

1 AGREEMENT

2 **30290**

3 THIS AGREEMENT is made and entered, in duplicate, as of September 19,
4 2007 for reference purposes only, pursuant to a minute order adopted by the City Council
5 of the City of Long Beach at its meeting on September 18, 2007, by and between
6 KINETIC LABORATORIES, INC., a California corporation, with a place of business at
7 PO Box 1040, Santa Cruz, California 95601 ("Consultant"), and the CITY OF LONG
8 BEACH, a municipal corporation ("City").

9 WHEREAS, City requires specialized services requiring unique skills to be
10 performed in connection with water quality testing and bacterial monitoring at selected
11 coastal sites in order to address the level and sources of fecal contamination in
12 recreation areas ("Project"); and

13 WHEREAS, City has selected Consultant in accordance with City's
14 administrative procedures and City has determined that Consultant and its employees
15 are qualified, licensed, if so required, and experienced in performing these specialized
16 services; and

17 WHEREAS, City desires to have Consultant perform these specialized
18 services, and Consultant is willing and able to do so on the terms and conditions in this
19 Agreement;

20 NOW, THEREFORE, in consideration of the mutual terms, covenants, and
21 conditions in this Agreement, the parties agree as follows:

22 1. SCOPE OF WORK OR SERVICES.

23 A. Consultant shall furnish specialized services more particularly
24 described in Exhibit "A", attached to this Agreement and incorporated by this
25 reference, in accordance with the standards of the profession, and City shall pay
26 for these services in the manner described below, not to exceed \$362,392, at the
27 rates or charges shown in Exhibit "A".

28 B. Consultant may select the time and place of performance for

OFFICE OF THE CITY ATTORNEY
ROBERT E. SHANNON, City Attorney
333 West Ocean Boulevard, 11th Floor
Long Beach, CA 90802-4664

1 these services; provided, however, that access to City documents, records and the
2 like, if needed by Consultant, shall be available only during City's normal business
3 hours and provided that milestones for performance, if any, are met.

4 C. Consultant has requested to receive regular payments. City
5 shall pay Consultant in due course of payments following receipt from Consultant
6 and approval by City of invoices showing the services or task performed, the time
7 expended (if billing is hourly), and the name of the Project. Consultant shall certify
8 on the invoices that Consultant has performed the services in full conformance
9 with this Agreement and is entitled to receive payment. Each invoice shall be
10 accompanied by a progress report indicating the progress to date of services
11 performed and covered by the invoice, including a brief statement of any Project
12 problems and potential causes of delay in performance, and listing those services
13 that are projected for performance by Consultant during the next invoice cycle.
14 Where billing is done and payment is made on an hourly basis, the parties
15 acknowledge that this arrangement is either customary practice for Consultant's
16 profession, industry or business, or is necessary to satisfy audit and legal
17 requirements which may arise due to the fact that City is a municipality.

18 D. Consultant represents that Consultant has obtained all
19 necessary information on conditions and circumstances that may affect its
20 performance and has conducted site visits, if necessary.

21 2. TERM. The term of this Agreement shall commence at midnight on
22 September 1, 2007, and shall terminate at 11:59 p.m. on August 31, 2008, unless sooner
23 terminated as provided in this Agreement, or unless the services or the Project is
24 completed sooner.

25 3. COORDINATION AND ORGANIZATION.

26 A. Consultant shall coordinate its performance with City's
27 representative, if any, named in Exhibit "B", attached to this Agreement and
28 incorporated by this reference. Consultant shall advise and inform City's

1 representative of the work in progress on the Project in sufficient detail so as to
2 assist City's representative in making presentations and in holding meetings on
3 the Project. City shall furnish to Consultant information or materials, if any,
4 described in Exhibit "C", attached to this Agreement and incorporated by this
5 reference, and shall perform any other tasks described in the Exhibit.

6 B. The parties acknowledge that a substantial inducement to City
7 for entering this Agreement was and is the reputation and skill of Consultant's key
8 employee Marty Stevenson. City shall have the right to approve any person
9 proposed by Consultant to replace that key employee.

10 4. INDEPENDENT CONTRACTOR. In performing its services,
11 Consultant is and shall act as an independent contractor and not an employee,
12 representative or agent of City. Consultant shall have control of Consultant's work and
13 the manner in which it is performed. Consultant shall be free to contract for similar
14 services to be performed for others during this Agreement; provided, however, that
15 Consultant acts in accordance with Section 9 and Section 11 of this Agreement.
16 Consultant acknowledges and agrees that (a) City will not withhold taxes of any kind from
17 Consultant's compensation; (b) City will not secure workers' compensation or pay
18 unemployment insurance to, for or on Consultant's behalf; and (c) City will not provide
19 and Consultant is not entitled to any of the usual and customary rights, benefits or
20 privileges of City employees. Consultant expressly warrants that neither Consultant nor
21 any of Consultant's employees or agents shall represent themselves to be employees or
22 agents of City.

23 5. INSURANCE.

24 A. As a condition precedent to the effectiveness of this Agreement,
25 Consultant shall procure and maintain, at Consultant's expense for the duration of this
26 Agreement, from insurance companies that are admitted to write insurance in California
27 and have ratings of or equivalent to A:V by A.M. Best Company or from authorized non-
28 admitted insurance companies subject to Section 1763 of the California Insurance Code

1 and that have ratings of or equivalent to A:VIII by A.M. Best Company, the following
2 insurance:

3 (a) Commercial general liability insurance (equivalent in scope to
4 ISO form CG 00 01 11 85 or CG 00 01 10 93) in an amount not less than
5 \$1,000,000 per each occurrence and \$2,000,000 general aggregate. This
6 coverage shall include but not be limited to broad form contractual liability,
7 cross liability, independent contractors liability, and products and
8 completed operations liability. City, its boards and commissions, and their
9 officials, employees and agents shall be named as additional insureds by
10 endorsement (on City's endorsement form or on an endorsement
11 equivalent in scope to ISO form CG 20 10 11 85 or CG 20 26 11 85), and
12 this insurance shall contain no special limitations on the scope of
13 protection given to City, its boards and commissions, and their officials,
14 employees and agents. This policy shall be endorsed to state that the
15 insurer waives its right of subrogation against City, its boards and
16 commissions, and their officials, employees and agents.

17 (b) Workers' Compensation insurance as required by the California
18 Labor Code and employer's liability insurance in an amount not less than
19 \$1,000,000. This policy shall be endorsed to state that the insurer waives
20 its right of subrogation against City, its boards and commissions, and their
21 officials, employees and agents.

22 (c) Professional liability or errors and omissions insurance in an
23 amount not less than \$1,000,000 per claim.

24 (d) Commercial automobile liability insurance (equivalent in scope
25 to ISO form CA 00 01 06 92), covering Auto Symbol 1 (Any Auto) in an
26 amount not less than \$500,000 combined single limit per accident.

27 B. Any self-insurance program, self-insured retention, or deductible must
28 be separately approved in writing by City's Risk Manager or designee and shall protect

1 City, its officials, employees and agents in the same manner and to the same extent as
2 they would have been protected had the policy or policies not contained retention or
3 deductible provisions.

4 C. Each insurance policy shall be endorsed to state that coverage shall not
5 be reduced, non-renewed or canceled except after thirty (30) days prior written notice to
6 City, shall be primary and not contributing to any other insurance or self-insurance
7 maintained by City, and shall be endorsed to state that coverage maintained by City shall
8 be excess to and shall not contribute to insurance or self-insurance maintained by
9 Consultant. Consultant shall notify City in writing within five (5) days after any insurance
10 has been voided by the insurer or cancelled by the insured.

11 D. If this coverage is written on a "claims made" basis, it must provide for
12 an extended reporting period of not less than one hundred eighty (180) days,
13 commencing on the date this Agreement expires or is terminated, unless Consultant
14 guarantees that Consultant will provide to City evidence of uninterrupted, continuing
15 coverage for a period of not less than three (3) years, commencing on the date this
16 Agreement expires or is terminated.

17 E. Consultant shall require that all subconsultants or contractors that
18 Consultant uses in the performance of these services maintain insurance in compliance
19 with this Section unless otherwise agreed in writing by City's Risk Manager or designee.

20 F. Prior to the start of performance, Consultant shall deliver to City
21 certificates of insurance and the endorsements for approval as to sufficiency and form. In
22 addition, Consultant shall, within thirty (30) days prior to expiration of the insurance,
23 furnish to City certificates of insurance and endorsements evidencing renewal of the
24 insurance. City reserves the right to require complete certified copies of all policies of
25 Consultant and Consultant's subconsultants and contractors, at any time. Consultant
26 shall make available to City's Risk Manager or designee all books, records and other
27 information relating to this insurance, during normal business hours.

28

1 G. Any modification or waiver of these insurance requirements shall only
2 be made with the approval of City's Risk Manager or designee. Not more frequently than
3 once a year, City's Risk Manager or designee may require that Consultant, Consultant's
4 subconsultants and contractors change the amount, scope or types of coverages
5 required in this Section if, in his or her sole opinion, the amount, scope or types of
6 coverages are not adequate.

7 H. The procuring or existence of insurance shall not be construed or
8 deemed as a limitation on liability relating to Consultant's performance or as full
9 performance of or compliance with the indemnification provisions of this Agreement.

10 6. ASSIGNMENT AND SUBCONTRACTING. This Agreement
11 contemplates the personal services of Consultant and Consultant's employees, and the
12 parties acknowledge that a substantial inducement to City for entering this Agreement
13 was and is the professional reputation and competence of Consultant and Consultant's
14 employees. Consultant shall not assign its rights or delegate its duties under this
15 Agreement, or any interest in this Agreement, or any portion of it, without the prior
16 approval of City, except that Consultant may with the prior approval of the City Manager
17 of City, assign any moneys due or to become due Consultant under this Agreement. Any
18 attempted assignment or delegation shall be void, and any assignee or delegate shall
19 acquire no right or interest by reason of an attempted assignment or delegation.
20 Furthermore, Consultant shall not subcontract any portion of its performance without the
21 prior approval of the City Manager or designee, or substitute an approved subconsultant
22 or contractor without approval prior to the substitution. Nothing stated in this Section
23 shall prevent Consultant from employing as many employees as Consultant deems
24 necessary for performance of this Agreement.

