

Elk Valley Water Quality Plan Technical Advisory Committee – Meeting #7 Notes - FINAL

July 8-10, 2014 – Vancouver, BC

Foreword

Technical Highlights & Key Messages from TAC Meetings 1 to 7

This foreword summarizes the main technical highlights and key messages from TAC meetings 1 through 7 and supporting technical working group meetings held between September 2013 and July 2014. The TAC reviewed and agreed to this summary following their final Meeting 7 (held on July 8-10th, 2014) and is provided upfront as a foreword to the TAC Meeting 7 Notes.

Background

Ministerial Order (No. M113) mandated the formation of a TAC to provide technical advice to Teck and to the public during the development of an Area Based Management Plan for the Elk Valley (which was subsequently referred to as the Elk Valley Water Quality Plan). The TAC met seven times from September 2013 to July 2014; and TAC members also participated in a series of supporting technical working group meetings that were struck during this time period. TAC meetings and the analytical process for the development of the Plan were framed around a series of work packages prepared and distributed by Teck in advance of the meetings. The role of the TAC was to provide technical advice to Teck during the Plan development and during this process approximately 700 technical advice items were generated and offered to Teck for their consideration. For a more complete summary of the deliberations and technical advice of the TAC refer to elkvalleytac.com.

TAC Technical Review Tasks

The main tasks undertaken by the TAC included the technical review of the:

- Existing water quality baseline information and studies used to help characterize current conditions and assess possible future ecological effects associated with different water level concentrations of selenium, cadmium, nitrate, and sulphate (referred to as Order water quality constituents) and calcite formation;
- Scientific methods and approaches to characterize current conditions and possible future ecological effects in the Elk and Fording Rivers;
- Scientific methods and approach for the protection of human health and groundwater resources;
- Approach and model parameters for Teck's Water Quality Planning model;
- Management scenarios and water treatment options proposed by Teck;
- Narrative objectives and proposed medium and long term targets for calcite management;
- Water quality benchmarks development with the intent of being protective of the aquatic environment in the Elk and Fording Rivers;
- Proposed short, medium and long term water quality concentration targets for selenium, cadmium, nitrate, and sulphate;
- EVWQP monitoring work in tandem with Teck's existing Regional Aquatic Effects Monitoring Program (RAEMP); and
- Proposed implementation and adaptive management approach.

Technical Highlights

Ecological Effects Assessment

A central focus of the TAC process was the review of the ecological effects assessment for the Fording River and Elk River, which involved developing site-specific Level 1 and Level 2 toxicity benchmarks for selenium, nitrate, cadmium and sulphate. These toxicity benchmarks represent water quality concentrations of a constituent that

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are estimated to result in a $\leq 10\%$ (Level 1) and $\leq 20\%$ (Level 2) effect on the most sensitive species, on the most sensitive life stage, and on the most sensitive measurement endpoint. Level 1 and Level 2 benchmarks were derived from laboratory and field studies. The TAC formed a Toxicology Working Group that met seven times to review the details of this assessment. Teck presented their approach and methods to the Working Group, considered all Working Group recommendations, and adopted most recommendations for their assessment methods. The Toxicology Working Group was supportive of Teck's approach for carrying out the ecological effects assessment and reached consensus on:

- A best scientific estimate of Level 1 and Level 2 toxicity benchmarks for selenium and nitrate, which were used to derive long-term water quality targets for selenium (at Elk River and Fording River Order Stations) and nitrate (at Fording River Order Stations);
- Additional monitoring and special studies that should be done to address residual uncertainties in the selenium and nitrate assessments;
- A toxicity benchmark for sulphate that is equivalent to the BC Water Quality Guideline and was applied by Teck as a long-term water quality target for all Order Stations;
- A toxicity benchmark for cadmium that has a similar level of protection as the Canadian Council of Ministers of the Environment Water Quality Guideline for cadmium was applied by Teck as a long-term water quality target for all Order Stations.

