

I. Executive Summary

A. Project Title: Chronic Aquatic Toxicity Monitoring for Ambient (Receiving) Waters in the San Joaquin River Watershed, NPDES Monitoring Results for 1991-1997

B. Applicant Name: Sierra Foothill Laboratory (SFL)

C. Project Description

Chronic three species freshwater aquatic toxicity testing of ambient (receiving) waters in the San Joaquin River watershed has been routinely performed for NPDES permittees in the watershed, beginning in 1991. NPDES permittees are frequently required to dilute wastewater effluent with ambient (receiving) water for chronic toxicity monitoring. At least 5% of the NPDES permittees in the San Joaquin River watershed have been required to study the aquatic toxicity of ambient (receiving) waters as part of their NPDES effluent monitoring program. An estimated 70 chronic, three species toxicity tests per year exist for ambient waters in the San Joaquin River watershed for the most-recent years, with probably progressively fewer per year from 1991 through 1994. Preliminary data retrieval indicates at least 3 NPDES permittees testing ambient water in the Yolo Basin, 8 permittees in the Delta Basin, 6 permittees in the East Side Delta Tributaries, 3 permittees in the West San Joaquin Basin, and 1 permittee in the East San Joaquin Basin. Ambient (receiving) water testing has been performed on a non-episodic basis (usually quarterly), so seasonal as well as annual patterns may become evident when data are retrieved. Currently, no data reside in the State Water Resources Control Board database for chronic toxicity monitoring results for Region V (Saiz, verbal 7/22/97). Ambient and effluent chronic toxicity monitoring results reside as hard-copy and microfiche reports in permittee monitoring files.

Retrieval of ambient chronic three species aquatic toxicity data resident with NPDES monitoring in the San Joaquin watershed will provide a wider spectrum of information about ambient waters than is now accessible. Organization of data will assure that data meet standard acceptability criteria, and will be formatted to facilitate export of data for other research and analytical uses. Categorization of data into watershed areas and general receiving water type along with graphical representation of ambient toxicity data over time should yield a concise summary of trends in ambient aquatic toxicity in the San Joaquin River watershed. The project is estimated to be complete in a minimum of nine months, to a maximum of eighteen months.

Ecosystem restoration for the priority species may be more efficient as a result of review of ambient chronic toxicity testing of surrogate species in the watershed.

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D. Approach/Tasks/Schedule

The objective of this project is to make chronic toxicity monitoring data of receiving waters readily available to interested persons. To meet this objective, SFL will retrieve the data from the public domain, standardize the quality of the data, and create a compendium of existing data for ambient sites associated with NPDES chronic aquatic toxicity compliance monitoring in the San Joaquin River watershed. NPDES permittees are frequently required to dilute wastewater effluent with ambient water. Consequently, receiving water data are resident with effluent data. Data are archived at the Central Valley Regional Water Quality Control Board (CVRWQCB). From the CVRWQCB case files, SFL will determine which permittees are required to dilute effluent with receiving water. SFL will then extract from the monitoring files receiving water chronic aquatic toxicity data. SFL will retrieve, categorize, and summarize the data and issue a comprehensive report within nine to eighteen months of project approval.

E. Justification for Project and Funding by CALFED

SFL believes that this study provides an important tool for San Joaquin watershed researchers and policy-makers in that it provides data are not currently available.

F. Budget Costs and Third Party Impacts

Direct salary and benefit costs total \$112,000 for an estimated 1120 man-hours of labor. Milestone reports will be issued at quarterly intervals. Project billing will be monthly. No third party impacts are forecast.

G. Applicant Qualifications

Sierra Foothill Laboratory is a well-established environmental testing laboratory in operation for eighteen years. Staff possess masters' and doctorate degrees. Chronic and acute freshwater aquatic toxicity data have been routinely generated by the laboratory since 1988. Both long-term and short-term contracts have previously been held with the CVRWQCB, but none are currently active. Only satisfactory performance evaluations have been received.

H. Monitoring and Data Evaluation

Statistical significance of individual results is not a foremost concern in this work; rather, trends, cycles, or averages over time are of primary interest. Section III-F supplies detail regarding proposed data evaluation.