25 7. CONFLICT OF INTEREST. Consultant, by executing this
26 Agreement, certifies that, at the time Consultant executes this Agreement and for its
27 duration, Consultant does not and will not perform services for any other client which
28 would create a conflict, whether monetary or otherwise, as between the interests of City

1 and the interests of that other client. And, Consultant shall obtain similar certifications
2 from Consultant's employees, subconsultants and contractors.

3 8. MATERIALS. Consultant shall furnish all labor and supervision,
4 supplies, materials, tools, machinery, equipment, appliances, transportation and services
5 necessary to or used in the performance of Consultant's obligations under this
6 Agreement, except as stated in Exhibit "C".

7 9. OWNERSHIP OF DATA. All materials, information and data
8 prepared, developed or assembled by Consultant or furnished to Consultant in
9 connection with this Agreement, including but not limited to documents, estimates,
10 calculations, studies, maps, graphs, charts, computer disks, computer source
11 documentation, samples, models, reports, summaries, drawings, designs, notes, plans,
12 information, material and memorandum ("Data") shall be the exclusive property of City.
13 Data shall be given to City, and City shall have the unrestricted right to use and disclose
14 the Data in any manner and for any purpose without payment of further compensation to
15 Consultant. Copies of Data may be retained by Consultant but Consultant warrants that
16 Data shall not be made available to any person or entity for use without the prior approval
17 of City. This warranty shall survive termination of this Agreement for five (5) years.

18 10. TERMINATION. Either party shall have the right to terminate this
19 Agreement for any reason or no reason at any time by giving fifteen (15) calendar days
20 prior notice to the other party. In the event of termination under this Section, City shall
21 pay Consultant for services satisfactorily performed and costs incurred up to the effective
22 date of termination for which Consultant has not been previously paid. The procedures
23 for payment in Section 1.B. with regard to invoices shall apply. On the effective date of
24 termination, Consultant shall deliver to City all Data developed or accumulated in the
25 performance of this Agreement, whether in draft or final form, or in process. And,
26 Consultant acknowledges and agrees that City's obligation to make final payment is
27 conditioned on Consultant's delivery of the Data to City.

28 11. CONFIDENTIALITY. Consultant shall keep all Data confidential and

1 shall not disclose the Data or use the Data directly or indirectly, other than in the course
2 of performing its services, during the term of this Agreement and for five (5) years
3 following expiration or termination of this Agreement. In addition, Consultant shall keep
4 confidential all information, whether written, oral or visual, obtained by any means
5 whatsoever in the course of performing its services for the same period of time.
6 Consultant shall not disclose any or all of the Data to any third party, or use it for
7 Consultant's own benefit or the benefit of others except for the purpose of this
8 Agreement.

9 12. BREACH OF CONFIDENTIALITY. Consultant shall not be liable for
10 a breach of confidentiality with respect to Data that: (a) Consultant demonstrates
11 Consultant knew prior to the time City disclosed it; or (b) is or becomes publicly available
12 without breach of this Agreement by Consultant; or (c) a third party who has a right to
13 disclose does so to Consultant without restrictions on further disclosure; or (d) must be
14 disclosed pursuant to subpoena or court order.

15 13. ADDITIONAL COSTS AND REDESIGN.

16 A. Any costs incurred by City due to Consultant's failure to meet
17 the standards required by the scope of work or Consultant's failure to perform fully
18 the tasks described in the scope of work which, in either case, causes City to
19 request that Consultant perform again all or part of the Scope of Work shall be at
20 the sole cost of Consultant and City shall not pay any additional compensation to
21 Consultant for its re-performance.

22 B. If the Project involves construction and the scope of work
23 requires Consultant to prepare plans and specifications with an estimate of the
24 cost of construction, then Consultant may be required to modify the plans and
25 specifications, any construction documents relating to the plans and specifications,
26 and Consultant's estimate, at no cost to City, when the lowest bid for construction
27 received by City exceeds by more than ten percent (10%) Consultant's estimate.

28 This modification shall be submitted in a timely fashion to allow City to receive new

1 bids within four (4) months after the date on which the original plans and
2 specifications were submitted by Consultant.

3 14. AMENDMENT. This Agreement, including all Exhibits, shall not be
4 amended, nor any provision or breach waived, except in writing signed by the parties
5 which expressly refers to this Agreement.

6 15. LAW. This Agreement shall be governed by and construed pursuant
7 to the laws of the State of California (except those provisions of California law pertaining
8 to conflicts of laws). Consultant shall comply with all laws, ordinances, rules and
9 regulations of and obtain all permits, licenses and certificates required by all federal, state
10 and local governmental authorities.

11 16. ENTIRE AGREEMENT. This Agreement, including all Exhibits,
12 constitutes the entire understanding between the parties and supersedes all other
13 agreements, oral or written, with respect to the subject matter in this Agreement.

14 17. INDEMNITY. Consultant shall, with respect to services performed in
15 connection with this Agreement, indemnify and hold harmless City, its Boards,
16 Commissions, and their officials, employees and agents (collectively in this Section,
17 "City") from and against any and all liability, claims, demands, damage, loss, causes of
18 action, proceedings, penalties, costs and expenses (including attorney's fees, court
19 costs, and expert and witness fees) (collectively "Claims" or individually "Claim"). Claims
20 include allegations and include by way of example but are not limited to: Claims for
21 property damage, personal injury or death arising in whole or in part from any negligent
22 act or omission of Consultant, its officers, employees, agents, sub-consultants or anyone
23 under Consultant's control (collectively "Indemnitor"); willful misconduct;
24 misrepresentation; and Claims by any employee of Indemnitor relating in any way to
25 worker's compensation. Independent of the duty to indemnify and as a free-standing
26 duty on the part of Consultant, Consultant shall defend City and shall continue this
27 defense until the Claim is resolved, whether by settlement, judgment or otherwise. No
28 finding or judgment of negligence, fault, breach or the like on the part of Indemnitor shall

1 be required for the duty to defend to arise. Consultant shall notify City of any Claim
2 within ten (10) days. Likewise, City shall notify Consultant of any Claim, shall tender the
3 defense of the Claim to Consultant, and shall assist Consultant, as may be reasonably
4 requested, in the defense.

5 18. AMBIGUITY. In the event of any conflict or ambiguity between this
6 Agreement and any Exhibit, the provisions of this Agreement shall govern.

7 19. COSTS. If there is any legal proceeding between the parties to
8 enforce or interpret this Agreement or to protect or establish any rights or remedies under
9 it, the prevailing party shall be entitled to its costs, including reasonable attorneys' fees.

10 20. NONDISCRIMINATION.

11 A. In connection with performance of this Agreement and subject to
12 applicable rules and regulations, Consultant shall not discriminate against any employee
13 or applicant for employment because of race, religion, national origin, color, age, sex,
14 sexual orientation, AIDS, HIV status, handicap or disability. Consultant shall ensure that
15 applicants are employed, and that employees are treated during their employment,
16 without regard to these bases. These actions shall include, but not be limited to, the
17 following: employment, upgrading, demotion or transfer; recruitment or recruitment
18 advertising; layoff or termination; rates of pay or other forms of compensation; and
19 selection for training, including apprenticeship.

20 B. It is the policy of City to encourage the participation of Disadvantaged,
21 Minority and Women-Owned Business Enterprises in City's procurement process, and
22 Consultant agrees to use its best efforts to carry out this policy in its use of
23 subconsultants and contractors to the fullest extent consistent with the efficient
24 performance of this Agreement. Consultant may rely on written representations by
25 subconsultants and contractors regarding their status. City's policy is attached as Exhibit
26 "D" to this Agreement. Consultant shall report to City in May and in December or, in the
27 case of short-term agreements, prior to invoicing for final payment, the names of all
28 subconsultants and contractors hired by Consultant for this Project and information on

1 whether or not they are a Disadvantaged, Minority or Women-Owned Business
2 Enterprise, as defined in Section 8 of the Small Business Act (15 U.S.C. Sec. 637).

3 21. NOTICES. Any notice or approval required by this Agreement shall
4 be in writing and personally delivered or deposited in the U.S. Postal Service, first class,
5 postage prepaid, addressed to Consultant at the address first stated above, and to City at
6 333 West Ocean Boulevard, Long Beach, California 90802, Attn: City Manager, with a
7 copy to the City Engineer at the same address. Notice of change of address shall be
8 given in the same manner as stated for other notices. Notice shall be deemed given on
9 the date deposited in the mail or on the date personal delivery is made, whichever occurs
10 first.

11 22. COPYRIGHTS AND PATENT RIGHTS.

12 A. Consultant shall place the following copyright protection on all
13 Data: © City of Long Beach, California ____, inserting the appropriate year.

14 B. City reserves the exclusive right to seek and obtain a patent
15 or copyright registration on any Data or other result arising from Consultant's
16 performance of this Agreement. By executing this Agreement, Consultant assigns
17 any ownership interest Consultant may have in the Data to City.

18 C. Consultant warrants that the Data does not violate or infringe
19 any patent, copyright, trade secret or other proprietary right of any other party.
20 Consultant agrees to and shall protect, defend, indemnify and hold City, its officials
21 and employees harmless from any and all claims, demands, damages, loss,
22 liability, causes of action, costs or expenses (including reasonable attorney's fees)
23 whether or not reduced to judgment, arising from any breach or alleged breach of
24 this warranty.

25 23. COVENANT AGAINST CONTINGENT FEES. Consultant warrants
26 that Consultant has not employed or retained any entity or person to solicit or obtain this
27 Agreement and that Consultant has not paid or agreed to pay any entity or person any
28 fee, commission or other monies based on or from the award of this Agreement. If

1 Consultant breaches this warranty, City shall have the right to terminate this Agreement
2 immediately notwithstanding the provisions of Section 10 or, in its discretion, to deduct
3 from payments due under this Agreement or otherwise recover the full amount of the fee,
4 commission or other monies.

5 24. WAIVER. The acceptance of any services or the payment of any
6 money by City shall not operate as a waiver of any provision of this Agreement or of any
7 right to damages or indemnity stated in this Agreement. The waiver of any breach of this
8 Agreement shall not constitute a waiver of any other or subsequent breach of this
9 Agreement.

10 25. CONTINUATION. Termination or expiration of this Agreement shall
11 not affect rights or liabilities of the parties which accrued pursuant to Sections 7, 10, 11,
12 17, 19, 22 and 28 prior to termination or expiration of this Agreement.