Members of the Toxicology Working Group had differing opinions on how to characterize the level of protection for aquatic life of the long-term selenium water quality targets in the Plan. The reasons that were voiced for why long-term targets may not be adequately protective included (1) the lack of a robust consideration of the presence of multiple stressors in the Fording River and Elk River watersheds, (2) the predicted ecological effects in some of the tributaries, and (3) the residual uncertainties associated with the baseline data and assessment methods. The reasons that were voiced for why long-term targets are protective were that (1) conservative assumptions were made at several points in the ecological effects assessment to account for these uncertainties, and (2) that residual uncertainties will be addressed in the Elk Valley Water Quality Plan through follow-up studies, regional monitoring, and adaptive management. Members of the Toxicology Working Group had different opinions as to the most appropriate way to calculate the cadmium benchmark. It was agreed that selection of a cadmium target was outside the scope and mandate of the TAC.

It was acknowledged by the Toxicological Working Group that assessing the interactive effects from multiple stressors is very complicated and additional information is required.

Lake Koochanusa

TAC Members advised that a similar level of ecological effects assessment, as was done for the Fording River and Elk River, should be undertaken for Lake Koochanusa to determine protective selenium water quality concentrations for the lake. The TAC recommended that a site-specific ecological effects assessment should be completed to evaluate whether a selenium water quality concentration of $2 \mu\text{g/L}$ is protective for the lake. The TAC was generally supportive of Teck's adaptive management approach to be responsive to monitoring data, new science, and changing circumstances, and where appropriate will review and adjust targets for the lake. The TAC made specific recommendations on monitoring and supporting studies related to selenium and other constituents. Many of these recommendations have been incorporated into the Plan and will be completed during Plan implementation.

TAC members also expressed that a key next step during the implementation of the Plan will be to evaluate the monitoring data for the "LK2" Order Station and determine how water quality concentrations in Lake Koochanusa will be evaluated against the proposed selenium water quality target (guideline) of $2 \mu\text{g/L}$.

Human Health and Groundwater

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The TAC provided advice during the process for a more detailed and robust approach to be undertaken in relation to the human health and groundwater component of the Plan. Teck met the expectations of the TAC with respect to the current assessment of human health based on available information. However, TAC members advised that there is a need for more comprehensive monitoring, assessment and communication of contaminants at specific locations and concentrations in the environment (groundwater, wildlife, backyard gardens, air) to ensure public health is not compromised and aquifers are protected for future use. Some TAC Members advised that Teck's groundwater monitoring program for drinking water wells was a good first step, but emphasized the need for a more comprehensive groundwater monitoring program to protect all aquifers in the Elk Valley for future use.

Implementation Plan

Teck developed an initial Implementation Plan that includes active water treatment and clean water diversion to show how short and long-term targets at the Order Stations can be met. The TAC expressed support for developing additional tools through Teck's Research and Development program to improve environmental performance over time and to reduce reliance on active water treatment in the long-term.

Monitoring & Adaptive Management

Teck provided current monitoring results in the *Draft Aquatic Environment Synthesis Report 2014*. The TAC supported the idea of a synthesis report and a report card as part of this *Report*. The TAC provided advice on the data analysis and the way in which technical information was summarized in the report cards of the original *Synthesis Report*; Teck agreed to address these points in the final version of the *Report*.

The TAC provided advice during the process on environmental monitoring for the Elk Valley and on the adaptive management framework for the Plan. The TAC expressed support for the monitoring program and supporting studies outlined in the Plan; and proposed some additional monitoring. The TAC supported the development of a detailed adaptive management framework that will define specific triggers and associated management actions as a key early step with the implementation of the Plan.