I. Local Support/Coordination with other Programs --Compatibility with CALFED objectives

Ecosystem restoration efforts for the priority species and the freshwater aquatic habitats listed by CALFED may be made more efficient in the San Joaquin River watershed if historical data for ambient aquatic toxicity are available for use by researchers or policy-makers.

II. Title Page

A. Title of Project: Chronic Aquatic Toxicity Monitoring for Ambient (Receiving) Waters in the San Joaquin River Watershed, NPDES Monitoring Results for 1991-1997

B. Name of applicant/principle investigator

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Sierra Foothill Laboratory
PO Box 1268
823 S. Highway 49
Jackson, CA 95642
(209) 223-2800 phone
(209) 223-2747 fax
sfl@volcano.net

C. Type of Organization and Tax Status

Sierra Foothill Laboratory is a Private commercial laboratory operated as a sole-proprietorship.

D. Tax Identification Number and/or contractor license

- Federal Tax Identification Number: 94-2545214
- Certified by California Department of Health Services Environmental Laboratory Accreditation Program #1113

E. Technical and Financial Contact person -- Sandra Nurse, Owner

F. Participants/Collaborators In Implementation

In cases where receiving water data are not resident with effluent monitoring reports in the public domain, SFL will seek the cooperation of NPDES permittees to release data directly to SFL.

G. RFP Project Group Type -- Group 3: Services

Sandra Nurse Sandra Nurse

Date 7-28-97

III. Project Description

A. Project Description and Approach

Chronic three species freshwater aquatic toxicity testing of ambient (receiving) waters in the San Joaquin River watershed has been routinely performed for NPDES permittees in the watershed, beginning in 1991. Both the chronic toxicity testing protocol and the species tested have been standard throughout this historical period for NPDES permittees. At least 5% of the NPDES permittees in the San Joaquin River watershed have been required to study the aquatic toxicity of ambient (receiving) waters as part of their NPDES effluent monitoring program. An estimated 70 chronic, three species toxicity tests per year exist for ambient waters in the San Joaquin River watershed for the most-recent years, with probably progressively fewer per year from 1991 through 1994. Preliminary data retrieval indicates at least 3 NPDES permittees testing ambient water in the Yolo Basin, 8 permittees in the Delta Basin, 6 permittees in the East Side Delta Tributaries, 3 permittees in the West San Joaquin Basin, and 1 permittee in the East San Joaquin Basin. Ambient (receiving) water testing has been performed on a non-episodic basis (usually quarterly), so seasonal as well as annual patterns may become evident when data are retrieved. Currently, no data reside in the State Water Resources Control Board database for chronic toxicity monitoring results for Region V (Saiz, verbal 7/22/97). Ambient and effluent chronic toxicity monitoring results reside as hard-copy and microfiche reports in permittee monitoring files.

Although there is no algorithm to translate the results of chronic testing to effect on the aquatic ecosystem, there is good correlation between surrogate species used in the toxicity testing and species resident in the aquatic environment. The USEPA developed the three species chronic toxicity protocol (USEPA, 1989) as a warning system of potential pollutant impacts of effluents. Test protocol are applicable for use with ambient waters (Norberg-King, June 1996). DeVlaming (in press 1997) concluded that in a majority of cases, toxicity test results are reliable qualitative predictors of aquatic ecosystem community responses when based on a series of test results and not on a single test result.

Retrieval of ambient chronic three species aquatic toxicity data resident with NPDES monitoring in the San Joaquin watershed will provide a wider spectrum of information about ambient waters than is now accessible. Organization of data will assure that data meet standard acceptability criteria, and will be formatted to facilitate export of data for other research and analytical uses. Categorization of data into watershed areas and general receiving water type along with graphical representation of ambient toxicity data over time should yield a concise summary of trends in ambient aquatic toxicity in the San Joaquin River watershed.

Ecosystem restoration for the priority species may be more efficient as a result of review of ambient chronic toxicity testing of surrogate species in the watershed.

