: Semi-annual eff  
 Project Number: [none]  
 Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Base Neutral and Acid Extractables Organic Analysis (EPA Method 625)

### Quality Control Report - Method Blank Analysis

Constituent	Batch ID	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
2-Chloronaphthalene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.50	
4-Chlorophenyl phenyl ether	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.68	
Chrysene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.73	
4,4'-DDD	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.50	
4,4'-DDE	BRA0810	BRA0810-BLK1	ND	ug/L	3.0	0.58	
4,4'-DDT	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.27	
Dibenzo[a,h]anthracene	BRA0810	BRA0810-BLK1	ND	ug/L	3.0	0.92	
Dibenzofuran	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.81	
1,2-Dichlorobenzene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.58	
1,3-Dichlorobenzene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.66	
1,4-Dichlorobenzene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.53	
3,3-Dichlorobenzidine	BRA0810	BRA0810-BLK1	ND	ug/L	10	0.88	
Dieldrin	BRA0810	BRA0810-BLK1	ND	ug/L	3.0	0.52	
Diethyl phthalate	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.85	
Dimethyl phthalate	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.55	
Di-n-butyl phthalate	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.74	
2,4-Dinitrotoluene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.99	
2,6-Dinitrotoluene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.74	
Di-n-octyl phthalate	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.85	
1,2-Diphenylhydrazine	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.70	
Endosulfan I	BRA0810	BRA0810-BLK1	ND	ug/L	10	2.7	
Endosulfan II	BRA0810	BRA0810-BLK1	ND	ug/L	10	2.4	
Endosulfan sulfate	BRA0810	BRA0810-BLK1	ND	ug/L	3.0	0.58	
Endrin	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.54	

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Project: Semi-annual eff  
 Project Number: [none]  
 Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Base Neutral and Acid Extractables Organic Analysis (EPA Method 625)

### Quality Control Report - Method Blank Analysis

Constituent	Batch ID	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
Endrin aldehyde	BRA0810	BRA0810-BLK1	ND	ug/L	10	0.86	
Fluoranthene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.70	
Fluorene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.73	
Heptachlor	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.60	
Heptachlor epoxide	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.63	
Hexachlorobenzene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.71	
Hexachlorobutadiene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.59	
Hexachlorocyclopentadiene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.26	
Hexachloroethane	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.52	
Indeno[1,2,3-cd]pyrene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.92	
Isophorone	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.51	
2-Methylnaphthalene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.51	
Naphthalene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.62	
2-Naphthylamine	BRA0810	BRA0810-BLK1	ND	ug/L	20	6.5	
2-Nitroaniline	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.80	
3-Nitroaniline	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.82	
4-Nitroaniline	BRA0810	BRA0810-BLK1	ND	ug/L	5.0	1.1	
Nitrobenzene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.55	
N-Nitrosodimethylamine	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.45	
N-Nitrosodi-N-propylamine	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.59	
N-Nitrosodiphenylamine	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.80	
Phenanthrene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.60	
Pyrene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.62	
1,2,4-Trichlorobenzene	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.67	

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 Ventura, CA 93003-3238

Project: Semi-annual eff  
 Project Number: [none]  
 Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Base Neutral and Acid Extractables Organic Analysis (EPA Method 625)

### Quality Control Report - Method Blank Analysis

Constituent	Batch ID	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
4-Chloro-3-methylphenol	BRA0810	BRA0810-BLK1	ND	ug/L	5.0	0.67	
2-Chlorophenol	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.65	
2,4-Dichlorophenol	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.60	
2,4-Dimethylphenol	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.52	
4,6-Dinitro-2-methylphenol	BRA0810	BRA0810-BLK1	ND	ug/L	10	2.2	
2,4-Dinitrophenol	BRA0810	BRA0810-BLK1	ND	ug/L	10	2.4	
2-Methylphenol	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.57	
3- & 4-Methylphenol	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.83	
2-Nitrophenol	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.42	
4-Nitrophenol	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	1.7	
Pentachlorophenol	BRA0810	BRA0810-BLK1	ND	ug/L	10	0.45	
Phenol	BRA0810	BRA0810-BLK1	ND	ug/L	2.0	0.37	
2,4,5-Trichlorophenol	BRA0810	BRA0810-BLK1	ND	ug/L	5.0	0.93	
2,4,6-Trichlorophenol	BRA0810	BRA0810-BLK1	ND	ug/L	5.0	0.43	
2-Fluorophenol (Surrogate)	BRA0810	BRA0810-BLK1	46.8	%	39 - 96 (LCL - UCL)		
Phenol-d5 (Surrogate)	BRA0810	BRA0810-BLK1	30.8	%	16 - 79 (LCL - UCL)		
Nitrobenzene-d5 (Surrogate)	BRA0810	BRA0810-BLK1	66.0	%	64 - 131 (LCL - UCL)		
2-Fluorobiphenyl (Surrogate)	BRA0810	BRA0810-BLK1	67.9	%	53 - 123 (LCL - UCL)		
2,4,6-Tribromophenol (Surrogate)	BRA0810	BRA0810-BLK1	96.8	%	56 - 141 (LCL - UCL)		
p-Terphenyl-d14 (Surrogate)	BRA0810	BRA0810-BLK1	67.2	%	47 - 145 (LCL - UCL)		

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Project: Semi-annual eff  
Project Number: (none)  
Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Volatile Organic Analysis (EPA Method 624)

BCL Sample ID: 0800458-03		Client Sample Name: TRAVEL BLANK, 1/9/2008 12:00:00AM											
Constituent	Result	Units	PQL	MDL	Method	Prep Date	Run Date/Time	Analyst	Instru- ment ID	Dilution	QC Batch ID	MB Bias	Lab Quals
Benzene	ND	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
Bromodichloromethane	ND	ug/L	0.50	0.13	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
Bromoform	ND	ug/L	0.50	0.22	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
Bromomethane	ND	ug/L	1.0	0.31	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
Carbon tetrachloride	ND	ug/L	0.50	0.089	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
Chlorobenzene	ND	ug/L	0.50	0.11	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
Chloroethane	ND	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
Chloroform	ND	ug/L	0.50	0.098	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
Chloromethane	ND	ug/L	0.50	0.14	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
Dibromochloromethane	ND	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
1,2-Dichlorobenzene	ND	ug/L	0.50	0.13	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
1,3-Dichlorobenzene	ND	ug/L	0.50	0.14	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
1,4-Dichlorobenzene	ND	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
1,1-Dichloroethane	ND	ug/L	0.50	0.11	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
1,2-Dichloroethane	ND	ug/L	0.50	0.098	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
1,1-Dichloroethene	ND	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
trans-1,2-Dichloroethene	ND	ug/L	0.50	0.14	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
1,2-Dichloropropane	ND	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
cis-1,3-Dichloropropene	ND	ug/L	0.50	0.086	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
trans-1,3-Dichloropropene	ND	ug/L	0.50	0.11	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
Ethylbenzene	ND	ug/L	0.50	0.13	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	
Methylene chloride	0.26	ug/L	1.0	0.16	EPA-624	01/16/08	01/16/08 20:33	MGC	MS-V7	1	BRA0843	ND	J

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Project: Semi-annual eff  
Project Number: [none]  
Project Manager: Doug Coats

