



Council Meeting: September 1, 2009

SUBJECT: Award of a Contract for Chronic Toxicity Testing Services at the Water Pollution Control Plant (F0805-70)

REPORT IN BRIEF

Approval is requested for the award of a three (3) year contract, with option to extend for two additional years, in an amount not to exceed \$290,000 to Pacific EcoRisk Environmental Consulting and Testing of Fairfield, to provide chronic toxicity testing services as required by the Public Works Environmental Services Division.

BACKGROUND

The Water Pollution Control Plant (WPCP) is a shallow water discharger such that the NPDES (National Pollution Discharge Elimination System) permit issued to the City by the Regional Water Quality Board requires, at a minimum, monthly testing of the toxicity of the effluent released by the facility. The chronic toxicity is measured using a dilution series of 12.5%, 25%, 50%, 70%, 85% and 100% effluent and live fresh water shrimp. The testing requires a state certified laboratory and traditionally has been competitively bid by the City.

DISCUSSION

Request for Proposals No. F0805-70 was developed by Purchasing and Environmental Services staff. The Request for Proposals (RFP) process was selected because, unlike an Invitation for Bids, it allows for consideration of factors in addition to cost during proposal evaluation. Because high toxicity test results could result in substantial fines to the WPCP, the proposing laboratories experience, quality control and chain of custody procedures are of great interest to Environmental Services staff. In this instance, staff determined that proposals would be evaluated based on the following criteria:

- Overall quality of proposal
- Quality, timeliness and usefulness of verbal and written results reporting
- Prior experience with conducting municipal effluent toxicity testing to minimize the impacts of ammonia
- Prior experience and proposed approaches for investigating causes of intermittent low level toxicity
- Prior experience with chronic toxicity testing overall and quality of laboratory procedures
- Estimated total annual cost to the City

The RFP was issued on May 13, 2009, and directly distributed to five Northern California testing laboratories specializing in toxicity testing. In addition, the RFP was advertised on the City’s web site and notification of the project was distributed to other potential laboratories through the Onvia DemandStar public procurement network. Eleven firms requested proposal documents. On June 3, 2009, three responsive proposals were received as follows:

- Block Environmental Services, of Pleasant Hill
- ToxScan Inc., of Watsonville
- Pacific EcoRisk Environmental Consulting & Testing, of Fairfield

Evaluations were performed by two teams for which members had sufficient background in the test methodologies proposed by the submitting laboratories. Eisenberg, Olivieri & Associates (EOA), an engineering consulting firm currently assigned multiple projects at the WPCP, formed one team; City staff of water quality scientists at the WPCP Lab Facility formed the second team. After extensive evaluation of the proposals received, Pacific EcoRisk was determined to be the highest scoring proposer, and staff recommends the award of a three year contract with option to extend for two additional years in an amount not to exceed \$290,000. Staff is also recommending that Council approve an option to extend the contract for additional two years if price and performance remain acceptable to the City.

Additionally, staff requests a secondary Contract, under the City Manager’s award authority, in an amount not to exceed \$75,000, to Toxscan, the second ranking proposer as a backup chronic toxicity testing laboratory. Environmental Services find this necessary as toxicity issues being experienced at the WPCP may require split or duplicate sampling on occasion. The naming of a secondary laboratory for these testing services is prudent as the ability to split analysis is critical to ascertaining the viability or practicality of current permitted testing limits. Additionally it aids the WPCP in determining “repeatability” or accuracy amongst testing labs and allows the secondary lab to step in as the primary testing lab in the event that unforeseen circumstances dictate such.

FISCAL IMPACT

Total costs for the three year contract period are as follows:

Chronic toxicity testing services (primary laboratory)	NTE \$290,000
Chronic toxicity testing services (backup laboratory)	NTE \$75,000
Total costs	NTE \$365,000

Budgeted funds are available in Environmental Services Program 344530.

PUBLIC CONTACT

Public contact was made by posting the Council agenda on the City's official-notice bulletin board outside City Hall, at the Sunnyvale Senior Center, Community Center and Department of Public Safety; and by making the agenda and report available at the Sunnyvale Public Library, the Office of the City Clerk and on the City's Web site.

RECOMMENDATION

1. It is recommended that Council award a contract, in substantially the same form as the attached draft and in an amount not to exceed \$290,000, to Pacific EcoRisk Environmental Consulting and Testing to provide chronic toxicity testing services for a three year period.
2. Delegate authority to the City Manager to exercise an option to extend the contract for two additional one-year periods, provided that price and service remain acceptable to the City.

Reviewed by:

Mary J. Bradley, Director of Finance
Prepared by: Pete Gonda, Senior Management Analyst, Finance

Reviewed by:

Marvin Rose, Director of Public Works

Approved by:

Gary M. Luebbers
City Manager

Attachments

- A. Draft Contract

ATTACHMENT A

DRAFT

CONTRACT BETWEEN CITY OF SUNNYVALE AND PACIFIC ECORISK ENVIRONMENTAL CONSULTING AND TESTING FOR CHRONIC TOXICITY LABORATORY SERVICES

THIS CONTRACT, dated _____, is by and between the CITY OF SUNNYVALE, a municipal corporation of the State of California ("CITY"), and Pacific EcoRisk Environmental Consulting and Testing ("CONTRACTOR").

RECITALS:

The parties to this Contract have mutually covenanted and agreed, as follows:

1. Contract Documents. The complete Contract consists of the following documents which are incorporated by reference: Request for Proposals No. F0805-70, including; Proposer Response Pages completed by CONTRACTOR, including attachments; and all required insurance certificate(s) and endorsement(s). The documents comprising the complete contract are collectively referred to as the Contract Documents. Any and all obligations of CITY and CONTRACTOR are fully set forth and described in the Contract Documents.
2. The Work. CONTRACTOR agrees to furnish all tools, equipment, materials, apparatus, facilities, labor, transportation, supervision and management necessary to perform the services set forth on the unit cost basis in Exhibit "A", attached and incorporated by reference, in a good and workmanlike manner and in strict conformity with the Contract Documents.
3. Contract Price. CITY agrees to pay and CONTRACTOR agrees to accept in full payment for the work above agreed to be done at the rates set forth in the unit cost table Exhibit "A" attached and incorporated by reference. Total value of the three (3) year Contract shall not exceed Two Hundred Ninety Thousand and NO/100 Dollars (\$290,000.00) without written modification of this Agreement.
4. Permits; Compliance with Law. CONTRACTOR shall, at its own expense, obtain all necessary permits and licenses for the completion of the work, give all necessary notices, pay all fees required by law, and comply with all laws, ordinances, rules and regulations relating to the work and to the preservation of the public health and safety.
5. Extra or Additional Work and Changes. At any time during the contract term, CITY shall have the right to request alterations, additions to, or deviations or omissions from the Contract Documents; and the rates for such additional or changed work shall be adjusted by a fair and reasonable valuation, agreed to in writing by CITY and CONTRACTOR. CONTRACTOR shall perform no extra or additional work or alter or deviate from the work specified herein unless agreed to in writing by CITY. Extra work to which CITY has not agreed in advance in writing will not be compensated by City.

6. Contract Term. The term of this contract shall be three (3) years from the date of contract execution, unless otherwise terminated. The City may elect to re-solicit proposals or to extend the contract on an annual basis for up to two additional years should service and pricing remain satisfactory to the CITY.

7. Termination. CITY may provide written notice to CONTRACTOR of CITY'S intention to terminate the contract under one or more of the following conditions:

- A. CONTRACTOR is adjudged a bankrupt;
- B. CONTRACTOR make a general assignment for the benefit of creditors;
- C. A receiver is appointed on account of insolvency;
- D. CONTRACTOR or any subcontractors violate any of the provisions of the Contract;
- E. CONTRACTOR is providing unsatisfactory level of service and responsiveness.

The notice shall contain the reason(s) for CITY'S intention to terminate the Contract. CONTRACTOR shall be given thirty (30) days after serving such notice to cease the violation described in the notice or to make satisfactory arrangements for correction of the violation. Otherwise, the Contract shall cease and terminate at the end of the thirty (30) day period.