13 26. TAX REPORTING. As required by federal and state law, City is
14 obligated to and will report the payment of compensation to Consultant on Form 1099-
15 Misc. Consultant shall be solely responsible for payment of all federal and state taxes
16 resulting from payments under this Agreement. Consultant's Employer Identification
17 Number is [REDACTED] If Consultant has a Social Security Number rather than an
18 Employer Identification Number, then Consultant shall submit that Social Security
19 Number in writing to City's Accounts Payable, Department of Financial Management.
20 Consultant acknowledges and agrees that City has no obligation to pay Consultant until
21 Consultant provides one of these numbers.

22 27. ADVERTISING. Consultant shall not use the name of City, its
23 officials or employees in any advertising or solicitation for business or as a reference,
24 without the prior approval of the City Manager or designee.

25 28. AUDIT. City shall have the right at all reasonable times during the
26 term of this Agreement and for a period of five (5) years after termination or expiration of
27 this Agreement to examine, audit, inspect, review, extract information from and copy all
28 books, records, accounts and other documents of Consultant relating to this Agreement.

OFFICE OF THE CITY ATTORNEY
ROBERT E. SHANNON, City Attorney
333 West Ocean Boulevard, 11th Floor
Long Beach, CA 90802-4664

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29. THIRD PARTY BENEFICIARY. This Agreement is not intended or designed to or entered for the purpose of creating any benefit or right for any person or entity of any kind that is not a party to this Agreement.

IN WITNESS WHEREOF, the parties have caused this document to be duly executed with all formalities required by law as of the date first stated above.

KINETIC LABORATORIES, INC., a California corporation

20 Oct 07, 2007

By Patrick Kinney

Patrick Kinney
(Type or Print Name)

2 Oct., 2007

By Philip D. Carpena

PHILIP D. CARPENTE
(Type or Print Name)

"Consultant"

CITY OF LONG BEACH, a municipal corporation

October 16, 2007

By Christine J. Shipley
Assistant
City Manager

EXECUTED PURSUANT TO SECTION 301 OF THE CITY CHARTER. "City"

This Agreement is approved as to form on October 4, 2007, 2007.

ROBERT E. SHANNON, City Attorney

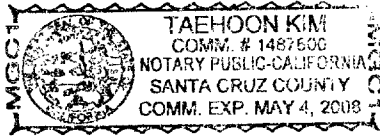
By [Signature]
Deputy

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California }
County of Santa Cruz } ss.

On 10/2/07, before me, TaeHoon Kim, Notary Public
Date Name and Title of Officer (e.g., "Jane Doe, Notary Public")
personally appeared Patrick Kinney
Name(s) of Signer(s)

- personally known to me
- proved to me on the basis of satisfactory evidence



to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Place Notary Seal Above

Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer

Signer's Name: _____

- Individual
- Corporate Officer — Title(s): _____
- Partner — Limited General
- Attorney in Fact
- Trustee
- Guardian or Conservator
- Other: _____

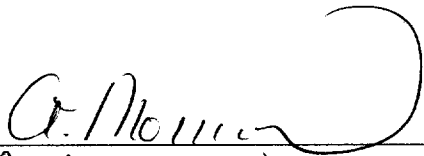
Signer Is Representing: _____

RIGHT THUMBPRINT OF SIGNER

Top of thumb here

STATE OF CALIFORNIA
COUNTY OF SANTA CRUZ } SS.

On 10/02/07 before me, A. Morrow a Notary
Public, personally appeared Philip D. Carpenter
personally known to me (or proven to me on the basis of satisfactory evidence) to be the
person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that
he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their
signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted,
executed the instrument. WITNESS my hand and official seal.

Signature 
A. Morrow
Name (Typed or Printed)
Notary Public in and for said County and State

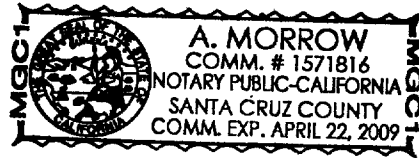


EXHIBIT “A”

Scope of Work



KINNETIC
LABORATORIES
INCORPORATED

5225 AVENIDA ENCINAS, SUITE H
CARLSBAD, CALIFORNIA 92008
(760) 438-8968
FAX (760) 438-2959

30 August 2007

Mr. Tom Leary
City of Long Beach
Clean Water Program
333 West Ocean Blvd., 9th Floor
Long Beach, California 90802

Subject: Revised Work Plan for Bacterial Testing at City of Long Beach Open Coastal Beach Sites

Attached is a revised Work Plan designed to address the increased frequency of bacterial water quality at Long Beach's recreational ocean beaches. The revisions reflect comments received from the City's Water Quality Task Force. The plan has been structured in phases that provide a sequential process for identification of "hot spots", the sources that contribute to water quality excursions at these sites, and lastly to assist in determining whether the sources are of human origin. The plan is designed to start by examining large scale phenomena and use that information to progressively focus on smaller geographical areas using tools that are more effective at defining the character of sources contributing to water quality problems. The ultimate objective is to develop data that can be used to guide any corrective actions that may be necessary.

The Work Plan identifies the intensive monitoring effort proposed for Phase I to examine bacterial concentrations at selected beach sites that are of most concern, paired nearshore waters located along the 2-meter depth contour, the mouth of the Los Angeles River, the entrance to Rainbow Harbor, and storm drains considered to have the potential to contribute to the water quality issues. An additional beach site has been added at western end of the beach where it meets the Rainbow Harbor Jetty. Phase I will include daily, early morning sampling for a 30-day period and a special 24-hour study that involves sampling all sites every 1.5 hours. This initial testing is expected to help identify key areas of concern along the beach and assist in determining whether the Los Angeles River or other offshore sources are contributing to the bacterial concentrations being reported in the swash zone at these beach sites.

During Phase II, the study area will likely be narrowed to focus on sites identified as hot spots during the Phase I investigation. This phase will focus on examination of potential subsurface flows that are not readily apparent. Well points will be installed in the beach sand at sites that would be expected to intercept subsurface flows. Candidate sites would include areas near storm drains or sites with facilities on the beach that would be serviced by the sanitary sewer system. Water will be sampled from each well point periodically over a full month. In addition, sediment will be collected from each beach, nearshore site, the Rainbow Harbor entrance and the mouth of the Los Angeles River to evaluate the potential that these sediments have to contribute to the water quality excursions at the beach face. Although some comments suggested removing the sediment analyses from the program, this element was left in due to

recent data developed by Yamahara¹ et al. (2007) showing FIB contamination of beach sands to be widespread and potentially serve as a reservoir and source to receiving waters.

Due to the uncertainty of the extent or requirement for Phase III investigations, budgets have not been prepared at this time. Phase III involves investigating whether samples contaminated with FIB are from human or non-human sources by use of selected methods that might include identification of the presence of human-specific bacteria, concentrations of mammal-specific bacteria, enteroviruses, or coliphage. This work plan details the approach and procedures for performing Phases I and II. A general strategy for Phase III testing is also included that will be further refined as the results of Phase I start to become available. Some Phase III testing will be considered for early implementation with Phase II activities to assist in determining whether human sources are contributing to elevated levels of FIBs in areas considered to be "hot spots".

The overall costs for Phases I and II are detailed below along with Project Management, Data Management and Reporting. The budget is broken out between costs for labor, directs and those associated with the analytical laboratory.

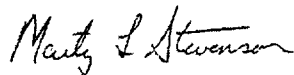
CITY OF LONG BEACH OPEN COASTAL BACTERIAL SOURCE STUDY
Project Summary by Task

PROJECT TASKS	LABOR COSTS	DIRECT COSTS	LABORATORY COSTS	TOTAL COSTS
Phase 1 - Intensive Spatial Temporal Investigation	\$86,790	\$33,990	\$135,746	\$256,526
Phase 2 - Focused Source Investigation	\$34,221	\$12,970	\$19,173	\$66,364
Project, Data Management and Reporting	\$29,002	\$500	\$0	\$29,502
SUMMARY	\$150,013	\$47,460	\$154,919	\$352,392

+ \$10K for 2 add'l sites

Please feel free to contact me if you have any questions regarding the proposed Work Plan. I can be reached at 831 901-7019 or by email at mstevens@kinneticlabs.com.

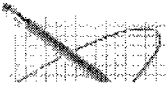
Sincerely,



Marty L. Stevenson

Attachment

¹ Yamahara, K.M., B.A. Layton, A.E. Santoro, and A. Boehm. 2007. Beach Sands along the California Coast are Diffuse Sources of Fecal Bacteria to Coastal Waters. Vol. 41, No. 13, 2007 Environmental Science & Technology



Nelson Kerr

09/03/2007 01:32 PM

To: "mstevens" <mstevens@kinneticlabs.com>
cc: Tom Leary/PW/CLB@CLB
Subject: Re: B-11 (72nd Street)

I concur. Let's add B-11 now and see what it shows us. City mgr is ok w/ additional 10k for additional site.

