Elk Valley Water Quality Plan

Annex A
Technical Advisory Committee Advice Table

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To: Technical Advisory Committee **Date:** July 22, 2014

Subject: EVWQP TAC Advice Response

Teck received close to 700 pieces of technical advice from the Technical Advisory Committee (TAC) during the development of the Elk Valley Water Quality Plan (the "Plan"). This advice was recorded in TAC meeting minutes by the independent third-party facilitator of the TAC process.

As required by the Terms of Reference (section 5.4) Teck considered all advice received from the TAC during the development of the Plan. Table 1 details all of the advice received and how it was considered. Teck directly incorporated close to 600 pieces of advice into the Plan; rationale is provided where advice was not fully incorporated.

Table 1:Teck Response to Technical Advisory Committee Advice, meetings #2 to #7 Appendix A and Band Working Group

ID# from Meeting	Category/Theme	Advice/Comment	Rationale (*to be filled in by Originator*)	Originator (Agency) of Advice	Other TAC Member Support	Date Advice Received (dd/mm/yy)	Teck Response
A2-1	**Overall Approach WP 2a Methods for Ecological Effects Assessment**	Recommend the explicit documentation of uncertainties (limitations of the current data) in order to assist in the interpretation of results and address key data gaps for the monitoring program.	The ecological effects matrices will be developed based on the existing data from toxicity testing and site monitoring. Due to gaps in the existing data, some assumptions will have to be made to develop the ecological effects matrices.	KNC	MOE MEM UBC US Govt	29-Oct-2013	This advice is incorporated in Annex O Management of Uncertainty in the Selenium Ecological Affects Assessment. This document was developed as part of the TAC Toxicology Working Group. Data gaps for monitoring are discussed in Chapter 10 (Monitoring).
A2-2	**Overall Approach WP 2a Methods for Ecological Effects Assessment**	Recommend that the effects matrixes being developed for selenium, sulphate, nitrate and cadmium reflect the full range of water quality present in the watershed.	For the effects matrixes to be the most relevant and useful to understanding potential effects that could occur at the 7 target locations and in the broader watershed, the analysis should reflect the full range of concentrations that are present for the parameters of concern.	MEM	MOE MEM UBC US Govt	29-Oct-2013	This advice is incorporated in the Plan at Chapter 4 (Baseline Conditions) and in Chapter 8 (Water-Quality Targets and Implementation Plan). Annexes D, E, F, and G, include further details of inputs to the ecological effects assessment including water quality data.
A2-3	**Overall Approach WP 2a Methods for Ecological Effects Assessment**	Where available and appropriate, use existing aquatic effects monitoring data from the Elk Valley to evaluate the toxicity testing approach and inform the development of ecological effects matrices for selenium, cadmium, sulphate and nitrate.	Toxicity testing using a limited suite of indicators and/or resident species may not reflect effects on sensitivity species associated with long-term exposure.	KNC	MOE MEM UBC US Govt	30-Oct-2013	Consistent with the advice provided, data from the Regional Aquatic Effects Monitoring Program have been used to verify the approach used to identify the long-term targets. More specifically, the multiple stressor analysis described in Chapter 7 (Calcite Management) was completed using current constituent concentrations, and the results of the analysis were compared to observed benthic invertebrate data to check for consistency between predicted potential effects and those observed in the field.
A2-4	**Selenium WP 2a Methods for Ecological Effects Assessment**	A site-specific ecosystem-scale model of selenium (Presser and Luoma, 2010, or equivalent) and associated selenium mass balance model is needed for Lake Koocanusa to assess current and future assimilative capacity of the reservoir and cumulative effects. Development of the model(s) should be done using water, sediment, and biological data from Lake Koocanusa and appropriate inflow/outflow sites. We suggest that this be a cooperative data collection and modeling effort between Teck Coal, the Ministry of the Environment (MOE), and U.S. state and federal agencies. At a minimum, the most sensitive species/food chain should be characterized so that threshold water quality criterion can be established. The calibrated (and confirmed) model should be used to determine egg and tissue concentrations under different loading scenarios and develop future adaptive management scenarios, as appropriate, in particular, those related to both increases and reductions of selenium in the watershed. Given the complexity of this advice, a longer timeline for assessment and implementation is likely needed to allow sufficient time to adequately address these concerns for Lake Koocanusa.	Site-specific water-quality targets for selenium are being developed for the protection of aquatic life in the Elk and Fording Rivers; however, cumulative impacts are not being considered for Lake Koocanusa either north or south of the international boundary. Furthermore, appropriate data have not been collected to determine if Lake Koocanusa is functioning as a selenium sink. Hence, the current approach is inconsistent with the rigor used elsewhere in the watershed and the conventional wisdom that reservoirs are often the most sensitive receiving-water. Given that selected water-column and fish-tissue data collected by the State of Montana in Lake Koocanusa in 2013 indicate elevated selenium levels, neither the State of Montana nor federal (US) regulators can adequately assess the ecosystem impacts of current (2013) and future selenium loads within Lake Koocanusa until a scientifically defensible cumulative effects assessment is initiated. The Order requires Teck to complete such an analysis (Schedule C, section B.3) and we believe this is a critical requirement of the Order. Once the assessment is complete, we can understand what level of protection, if any, is needed so that allowable loadings from the U.S. and Canada can be established.	US Govt MT Govt	KNC	29-Oct-2013	A site-specific ecosystem-scale model of selenium for Lake Koocanusa is not currently required to evaluate cumulative effects within the reservoir. Consistent with the Order and terms of reference, current baseline conditions and cumulative effects for Lake Koocanusa were evaluated by comparing existing data to guidelines for the protection of freshwater aquatic life (see Chapter 4 [Baseline Conditions]). Furthermore, a probabilistic assessment of potential effects due to selenium was completed for the reservoir based on the concentration-response curve for the most sensitive species tested to-date (brown trout; EPA 2014)(see Chapter 4 [Baseline Conditions]). Based on data collected to date and under existing conditions, negligible effects are predicted within the reservoir. A selenium mass balance model to assess assimilative capacity of the reservoir is outside the scope of the Order. See notes from the Order Manager recorded in the Technical Advisory Committee – Meeting #3 Notes – FINAL; page 13 "consideration of assimilative capacity in Lake Koocanusa and international waters values is out of scope for this planning process." Teck is committed to maintaining the long-term target for selenium within the reservoir below the BC Water Quality Guideline. As detailed within Chapters 10 (Monitoring) and 11(Adaptive Management), data collected through environmental monitoring programs will help validate the initial implementation plan and inform if adaptive measures are required. Should monitoring data indicate that outcomes and objectives of the Plan have the potential of not being met within the Designated Area, or portions thereof, Teck will identify and evaluate corrective measures and potential modeling tools at such time. References: US Environmental Protection Agency (EPA). 2014. External Peer Review Draft Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater. EPA 822-P-14-001, Office of Water, Office of Science and Technology, Washington, DC. May.
A2-5	**Selenium WP 2a Methods for Ecological Effects Assessment**	Recommend assessing potential ecological effects in Lake Koocanusa given the site specific nature of selenium effects.	Ecological effects in lentic habitats can occur at lower exposure levels than in lotic habitats. Therefore, it is essential to evaluate effects in Lake Koocanusa where loadings of selenium are ultimately deposited.	KNC	UBC MT Govt US Govt	29-Oct-2013	As outlined in Chapter 4 (Baseline Conditions), water quality is below B.C. water quality guidelines for sulphate, nitrate and cadmium, and below selenium guidelines in almost all (98%) water samples collected in Lake Koocanusa. Data collected to date indicate that selenium in fish tissues is below levels that would be harmful to fish populations. Monitoring of water, sediment and fish will continue during Plan implementation and will inform whether adaptive management measures are required. This could include consideration of an ecological effects assessment for Lake Koocanusa.
A2-6	**Selenium WP 2a Methods for Ecological Effects Assessment**	Recommend that the algal-water concentration rations (Kd values) derived from estimated exposure data (i.e., water chemistry data based on monthly sampling results averaged over some period of time) should be validated using the results of a site-specific investigation that involves deployment of plate samplers at multiple locations in the Elk/Fording/Lake Koocanusa system and intensive evaluation of exposure to selenium. The exposure assessment should be conducted by collecting water samples on a weekly basis for analysis of selenium and mine-related conventional variables (e.g., alkalinity) and by conducting continuous monitoring of mine-related conventional variables (i.e., using continuous monitoring probes). This work should be conducted in the late summer and early spring to determine if Kds vary on a seasonal basis, which could substantially affect the results of bioaccumulation modeling.	Synoptically-collected water chemistry and algal tissue-chemistry data appear to be insufficient to support the derivation of reliable algal-water concentration ratios (Kd values). These ratios are of fundamental importance to the overall bioaccumulation modeling for selenium.	KNC	MOE UBC EC	29-Oct-2013	Surface water and periphyton (includes algae) monitoring is included as an integral component of implementing and validating the Plan. As outlined within Chapter 10 (Monitoring), monthly surface water samples will be collected within the Designated Area, with weekly samples collected during seasons where surface water quality concentrations are observed to be the most elevated. Periphyton sampling will also be conducted during the growing season (late summer), but not outside of the growing season. This period, early spring, coincides with extreme flows and represents unsafe sampling conditions, regardless of technique. In other words, the extreme flows would prevent safe egress and ingress of field sampling personal to collect periphyton tissue samples. The data collected under these monitoring programs will help validate and refine site-specific partition coefficients (Kds) within selenium-bioaccumulation models.
A2-6a	**Selenium WP 2a Methods for Ecological Effects Assessment**	**Description of related alternate (or Addn) Advice:** Both the MT Govt and US Govt generally support this advice, but also recommend that a more robust approach be taken towards the determination of K*g* (and other trophic transfer factors) for lentic waters, in particular, for Lake Koocanusa. Specifically, we recommended that a Quality Assurance Project Plan (QAPP) and sampling and Analysis Plan (SAP) be developed to direct these activities so that the bioaccumulation modeling work outlined in advice item #2-4 can be appropriately implemented. Important supporting information that should be considered in this SAP includes: (1) distribution and seasonal changes in selenium species in the lentic water column; (2) particle surface composition (algal, sediment); (3) water/particle residence time and recycling potential; and (4) seasonal changes of redox conditions in the water column, particularly at the sediment/water interface.	None provided.	US Gov't MT Gov't		5-Dec-2013	Prior to initiating any environmental sampling program it is important that a study design be carefully considered, developed, and documented. Presently, prior to conducting environmental sampling activities within the Designated Area, Teck and its Consultants develop a study design document similar to a Quality Assurance Project Plan (QAPP) and associated Sampling and Analysis Plan (SAP). As outlined in response to Advice Item No. A2-6, Teck is committed to continue monitoring environmental conditions within the Designated Area (refer to Chapter 10 [Monitoring]) using existing and future monitoring program(s). These data will not only be used to monitor environmental conditions, but help validate and refine planning tools such as site-specific bioaccumulation models.

