

Development of a Site-specific Objective (SSO) for Selenium in the Newport Bay Watershed

Scope of Work with Initial Cost Estimates

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INTRODUCTION

On December 20, 2004, the Santa Ana Regional Water Quality Control Board (RWQCB) issued Order No. R8-2004-0021 (NPDES No. CAG998002) (Order), which specifies waste discharge requirements for short-term (i.e., one year or less) groundwater-related discharges and for de minimus discharges within the Newport Bay watershed. The Order was issued due to the concern that the groundwater-related discharges in the Newport Bay watershed have the potential to adversely affect surface waters and would likely not comply with established Total Maximum Daily Loads (TMDLs) for the watershed.

The Order incorporates an alternative compliance approach that requires either

- a) Compliance with an average monthly concentration limit of 4 µg/L selenium and a daily maximum concentration limit of 8 µg/L selenium, or
- b) Participation in a Working Group to develop and implement a comprehensive Work Plan to address selenium and nitrate discharges in the watershed over the five year permit term.

The Order identifies tasks for the Working Group to complete through the implementation of the Work Plan, including an assessment of the need for a site specific objective (SSO) for selenium for the Newport Bay watershed and development of the SSO if determined appropriate/necessary. The Order establishes individual deadlines for tasks included in the Work Plan and a final compliance deadline of December 20, 2009 for the development/adoption of the SSO (the term of the Order). Meeting these deadlines is critical for compliance with the requirements of the Order. If these deadlines are missed, the Working Group will be considered out of compliance with the permit and the numeric effluent limits will apply.

The Working Group has met the required deadlines for Work Plan tasks to date, including completion of Task 5.1 (Assess Need for a Selenium SSO) by December 20, 2006. Completion of Task 5.1 lead to the conclusion that an SSO for Selenium in the Newport Bay Watershed is warranted based on available data, review of the literature, and expert review of all available evidence. This document presents a preliminary scope of work for completion of Task 5.2 (Develop Site-Specific Objective if needed) as well as other related Tasks such as 1.1, 1.2 and 1.3.

OBJECTIVES

The overarching objective of tasks included in this document is to determine the concentration of selenium (and species of selenium) in surface waters of the Newport Bay Watershed which is protective of local aquatic life and wildlife and to use that information to develop the selenium SSO.

In developing the selenium SSO, the work effort will strive to:

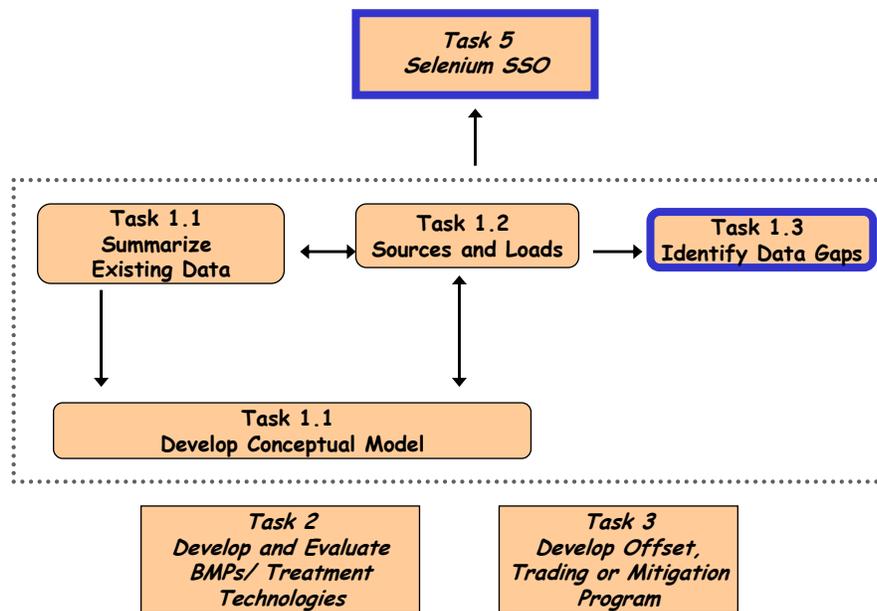
- Maintain flexibility throughout completion of the effort to ensure that implementation of the overall NSMP Work Plan complies with the requirements of the Order; and
- Build upon the work products completed under the Year 1 and Year 2 Scope of Work.

The scope of work for development of the selenium SSO is described below.