----- Original Message -----

From: "Marty Stevenson" [mstevens@kinneticlabs.com]
Sent: 09/03/2007 08:24 AM HST
To: Nelson Kerr
Cc: Tom Leary
Subject: B-11 (72nd Street)

Nelson:

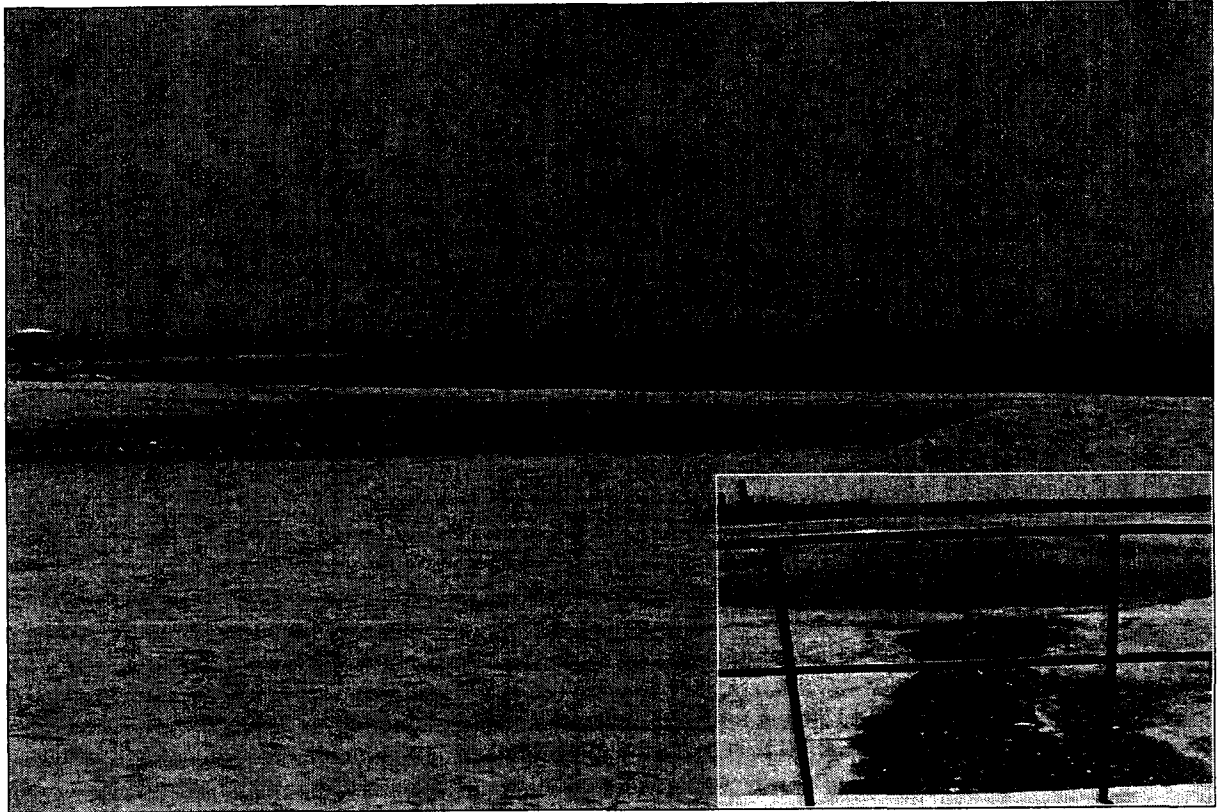
One thing you might want to consider is just adding B-11 to the 30-day program. I don't think that it would be practical to add this site to the 24-hour study simply due to time constraints. We will be pushed to accomplish the sampling every 1.5 hours at the existing sites already since we are collecting so much more water quality and observational information to help interpret the bacteria results. Adding it this site to the intensive 30-day program should allow us to evaluate whether we are dealing with a land-based source or if we are getting contamination introduced by advection from other offshore or nearshore source areas. That is the first question that we need to answer. Depending upon the results of 30 days of data, we could then decide how much of the existing program resources to allocate to this site. Just including this site (beach and nearshore) in the 30-day program would increase costs by about \$10K.

I will be in and out of the office today but I should be reachable on my cell phone most of the time.

Marty

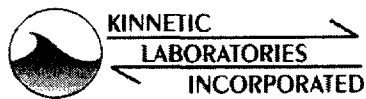
Marty Stevenson, Regional Manager
Kinnetic Laboratories, Inc.
55-1 Puapake Place
Lahaina, HI 96761
Phone (808) 661-1110 Cell (831) 901-7019
Fax (808) 661-0766

**City of Long Beach
Recreational Water Sample Work Plan
Open Coastal Beach Sites**



Prepared for:
City of Long Beach, Dept. of Health and Human Services
Bureau of Environmental Health

Prepared by:
Kinnetic Laboratories, Inc.
5225 Avenida Encinas
Carlsbad, California



Revised August 30, 2007

**City of Long Beach
Recreational Water Sample Work Plan
Open Coastal Beach Sites**

August 2007

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1.0 INTRODUCTION AND PURPOSE

Nearshore waters along open coastal beaches in the City of Long Beach have been placed on the Clean Water Act (CWA) 303(d) list as an impaired water body due to bacteria contamination. Approximately 4.1 miles of open coastal beaches extend from the Los Angeles River to the San Gabriel River. The CWA requires states to develop and implement Total Maximum Daily Loads (TMDLs) for waters on the 303(d) list. As part of the TMDL process, it is necessary to characterize potential sources of contamination in the open coastal beaches of Long Beach. Possible sources of bacteria or pathogens include major drainages such as the Los Angeles River, local storm drains, boats and associated pump out facilities, exfiltration from sanitary sewers associated with beach facilities, birds and even recreational beach users.

Currently, fifteen locations along the City of Long Beach coastal beaches are monitored for fecal indicator bacteria (FIB) on a weekly basis (Figure 1 and Table 1). Periodic violations of FIB water quality standards occur at these locations, even during dry weather conditions. Six locations (B5, B6, B8, B56, B60 and B62) located west of the Belmont Pier have been identified as having on average, the highest frequency of FIB exceedances over the past five years (2002-2006). In addition to these six sites, two additional shoreline sites (B-63 and B-W) have been added at the western end of the beach to provide more resolution as to potential problems in this region. These sites were added in response to reviewers comments on the initial proposal. Therefore, this investigation will focus on sources contributing FIB at these eight locations along with likely sources such as the Los Angeles River, Rainbow Harbor and four identified storm drains.

The purpose of this study is to address whether contamination at the beach is coming from onshore or offshore sources and if it is human or non-human in origin. Examining swashzone and nearshore contamination levels and taking into account tidal information can be helpful in making a determination as to the origin of the contamination. For instance, higher levels of contamination from nearshore and during low/ebb tides may indicate that contamination is coming from an onshore source.

The approach for this study has been generally patterned after that of a previous beach contamination study conducted in Avalon Bay, California (Boehm, Fuhrman, Mrse and Grant, 2003). This study has been divided into three phases. Elements of the last two phases may be conducted concurrently to expeditiously address potential sources.

Phase I involves determining the spatial and temporal distribution of FIB contamination in swashzone and nearshore waters as well as likely sources. This strategy differs from that used in Avalon Bay but provides early screening of more likely source areas. This phase is intended to identify "hot spots" or areas of concern that will require more focused investigations. This phase will also allow a determination as to whether contamination is coming from offshore or land-based sources.

Phase II will focus more on identifying specific sources of FIB contamination that may not be evident from the initial, more obvious sources examined under Phase I. This phase will focus on subsurface water discharges from anthropogenic sources and sand/sediment that may serve as reservoirs and sources of FIBs. Of course, implementation of Phase II studies would need to be revisited if offshore sources are implicated during the intensive Phase I surveys.

Phase III involves investigating whether samples contaminated with FIB are from human or non-human sources by use of selected methods that might include identification of the presence of human-specific bacteria, concentrations of mammal-specific bacteria, enteroviruses, or coliphage. This work plan details the approach and procedures for performing Phases I and II. A general strategy for Phase III testing is also included that will be further refined as the results of Phase I start to become available. Some Phase III testing will be considered for early implementation with Phase II activities.

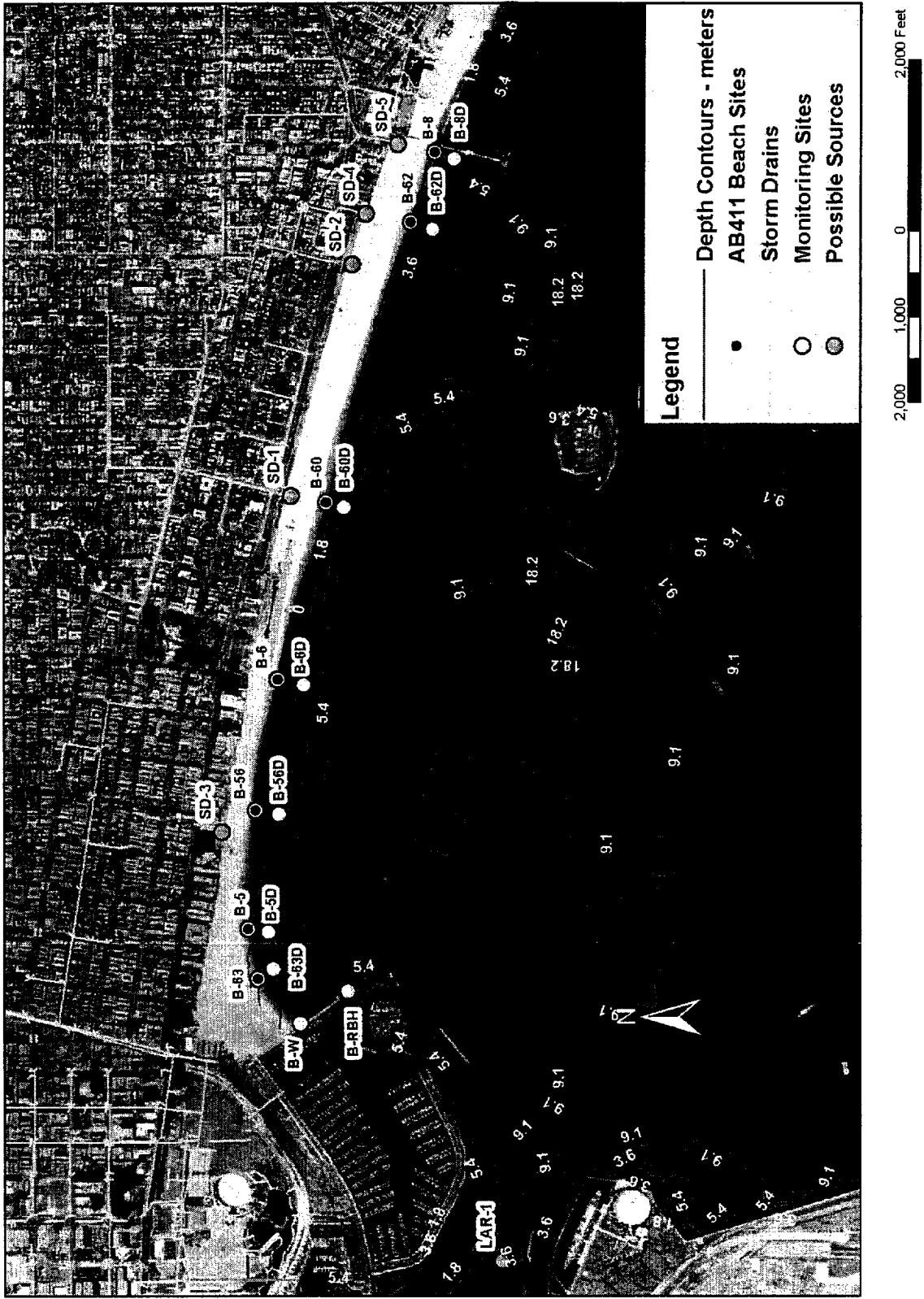


Figure 1. City of Long Beach Open Coast Monitoring Locations, Nearshore Monitoring Locations and Most Likely Sources