Table 1:Teck Response to Technical Advisory Committee Advice, meetings #2 to #7 Appendix A and Band Working Group

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A2-6b	**Selenium WP 2a Methods for Ecological Effects Assessment**	**Description of Related Alternate (or Addn) Advice:** EC supports controlled field assessment of Kd, with artificial substrates and seasonal sampling to assess variability.	None provided.	EC		19-Dec-2013	See response Advice Item No. A2-6.
A2-7	**Selenium WP 2a Methods for Ecological Effects Assessment**	In terms of calculating a weighted exposure between both lentic and lotic habitats (for species that reside in both habitats like Westslope Cutthroat Trout), need to conduct a sensitivity assessment to assess the impacts of assumptions in the weighting methodology on the ecological effects matrices. This should include conducting and sharing the results of the sensitivity analyses for lentic and lotic areas separately.	Exposure of WCT to dietary Se will likely be higher in lentic than lotic environments. However, both the fraction of the population and the relative amount of time spent in the two environments is uncertain. Consequently, some assumptions will be required to estimate exposure. Understanding the impacts of these assumptions on the resulting ecological effects matrices is important. Also, by conducting the exposure assessment for the two environments independently, it will be possible to define the range of exposure scenarios. The results can then be weighted in various ways to conduct the overall assessment.	UBC KNC	MOE	29-Oct-2013	Differences in selenium bioaccumulation among areas were explicitly considered to assess the impact of target concentrations within a management unit. Certain areas (e.g., the Fording Oxbow) are hypothesized to exhibit distinct underlying mechanisms of bioaccumulation, and therefore were included in a separate bioaccumulation model. The 'lentic' model presented in Orr et al. (2012) and Minnow (2014) was used in the selenium ecological effects assessment to model bioaccumulation in these areas (for further detail please refer to Chapter 7, Section 7.2.4 [Calcite Management]). References: Orr PL, Wiramanaden CI, Paine MD, Franklin W, Fraser C. 2012. Food chain model based on field data to predict westslope cutthroat trout (Oncorhynchus clarkii lewisi) ovary selenium concentrations from water selenium concentrations in the Elk Valley, British Columbia. Environmental Toxicology and Chemistry 31: 672-680 .
A2-8	**Selenium WP 2a Methods for Ecological Effects Assessment**	Whenever available, the effects on ecological receptors under current and relevant historic conditions (i.e., where exposures may have been similar to some future exposure scenario) should be evaluated using measured data on the concentrations of selenium in invertebrates, fish, amphibians, and birds. These data should also be used to validate the bioaccumulation model used in the ecological effects assessment for selenium.	Such an assessment provides an independent basis for evaluating effects on aquatic organisms and wildlife species, beyond the modeling approach that is proposed by Teck.	KNC	MOE UBC	29-Oct-2013	The recommended validation has been completed and is reported in Annex E of the Benchmark Derivation Report for Selenium (Appendix C). Based on input provided by the technical advisory committee, model predictions from the one- step, two-step, and three-step bioaccumulation models were compared to measured selenium concentrations in invertebrates, fish eggs, amphibian eggs, and bird eggs. The comparison was performed by plotting models and measured data across a range of aqueous selenium concentrations for visual evaluation of model fit, and by calculating the root mean squared deviation (RMSD) to characterize residual scatter in measured data around each model.
A2-9	**Nitrate/Sulphate WP 2a Methods for Ecological Effects Assessment**	For the results of the nitrate/sulphate work plan, recommend a comparison of the stoichiometry (or ratio of ions) between test water and site water and provide an analysis of the uncertainty for any differences in the stoichiometry.	Aqueous concentrations of certain parameters in Elk Valley waters are dictated by specific water-rock interactions (dissolution / oxidation / reduction) that occur in the natural system. Toxicity testing conducted using solutions created using salts to produce a range of concentrations may lead to ionic ratios that differ from the natural system. The artificial action-anion ratios created by using salts in lab testing may lead to unintended/unidentified artifacts in data that may contribute to overall uncertainty in the test data.	MEM	UBC MOE KNC EC	30-Oct-2013	There are two components to this issue: one relates to the ionic composition of the unamended test waters; and the other relates to the changes in this ionic composition introduced through spiking of additional anions into the tested water. In terms of the representativeness of unamended site waters, the toxicity tests conducted in Fall 2013 for sulphate and nitrate were performed in water samples collected from the Elk Valley. Therefore, the stoichiometry of the test waters was equivalent to the site waters, and represents the approximate annual average conditions in the Fording and Elk rivers. In terms of the effect of nitrate and sulphate amendment on ionic ratios, there is a small effect on ionic composition that occurs due to the addition of nitrate (as sodium nitrate) or sulphate (magnesium sulphate and calcium sulphate). The changes are summarized below: • Sulphate – Sulphate was introduced using a 1.6:1 ratio of Ca:Mg is largely consistent with the ratio of these cations that occurs in mine-influenced site waters. Although this is an approximation of typical conditions, the procedure is considered to have provided a relevant dosing in a manner that is consistent with stoichiometry under current conditions. • Nitrate – Nitrate was introduced as sodium nitrate, resulting in increased sodium concentrations in the nitrate-amended test solutions; however, there would have been no change to the Ca:Mg ratios. Furthermore, the mass of sodium introduced was small relative to both the total ionic composition; the nitrate amendment series required only small quantities of sodium at a molar ratio of 1:1. These changes are also not expected to cause large differences in toxicity potential because sodium has been documented to yield a very low contribution to combined toxicity of major ions in TDS mixtures (Mount et al. 1997). Golder and Nautilus (2013; Appendix A) summarized the ionic balance of water samples from the Elk Valley. Relative to sulphate, calcium, and magnesium (the dominant ions contributing to total dissolved solids), the concentrations of chloride, sodium and potassium were low across all stations, with little evidence of change in concentration related to mine influence. Therefore, controlling for sulphate, calcium, and magnesium concentrations in the amendments (i.e., maintaining ratios similar to current conditions) maintains stoichiometry similar to what is expected under site conditions. Golder (Golder Associates Ltd.) and Nautilus (Nautilus Environmental Ltd.). 2013. Phase I Report: Elk Valley Mixture Toxicity Study. Report Number 13-1349-0006. July 2013. Mount, D.I., D.D. Gulley, J.R. Hockett, T.D. Garrison and J.M. Evans. 1997. Statistical models to predict the toxicity of major ions to Ceriodaphnia dubia, Daphnia magna, and fathead minnows (Pimephales promelas). Environ Toxicol Chem 16:2009-2019.
A2-9a	**Nitrate/Sulphate WP 2a Methods for Ecological Effects Assessment**	**Description of Related Alternate (or Addn) Advice:** EC support extra control of ionic constituents in toxicity testing waters.	None provided.	EC		19-Dec-2013	See response Advice Item No. A2-9.