1. Retrieve

The objective of this project is to retrieve chronic three species aquatic toxicity monitoring data for ambient (receiving) waters in the San Joaquin River watershed. Concurrent chemical measurements made upon the ambient sample used in the aquatic toxicity testing will also be retrieved. Usually these measurements include pH, conductance, dissolved oxygen, alkalinity, and hardness; total residual chlorine and total ammonia are sometimes measured. Approximately 5% of the NPDES permittees in the San Joaquin River watershed are required to dilute wastewater effluent with R1 upstream ambient (receiving) water for their NPDES chronic toxicity monitoring. Chronic three species aquatic toxicity monitoring data for the undiluted R1 upstream ambient (receiving) waters are resident with the chronic toxicity effluent monitoring results for these NPDES permittees. Data are archived at the Sacramento and Fresno offices of the Central Valley Regional Water Quality Control Board (CVRWQCB).

Sierra Foothill Lab will examine the case files for each NPDES permittee in the designated portion of the San Joaquin River watershed (figure 1) to determine which permittees are required to dilute their effluent with ambient (receiving) water for chronic toxicity monitoring. Approximately 30 permittees with discharges >0 mgd exist in the Yolo Basin, 89 in the Delta Basin, 73 in the East Side Delta Tributary, 136 in the East San Joaquin Basin, and 97 in the West San Joaquin Basin (table 1). CVRWQCB case rooms will be visited and upwards of 435 permits will be examined. Copies of permits which require ambient (receiving) water toxicity monitoring will be made, and site location will be subsequently mapped and described. An estimated 21 NPDES permits containing ambient three species chronic aquatic toxicity monitoring exist for the San Joaquin River watershed.

Pertinent monitoring data will be examined and retrieved for 6/30/91 forward to 6/30/97. Pertinent data will include date/time of sample, dates of test, any chemical parameters measured for each sample, laboratory bench sheets if available, % mortality, average fish weight, average invertebrate reproduction, and sample manipulation comment. Data will be retrieved for ambient (receiving) water and for laboratory control.

2. Organize

Aquatic toxicity data will be reviewed to determine if laboratory control met the minimum test acceptability criteria. Data which do not meet TAC will be discarded. Acceptable fathead minnow tests must have 80% or greater survival in controls; average dry weight of surviving controls equals

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or exceeds 0.25mg. Acceptable *Ceriodaphnia dubia* tests must have 80% or greater survival and an average of 15 or more young/surviving female in the control solution; at least 60% of surviving females in the controls should have produced their third brood. Acceptable *Selenastrum capricornutum* tests must have 200,000 cells/ml in the controls; variability of controls should not exceed 20%. (USEPA, 1989)

Chemical measurements and usable chronic toxicity data will be organized into a spreadsheet format. Data in this file will be organized by parameter and test date for each site. The objective of this organization is to create a compendium of existing data in a form easily exported for use in subsequent research or data analyses. The format will include the following:

- Watershed
- Watershed sub area (Delta Basin, etc.)
- Site Description
- Test initiation date
- Chemical parameters measured: sample1, sample2, sample3
- Sample manipulation description
- Daily mortality detail if available
- Fathead minnow % mortality, ambient
- Fathead minnow % mortality, control
- Fathead minnow avg. dry weight, ambient
- Fathead minnow avg. dry weight, control
- *Ceriodaphnia dubia* % mortality, ambient
- *Ceriodaphnia dubia* % mortality, control
- *Ceriodaphnia dubia* average young, ambient
- *Ceriodaphnia dubia* average young, control
- *Selenastrum capricornutum* density, ambient
- *Selenastrum capricornutum* density, control.

3. Categorize/ Summarize

Data will be graphically presented in the following ways:

a) *By site*

Within each watershed area (Delta Basin, etc.), graphs will be generated for each site. Percent mortality, average weight, average reproduction, and cell density will be plotted against time at each site for both the ambient (receiving) water and the lab control.

b) *By category of ambient (receiving) water*

Ambient (receiving) water data from ephemeral sites in the San Joaquin River watershed will be grouped and graphed together. Data from waterways with year-round ambient (receiving) water

flow will be grouped and graphed together. Data from a main stem river (San Joaquin, Stanislaus, Tuolumne, or Merced) will be grouped and graphed together.