Table 1. Monitoring Locations for City of Long Beach Bacteria Source Investigation

Site ID	Site Name	Northing (ft)	Easting (ft)
<i>City Health Department Monitoring Locations</i>			
B-3	East Belmont Pier	1734178	6516724
B-5	5 th Place	1736413	6507512
B-6	16 th Place	1736068	6510413
B-7	Coronado	1734899	6514573
B-8	West Belmont Pier	1734234	6516550
B-9	Prospect	1733607	6517921
B-10	55 th Place	1731384	6522208
B-11	72 nd Place	1729225	6525743
B-56	10 th Place	1736325	6508889
B-60	Molino	1735508	6512469
B-62	36 th Place	1734518	6515732
B-63	3 rd Place	1736301	6506931
B-64	Granada	1732924	6519130
B-65	54 th Place	1731924	6521020
B-66	62 nd Place	1730528	6524113
<i>Additional Shore Monitoring Location</i>			
B-W	Westernmost Beach @ Jetty	1735812	6506406
<i>Nearshore Monitoring Locations</i>			
B-63D	Nearshore 3rd Place	1736120	6507046
B-5D	Nearshore 5 th Place	1736180	6507475
B-6D	Nearshore 16 th Place	1735767	6510347
B-8D	Nearshore West Belmont Pier	1734004	6516471
B-56D	Nearshore 10 th Place	1736056	6508846
B-60D	Nearshore Molino	1735301	6512410
B-62D	Nearshore 6 th Place	1734256	6515646
<i>Likely Sources</i>			
LAR-1	LA River Mouth	1722436	6503643
B-RBH	Rainbow Harbor Mouth	1735258	6506784
SD-1	Molino Avenue Storm Drain	1735914	6512542
SD-2	Redondo Street Storm Drain	1735208	6515241
SD-3	9 th Place Storm Drain	1736717	6508638
SD-4	36 th Place Storm Drain	1735047	6515830
SD-5	West Belmont Pier Storm Drain	1734672	6516644

Shaded locations have been identified as sites with most frequent exceedances of FIB criteria, or are located in regions subject to frequent exceedances of FIB criteria and are a part of this monitoring program. Other City Health Department sites and locations are listed for informational purposes only.

2.0 APPROACH

The overall approach for all phases of this study is similar to the approach used by Alexandria Boehm and others as part of a source study at a recreational beach at Avalon Bay, Catalina Island, California (Boehm et al., 2003). The Avalon study involved a three-tiered approach for determining sources of human and non-human FIB. The first tier looked at documenting the spatiotemporal variability of FIB contamination in coastal waters. For Long Beach, part of the Tier I approach will be conducted in a separate study by plotting historical Health Department data from the fifteen permanent monitoring studies along with tide, weather and other variables. The remaining portion of the Tier I approach will be conducted as Phase I of this study as described below, and includes the similar elements of the Avalon study such as a 24-hour study to characterize diurnal variability and a month long study to document daily changes in FIB contamination. Phase II of this study will focus upon less obvious sources in areas that were identified as “hot spots” during the first phase and a sediment study to determine if sediment along the City’s open

coast beaches are a source of FIB. Phase III will use selected methods that focus on determining whether the bacteria is of probable human origin and whether pathogenic enteric viruses are detectable and quantifiable in these locations. Determination of appropriate Phase III activities will be based upon the results of Phase I. It is possible that implementation of some Phase III activities may be recommended for inclusion with Phase II studies if warranted by the results of Phase I. Preliminary results of the Phase I surveys will be provided to the City of Long Beach as they are received from the laboratory so that information is available for guiding Phase II and III investigations. Phases I and II are described further below.

2.1 Phase I Approach

Phase I involves the following two tasks:

1. 30-day Water Quality Study
2. 24-hour Water Quality Study

Phase I water quality tasks involve sampling swashzone and nearshore waters at the seven identified sites where FIBs most commonly exceed water quality criteria and at the more obvious sites with potential to influence water quality. Water samples will be collected at each site for analysis of FIB (total coliforms, *Escherichia coli* and *Enterococcus*). Additional water quality measurements (pH, salinity/conductivity, temperature and turbidity) will be taken at each site where the use of field instrumentation is possible.

Locations that have initially been identified as likely sources of FIBs are shown in Figure 1 and Table 1 and are identified as follows:

- Rainbow Harbor Entrance (B-RBH)
- Los Angeles River Mouth (LAR-1)
- Molino Avenue Storm Drain (SD-1)
- Redondo Street Storm Drain (SD-2)
- 9th Place Storm Drain (SD-3)
- 36th Place Storm Drain (SD-4)
- West Belmont Pier Drain (SD-5)

Major storm drains (SD-1 through SD-5) will be inspected during all daily sampling episodes for the month long water quality study and will only be sampled if flow is observed. For scoping purposes, it is assumed that SD-3 will not be sampled for FIBs since it appears to represent a relatively small drainage area and would be less likely to represent a major source. Although, if nuisance runoff is observed at SD-3 or one of several other minor discharge points along the beaches, then this runoff will be photographed and sampled.

Nearshore sampling at the seven selected beach sites will be from the swash zone, about ankle depth, consistent with AB-411 sampling protocol. Nearshore samples will be collected along the two-meter contour line directly offshore of the seven selected beach monitoring sites as shown in Figure 1. At each nearshore location and at the Los Angeles River location, FIB samples will be collected from just below the surface. Surface water quality parameters (pH, temperature, salinity and turbidity) will be performed at each nearshore location during each sampling event using a YSI multiparameter sonde outfitted with appropriate sensors, including depth. Occasional water quality profiles will be taken at a subset of the nearshore sites to document water column structure during the surveys. In order to have consistent turbidity readings, a YSI sonde will also be used for water quality measurements at the beach sites. Use of the same type of instrument is critical for turbidity measurements to be comparable due to the wide range of methods used to measure turbidity and the different results that can be obtained by different

instrumentation. The profiler will be laid on its side to measure water quality parameters near the swash zone. Hand held instruments will be used to measure water quality parameters in storm drain flow.

A number of environmental factors can influence FIB concentrations. Wind patterns, tide, precipitation and sunlight all can influence FIB concentrations. These variables will be noted on field sheets for each FIB sample collected. In addition, data from nearby weather stations will be obtained for quantitative evaluation during the 30-day and 24-hour study periods. Littoral drift may also influence FIB concentrations. Therefore, crude measurements of surface current and direction will be made periodically during sample collection. Likewise, flow from any storm drain outfall will be quantified. Additional observations such as bird usage, trash and water color and clarity will also be noted on the field logs.

2.1.1 30-Day Water Quality Study

The 30-day water quality study will be conducted in the swash zone and in 6 meters of water at each of the identified “hot spots”, at the mouth of the Los Angeles River and at each outfall location with observed flow. Samples and water quality parameters will be collected or measured every morning for 30 days straight. Samples will be collected prior to 9:00 AM to minimize the effects of sunlight on FIB survival. Table 2 identifies the type and number of samples to be collected for the month long water quality study at each sampling location.

Table 2. Summary of FIB samples to be Collected for the Month Long Water Quality Study

Site ID	Site Name	Total Coliforms	<i>E. Coli</i>	<i>Enterococcus</i>
B-5	5 th Place	30	30	30
B-6	16 th Place	30	30	30
B-8	West Belmont Pier	30	30	30
B-56	10 th Place	30	30	30
B-60	Molino	30	30	30
B-62	36 th Place	30	30	30
B-63	3rd Place	30	30	30
B-W	Westernmost Beach @ Jetty	30	30	30
B-5D	Nearshore 5 th Place	30	30	30
B-6D	Nearshore 16 th Place	30	30	30
B-8D	Nearshore West Belmont Pier	30	30	30
B-56D	Nearshore 10 th Place	30	30	30
B-60D	Nearshore Molino	30	30	30
B-62D	Nearshore 6 th Place	30	30	30
B-63D	Nearshore 3rd Place	30	30	30
B-RBH	Rainbow Harbor Mouth	30	30	30
LAR-1	LA River Mouth	30	30	30
SD-1	Molino Avenue Storm Drain	30	30	30
SD-2	Redondo Street Storm Drain	30	30	30
SD-3	9 th Place Storm Drain	(a)	(a)	(a)
SD-4	36 th Place Storm Drain	30	30	30
SD-5	West Belmont Pier	30	30	30
Total		630	630	630
Field Duplicate Samples		40	40	40
Blank Samples		5	5	5
Grand Total		675	675	675

(a) SD-3 –the 9th Place storm drain appears to discharge from a relatively small area and is not currently scheduled for monitoring.

2.1.2 24-Hour Water Quality Study

The 24-hour water quality study will be conducted in the swash zone and in 2 meters of water at each of the identified study locations. Samples and water quality parameters will be collected or measured at each location every 1.5 hours for 24-hours. The type and number of samples to be collected at each sampling location for the 24-hour study are identified in Table 3.

Table 3. Summary of FIB samples to be Collected for the 24-hour Water Quality Study

Site ID	Site Name	Total Coliforms	<i>E. Coli</i>	<i>Enterococcus</i>
B-5	5 th Place	16	16	16
B-6	16 th Place	16	16	16
B-8	West Belmont Pier	16	16	16
B-56	10 th Place	16	16	16
B-60	Molino	16	16	16
B-62	36 th Place	16	16	16
B-63	3rd Place	16	16	16
B-W	Westernmost Beach @ Jetty	16	16	16
B-RBH	Rainbow Harbor Mouth	16	16	16
LAR-1	LA River Mouth	16	16	16
B-5D	Nearshore 5 th Place	16	16	16
B-6D	Nearshore 16 th Place	16	16	16
B-8D	Nearshore West Belmont Pier	16	16	16
B-56D	Nearshore 10 th Place	16	16	16
B-60D	Nearshore Molino	16	16	16
B-62D	Nearshore 6 th Place	16	16	16
B-63D	Nearshore 3 rd Place	16	16	16
Total		272	272	272
Field Duplicate Samples		8	8	8
Blank Samples		1	1	1
Grand Total		281	281	281

Ideally, the 24-hour study should be conducted during advisory periods or at least during periods of elevated FIB concentrations. This may be difficult to do in the time frame of this project, especially since City monitoring data is only available on a weekly basis. We intend to target a 24-hour period when exceedances are most likely to occur. From our experience, water quality excursions often occur during periods of extreme tides. We will therefore select candidate 24-hour periods with when tidal ranges are most extreme. Previous City of Long Beach data being synthesized under a different Task Order would also be reviewed to determine if the data will be useful in selecting the time period for an intensive 24-hour study.