Scope of Work

The scope of work for the development of the selenium SSO is presented below in the form of tasks and sub-tasks and is presented within the framework of the *Nitrogen and Selenium Management Program Work Plan, June 2005*. The scope of work recognizes and builds upon previous selenium-related tasks such as the Conceptual Model (Task 1.1) and the Sources and Loads Report (Task 1.2) and includes work that is directly related to the Data Gaps (Task 1.3) and the Development of the Selenium SSO (Task 5.2). The relationship and interconnectedness between the tasks is illustrated within the figure below. The tasks outlined in blue are the tasks that are included within the draft cost estimate. This scope of work is an estimate based on information available as of March 2007, and is subject to change based on new information which may arise during annual work planning efforts

Relationship Between the Nitrogen and Selenium Management Plan Major Tasks



Task 1.1 – Develop Explicit Se Conceptual Model (Year 3 Work Plan)

Under the Year 1 Work Plan, a conceptual model for selenium was developed along with a sources and loadings document. The conceptual model identified processes of transport and transformation, mechanisms of impact, the spatial and temporal detail related to these processes and mechanisms, and features of the models that are essential for the other Work Plan tasks but that are not well characterized (i.e. data gaps). The processes and relationships in the conceptual models were developed to guide the site-specific development of assessment and monitoring efforts and support the BMP evaluation efforts as well as the development of the site specific objective. Development of the conceptual models was based on a review of available data and information about selenium and nitrogen in the watershed. The conceptual model will be updated during Year 3 of the work plan to incorporate new information. While the updated conceptual model will support the SSO work effort, the estimated budget for this task is not included in the selenium SSO work plan. However, it will be included within the overall Year 3 Work Plan. The work completed under this Task will also be used to support the work completed under Task 5.2.

Task 1.2 – Identify Se Sources and Loads (Year 3 Work Plan)

Under the Year 1 Work Plan, written summaries of selenium and nitrogen sources and loads were prepared. Existing information on the distribution of selenium and nitrogen concentrations and loads were organized using map-based graphical tools, and characterization of sources and of habitats at risk was based on a review of available data, framed in terms of the conceptual models developed in Task 1.1. The selenium sources and loads document will be updated during Year 3 of the work plan to incorporate new information. While the updated document will support the SSO work effort, the estimated budget for this task is not included in the selenium SSO work plan. However, it will be included within the overall Year 3 Work Plan. The work completed under this Task will also be used to support the work completed under Task 5.2.

Task 1.3 – Assess Bioavailability and Impacts of Selenium (Selenium SSO Work Plan)

The tasks that will be conducted under Task 1.3 as a part of the selenium SSO and the Year 3 work plan are outlined below. The work completed under this Task will also be used to support the work completed under Task 5.2.

Sub-Task 1.3.1 – Data Gaps

Acquire, assimilate, and review all available field data from the Newport Bay Watershed (including water quality, sediment, particulate and selenium tissue concentration data from California State University Long Beach (CSULB), Southern California Coastal Water Research Project (SCCWRP), California Department of Fish and Game (CDFG)), and other NSMP or other sampling and monitoring efforts. This watershed-specific data and information will be used to help fill the data gaps relative to the technical elements under Task 5.2. Update database to include the additional data.

Analyze and assimilate the data collected from the turtles and carp obtained from the Newport Bay Watershed during Year 2 of the work plan. The carp data will be valuable since it will be representative of fish bioaccumulation levels in the creek after several years of exposure to elevated selenium levels. Turtles are a relatively long-lived vertebrate in freshwater ecosystems. Their diet in the wild consists of not only plant matter, but also arthropods, small vertebrates, and dead and decaying organisms. In many parts of the watershed bird nests were not found and red-eared sliders are an omnivorous animal that feeds in the creek and marshes and are therefore well positioned to supplement the bird selenium data from the watershed. The scope currently includes the preparation, analysis and incorporation of data from the turtles and carp. Any additional work will be added to this scope of work as needed.

Sub-Task 1.3.2 - Update Summary of Monitoring Data/Results and Interim Report on Bioavailability and Effects of Selenium

Under the Year 2 Work Plan, a *Summary of Monitoring Data/Results and Interim Report on Bioavailability and Effects of Selenium* was prepared. The report summarized the data compiled for the Nitrogen and Selenium Management Program (NSMP) from the period of 2002 through 2006 and assessed selenium bioavailability and toxicity in the watershed. The report provides the results of the 2006 sampling effort conducted for the NSMP, outlined the conceptual approach and general methods for the 2006 sampling of biotic and abiotic media to support the NSMP, and summarized the latest selenium concentrations in water, sediment, and biota throughout the upper Newport Bay watershed and interpreted those results with regard to sources and potential effects of selenium to ecological receptors (particularly birds).

Deliverables for Task 1.3:

- Identification of additional available watershed-specific data and incorporation of that data in the database
- Preparation, analysis and incorporation of data from tissue or other types of samples that have been archived but not analyzed
- Incorporation of the data into the database.
- Updated Summary of Monitoring Data/Results and Interim Report on Bioavailability and Effects of Selenium

Task 5.2 – Develop Selenium SSO

The development of the selenium SSO consists of several sub-tasks, each of which is described in further detail below.