8. Notices

All notices required by the Contract shall be in writing, and shall be personally delivered or sent by first class mail, postage prepaid or by commercial courier, addressed as follows:

To CITY: Ms. Lorrie Gervin
Environmental Division Manager
CITY OF SUNNYVALE
P. O. Box 3707
Sunnyvale, CA 94088-3707

To CONTRACTOR: Pacific EcoRisk Environmental Consulting and Testing
Attn: R. Scott Ogle
2250 Cordelia Road
Fairfield, CA 94534

Nothing in this provision shall be construed to prohibit communication by more expedient means, such as by telephone, email, or facsimile transmission, to accomplish timely communication. However, to constitute effective notice of Contract termination, written confirmation of a telephone conversation or an original of a facsimile or email transmission must be sent by first class mail or commercial carrier, or hand delivered.

Each party may change the address by written notice in accordance with this paragraph. Notices delivered personally shall be deemed communicated as of actual receipt; mailed notices shall be deemed communicated as of three days after mailing, unless such date is a date on which there is no mail service. In that event communication is deemed to occur on the next mail service day.

9. Assignment. Neither party shall assign or sublet any portion of the Contract without the prior written consent of the other party.

10. Insurance.

CONTRACTOR shall take out and maintain throughout the life of the Contract, at its own expense and from an admitted insurer authorized to operate in California, Workers' Compensation and Employer's Liability Insurance for its employees. The amount of insurance shall not be less than \$1,000,000 per accident for bodily injury or disease.

CONTRACTOR shall take out and maintain throughout the life of the Contract, at its own expense and from an admitted insurer authorized to operate in California, such Commercial General Liability Insurance as shall protect CONTRACTOR, CITY, its officials, officers, directors, employees, and agents from claims which may arise from work performed under the Contract, whether such work is performed by CONTRACTOR, by CITY, its officials, officers, directors, employees, or agents or by anyone directly or indirectly employed by either. The amount of insurance shall not be less than the following: Single limit coverage applying to bodily and personal injury liability and property damage - \$1,000,000.

The liability insurance shall include, but shall not be limited to:

- Protection against claims arising from bodily and personal injury and damage to property, resulting from CONTRACTOR'S or CITY'S operations, and use of owned or non-owned automobiles.
- Coverage on an "occurrence" basis.
- Broad form property damage liability. Deductible shall not exceed \$5000 without prior written approval of the CITY.
- Notice of cancellation to City at least thirty (30) days prior to the cancellation effective date.

The following endorsements shall be attached to the liability insurance policy:

- The policy shall cover complete contractual liability. Exclusions of contractual liability as to bodily injuries, personal injuries and property damage shall be eliminated.
- CITY shall be named as additional named insured with respect to the work to be performed under the Contract.
- The coverage shall be primary insurance so that no other insurance effected by CITY will be called upon to contribute to a loss under this coverage.

11. Indemnification. CONTRACTOR shall indemnify, defend and hold harmless CITY and its officers, officials, employees and volunteers from and against all claims, damages, losses and expenses, including attorney fees, arising out of the performance of the work described in the Contract Documents, caused in whole or in part by any negligent act or omission of CONTRACTOR, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, except where caused by the active negligence, sole negligence, or willful misconduct of CITY.

12. CONTRACTOR'S Guarantee. CITY shall not, in any way or manner, be answerable or suffer loss, damage, expense or liability for any loss or damage that may happen to the work site or other City-owned equipment or property any part thereof or in, on or about the same during CONTRACTOR'S performance of work under this contract.

CONTRACTOR unqualifiedly guarantees the first-class quality of all work performed by CONTRACTOR, or by any subcontractor, under this Contract. CONTRACTOR also unqualifiedly guarantees that the work performed by CONTRACTOR will conform with the Contract Documents and any written authorized deviations therefrom. In case of any defect in work, CONTRACTOR will forthwith remedy such defect or defects without cost to CITY.

13. Liquidated Damages. Time shall be the essence of this contract. If CONTRACTOR fails to perform the work, within the agreed-upon time, CONTRACTOR shall become liable to CITY for liquidated damages in the sum of two hundred and fifty dollars (\$250) per day for the first ten (10) days and five hundred dollars (\$500) per day thereafter for each and every calendar day during which work was delayed beyond the agreed-upon time. The amount specified as liquidated damages is presumed to be the amount of damage sustained by CITY since it would be impracticable or extremely difficult to fix the actual damage. The amount of liquidated damages may be deducted by CITY from moneys due CONTRACTOR; and CONTRACTOR and its surety shall be liable to CITY for any excess.

IN WITNESS WHEREOF, the parties have executed this contract.

ATTEST:

CITY OF SUNNYVALE ("CITY")

By _____
City Clerk

By _____
City Manager

APPROVED AS TO FORM: Pacific

EcoRisk Environmental Consulting and Testing
("CONTRACTOR")

By _____
City Attorney

By _____

Title and Date

By _____

Title and Date



EXHIBIT A

Dave Gakle, Principal Buyer
Sunnyvale City Hall Annex
650 W. Olive Ave.
P.O. Box 3707
Sunnyvale, CA 94088-3707

June 2, 2009

Dear Mr. Gakle:

Pacific EcoRisk is very pleased to have this opportunity to respond to Sunnyvale's Request for Proposals No. F0805-70.

As you may be aware, Pacific EcoRisk is arguably the premier water and sediment testing firm in the western United States. The depth and breadth of NPDES permit testing, as well as ambient and stormwater monitoring work that we have performed is considerable, and we believe that this experience would make us a valuable team member on the City of Sunnyvale's NPDES toxicity testing program. We hope that you will have an opportunity to take a look at our web page (pacificecorisk.com) for additional information about our company.

Having worked with the City of Sunnyvale for many years, Pacific EcoRisk is very familiar with Sunnyvale's NPDES requirements as well as the existing intermittent toxicity issues. On this project, we have worked under the supervision of Sunnyvale staff as well as staff from EOA, Inc., Sunnyvale's NPDES compliance consultant. We work with numerous dischargers under similar arrangements in which the discharger and/or their consultant provide us with instruction for testing services. In all of these cases, our role is typically limited strictly to the performance of testing, although when issues arise, our expertise is called upon to help resolve toxicity issues. In our work with Sunnyvale, we have historically similarly perceived that our role was being limited to performance and reporting of the toxicity testing, with occasional specific requests for input on specific testing issues (again, with our perception being that our input was to be limited). We were very pleased to have been requested in February 2009 to become further involved in Sunnyvale's efforts to resolve the current intermittent toxicity issue, and we believe that we have made significant contributions since then:

It was Pacific EcoRisk that suggested that the Sunnyvale team obtain the suspect polymer MSDS for additional information on the polymer (including potential toxicity info). This led to the discovery on critical aspects of the polymer's fate and tendencies in the effluent (e.g., short half-life, tendency to sorb to substrates, rapid reactivity to become transformed into other polymer forms, etc).

CORPORATE HEADQUARTERS
2250 Cordelia Road
Fairfield, CA 94534
phone : 707.207.7760
fax : 707.207.7916

CENTRAL VALLEY
6820 Pacific Avenue, Ste. 3D
Stockton, CA 95207
phone : 209.952.1180
fax : 209.952.1180

SOUTHERN CALIFORNIA
2792 W. Loker Avenue, Ste. 100
Carlsbad, CA 92010
phone : 760.602.7919
fax : 760.602.9119

It was Pacific EcoRisk that identified that the interfering effect of ammonia, particularly the fact that pH will affect not only ammonia-targeted TIE treatments but polymer chemistry as well, which in turn dictates the resolution of polymer targeted testing and TIE work.

It was Pacific EcoRisk that recommended that polymer-targeted testing and TIEs would need to be performed concurrently with the regular compliance testing. Further, it was Pacific EcoRisk that observed and recommended that the focused TIE treatments would need to be modified to include testing at pH3 and pH9-11 due to the high reactivity of the polymer.

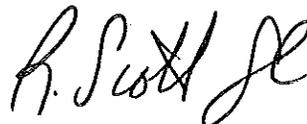
It was Pacific EcoRisk that recommended that a brief review of polymer toxicity and TIE scientific articles be performed. This review is resulting in a clear strategy for TIE testing that will be appropriately targeted to the suspect polymer.

Finally I should add that Pacific EcoRisk has recently implemented changes in personnel and project management strategy that have resulted in more responsive reporting that includes real-time reporting of ammonia concentrations, as well as report submittal within 48 hrs of test completion (most labs have difficulty achieving a 2-week response time!).

I have enclosed a copy of our proposal. We believe that our experience and commitment to performance of high quality work will continue to make us a valued part of your environmental team, and we look forward to the opportunity to work with you to resolve the cause(s) of toxicity that may be associated with your wastewater discharges in a successful and cost-effective fashion.