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A2-10	**Nitrate/Sulphate WP 2a Methods for Ecological Effects Assessment**	Recommend that additional toxicity testing be conducted using sensitive species and longer term exposures *(see technical advice #B2-12 in Appendix B – Received within 7 days after TAC Meeting 2 for more information).* If this work is not completed, then an approach needs to be developed for translating empirically derived toxicity thresholds (based on the results of toxicity tests) to estimate toxicity thresholds for communities in the Elk/Fording watershed.	It is not clear that the selected toxicity tests for evaluating the effects on aquatic organisms associated with exposure to nitrate or sulphate are the most sensitive and/or relevant (i.e., mayflies were not tested; amphipods were tested in 14-d exposures only; biomass and reproduction were not evaluated; amphibians were not tested). Therefore, the results of such toxicity tests cannot be used directly to identify toxicity thresholds for aquatic organisms relative to nitrate or sulphate.	KNC	UBC	30-Oct-2013	Teck considered this advice and did not conduct additional toxicity testing post fall of 2013. As discussed in TAC meeting #4, four species were selected for site specific toxicity testing in Fall 2013. The tests were selected to target sensitive life stages and species, and involved standardized chronic tests. However, additional site-specific testing results were also utilized from the Phase 1 mixture toxicity study (Golder and Nautilus 2013), to derive the benchmarks form both nitrate and sulphate. The Phase 1 Mixture Toxicity Study conducted between December 2012 and March 2013, using Fording River waters entailed long-term testing and additional sensitive endpoints. Teck took direction from the Toxicological Working Group of the Plan and the TAC to derive the nitrate and sulphate benchmarks, the details of how the results of the toxicity tests were translated into benchmarks protective of aquatic life can be found in the Plan, Annex F. Golder (Golder Associates Ltd.) and Nautilus (Nautilus Environmental Ltd.). 2013. Phase I Report: Elk Valley Mixture Toxicity Study. Report Number 13-1349-0006. July 2013.
A2-11	**Nitrate/Sulphate WP 2a Methods for Ecological Effects Assessment**	We recommend that the ecological effects assessment for dissolved nitrate (NO3) include the effect of NO3 loading to Lake Koocanusa from coal mining activities, in particular, whether this load (in accompaniment with additional dissolved phosphorus loadings) would cause harmful eutrophication effects or additional accumulation of selenium in biota in the reservoir. It is recommended that loading models (e.g., LOADEST or physically based watershed models) be used to simulate historical and current phosphate and nitrate loadings from the Kootenay, Elk, and other rivers, and that the receiving water response in Lake Koocanusa be evaluated with respect to impact(s) to ecosystem function. The CE-QUAL-W2 model developed by the U.S. Army Corps of Engineers may be of help in addressing the receiving water component (in particular eutrophication effects); although at present, only the temperature component of the model has been calibrated. Realistic future loading scenarios should then be evaluated which address levels of phosphorus needed to minimize eutrophication effects and characterize the flux of selenium to the sediments under such conditions (from phytoplankton settling). The proposed work plan, including modeling methods, should be reviewed by U.S.and Montana Government representatives prior to implementation and should then be tied back to the work described in item 2-4 to evaluate potential effects on selenium bioaccumulation.	Lake Koocanusa appears to currently (2013) be a phosphorus (P) limited system, however, dissolved nitrate (NO3) concentrations in Lake Koocanusa at the international boundary are high (and increasing) presumably due to the increased loading in the Elk and Fording River from blasting operations associated with coal mining. In fact, NO3 currently exceed levels saturating for phytoplankton growth [see Thoman and Mueller (1987) or Chapra (1997)]. Hence some investigation of the importance of the control of P needs to be made to ensure no shifts in lake trophic state occur (i.e., eutrophication) which may enhance the removal of selenium from the water column, change or increase bioavailability through hypoxia, and subsequently impact the bioaccumulation of selenium. Presumably, future increases in loadings of soluble P (e.g., POTWs, agriculture, logging, phosphate mining, wildfires, etc.) have potential to significantly degrade water quality and ecosystem function by accelerating eutrophication and changing the rate of selenium accumulation in the base of the food chain. In addition, some thought should be given about how increasing NO3 loading may alter the assimilative capacity of the reservoir and reservoir outflow (Kootenai River) with respect to N (i.e., referring to ongoing numeric nutrient criteria work in the U.S.).	US Govt Mt Govt	KNC	30-Oct-2013	In addition to evaluating current baseline conditions by examining constituent concentrations in relation to guidelines/criterion (see Chapter 4 [Baseline Conditions]), Teck evaluated the potential to affect trophic status (eutrophication) within the Designated Area (see Chapter 6 [Development and Selection of Management Options]).The analysis concluded that the initial implementation plan is not anticipated to adversely affect the trophic status of the reservoir. As a result, no additional assessment or modeling will commence at this time. As detailed in Chapter 10 (Monitoring), Teck is committed to continue monitoring environmental conditions within the Designated Area. Existing and future monitoring program(s) will not only be used to monitor environmental conditions, but help validate and refine planning tools such as site-specific bioaccumulation models, and inform the need to initiate adaptive management measures (see Chapter 11 [Adaptive Management]). In addition, Teck has also developed and incorporated a mass balance model in the Plan. The mass balance model allows for the consideration of constituent loadings within the Designated Area including the reservoir. Given that the Plan considers constituents above and beyond nitrate, and is directly associated with Teck's mining operations within the Elk Valley, the GoldSim platform was elected as the preferred model. As with environmental monitoring programs, Teck is committed to refining planning models such as the water quality planning model through efforts of the Research and Development program.
A2-12	**Nitrate/Sulphate WP 2a Methods for Ecological Effects Assessment**	Evaluate the potential adverse effects on mammals associated with exposure to nitrate via drinking water. Use a range of concentrations representative of current concentrations in the Elk Valley watershed.	The current concentration levels of nitrogen in the surface water of the Elk Valley watershed may be too low to cause effects on mammals that use the surface water as a source of drinking water. However, this is an issue that members of the public have voiced concerns over and thus the Plan should explicitly demonstrate that mammals are not currently experiencing effects from this pathway.	KNC		30-Oct-2013	Current concentrations of nitrate in surface water of the Elk Valley watershed are too low to cause effects on mammals that use the surface water as a source of drinking water. This determination was made based on comparison of current nitrate concentrations to water quality guidelines for protection of wildlife. The provincial guidelines for nitrate (Nordin and Pommen 2001) include guidelines for irrigation and livestock watering. For nitrate or nitrate plus nitrite, a maximum concentration of 100 mg/L (as N) is recommended. Furthermore, the same concentration is recommended "for waters which might be used by wildlife as a drinking water supply" (Nordin and Pommen 2001). Annex K.1 DRAFT Aquatic Environment Synthesis Report includes summary statistics for 3-year dataset that reflects current conditions. The only monitoring station that has indicated a maximum detected concentration of nitrate above 100 mg/L N is the South Kilmarnock Ponds Phase 1 mine-influenced tributary (MU1 FR_SKP1); the maximum detected concentration was 123 mg/L N, with a median of 30.7 mg/L N. Based on the above, the vast majority of locations exhibit nitrate concentrations that are below guidelines. The small exceedance observed in a portion of Kilmarnock represents a limited temporal and spatial range that would be unlikely to be of significance to wildlife populations. The guideline for irrigation and livestock watering is also conservative (low) relative to concentrations causing no adverse responses to laboratory organisms in chronic exposures to nitrate through drinking water (Sleight and Atallah 1968). Nordin, R.N. and L.W. Pommen. 2001. Water Quality Criteria for Nitrogen (Nitrate, Nitrite, and Ammonia) – Overview Report. Prepared pursuant to Section 2(e) of the Environment Management Act, 1981. Resource Quality Section, Water Management Branch, Ministry of Environment and Parks (now called Ministry of Environment). Updated: August 7, 2001. Sleight, S. D. and O. A. Atallah. 1968. Reproduction in the guinea pig as affected by chronic administration of potassium nitrate and potassium nitrite. Toxicol. Appl. Pharmacol. 12: 179-185.
A2-13	**Overall Approach WP 2a Methods for Ecological Effects Assessment**	Benthic invertebrate community structure data should be used as an independent line of evidence for evaluating the potential effects of mine-related discharges. In this respect, multivariate analysis (or similar methods) should be used to evaluate potential effects on benthic invertebrates relative to exposure to chemicals of potential concern (COPCs) and habitat characteristics.and the analysis should include evaluating the toxicity of sediments within the study area on benthic invertebrates.	Toxicity test results are useful for assessing potential effects on aquatic organisms. However, such data may not be relevant t0 all species or exposure periods the benthic community integrates.	KNC	MOE UBC EC	30-Oct-2013	Teck completed benthic invertebrate community structure sampling as part of the 2012 RAEMP. Mine-influenced areas were compared to the group of reference areas that was statistically identified as the best match based on methods described in the literature for that purpose. The upstream reference area of the same stream was not always among the areas determined to be a good match (e.g., lower reaches of Fording River and Michel Creek) because of the large difference in habitat variables related to catchment area and elevation between upstream and downstream areas. This information was summarized in Chapter 4 (Baseline Conditions) and in Annex K.1. DRAFT Aquatic Environment Synthesis Report. Benthic Invertebrate Community Structure will be part of the ongoing monitoring for the RAEMP and additional support study to evaluate effects of Calcite on benthic invertebrate community structure.
A2-13a	**Overall Approach WP 2a Methods for Ecological Effects Assessment**	**Description of Related Alternate (or Addn) Advice:** EC supports analysis of benthic macroinvertebrate community structure.	None provided.	EC		19-Dec-2013	Teck completed benthic invertebrate community analysis focused on proportion community data as per the CABIN travelling kick sampling method (Environment Canada 2011), which was the method recommended by MOE during study design development and implementation for the 2012 RAEMP.

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A2-13b	**Overall Approach WP 2a Methods for Ecological Effects Assessment**	**Description of Related Alternate (or Addn) Advice:** Pore-water chemistry, surface water chemistry, and invertebrate tissue chemistry (from field studies and/or laboratory bioaccumulation tests) should also be carried out to evaluate effects on benthic invertebrates.	Toxicity and benthic invertebrate community structure represent only two of multiple lines of evidence that can and should be used to assess effects	KNC		6-Jan-2014	As outlined in Chapter 10 (Monitoring), surface water and benthic tissue chemistry will be monitored and evaluated during Plan implementation. In addition, sediment toxicity tests will be implemented. The results of this monitoring and testing inform the need of evaluation of pore-water chemistry. At this time, there is no apparent data gap associated with pore-water
A2-14	**Overall Approach WP 2a Methods for Ecological Effects Assessment**	The interactive effects of mixtures of COPCs and calcite formation needs to be evaluated in the tributaries and in the Elk/Fording mainstem habitats.	Calcite deposits have the potential to reduce the productivity of tributary habitats and/or influence the reproductive success of fish species. Such effects could be exacerbated by exposure of aquatic organisms to COPCs.	KNC	MOE	30-Oct-2013	This advice has been incorporated into the Plan in Chapter 10 (Monitoring). Teck will be undertaking a supporting study starting in 2014 in coordination with the calcite monitoring program to evaluate interactive effects on periphyton and benthic invertebrates in the Elk River watershed.
A2-15	**Cadmium WP 2a Methods for Ecological Effects Assessment**	Recommend that the cadmium Biotic Ligand Model (BLM) being developed for use in the Elk/Fording watershed be validated using site-specific chronic toxicity test data. And the TAC should be provided with an opportunity to review the design of the toxicity testing program that is developed to generate the requisite site specific toxicity data.	No site-specific toxicity tests have been conducted or have been proposed to support the development of toxicity thresholds or relationships for cadmium. Rather, the proposed approach is dependent on development of concentration-response relationships based on hardness normalization and/or biotic ligand modeling (BLM). Hardness normalization has been used to derive numerical water quality guidelines for cadmium by the CCME and BC MOE. However, BLM has not been used to derive water quality guidelines or water quality criteria for cadmium in Canada or the United States.	KNC	MOE UBC	30-Oct-2013	The time frame of the Plan development (1 year) did not allow for completion of toxicity testing for cadmium. Instead, Teck relied on the Biotic Ligand Model and hardness normalization to show that cadmium concentrations at Order Stations are below benchmarks. The rationale informing the development of benchmarks was presented and discussed at the TAC Toxicological Working Group meetings #1, #2, and #3 (see TAC Toxicology Working Group Meeting Minutes #1, #2, and #3).
A2-16	**Cadmium WP 2a Methods for Ecological Effects Assessment**	When assessing the ecological effects of cadmium through the Biotic Ligand Model or other methods, consider the temporal nature of cadmium exposure and toxicity modifying factors in the natural system.	In the natural system, the concentration of cadmium and factors that modify the toxicity of cadmium vary throughout the year, mostly because of variable flow conditions. Other related points raised in relation to this discussion included a) taking into account changes in water chemistry as a result of water treatment at sites, b) consideration of TMFs given co-precipitation of carbonates, c) consideration of conducting a serio test as a means of validation approach.	MOE	UBC KNC EC	30-Oct-2013	Teck considered this advice, as presented and discussed at the Toxicological Working Group meeting # 3 (Cadmium Presentation EVWQP 28 Mar 2014 available on TAC SharePoint). The temporal nature of cadmium exposure and toxicity modifying factors in the natural system are included in the Plan at Annex G Evaluation of Potential Ecological Effects Associated with Cadmium.
A2-16a	**Cadmium WP 2a Methods for Ecological Effects Assessment**	**Description of Related Alternate (or Addn) Advice:** EC states it is important to be looking at any factors relating to Cd toxicicty.	None provided.	EC		30-Oct-2013	We agree it is important to look at a variety of factors that affect cadmium toxicity. For this reason the biotic ligand model (BLM) was introduced, and in addition to hardness-based equations will also be considered during Plan implementation. The BLM considers a number of water quality factors to assess cadmium toxicity as compared to a hardness equation which does not consider important factors like pH or dissolved organic carbon (see Cadmium Benchmark Derivation Report Annex G).
A2-17	**Cadmium WP 2a Methods for Ecological Effects Assessment**	Recommend the evaluation of the ecological effects of cadmium under current conditions must consider maximum exposures as well as average exposures to these substances.	In conducting such assessments, it is important to recognize that the results of monthly water sampling represent the average concentration of the COPC for that month. Average COPC concentrations must be determined based on the results of five water samples collected within a 30-d period.	KNC	MOE	30-Oct-2013	Teck has incorporated this advice as reflected in the derivation of benchmarks and in the presentation of maximum observed value. This was discussed at the Toxicological Working Group meeting # 3 (see Annex G (Evaluation of Potential Ecological Effects Associated with Cadmium). For the period of time coincident with the freshet, which is when cadmium concentrations are at their seasonal high, the sampling frequency is approximately weekly in the current monitoring dataset which resulted in 4 samples collected within a 30 day period. Furthermore and as detailed 2014 in Annex K.1 DRAFT Aquatic Environment Synthesis Report maximum concentrations were used in the first step of the evaluation.
A2-18	**Protection of Human Health WP 7**	Recommend that a Human Health Assessment be conducted that includes consideration of a surface water pathway and the full range of water quality present in the watershed.	The current proposed approach of Work Package #7 appears to focus on fish consumption and on groundwater pathways (and possibly surface to groundwater pathways). It further proposes that management actions will be identified to maintain protection of human health. However, it is noted that water quality guidelines exist for drinking water for selenium (500 mg/l), sulphate (10 ug/l) and nitrate + nitrite (10 mg/l) and some areas of the Elk Valley watershed are above these concentrations. Thus it is recommended that a similar effects analysis (matrices) should be developed for drinking water quality for the full range of water quality present in the watershed, and that this should be applied to both surface water and groundwater evaluations. This assessment step should be done before management actions are identified (i.e. a similar approach to aquatic health assessment). Having water quality that is suitable for drinking water speaks to values for both current and potential future users of drinking water in the watershed. Also the current proposed approach may not be reflective of stakeholder values that have been previously expressed for a healthy watershed that is fishable, drinkable and swimmable.	MEM	MOE KNC EC	30-Oct-2013	This advice has been incorporated into Chapter 5 (Assessment of Protection of Human Health and Groundwater). The human health assessment includes an evaluation of surface water ingestion as drinking water in addition to consideration of recreational use of surface water. MOE and Health Canada drinking water guidelines were used in the assessment of water quality.
A2-18a	**Protection of Human Health WP 8**	**Description of Related Alternate (or Addn) Advice:** EC supports an assessemnt of drinking water quality	None provided.	EC		19-Dec-2013	This advice has been incorporated into Chapter 5 (Assessment of Protection of Human Health and Groundwater). The human health evaluation considers both surface water and groundwater as drinking water sources.
B2-1	**Selenium WP 2a Methods for Ecological Effects Assessment**	Page 4, Top Paragraph: it seems premature to rule out invertebrates as apotentially sensitive taxa in the ecological effects matrix. At a minimum, an explicit analysis of this pathway should be included in the ecological effects matrix and depending on the details of the toxicity testing (to be provided by Teck) where effects were observed, additional studies may be necessary. *For additional context refer to Brix letter (dated Nov 6, 2013)*	The recent study by Conley et al. (2013) suggests that some invertebrates (e.g. mayflies) are comparable in sensitivity to vertebrates. Some of the toxicity testing performed with mayflies also sugests they may be sensitive to Se at instream concentrations (NO3/SO4 workplan).	UBC	KNC	6-Nov-2013	The derivation of toxicity benchmarks for selenium did consider invertebrates, as discussed at TAC meeting #4. At that time, effect concentrations were presented for invertebrate growth, reproduction, and survival, along with similar data for fish reproduction, juvenile fish growth and survival, bird reproduction, and juvenile bird growth and survival. Subsequent to that, and as presented at Toxicology Working Group meeting #3 and TAC meeting #5, additional invertebrate data from Swift (2002) was added to the dataset for consideration. Benchmark toxicity values for invertebrates were found to be higher than those associated with fish growth and survival, as well as higher than those associated with bird reproduction (i.e., invertebrates were not identified as the most sensitive taxon). Benchmark toxicity values for selenium in the Elk and Fording rivers were based on the most sensitive toxicity result for the most sensitive species, which for invertebrates was a reproductive effect to mayflies under resource-limited conditions, as reported by Conley et al.(2013).