Reported: 01/28/2008 9:50

## Volatile Organic Analysis (EPA Method 624)

BCL Sample ID: 0800458-03		Client Sample Name: TRAVEL BLANK, 1/9/2008 12:00:00AM												
Constituent	Result	Units	PQL	MDL	Method	Prep	Run		Analyst	Instru- ment ID	Dilution	QC	MB	Lab
						Date	Date/Time	Batch ID				Bias	Quals	
Methyl t-butyl ether	ND	ug/L	0.50	0.13	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	
1,1,2,2-Tetrachloroethane	ND	ug/L	0.50	0.22	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	V11
Tetrachloroethane	ND	ug/L	0.50	0.11	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	
Toluene	ND	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	
1,1,1-Trichloroethane	ND	ug/L	0.50	0.27	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	
1,1,2-Trichloroethane	ND	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	
Trichloroethene	ND	ug/L	0.50	0.13	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	
Trichlorofluoromethane	ND	ug/L	0.50	0.14	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	ug/L	0.50	0.13	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	
Vinyl chloride	ND	ug/L	0.50	0.14	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	
Total Xylenes	ND	ug/L	0.50	0.33	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	
Acrolein	ND	ug/L	20	3.7	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	V11
Acrylonitrile	ND	ug/L	5.0	2.0	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	
p- & m-Xylenes	ND	ug/L	0.50	0.21	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	
o-Xylene	ND	ug/L	0.50	0.12	EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843	ND	
1,2-Dichloroethane-d4 (Surrogate)	95.1	%	76 - 114 (LCL - UCL)		EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843		
Toluene-d8 (Surrogate)	92.8	%	88 - 110 (LCL - UCL)		EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843		
4-Bromofluorobenzene (Surrogate)	93.1	%	86 - 115 (LCL - UCL)		EPA-624	01/16/08	01/16/08	20:33	MGC	MS-V7	1	BRA0843		

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Project: Semi-annual eff  
Project Number: [none]  
Project Manager: Doug Coats

Reported: 01/28/2008 9:50

### Notes And Definitions

J	Estimated Value (CLP Flag)
MDL	Method Detection Limit
ND	Analyte Not Detected at or above the reporting limit
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
A01	PQL's and MDL's are raised due to sample dilution.
A02	The difference between duplicate readings is less than the PQL.
L01	The Laboratory Control Sample Water (LCSW) recovery is not within laboratory established control limits.
Q03	Matrix spike recovery(s) is(are) not within the control limits.
S09	The surrogate recovery on the sample for this compound was not within the control limits.
V11	The Continuing Calibration Verification (CCV) recovery is not within established control limits.

# **Chains of Custody**



Date of Report: 01/28/2008

Doug Coats

Marine Research Specialists  
3140 Telegraph Road, Suite A  
Suite A  
Ventura, CA 93003-3238

RE: Semi-annual eff  
BC Work Order: 0800458

Enclosed are the results of analyses for samples received by the laboratory on 01/09/2008 16:54. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Tina Green".

Contact Person: Tina Green  
Client Services Manager

A handwritten signature in black ink, which is mostly illegible but appears to be a stylized name.

Authorized Signature



Submission #: 0500 458

Project Code:

TB Batch #

SHIPPING INFORMATION

Federal Express  UPS  Hand Delivery  BC Lab Field Service  Other  (Specify)

SHIPPING CONTAINER

Ice Chest  None  Box  Other  (Specify)

Refrigerant: Ice  Blue Ice  None  Other  Comments:

Custody Seals: Ice Chest  Containers  None  Comments: Intact? Yes  No

All samples received? Yes  No  All samples containers intact? Yes  No  Description(s) match COC? Yes  No

COC Received  YES  NO

Ice Chest ID: RW Temperature: 2.1 °C Thermometer ID: 48

Emissivity: .85 Container: QP RW

Date/Time: 1/19/08 2059 Analyst Init: [Signature]

Table with columns for Sample Containers and Sample Numbers (1-10). Rows include various sample types like QT GENERAL MINERAL, PT PE UNPRESERVED, etc. Includes handwritten annotations like 'A.1', 'A.3', 'DE', 'GE'.

Comments: No time on any containers or COC. Sample Numbering Completed By: RML Date/Time: 1/16/08 1400

**Analyses of Effluent Samples to be collected from the Morro Bay  
Wastewater Treatment Plant on January 9, 2008**

<b>Analysis</b>	<b>Sample</b>	<b>Method</b>
Level IIA QC Report concentrations that are detected above the MDL, but are below the PQL		
Ammonia as N w/ distillation	Grab	EPA-350.1
Total Chlorinated and Total Non-Chlorinated Phenolic Compounds (Report only the phenolic compounds)	Grab	EPA-625
<b>13 Metals:</b>		
Ag Silver	Composite	EPA 200.7
As Arsenic	Composite	EPA 200.8
Be Beryllium	Composite	EPA 200.7
Cd Cadmium	Composite	EPA 200.7
Cr Chromium	Composite	EPA 200.7
Cu Copper	Composite	EPA 200.7
Hg Mercury	Composite	EPA 245.1
Ni Nickel	Composite	EPA 200.7
Pb Lead	Composite	EPA 200.8
Sb Antimony	Composite	EPA 200.7
Se Selenium	Composite	EPA 200.8
Tl Thallium	Composite	EPA 200.8
Zn Zinc	Composite	EPA 200.7
Volatile Organics - Low Level Including Acrolein, Acrylonitrile, MTBE	Composite	EPA 624/8240
Organochlorine Pesticides and PCBs	Composite	EPA 608/8080
Phenolic Compounds: Full list of base-neutral and acid-extractable congeners	Composite	EPA 625/8270
Cyanide	Composite	EPA 335.3

Invoice and Report to be sent to: Dr. Douglas A. Coats (Doug.Coats@mrsenv.com)  
Marine Research Specialists  
3140 Telegraph Rd., Suite A  
Ventura, CA 93003  
Telephone: (805) 644-1180

Samples to be collected from: Morro Bay Wastewater Treatment Plant  
160 Atascadero Rd.  
Morro Bay, CA 93442  
Telephone: (805) 772-6272

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 Suite A  
 Ventura, CA 93003-3238

Project: Semi-annual eff  
 Project Number: [none]  
 Project Manager: Doug Coats

Reported: 01/28/2008 9:50

### Laboratory / Client Sample Cross Reference

Laboratory	Client Sample Information		Receive Date:	Sampling Date:	Sample Depth:	Sample Matrix:
0800458-01	COC Number:	---	01/09/2008 16:54	01/09/2008 00:00	---	Water
	Project Number:	---				
	Sampling Location:	---				
	Sampling Point:	GRAB EFF				
	Sampled By:	---				
0800458-02	COC Number:	---	01/09/2008 16:54	01/09/2008 00:00	---	Water
	Project Number:	---				
	Sampling Location:	---				
	Sampling Point:	COMP EFF				
	Sampled By:	---				
0800458-03	COC Number:	---	01/09/2008 16:54	01/09/2008 00:00	---	Water
	Project Number:	---				
	Sampling Location:	---				
	Sampling Point:	TRAVEL BLANK				
	Sampled By:	---				



# ***CHAIN OF CUSTODY***

# CHAIN OF CUSTODY

Client: City of Morro Bay

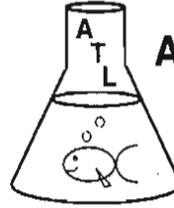
Address: Wastewater Treatment Plant  
160 Atascadero Road  
Morro Bay, CA 93442

Project Manager: Doug Coats - MRS

Phone: (805) 644-1180

Fax: (805) 289-3935

Purchase Order No:



**Aquatic  
Testing  
Laboratories**

4350 Transport St., Unit 107  
Ventura, CA 93003  
(805) 650-0546 Fax (805) 650-0756

Sample ID	Sample Date	Sample Time	Sample Type *	Chlorine (TRC)**	Number of Containers	Testing Requested
Grab Eff. ARS	7 Jan 08	0825	E	.02	1 (one gallon)	FHM Acute daily renewal