The 24-hour study will occur sometime during the 30-day study. If practical, the time period for the 30-day study will selected such that timing of the 24-hour study occurs sometimes during the last 15 days. This will allow daily measurements to be used to assist in guiding final selection of the time period for the 24-hour study.

2.2 Phase II Approach

Phase II investigations will focus on sites where both the City of Long Beach and the intensive 30-day and 24-hr investigations monitoring records indicate high frequencies of FIB water quality exceedances. The exact nature of the Phase II investigations will depend upon the number and location of sites which are considered "hot spots". The first step involves identifying and photographing all potential local

sources in the vicinity of the "hot spots". Storm drains, areas with evidence of chronic nuisance discharges, rest rooms, any facility such as restaurants or snack bars with a sanitary sewer connection would be considered as potential sources.

2.2.1 Subsurface Sources

We anticipate installing approximately a dozen well points between the beach face and areas that are considered to be possible sources of FIBs. These would be installed so that water could be sampled from approximately MLLW. The well points would allow fresh/brackish groundwater to be sampled repeatedly over a period of one month. Each well point would be installed using a Geoprobe system. The top of the well point would be located 8-12 inches below the sand so that they would not impact beach grooming. The top would be capped to prevent sand from entering the well point.

For sampling, the well points would be located using a hand-held differential GPS system and a light weight tag-line that would be connected to the unit to assist in finding each installation. These would be sampled twice a week for a month for FIB and standard water quality measurements (pH, temperature, salinity and turbidity) used throughout the program.

Evidence of persistent, elevated concentrations of FIB at any of these locations may trigger even more focused Phase III actions to determine if human sources are implicated and need to be remedied. The Phase III action(s) to be taken will be dependent upon the sources identified. If groundwater from one of the well points between a beach restroom and the shoreline is found to contain high levels of FIBs, the correct Phase III action would be to investigate the potential for leaks from the upstream sanitary system. If similar high levels are consistently found in an area of the beach face or found in well points near storm drains or other nuisance flows, further Phase III actions in terms of more advanced or alternative Bacterial Source Tracking (BST) methods would be warranted.

Bacteria counts in bird droppings have already been well documented (Boehm et al., 2003; KLI, 2006) and will not be further tested for this program.

2.2.2 Sediment Study

A one-time sampling of surface sediment will be conducted in the swash zone and in two meters of depth at each of the seven identified swash-zone and nearshore locations. Sediment samples will analyzed for FIB and physical characteristics (grain size and total organic carbon). At each sampling location, water will be collected from just above the sediment/water interface just prior to sediment collection and analyzed for FIB. Water quality parameters will also be measured and profiled at this time and all observations described previously will be made.

2.3 Phase III Approach

In addition to the question of whether the beach contamination is coming from onshore or nearshore sources, it is also desired to determine if it is human or non-human in origin. The purpose of Phase III will be to carry out selective sampling and analyses for human-specific bacteria and enterovirus from beach sites or regions identified as "hot spots" in order to assess whether the source of the contamination found at the beaches is of human origin for contamination. A variety of microbiological and chemical methods have been developed to detect and differentiate human and animal fecal pollution. Many of the methods are still limited to a few specific research laboratories located throughout the country.

It is generally considered that no single method provides definitive answers to these critical questions. A review of methods was carried out by Stenstrom and Haejin (2001). Each has positive and negative

attributes with respect to the ability of the method to differentiate whether contamination is from human or non-human sources as well as costs. Some of the selected tools to be considered for Phase III and both the advantages and disadvantages are shown in Table 4.

As per general recommendations of the Water Quality Task Force Technical Review Committee, elements of Phase III will be moved forward in the process in order to get an early determination as to the presence of human sources in areas defined as “hot spots” during the Phase I investigation. Final action as to implementation of any Phase III testing will require rapid turnaround of data from Phase I.

Table 4. Summary of Selected Bacterial Source Identification Methods

Method	Advantages	Disadvantages
<i>Bacteroides</i> QPCR	<ul style="list-style-type: none"> Provides quantitative estimates for universal markers, human markers and several other hosts Moderate Cost(\$500-700) 	<ul style="list-style-type: none"> Method still limited to research laboratories Primers limited at this time and unique to different laboratories Turn around at University Research Laboratories can be 4-6 weeks.
Male-specific RNA (FRNA) coliphages	<ul style="list-style-type: none"> Abundant in GI tract of warm blooded animals and domestic sewage Persistence in environment similar to other enteric viruses Subgroups may help distinguish between human and animal sources Requires relatively low sample volumes (~100 ML) Relatively low cost (\$100-\$120) 	<ul style="list-style-type: none"> Does not distinguish between warm-blooded animals without additional work limited to research labs. Even then, differentiation not clearly definitive. Possibly more indicative of sewage contamination than direct fecal contamination.
<i>Clostridium perfringens</i>	<ul style="list-style-type: none"> Spore forming bacteria that is persistent. Spores can be found in sediments subject to contamination from sewage Persistence considered comparable to some enteric viruses Relatively low cost (\$120) Concentrations in bird feces 4 to 6 orders of magnitude less than dogs/cats Requires relatively small sample volumes (~100 ml) <i>E. coli</i> has been found in soils in warmer climates whereas <i>C. perfringens</i> is absent 	<ul style="list-style-type: none"> Measured concentrations of <i>Clostridium</i> in environmental samples are typically 1-2 orders of magnitude less than <i>E. coli</i> Found in sewage at 10^3-10^4/100 ml Present in both mammals and birds
Enteric Virus QPCR	<ul style="list-style-type: none"> Directly measures the presence enteric virus Cost effective if test is conducted with <i>Bacteriodes</i> testing (adds about \$200/test) 	<ul style="list-style-type: none"> Moderately expensive if analyzed separately from other PCR tests—Cost is approximately \$500-600 per test Recommended sample size of 10+ liters of water but can be done on 2-3 liters with loss of sensitivity Turn around at University Research Laboratories can be 4-6 weeks.

Two of the methods (FNRA coliphage and *Clostridium perfringens*) in Table 4 are relatively low cost and can be performed on relatively small sample volumes. One of these will likely be selected depending upon the specific sources that need to be investigated.

Bacteriodes QPCR, and enteric virus QPCR assays can provide more specific information as to the relative magnitude of various sources and provide direct information as to the presence of enteric viruses. These methods were recently selected for microbial source tracking efforts in the Los Angeles River (CREST 2007) and are likely tools that will be used in the Phase III of this investigation. Although these methods provide valuable information, limited numbers tests can be conducted due to the costs. If a laboratory does both types of analyses, the costs can be significantly reduced. Use of these methods needs to be judiciously applied to situations where this information will be considered most critical in the process of tracking and identifying bacterial sources so that actions can be taken to address reduction or elimination of those sources.

Final recommendations and cost estimates for Phase III testing will be developed during and just after completion of the Phase I testing and while portions of the Phase II testing is being implemented. Compression of Phase II and III investigations are necessary to complete the investigation before winter rains.

3.0 METHODS

3.1 Water Collection

Water samples for fecal indicator bacteria analyses will be collected from the surface at each of the 7 beach sampling locations, the nearshore monitoring sites and at the Los Angeles River sampling location. All nearshore sample locations will be accessed from a 17-foot Boston Whaler powered by a 70-horse power outboard engine. Surface samples will be collected 1-2 inches below the water surface by directly dipping standard sterilized bacterial sampling bottles underneath the surface. In obtaining surface samples, a collector wearing clean Nitrile gloves will position a sterilized bacterial sampling container at the correct depth, removed the cap to allow sample to enter, and then reseal the container before removing it from the water. Outfall locations may alternatively be sampled by allowing flow to spill directly into sample containers. Near-bottom water samples will be collected in a sterilized 1-liter glass bottle mounted to a Valscon sampler (this will be limited to water samples collected in association with the sediment samples). This sampler has a Teflon stopper with a Viton™ o-ring that seals the bottle as it travels through the water column. Once the bottle is lowered to approximately one meter above the sediment, the stopper will be unsealed for several seconds by pulling on a messenger line. The messenger line is released to reseal the 1-liter bottle for transport back to the surface. Once the 1-liter bottle is retrieved, the water sample will be transferred directly into a standard sterilized bacterial sample container for laboratory analysis. The Teflon stopper will be rinsed with isopropyl alcohol between stations and allowed to air dry.

The positions of all sampling locations will be determined and documented using a Garmin handheld differential GPS. All coordinates will be recorded on field data log sheets along with all empirical observations.

All water samples collected will immediately be placed on ice in a cooler for transport to the laboratory. Considerable effort will be made to deliver all water samples to the laboratory on time to meet the six-hour holding time. To ensure that holding time criterion is met, the laboratory sample manager will receive a copy of the field log for each sample and log all samples in according to the time of collection and time of reception.

3.2 Water Quality Measurements

Except for storm drain outfall water, salinity, pH, temperature, turbidity and depth will be measured and recorded with a YSI multi-parameter Sonde. In shallow waters, the Sonde will be located horizontally to make direct water quality measurements. Along the 2-meter contour and at the mouth of the Los Angeles River, the Sonde will be deployed from a boom located on the sampling vessel. Limited water quality profiles will be taken by slowly lowering the Sonde to the bottom and then back up while continuously recording. For outfalls, water quality parameters will be measured with handheld meters either *in situ* or back at the laboratory.

All water quality instruments will be calibrated prior to original use and subsequently according to manufacture recommendations.

3.3 Sediment Collection

All sediment samples will be collected in sterilized 250 ml containers. Nearshore sediment samples will be collected using pre-sterilized spoons. Divers will collect sediment samples along the 2-meter contour. Using the sample container, the divers will carefully scrape the top two centimeters of sediment directly into a sample container. The sample containers will be capped under the water for transport to the surface. Alternatively, small diver cores may be taken, capped, and brought to the surface for subsampling of the top two centimeters.