We look forward to the opportunity of continuing to provide the highest quality toxicity testing services for the City of Sunnyvale. If you have any questions regarding our proposal, or any questions in general, please feel free to contact me at (707)207-7762.

Sincerely,



R. Scott Ogle, Ph.D.
CEO & Special Projects Director

cc: Lorrie Gervin, City of Sunnyvale
Regina Galicki, City of Sunnyvale

A Proposal to Conduct NPDES Aquatic Toxicity Testing for the City of Sunnyvale

Prepared for:

City of Sunnyvale
Department of Purchasing
P.O. Box 3707
Sunnyvale, CA 94088-3707

Prepared by:

Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534

June 2009



PACIFIC ECORISK
ENVIRONMENTAL CONSULTING & TESTING

A Proposal to Conduct NPDES Aquatic Toxicity Testing for the City of Sunnyvale

1. INTRODUCTION TO PACIFIC ECORISK

Company Name: Pacific EcoRisk, Inc. (PER)

Business Address: 2250 Cordelia Rd.
Fairfield, CA, 94534
PH: 707-207-7760

Primary Contact: R. Scott Ogle, Ph.D.
2250 Cordelia Rd.
Fairfield, CA, 94534
PH: 707-207-7762

2. DESCRIPTION OF COMPANY

Pacific EcoRisk (PER) is an environmental consulting firm conducting research and testing in the fields of environmental toxicology, aquatic biology, and environmental chemistry. Our staff is comprised of 15 degreed scientists (and 10+ support technicians) who are skilled in integrating their experience in these areas to produce high-quality, cost-effective, and often innovative solutions to complex environmental problems. Our primary objective is to provide the best information available for our clients, which include local, state, and federal regulatory agencies, industry and agriculture, ports and marinas, POTWs, US military services, as well as support services for other environmental or engineering firms.

Pacific EcoRisk has considerable experience in the performance of water and sediment toxicity and bioaccumulation testing, and has come to be regarded as one of the premier environmental testing labs in the nation. The most fundamental element of our approach to meeting the needs of our clients is that the quality of the work to be performed must be of the highest caliber, and must successfully pass the scrutiny of the resource agencies evaluating the data that is generated.

Company Principals: R. Scott Ogle, Ph.D. (hourly billing rate - \$195/hr)
Jeffrey Cotsifas (hourly billing rate - \$185/hr)
Stephen Clark (hourly billing rate - \$175/hr)

Project Lead: Eddie Kalombo (hourly billing rate - \$95/hr)
Mr. Kalombo assists Dr. Scott ogle in the compilation and reporting of data for this project.

Longevity: Pacific EcoRisk, Inc. has been in business since 1994.

Client Base: NPDES dischargers (includes numerous municipal, industrial, and stormwater dischargers)
Agricultural dischargers
Major and minor Ports and Marinas
US military services
Large engineering firms (e.g., URS Corp., Tetra Tech, Brown & Caldwell, etc.)
Local, state, and federal regulatory agencies

Areas of Specialization: NPDES Whole Effluent Toxicity (WET) testing
Sediment testing
Stormwater and watershed (ambient water) monitoring
Toxicity Identification & Evaluations (TIEs)
Toxicity Reduction Evaluations (TREs)
Expert consulting on the fate and effects of contaminants in aquatic ecosystems

3. Technical Qualifications and Experience

The Project Management team of Dr. Scott Ogle, Jeffrey Cotsifas and Stephen Clark collectively bring an additional 60+ years of toxicity testing experience to this project). This experience includes the logistical scheduling of sample collection, testing and analytical staff and facilities, and equipment and supplies necessary to successfully perform small- to very large-scale projects.

Pacific EcoRisk is very familiar with the San Francisco Bay Regional Board's (Regional Board) NPDES staff, the Regional Board's NPDES permits, and their expectations for NPDES toxicity testing. We provide NPDES toxicity testing services for many SF Bay dischargers, including:

City of American Canyon	City of Benicia
C&H Sugar, Inc.	City of Calistoga
Central Marin Sanitation Agency	Chevron Richmond Refinery
City of Daly City	Delta Diablo Sanitation District
East Bay Municipal District	Fairfield-Suisun Sewer District
GWF Power Systems, Inc.	Las Gallinas Valley Sanitation District
Lawrence Livermore National Laboratory	Napa Sanitation District
City of Pacifica	City of Petaluma
Rhodia Inc.	City of San Mateo
Shell Martinez Refinery	South Bayside System Authority
City and County of San Francisco	Tesoro Martinez Refinery
Town of Windsor	Valero Benicia Refinery

4. Lab Accreditation

A copy of our most recent NELAP audit report is provided as Attachment A (the on-site audit took place in December 2008); our corrective actions have been approved with no further requirements. PER is one of the few toxicity testing labs in the United States that is NELAP-certified, a measure of a much higher standard of QA/QC than the State's ELAP certification, resulting in a higher degree of data integrity for more reliable evaluations and testing programs. In fact, PER is the only lab in California that is NELAP-certified to perform the EPA estuarine and marine tests.

We would also like to bring your attention to the fact that as part of the Central Valley Regional Board's Irrigated Lands Regulatory Program (ILRP), the labs participating in the ILRP will all undergo EPA Lab Audits. As the lab doing the majority of the ILRP work, our lab was selected to be the first, and a 2-day audit with 2 EPA auditors and 2 Regional Board auditors took place this past February. We were very pleased to have received the EPA's highest rating as a result of that audit, along with numerous complimentary comments such as "Laboratory documentation and reporting is excellent" and observations such as "All of the tests performed for the ILRP have coefficients of variation that are far below the national average 75th percentile and 90th percentiles".

In addition, PER is very proud to be one of very few labs that also performs an extensive daily QA Review, in which a senior-level scientist examines each piece of data that was generated in the laboratory each day to confirm that all analyses and accompanying QA documentation are appropriate. During our NELAP audit, and again in an external laboratory audit performed by the Los Alamos National Laboratory, the auditors commented approvingly that PER's daily QA review was the most extensive and intensive daily QA review that they had seen being implemented by any toxicity testing laboratory that they had audited.

5. Disclosure of Defaults or Performance Failures

There have been no defaults of performance failures that have led to our client to terminate the contract. The only contracts that this company has lost have been due strictly to lower costs bidden by lesser-quality labs. There have also been no civil or criminal litigation or investigations in our company's history.

6. Names, Qualifications, and Experience of Key Project Team Members

Dr. Scott Ogle - For over 20 years, Dr. Scott Ogle has been directing and/or participating in research in the areas of aquatic ecotoxicology and environmental chemistry. A major area of Dr. Ogle's past research efforts has focused on factors affecting toxicity and bioaccumulation of selenium to algae, invertebrates, and fish and have established him as an expert in this field. Current research activities include evaluation of the fate and effects of metals, pesticides, and

petroleum and petroleum products in the aquatic environment, monitoring and investigation of contaminants and toxicity in ambient waters, point-source and non-point source discharges, and stormwater runoff. Dr. Ogle is also an expert in all aspects of freshwater, estuarine, and marine sediment toxicity and bioaccumulation issues, and has served as Lead Instructor for the SETAC sediment toxicity professional short course at the regional and national level. Dr. Ogle has directed and participated in numerous projects encompassing all of the standardized EPA and ASTM test procedures as well as projects involving development of new testing procedures. Performance of all of these projects has involved a leadership role by Scott, from conception and design of experimental approach, through completion of studies and analyses of results, and finally, reporting of the results to the concerned parties.

Jeffrey Cotsifas – Mr. Cotsifas has almost 20 years of experience in the areas of aquatic ecotoxicology, environmental chemistry, environmental/ecological risk assessment, contaminant fate studies, and regulatory permitting and negotiation. Mr. Cotsifas's current research interests are in the development and implementation of surface water, sediment porewater and sediment toxicity identification/ reduction evaluation (TIE and TRE) methods using standard EPA test species as well as resident aquatic organisms. Jeff is also actively investigating the fate and effects of petroleum and petroleum products in the aquatic environment. Mr. Cotsifas was very involved in the development of sediment porewater TIE/TRE guidelines for the San Francisco Bay System as well as evaluating the application of TI/RE methods to stormwater discharges.

Mr. Cotsifas also currently heads up Pacific EcoRisk's Dredge Materials Program, which provides services for a wide variety of clients including the Port of Oakland, Port of San Francisco, as well as numerous port terminals and marinas.