**Special Instructions:**

**\*\* Note: Total residual chlorine must be taken immediately after sample collection if sample is a chlorinated effluent.**

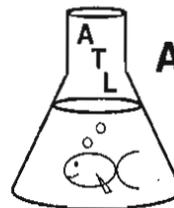
\* L - Liquid, S - Solid, SS - Semi-Solid/sludge, RW - Receiving Water, GW - Ground Water, E - Effluent

## CUSTODY TRANSFERS

Relinquished by (signature)	Received by (signature)	Date (mm/dd/yy)	Time (hh:mm)	Seals Intact? (Yes, No, NA)	Temperature Received (°C)
<i>Steven R. Aschenburn</i>	<i>Fed Rex</i>	7 Jan 08	1430	YES	2°
<i>Fed Rex</i>	<i>[Signature]</i>	1-8-08	0930	NA	2°

# CHAIN OF CUSTODY

Client: City of Morro Bay  
 Address: Wastewater Treatment Plant  
 160 Atascadero Road  
 Morro Bay, CA 93442  
 Project Manager: Doug Coats - MRS  
 Phone: (805) 644-1180  
 Fax: (805) 289-3935  
 Purchase Order No:



**Aquatic  
Testing  
Laboratories**

4350 Transport St., Unit 107  
 Ventura, CA 93003  
 (805) 650-0546 Fax (805) 650-0756

Sample ID	Sample Date	Sample Time	Sample Type *	Chlorine (TRC)**	Number of Containers	Testing Requested
Grab Eff. ARS	8 Jan 08	0835	E	.05	1 (one gallon)	FHM Acute daily renewal
Comp. Eff.	8 Jan 08	0835	E	.03	1 (one gallon)	Giant Kelp Chronic

**Special Instructions:**

**\*\* Note: Total residual chlorine must be taken immediately after sample collection if sample is a chlorinated effluent.**

\* L - Liquid, S - Solid, SS - Semi-Solid/sludge, RW - Receiving Water, GW - Ground Water, E - Effluent

## CUSTODY TRANSFERS

Relinquished by (signature)	Received by (signature)	Date (mm/dd/yy)	Time (hh:mm)	Seals Intact? (Yes, No, NA)	Temperature Received (°C)
<i>Steven R. Anderson</i>	<i>[Signature]</i>	8 Jan 08	10:48	Y	not cold
<i>[Signature]</i>	<i>[Signature]</i>	8 Jan 08	15:37	NA	2°C

# CHAIN OF CUSTODY

Client: City of Morro Bay

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Address: Wastewater Treatment Plant

---

160 Atascadero Road

---

Morro Bay, CA 93442

---

Project Manager: Doug Coats - MRS

---

Phone: (805) 644-1180

---

Fax: (805) 289-3935

---

Purchase Order No:



**Aquatic  
Testing  
Laboratories**

4350 Transport St., Unit 107  
Ventura, CA 93003  
(805) 650-0546 Fax (805) 650-0756

Sample ID	Sample Date	Sample Time	Sample Type *	Chlorine (TRC)**	Number of Containers	Testing Requested
Grab Eff. ARS	9 Jan 08	0900	E	04	1 (one gallon)	FHM Acute daily renewal

**Special Instructions:**

**\*\* Note: Total residual chlorine must be taken immediately after sample collection if sample is a chlorinated effluent.**

\* L - Liquid, S - Solid, SS - Semi-Solid/sludge, RW - Receiving Water, GW - Ground Water, E - Effluent

## CUSTODY TRANSFERS

Relinquished by (signature)	Received by (signature)	Date (mm/dd/yy)	Time (hh:mm)	Seals Intact? (Yes, No, NA)	Temperature Received (°C)
<i>Steven R. Decker</i>	<i>Fred Ex</i>	9 Jan 08	1430	YES	—
<i>Fred Ex</i>	<i>[Signature]</i>	10-8	0930	NA	2°C

# CHAIN OF CUSTODY

Client: City of Morro Bay

---

Address: Wastewater Treatment Plant

---

160 Atascadero Road

---

Morro Bay, CA 93442

---

Project Manager: Doug Coats - MRS

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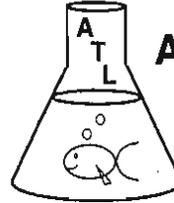
Phone: (805) 644-1180

---

Fax: (805) 289-3935

---

Purchase Order No:



**Aquatic  
Testing  
Laboratories**

**4350 Transport St., Unit 107  
Ventura, CA 93003  
(805) 650-0546 Fax (805) 650-0756**

Sample ID	Sample Date	Sample Time	Sample Type *	Chlorine (TRC)**	Number of Containers	Testing Requested
Grab Eff. ARS	10 Jan 08	0900	E	.04	1 (one gallon)	FHM Acute daily renewal

Special Instructions: FEDEX Track # 8463 7613 2770

\*\* Note: Total residual chlorine must be taken immediately after sample collection if sample is a chlorinated effluent.

\* L - Liquid, S - Solid, SS - Semi-Solid/sludge, RW - Receiving Water, GW - Ground Water, E - Effluent

## CUSTODY TRANSFERS

Relinquished by (signature)	Received by (signature)	Date (mm/dd/yy)	Time (hh:mm)	Seals Intact? (Yes, No, NA)	Temperature Received (°C)
Steven R. Ashburn	FEDEX	10 Jan 08	1430	YES	—
FEDEX	JH My	1-11-8	1000	—	1°C



***REFERENCE  
TOXICANT  
DATA***



*Fathead Minnow  
Reference  
Toxicant  
Data*

**FATHEAD MINNOW ACUTE**  
**Method 2000.0**  
**Reference Toxicant - SDS**



QA/QC Batch No.: RT-080103

**TEST SUMMARY**

Species: *Pimephales promelas*.  
 Age: 11 days old.  
 Regulations: NPDES.  
 Test chamber volume: 250 ml.  
 Feeding: Prior to renewal at 48 hrs.  
 Temperature: 20 +/- 1°C.  
 Number of replicates: 2.  
 Dilution water: MHSF.

Source: In-lab culture.  
 Test type: Static-Renewal.  
 Test Protocol: EPA-821-R-02-012.  
 Endpoints: LC50 at 96 hrs.  
 Test chamber: 600 ml glass beakers.  
 Aeration: None.  
 Number of organisms per chamber: 10.  
 Photoperiod: 16/8 hrs light/dark.

**TEST DATA**

Date/Time: Analyst:	INITIAL			24 Hr					48 Hr				
	<u>1-3-08 1400</u>			<u>1-4-08 1200</u>					<u>1-5-08 1200</u>				
	<u>[Signature]</u>			<u>[Signature]</u>					<u>[Signature]</u>				
	°C	DO	pH	°C	DO	pH	# Dead		°C	DO	pH	# Dead	
A							B	A				B	
Control	20.3	8.8	7.9	19.9	6.8	7.5	0	0	19.9	7.6	7.4	0	0
1.0 mg/l	20.3	8.8	7.9	19.9	6.8	7.4	0	0	19.9	7.4	7.4	0	0
2.0 mg/l	20.3	8.9	7.9	19.9	7.0	7.3	0	0	20.0	7.5	7.3	0	0
4.0 mg/l	20.3	8.9	7.8	19.9	6.9	7.3	0	0	20.1	7.3	7.3	0	0
8.0 mg/l	20.3	9.0	7.8	19.9	5.7	7.2	10	10	-	-	-	-	-

Date/Time: Analyst:	RENEWAL			72 Hr					96 Hr				
	<u>1-5-08 1200</u>			<u>1-6-08 1330</u>					<u>1-7-08 1345</u>				
	<u>[Signature]</u>			<u>[Signature]</u>					<u>[Signature]</u>				
	°C	DO	pH	°C	DO	pH	# Dead		°C	DO	pH	# Dead	
A							B	A				B	
Control	20.4	9.0	7.7	20.0	7.1	8.0	0	0	19.9	6.4	7.6	0	0
1.0 mg/l	20.4	9.0	7.7	20.0	6.9	8.0	0	0	20.0	6.6	7.6	0	0
2.0 mg/l	20.4	9.1	7.7	20.0	7.1	7.9	0	0	19.9	6.8	7.5	0	0
4.0 mg/l	20.4	9.1	7.7	20.0	7.3	7.9	1	0	19.8	6.2	7.0	0	1
8.0 mg/l	-	-	-	-	-	-	-	-	-	-	-	-	-

Comments: Control: Alkalinity: 62 mg/l; Hardness: 97 mg/l; Conductivity: 290 umho.  
 SDS: Alkalinity: 62 mg/l; Hardness: 96 mg/l; Conductivity: 285 umho.