- Procedural and Technical Elements
- Model Design, Calibration, Revision
- Model Results
- Selenium Site Specific Objective Report
- Ongoing Support for the SSO Process

The work completed under Tasks 1.1, 1.2 and 1.3 will also be used to support the work completed under this Task.

Sub-Task 5.2.1 - Procedural Elements and Coordination

Task 5.2.1-1 – Assist in formalizing agreements with United States Geological Survey (USGS) (Theresa Presser, Sam Luoma, and Michael Saiki) and United States Fish and Wildlife Service (USFWS) (Joe Skorupa).¹

- USGS will serve in a technical role and will assist in the completion of work products related to adaptation of the model, modeling runs, and SSO technical report.
- USGS will also serve in an advisory role to help identify sensitive aquatic life (fish) receptors and endpoints that will need to be considered in the SSO process.
- USFWS is expected to operate primarily in an advisory role to help identify sensitive aquatic dependent wildlife (bird) receptors and endpoints that will need to be considered in the SSO process.

Task 5.2.1-2 - Define procedural elements necessary for the development of the selenium SSO

- Procedural elements must adhere to United State Environmental Protection Agency (USEPA), State Water Resources Control Board (SWRCB), and RWQCB requirements and address the concerns of relevant resource management agencies.
- Describe the procedure for developing the SSO, including timeline, decision makers, and needed regulatory and scientific documentation.
- Include processes for interagency communication/collaboration, regulatory and legal requirements for establishing records of decision, and essential requirements for determining aquatic life criteria.

¹ This scope of work recognizes that the County will directly contract with the resource agencies.

Task 5.2.1-3 - Hold a kickoff meeting via a teleconference to initiate the SSO development process and facilitate a clear vision for the effort including critical policy and technical needs.

- Clarify specific roles of all parties involved in the SSO effort (Working Group, Regional Board, State Water Resources Control Board, USGS, USFWS, USEPA, California Department of Fish and Game - CDFG) and modeling work (Consultants, USGS).
- Review/revise scope and schedule as needed.
- Identify the procedure to be used in developing the SSO.

Task 5.2.1-4 - Ongoing meetings with Working Group, Resource Agencies (USGS, USFWS) and Regulatory Agencies (RWQCB, SWRCB, USEPA)..

- Development of the selenium SSO will rely upon a coordinated effort among members of the NSMP Working Group, as well as selenium technical and policy experts from USGS, USFWS, USEPA, SWRCB and the RWQCB.
- This task assumes four meetings per year for 2.5 years (10 meetings total), with project scientists from LWA and CH2M HILL in attendance for each meeting and half of the meetings occurring via phone.

Deliverables for Sub-Task 5.2.1:

- Memo detailing procedural elements for development of SSO.

Sub-Task 5.2.2 – Technical Elements

Completion of actions assigned under Task 5.2.2 will be closely coordinated with actions assigned under Task 5.2.3, in order to accommodate the iterative and closely linked nature of these two tasks.

Task 5.2.2-1 - Define the technical elements necessary for development of the selenium SSO

The Presser/Luoma model (Presser and Luoma 2006) will be adapted for the Newport Bay watershed and used to identify selenium thresholds for water, fish tissue, and bird egg tissue. In adapting the model for the Newport Bay watershed, a number of watershed-specific considerations will be taken into account including the need to:

- Consider physical and biological characteristics of the Newport Bay Watershed.
- Identify the data needs of the Presser/Luoma model (Presser and Luoma 2006) for the Newport Bay watershed and data gaps. Although a more detailed analysis will be conducted, these data gaps may include particulate data for the watershed and Newport Bay as well as Newport Bay selenium concentration data.
- Describe the technical elements in enough detail to provide a sound basis for supporting the SSO, assessing its performance over time, and adapting it in the future if needed.

Task 5.2.2-2 - Collect additional data from the literature and/or other available sources as necessary for critical data needs/data gaps identified in Task 5.2.1. The watershed-specific data and information collected as a part of sub-task 1.3.1 will also be used to fill identified data gaps.

Task 5.2.2-3 - Update database to include the additional data.

Deliverables for Task 5.2.2:

- Memo detailing technical elements for development of SSO, data gaps, and suggestions for acquisition of critical missing data.
- Deliver updated database

Sub-Task 5.2.3 – Model Design, Calibration, Revision

Completion of actions assigned under Task 3 will be closely coordinated with actions assigned under Task 2, in order to accommodate the iterative and closely linked nature of these two tasks.

Task 5.2.3-1 - Identify questions to answer during SSO development, specific to use of the Presser/Luoma model for determining selenium impact thresholds in water and biota of the Newport Bay Watershed.