All sediment samples collected will be placed on ice in a cooler for transport to the laboratory where they will be extracted immediately for FIB. Similar steps taken for the water samples will be taken for the sediment samples to ensure that the holding time criterion will be met.

Each sample location will be identified using a Garmin differential GPS and exact coordinates will be logged onto field data sheets along with all empirical observations.

3.4 Documentation of Field Sampling Activities

Field sampling activities will be documented on field data sheets. For all visits, station ID, location, coordinates, date, sampling time, depth, and sample collector's name/signature will be recorded. Values for all measured field parameters will also be recorded. Detailed observational data including water appearance, weather, biological activity, unusual odors, specific sample information, days since last significant rainfall, and current speed and direction will be recorded.

Using indelible ink, each sample container will be labeled with the station ID, date, time, analyses, and the collector's initials. This same information will be recorded on a Chain of Custody (COC) form that accompanied the samples to the laboratory. Also recorded on the COCs will be sample matrix, number of containers, preservative used, custody transfer signatures, dates and time of transfer, and name of the laboratory taking the samples.

3.5 Laboratory Methods

CRG Marine Laboratories (ELAP #2261) will carry out routine FIB analyses. For Phase III human or non-human origin studies BioVir Laboratories (ELAP #1795) and other specialized laboratories will be used. Preliminary contacts have been made with Stefan Wuertz at UCD for QPCR analysis of *Bacteriodes* and enteric viruses. Dr. Wuertz is currently evaluating his laboratory capacity to determine if he can handle 20-30 samples in the latter half of October. Local university labs will also be contacted

while the Phase I studies are underway to determine if they can provide appropriate analytical support for some of the newer MST methods that are not yet in commercial use.

3.5.1 Sediment FIB Extraction

Upon receipt to the laboratory, all sediment samples will be extracted for FIB. The extraction process involves suspending 50g of wet sediment in 450 ml of phosphate-buffered saline solution. This solution will be gently shaken for about one minute. Afterwards, the elutriated sediment will be allowed to settle for 10 minutes. Once 10 minutes is up, a sterilized pipette will be used to carefully draw off 10 ml of supernatant for analysis.

3.5.2 FIB analyses

Analytical methods for FIB analyses are listed in Table 5. These methods were chosen to be consistent with methods used by the City of Long Beach at the 15 permanent monitoring stations.

Table 5. Analytical Methods for Microbiological Measurements

TOTAL COLIFORM BACTERIA	
Colilert®, Colilert®18	(IDEXX) (Quanti-Tray™), SM 9223
E. COLI BACTERIA	
Colilert®, Colilert®18	(IDEXX) (Quanti-Tray™), SM 9223
ENTEROCOCCUS BACTERIA	
Enterolert® 1,2,3	IDEXX Co.

1. Abbott, S., B. Caughley, and G. Scott. 1998. Evaluation of Enterolert for the Enumeration of Enterococci in the Marine Environment. New Zealand Jour. of Marine & Freshwater Research. 32: 505-513.
2. Budnick, G.E., R.T. Howard and D.R. Mayo. 1996. Evaluation of Enterolert for Enumeration of Enterococci, In Recreational Waters. Appl. Environ. Microbiol. 62: 3881-3884.
3. Eckner, K.F. 1998. Comparison of Membrane Filtration and Multiple-Tube Fermentation by the Colilert and Enterolert Methods for Detection of Waterborne Coliform Bacteria, *Escherichia coli* and Enterococci Used in Drinking and Bathing Water Quality Monitoring in Southern Sweden. Appl. Environ. Microbiol. 64: 3079-3083.

3.5.3 Sediment Grain Size and Total Organic Carbon Analyses

Particle size and total organic carbon (TOC) will be determined from each sediment sample to help interpret FIB concentrations. Particle size distribution will be analyzed using the method detailed in Plumb (1981). TOC will be analyzed by EPA Method 9060A. The target reporting limit for TOC analysis is 0.1%.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

4.1 Sampling Quality Control Requirements

The minimum Field QC Requirements are outlined below.

4.1.1 Blanks

A bottle blank is a sample of sterile water poured into a sample bottle. It is collected in the same type of container as the environmental sample, preserved in the same manner and analyzed for the same parameter. ASTM Type I reagent grade water is used for analytical chemistry testing. Sterile (autoclaved) ASTM Type III water is used for bacterial bottle blanks with sterile (autoclaved) phosphate water used for MTF dilutions. These blanks confirm that the materials provided by the laboratory are free of contamination. The QC check is performed before each batch of containers is sent to the field.

Since bottle blanks are generated in the field and transferred to the appropriate container in precisely the same manner as a sample during the course of a sampling event, bottle blanks are also considered field blanks. Field blanks can be used to assess the contamination from field sources such as airborne materials, containers, and preservatives. The analysis of all blanks should yield values less than the detection limit.

4.1.2 Field Duplicates

As a measure of field and laboratory precision field duplicates will be collected for every 20 samples collected. A field duplicate is defined as a second sample (or measurement) from the same location, collected in immediate succession, using identical techniques. This applies to all cases of routine water collection procedures. Duplicate samples are sealed, handled, stored, shipped, and analyzed in the sample manner as the primary sample. The precision of duplicate results is calculated by the relative percent difference (RPD) as defined by 100 times the difference (range) of each duplicate set, divided by the average value (mean) of the set. For duplicate results, X_1 and X_2 , the RPD is calculated from the following equation:

$$RPD = [(X_1 - X_2) / ((X_1 + X_2) / 2)] * 100$$

The RPD between field duplicates should be less than 40%.

4.2 Laboratory Measurement Quality Control Requirements

Detailed laboratory QC requirements are contained within each individual method. The minimum requirements are stated below. Acceptability criteria are outlined in Table 6.

4.2.1 Laboratory Replicates

The method of precision for bacteria testing followed Standard Methods (Ed. 20,1998) 9020 B. (Section 8b items 1-5)(Page 9-10, Tables 9020:VI & VII.)(APHA & WEF, 1998). The logarithm (base 10) and subsequent range of logarithms will be calculated for each pair of positive samples. The mean of the ranges will be averaged and multiplied by 3.27, as prescribed in Standard Methods: $3.27R =$ Upper Control Limit.

Table 6. Data Quality Objectives for Laboratory Analyses of Indicator Bacteria.

PARAMETER	UNITS	METHOD TYPE	METHOD	REPORTING LIMIT	LABORATORY PRECISION	PERCENT COMPLETE
Total Coliform	MPN/100 mL	Colilert® 18, Chromogenic Substrate	Colilert® 18, (Quanti-Tray™), SM 9223	10	CL ¹	95
<i>E. coli</i>	MPN/100 mL	Colilert® 18, Chromogenic Substrate	Colilert® 18, (Quanti-Tray™), SM 9213D	10	CL ¹	95
Enterococcus	MPN/100 mL	Enzyme Substrate	Enterolert® ASTM Method (#D6503-99)	10	CL ¹	95

1. CL = Upper Control Limit is equal to 3 standard deviations. See SM9020B 8.b. 1) (APHA and WEF, 1998)

4.2.2. Procedural Control Samples

Known positive and negative control cultures will be used to assess proper analytical procedures as well as the performance and quality of the media. Expected results for the controls are shown in Table 7.

Table 7. Expected Positive and Negative Control Results.

GROUP	CONTROL CULTURE	
	POSITIVE	NEGATIVE
Total Coliforms	<i>Klebsiella pneumoniae, Escherichia coli</i>	<i>Pseudomonas aeruginosa</i>
<i>Escherichia coli</i>	<i>Escherichia coli</i>	<i>Pseudomonas aeruginosa</i>
Enterococcus	<i>Enterococcus faecium</i>	<i>Klebsiella pneumoniae</i>

5.0 DATA ANALYSIS AND REPORTING

An interim letter report will be submitted after the Phase I investigations are complete and while initial Phase II investigations are underway. This interim report will provide recommendations and estimated costs for any Phase III studies deemed necessary. This will be an informal report that will emphasize rapid transmittal of data from these initial surveys that will serve as the basis for further decision making processes. All field and laboratory data will be maintained up to date in a database format in an Excel spreadsheet and will be made available to the City on an ongoing basis at frequencies to be determined by the City.

A draft final interpretative report on the Phase I and II investigations will be submitted six weeks after completion of the field studies. The final report will be submitted within two weeks of receipt of comments on the draft.

6.0 REFERENCES

- Abbott, S., B. Caughley, and G. Scott. 1998. Evaluation of Enterolert for the Enumeration of Enterococci in the Marine Environment. *New Zealand Jour. of Marine & Freshwater Research*. 32: 505-513.
- APHA and WEF. 1998. *Standard Methods for the Examination of Water and Wastewater (20th Edition)* Greenberg, A.E., L.S. Clesceri, and A.D. Eaton (Eds.) American Public Health Association and the Water Environment Federation.
- Boehm, A.B., J.A. Fuhrman, R.D. Mrse and S.B. Grant. 2003. Tiered Approach to Identification of a Human Fecal Pollution Source at a recreational Beach: Case Study at Avalon Bay, Catalina Island, California. *Environ Sci Tech*, 37:673-680.
- Budnick, G.E., R.T. Howard and D.R. Mayo. 1996. Evaluation of Enterolert for Enumeration of Enterococci, In *Recreational Waters*. *Appl. Environ. Microbiol.* 62: 3881-3884.
- CREST 2007. *Conceptual Approach for the Los Angeles River Bacterial Source Investigation*.
- Eckner, K.F. 1998. Comparison of Membrane Filtration and Multiple-Tube Fermentation by the Colilert and Enterolert Methods for Detection of Waterborne Coliform Bacteria, *Escherichia coli* and Enterococci Used in Drinking and Bathing Water Quality Monitoring in Southern Sweden. *Appl. Environ. Microbiol.* 64: 3079-3083.

Kinnetic Laboratories, Inc., 2004. Marina Beach Water Quality Improvement Project. Bacteria Source Studies and Recommendations. Phase 1 Final Report. Report Prepared for Los Angeles County Department of Beaches and Harbors. Los Angeles, CA.

Kinnetic Laboratories, Inc., 2006. Inner Cabrillo Beach Water Quality Improvement Project. Source Identifications and Mitigation Alternatives, Volumes I and II. Final report January, 2006.

