

EXHIBIT A
SCOPE OF WORK

“Pesticide Water Quality Criteria Development”

1. The Regents of the University of California, Davis (UCD), agrees to provide the following research services to the State Water Resources Control Board, California Regional Water Quality Control Board, Central Valley Region (Regional Board) as described herein:

Pesticide Water Quality Criteria Development – The purpose of this study is to identify or develop a method or methods for deriving numeric water quality criteria that are protective of aquatic life and could be used as the basis for pesticide water quality objectives in the Central Valley of California. UCD will review available criteria development methodologies; propose, modify, or develop a methodology appropriate for pesticides; and apply that methodology to pesticides identified by Regional Board staff as posing a potentially high risk to surface waters (including diazinon and chlorpyrifos).

2. The project representatives during the term of this agreement will be:

Regional Board	UCD
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Direct all inquiries to:

Regional Board	UCD
Attention: Joe Karkoski	Attention: Dr. Patti L. TenBrook
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The parties may change their Project Representative upon providing ten (10) days written notice to the other party prior to the change.

A. Scope and Objectives

Background

The Regional Board is charged with the protection of water quality in the Central Valley. The Regional Board is the lead agency for implementation of both the California Porter-Cologne Water Quality Control Act and the Federal Clean Water Act. As part of its charge, the Regional Board adopts water quality objectives to protect the beneficial uses of surface water and groundwater. Although the Regional Board has narrative objectives for pesticides and other contaminants, there are very few numeric objectives. The lack of numeric objectives makes it more challenging to assess the status of Central Valley waterways and to ensure that dischargers are protecting beneficial uses.

The Regional Board has begun addressing this issue through its Total Maximum Daily Load (TMDL) process. When adopting TMDLs, the Regional Board is often addressing beneficial

use designations, water quality objectives, and programs of implementation. This comprehensive approach provides a complete framework for solving the identified surface water quality problem.

As part of the adoption of the diazinon TMDL for the Sacramento and Feather Rivers, some stakeholders raised concerns that a focus on a single pesticide might only result in a shift by growers to another pesticide, without improving water quality. The Regional Board plans to address this concern by taking a more comprehensive look at pesticides that could pose a risk to surface water quality. One part of that process requires the development of numeric water quality criteria that may form the basis for numeric water quality objectives.

The United States Environmental Protection Agency (U.S. EPA) and many states have used the U.S. EPA's methodology (U.S. EPA, 1985) for deriving numeric aquatic life criteria. The methodology has served as the basis for establishing hundreds of water quality standards throughout the country. For numeric criteria, Federal regulations (40 CFR 131.11) indicate that states should use the Clean Water Act Section 304(a) Guidance (i.e. the U.S.EPA 1985 methodology for aquatic life) or other scientifically defensible methods.

Although the U.S. EPA methodology is scientifically defensible, it does not provide clear guidance when data for all eight required families are not available. Additionally, the methodology assumes an unbiased data set of toxicity results (i.e. toxicity tests were performed with no known or assumed tolerance of the species tested to the toxicant).

Since there are limitations to the U.S. EPA methodology, the Regional Board is interested in developing or identifying alternative methods for establishing numeric water quality criteria. An alternative methodology may then be used as the basis for establishing new water quality objectives.

Objectives

The purpose of this project is to identify or develop a method or methods for deriving numeric water quality criteria that are protective of aquatic life and could be used as the basis for pesticide water quality objectives in the Central Valley of California. The methodology must have the following characteristics: 1) scientifically and technically defensible; 2) applicable to aquatic life effects data sets of varying quantity; 3) ability to differentiate between lethal and sublethal effects; 4) ability to describe or account for uncertainty based on variability and quantity of the data set; and 5) ability to differentiate between effects on different groups of aquatic organisms (e.g. invertebrates v. fish).

The scope of this project will include the development of water quality criteria for at least diazinon and chlorpyrifos. As funding allows, criteria will be developed for other pesticides that potentially pose a high risk in Central Valley waterways.

B. WORK TO BE PERFORMED

Contractor shall be responsible for the performance of the work as set forth herein and for the preparation of products and a final report as specified in this Exhibit. The Project Director

shall promptly notify the Contract Manager of events or proposed changes that could affect the scope, budget, or schedule of any work to be performed under this Agreement.

Task 1. Project Management and Administration

UCD shall provide all technical and administrative services as needed for Agreement completion; monitor, supervise and review all work performed; and coordinate budgeting and scheduling to assure that the Agreement is completed within budget, on schedule and in accordance with approved procedures, applicable laws and regulations.

Ensure Agreement requirements are met through completion of quarterly progress reports submitted to the Contract Manager by dates specified in the Schedule of this Exhibit and through regular communication with the Contract Manager. The progress reports shall describe activities undertaken and accomplishments of each task during the quarter, milestones achieved, and any problems encountered in the performance of the work under this Agreement. The description of activities and accomplishments of each task during the quarter shall be in sufficient detail to provide a basis for payment of invoices and shall be translated into percent of task work completed for the purpose of calculating invoice amounts.

Provide a detailed work plan with specific timelines, milestones, and estimated resource expenditures that cover the duration of the project and addresses each identified task.

Products: Quarterly progress reports and invoices. Project work plan.