B. *Location and/or geographic boundaries of project*

The geographic boundaries of the project are outlined in bold on the map included in the RFP (Figure 1). Counties included are Sacramento, Yolo, Stanislaus, San Joaquin, El Dorado, Amador, Calaveras, Tuolumne, Fresno, Mariposa, Madera, and Merced. A preliminary list of NPDES permittees with discharges >0 mgd may be found in Table 1.

C. *Expected benefits*

Screening for impairment of a freshwater vertebrate, invertebrate, and algae exists for at least 21 sites in the San Joaquin River watershed, beginning in 1991. Aggregate toxicity has been assessed for these sites. Bioavailability has been measured at these sites. Stress on the ecosystem due to ambient water quality can be tracked at these sites for up to 6 years. This testing has been performed using the standard USEPA protocol for chronic aquatic toxicity testing and has used the younger life stages of the test organisms, stages which may have longer exposure and/or greater sensitivity to contaminants. This series of toxicity test results may be considered a reliable qualitative predictor of aquatic ecosystem response. Retrieval and organization of this ambient toxicity monitoring widens the spectrum of information available and, at the minimum, presents what we know to date. Whether the surrogate vertebrate tested has a similar sensitivity to the salmonid species on the CALFED priority species list may or may not be debatable. Whether the surrogate invertebrate tested has a similar sensitivity to the small zooplankton used as food by the splittail, delta smelt, and striped bass may or may not be debatable. Whether the measurement of cell density for a single-cell green algae directly relates to primary production in the aquatic ecosystem may or may not be debatable.

The primary benefit would be to retrieve and summarize a relatively-large body of aquatic toxicity data gathered using a standard protocol over a long period of time. Data accessibility and incorporation into future projects may be a secondary benefit. Third party benefits are not projected at this time.

D. *Background and Biological/Technical Justification*

The retrieval of historical ambient aquatic toxicity data will yield information for at least 21 sites in the San Joaquin River watershed. At this time, test data may be erroneously assumed not to be present because they are not easily accessible. The testing protocol was standard for the 6 year period spanned. But the hydrologic events in the watershed during this period included a range of events which may be of interest for comparison to aquatic toxicity data in the ambient waters.

To date, Sierra Foothill Lab expenditures are minimal, including acquisition of a listing of NPDES permittees and preparation of this RFP.

E. Proposed Scope of Work

- Project will be billed monthly and reported quarterly.
- **Preliminary Stage** -- An estimated 300 man-hours will be needed to determine which of the 435+ NPDES permittees have ambient toxicity monitoring data available for retrieval.
- **Stage 2** will report for retrieval of this information. An estimated 420 man-hours will be needed to retrieve aquatic toxicity and chemical measurement information from the NPDES monitoring files.
- **Stage 3** will report for retrieval of this information. An estimated 400 man-hours will be needed to synthesize the information into a compendium database, to generate the summary graphs, and to complete the final report.
- **Stage 4** will report the final stage. The final report will be available electronically as well as hard-copy. The stages can proceed as quickly as data retrieval can proceed. Each stage is estimated to take from 3 - 6 months, with the entire project complete in 9 - 18 months.

F. Monitoring and Data Evaluation

Data collected and reported for NPDES permits must be done by certified laboratories following EPA protocol (which specify precise test methods and quality control). It is assumed that the results reported by different laboratories over time will be comparable and reliable.

Fathead minnow mortality will be presented as the difference between ambient percent mortality and control percent mortality. Fathead growth will be expressed as the ratio of ambient to control dry weights.

Likewise, Ceriodaphnia mortality will be the difference between ambient and control percent mortalities and reproduction as the ratio of mean number of young in ambient water to mean number of young in the control.

The method of calculating fathead growth and Ceriodaphnia reproduction was changed between EPA's 2nd and 3rd edition manuals. Most, if not all, of the data collected to date was reported using 1st or 2nd edition. If any data is found using 3rd edition calculations, the results may not be strictly comparable and may have to be recalculated using the older method.