Mr. Cotsifas has extensive experience in aquatic and sediment toxicity issues and has managed and performed numerous studies that have included water-column, whole sediment, sediment elutriate, sediment porewater, sediment bioaccumulation and intact sediment core (sediment-water interface) testing approaches. Mr. Cotsifas has experience in directing large-scale projects, including management of multi-subcontractor teams. In addition, Mr. Cotsifas is very familiar with relevant regulatory issues and has worked with all the major regulatory agencies.

7. Three Municipal WWTP References

City of Petaluma

Contact: Larry Bahr

Senior Project Manager

Oakley Water Strategies (Consultant to the City of Petaluma)

Telephone: (707) 738-5218

e-mail: lbahr@oakleywater.com

Services Performed: Pacific EcoRisk has provided the City of Petaluma with NPDES toxicity testing services since 1998. This has included acute and chronic toxicity testing (chronic testing with *Americamysis bahia*) and screening phase studies. Of particular interest is the work recently performed identifying ammonia as a source of toxicity and working with the City of Petaluma and their consultant to resolve the issue.

City of American Canyon

Contact: Veronica Gummo (or Stacey Ambrose)

Environmental Specialist

City of American Canyon

Telephone: 707-647-4540

e-mail: vgummo@cityofamericancanyon.org

Services Performed: Pacific EcoRisk has provided the City of American Canyon with NPDES toxicity testing services since 2004. This has included acute and chronic toxicity testing (chronic testing with *Americamysis bahia*).

City of Daly City

Contact: Marcus Cotton (Mark Baker, Cynthia Royer)

City of American Canyon

Telephone: 650-991-5733

e-mail: mcotton@dalycity.org

Services Performed: Pacific EcoRisk has provided the City of American Canyon with NPDES toxicity testing services since 2006. This has included acute and chronic toxicity testing (chronic testing with *Americamysis bahia*) and screening phase studies. Pacific EcoRisk proposed and helped the City of Daly City obtain Regional Board approval to calculate their TUC as 100/EC25 and 100/IC25 rather than 100/NOEC, much to their advantage. Pacific EcoRisk also prepared the City of Daly City's TRE Workplan.

8. Understanding of Project Requirements

As Sunnyvale's current toxicity testing lab, Pacific EcoRisk is quite familiar with the project requirements. We understand that this will require the performance of routine compliance monitoring and reporting, toxicity screening studies, and performance of TIEs within a TRE framework (e.g., an adaptive management approach to toxicity testing). We also understand that expeditious reporting is required to have an effective TRE process.

9. Experience with TIEs

Pacific EcoRisk is quite expert in TIEs and in Sunnyvale's current TIE needs based on intermittent low-level toxicity. For example, in December of 2008, Pacific EcoRisk performed a

TIE to try and identify the role that ammonia might be playing in the effluent toxicity (see attached example report). This TIE was highly successful (virtually a “textbook” example of a ammonia-targeted TIE!). We are currently using our TE expertise to help Sunnyvale resolve suspected toxicity from a polymer. There is surprisingly very limited literature on TIEs for polymers, and they can often have effects that are intermittent and are not persistent, resulting in the need for an understanding of the fate of such materials. Based upon our brief review of polymer toxicity and TIE scientific articles, as well as our experience in the environmental fate and effects of chemicals, we believe that we have a clear strategy for TIE testing that will be appropriately targeted to the suspect polymer.

10 Modifying Municipal Effluents to Minimize Impacts of Ammonia

Historically, as ammonia has been identified as contributing to municipal effluent toxicity, Pacific EcoRisk was at the forefront of working with dischargers and Regional Boards to resolve how to circumvent the interference of ammonia in the acute and chronic toxicity testing. As a result, many dischargers have gained approval to modify their NPDES testing to minimize or eliminate ammonia as a source of toxicity. This work has included:

1. Stripping of ammonia via zeolite treatment (while this method is approved by the Central Valley Regional Board, the SF Bay Regional Board is very reluctant to use this approach);
2. Conversion of ammonia to less toxic forms (this is typically accomplished by controlling the pH at a lower level). Control of pH has been achieved via:
 - a. Daily manual adjustments of test solution pH levels via drop-wise addition of HCl;
 - b. Control of test solution pH via use of buffers;
 - c. Control of pH via CO₂ headspace manipulations.
3. A method used in marine TIEs that has not yet been implemented for routine NPDES testing is the use of a macroalga, *Ulva lactuca*, to absorb and remove the ammonia prior to toxicity testing. This could be suggested to the Regional Board for application to Sunnyvale’s effluent.

11. Choice of Species for Screening Phase Studies

Based upon our review of Sunnyvale’s tentative 2009 Permit, we propose that the 5 species to be used in the screening phase study consist of:

- the algal germination and growth test with the green alga, *Selenastrum capricornutum*,
- the bivalve embryo development test with the mussel, *Mytilus galloprovinciales*,
- the crustacean survival and growth test with the gulf shrimp, *Americamysis bahia*,
- the larval fish survival and growth test with the inland silversides, *Menidia beryllina*,
- the larval fish survival and growth test with the fathead minnow, *Pimephales promelas*.

These species were selected based upon the consistent availability of good quality test organisms (e.g., the giant kelp cannot be obtained in good quality during certain times of the year due to

elevated water temperatures, or dilution of seawater salinity due to stormwater runoff). In addition, they were selected to provide test results that should be most beneficial to Sunnyvale's continued compliance.

12. Description of Management Plan

Through the recent experience of working collaboratively with both Sunnyvale and EOA Inc. to try and resolve a very complex toxicity situation, Pacific EcoRisk recognizes the importance of real-time communication of effluent chemistry and observation of toxicity as well as submittal of test reports as soon as possible (i.e., 1-2 days after test completion rather than 2 weeks after test completion).

We have modified our management strategy and personnel considerably over the past several months to achieve that, and our communications and report submittals over the past couple of months bear that out. We now have the right people in the right places and an internal communication infrastructure to ensure that this is maintained from here on out.

We also recognize the importance on intercommunication between ourselves, Sunnyvale staff, and EOA. Towards that end, and when new test results or newly-obtained information have warranted, we have been extremely pro-active in proposing conference calls and/or meetings at our lab facility for discussion and consensus decision-making.

Dr. Scott Ogle is the primary Project Manager, with additional support by Mr. Jeffrey Cotsifas with regards to TIEs and in particular, use of newer TIE methods to address polymer toxicity (such as addition of humic acids, which was borne out by our recent review of scientific articles). Day-to-day oversight of the tests themselves is now being provided by Mr. Eddie Kalombo (Mr. Kalombo's recognition of the importance of this project is reflected in the recent reporting of effluent ammonia concentrations on a real-time basis and submittal of reports within 1-2 days of test completion. Mr. Kalombo will be assisted by Ms. Lisa Nugent who has been with our staff for several years, including roles as the lab manager.

13. Example of Toxicity Testing Report

A copy of our toxicity testing report for the targeted ammonia TIE for Sunnyvale that was performed in December 2008 is provide as Attachment B. As stated previously, this was a "textbook" example of an ammonia-targeted TIE that also brought historical Sunnyvale ammonia toxicity data into the evaluation.

14. Breakdown of Toxicity Test Unit Costs

The breakdown of toxicity test unit costs is provided as Attachment C.

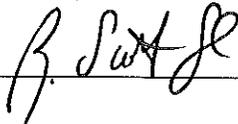
15. Recognition and Acceptance of Sample Consultant Agreement

Pacific EcoRisk has read and agrees to the Sample Consultant Agreement

16. Binding Signature

Name: R. Scott Ogle, Ph.D.

Title: CEO

Signature:  Date: June 3, 09

Attachment A

Copy of Most Recent NELAP Audit Report



MARK B HORTON, MD, MSPH
Director

State of California—Health and Human Services Agency
California Department of Public Health

S. Boggs



ARNOLD SCHWARZENEGGER
Governor

January 5, 2009

Mr. Stephen Clark
Pacific EcoRisk, Inc.
2250 Cordelia Road
Fairfield, California 94534

NELAP ON-SITE ASSESSMENT REPORT
APPLICATION REFERENCE NUMBER: 5201
DATES OF ASSESSMENT: December 3 – 5, 2008
RENEWAL NELAP ACCREDITATION

An on-site assessment (OSA) was conducted by the California Environmental Laboratory Accreditation Program (ELAP) for the purpose of evaluating your laboratory for conformance with the requirements as specified in the NELAC Standards (July 2003). The OSA was conducted in accordance with the protocol as described in the NELAC Standards.

During the OSA your laboratory was evaluated for compliance or non-compliance with the NELAC Standards and requirements specified in the test methods applied for. Items of non-compliance will require a Corrective Action Report (CAR) from your laboratory.