Key Concluding Messages

- Over 10 months the TAC reviewed numerous technical documents and participated in 7 TAC meetings and a number of working group meetings.
- The TAC provided 700 science-based technical recommendations for Teck to consider during development of the plan.
- Teck has been responsive to the advice of the TAC.
- The TAC believes its advice was well received by Teck, and that it has influenced the development of the Plan to the extent possible within the limitations of the Order.
- As with any complex scientific/technical process, there are uncertainties that remain around the benchmarks and associated targets for the valley as a whole. The TAC has made recommendations for monitoring and studies to address these uncertainties during Plan implementation.
- The TAC recognizes the importance of a robust and adaptable monitoring program, supplemented by additional studies that will form part of the on-going adaptive management process that Teck is committing to in the EVWQP.

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Meeting Notes for TAC Meeting 7

Meeting Objectives

- Provide an update on the EVWQP.
- Review and discuss past action items.
- Review and discuss the technical advice received at TAC Mtg 6 and the recent WG meetings.
- Review and discuss the complete draft Elk Valley Water Quality Plan
- Review and discuss the “Technical Highlights and Key Concluding Messages” of the EVWQP TAC process.
- Review the next steps of the TAC process

Meeting Summary

- **TAC Advice:** The Technical Advisory Committee’s (TAC’s) specific technical advice on the topics discussed at TAC Meeting 7 is summarized in two separate appendices¹ to this Meeting Summary.
- **TAC Administration:** The TAC discussed a number of administrative items, including (a) the shorter schedule for providing additional technical advice (Appendix B) for TAC Meeting 7; (b) the absence of a few technical EVWQP annexes² that were not available for TAC member technical advice; and (c) the final steps to close off the TAC process.
- **Aquatic Environment Synthesis Report:** The TAC discussed the significant technical advice generated during TAC Meeting 6 (and the subsequent Working Group meetings) for the draft “Aquatic Environment Synthesis Report”, given that this draft of the report will be included as Annex K.1. of the EVWQP before it has been updated and revised with the advice received. Teck confirmed that they would (a) provide an introductory letter at the beginning of the report to be included in EVWQP Appendix K.1. outlining how the report will be updated, and (b) remove the “report card” tables found in Appendix E of the report, given the technical advice they received.

¹ Appendix A – TAC Technical Advice Received at TAC Meeting 7 and Appendix B – TAC Technical Advice Received After TAC Meeting 7.

² The following technical annexes were not available in time for TAC review prior to or at TAC Meeting 7: **Annex B. EVWQP Action Item Summary Table**; **Annex D.2. Water Quality Modeling for the Initial Implementation Plan**; **Annex H. Target Evaluation Report**; and **Annex H. Appendix A. EVWQP Mixtures Assessment**; **Annex K.1. Aquatic Environmental Synthesis report 2014** (with cover letter outlining plans for updates); and **Annex L.2. Groundwater Conceptual Site Model**.

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- **Draft EVWQP Chapters 1 through 11:** The TAC reviewed and provided comments and technical advice on each of the draft chapters that were distributed in advance of the meeting. Some focus areas of technical advice and comments raised by TAC members included:
 - *Chapter 4 Current Baseline Conditions:* (1) Reference Areas for the assessment of current baseline conditions, (2) the characterization of the overview/highlight statements summarizing current baseline evaluation, and (3) the analysis & presentation of selenium fish tissue data;
 - *Chapter 8 Water Quality Targets and Implementation Plan:* how the results from the interactive effects assessment were summarized (in Sec 8.2.2.6) and on the predicted integrated effect size threshold for birds and amphibians (in Sec 8.2.2.6);
 - *Chapter 10 Monitoring:* clarifying the relationships, timing, and opportunities for input between the various monitoring programs / studies; and
 - *Chapter 11 Adaptive Management:* providing additional details on the approach and process for the full evaluation methodology for assessing WQ trends.

- **TAC Process Highlights and Key Concluding Messages:** The TAC reviewed and agreed to a summary of the main technical highlights and key messages during the 7 TAC meetings from September 2013 to July 2014, which will be included at the beginning of the TAC Meeting 7 Notes.