MEC-Weston. 2004. Mission Bay Clean Beaches Initiative Final Report.

Plumb, R.H., Jr. 1981. Procedures for Handling and Chemical Analysis of Sediment and Water Samples. Environmental laboratory. Tech. Rep. EPA/CE-81-1. U.S. Army Engineer Waterways Experiment Station. Vicksburg, MS.

Stenstrom, M.K. and H. Haejin. 2001. Final Report AB-538 Study.

KINNETIC LABORATORIES, INC.

2007-2008 LABOR RATE SCHEDULE

<u>PROFESSIONAL CATEGORY</u>	<u>HOURLY RATE</u>
SCIENTIST V / PRINCIPAL	\$ 153.36
SCIENTIST IV / PROJECT MANAGER	\$ 142.50
SCIENTIST III	\$ 114.43
SCIENTIST II	\$ 95.37
SCIENTIST I	\$ 79.29
TECHNICAL EDITOR	\$ 86.37

**FOR EXTENDED PERIOD CONTRACTS:
ESCALATION RATE IS 5% PER YEAR.**

<u>DIRECT COSTS</u>	<u>RATE</u>
MILEAGE	
< 1 TON	\$ 0.36 / MILE
> 1 TON	\$ 0.46 / MILE
FACSIMILE	\$ ACTUAL
PHOTOCOPYING	\$ 0.15 / PAGE
KLI TRUCKS & VANS	\$ 75.00 / DAY
PER DIEM AND ACCOMODATIONS	
LODGING	\$125.00 / DAY
MEALS	\$ 48.25 / DAY
EQUIPMENT USEAGE FEES	AS QUOTED

**KINNETIC LABORATORIES, INC. DIRECT COSTS AND TRAVEL
SCHEDULE**

EFFECTIVE 4/07

ITEM	COST
Black & White Copying	\$0.15/Page
Color Copying / Printing	\$1.00/Page
Graphics Computer	\$20.00/Hour
Black & White Graphics – Bond	\$.020/Sq. Ft.
Black & White Graphics – Vellum	\$0.45/Sq. Ft.
Black & White Graphics – Film	\$2.35/Sq. Ft.
Color Graphics – Bond	\$1.45/Sq. Ft.
Color Graphics – Vellum	\$1.85/Sq. Ft.
Color Graphics – Film	\$2.85/Sq. Ft.
Facsimile	Actual
Telephone	Actual
Postage/Shipping	Actual
Vans/Pick-Up Trucks	\$50/Day
Service Trucks w/ Traffic Safety Equipment & Tools	\$75/Day
Vehicle Miles < 1 Ton	\$0.36/Mile
Vehicle Miles > 1 Ton	\$0.46/Mile
Per Diem	
Lodging	\$125/Day
Meals	\$48.25/Day
Parking/Tolls	Actual
Airfare	Actual
Rental Vehicles	Actual
Computer, Portable	Up to \$125/Day
Cellular Phones	Actual
Camera, 35mm	Up to \$25/Day

**KINNETIC LABORATORIES, INC. DIRECT COSTS AND TRAVEL
SCHEDULE (continued)**

ITEM	COST
Storm Water Monitoring*	
Basic Station	\$1,000/Month
Security Enclosure	\$300/Month
Composite Sample Container (20liter)	\$50/Month
Depth Sensor	\$200/Month
Velocity/Flow Sensor	\$500/Month
Rain Gauge	\$100/Month
Cellular Telephone Link	\$100/Month
Solar Panel	\$50/Month
AC Power	Actual
Refrigerated Sampler (requires AC Power)	\$500/Month
Confined Space Entry Equipment	\$500/Day
Field Meters*	
Anemometer	\$25/Day
Conductivity and Temperature	\$35/Day
Dissolved Oxygen	\$35/Day
Nephelometer	\$75/Day
pH	\$35/Day
Boats*	
34' Research Vessel : D.W. Hood	\$1,500/Day
30' Research Vessel : Prophecy	\$1,350/Day
21' Zodiac Mark 5	\$450/Day
17' Boston Whaler	\$350/Day
14' Jon Boat	\$100/Day
13' Zodiac Mark 3	\$300/Day
15 hp Outboard Engine	\$75/Day
A-Frame w/ Puller Motor, for Whaler & Zodiac	\$50/Day

**KINNETIC LABORATORIES, INC. DIRECT COSTS AND TRAVEL
SCHEDULE (continued)**

ITEM	COST
Navigation*	
GPS, Differential w/ Base Station	\$350/Day
GPS, Differential w/ Beacon Receiver	\$150/Day
Loran C	\$40/Day
Mini Ranger	\$350/Day
Transit Surveyor	\$50/Day
Water Sampling*	
Diaphragm Pump, Teflon	\$25/Day
Go Flo Bottle	\$25/Day
Niskin Bottle w/ Messenger	\$25/Day
Peristaltic Pump	\$75/Day
Valskon Sampler	\$60/Day
VIPS, Trace Metals Sampler	\$250/Day
Sediment Sampling*	
Gravity Core, 3-1/2" X 8' w/ Butyrate Liners	\$125/Day
Gravity Core, 1-3/4" X 2' w/ Butyrate Liners	\$75/Day
Hand Core, Stainless-Steel	\$50/Day
Vibracore, 4" diameter up to 20' length w/ Generator	\$1,050/Day
Bucket Dredge, Stainless-Steel, 40-Gal. Capacity	\$200/Day
Gray/O'Hara Box Core, Halar Coated	\$150/Day
Smith/MacIntyre, Halar Coated	\$100/Day
Smith/MacIntyre, Galvanized Steel	\$75/Day
Van Veen, 0.1 m2, Halar Coated w/ Cage	\$100/Day
Van Veen, 0.1 m2, Stainless-Steel w/ Cage	\$75/Day
Van Veen, 0.1 m2, Kynar Coated	\$100/Day
Van Veen, 0.06 m2, Stainless-Steel	\$50/Day
Ponar Grab, 0.06 m2, Galvanized Steel	\$50/Day
Sediment Mixer, Hobart (30-Gal. Capacity)	\$150/Day
Dive Operations*	
Communication Gear, Diver to Diver or Diver to Ship	\$50/Day

**KINNETIC LABORATORIES, INC. DIRECT COSTS AND TRAVEL
SCHEDULE (continued)**

ITEM	COST
Oceanographic Monitoring*	
CTD w/ D.O. ph Transmissivity	\$400/Day
Current Meter, Doppler	\$2,000/Month
Current Meter, Acoustic	\$800/Month
Current Meter, Rotor	\$500/Month
Current Meter, Tape Reader	\$100/Day
Drogue, Holey Sock	\$35/Day
Drogue, Window Shade	\$35/Day
Fluorometer	\$150/Day
Fluorometer w/ Data Logger	\$175/Day
OBS, D&A, w/ Pressure Housing and Data Logger	\$500/Month
Underwater Beacon	\$150/ Month
Underwater Beacon Locator	\$150/Day
Release, Acoustic	\$400/Month
Release, Acoustic, Command Unit	\$300/Day
Thermistor Chain, 16 Array	\$750/Month
Thermistor Chain, 8 Array	\$600/Month
Data Logger*	
Datalogger/Controller	\$50/Day
Interface Device	\$25/Day
Multiplexer Device	\$25/Day
Storage Module	\$25/Day
Benthic and Bioaccumulation*	
Benthic Sampling Sieves, Table, Supplies	\$50/Day
Crab Trap, Plastic	\$25/Day
Long-Line Fishing Gear	\$25/Day
Otter Trawl, 25'	\$100/Day
Otter Trawl, 16'	\$90/Day

Biological Testing – ToxScan, Inc.

BIOASSAY/BIOACCUMULATION EXPOSURES	1 ST SAMPLE PRICE	ADDITIONAL SAMPLE PRICE
Suspended Particulate Phase Bioassays*		
<i>Mytilus edulis</i> / <i>M. galloprovincialis</i>	\$1400	\$390
<i>Mysidopsis bahia</i>	\$1320	\$525
<i>Menidia beryllina</i>	\$1320	\$525
Solid Phase Bioassays – 10 day		
<i>Ampelisca abdita</i>	\$2250	\$700
<i>Neanthes arenaceodentata</i>	\$2250	\$700
<i>Nephtys caecoides</i>	\$2250	\$700
<i>Rhepoxynius abronius</i>	\$2250	\$700
<i>Eohaustorius estuarius</i>	\$2250	\$700
Chronic Bioassays – Marine**		
<i>Haliotis rufescens</i>	\$1400	\$390
<i>Strongylocentrotus purpuratus</i>	\$1275	\$330
<i>Macrocystis pyrifera</i>	\$1620	\$445
<i>Atherinops affinis</i>	\$2400	\$1440
<i>Menidia beryllina</i>	\$2400	\$1440
Chronic Bioassays – Freshwater**		
<i>Ceriodaphnia dubia</i>	\$1500	\$1080
<i>Pimephales promelas</i>	\$1980	\$1140
<i>Selenastrum capricornutum</i>	\$960	\$480
28 Day Bioaccumulation Exposures		
<i>Nereis viriens</i>	\$3625	\$990
<i>Nephtys caecoides</i>	\$3625	\$990
<i>Macoma nasuta</i>	\$3625	\$990

TOXICITY IDENTIFICATION EVALUATION (TIE) TESTING	
<i>Ceriodaphnia dubia</i>	
Phase 1	\$4500
Phase 2	\$6500
Phase 3	\$4000
<i>Pimephales promelas</i>	
Phase 1	\$5500
Phase 2	\$7000
Phase 3	\$4500
<i>Haliotis rufescens</i>	
Phase 1	\$4500
Phase 2	\$6500
Phase 3	\$4500
<i>Selenastrum capricornutum</i>	
Phase 1	\$4500
Phase 2	\$6000
Phase 3	\$4500

EXHIBIT “B”

City’s Representative:

City Engineer or His Designee

EXHIBIT “C”

Materials/Information Furnished: NONE

CITY OF LONG BEACH POLICY FOR DISADVANTAGED, MINORITY-OWNED AND WOMEN-OWNED BUSINESS ENTERPRISES

It is the policy of the City of Long Beach to utilize Disadvantaged, Minority-Owned and Women-Owned Business Enterprises in all aspects of contracting, including construction, the purchase of materials and services, including professional services, leases and the granting of concessions.

EXHIBIT "D"