Selenastrum algae data will be expressed as the ratio of ambient to control densities.

Statistical significance of individual results is not a foremost concern in this work; rather, trends, cycles, or averages over time are of primary interest. Therefore,

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only the “threshold” differences or ratios will be adopted for the significance of individual results which would be based on the number of replicates (if reported) or the minimum number of replicates required by EPA, and on typical variances for bioassays.

G. *Implementability*

Data retrieval will be from documents in the public domain, resident at the Sacramento and Fresno offices of the California Water Resources Control Board. In the unanticipated event that some data may reside with the permittee, the permittee will be petitioned for release of the data for use in this project.

IV. Costs and Schedule to Implement Proposed Project

A. Budget costs

As delineated in Section III-E of this proposal a total of 1120 man-hours will be required to complete this project. At \$100 per hour, total cost of this proposal is \$112,000. Direct salary and benefits comprise the costs for this project.

B. Schedule Milestones

See Section III-E for detail of project milestones

C. Third Party Impacts

No third party impacts are anticipated

V. Applicant Qualifications

Sierra Foothill Laboratory is a well-established environmental testing laboratory, in business since January 1979. Sandy Nurse is co-owner of the lab and has headed the aquatic toxicity testing section since 1988. Synthesis of the data retrieved will be overseen by Sandy Nurse. Larry Kepner is the PhD on staff at Sierra Foothill Lab who is routinely involved with the analysis of aquatic toxicity test data. Larry will analyze the data and generate the graphical presentations in the final report. Formulation of the retrieved data into a spreadsheet database will be overseen by Richard Johnstone, laboratory QA/QC officer. Data retrieval will be performed by technical staff specifically trained for the project.

In the 18 years of operation, Sierra Foothill Lab has participated in the generation of data for many projects that have run long-term. A project for the CVRWQCB funded through the USEPA required that the lab test with *Ceriodaphnia* for 52 consecutive weeks in 1991-1992. Timely performance is a hallmark of the lab.

Past contracts (including the one mentioned above) have been between the lab and Region V CVRWQCB, but no current contracts are in place. Those contracts have involved laboratory generation of aquatic toxicity data. It is unforeseen as to whether or not this data will be retrieved for the purposes of this report. Sierra Foothill maintains a long-standing professional relationship with both the Fresno and Sacramento offices of the Regional Water Quality Control Board. A proportion of the ambient aquatic toxicity data which will be retrieved from the public domain for this report has been generated by Sierra Foothill Laboratory. Any preference toward this data is not anticipated because all data retrieved will be objectively reviewed for standard test method and data quality prior to use for this project.

VI. Compliance with standard terms and Conditions

Forms required with submittal (attached): Non-discrimination; Small Business Preference