Meeting Participants

At least one representative from each TAC member agency was present. The nine TAC members represent:

- Teck;
- the BC Ministry of Environment (MOE);
- the BC Ministry of Energy and Mines (MEM);
- the BC Environmental Assessment Office (EAO);
- the Government of Canada represented by Environment Canada (EC);
- the US Federal Government represented by US Geological Survey (US Govt);
- Montana State Government represented by Department of Environmental Quality (MT Govt);
- the Ktunaxa Nation Council (KNC);
- an independent third-party qualified professional scientist (Independent Scientist).

Presentations and Discussions

TAC Meeting 7 was centred on the review of Teck's draft EVWQP, which had been distributed to TAC members in advance of the meeting. TAC members provided (1) general comments on the overall Plan, and (2) more detailed input and technical advice on individual chapters and some associated annexes.

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1. TAC General Comments on the Overall Draft EVWQP

TAC members offered general comments on the overall draft Plan, as follows:

- **EC TAC Member:** This was an impressive effort at incorporating a lot of information, advice, and input that substantively addresses the intent of the Order. We recognize that Teck has undertaken a significant amount of work to integrate a lot complex information into one document. Good scientific agreement on the Plan. We have some comments on the policy side (such as setting final targets at threshold levels), but recognize that the TAC is not the venue to discuss policy. Role of adaptive management is an important component. A shorter, public consumption piece would be useful.
- **EAO TAC (Alternate) Member:** Support Environment Canada's comments, with the caveat that my comments need to be confirmed with the EAO TAC member (who could not attend the meeting). Valuable information has been produced through this process that will support future Environmental Assessments.
- **MEM TAC Member:** The process has been robust and exceeded our expectations. Generally support the Plan and the process, while still recognizing that some more detailed pieces are still coming together. Teck has done a great job at providing meaningful information. The Plan will be useful to everyone and will be a benchmark that we can return to. The adaptive management framework is a good beginning, as is the calcite program. The detailed triggers and management actions are very important pieces moving forward.
- **Independent Scientist TAC Member:** Thank you to Compass for helping make the TAC process efficient and effective. The timeframe was too short for this process, which has resulted in not being able to review and provide advice on key annexes to the Plan. I have been very impressed with the knowledge and dedication of TAC members, Teck's staff and consultants. My focus has been on the ecological effects assessment and from my perspective, this was a fantastic assessment. It's likely one of the top 1 or 2 assessments in the world for selenium. There are still data gaps that need to be addressed – for example, Lake Koochanusa and mixtures toxicity. But these are issues to be addressed in the longer term. I generally support the Plan and recognize that it was a tremendous amount of work to complete.
- **TECK TAC Member:** Thank you to the TAC for your effort, time, and willingness to dive into a lot of material on tight timelines. We appreciate the collective experience and expertise of TAC members. We have a better Plan because of the TAC.
- **MT TAC Member:** Agree that the timeline for the process was too short and future processes should allow for more time. Grateful to Compass for facilitating the process. Thank you to MOE for setting up the process, and thank you to all TAC members and observers for your participation. Thank you to Teck for preparing materials and responding to requests. We have all grown as scientists and individuals through this process. MT Govt is encouraged steps have been taken to protect water-quality, and are generally in support of the concepts in the Plan, but not the full details. Our primary interest has been Lake Koochanusa, and are interested in long-term control and management of pollutant sources in the Elk Valley. In regard to the reservoir, MT Govt is glad that eutrophication has been considered in the Plan (success), and have commented extensively on the selenium target in the reservoir (though unsuccessfully). Encouraged that this step is complete and that we are beginning a new government to government process. We will frame our official position in a letter to the Deputy Minister of the Ministry of Environment.