The assessment findings were presented at the OSA closing conference and were agreed upon by the assessor and representatives of your laboratory. Your submittals emailed on December 19 and 20 adequately addressed some of the findings discussed.

Pacific EcoRisk, Inc. is seeking the National Environmental Laboratory Accreditation Program (NELAP) accreditation for the following Field of Accreditation (FOA):

<u>FOA#</u>	<u>Description</u>
N113	Whole Effluent Toxicity of Wastewater

ASSESSMENT TEAM

Steven Boggs (Lead Assessor)

LABORATORY REPRESENTATIVES

The following laboratory personnel were interviewed during the assessment:

Stephen Clark	Vice President/QA Officer
Jeffrey Cotsifas	President
Scott Ogle	C.E.O.
Allison Briden	QA Manager

SUMMARY:

Pacific EcoRisk, Inc. in Fairfield, CA is furnished with all items of equipment needed for the correct performance of tests for which accreditation is sought. Facilities are well organized and have effective separation between neighboring areas for the proper performance of test procedures. Hard copies of records and reports are stored on-site.

The laboratory management and organization are appropriate for the range, scope and volume of tests performed. The laboratory analysts are technically knowledgeable to perform their assigned functions and staffing is adequate for the volume of tests performed.

The documentation for the operation and maintenance of instruments and support equipment are in compliance with the standards. All Quality and Method Manuals are available to all analysts. Test methods and Standard Operating Procedures (SOPs) generally conform to 2003 NELAC Standards and mandated requirements.

Items of non-compliance listed below will require a formal CAR in order to complete the OSA phase of the accreditation process.

FINDINGS AND REQUEST FOR CORRECTIVE ACTIONS:

Unless otherwise noted, all citations are referenced to the NELAC Standards (June 2003). The same item numbers from the NELAC Quality Systems Checklist are hereby listed for easy reference.

Item 5 (Subsection 2.5): Proficiency testing (PT) samples are not handled (i.e., managed, analyzed, and reported) in the same manner as real environmental samples utilizing the same staff, methods as used for routine analysis of that analyte, procedures, equipment, facilities, and frequency of analysis. PT samples must be analyzed only once, and with a concurrent standard reference toxicant (SRT) test.

Items 42, 211, 212 (5.4.1.5.i.6 and 5.4.13.1): Management did not conduct an Internal Audit in 2006 to verify that all its operations continue to comply with the requirements of the quality system and the NELAC Standard.

Items 95 & 96 (5.4.3.2.2.c and d): Electronic documents are not suitably marked as obsolete to assure against unintended use.

Item 189 (5.4.12.2.2): Some test datasheets include pre-printed organism counts.

Items 424 and 699 (5.5.6.4.c and D.2.6.a): Records were not maintained on preparation of all SRT's.

Item 520 (5.5.10.4): In the report for the sample from Daly City (collected on August 13, 2008) your laboratory did not document the basis upon which opinions and interpretations were made, or clearly mark them as such.

Item 523 (5.5.10.5): Reports do not include clear identification of results reported by subcontractors.

Item 543 (C.2): A copy of each certification statement is not retained in the personnel records of each employee.

Item 659 (D.2.1.a.1.ii): As part of the initial Demonstration of Capability, the laboratory has not recorded initial control performance for each species and endpoint on control charts.

Item 741 (D.2.8.s): The maximum holding time for first use of renewal samples must be documented.

Item 746 (D.2.8.x): Additional documentation is required to verify that your system of "blocking by known parentage" meets test requirements (EPA Method 1002, Subsection 13.10.2.3).

1. Test datasheets must identify parentage of each neonate.
2. SOPs must require, and test documentation must show, that neonates are obtained from adults having 8 or more young in their 3rd or subsequent brood.

The findings included here were those observed during the on-site assessment. Others may have been noted and exist and their omission from this report does not constitute endorsement by the accrediting authority. ELAP encourages the laboratory to correct any existing deficiencies even if they are not included in this report.

You are to respond to the items of non-compliance cited in this report by submitting a written Corrective Action Report (CAR) along with supporting documentation to demonstrate the implementation of the corrective actions.

Your CAR is to be returned to ELAP to the attention of your assessment team leader on or before the due date in order to complete the OSA aspect of the NELAP accreditation process.

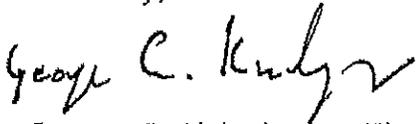
YOUR CAR IS DUE 30 CALENDAR DAYS FROM THE DATE OF RECEIPT OF THIS ASSESSMENT REPORT (NELAC Standard requirement, Section 3.5.6). Your due date is determined by the date of receipt from the certified mail return receipt. Failure to respond in a timely manner will affect the accreditation status of your laboratory.

IMPORTANT NOTICE

ELAP must receive written notification for any changes in OWNERSHIP, LOCATION, KEY PERSONNEL, and MAJOR INSTRUMENTATION within 30 days (Standard Section 4.3.2).

Should you have any questions or require further assistance, please contact Steve Boggs at (916) 449-5616.

Sincerely,



George C. Kulasingam, Ph.D.
Chief

Environmental Laboratory Accreditation Program Branch

Cc: Steven J. Boggs
Staff Environmental Scientist

CERTIFIED MAIL

Attachment B

Example Report



Regina Galicki
City of Sunnyvale/WPCP
P.O. Box 3707
Sunnyvale, CA 94088

January 16, 2009

Dear Regina:

I have enclosed two copies of our report "Toxicity Identification Evaluation (TIE) of City of Sunnyvale WWTP Effluent" for the samples collected December 10-16, 2008. Following the observation of toxicity in the initial routine testing of these effluent samples, a Phase I TIE was performed to characterize the physical/chemical properties of the effluent toxicant(s); this Phase I TIE included the following treatments:

- Baseline (untreated effluent);
- Zeolite-treatment (to remove ammonia);
- Effluent adjusted to pH6.5, pH7.5, and pH8.5 (to identify pH-labile compounds);
- Centrifugation (a necessary step prior to C8SPE treatment); and
- C8SPE treatment (to remove non-polar organic compounds).

Zeolite Treatment

Survival and growth toxicity were both completely removed by the zeolite treatment, suggesting that ammonia was a primary contributor to the observed toxicity.

Graduated pH Adjustments

The changes in toxicity at the graduated pH treatments clearly indicated that the toxicant(s) was pH-labile, as the toxicity was greatly reduced as pH decreased and was greatly increased as pH increased. This pattern of pH-lability is consistent with ammonia being the cause of the observed toxicity.

In combination, the results of the zeolite treatment and graduated pH adjustments provide exceptionally strong evidence that the primary cause of the observed toxicity is ammonia.

C8SPE Treatment

There was a significant reduction in mortalities in the C8SPE-treated effluent relative to the centrifuged effluent, suggesting that organics may have contributed to the observed toxicity.

In conclusion, this TIE indicated that ammonia was the likely primary cause of the observed toxicity, and that non-polar organics may have contributed to the overall toxicity response. It is important that this conclusion be qualified by the fact that the neither the zeolite treatment nor

the graduated pH tests are definitive for ammonia (i.e., a non-polar organic compound that was similarly pH-labile and similarly amenable to removal by zeolite would produce the same results as were observed). However, in combination, the results for these TIE treatments are strongly indicative of ammonia as the primary toxicant.

The results of previous testing by this laboratory to determine the toxicity of ammonia to *Americamysis bahia* in the 7-day short-term chronic test are summarized below. The measured concentrations of un-ionized ammonia (UIA) in the Sunnyvale effluent ranged from 0.31-0.53 mg/L UIA; these concentrations were all near the previously measured EC25 concentration and all were above the previously measured IC25 concentration, although only one sample had a measured UIA concentration that exceeded the EC50 and IC50. Again, these results are suggestive of ammonia as a significant cause of the observed toxicity, with the presence of another contaminant likely causing additional toxicity.

Toxicity of ammonia to <i>Americamysis bahia</i> in the 7-day short-term chronic test.		
Test Endpoint	Point Estimate	Un-ionized Ammonia (mg/L)
Survival	EC25 =	0.41
	EC50 =	0.48
Growth ("biomass value")	IC25 =	0.29
	IC50 =	0.43

If you have any questions regarding this test or the report, or if you would like to discuss our recommendations for any follow-up work or plans for future testing, please feel free to call me at (707) 207-7760.