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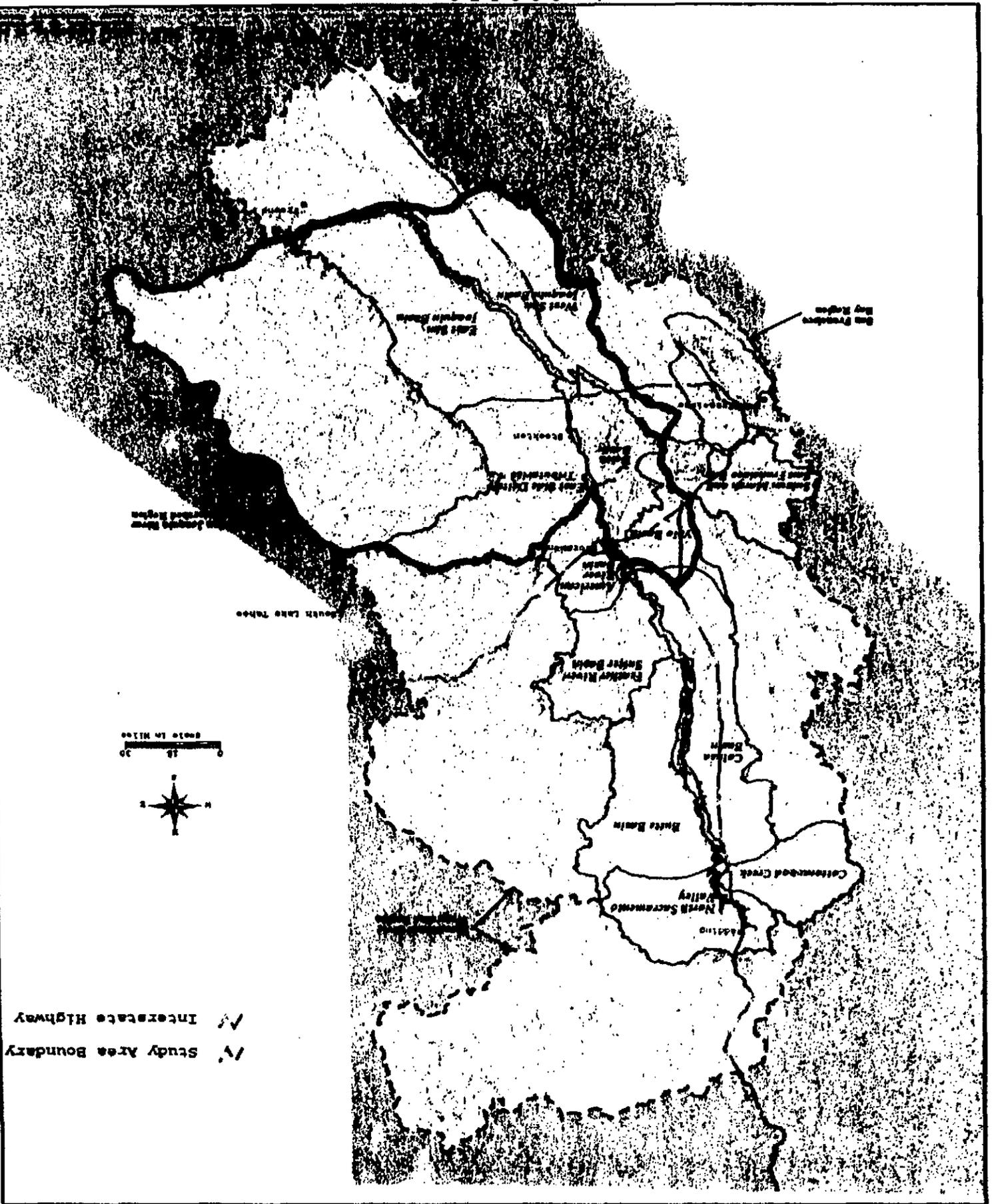
TABLE 1 - Geographic Boundaries of Project

Watershed Region	County	Target NPDES Discharges
Delta Basin	San Joaquin	60
Delta Basin	Stanislaus	29
East San Joaquin Basin	Mariposa	22
East Side Delta Tributaries	Amador	12
East Side Delta Tributaries	Calaveras	29
East Side Delta Tributaries	El Dorado	15
East Side Delta Tributaries	Tuolumne	17
East/West San Joaquin Basin	Fresno	114
West San Joaquin Basin	Madera	43
West San Joaquin Basin	Merced	54
Yolo Basin	Sacramento	24
Yolo Basin	Yolo	16

BIBLIOGRAPHY

- USEPA. 1989. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organism, 2nd Ed. EPA600/4-89-001. Environmental Monitoring and Support Laboratory. Cincinnati, OH.
- Norgerg-King, T.J. 1996. EPA Toxicity Evaluation Procedure and Underlying Philosophy. Pesticide Symposium. NorCal SETAC. Sacramento, CA.
- DeVlaming, V. 1997 in press. Are the Results of Single Species Toxicity Tests Reliable Predictors of Aquatic Ecosystem Community Response? A Review. California State Water Resources Control Board. Sacramento, CA.
- Saiz, S. 1997. Phone Conversation. Californial Environmental Protection Agency/StateWater Resources Control Board. Sacramento, CA.

