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Memorandum

From: Dave Dilks **Date:** July 17, 2013
Project: SRRTTF
To: SRRTTF CC:

SUBJECT: **Issues to Consider Prior to First Monitoring Objectives Meeting**

Summary

The Spokane River Regional Toxics Task Force (SRRTTF) is developing a comprehensive plan to reduce toxic pollutants in the Spokane River, and has hired LimnoTech to serve as a technical advisor. The SRRTTF recognizes that additional data will need to be collected to support preparation of the comprehensive plan. LimnoTech's scope of work calls for development of a data collection strategy, and has an initial subtask corresponding to attaining consensus on monitoring objectives. The purpose of this memorandum is to identify specific aspects of the monitoring objectives that require clarification, setting the stage for discussions at the July 24 SRRTTF meeting,

A range of monitoring objectives exists, covering broad management concerns (e.g. "How can PCB sources be reduced to meet water quality standards?") to detailed technical issues (e.g. "How frequently will samples be collected?") Consensus must be obtained on the management-oriented objectives of the monitoring prior to setting the detailed technical specifications. Key questions that need to be discussed by the SRRTTF during the July 24 meeting include:

- How much emphasis should be given to dioxins/furans relative to PCBs?
- Does the initial monitoring plan need to address monitoring in future years?
- What is the desired trade-off between monitoring budget and the level of detail/accuracy necessary to measure very small sources? Potential answers to this question include:
    - Measure all sources, regardless of size, with the level of accuracy typically provided by TMDL studies.
    - Measure all *significant* sources with the level of accuracy typically attributed to TMDL studies, and accept much larger uncertainty for very low-level sources.

Introduction

Task 8 of LimnoTech's scope is to design a monitoring program that will produce the information needed for more effective environmental management. Effective monitoring plan design requires an explicit delineation of the objectives to be achieved by the monitoring. To ensure that monitoring design specifically addresses management needs, these needs should be expressed as clear objectives in sufficient detail to guide design of the monitoring program. Monitoring objectives cover a wide range of categories, both and management- and technically-oriented. Bernstein et al (1993) provide a process for defining monitoring objectives in hierarchical fashion, beginning with the broadest concerns, then continuing to additional levels of detail. They define four levels of objectives, consisting of:

- Level I: Public and Management Concerns

- Level II: Management and Science Objectives
- Level III: Measurement Goals
- Level IV: Technical Plans and Methods

Level I objectives reflect the broadest-level concerns, and are typically the driving force behind a monitoring study being conducted. The primary Level I objective for the SRRTTF is to develop a comprehensive plan to reduce toxic pollutant levels in the Spokane River basin to acceptable levels. Level II objectives combine management and scientific desires and are designed to bridge the gap between the general Level I goals and the more detailed Level III and IV goals. A primary Level II issue to be addressed by the SRRTTF is "How much effort should be devoted to defining very small sources?" Levels III and IV reflect more technically-oriented decisions, which are made after Level I and Level II objectives are clarified.

The objective of this memorandum is to set the stage for discussions at the July 24 SRRTTF meeting designed to begin obtaining consensus on management-oriented objectives. It begins with a discussion of our understanding of Level I objectives (as well as outstanding questions), and follows that with a discussion of the Level II questions that must be addressed relative to each of the Level I objectives.

SRRTTF Level I Objectives

This section lists the Level I objectives that have been previously stated by the SRRTTF, and follows that with a list of the questions that must be addressed prior to development of a monitoring plan.

Previously Stated Objectives

The most commonly stated objective of the SRRTTF is to develop a comprehensive plan to bring the Spokane River into compliance with applicable water quality standards for toxic pollutants. Monitoring data is required to support two aspects of this objective:

1) Define the nature and magnitude of existing pollutant loads, and
2) Define the relationship between pollutant loads and resulting environmental concentration.

These can be considered the first two Level I monitoring objectives.

The SRRTTF First Draft Work Plan also lists the following objectives for the monitoring plan:

- Establish the baseline conditions for PCBs and the other identified toxics
- Monitor and assess the effectiveness of toxic reduction measures
- Be adaptable to take into account newly generated data and sampling techniques

These objectives have not received as much discussion as the objective for developing a comprehensive plan, and will require further clarification as discussed in the following section.

Questions for Discussion

The following questions need to be addressed relative to Level I objectives:

- **How much emphasis should be given to dioxins/furans relative to PCBs?** SRRTTF documents are somewhat inconsistent in defining the relative importance of specific

pollutants of concern. Some statements mention only PCBs, while others describe "PCBs and the other identified toxics."

- **How forward-looking does the initial monitoring plan need to be?** LimnoTech's existing scope of services is to develop a plan for a single year of monitoring. The previously stated SRRTTF objectives of "Monitor and assess the effectiveness of toxic reduction measures" and "Be adaptable to take into account newly generated data and sampling techniques" are more targeted to multi-year monitoring programs.
- **Are there other Level I (i.e. broad, management-oriented) objectives for the monitoring that are not listed here?** We are not aware of other broad objectives, but now is the time to identify them if they exist.