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B2-2	**Selenium** **WP 2a** **Methods for Ecological Effects Assessment**	Effects on burbot utilizing lentic habitats in Lake Koocanusa associated with exposure to selenium need to be evaluated as part of the overall ecological effects assessment for selenium. *For additional context refer to MESL letter (dated October 31, 2013)*	Burbot in Lake Koocanusa represent a key resource for KNC members and others. Therefore effects on this species needs to be evaluated.	KNC	Mt Govt US Govt	31-Oct-2013	Consistent with the Order and terms of reference, current baseline conditions and cumulative effects for Lake Koocanusa were evaluated by comparing existing data to guidelines/criterion for the protection of freshwater aquatic life; see Chapter 4 (Baseline Conditions). Furthermore, a probabilistic assessment of potential effects due to selenium was completed for the reservoir based on the concentration-response curve for the most sensitive species tested to-date (brown trout; EPA 2014). Based on data collected to date and under existing conditions, negligible effects are predicted within the reservoir. Therefore no additional assessment is required at this time. Teck is however committed to maintaining the long-term target for selenium within the reservoir below the BC Water Quality Guideline (see Chapter 8 [Water-Quality Targets and Implementation Plan]) and continue monitoring environmental conditions throughout the Designated Area (see Chapter 10 [Monitoring]). US Environmental Protection Agency (EPA). 2014. External Peer Review Draft Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater. EPA 822-P-14-001, Office of Water, Office of Science and Technology, Washington, DC. May.
B2-2a	**Selenium** **WP 2a** **Methods for Ecological Effects Assessment**	**Description of Related Alternate (or Addn) Advice:** EC feels this advice is pretty open-ended, but supports burbot as an important receptor to be monitored.	None provided.	EC		19-Dec-2013	Teck agrees that fish (including burbot) will be an important receptor to monitor during implementation of the Plan, see Chapter 10 (Monitoring). At this time, it is unclear for what species provincial collection permits will be granted.
B2-3	**Nitrate/Sulphate** **WP 2a** **Methods for Ecological Effects Assessment**	The potential for adverse effects on primary productivity in tributaries, Fording River, Elk River, and Lake Koocanusa associated with releases of nitrate from mine-related activities, in conjunction with releases of nutrients from mining and other sources, needs to be evaluated. Such an evaluation cannot be limited to the locations identified explicitly in the order for water quality target development. *For additional context refer to MESL letter (dated October 31, 2013)*	None provided.	KNC	Mt Govt US Govt	31-Oct-2013	This advice has been incorporated as part of the evaluation of Chapter 4 (Baseline Conditions).The potential for the initial implementation plan to affect trophic status (eutrophication) within the Designated Area has also been evaluated (see Chapter 6 [Development and Selection of Management Options]).
B2-3a	**Nitrate/Sulphate** **WP 2a** **Methods for Ecological Effects Assessment**	**Description of Related Alternate (or Addn) Advice:** The Mt and US Govt are in agreement with this advice for Lake Koocanusa (e.g. Appendix A2-11). However we do not think the analysis should be constrained only to nitrate. Rather we recommend the following additional related constituents: inorganic phosphorus, ammonia and ammonium.	Primary productivity is thought to be governed by Liebig's law of the minimum, i.e. the resource in shortest supply will limit its potential. In regard nitrate, ammonia/ammonium and organic phosphorus should be all considered concomitantly with respect to increasing the primary productivity of Lake Koocanusa.	Mt Govt US Govt		5-Dec-2013	This advice has been incorporated as part of the evaluation of Chapter 4 (Baseline Conditions).
B2-4	**Nitrate/Sulphate** **WP 2a** **Methods for Ecological Effects Assessment**	The evaluation of the ecological effects of nitrate and sulfate under current conditions must consider maximum exposures as well as average exposures to these substances. In conducting such assessments, it is important to recognize that the results of monthly water sampling represent the average concentration of the COPC for that month. Average COPC concentrations must be determined based on the results of five water samples collected within a 30-d period. *For additional context refer to MESL letter (dated October 31, 2013)*	None provided.	KNC		31-Oct-2013	This advice was addressed during the evaluation of current baseline conditions against water quality guidelines; see Chapter 4 (Baseline Conditions).
B2-5	**Cadmium** **WP 2a** **Methods for Ecological Effects Assessment**	**Page 11, 2nd Paragraph** Teck should consider using test organisms/methods that are sensitive to contaminant concentrations near the WQG in their testing program. *For additional context refer to Brix letter (dated Nov 6, 2013)*	Given the site waters will be a mixture of contaminants it is not clear how any observed toxicity can be associated with Cd. Additionally, 3 of the 4 taxa to be used in testing for the NO3/SO4 program are not particularly sensitive to Cd, especially using the short-term chronic test described in the work plan. Even for Hyalella, the 14-d test design described in the work plan is unlikely to be as sensitive as the 42-d test design that generated the toxicity data that is generated the toxicity data that is currently driving the Cd WQG.	UBC	KNC	6-Nov-2013	Teck will consider this advice when designing and evaluating future aquatic monitoring and testing programs.
B2- 6	**Cadmium** **WP 2a** **Methods for Ecological Effects Assessment**	It is critical that Teck properly validate the Cd BLM developed for this site. To do this, Teck will need to conduct experiments in which site waters with varying water chemistry (reflecting both spatial and temporal variability) are spiked with concentrations of Cd and toxicity testing is performed with a sensitive organism/endpoint. I would avoid the 7-d test with Ceriodaphnia test for this validation as the YCT food (a source of DOC with low binding affinity) will confound results (this is likely why C. dubia are apparently relatively insensitive to Cd). Instead, I recommend either a 14 or 28-d Hyalella test (preferable) or the 21-d test with Daphnia magna for this validation study. The critical issue in test organism/endpoint selection is that it is comparable in sensitivity to the Cd WQG and therefore critically evaluating whether the BLM can predict how transport proteins involved in Cd uptake at these concentrations are interacting with the environment. *For additional context refer to Brix letter (dated Nov 6, 2013)*	I understand that previous efforts to develop chronic BLMs from existing acute BLMs have generally relied on adjusting LA5os (i.e., effectively extrapolating to an LA10/20) rather than log K's for metals. Conceptually of course this makes sense and an increase in intrinsic sensitivity is highly likely to explain some of the differences between acute and chronic toxicity. However, there is increasing evidence that multiple transport proteins are involved in metal uptake with different transporters dominant over the range of concentrations involved in acute toxicity versus chronic toxicity (i.e., ;lower versus high affinity transporters). This uncertainly the case a Zn (Hogstrand et al. 1998 Qui et al. 2005) and Cd is often considered a Zn analog. Hence the conditional log K's derived by Playe et al. (Playe and Dixon 1993. Playle et al. 1993) based on exposures with 6 up^-1 Cd, are not necessarily relevant to organisms exposed to Cd Concentrations an order of magnitude lower, near WQG. Of course, differences in the log K -CD will influence how the BLM predicts interactions with other water quality parameters and hence is important to understand. This issue highlights the need for some sort of field validation program to test the reliability of chronic Cd BLM.	UBC	KNC EC	6-Nov-2013	This advice was provided at a time when we were contemplating developing a target using the BLM. Subsequently through discussions with the Toxicology Working Group, it was decided to set the target based on a hardness relationship and not the BLM. Therefore, we do not have any plans to undertake additional work to validate the cadmium BLM.
B2-7	**Cadmium** **WP 2a** **Methods for Ecological Effects Assessment**	The potential for adverse effects on aquatic organisms in tributaries, Fording River, Elk River, and Lake Koocanusa associated with releases of cadmium from mine-related activities must be evaluated. Such an evaluation cannot be limited to the locations identified explicitly in the order for water quality target development. *For additional context refer to MESL letter (dated October 31, 2013)*	None provided.	KNC	Mt Govt US Govt	31-Oct-2013	As noted in Advice Item No. B3-3a, this advice has been incorporated as part of the evaluation of Chapter 4 (Baseline Conditions).