Concentration-response relationship acceptable? (see attached computer analysis):

Yes (response curve normal)

No (dose interrupted indicated or non-normal)

**Acute Fish Test-96 Hr Survival**

Start Date: 1/3/2008 14:00    Test ID: RT-080103f    Sample ID: REF-Ref Toxicant  
 End Date: 1/7/2008 13:45    Lab ID: CAATL-Aquatic Testing Labs    Sample Type: SDS-Sodium dodecyl sulfate  
 Sample Date: 1/3/2008    Protocol: ACUTE-EPA-821-R-02-012    Test Species: PP-Pimephales promelas  
 Comments:

Conc-mg/L	1	2
D-Control	1.0000	1.0000
1	1.0000	1.0000
2	1.0000	1.0000
4	0.9000	0.9000
8	0.0000	0.0000

Conc-mg/L	Mean	N-Mean	Transform: Arcsin Square Root				N	Number Resp	Total Number
			Mean	Min	Max	CV%			
D-Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
1	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
2	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
4	0.9000	0.9000	1.2490	1.2490	1.2490	0.000	2	2	20
8	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	2	20	20

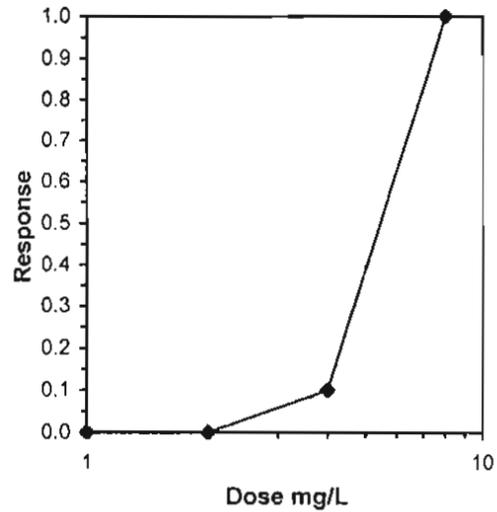
**Auxiliary Tests**

Normality of the data set cannot be confirmed  
 Equality of variance cannot be confirmed

Statistic                      Critical                      Skew                      Kurt

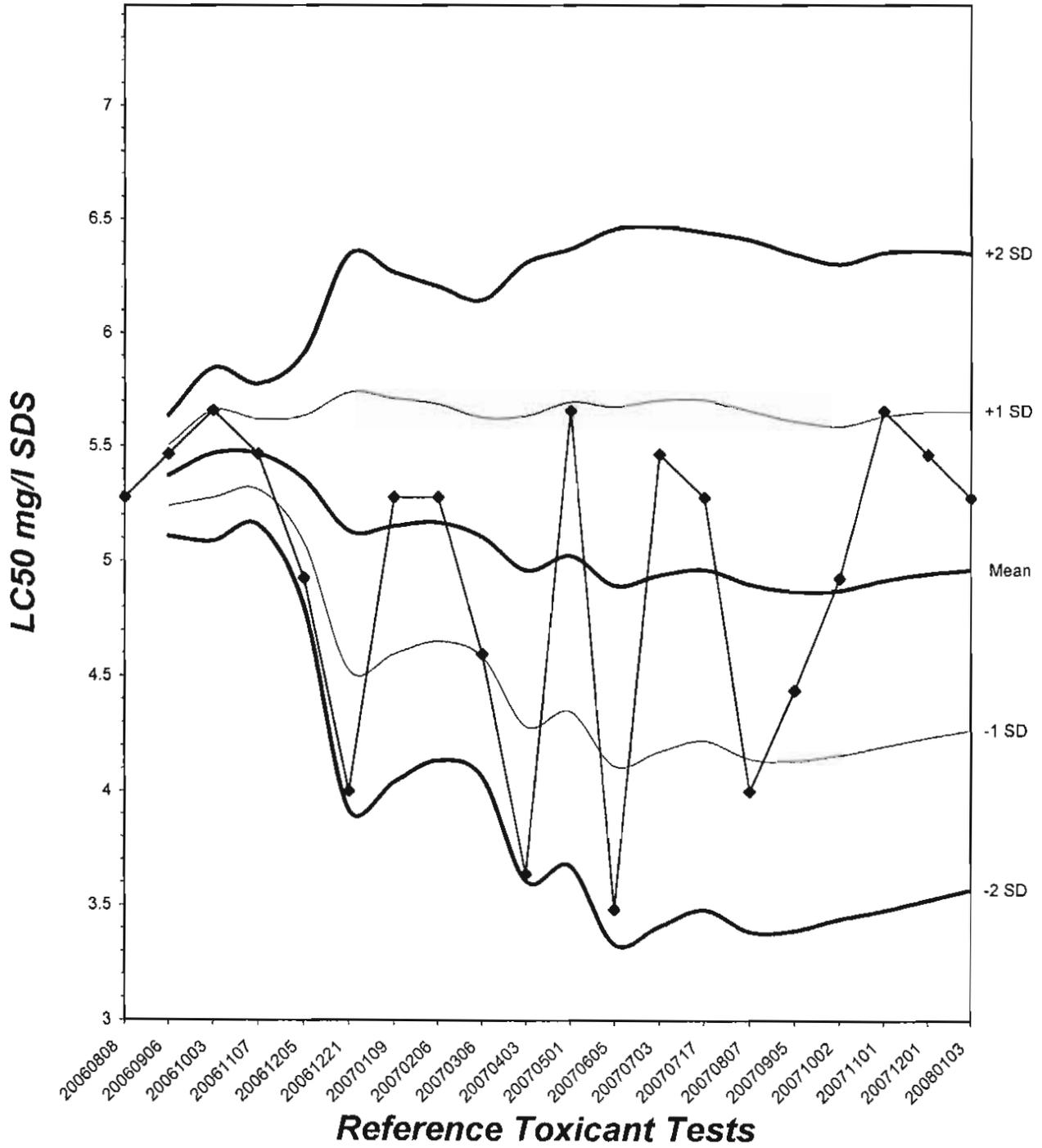
**Trimmed Spearman-Kärber**

Trim Level	EC50	95% CL	
0.0%	5.2780	4.8093	5.7924
5.0%	5.3968	4.8053	6.0611
10.0%	5.4432	5.1395	5.7648
20.0%	5.4432	5.1395	5.7648
Auto-0.0%	5.2780	4.8093	5.7924