Sincerely,

R. Scott Ogle, Ph.D.
Principal & Special Projects Director

cc: Kristen Kerr, EOA

This testing was performed under Lab Order 14287. The test results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report, and only relate to the sample tested. This report shall not be reproduced, except in full, without the written consent of Pacific EcoRisk.

Toxicity Identification Evaluation (TIE) of City of Sunnyvale WWTP Effluent

(Samples collected December 10-16, 2008)

Performed for:

City of Sunnyvale/WPCP
P.O. Box 3707
Sunnyvale, CA 94088

Prepared By:

Pacific EcoRisk, Inc.
2250 Cordelia Rd.
Fairfield, CA 94534

January 2009



PACIFIC ECORISK
ENVIRONMENTAL CONSULTING & TESTING

Toxicity Identification Evaluation (TIE) of City of Sunnyvale WWTP Effluent

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January 2009

Toxicity Identification Evaluation (TIE) of City of Sunnyvale WWTP Effluent

(Samples collected December 10-16, 2008)

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- Appendix A Test Data and Summary of Statistical Analyses TIE Testing of the Baseline (Untreated) Sunnyvale Effluent
- Appendix B Test Data and Summary of Statistical Analyses TIE Testing of the Zeolite-Treated Sunnyvale Effluent
- Appendix C Test Data and Summary of Statistical Analyses TIE Testing of the Graduated pH-Adjusted Sunnyvale Effluent – pH6.5
- Appendix D Test Data and Summary of Statistical Analyses TIE Testing of the Graduated pH-Adjusted Sunnyvale Effluent – pH7.5
- Appendix E Test Data and Summary of Statistical Analyses TIE Testing of the Graduated pH-Adjusted Sunnyvale Effluent – pH8.5
- Appendix F Test Data and Summary of Statistical Analyses TIE Testing of the Centrifuged Sunnyvale Effluent
- Appendix G Test Data and Summary of Statistical Analyses TIE Testing of the C8SPE-Treated Sunnyvale Effluent

1. INTRODUCTION

In compliance with their NPDES permit, the City of Sunnyvale Wastewater Treatment Plant (Sunnyvale WWTP) has contracted Pacific EcoRisk to perform chronic toxicity testing of the Sunnyvale WWTP effluent. Currently, this chronic toxicity evaluation consists of the US EPA 7-day survival and growth test with the mysid shrimp *Americanysis bahia*.

Following the observation of lethal and sub-lethal toxicity in the routine testing of Sunnyvale effluent samples collected from December 10-16, 2008, a Phase I TIE was performed to characterize the physical/chemical properties of the effluent toxicant(s) using effluent manipulations and accompanying toxicity tests; as per guidance provided by Sunnyvale WWTP consultants (EOA, Inc), this Phase I TIE included the following treatments:

- Baseline (untreated effluent);
- Zeolite-treatment (to remove ammonia);
- Graduated pH-adjustments to pH6.5, pH7.5, and pH8.5 (to identify pH-labile compounds);
- Centrifugation (a necessary step prior to C8SPE treatment); and
- C8SPE treatment (to remove non-polar organic compounds).

This report describes the results of this testing.

2. TOXICITY IDENTIFICATION EVALUATION TEST PROCEDURES

The methods used in conducting the toxicity testing and related TIE followed the guidelines established by the following manuals:

- Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms (Third Edition) (EPA-821-R-02-014).
- Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures (Second Edition). EPA-600/6-91/003.
- Marine Toxicity Identification Evaluation (TIE): Phase I Guidance Document. EPA/600/R-96/054.

2.1 Sample Receipt and Handling

On December 10-16, 2008, daily samples of the Sunnyvale WWTP effluent were collected into appropriately-cleaned sample cubitainers. The samples were transported, on ice and under chain-of-custody, to the PER testing laboratory in Fairfield. Upon receipt at the testing laboratory, aliquots of each sample were collected for analysis of initial water quality characteristics (Table 1), with the remainder of the samples being stored at $\leq 6^{\circ}\text{C}$ in the dark except when being used to prepare test solutions for the initial compliance chronic toxicity test and the current TIE testing. used for the set-up and initiation of the TIE tests. The chain-of-custody record for the collection and transport of the samples is presented in Appendix A.

Table 1. Initial water quality characteristics of the Sunnyvale WWTP final effluent samples.

Sample Receipt Date	Sample ID	Temp (°C)	pH	D.O. (mg/L)	Conductivity (μ S/cm)	Total Ammonia (mg/L N)	Un-Ionized Ammonia (mg/L N)	Sulfite (mg/L)
12/10/08	L7940	5.7	7.62	11.9	1940	18.7	0.389	1.0
12/11/08	L7941	2.4	7.65	11.3	1942	16.8	0.374	1.0
12/12/08	L7942	5.8	7.66	10.8	1897	18.2	0.415	0.5
12/14/08	L7953	1.5	7.52	11.4	1923	18.8	0.312	1.0
12/14/08	L7954	3.4	7.57	11.2	1936	20.2	0.376	0.5
12/16/08	L7955	1.8	7.85	11.2	1919	15.3	0.533	nm
12/16/08	L7956	3.8	7.73	11.4	1875	14.5	0.387	1.5

Note – All calculations of un-ionized ammonia were normalized to the nominal test temperature of 26°C.
nm – not measured.

2.2 Test Organisms

The *Americamysis bahia* used in this TIE were obtained from the Aquatic Biosystems (Ft. Collins, Co.). Upon receipt at the lab, the mysids were transferred into aerated tanks containing saltwater at 25 ppt, and were fed brine shrimp nauplii during the pre-test holding period.

2.3 Survival and Growth Toxicity Testing with *Americamysis bahia*

The short-term chronic *Americamysis bahia* test consists of exposing the organisms to a series of effluent dilutions for 7 days, after which effects on survival and growth are evaluated. The specific procedures used in this test are described below and apply to the Baseline treatment of the TIE; the TIE treated effluent fractions (and accompanying treatment blanks) were similarly tested.

The Lab Control/dilution water for this test was prepared by salting up reverse-osmosis, de-ionized water to a salinity of 25 ppt using a commercial artificial sea salt (Crystal Sea Salt®- bioassay grade). Each day, an aliquot of the final effluent sample was similarly adjusted to a salinity of 25 ppt using the same artificial sea salt. The salinity-adjusted Lab Control/dilution water and effluent samples were used to prepare daily test solutions at test treatment concentrations of 25, 50, and 100% effluent. “New” water quality characteristics (pH, D.O., and salinity) were measured on these test solutions prior to use in the test.

There were 3 replicates at each test treatment, each replicate consisting of 200 mL of test solution in a 400-mL glass beaker. The test was initiated by randomly allocating five 7-day old mysids into each replicate beaker. The beakers were randomly positioned in a temperature-

controlled room at 26°C (with temperature being monitored daily) under a 16L:8D photoperiod. The mysids were fed freshly-hatched brine shrimp nauplii twice daily.

Each day of the test, fresh test solutions were prepared and characterized as before. The test replicate beakers were examined, with any dead animals, uneaten food, wastes, and other detritus being removed. The number of live mysids in each replicate was determined and ~80% of the test media in each beaker was carefully poured out and replaced with fresh test solution. "Old" water quality characteristics (pH, D.O., and salinity) were measured on the old test water that had been discarded from one randomly-selected replicate at each treatment.

After 7 days exposure, the test was terminated and the number of live mysids in each replicate beaker was recorded. The mysids from each replicate were then carefully euthanized in methanol, rinsed in de-ionized water, and transferred to a pre-dried and pre-tared weighing pan. The mysids were then dried at 100°C for >24 hrs and re-weighed to determine the total weight of mysids in each replicate; the total weight was divided by the initial number of mysids per replicate (n=5) to determine the "biomass value". The resulting survival and growth (biomass value) data were analyzed to evaluate any impairment(s) caused by the effluent; all statistical analyses were performed using CETIS[®] statistical software (Tidepool Scientific, McKinleyville, CA).

2.3.1 Phase I TIE Procedures

The goal of the Phase I TIE is to characterize the physical/chemical properties of the compound(s) responsible for the effluent toxicity. This is achieved by performing physical and chemical manipulations (or treatments) on the effluent sample. The **Baseline** toxicity test is performed on untreated effluent concurrently with the TIE fractionation tests (the basic Baseline treatment testing was described above in Section 3.1). Changes in effluent toxicity that result from the TIE treatments help characterize the physical-chemical nature of the compound(s) responsible for the observed toxicity, which in turn can be used to identify the compound(s) responsible for the toxicity.