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B2-7a	**Cadmium WP 2a Methods for Ecological Effects Assessment**	**Description of related Alternate (or Addn)Advice:** The Us and MT Govt generally support this comment but recommend additional monitoring of cadmium un Lake Koocanusa be completed before determing whether a comprehensive effects analysis (i.e. like the one described for selenium in A2-4) is required.	Insufficient data currently exist to assess cadmium levels in Lake Koocanusa. Since it is a pollutant of concern, continued monitoring is needed within the designated area (including the reservoir) to forma more robust understanding of its importance.	US MT Govt		5-Dec-2013	This advice has been incorporated as part of the evaluation Chapter 4 (Baseline Conditions). Teck is committed to continue monitoring environmental conditions within the Designated Area (see Chapter 10 [Monitoring]). Existing and future monitoring program(s) will be used to monitor environmental conditions, to validate and refine planning tools, and inform the need to initiate adaptive management measures (see Chapter 11 [Adaptive Management]).
B2-8	**Overall Approach WP 2a Methods for Ecological Effects Assessment**	Recommend that a cumulative effects assessment consider a broader list of COPCs in order to better understand the potential effects on all water uses from point and non-point sources. *For additional context refer to MacDonald letter (dated October 31, 2013)*	There are numerous point and non-point sources of COPC in the Elk River Watershed. Releases of COPCs from these sources can result in impairment of water quality conditions in receiving waters. Because mixtures of COPCs can cause additive or greater effects on aquatic organisms, it is necessary to consider a broader range of COPCs in the cumulative effects assessment.	KNC		31-Oct-2013	This advice is incorporated in the Plan at Chapter 4 (Baseline Conditions), existing levels of cadmium, nitrate, sulphate and selenium and other constituents were evaluated in the Elk River and Fording rivers, their tributaries and Lake Koocanusa. Baseline conditions were examined for surface water quality, sediment quality and constituent concentrations in tissues of aquatic organisms, individually and cumulatively, to determine the overall health of the aquatic environment.
B2-9	**Protection of Human Health WP 7**	Potential effects on human health associated with exposure to selenium from dietary sources needs to be evaluated. This evaluation should rely primarily on measured (rather than modeled) tissue selenium data and should identify uncertainties in the analysis associated with data gaps and other factors. The results of the LCOII human health risk assessment should be used as a primary basis for this work. *For additional context refer to MESL letter (dated October 31, 2013)*	None provided.	KNC		31-Oct-2013	This advice has been incorporated into Chapter 5 (Assessment of Protection of Human Health and Groundwater). The human health assessment includes an evaluation of dietary selenium intake. Health effects are quantified for selenium intake via fish tissue. Selenium in game (elk, deer, sheep) muscle and organ meat also is discussed. Data gaps and uncertainties associated with evaluation of food items are provided in Annex L.1 Human Health Evaluation of Current Baseline Conditions.
A3-1	**Values and Components**	Recommend impact assessments of the impact of current and predicted future water quality conditions on other current and potential future water uses (e.g. agriculture, wildlife watering, cultural, etc.) during the development of the EVWQP. *For additional context refer to MESL letter (dated October 31, 2013)*	This information is needed to fully evaluate the effects on water uses associated with current water quality conditions and to determine how actions taken under the EVWQP will protect or restore these other water uses. This information will also be useful for identifying and assessing the trade offs that will need to be considered during development of the EVWQP.	KNC	MEM	25-Nov-2013 & 31-Oct-2013 Letter (MESL)	The Plan evaluated current baseline conditions against the most conservative provincial and/or federal water quality guidelines. As a result, current water quality conditions were evaluated against guidelines designed for the protection of aquatic life (Chapter 4 [Baseline Conditions]) and the protection of human health (Chapter 5; drinking water and potability); both of which are lower than guidelines for other uses such as irrigation, livestock or industrial purposes. The potential for future impacts at the long-term water quality targets were also evaluated for the protection of aquatic life (Chapter 8 [Water-Quality Targets and Implementation Plan]) and human health (Chapter 5 [Assessment of Protection of Human Health and Groundwater]), again against the most conservative provincial and/or federal water quality guidelines.
A3-2	**Protection of Human Health WP7**	Recommend consideration of all the pathways connected to human health (e.g. plants, invertebrates, animals, groundwater, surface water, etc.).	To address concerns and perceptions of safety with KNC community members.	KNC		25-Nov-2013	This advice has been incorporated into Chapter 5 (Assessment of Protection of Human Health and Groundwater). Human health exposure pathways are illustrated in the conceptual site model and accompanied by a pathway analysis which discusses exposure pathways evaluated quantitatively versus qualitatively.
A3-3	**Water Quality Planning Model WP 6A**	Recommend that Teck develops a more robust approach towards water-quality modeling and geochemical source term characterization in the Elk River watershed. Ultimately such an endeavor will provide a better understanding of watershed pollutant fate and transport processes and will better inform management and remediation strategies with respect to both the watershed and its receiving waters (i.e., Lake Koocanusa). We have created a separate memo documenting our specific technical comments with respect to the modeling approach. Due to the extent of these comments, we recommend that a strong adaptive management approach be included which at a minimum should include the procedure for future model updates, how incorporation of R+D program findings, a description of model uncertainty, and methodology and frequency for model post-audits (i.e., calibration checks with observed data). *For additional context refer to Technical Comment Memo supplied by US & MT Governments (dated December 13, 2013)*	Either an enhanced empirical model, or alternatively a process-based mechanistic model, is needed to provide a more detailed representation of the hydrologic and geochemical processes in the Elk River watershed. In particular, this is necessary with respect to the evaluation of management scenarios which alter system hydrology (i.e., net percolation within the spoil piles) and/or site geochemistry. Currently, the model does not have the capability due to its empirical nature and an enhanced approach would allow better evaluations of possible future scenarios resulting from changes in hydrology, land cover, treatment plants, etc.	US Govt MT Gov't		11/25/2013 (& via email on Dec 13, 2013)	As detailed within Chapter 6 (Development and Selection of Management Options), one of the focal areas associated with Teck's Research and Development (R&D) program is to gain a better understanding on the mechanism and geochemical relationships associated with the release of constituents from waste rock. Data and information gained through the R&D program will be used to help refine site-specific models such as the Elk Valley Water Quality Planning Model and will also inform the need to initiate adaptive management measures (see Chapter 11 [Adaptive Management]). This information will refine understanding of fate and transport mechanisms within the Designated Area, and as such, inform management strategies.
A3-4	**Water Quality Planning Model WP 6A**	Recommend a more quantitative hydrologic and geochemical approach to support the initial results from the WQ Planning Model. Areas requiring further investigation include: (1) long-term release rates of selenium from the waste rock; (2) solid-phase and(or) laboratory verification of annual selenium release rates suggested by the water-quality planning model; and (3) a quantitative understanding of saturated and unsaturated flow in the waste rock piles, including residence time of dual porosity flow components and a better quantitative understanding of the dominant geochemical processes occurring in the waste rock piles. Work plans should be prepared to address these deficiencies and should include (1) detailed descriptions on how these investigations will be conducted; (2) proposed schedule for completion of individual tasks; and (3) how the results will be integrated into the basin wide water-quality model. *For additional context refer to Technical Comment Memo supplied by US & MT Governments (dated December 13, 2013)*	Given the environmental implications associated with past, present, and future mining in the Elk and Fording River valleys, multiple lines of more quantitative hydrologic and geochemical evidence are needed to support the water-quality planning model. Specifically, U.S. and Montana government agencies are concerned about the short- and long-term release of contaminants of concern to Lake Koocanusa. For example, the average selenium release rate of 1.6 mg/m3/year (Table 3; Geochemical Source Term Inputs and Methods for Elk Valley Water Quality Planning Model) from the waste rock results in a very small fraction (0.00085 mg/kg) of the available selenium being mobilized. Assuming a bulk density of 1.85 g/cm3 and a bulk selenium concentration ranging from 1 to 5 mg/kg (p. 3, Geochemical Source Term Inputs and Methods for Elk Valley Water Quality Planning Model), only 0.02 to 0.08 percent of the selenium is mobilized from the bulk spoil material on an annual basis. This suggests that there is a potential for selenium releases to continue for 100s to 1,000s of years into the future to U.S. waters, persisting beyond the operation of the mines and associated treatment plants in the Elk and Fording River valleys.	US Govt MT Gov't		11/25/2013 (& via email on Dec 13, 2013)	The Water Quality (WQ) Planning Model underwent two separate third party reviews. These reviews were provided as pre-reading for TAC meeting #4. The two reports confirmed the model is sufficiently robust for its intended use as a Regional planning tool. Reference to these reviews is included in Chapter 8 (Water-Quality Targets and Implementation Plan). In addition a focal area of Teck's Research and Development (R&D) program is associated with evaluating long-term release rates of selenium from waste rock and a quantitative understanding of saturated and unsaturated flow in waste rock piles. Data and information gained through the R&D program is intended to help inform a quantitative understanding of dominant geochemical processes occurring in waste rock piles, and be used to help refine site-specific models such as the WQ Planning Model.
A3-5	**Water Quality Planning Model WP 6A**	Recommend a comprehensive assessment of the potential effects of mining activities on groundwater be conducted. This assessment should include an evaluation of contaminant pathways and receptors; a review of known aquifers; a scan of all groundwater well information (including construction logs to help assess the quality of the data) and data in the designated area; a preliminary assessment of connectivity between groundwater and surface water in areas of concern (e.g., in areas where contaminants may be in contact with groundwater); and an overall plan for monitoring to fill in gaps where the assessment of pathways has shown a potential concern, and where the information may be important to validate water quality models used in setting targets.	In order to understand the potential movement of contaminants in surface water; to potentially help validate the water quality models; and to ensure groundwater resources are not negatively impacted (i.e., cannot be used for drinking water and to sustain aquatic life), it is important to conduct an assessment to understand groundwater in the designated area. It is recognized that it may not be feasible to conduct a detailed assessment as outlined here, given the time frame for the development of the Plan (i.e., by July). However, a phased approach to assess groundwater effects should be prepared and preliminary steps should be taken, as part of the development of the Plan, to ensure groundwater pathways are evaluated and knowledge of groundwater and connectivity with surface water is characterized in areas of concern.	MOE	US Govt	25-Nov-2013	Modeled water quality concentrations for constituents of potential concern (i.e., Order constituents) in the short-term and throughout the planning window have been incorporated in the Plan (see Chapter 8 [Water-Quality Targets and Implementation Plan]). As detailed within Chapter 8 modeled Order constituent concentrations have been represented using time series plots. In addition, although phosphorous is not an Order constituent, Teck evaluated the potential to affect trophic status (eutrophication) within the Designated Area (see Chapter 6 [Development and Selection of Management Options]). Based on this analysis, no additional assessment or modeling is currently planned.