# Fathead Minnow Acute Laboratory Control Chart

CV% = 14



# TEST ORGANISM LOG



## FATHEAD MINNOW - LARVAL (*Pimephales promelas*)

QA/QC BATCH NO.: RT-080103

SOURCE: In-Lab Culture

DATE HATCHED: 12-23-07

APPROXIMATE QUANTITY: 400

GENERAL APPEARANCE: good

# MORTALITIES 48 HOURS PRIOR TO  
TO USE IN TESTING: 0

DATE USED IN LAB: 1/3/08

AVERAGE FISH WEIGHT: 0.006 gm

TEST LOADING LIMITS: 0.65 gm/liter

200 ml test solution volume = 0.013 gm mean fish weight limit

250 ml test solution volume = 0.016 gm mean fish weight limit

### ACCLIMATION WATER QUALITY:

Temp.: 20.3 °C

pH: 7.9

Ammonia: 0.1 mg/l NH<sub>3</sub>-N

DO: 8.5 mg/l

Alkalinity: 62 mg/l

Hardness: 97 mg/l

READINGS RECORDED BY: 

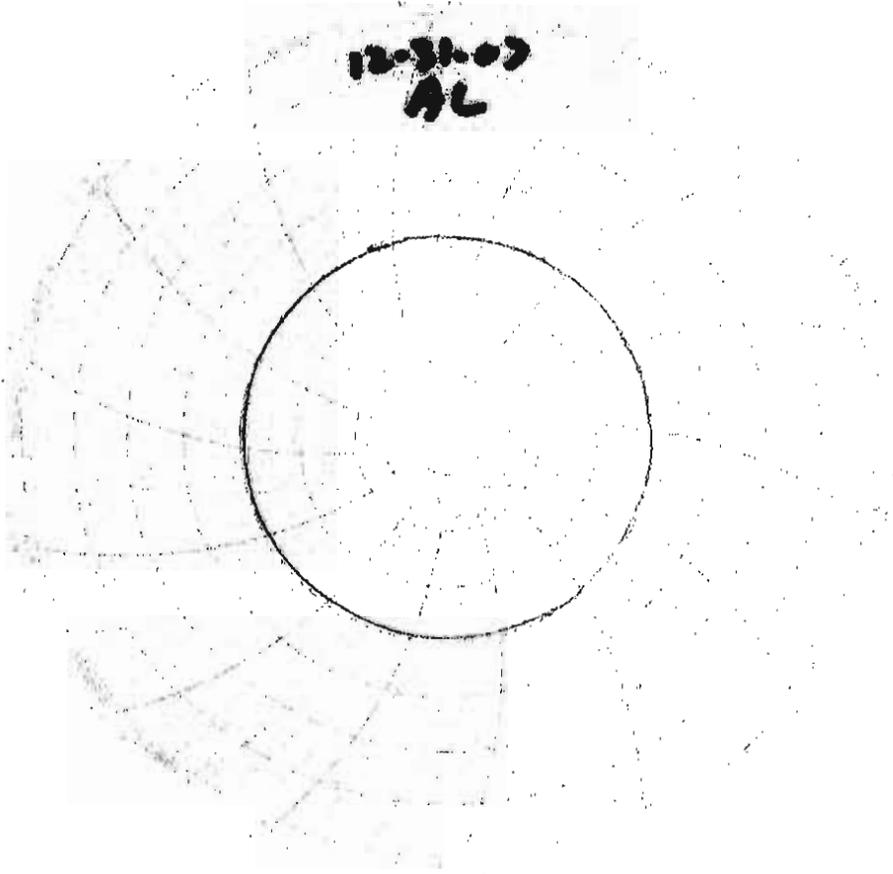
DATE: 1-4-08

# *Laboratory Temperature Chart*

*QA/QC Batch No: RT-080103*

*Date Tested: 01/03/08 to 01/07/08*

*Acceptable Range: 20 $\pm$ 1 $^{\circ}$ C*





# *Giant Kelp Germination and Germ Tube Growth Short-Term Toxicity Test*

- *Test and Result Summary*
- *Data Summary and Statistical Analysis*
- *Raw Test Data: Water Quality &  
Test Organism Measurements*

# GIANT KELP GERMINATION AND GROWTH TEST REFERENCE TOXICANT - COPPER



QA/QC Batch No.: RT-080109

Date Tested: 01/09/08 - 01/11/08

## TEST SUMMARY

Species: *Macrocystis pyrifera*.  
 Protocol: EPA Method 1009.0.  
 Test type: Static.  
 Test chamber: Plastic beakers.  
 Temperature: 15 +/- 1°C.  
 Number of spores per ml: 7,500 (approx.).  
 Standard toxicant: Copper chloride.  
 Lab seawater: 0.2 um filtered seawater.

Source: Field collected.  
 Dilution water: Lab seawater.  
 Endpoints: NOEC, IC25 at 48 hrs.  
 Test volume: 200 ml.  
 Aeration: None.  
 Number of replicates: 5.  
 Ref. tox. source: Mallinckrodt.  
 Preservative: none.

## RESULTS SUMMARY

Sample Concentration	Percent Germination		Mean Germ Tube Length (µm)	
Control	86.5%		15.60	
10 µg/l	86.0%		15.95	
18 µg/l	84.1%		15.55	
32 µg/l	73.9%	*	13.70	*
56 µg/l	53.0%	*	9.80	*
100 µg/l	31.5%	*	7.30	*
180 µg/l	8.2%	*	6.10	*

\* Statistically significantly less than control at P = 0.05 level

## CHRONIC TOXICITY

Germination NOEC	18 µg/l
Germination IC25	42.4 µg/l
Germ Tube Growth NOEC	18 µg/l
Germ Tube Growth IC25	43.5 µg/l

## QA/QC TEST ACCEPTABILITY

Parameter	Result
Mean control germination ≥ 70%	Yes (86.5%)
Mean control germination tube length > 10 µm	Yes (15.60 µm)
Germination tube growth NOEC < 35 µg/l Copper	Yes (18 µg/l)
%MSD < 20% relative to control (germination & growth)	Yes (germ = 10.9%, growth = 6.2%)

**Macrocyctis Germination and Growth Test-Proportion Germinated**

Start Date: 1/9/2008 13:00      Test ID: RT-080109k      Sample ID: REF-Ref Toxicant  
 End Date: 1/11/2008 13:00      Lab ID: CAATL-Aquatic Testing Labs      Sample Type: CUCL-Copper chloride  
 Sample Date: 1/9/2008      Protocol: MBP 90      Test Species: MP-Macrocyctis pyrifera

Comments:

Conc-ug/L	1	2	3	4	5
D-Control	0.8846	0.8529	0.9029	0.8317	0.8515
10	0.9029	0.8627	0.8317	0.8447	0.8585
18	0.8558	0.8431	0.8039	0.8350	0.8654
32	0.7364	0.7248	0.7757	0.7961	0.8639
56	0.6339	0.6937	0.6058	0.4019	0.3173
100	0.2037	0.3364	0.3714	0.2500	0.4118
180	0.0990	0.0943	0.0561	0.1048	0.0571

Conc-ug/L	Mean	N-Mean	Transform: Arcsin Square Root					N	t-Stat	1-Tailed Critical	MSD
			Mean	Min	Max	CV%					
D-Control	0.8647	1.0000	1.1957	1.1481	1.2539	3.557	5				
10	0.8601	0.9946	1.1888	1.1481	1.2539	3.380	5	0.135	2.409	0.1235	
18	0.8406	0.9721	1.1609	1.1121	1.1951	2.740	5	0.679	2.409	0.1235	
*32	0.7394	0.8550	1.0364	0.9523	1.1023	5.592	5	3.107	2.409	0.1235	
*56	0.5305	0.6135	0.8165	0.5984	0.9843	20.239	5	7.398	2.409	0.1235	
*100	0.3147	0.3639	0.5925	0.4683	0.6967	15.940	5	11.765	2.409	0.1235	
*180	0.0823	0.0951	0.2885	0.2391	0.3296	15.418	5	17.696	2.409	0.1235	