Task 2. Evaluation of Criteria Development Methodology

Conduct an evaluation of water quality criteria development methodologies proposed by other researchers; used by other States and the US EPA; and used by other countries. The focus of the evaluation will be on those methodologies used to develop criteria that are protective of aquatic life uses. Methodologies employed to derive human health criteria may also be evaluated if key features of those methodologies can be adapted to derivation of aquatic life criteria. The evaluation must include, at a minimum:

Identification of the key features of each methodology;
Identification of criteria used to evaluate each methodology;
Evaluation of the strengths and weaknesses of each methodology with respect to the criteria;
Listing of all references used; and
Responses to peer review comments.

Products: Draft Evaluation Report for peer review and Regional Board review. Final Evaluation Report. Copies of all references cited in the report. One hard copy and one electronic copy of each report shall be submitted. One hard copy of references shall be submitted.

Task 3. Development of a Pesticide Water Quality Criteria Methodology

UCD will develop a methodology for deriving aquatic life water quality criteria for pesticides. The methodology may be based on an existing methodology; a combination of existing methodologies; or a new methodology and must include the following features:

A procedure for assessing the quality and applicability of toxicity test results;
A process that allows the derivation of criteria for pesticides that have varying toxicity datasets (i.e. from limited data sets to robust data sets);
Ability to incorporate into the final criteria a safety factor that accounts for the uncertainty and variability in the toxicity data set;
A procedure for deriving criteria based on short-term (1 day or less) and long-term (4 days or more) exposures;
Ability to incorporate toxicity information based on both lethal and sublethal (including behavioral, reproductive, and growth) effects;
A process that allows toxic effects to different groups of aquatic organisms (e.g. invertebrates v. fish v. amphibians v. plants) to be identified; and
Proposed numeric criteria of the pesticide (in total or dissolved form) that when attained should not “produce detrimental physiological responses in aquatic life”, as required by the current narrative toxicity objective. The criteria should identify the allowed maximum pesticide concentration, the duration of exposure, and the allowable frequency of excursion, if any, above the maximum.

The criteria should be expressed in a manner that is compatible with typical monitoring programs¹ required to assess compliance. A combination of well-described heuristic and quantitative approaches is acceptable. Responses to peer review comments should be incorporated into the Final Report.

Products: Draft Pesticide Water Quality Criteria Methodology for peer review and Regional Board review. Final Pesticide Water Quality Criteria Methodology. Copies of all references cited in the report. . One hard copy and one electronic copy of each report will be submitted. One hard copy of references will be submitted.

Task 4. Application of the Pesticide Water Quality Criteria Methodology

The methodology developed under Task 3 will be applied to up to five pesticides that pose a potentially high risk to surface waters in the Central Valley. At a minimum, the methodology will be applied to diazinon and chlorpyrifos. As funds are available, the methodology will be applied to other pesticides that are on the 303(d) list of impaired water bodies or have the potential to impact surface waters. The Regional Board will identify the other pesticides that will undergo evaluation.

¹ Most monitoring programs will collect a single daily grab sample for a site or a composite sample that represents a single day.

The applicable toxicity literature for the pesticides in Task 4 will be reviewed and evaluated for their appropriateness in deriving the water quality criteria. The rationale for the acceptance or rejection of a potentially relevant toxicity test will be provided.

The criteria derived using the methodology in Task 3 will be compared to results derived from applying the three best methodologies identified in Task 2. At a minimum, this comparison will be made for diazinon and chlorpyrifos. The differences in the criteria each methodology produces should be discussed.

Products: Draft Diazinon and Chlorpyrifos Criteria documents for peer review and Regional Board review. Final Diazinon and Chlorpyrifos Criteria Documents. Copies of all references cited in the report.

Task 5. Peer review and response to peer review

The Project Director and Contract Manager will convene a three-member peer review panel to review the major deliverables for this project (Tasks 2, 3, and 4). UCD will provide the peer reviewers with reasonable compensation for their time.

The peer reviewers will provide a written evaluation of each of the major deliverables produced by UCD. The peer reviewers will evaluate whether UCD has followed sound scientific principles and practices.

UCD will prepare a response to peer review comments and make any necessary changes to the reports produced. The responses and changes can be incorporated into the Final Reports for Tasks 2, 3, and 4.

Products: Evaluations from the peer reviewers on the draft versions for each of the primary products in Tasks 2, 3, and 4. Response to peer review comments.

Task 6. Presentations at Public Workshops

UCD will present their findings at up to three staff sponsored public workshops. Presentations on the draft results from Tasks 2, 3, and 4 will be given.

UCD will present their draft work plan and proposed approach at one staff sponsored public workshop.

Products: Workshop presentation materials.

**EXHIBIT A – ATTACHMENT 1
SCHEDULE AND LIST OF DELIVERABLES**

Task	Task Title	Deliverable	Estimated Completion Date
1	Project Management and Administration	Project work plan Quarterly progress reports Quarterly invoices	Quarterly throughout the contract term. Due October 15, January 15, April 15, and July 15 of each year.
2	Evaluation of Criteria Development Methodology	Draft Report Final Report References	October 2005 January 2006 January 2006
3	Development of a Pesticide Water Quality Criteria Methodology	Draft Report Final Report References	April 2006 July 2006 July 2006
4	Application of the Pesticide Water Quality Criteria Methodology	Draft Report Final Report References	September 2006 December 2006 December 2006
5	Peer review and response to peer review	Peer reviewer evaluations	Within 30 days of receipt of draft report
6	Presentations at Public Workshops	Workshop presentation materials	September 2005 October 2005 April 2006 September 2006