2.3.1.1 TIE Fractionation Method Blanks - As part of the TIE process, a method blank is prepared for each fractionation treatment and then tested to determine whether any of the fractionation procedures contribute any artifactual toxicity to the manipulated sample. Aliquots of Control water were subjected to each of the fractionation test treatments (discussed below) to prepare the method blanks.

2.3.1.2 Zeolite Treatment - Ammonia removal via zeolite treatment is performed to determine if there is any ammonia related toxicity present in the effluent. Zeolite, obtained from a commercial supplier, was washed with reverse-osmosis, de-ionized water to remove fine particles prior to treatment of test solutions. An aliquot of the effluent sample (and Control water for the accompanying method blank) were treated by placing cleaned zeolite into a separatory funnel and passing the sample over the zeolite. Removal of ammonia (to <0.1 mg/L) was confirmed by

analysis of the treated effluent (Table 2). Although zeolite is very effective at removing ammonia from aqueous matrices, it should be noted that it can also non-selectively remove other compounds from the matrix. The zeolite-treated effluent toxicity tests were performed as described in section 2.3 for the Baseline test.

Sample Collection Date	Sample ID	Total Ammonia (mg/L N)	
		Pre-Zeolite ^a	Post-Zeolite
12/10/08	L7940	18.7	<1.0
12/11/08	L7941	16.8	<1.0
12/12/08	L7942	18.2	<1.0
12/13/08	L7953	18.8	<1.0
12/14/08	L7954	20.2	<1.0
12/15/08	L7955	15.3	<1.0
12/16/08	L7956	14.5	<1.0

a – The total ammonia concentrations were measured at the time of sample log-in.

2.3.1.3 Graduated pH Adjustments - The graduated pH test is performed to identify effluent toxicity is caused by compounds whose toxicity are pH dependent. For example, ammonia is generally much less toxic in its ionized form (NH_4^+ , the dominant form at lower pH levels) relative to its un-ionized form (NH_3 , the dominant form at higher pH levels). In addition, pH differences can also affect metal toxicity through changes in solubility and speciation. It should be noted that characterization of contaminant pH-lability is made by comparison on the changes in toxicity at the graduated pH treatments relative to each other.

Aliquots of each effluent (and Control water for the accompanying method blank) were adjusted to pH6.5, pH7.5, and pH8.5 by drop-wise addition of reagent grade HCl and/or NaOH to the test sample until the pH reading is ± 0.05 pH units of the target pH (a log was kept recording the amount of acid and base added to each treatment). The pH-adjusted effluents and method blanks were then tested to determine if changes in effluent toxicity occurred as a result of the increase or decrease in pH relative to initial conditions. The graduated pH toxicity tests were performed as described in section 2.3 for the Baseline test. Note – each test solution was pH-adjusted prior to the usage in the test, and the test solution pHs were allowed to drift naturally during each 24-hr exposure period.

2.3.1.4 Centrifugation Treatment - Centrifugation of the effluent sample is a precursor to the C8SPE treatment, and also can be used to characterize the removal of toxicants associated with suspended particulates. Aliquots of the effluent samples (and Control water for the accompanying method blank) were centrifuged at 4500 g for 30 minutes. Approximately 50% of the centrifuged effluent and method blank samples were set aside for subsequent use in the

C8SPE treatment. The remaining centrifuged effluents and method blank were then tested to determine if changes in effluent toxicity had occurred as a result of centrifugation. The toxicity tests were performed as described in section 2.3 for the Baseline test.

2.3.1.5 C8 Solid Phase Extraction (SPE) - The C8SPE test is used to identify effluent toxicity that is due to compounds that are removed or sorbed onto chromatographic resin specific for non-polar organic compounds. By passing a sample through a C8SPE column, non-polar organics (and some relatively non-polar metal chelates) are removed from the sample. In order to facilitate movement of the effluent through the C8SPE column, the effluent sample was centrifuged prior to the C8SPE treatment; as a result, this treatment determines the combined effects of centrifugation *and* C8SPE extraction, and changes in toxicity resulting from the C8SPE treatment should be evaluated relative to the centrifuged effluent.

Aliquots of the centrifuged effluents (and Control water for the accompanying method blank) were passed over C8SPE columns. For each sample, the first 50 mL of solution that passed through the column were discarded, and the remaining C8SPE-treated effluent sample was collected and tested for toxicity (the method blank was similarly prepared in a similar fashion). The C8SPE toxicity tests were performed as described in section 2.3 for the Baseline test.

3. RESULTS

3.1 Phase I TIE Testing with *Americamysis bahia*

Evaluation of the effects of the various TIE fractionation treatments are made, in part, by evaluating the changes in effluent toxicity relative to the Baseline treatment. However, it should be noted that there was a relatively small reduction in survival in the 100% untreated effluent (Table 4). At first glance, this appears to be slightly anomalous, as the magnitude of mortality response was greater in most all of the TIE treatments. However, it is important to keep in mind that the potential contaminants in the effluent may be pH-labile, and that test solutions pH differences between the test treatments may have affected the expression of toxicity at the Baseline treatment. The mean test solution pHs for the various 100% effluent test treatments of this TIE are summarized in Table 3 below (where the mean daily pH was calculated as the mean of the “new” + “old” pH measurements for each 24 hr test period, and the overall mean pH was calculated as the mean of the 7 daily mean pHs):

TIE Treatment	Overall Mean pH of Test Solutions
Baseline	7.97
Zeolite-treated Effluent	8.20
pH6.5-adjusted Effluent	7.17
pH7.5-adjusted Effluent	7.79
pH8.5-adjusted Effluent	8.37
Centrifuged Effluent	8.10
C8SPE-treated Effluent	8.17

Of particular relevance is the difference in test response at the Baseline vs. the centrifuged effluent. As the data above indicate, the Baseline test solution pH was less than the centrifuged effluent (note –although this difference seems small, it is important to remember that the relative proportion of ammonia vs. ammonium ion increases dramatically as pH increases above pH8.0). If ammonia is a major source of the toxicity in the Sunnyvale effluent, then the observed reduction in toxicity in the Baseline treatments is to be expected. As a result, efficacy of the TIE treatments was considered in comparison to the overall (holistic) toxicity response.

The results for the TIE toxicity testing of the Sunnyvale effluent samples are summarized in Tables 4, 5 and 6. The test data for these tests are presented in Appendices A-G.

Zeolite Treatment

Survival and growth toxicity were both completely removed by the zeolite treatment, suggesting that ammonia was a primary contributor to the observed toxicity. This elimination is all the more dramatic when the high test solution pH is considered (i.e., based on pH, the effluent would be

expected to be more toxic [see results of graduated pH tests below], yet the toxicity is all removed).

Graduated pH Adjustments

The changes in toxicity at the graduated pH treatments clearly indicated that the toxicant(s) was pH-labile, as the toxicity was greatly reduced as pH decreased and was greatly increased as pH increased. This pattern of pH-lability is consistent with ammonia being the cause of the observed toxicity.

In combination, the results of the zeolite treatment and graduated pH adjustments provide exceptionally strong evidence that the primary cause of the observed toxicity is ammonia.

C8SPE Treatment

There was a significant reduction in mortalities in the C8SPE-treated effluent relative to the centrifuged effluent, despite the fact that the C8SPE-treated effluent pH was greater than the centrifuged effluent pH. These results suggest that non-polar organics may have contributed to the observed toxicity. These results are also consistent with polar organics as a cause of toxicity with partial removal of the non-polar fraction by the C8SPE treatment. It should be noted that the absence of removal of growth toxicity (as mean dry weight) by the graduated pH tests is suggestive that a non-ammonia toxicant is contributing to the observed toxicity.