GEOGRAPHIC SCOPE OF RFP PROGRAMS AND PROJECTS



NONDISCRIMINATION COMPLIANCE STATEMENT

COMPANY NAME

Sierra Foothill Laboratory

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age, marital status, denial of family and medical care leave and denial of pregnancy disability leave.

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California

OFFICIAL'S NAME

Sandra Nurse

DATE EXECUTED

7/28/97

EXECUTED IN THE COUNTY OF

Amador

PROSPECTIVE CONTRACTOR'S SIGNATURE

Sandra Nurse

PROSPECTIVE CONTRACTOR'S TITLE

Owner

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME

Sierra Foothill Laboratory

Agreement No. _____

Exhibit _____

**STANDARD CLAUSES --
SMALL BUSINESS PREFERENCE AND CONTRACTOR IDENTIFICATION NUMBER****NOTICE TO ALL BIDDERS:**

Section 14835, et. seq. of the California Government Code requires that a five percent preference be given to bidders who qualify as a small business. The rules and regulations of this law, including the definition of a small business for the delivery of service, are contained in Title 2, California Code of Regulations, Section 1896, et. seq. A copy of the regulations is available upon request. Questions regarding the preference approval process should be directed to the Office of Small and Minority Business at (916) 322-5060. To claim the small business preference, you must submit a copy of your certification approval letter with your bid.

Are you claiming preference as a small business?

Yes* No

*Attach a copy of your certification approval letter.

DEPARTMENT OF GENERAL SERVICES

OFFICE OF SMALL AND MINORITY BUSINESS
 1531 I STREET, SECOND FLOOR
 SACRAMENTO, CA 95814-2018



May 8, 1995

PIN #1128757
 SIERRA FOOTHILL LABORATORY
 P O BOX 1268
 JACKSON CA 95642

Dear Businessperson:

The Office of Small and Minority Business (OSMB) conditionally approves your firm's small business certification request effective 05/02/95 through 04/30/98. This certification enables your firm to use the 5% bidding preference in state government contracts according to the Small Business Procurement and Contract Act. Reverification of status may occur any time the OSMB deems appropriate. The small business certification is **ONLY** applicable to the following industry group(s) within the designated business type(s):

<u>Business Type(s)</u>	<u>Industry Group(s)</u>	<u>Description</u>
Service:	(ix)(h)	Business Services/Commercial Testing Labs

1. Current small business certification status requires:

A. Annual submission of the following items:

- Notarized "Affidavit of Income" (AI) form (enclosed) for the applicant and each affiliate in lieu of Federal Tax Returns (FTRs). The AI must be submitted at the conclusion of each firm's tax year and is only valid for 90 days. If the FTRs cannot be provided within 90 days, submit a photocopy of a valid Federal Tax Extension for each FTR filed.
- SIGNED FTRs as submitted to the Internal Revenue Service (IRS) for the applicant and each affiliate.

B. Written notification of any change of address, signed by an owner/officer.

C. ALL changes in business name, structure or ownership require completion of a new Std. 812 (formerly OSMB Form 11).

2. Upon being awarded a state contract, your firm can participate in the Prompt Payment Act Program. Submit the following to the OSMB to receive a rubber stamp:

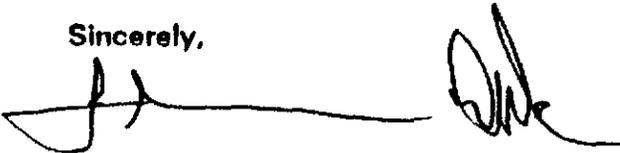
A. A written request to the OSMB for the rubber stamp;

- B. A copy of a current state contract or purchase order soliciting services from the applicant;
- C. A \$15.00 check/money order made payable to the Department of General Services.

A high grade rubber stamp with a corresponding PIN number will be ordered by the OSMB. Once received, the stamp and instructions for its use will be sent.

The OSMB will send a renewal application prior to expiration of your small business certification. Thank you for doing business with the State.

Sincerely,



Flemming L. Duke
Programs/Certification Officer
(916) 322-3422

FLD:sjc

Enclosures