- Define the range of conditions that the SSO must address. These may include seasonality, spatial heterogeneity, and different species and/or foodweb pathways. However, the emphasis in this subtask should be on identifying the minimum number of critical conditions.
- Describe the potential for impacts to local biota from selenium, and define the foodweb pathways and bioaccumulation factors that determine the degree of impact.
- Collect additional data from the literature and/or other available sources as necessary for critical data needs identified in the technical needs.

Task 5.2.3-2 - Identify and complete adaptations to Presser/Luoma model, as necessary for use of that model in the Newport Bay Watershed.

- Use local data to develop empirical and mechanistic relationships of the links between selenium in water and impacts to fish or wildlife. Identify key assumptions and provide clear supporting rationale.

Task 5.2.3-3 - Calibrate the Presser/Luoma model for conditions in the Newport Bay Watershed; complete draft technical support document for the model.

- Validate the modeling approaches with a test dataset established for this purpose.

Task 5.2.3-4 - Solicit comments from Working Group, USGS, USFWS, RWQCB, SWRCB, and USEPA regarding model performance; revise model to address comments.

Deliverables for Sub-Task 5.2.3:

- Memo summarizing basics of Presser/Luoma model, explaining key questions model will seek to answer, and detailing the means by which model will answer those questions.
- Draft technical memo explaining model design and calibration results.

Sub-Task 5.2.4 – Final Model Runs

Task 5.2.4-1 - Run model, report and interpret results; solicit comments from Working Group, USGS, USFWS, RWQCB, SWRCB, and USEPA.

Task 5.2.4-2 - Revise model per comments from Task 4.1, complete final model runs, analyze results, and update draft technical memo (see Task 3) to reflect changes.

Deliverables for Task 5.2.4:

- Update draft technical memo (see Task 3) to include final model design and revision per Working Group and Agency comment; incorporate information in updated memo as a section in the Final SSO Report (see Task 5).

Sub-Task 5.2.5 – SSO Report

Task 5.2.5-1 - Complete **Draft Selenium SSO Report** presenting scientific justification for the SSO; submit Draft SSO Report to Working Group and advisors as needed.

Task 5.2.5-2 - Address comments from Working Group and advisors; complete **Draft-Final SSO Report**; submit Draft-Final Selenium SSO Report for review by USGS, USFWS, RWQCB, SWRCB, and USEPA.

Task 5.2.5-3 - Address comments from USGS, USFWS, RWQCB, SWRCB, and USEPA; complete **Final SSO Report**; submit to Final SSO Report to RWQCB (June 2009).

Deliverables for Task 5.2.5:

- Draft Selenium SSO Report
- Draft-Final Selenium SSO Report
- Final Selenium SSO Report

Sub-Task 5.2.6 – Provide Continuing Support for SSO Development and Approval Process

Task 5.2.6-1 - Consultants to remain involved in approval process as SSO moves from RWQCB adoption through to SWRCB and USEPA approval/adoption.

Deliverable for Task 5.2.6:

- Continuing technical assistance – specific deliverables to be determined.

Estimated Timeline for Selenium Site Specific Objective Development

Task	Description	2007				2008				2009			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1.1	Se Conceptual Model												
	• Update conceptual model to incorporate new information												
1.2	Se Sources and Loads												
	• Update sources and loads to incorporate new information												
1.3	Bioavailability and Impacts of Selenium												
1.3.1	• Obtain new data/information analyze carp/turtle livers												
1.3.2	• Update Bioavailability and Effects Report												
5.2	Develop Selenium SSO												
5.2.1	Procedural Elements and Coordination												
5.2.1-1	• Formalize agreements (USGS, USFWS)												
5.2.1-2	• Define procedural elements for SSO												
5.2.1-3	• Kickoff meeting												
5.2.1-4	• On-going meetings as needed												
5.2.2	Technical Elements												
5.2.2-1	• Define technical elements for SSO												
5.2.2-2	• Acquire additional data from literature/other sources												
5.2.2-3	• Update database												
5.2.3	Model Design, Calibration, Revision												
5.2.3-1	• Identify specific modeling questions/data needs												
5.2.3-2	• Adapt Presser/Luoma Model for Newport Bay Watershed												
5.2.3-3	• Calibrate model; complete Draft Tech Support Document												
5.2.3-4	• Solicit comments and complete model revisions												
5.2.4	Model Results												
5.2.4-1	• Run model; report and interpret results; solicit comments												
5.2.4-2	• Revise model and finalize; update Task 3 tech memo												
5.2.5	Selenium Site Specific Objective Report												
5.2.5-1	• Draft Report												
5.2.5-2	• Draft-Final Report												
5.2.5-3	• Final Report											6-20	
5.2.6	Provide Support for SSO Adoption Process (ongoing)												→

Q1: Jan-Mar; Q2: April-June; Q3: July-Sep; Q4: Oct - Dec