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A3-6	**Water Quality Planning Model** **WP 6A**	Recommend modeling near term water-quality scenarios for all concentrations of all pollutants of concern (e.g., selenium, nitrate, cadmium, sulfate, phosphorus, etc.) to Lake Koocanusa for the purpose of estimating the short-term (and greatest) effects on water-quality (under the assumption that waste-treatment strategies will be ramping up in the future). Model results should include a time-series of loadings showing the impact of planned mine expansion and treatment options for the next 30 years (i.e., showing the monthly impacts of expansions/treatments as they are planned). For additional context refer to Technical Comment Memo supplied by US & MT Governments (dated December 13, 2013)	As demonstrated by the measured data, pollutant loadings (e.g., selenium, nitrate, sulfate, cadmium, etc.) have been increasing through time in the Elk River and Lake Koocanusa in direct concert with placement of waste-rock. With new mine expansions, these will undoubtedly increase in the near-term. Although Teck has proposed a series of mitigation options including treatment plants, water management, etc. to buffer these impacts, it appears that many of these treatment options will not be operational for many years. Additionally, these may have unintended consequences (i.e., phosphorus discharge). Due to the fact that, mine expansions will be occurring, and for the U.S. and MT Govt. to adequately evaluate impacts to Lake Koocanusa, we would like estimates of these loadings over time to evaluate the associated response in the reservoir (i.e., with respect to selenium bioaccumulation and eutrophication).	US MT Gov't		25-Nov-2013	Model results, including near term water quality for selenium, sulphate and nitrate concentrations and loads in Lake Koocanusa, are provided in Annex D2 – Water Quality Modelling for the Initial Implementation Plan. Modelled phosphorus loads and concentrations are provided in Annex I Eutrophication. These are provided as time series plots and include the influence of future mine plans and mitigation.
A3-7	**/Management Scenarios** **WP 5**	Recommend that design criteria for clean water management (diversions) and mine affected water management (conveyance) should be informed by the consequences of a failure.	The capture efficiencies of water diversion and conveyance structures will have an effect on the water quality at the order stations and in the watershed. The ultimate design criteria of these structures must consider a range of climatic and flow scenarios and the potential consequences of failure. For example, overflow could result in flushing additional loadings from waste rock and/or bypassing of contaminant loadings to the receiving environment.	MEM		26-Nov-2013	Teck agrees that the design criteria of diversion and conveyance systems should be informed by field data and adaptively managed. Teck will select initial design return periods and capture efficiencies based on the best information available from field investigations. An adaptive management approach will be required over a period of several years to achieve optimal configuration. The consequence pointed out in the advice, flushing of additional loadings, is an example of a process that will be extremely difficult to predict, but is easily testable in the first years of operation. This will be undertaken during Plan implementation.
B3-1	**Site Specific Water Quality Objectives** **WP 3**	Recommend conducting a site-specific study to set a new selenium target for Lake Koocanusa. *For additional context refer to Technical Comment Memo supplied by US & MT Governments (dated December 13, 2013)*	The selenium target set in the Order for Lake Koocanusa was not based on site-specific conditions in the reservoir. Rather, it appears that the target was determined using province-wide selenium guidelines. However, monitoring indicates that water-quality concentrations are already above the alert levels noted in the 2012 Draft BC Selenium Guidelines (2012), hence the trigger point for further action has already been exceeded. A site-specific study therefore needs to be conducted in Lake Koocanusa to determine an appropriate selenium target that protects fish, aquatic life, terrestrial life, and human health in a lentic environment. This study and subsequent targets need to be developed to consider bioaccumulation factors, reservoir dynamics, source loadings, migratory populations, and natural conditions.	US Govt MT Govt		5-Dec-2013	Teck is committed to maintaining the long-term target for selenium within the reservoir below the BC Water Quality Guideline (see Chapter 8 [Water-Quality Targets and Implementation Plan]) and to continue monitoring environmental conditions throughout the Designated Area (see Chapter 10 [Monitoring]). As detailed within Chapters 10 and 11 (Adaptive Management) of the Plan, data collected through environmental monitoring programs will help validate the initial implementation plan and inform if adaptive measures are required. Should monitoring data indicate that outcomes and objectives of the Plan have the potential of not being met within the Designated Area, or portions thereof, Teck will identify and evaluate corrective measures at such time. For these reasons, a decision to proceed with a site-specific study to set a selenium water quality target for Lake Koocanusa will not be undertaken at this time.
B3-2	**Water Quality Planning Model** **WP 6a**	Recommend one or more hydrologic models with physically-based, watershed parameters suited to the local hydrologic regime be calibrated and validated to quantify similarities / discrepancies with the **historic modelling** results produced from GoldSim.	This recommendation will help to address uncertainty in the selected empirical approach, quantify comparability to standard hydrologic modelling approaches, and create a range of possible futures for Water Quality Modelling.	MOE		10-Dec-2013	Teck is currently scoping development of a physically based hydrologic model to support local scale design of mitigation at Fording River Operations as mentioned in Chapter 8.3 (Water-Quality Targets and Implementation Plan). Once developed and evaluated, this model will either replace the flows within the regional model or be used to evaluate the similarities/discrepancies with the regional flow modelling.
B3-3	**Water Quality Planning Model** **WP 6a**	Recommend a physically-based hydrologic model be used for all simulations of future flows for input into the WQM.	The ability to manipulate and change watershed physical characteristics is the standard approach to investigate future flows and changes via hydrologic drivers. The GoldSim approach, however, relies on developing empirical (mathematical) relationships to simulate current and future flows. This empirical relationship is based solely on data and static watershed conditions (not future). From a scientific basis, the assumption that an empirical relationship is valid in the future after a watershed has been disturbed is one of high uncertainty.	MOE		10-Dec-2013	The advice is similar to Advice Item No. B3-2. Teck's response as articulated in B3-2: Teck is currently scoping development of a physically based hydrologic model to support local scale design of mitigation at Fording River Operations as mentioned in Chapter 8.3 (Water-Quality Targets and Implementation Plan). Once developed and evaluated, this model will be integrated with the regional model.
B3-4	**Water Quality Planning Model** **WP 6a**	Strongly recommend using only good quality hydrologic data that has been collected to a published hydrometric standard (e.g., WSC or BC Govt. RISC standards [RISC 2009]) for input into hydrologic models. Fair, poor, incomplete, or other data that does not meet the standards of data collection under a provincial or nationally recognized protocol should not be used.	As the approach relies on mathematical relationships, high quality data is critical to the process. The available data varies in quality from very high (Environment Canada) to fair / poor quality. The report cites 26 watersheds that Teck monitors. However only 22 are listed in Table 3-1 (+1 EC station). Most of the listed data in table 3-1 is self-rated as Poor (9), or Fair (9). Only 4 stations are rated as good quality. The majority of measurements are weekly (Mar. – June) and monthly (rest of year) spot measurements. Some continuous data is collected. It is unknown if these data are all spot water level readings or if they are discharge measurements (water level and flow).	MOE		10-Dec-2013	Teck has incorporated the best available information to date, which includes: water quality information from eight (8) regional Environment Canada (WSC) stations, observed local data from Hosmer Creek (08NK026), Line Creek station (08NK022), Elk River stations (08NK016, 08NK002, 08NK005), Fording River (08NK018), Grave Creek station (08NK019) and Michel Creek station (08NK020). Other major flow inputs to the water quality model were derived from the Dry Creek representative hydrograph and from observed flows at Cataract Creek. These represented mining areas. The water quality model is described in Chapter 8 (Water-Quality Targets and Implementation Plan) and details on the methodology and data used is included in Annex D.1 Water Quality Modelling Methods. Improvements in the availability of long-term, high quality and continuous monitoring data will be incorporated during Plan implementation.
B3-5	**Water Quality Planning Model** **WP 6a**	Recommend clarifying Teck Flow measurement protocol: · data collection standards, · data collected, staff training protocol and (re)certifications, • instrumentation used (e.g., flow tracker, Price AA, others?), • continuous data logging equipment (i.e., data logger model, accuracy and precision) used • equipment maintenance and calibration protocol, • process for developing rating curves for each site and the rating curves produced, • variability in the annual rating curves, and • whether the quality of data as a result of the above are comparable to WSC collected data and if not what effect this may have on the modeling result.	As the approach relies on mathematical relationships, high quality data is critical to the process. It is important to know what data collection protocol (e.g., if RISC 2009) were used. This is important in confirming that data from WSC and Teck are comparable (i.e., WSC/EC data are continuous measurements that conform to ISO standards. EC-WSC are the highest standard of hydrometric data available).	MOE		10-Dec-2013	Teck will review the flow monitoring protocols in relation to provincial standards (2012 Water and Air Baseline Monitoring Guidance Document for Mine proponents and Operators) during Plan implementation.
B3-6	**Water Quality Planning Model** **WP 6a**	Recommend following the advice of the 2012 Water and Air Baseline Monitoring Guidance Document for Mine proponents and Operators http://www.env.gov.bc.ca/epd/industrial/mining/pdf/water_air_baseline_monitoring.pdf Specifically, as per pg. 120, generate the 7Q10 and the 10 year maximum (peak daily or instantaneous) discharge vs. monthly statistics produced by GoldSim. Include a description of how average monthly values are compiled from hydrometric stations that only possess weekly to monthly spot reading data. Describe the plotting position used in frequency analyses.	The flow metrics generated by GoldSim were monthly, max and min monthly flow (10 year return). However, the BC guidance document (2012) for Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators recommends using the 7Q10 for low flows (i.e., lowest 7 day annual flow, 10 year return stat) and the maximum flow (10 year return stat). These statistics can be quite different from the statistics of monthly values simulated by GoldSim. For example, the 7Q10 will likely be much lower than the lowest monthlyQ10 presented in the report. This is important for pollution dilution calculations input into the water quality model.	MOE		10-Dec-2013	Teck has added descriptions as requested to the hydrology methods report. For the purposes of the Plan, a range of flow conditions is considered to provide an indication of how future concentrations may vary with flows. This range of flow conditions is adequate for regional planning purposes. Specific flow statistics (i.e., 7Q10) as required for Environmental Assessment Certificate applications, permitting and detailed design are used for different purposes. Both flow and geochemical loadings are required to estimate concentrations for pollution-dilution calculations. For geochemistry and hydrology inputs, the level of confidence is higher for annual and monthly time scales, and for average flow conditions. Calculations of concentrations under more extreme flows have higher uncertainty because of the temporal resolution in the geochemistry input data. Teck is working towards an improved understanding of geochemical and hydrological mechanisms which will support these calculations if required during implementation.