SRRTTF Level II Objectives

Level II objectives begin to introduce scientific considerations into the previously defined Level I objectives. This section begins by introducing a framework for defining Level II objectives, and follows that with a discussion of the Level II questions that must be addressed relative to each of the Level I objectives.

Framework for Defining Level II Objectives

Bernstein et al (1993) found that the combination of management and scientific components associated with Level II objectives usually makes them the most difficult ones on which to obtain consensus. They provide specific questions that can be used to help define Level II objectives:

- What are acceptable levels?
- What degree of certainty/precision is required?
- What monitoring strategy (i.e. direct measurement or model simulation) is appropriate?
- What spatial scale is appropriate?
- What temporal scale is appropriate?

The remainder of this section applies these questions, as appropriate, to each of the Level I objectives defined above.

Nature and Magnitude of Existing Loads

The first management goal is to define the nature and magnitude of existing pollutant loads.

Acceptable Levels/Required Certainty/Spatial Scale

Monitoring plan development needs to recognize that the cost of monitoring is directly related to the Level II objectives corresponding to acceptable levels, required certainty/precision, and desired spatial scale. The Spokane River is unique in that water quality standards for toxic pollutants are among the lowest in United States. The practical ramification of these target levels is that very low level pollutant sources (i.e. ones that may be considered insignificant in most parts of the country) could be considered a significant contributor to water quality impairment in the Spokane River.

Development of a monitoring plan that accurately defines all low-level sources at a sub-watershed scale could require a budget in the tens of millions of dollars. Prior to defining Level II objectives in detail, a broader discussion is needed to define the desired balance between monitoring budget

and the level of detail/accuracy necessary to measure very small sources. Two alternative approaches that the SRRTTF could consider are:

- Measure all sources, regardless of size, with the level of accuracy typically provided by TMDL studies (e.g. error less than 20%).
- Measure all significant sources with the level of accuracy typically attributed to TMDL studies, and accept much larger uncertainty for very low-level sources.

It is expected that this topic will be the focus of discussion at the July 24 meeting.

Monitoring Strategy

Pollutant loads can be estimated via direct measurement, from literature values for comparable sites, or by a combination of the above. The monitoring strategy to be applied in Spokane for defining loads corresponds to the combination approach. Literature values will be used to provide initial estimates of loading rates by category; these literature values will be supplemented by direct measurements as necessary to achieve the accuracy goals defined above.

Required Temporal Scale

Temporal scale refers to the importance of capturing the variability in pollutant loads over time. The required temporal scale depends on the method of environmental damage caused by the pollutant. If acute toxicity (i.e. harm caused by short-term pollutant exposure) were a concern, it may be necessary to capture hour-by-hour or day-by-day variability in loads concentrations. The environmental endpoint of concern for PCBs/dioxins/furans corresponds to human health, where adverse impacts are caused by long-term pollutant exposure. For this reason, an annual temporal scale is sufficient for defining the magnitude of loads.

Define the Relationship between Loads and Resulting Environmental Concentration

The second management goal is to define the relationship between loads and resulting environmental concentrations.

Acceptable Levels/Required Certainty

The answers to the Level II questions raised above for pollutant sources regarding acceptable levels/required certainty apply equally to this management objective.

Spatial Scale

Given the diffuse nature of the pollutant loads, it is likely sufficient to simulate laterally- and vertically-averaged pollutant concentrations (i.e. not necessary to simulate localized hot spots). It is recognized that a model with finer spatial resolution may still be applied, if such a model is necessary to provide an accurate assessment of laterally- and vertically-averaged pollutant concentrations. If the SRRTTF has reasons for requiring a model capable of predicting with fine spatial resolution, those reasons should be raised at the July 24 meeting.

Monitoring Strategy

The relationship between loads and resulting environmental concentrations will be defined with a water quality model. Environmental fate coefficients in them model will be calibrated to observed instream pollutant concentrations measured as part of the monitoring program.

Required Temporal Scale

An annual temporal scale is sufficient for defining the relationship between loads and resulting environmental concentrations, due to the endpoint of concern being long-term human health exposure. It is recognized that a model with finer temporal resolution may still be applied, if such a model is necessary to provide an accurate assessment of annual average concentrations.

Define Baseline Conditions

The final Level I management objective (unless others are raised prior to, or during, the meeting) is to define baseline pollutant concentrations in the Spokane River.

Acceptable Levels/Required Certainty/Spatial Scale

The instream monitoring that will be conducted to define the relationship between loads and resulting environmental concentration will also provide information on existing pollutant concentrations. This monitoring data may be sufficient to satisfy the Level I objective of defining baseline conditions. Consensus needs to be achieved regarding whether the monitoring plan needs to be further tailored to specifically address the objective of defining baseline conditions, i.e. whether the spatial detail needs to be finer than what is necessary for supporting the water quality model.

References

Bernstein, B. B., B. E. Thompson, and R. W. Smith. 1993. A Combined Science And Management Framework for Developing Regional Monitoring Objectives. Coastal Management. Volume 21, Issue 3.