Auxiliary Tests	Statistic	Critical	Skew	Kurt						
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.9734	0.934	-0.5674	1.53235						
Bartlett's Test indicates unequal variances (p = 8.62E-03)	17.1864	16.8119								
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	18	32	24		0.09443	0.10907	0.6108	0.00657	3.6E-17	6, 28
Treatments vs D-Control										

**Macrocyctis Germination and Growth Test-Proportion Germinated**

Start Date: 1/9/2008 13:00      Test ID: RT-080109      Sample ID: REF-Ref Toxicant  
 End Date: 1/11/2008 13:00      Lab ID: CAATL-Aquatic Testing Labs      Sample Type: CUCL-Copper chloride  
 Sample Date: 1/9/2008      Protocol: EPAWC-EPA/600/R-95/136      Test Species: MP-Macrocyctis pyrifera

Comments:

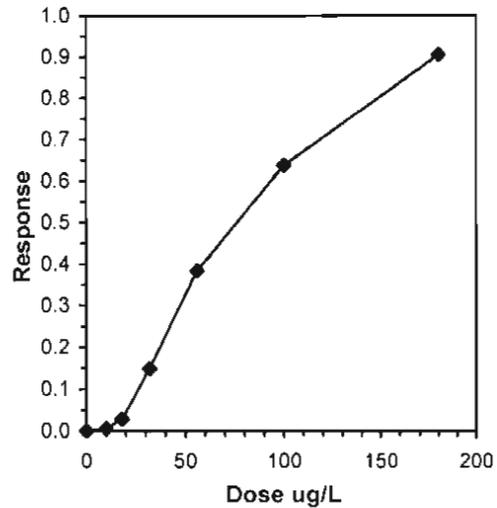
Conc-ug/L	1	2	3	4	5
D-Control	0.8846	0.8529	0.9029	0.8317	0.8515
10	0.9029	0.8627	0.8317	0.8447	0.8585
18	0.8558	0.8431	0.8039	0.8350	0.8654
32	0.7364	0.7248	0.7757	0.7961	0.6639
56	0.6339	0.6937	0.6058	0.4019	0.3173
100	0.2037	0.3364	0.3714	0.2500	0.4118
180	0.0990	0.0943	0.0561	0.1048	0.0571

Conc-ug/L	Transform: Arcsin Square Root							Rank Sum	1-Tailed Critical	Isotonic	
	Mean	N-Mean	Mean	Min	Max	CV%	N			Mean	N-Mean
D-Control	0.8647	1.0000	1.1957	1.1481	1.2539	3.557	5			0.8650	1.0000
10	0.8601	0.9946	1.1888	1.1481	1.2539	3.380	5	27.00	16.00	0.8602	0.9945
18	0.8406	0.9721	1.1609	1.1121	1.1951	2.740	5	23.00	16.00	0.8408	0.9720
*32	0.7394	0.8550	1.0364	0.9523	1.1023	5.592	5	15.00	16.00	0.7372	0.8523
*56	0.5305	0.6135	0.8165	0.5984	0.9843	20.239	5	15.00	16.00	0.5335	0.6167
*100	0.3147	0.3639	0.5925	0.4683	0.6967	15.940	5	15.00	16.00	0.3132	0.3621
*180	0.0823	0.0951	0.2885	0.2391	0.3296	15.418	5	15.00	16.00	0.0821	0.0949

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.9734	0.934	-0.5674	1.53235
Bartlett's Test indicates unequal variances (p = 8.62E-03)	17.1864	16.8119		

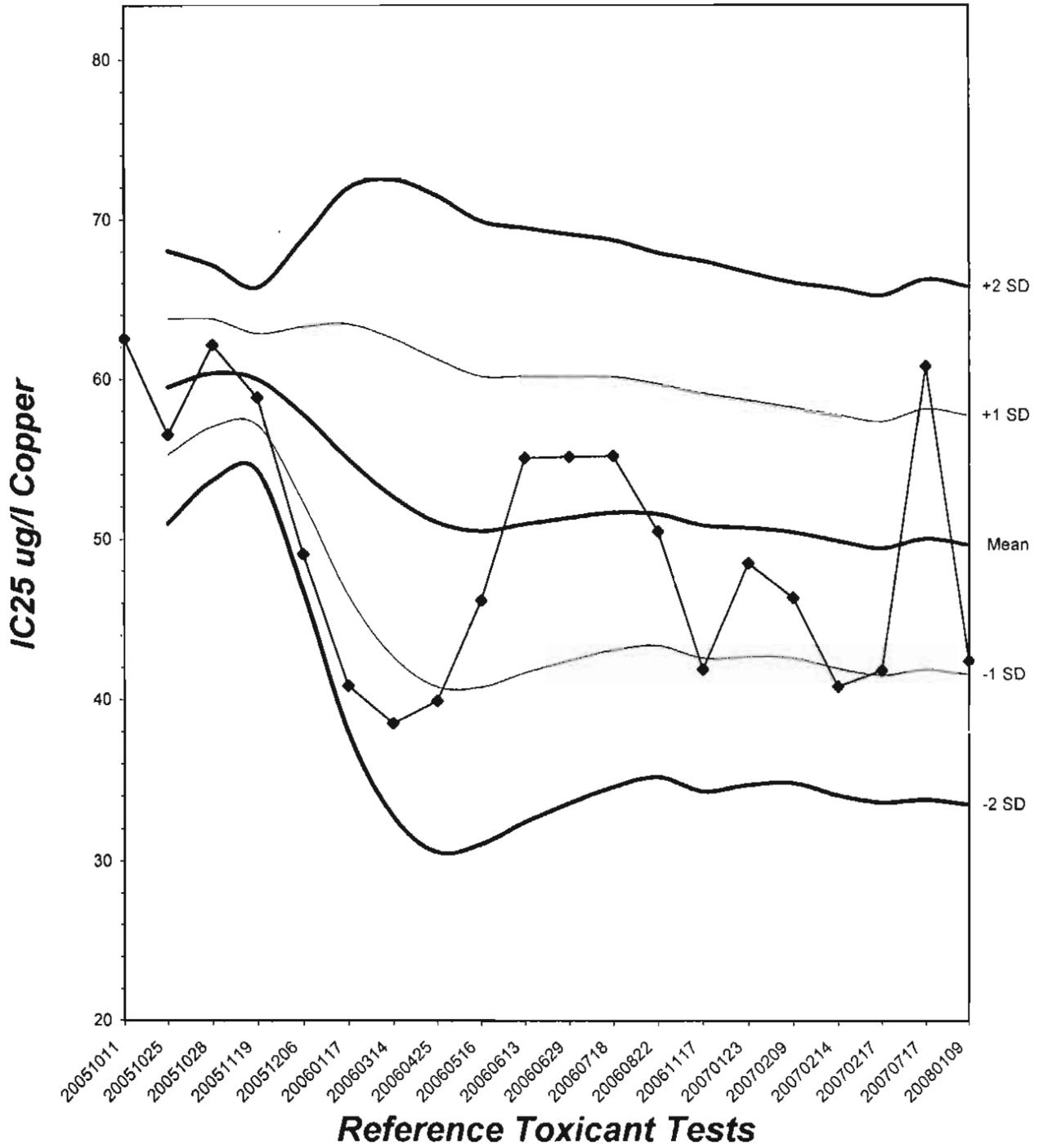
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	18	32	24	