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ID# from Meeting	Category/Theme	Advice/Comment	Rationale (*to be filled in by Originator*)	Originator (Agency) of Advice	Other TAC Member Support	Date Advice Received (dd/mm/yy)	Teck Response
B3-7	**Water Quality Planning Model** **WP 6a**	Recommend including climate change forecasts (via Climate WNA or alternate multiple emissions scenarios) in the hydrologic model simulations of future flows. Describe how will the projected changes in the amount, form and timing of precipitation affect stream flow discharges from the simulated watersheds. How will the changes in watershed characteristics, influence the accumulation and melt/ runoff of precipitation in the future.	Climate Change as part of the future flows is an important driver and was not discussed or considered in the flow forecasts. For example, in this area (Using Climate BC) Natal Peak near Sparwood could see an increase in Winter Precipitation (255 mm up to 267-321 mm), Summer ppt is likely to decrease from 173 mm to 160-138 mm. The effects of changing climate and precipitation amount/timing are critically important hydrologic drivers and subsequently affect future flows and water quality. The report states that specifically "leaching effects (both concentrations and loadings) are expected to vary seasonally in response to changes in infiltration caused by snowmelt and other climatological events. High flow events may expose more rock to leaching resulting in higher chemical loads but may also provide dilution leading to lower concentrations." This is important for the WQM.	MOE		10-Dec-2013	Teck has considered meteorological inputs into the Model indirectly using a conceptual relationship that correlates elevation and precipitation. However, Teck will consider this advice through adaptive management. Climate and hydrology monitoring will continue during implementation and updates made to the planning tools and the Plan through adaptive management. Local meteorological data are being collected and will be considered.
B3-8	**Targets / Objectives**	Develop a table that presents the recommended Site-Specific Water Quality Objectives (SSWQOs) for total selenium, nitrate, sulphate, and total cadmium for the Elk and Fording Rivers. The table should explicitly indicate the period of the year in which the SSWQO applies (e.g., spring freshet, recession, low flow) and define the duration of each period (e.g., low flow period is December through March). Recommend revising the technical memorandum entitled "Calculation of Site-Specific Water Quality Objectives for Selenium, Sulphate, Nitrate, and Cadmium in Support of the Elk Valley Water Quality Plan" to address this advice. *For additional context refer to MacDonald letter (dated December 3, 2013)*	Teck (2013) derived Site-Specific Water Quality Objectives (SSWQOs) for total selenium, nitrate, sulphate, and total cadmium for the Elk and Fording Rivers. Table 5 of the document presents the preliminary SSWQOs as specific values for total selenium and nitrate, and as ranges for sulphate and total cadmium. However, the document does not include a table that presents the final recommended SSWQOs for these substances. For this reason, a table should be created that explicitly describes the recommended SSWQOs for each river.	KNC		11-Feb-2014	Pursuant to the Order, and direction provided by the Ministry of Environment, site-specific water-quality objectives (SSWQOs) were calculated based on approved methods to support the long-term target setting process. The purpose for developing SSWQOs was to determine if natural background conditions in the Designated Area would suggest that B.C. WQGs would not apply, due to naturally elevated constituent concentrations. The calculated SSWQO for selenium, nitrate, sulphate and cadmium in the Elk and Fording rivers confirmed that the current BC WQGs are applicable to the Designated Area.
B3-9	**Targets / Objectives**	Develop a list of substances and media types for which Site-Specific Water Quality Objectives (SSWQOs) are required, based on exceedances of the BC WQGs. Derive SSWQOs for each substance in each media type included on the list. Recommend revising the technical memorandum entitled "Calculation of Site-Specific Water Quality Objectives for Selenium, Sulphate, Nitrate, and Cadmium in Support of the Elk Valley Water Quality Plan" to address this advice. *For additional context refer to MacDonald letter (dated December 3, 2013)*	Teck (2013) derived Site-Specific Water Quality Objectives (SSWQOs) for total selenium, nitrate, sulphate, and total cadmium in surface water for the Elk and Fording Rivers. However, other substances have the potential to exceed BC water quality guidelines in surface water, sediments, or tissues in the Fording River, Elk River, and/or Lake Koocanusa. For this reason, the available surface water chemistry, sediment chemistry, fish-tissue chemistry, invertebrate-tissue chemistry, and bird-egg tissue chemistry should be reviewed and evaluated to identify exceedances of BC guidelines according to the definition of an exceedance as defined in these guidelines. The SSWQOs should be established for any substance for which exceedances of the BC water quality guidelines have occurred within the period of record. BC guidelines are considered to be applicable for all other substances. □	KNC		11-Feb-2014	Substances that exceed and have the potential to exceed BC WQGs are documented in Chapter 4 (Baseline Conditions). Consistent with the requirements of the Order, Teck calculated SSWQOs for the Order Constituents and developed benchmarks for the protection of aquatic life and human health and did not focus on non-Order constituents.
B3-10	**Targets / Objectives**	Derive Site-Specific Water Quality Objectives (SSWQOs) for total selenium, nitrate, sulphate, and total cadmium in Lake Koocanusa, including season-specific SSWQOs if warranted by variability in water quality conditions. Recommend revising the technical memorandum entitled "Calculation of Site-Specific Water Quality Objectives for Selenium, Sulphate, Nitrate, and Cadmium in Support of the Elk Valley Water Quality Plan" to address this advice. *For additional context refer to MacDonald letter (dated December 3, 2013)*	Teck (2013) derived Site-Specific Water Quality Objectives (SSWQOs) for total selenium, nitrate, sulphate, and total cadmium for the Elk and Fording Rivers. However, SSWQOs were not recommended for Lake Koocanusa. For this reason, SSWQOs should be derived for total selenium, nitrate, sulphate, and total cadmium in Lake Koocanusa. The seasonal variability in water quality conditions is a key factor that needs to be considered during SSWQO deviation, if the WQGs are not adopted directly as SSWQOs.	KNC		11-Feb-2014	This advice was not adopted given that the concentrations of all expected Order constituents in Lake Koocanusa are expect to remain below the respective water quality guidelines.
B3-11	**WQ Modeling**	Modify the water quality planning model to provide a reliable tool for predicting water quality in Lake Koocanusa (i.e., not just at the mouth of the Elk River). The water quality planning tool also needs to consider effects on sediment quality and tissue chemistry, if it is to provide a reliable basis for decisions-making in the Elk Valley. *For additional context refer to MacDonald letter (dated December 3, 2013)*	Model Domain - The water quality planning model was developed to simulate concentrations of cadmium, selenium, nitrate, and sulphate at selected stations in the Fording and Elk rivers. While simulations of historic and future water quality conditions in the Fording and Elk rivers are directly relevant to the water quality planning process, predictions of future water quality conditions in Lake Koocanusa under various management scenarios are also required because the Lake is in the designated area of the Ministerial Order and is a receiving water body. Therefore, the water quality planning model should be modified to facilitate prediction of water quality conditions in Lake Koocanusa. This work needs to be completed with a timeframe that informs decisions taken during the development of the EVWQP.	KNC		11-Feb-2014	The water quality planning model predicts concentrations in water in Lake Koocanusa, and is presented in Annex D 1, Water Quality Modelling Methods. Predictions of sediment quality are not possible and were not required to support the development of the Plan. Tissue chemistry can be estimated using the bioaccumulation model as described in Annex E, Benchmark Derivation Report for Selenium (Appendix C).
B3-12	**WQ Modeling**	Modify, if necessary, the water quality planning model to provide a reliable tool for predicting water quality conditions in the tributaries to the Fording and Elk rivers that are affected by coal-mining activities. Report the results of water quality predictions for all coalmining affected tributaries and utilize these results in the EVWQP development process. *For additional context refer to MacDonald letter (dated December 3, 2013)*	Model Domain - The water quality planning model was developed to simulate concentrations of cadmium, selenium, nitrate, and sulphate at selected stations in the Fording and Elk rivers. While simulations of historic and future water quality conditions in the Fording and Elk rivers are directly relevant to the water quality planning process, predictions of future water quality conditions in the tributaries to these rivers are required to evaluate the costs and benefits of various candidate mitigation measures and management scenarios.	KNC		11-Feb-2014	Water quality conditions in the tributaries, for the purpose of plan development, were estimated using the method described in Chapter 8, Section 8. 2 3 3 (Water-Quality Targets and Implementation Plan). The model does not accurately predict concentrations in all mine-influenced tributaries; however; it can more reliably predict relative changes in water quality in these areas, because this is strongly correlated with changes to waste-rock volume. As such, model predictions for current and long-term conditions were used to proportionally scale values observed in 2013 to provide an estimate of long-term concentrations in mine-discharge tributaries (i.e., long-term concentration in a mine-discharge tributary = current observed concentration × modelled long-term concentration ÷ modelled current concentration).
B3-13	**WQ Modeling**	The Elk Valley Water Quality Plan needs to include the development of a mechanistic model to facilitate predictions of the concentrations of cadmium and nitrate in tributaries, the Fording River, the Elk River, and Lake Koocanusa. Compare the performance of the empirical and mechanistic models, and select the more reliable model for use in water quality planning in the Elk River watershed. Develop a strategy for collecting information relevant to model refinement and for refining the water quality planning model(s) as additional information is generated. *For additional context refer to MacDonald letter (dated December 3, 2013)*	Based on the results of water quality modeling conducted to simulate historical conditions, it appears that the water quality planning model may provide a relevant basis for predicting the concentrations of certain water quality variables (e.g., selenium, sulphate), but not for other variables (i.e., nitrate and cadmium). These inconsistencies in model performance suggest that key mechanisms controlling the release and/or transport of certain variables may not be adequately accounted for in the model assumptions and/or model development. For this reason, development of mechanistic, rather than empirical, model is likely to be more effective for nitrate and cadmium. This work needs to be completed within a timeframe that informs decisions taken during development of the EVWQP.	KNC		11-Feb-2014	Teck recognizes that the water quality model performs adequately for selenium and sulphate, less so for nitrate, and insufficiently for cadmium to be used as a planning tool. As part of adaptive management, as described in Chapter 11 (Adaptive Management), the water quality model will be updated as new information is available to support model development and as required to support decision making during implementation.