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- **KNC TAC (Alternate) Member:** It was a good method to go through a process like this and we have appreciated Teck and the involvement of the TAC members. I need to confer with KNC before providing any indication of support for the Plan. Personally, I support a lot of the pieces of the Plan, although a couple of pieces are still missing: (1) uncertainties in Lake Koochanusa, (2) we would need to see the detailed triggers and resulting actions before supporting the adaptive management piece, and (3) allowing water quality concentrations for selenium and sulphate to increase is discordant with the Order. The timing for the process was too short and this did not allow enough time to support these other pieces. It's unfortunate that we were not able to review all of the technical annexes to the Plan. This wasn't for lack of effort, but was because the process was too short. The Toxicology Working Group process was a really positive experience.
- **MOE TAC Member:** From a technical perspective, the Plan has produced a tremendous amount of information. Teck has been responsive to advice and comments. An example of this was the human health risk assessment which was expanded following the TAC's recommendations. The Toxicology Working Group worked collaboratively and mostly reached consensus. The calcite program is a good beginning and the assessment conducted to date was very useful in terms of setting targets. However, monitoring was one topic that could have been discussed further. We look forward to the additional information that will address outstanding questions related to (1) current conditions, (2) integrated effects (to be provided in Appendix H), and (3) the monitoring and adaptive management which will be key for implementation.
- **US Govt TAC Member** (Member and Alternate were not present during the go around). An observer with USEPA made the following comments: They thanked everyone on behalf of the US Government. He could not comment on the U.S. Government's support for the plan, but said the US Government will be providing its final comments in a letter. He also commented that they have been encouraged by the work done and emphasized that the US Government is very committed to improving water quality in the watershed. He expressed disappointment that Confederated Salish and Kootenai Tribes could not participate as a TAC member. He also mentioned that they were disappointed about the 2ug/l selenium target for Lake Koochanusa in the Plan, but encouraged through the bilateral process. Migratory birds and endangered species still need to be considered and will be highlighted in their final comments letter.

2. TAC Review of Individual Chapters (of the Draft EVWQP)

The TAC reviewed and commented on each chapter of the draft EVWQP. In some cases, parts of the associated draft annexes were referenced and commented on. The sections below provide a brief summary of the technical chapters within the report that the TAC focused their comments and advice on.

Chapter 4 – Current Baseline Data

Teck provided an introduction to this chapter that was based on the draft Synthesis Report (reviewed during TAC Meeting 6) and how they felt it meets the Order requirements for baseline conditions. Teck commented on the good feedback received on the draft Synthesis Report and how much of this was incorporated into the chapter. The bulk of the TAC feedback on this chapter was focused on (1) the reference areas used and their appropriateness for evaluating current and future conditions, (2) the characterization of the overview and highlight statements summarizing current baseline evaluation, and (3) the analysis & presentation of selenium fish tissue data. TAC members acknowledged the degree of information in the chapter and how it had been distilled. Some felt that there were areas that had too few details given the absence of the updated Aquatic Environment Synthesis Report in Annex K.1.

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Chapter 5 – Assessment of Protection of Human Health and Groundwater

Teck provided an introduction to this chapter and what had changed since the TAC reviewed an earlier draft (at TAC Meeting 6), which included the recently completed human health risk assessment. The MOE TAC representative highlighted that more comprehensive information and context was still required for groundwater related to groundwater flow systems, surface-groundwater interactions, and groundwater quality as per their previous advice.

Chapter 6 – Management Options

Teck provided an introduction to this chapter and what had changed since the TAC reviewed an earlier draft at TAC Meeting 6. The MEM and Montana Government TAC members emphasized that more context was still needed in relation to documenting the options assessment with a clearer rationale and evaluation why some management options were not selected (i.e. covers and geomembranes) in favour of active water treatment and clean water diversions in the current iteration of the draft EVWQP. Teck mentioned that there was information on other management options included under research and development.

Chapter 7 – Calcite Management

Teck provided an introduction to this chapter and what had changed since the TAC reviewed an earlier draft at TAC Meeting 6 and this included the splitting up of the calcite index into two parameters, a revision to the priority streams, more information on the targets, and more details on the proposed implementation plan. The table below summarizes the detailed TAC member feedback and questions made during their review of the draft chapter. TAC members made two advice recommendations and made only a few comments on this chapter.