Point	ug/L	SD	Linear Interpolation (200 Resamples)		
			95% CL(Exp)	Skew	
IC05	20.576	2.155	14.028	25.727	-0.9564
IC10	26.423	2.314	21.990	34.874	0.5204
IC15	32.236	2.358	25.972	39.859	0.0341
IC20	37.330	2.887	30.827	48.831	0.6793
IC25	42.423	4.151	34.873	61.563	1.2138
IC40	58.892	7.413	42.703	81.117	0.3410
IC50	76.171	9.041	42.999	90.692	-0.7119



# Giant Kelp Germination Laboratory Control Chart

CV% = 16.3



**Macrocystis Germination and Growth Test-Growth-Length**

Start Date: 1/9/2008 13:00    Test ID: RT-080109k    Sample ID: REF-Ref Toxicant  
 End Date: 1/11/2008 13:00    Lab ID: CAATL-Aquatic Testing Labs    Sample Type: CUCL-Copper chloride  
 Sample Date: 1/9/2008    Protocol: MBP 90    Test Species: MP-Macrocystis pyrifera  
 Comments:

Conc-ug/L	1	2	3	4	5
D-Control	15.000	15.750	15.750	16.000	15.500
10	16.250	16.000	16.000	16.250	15.250
18	16.000	15.750	15.750	15.250	15.000
32	13.500	14.250	14.000	13.000	13.750
56	9.000	9.250	10.000	11.750	9.000
100	6.000	8.250	7.500	7.250	7.500
180	5.750	6.000	6.000	6.250	6.500

Conc-ug/L	Transform: Untransformed							1-Tailed		
	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	15.600	1.0000	15.600	15.000	16.000	2.430	5			
10	15.950	1.0224	15.950	15.250	16.250	2.575	5	-0.872	2.409	0.967
18	15.550	0.9968	15.550	15.000	16.000	2.642	5	0.125	2.409	0.967
*32	13.700	0.8782	13.700	13.000	14.250	3.510	5	4.734	2.409	0.967
*56	9.800	0.6282	9.800	9.000	11.750	11.883	5	14.452	2.409	0.967
*100	7.300	0.4679	7.300	6.000	8.250	11.202	5	20.681	2.409	0.967
*180	6.100	0.3910	6.100	5.750	6.500	4.673	5	23.671	2.409	0.967

Auxiliary Tests	Statistic	Critical	Skew	Kurt						
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.93044	0.934	0.69465	3.09324						
Bartlett's Test indicates equal variances (p = 0.07)	11.6984	16.8119								
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs D-Control	18	32	24		0.96665	0.06196	88.1625	0.40268	3.4E-22	6, 28

**Macrocyctis Germination and Growth Test-Growth-Length**

Start Date: 1/9/2008 13:00    Test ID: RT-080109k    Sample ID: REF-Ref Toxicant  
 End Date: 1/11/2008 13:00    Lab ID: CAATL-Aquatic Testing Labs    Sample Type: CUCL-Copper chloride  
 Sample Date: 1/9/2008    Protocol: MBP 90    Test Species: MP-Macrocyctis pyrifera

Comments:

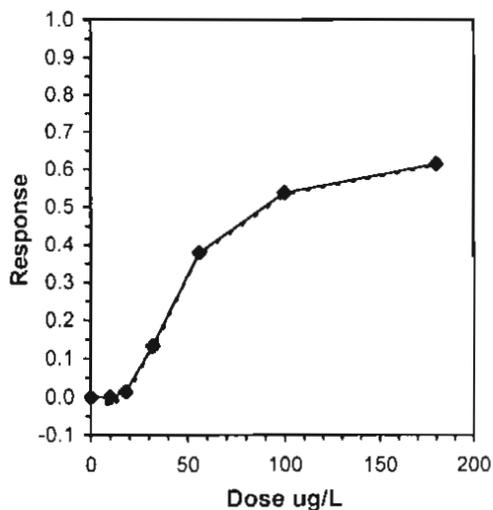
Conc-ug/L	1	2	3	4	5
D-Control	15.000	15.750	15.750	16.000	15.500
10	16.250	16.000	16.000	16.250	15.250
18	16.000	15.750	15.750	15.250	15.000
32	13.500	14.250	14.000	13.000	13.750
56	9.000	9.250	10.000	11.750	9.000
100	6.000	8.250	7.500	7.250	7.500
180	5.750	6.000	6.000	6.250	6.500

Conc-ug/L	Transform: Untransformed							Rank Sum	1-Tailed Critical	Isotonic	
	Mean	N-Mean	Mean	Min	Max	CV%	N			Mean	N-Mean
D-Control	15.600	1.0000	15.600	15.000	16.000	2.430	5			15.775	1.0000
10	15.950	1.0224	15.950	15.250	16.250	2.575	5	35.00	16.00	15.775	1.0000
18	15.550	0.9968	15.550	15.000	16.000	2.642	5	27.00	16.00	15.550	0.9857
*32	13.700	0.8782	13.700	13.000	14.250	3.510	5	15.00	16.00	13.700	0.8685
*56	9.800	0.6282	9.800	9.000	11.750	11.883	5	15.00	16.00	9.800	0.6212
*100	7.300	0.4679	7.300	6.000	8.250	11.202	5	15.00	16.00	7.300	0.4628
*180	6.100	0.3910	6.100	5.750	6.500	4.673	5	15.00	16.00	6.100	0.3867

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.93044	0.934	0.69465	3.09324
Bartlett's Test indicates equal variances (p = 0.07)	11.6984	16.8119		

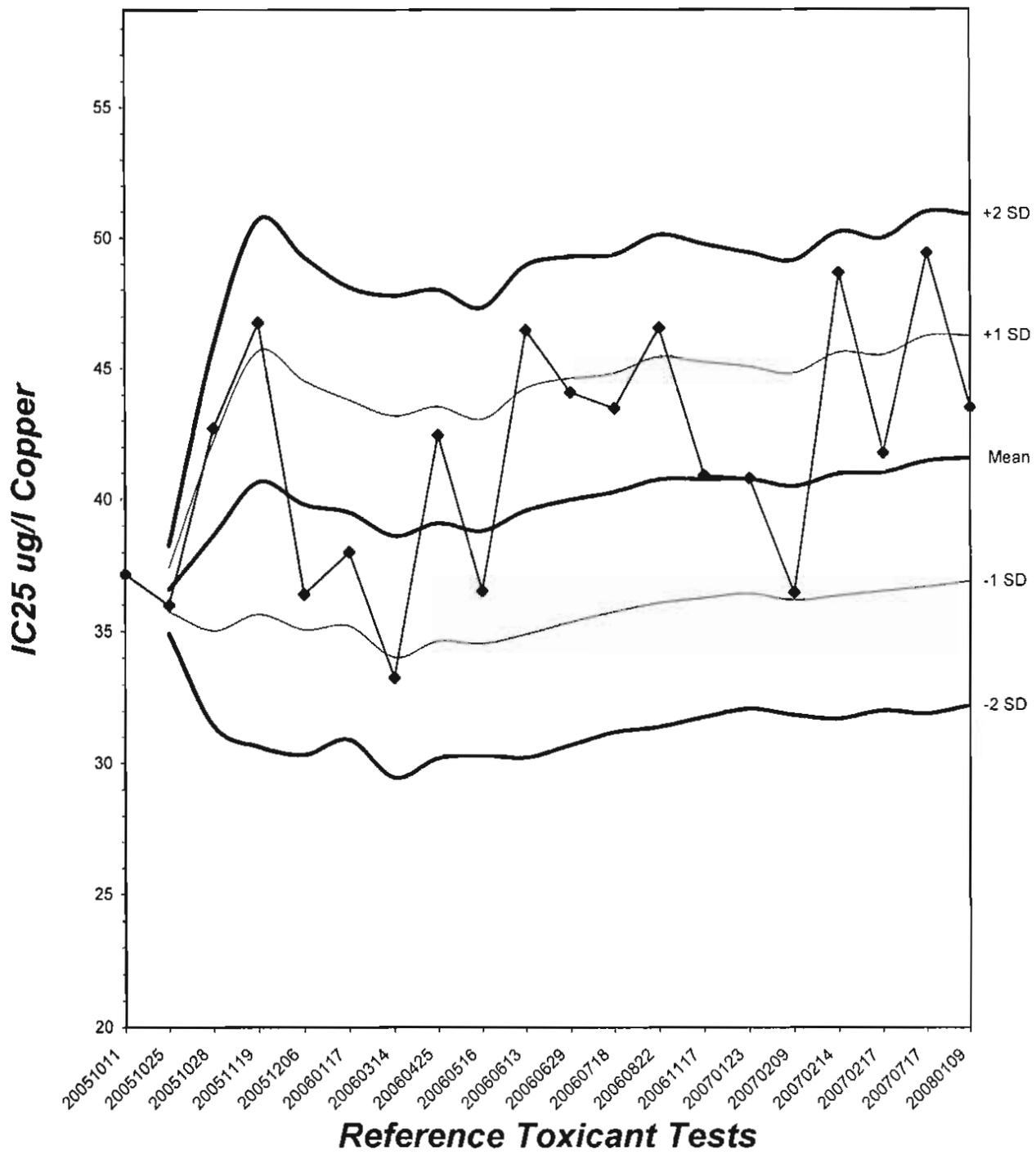
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	18	32	24	