TIE Treatment	Effluent Concentration				Evaluation of Toxicity
	Control	25%	50%	100%	
Baseline	93.3	100	93.3	80	-
Centrifugation	86.7	100	86.7	13.3	increased mortality (vs. Baseline) due to higher test solution pH
C8SPE	100	100	100	46.7	significant removal of toxicity relative to centrifuged effluent
Zeolite	100	93.3	100	93.3	complete removal of toxicity
pH6.5	93.3	86.7	100	86.7	toxicity decreased as pH decreased
pH7.5	93.3	93.3	93.3	60	-
pH8.5	100	100	100	6.7	toxicity increased as pH increased

TIE Treatment	Effluent Concentration				Evaluation of Toxicity
	Control	25%	50%	100%	
Baseline	0.18	0.22	0.15	0.10	-
Centrifugation	0.19	0.20	0.15	0.02	increased toxicity (vs. Baseline) due to higher test solution pH
C8SPE	0.19	0.18	0.22	0.07	significant removal of toxicity relative to centrifuged effluent
Zeolite	0.17	0.21	0.24	0.22	complete removal of toxicity
pH6.5	0.18	0.22	0.19	0.13	toxicity decreased as pH decreased
pH7.5	0.21	0.18	0.16	0.09	-
pH8.5	0.24	0.20	0.19	0.01	toxicity increased as pH increased

TIE Treatment	Control	25% effluent	50% effluent	100% effluent
Baseline	0.20	0.22	0.16	0.13
Centrifugation	0.23	0.20	0.19	0.16
Centrifugation + C8SPE	0.19	0.18	0.22	0.13
Zeolite	0.17	0.22	0.24	0.24
pH6.5	0.20	0.25	0.19	0.14
pH7.5	0.23	0.19	0.18	0.16
pH8.5	0.24	0.20	0.19	0.15

4. TIE SUMMARY AND CONCLUSIONS

Zeolite Treatment

Survival and growth toxicity were both completely removed by the zeolite treatment, suggesting that ammonia was a primary contributor to the observed toxicity.

Graduated pH Adjustments

The changes in toxicity at the graduated pH treatments clearly indicated that the toxicant(s) was pH-labile, as the toxicity was greatly reduced as pH decreased and was greatly increased as pH increased. This pattern of pH-lability is consistent with ammonia being the cause of the observed toxicity.

In combination, the results of the zeolite treatment and graduated pH adjustments provide exceptionally strong evidence that the primary cause of the observed toxicity is ammonia.

C8SPE Treatment

There was a significant reduction in mortalities in the C8SPE-treated effluent relative to the centrifuged effluent, suggesting that non-polar organics may have contributed to the observed toxicity.

In conclusion, this TIE indicated that ammonia was the likely primary cause of the observed toxicity, and that non-polar organics may have contributed to the overall toxicity response. It is important that this conclusion be qualified by the fact that neither the zeolite treatment nor the graduated pH tests are definitive for ammonia (i.e., a non-polar organic compound that was similarly pH-labile and similarly amenable to removal by zeolite would produce the same results as were observed). However, in combination, the results for these TIE treatments are strongly indicative of ammonia.

The results of previous testing by this laboratory to determine the toxicity of ammonia to *Americamysis bahia* in the 7-day short-term chronic test are summarized in Table 7, and the concentrations of un-ionized ammonia (UIA) measured in the Sunnyvale effluent samples at the time of sample log-in are summarized in Table 8. The measured concentrations of UIA in the Sunnyvale effluent are near the previously measured EC25 concentrations and all were above the previously measured IC25 concentration, although only one sample had a measured UIA concentration that exceeded the EC50 and IC50. Again, these results are suggestive of ammonia as a significant cause of the observed toxicity, with the presence of another contaminant likely causing additional toxicity.

Test Endpoint	Point Estimate	Un-ionized Ammonia (mg/L)
Survival	EC25 =	0.41
	EC50 =	0.48
Growth ("biomass value")	IC25 =	0.29
	IC50 =	0.43

Sample Collection Date	Un-Ionized Ammonia (mg/L)
12/10/08	0.389
12/11/08	0.374
12/12/08	0.415
12/13/08	0.312
12/14/08	0.376
12/15/08	0.533
12/16/08	0.387

Attachment C
Toxicity Test Unit Costs

ATTACHMENT A**PROPOSER RESPONSE PAGE FOR CHRONIC TOXICITY LABORATORY SERVICES**

The undersigned proposer hereby offers to complete the specified services for the following prince(s) in strict compliance with the specifications, terms and conditions set forth in this Request for Proposals.

Routine Compliance Monitoring Chronic Toxicity Testing Costs

Test Species	Scientific name	Effluent Test	Reference Toxicant Test	Total ^a
shrimp	<i>Americamysis bahia</i>	\$1500	\$1200	\$2525 ^a
giant kelp	<i>Macrocystis pyrifera</i>	\$1500	\$1200	\$2600
topsmelt	<i>Atherinops affinis</i>	\$1500	\$1200	\$2600
Alga	<i>Skeletonema costatum</i> <i>Thalassiosira pseudonana</i>	\$1300 ea.	\$1040	\$2300
Red alga	<i>Champia parvula</i>	n/a	n/a	n/a
Abalone	<i>(Haliotis rufescens)</i>	\$1400	\$1120	\$2500
Oyster	<i>Crassostrea gigas)</i>	\$1400 ea.	\$1120	\$2500
Mussel	<i>(Mytilus edulis)</i>			
Echinoderms	<i>Strongylocentrotus purpuratus,</i>	\$1400	\$1120	\$2500
Urchins	<i>S.franciscanus</i>			
Sand dollar	<i>Dendraster excentricus</i>			
Shrimp	<i>(Holmesimysis costata)</i>	\$1500	\$1200	\$2600
Silversides	<i>(Menidia beryllina)</i>	\$1500	\$1200	\$2600
Fathead minnow	<i>(Pimephales promelas)</i>	\$1500	\$1200	\$2600
Water flea	<i>(Ceriodaphnia dubia)</i>	\$1400	\$1120	\$2500
Alga	<i>(Selenastrum capricornutum)</i>	\$1300	\$1040	\$2300

a - Costs shall include sample pick-up and reflects continued client discount.

TIE Tests**Unit Pricing**

Tests	100% Effluent Only	Dilution Series
Baseline	\$600	\$900
Filtration/Centrifugation	\$775	\$1165
C18SPE treatment	\$950	\$975
Zeolite treatment	\$775	\$1165
Graduated pH testing at 3 different pH units	\$1975 (for all 3)	\$2965
Chelex treatment	\$950	\$975
Acute toxicity test (one day's sample)	\$450	\$675
Piperonyl butoxide (PBO) addition	\$775	\$1165
Complete Phase I TIE (pH initial only)	\$7825	\$11,750
Complete Phase I TIE (pH3, pH initial, pH11)	\$16,000	\$24,000

Costs shall include sample pick-up and report generation

Pacific EcoRisk

2250 Cordelia Rd.
 Fairfield, CA 94534
 PH (707)207-7760
 FAX (707)207-7916
 TAX ID #: 68-0482693

Quote

Date: 6/3/09
Terms Net 30
1.5% discount -10 days

Prepared For:

City of Sunnyvale WPCP
 P.O. Box 3707
 Sunnyvale, CA 94088

Contact

Contact: Regina Galicki
 Phone: (408)730-7275
 Fax:

Service	Quantity	Unit	Unit Fee	Net Fee
NPDES Effluent Testing - Follow-Up TIE Testing				
Chronic Toxicity Phase I TIE				
Baseline (Control, 100% - 4 reps) - <i>not needed if concurrent TIE</i>	1	each	\$600.00	\$600.00
Aeration	1	each	\$600.00	\$600.00
Aeration treatment	7	each	\$25.00	\$175.00
Centrifugation (Control, 100% - 4 reps)	1	each	\$600.00	\$600.00
Filtration/Centrifugation Treatment	7	each	\$25.00	\$175.00
C18SPE (Blank, 100% - 3 reps)	1	each	\$600.00	\$600.00
C18SPE Treatment - pHambient	7	each	\$50.00	\$350.00
Graduated pH at 6.5, 7.5, and 8.5 (Control, 100% - 4 reps)	3	each	\$600.00	\$1,800.00
pH adjustment	7	each	\$25.00	\$175.00
EDTA	2	each	\$600.00	\$1,200.00
EDTA Treatment	7	each	\$25.00	\$175.00
STS	2	each	\$600.00	\$1,200.00
STS Treatment	7	each	\$25.00	\$175.00
Chelex (Control, 100% - 4 reps)	1	each	\$600.00	\$600.00
Chelex treatment	7	each	\$50.00	\$350.00
Methanol Eluate	1	each	\$600.00	\$600.00
Methanol Eluate Treatment	7	each	\$25.00	\$175.00
Zeolite	1	each	\$600.00	\$600.00
Zeolite Treatment	7	each	\$25.00	\$175.00
Sub-total				\$10,325.00
minus "Full TIE" discount				-\$2,500.00
			Total	\$7,825.00

Notes:

Please note that The TIE treatments are performed 7 times each, once for each daily sample.
 Please note that chelex and zeolite are not "standard" EPA TIE treatments, but are highly recommended

Net 30. All prices quoted are confidential and solely for use of client.