Chapter 8 – Water Quality Targets and the Implementation Plan

Teck provided an introduction to this chapter and what had changed since the TAC reviewed an earlier version at TAC Meeting 6; and this included the additional information on uncertainty, integrated assessment methodology, multiple stressors and how they were integrated, and implementation details. The bulk of the TAC feedback on this chapter was focused on (1) how the results from the interactive effects assessment were summarized, and (2) on the predicted integrated effect size threshold for birds and amphibians. A few additional TAC discussion points included:

- **The MOE TAC member** suggested using the integrated effects methodology to assess current baseline conditions as a reference point during implementation of the Plan. Teck stated that they would consider this for the next version of the Synthesis Report.
- **The KNC TAC member** stated that they felt that the targets (in particular for sulphate, for example, where water quality concentrations are allowed to increase for twenty years until they exceed the target level in the Fording River downstream of Greenhills Creek at FR₄) are being treated as “pollute-up” numbers and, in their view, is discordant with the intent of the Order to stabilize and reduce contaminant concentration levels. Teck responded that it is their understanding that stabilize and reduce in the Order is in relation to levels above the BC Guidelines; further, that sulphate levels are currently below guidelines and they will continue to evaluate levels over time and adjust accordingly.

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- **The MEM TAC member** requested that additional information and rationale be provided, as follows: (1) in instances where targets are not able to be achieved (e.g. at FR₄ targets will not be met across the management unit), (2) where timelines to meet targets are some ways off into the future (e.g. the Level 2 benchmark at ER₂ not being reached until 2023), and (3) as to the specific details of the active water treatment facilities and clean water diversions considered and included within the implementation plan.
- **Several TAC members** suggested that a key point to emphasize in the chapter (and more broadly the Plan itself) was how targets would be assessed during the implementation of the Plan through a detailed adaptive management framework (with more specific and defined triggers and their associated management actions) that is yet to be developed.
- **Several TAC members** commented on the organization and flow of the chapter and how it was disjointed. There was a suggestion to break up the chapter and separate out the information on the benchmarks.
- **Some TAC members** highlighted that they needed to see the more detailed information in **Annex H. Target Evaluation Report** and the associated **Appendix A. EVWQP Mixtures Assessment**, which was not available in time for TAC Meeting 7.

Chapter 10 – Monitoring

Teck provided an introduction to this chapter and what had changed since the TAC reviewed an earlier version at TAC Meeting 6; and this included better linkages to adaptive management, more details on the monitoring, additional information related to groundwater operations, and updated language to be more consistent with the RAEMP. The majority of the TAC feedback was in relation to the relationships and timing of the various monitoring and research study programs, and clarifying where there will be opportunities for additional review and input during the implementation of the Plan. Many TAC members expressed support for the changes that had been made to the current version of the chapter.

The MOE TAC member stated that other than for drinking water purposes, the current approach may not be protecting groundwater resources for other purposes. Teck commented that in the Elk Valley floodplain their approach has been based on if you protect surface water, this will protect groundwater. Teck also commented that there are no uses of groundwater in the upper Fording River watershed and this is not expected to change. It was also mentioned that the proposed wells sampling program will help validate the conceptual site model for groundwater.

Chapter 11 – Adaptive Management

Teck provided an introduction to this chapter and what had changed since the TAC reviewed an earlier version at TAC Meeting 6. It was mentioned how this chapter underwent a significant overhaul where most sections were revised based on TAC member feedback. TAC member feedback centered on providing additional details on specific triggers and associated management actions that will still need to be developed and on the process for the full evaluation methodology for assessing water quality trends is defined (including the frequency of analysis, reporting, and the feedback loop for adapting the Plan). The MEM TAC also reiterated their recommendation for triggers being included further up the watershed closer to the sources (and above the Order Stations). Teck mentioned that they would look at this. The KNC TAC member stressed the importance of not being able to evaluate the adaptive management approach without having the more specific details on the triggers and management actions.