Point	ug/L	SD	Linear Interpolation (200 Resamples)		
			95% CL(Exp)	Skew	
IC05	22.266	1.179	18.558	25.225	-0.2478
IC10	28.235	1.476	24.405	32.865	0.3404
IC15	33.792	1.391	29.821	37.441	-0.0377
IC20	38.646	1.486	35.076	43.599	0.5275
IC25	43.500	1.876	39.651	50.482	1.2002
IC40	61.896	5.871	49.700	80.133	0.6932
IC50	89.660	5.825	74.902	107.908	0.7667



# Giant Kelp Germ Tube Growth Laboratory Control Chart

CV% = 11.2



**GIANT KELP GERMINATION  
AND GROWTH  
SHORT-TERM TOXICITY TEST**



QA/QC No.: RT-080109

Start Date: 01/09/2008

Dish No.	Sample Conc.	Total Number Counted	Number Germin.	Number Non-Germin.	Germ Tube Lengths (micrometer units)									
					A	B	C	D	E	F	G	H	I	J
1	100	108	22	86	2	3	2	2	4	2	2	3	2	2
2	10	103	93	10	5	7	8	7	6	6	7	7	5	7
3	56	112	71	41	2	4	2	5	4	3	3	4	5	4
4	C	104	42	12	6	7	6	5	7	7	6	5	4	7
5	18	104	89	15	8	4	6	6	5	6	7	7	8	7
6	180	101	10	91	2	3	2	2	3	2	2	2	3	2
7	32	110	81	29	7	6	7	4	4	4	5	7	5	5
8	10	102	88	14	7	6	5	7	7	6	8	4	7	7
9	32	109	79	30	7	5	7	6	6	6	5	4	6	5
10	100	107	36	71	4	3	4	5	3	4	3	2	2	3
11	C	102	87	15	5	6	7	7	6	5	7	7	7	6
12	180	106	10	96	3	2	2	2	4	2	2	2	2	3
13	56	111	77	34	3	5	4	2	3	4	3	4	4	5
14	18	102	86	16	8	6	7	4	7	6	7	7	6	5
15	100	105	39	66	3	2	4	4	3	2	4	3	2	3
16	C	103	93	10	5	7	7	6	5	7	6	6	7	7
17	56	104	63	41	6	4	3	3	4	2	4	7	3	4
18	180	107	6	101	2	3	2	4	2	2	2	2	3	2
19	180	102	82	20	7	7	5	6	7	7	6	5	7	6
20	32	107	83	24	6	5	7	6	6	4	5	6	6	5

Comments:

Micrometer conversion factor: 1 unit = 2.5 um at 400X power

**GIANT KELP GERMINATION  
AND GROWTH  
SHORT-TERM TOXICITY TEST**



QA/QC No.: RT-080109

Start Date: 01/09/2008

Dish No.	Sample Conc.	Total Number Counted	Number Germin.	Number Non-Germin.	Germ Tube Lengths (micrometer units)									
					A	B	C	D	E	F	G	H	I	J
21	10	101	84	17	8	6	7	7	6	5	7	6	6	4
22	100	108	27	81	3	4	2	2	3	4	3	3	2	3
23	C	101	84	17	8	6	7	5	7	7	6	5	7	6
24	56	107	43	64	5	4	7	6	4	4	5	4	3	5
25	10	103	87	16	6	8	7	5	7	7	6	5	7	7
26	32	103	82	21	5	5	6	6	5	4	7	5	4	5
27	180	105	11	94	3	2	3	2	2	3	2	2	3	3
28	18	103	86	17	6	7	5	7	6	5	7	7	6	5
29	10	106	91	15	5	7	6	7	7	7	4	5	6	7
30	56	104	33	71	3	4	4	3	5	4	2	4	3	4
31	100	102	42	60	3	3	4	2	3	4	4	2	3	2
32	C	101	86	15	7	6	5	7	6	6	7	4	7	7
33	32	119	79	40	4	6	5	6	7	6	6	4	5	6
34	18	104	90	14	6	6	7	5	6	7	7	6	4	6
35	180	105	6	99	3	2	3	4	3	2	2	2	2	3
36														
37														
38														
39														
40														

Comments:

Micrometer conversion factor: 1 unit = 2.5 um at 400X power

# GIANT KELP GERMINATION AND GROWTH SHORT-TERM TOXICITY TEST



QA/QC No.: RT-080109

Start Date: 01/09/2008

## WATER QUALITY READINGS

Sample	Initial Readings				Final Readings			
	Temp (°C)	DO (mg/l)	pH	Salinity (o/oo)	Temp (°C)	DO (mg/l)	pH	Salinity (o/oo)
Control	15.4	7.6	8.1	34	15.3	7.4	8.1	34
10 µg/l	14.8	7.7	8.1	34	15.2	7.6	8.1	34
18 µg/l	14.8	7.8	8.1	34	15.3	7.8	8.1	34
32 µg/l	15.3	7.8	8.1	34	15.4	7.7	8.1	34
56 µg/l	14.7	7.7	8.1	34	15.3	7.7	8.1	34
100 µg/l	14.8	7.7	8.1	34	15.2	7.8	8.1	34
180 µg/l	14.7	7.6	8.1	34	15.3	7.8	8.1	34

**Comments:**

Reference toxicant: Copper chloride.

All dilutions made with reference lab seawater.

Illumination (16 hr light / 8 hr dark at  $50 \pm 10$   $\mu\text{E}/\text{m}^2/\text{s}$ ) at 5 locations in incubator:  
(four corners and center): 56, 51, 54, 55, 49  $\mu\text{E}/\text{m}^2/\text{s}$ .

Initial readings: Analyst: [Signature] Date: 1-9-08 Time: 1300

Final readings: Analyst: [Signature] Date: 1-11-08 Time: 1300



# *Laboratory Temperature Chart*

*QA/QC Batch No: RT-080109*

*Date Tested: 01/09/08 to 01/11/08*

*Acceptable Range: 15+/- 1°C*

