

Detention Basin Design and Performance for Pyrethroid Removal

Contract 20-C0071 Progress Report #1
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Task 1. Site Selection and Sample Collection. Four agricultural sites in the Central Coast region will be selected for sampling. A flow-through centrifuge will be used to separate and collect concentrated suspended solids and clarified supernatant. Samples will be collected, transported, and stored at 4°C in the laboratory until use.

Work accomplished this period: Whole water, concentrated suspended solids, and clarified supernatant subsamples were collected for two sites in Salinas, California. (Site #1 – Sal Hartnell and Site #2 – Sal Tembl). About 300 grams of concentrated suspended solids and 100 liters of clarified supernatant were collected for each site.

Work planned for the upcoming period: Two more sites in the Central Coast region will be sampled for whole water, concentrated suspended solids, and clarified supernatant subsamples using the flow-through centrifuge and the same methods. Estimated sampling date will be sometime in May-June to examine seasonal variability.

Task 2. Characterize Pyrethroid Phase Distribution in Samples. The freely dissolved (C_{free}), colloiddally associated (C_{doc}), and suspended particle (C_{tss}) bound quantities of targeted pyrethroids; total organic carbon (TOC) and dissolved organic carbon (DOC); and sediment fraction of organic carbon (f_{oc}) will be measured for each site. Together the measurements will be used to calculate site- and compound- specific values of the organic carbon normalized distribution coefficients for suspended solids (K_{oc}) and colloiddal organic matter (K_{DOC}).

Work accomplished this period: Native freely dissolved (C_{free}), colloiddally associated (C_{doc}), and suspended particle (C_{tss}) pyrethroid concentrations in whole water samples for each site have been measured. Additional whole water samples for each site were fortified with targeted pyrethroids and freely dissolved (C_{free}), colloiddally associated (C_{doc}), and suspended particle (C_{tss}) pyrethroid concentrations have been measured.

The total organic carbon (TOC) and dissolved organic carbon (DOC) for each site have also been measured.

Work planned for the upcoming period: Sediment subsamples will be sent to UC Davis Analytical Lab to be analyzed for sediment fraction of organic carbon (f_{OC}). Using this value, final K_{OC} and K_{DOC} partition coefficients will be calculated for each pyrethroid at each site.

Task 3. Perform Settling Column Tests to Assess Removal of Suspended Solids and Pyrethroid Compounds. Suspended solids and clarified supernatant will be recombined at varying ratios to represent different total suspended solid (TSS) concentrations. Small scale settling column tests will be conducted to determine distribution of particle settling velocities and effective removal of pyrethroids over time. Large scale settling column tests in collaboration with UC Davis Aquatic Health Program Lab (AHPL) will be conducted to determine pyrethroid removal and associated toxicity to *Hyalella Azteca*.

Work accomplished this period: None.

Work planned for the upcoming period: Design small-scale and large-scale settling column apparatus and conduct settling column experiments. Small-scale column experiments will be conducted first to characterize particle settling velocities. Using this data and partition coefficients, large-scale settling column experiments will be designed with UC Davis Aquatic Health Program Lab (AHPL) to assess pyrethroid removal and associated toxicity to *Hyalella Azteca*.

Task 4. Develop a Model that Effectively Describes Observed Solids and Pesticide Removals. Use partition coefficients and the data collected from settling column tests to develop a model to describe suspended solids and pyrethroid removal processes.

Work accomplished this period: None.

Work planned for the upcoming period: None.

Task 5. Apply Model to Field Scale Sites to Predict Design-Performance Relationships. Use the model developed in Task 4 to design and predict performance of hypothetical field-scale detention basins to be located at the sampling sites.

Work accomplished this period: None.

Work planned for the upcoming period: None.