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B3-14	**WQ Modeling**	Revise the water quality planning model by incorporating predictions of the influence of climate change on hydrological conditions and other variables considered in the water quality planning model. *For additional context refer to MacDonald letter (dated December 3, 2013)*	Currently, the water quality planning model does not include the potential effects of climate change on hydrological conditions in the Elk Valley or on other variables that are included in the model. However, climate change has the potential to influence climatic conditions in the future and such changes should be accounted for in the water quality planning model. For this reason, relevant climate change models should be reviewed to identify potential climate-related effects in the Elk Valley. This information should be used to adjust assumptions related to future hydrological conditions and other variables considered in the water quality planning model.	KNC		11-Feb-2014	See response to Advice Item No. B3-7.
B3-15	**WQ Modeling**	Extend water quality modeling to encompass a post-closure period of 100 years for coal mines in the Elk Valley. *For additional context refer to MacDonald letter (dated December 3, 2013)*	Currently, the water quality planning model provides simulations of historical conditions (i.e., 2004 to 2012). This model will be used as a basis for making predictions regarding future water quality conditions in the Elk and Fording rivers. To ensure that such predictions provide a fulsome basis for decision making regarding water management options, water quality predictions should extend at least 100 years beyond closure of coal mines in the valley.	KNC		11-Feb-2014	During Plan implementation the evaluation of mitigation options will take into account a number of factors including but not limited to: site specific considerations; life cycle cost profile (including construction, sustaining and operating costs); implementation timing (including timing to construct and time to reach full effectiveness); technology readiness; and certainty of effectiveness. Only two of these factors are time influenced; implementation timing and life cycle cost profile. For these two factors, to ensure that the full implementation benefit of a technology is realized, and that the differences in life-cycle cost profile are taken into account, evaluations will be run over extended timelines (e.g. 100 years). This may or may not be completed using the current water quality model.
B3-16	**WQ Modeling**	As part of the development of the aquatic effects monitoring program within the Elk Valley Water Quality Plan, include water quality monitoring and stream flow monitoring at the modeling nodes included in the water quality planning model. The frequency and duration of monitoring at each location should be determined with input from the TAC. *For additional context refer to MacDonald letter (dated December 3, 2013)*	Model Inputs - The water quality planning model is dependent on estimates of stream flows and water chemistry at 35 nodes within the Elk River watershed. For the purpose of model development, the required information has been estimated based on hydrological monitoring data and estimation procedures, as well as water quality monitoring data and estimation procedures. In the future, simultaneous water quality monitoring and hydrological monitoring should be conducted at each of these nodes to provide the information needed to validate and refine the water quality planning tool.	KNC		11-Feb-2014	Teck will continue to monitoring water quality and flow within the Elk River watershed as part of the EVWQP and EMA operational permit requirements which includes monitoring at over 100 stations in mine-influenced tributaries, mainstem receiving environment and reference stations. This information will be used to make necessary updates to the water quality planning model.
B3-17	**Sediment Modeling**	Develop a planning model to facilitate predictions of COPC concentrations in sediments within tributary streams, the Fording River, the Elk River, and Lake Koocanusa. Report the results of the sediment quality predictions for the tributary streams, the Elk and Fording rivers, and Lake Koocanusa and utilize these results in the EVWQP development process. *For additional context refer to MacDonald letter (dated December 3, 2013)*	Model Domain - The water quality planning model was developed to simulate concentrations of cadmium, selenium, nitrate, and sulphate at selected stations in the Fording and Elk rivers. This approach assumes that predictions of surface water chemistry provide the necessary and sufficient information for evaluating management scenarios and developing the EVWQP. However, adverse effects on fish and other aquatic organisms can also occur as a result of exposure to sediment-associated COPCs. For this reason, an approach to modeling the concentrations of selected COPCs in sediments needs to be developed to support the EVWQP.	KNC		11-Feb-2014	Based on data collected to date and as detailed within Chapter 4 (Baseline Conditions), sediment concentrations for constituents of interest do not exceed sediment quality guidelines that would adversely effect sediment dwelling organisms. To ensure that sediment concentrations are not adversely effected downstream of Teck's operations, control structures (settling ponds), are used and actively monitored and maintained at all of Teck's operations. Such control structures are specifically designed to remove particulates from the water column prior to being discharged into the receiving environment. In addition, Teck has a robust monitoring program (the Regional Aquatic Effects Monitoring Program) that can and will be used to monitor sediment constituent concentrations within the Designated Area (refer to Chapter 10 [Monitoring]).
B3-18	**Mitigation Measures / Management Scenarios**	Develop alternate assumptions regarding the efficacy of various types of covers (including no cover, simple covers, complex covers, and geomembrane-incorporating covers) for reducing net percolation and loadings of contaminants to receiving waters in the Elk Valley. *For additional context refer to MacDonald letter (dated December 3, 2013)*	Based on the information that was presented during the TAC meeting, it appears that the geochemical inputs assume no decreased contaminant loading in association with cover placement over waste rock piles (i.e., decreased infiltration into waste rock piles is assumed to result in increased residence time and, hence, increased concentrations of constituents of potential concern in seepage). This assumption creates a strong bias against incorporation of covers into the overall water quality plan for the Elk Valley. As the assumption regarding the impact of covers on contaminant loadings is not supported by any data, a range of alternate assumptions should be developed and incorporated into the water quality modeling activities.	KNC		11-Feb-2014	Teck provided TAC a memo titled "Summary of Current Thinking about Covers" dated March 31, 2014 and distributed at TAC meeting #5. As noted in that memo, Teck continues research and development (R&D) into the potential application of covers as a mitigation measure. A key focus of the R&D work on covers is to understand how covers impact the environmental conditions within, and therefore leach rates from, spoil piles. Results of a model run which includes fully effective covers show a significant improvement in water quality over an unmitigated case; work to support potential application of covers continues as outlined in Chapter 6, Section 6.5.1 (Development and Selection of Management Options).
B3-19	**WQ Modeling**	Ensure that the water quality planning tool and associated elements are designed in a manner that facilitates timely consideration of alternative information, different assumptions, and/or refined management scenarios, as provided by the TAC and/or the public. *For additional context refer to MacDonald letter (dated December 3, 2013)*	While a number of management scenarios are being developed for consideration during development of the EVWQP, it is likely that the TAC will provide specific advice regarding the modification or refinement of the management scenarios and/or underlying assumptions. Therefore, it is important to develop the water quality planning tool and associated elements in a manner that facilitates efficient consideration of alternative information, different assumptions, and/or refined management scenarios.	KNC		11-Feb-2014	Teck agrees that the water quality planning tool and associated elements need to be able to consider alternative information, assumptions and a range of management options. The model has been developed on the GoldSim software platform which is flexible and can be updated to incorporate the suggestion above.
B3-20	**Mitigation Measures / Management Scenarios**	Clearly identify all of the assumptions and information inputs that are used to develop and evaluate the various management scenarios that are considered during formulation of the EVWQP. For each management scenario, prepare a table that identifies the information requirements, documents the information or assumptions used, and the rationale/source of the information or assumptions. *For additional context refer to MacDonald letter (dated December 3, 2013)*	The development of management scenarios that provide a basis for meeting short-term, medium-term, and long-term targets will require a substantial number of assumptions and information inputs. These underlying assumptions and information inputs need to be clearly documented and referenced to provide confidence in the EVWQP that is ultimately established.	KNC		11-Feb-2014	The assumptions, rationale and information associated with the initial implementation plan are documented in Chapter 8 8. 2 3 3. The assumptions and information associated with the management scenario options evaluated are described in Annex D.2 Water Quality Modeling for the Initial Implementation Plan and Annex D.5 Site Conditions Report. The Model input assumptions are described in detail in the Annex D.1 Water Quality Modelling Methods, D.3 Hydrology Modelling Report, and D.4 Geochemical Source Term Inputs and Methods Report.
B3-21	**WQ Modeling**	Recommend including climate change forecasts (via Climate WNA or alternate multiple emissions scenarios) in the hydrologic model simulations of future flows. Describe how will the projected changes in the amount, form and timing of precipitation affect streamflow discharges from the simulated watersheds. How will the changes in watershed characteristics, influence the accumulation and melt/ runoff of precipitation in the future.	This will allow the development of a range of possible futures for input into the WQM Climate Change as part of the future flows is an important driver and was not discussed or considered in the flow forecasts. For example, in this area (Using Climate BC) Natal Peak near Sparwood could see an increase in Winter Precipitation (255 mm up to 267-321 mm), Summer ppt is likely to decrease from 173 mm to 160-138 mm. The effects of changing climate and precipitation amount/timing are critically important hydrologic drivers and subsequently affect future flows and water quality. The report states that specifically "leaching effects (both concentrations and loadings) are expected to vary seasonally in response to changes in infiltration caused by snowmelt and other climatological events. High flow events may expose more rock to leaching resulting in higher chemical loads but may also provide dilution leading to lower concentrations." This is important for the WQM.	KNC		11-Feb-2014	See response Advice Item No. B3-7.

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A4-1	**Overall Approach WP 2b Methods for Ecological Effects Assessment**	For toxicity benchmark, rename the "no effects", "low effects", a and intermediate effects" benchmark that are more neutral (e.g. A,B,C or ECx ranges that the benchmarkl represents).	Generic terms such as "no-effect", "low-effect" and "intermediate-effects" are subjective. EC10 by definition is a 10% effect level, EC20 is a 20% effect level etc. If using ECx ranges report the associated endpoints (i.e. growth, reproduction, death).	MOE	KNC	4-Feb-2014	The toxicity values previously referred to as "no effects", "low effects", and "intermediate effects" have been renamed as Level 1, Level 2, and Level 3 Thresholds. Definitions for these levels are provided in Annex E Benchmark Derivation Report for Selenium, Annex F Benchmark Derivation Report for Nitrate and Sulphate, and Annex G Evaluation of Potential Ecological Effects Associated with Cadmium.
A4-2	**Overall Approach WP 2b Methods for Ecological Effects Assessment**	Always include measures or descriptions of uncertainty (i.e. confidence intervals around estimates and error bars for figures).	Reporting error and confidence intervals will help when determining the uncertainty associated with effects estimates. Also it may be desirable to use the lower confidence interval for benchmark given all the uncertainties identified when developing them.	MOE		5-Feb-2014	This advice has been adopted where applicable and practical in Annex E Benchmark the Benchmark Derivation Reports for Selenium, Annex F Benchmark Derivation Report for Nitrate and Sulphate, and Annex G Evaluation of Potential Ecological Effects Associated with Cadmium and any associated Action Items delivered to TAC.
A4-3	**Overall Approach WP 2b Methods for Ecological Effects Assessment**	Document the rationale and all of the conditionalizing assumptions in characterizing effects in the matrices.	Clearly identify all the assumptions and rationale used when developing the effects matrices.	MOE	UBC KNC	4-Feb-2014 (originally TOX WG#1)	This advice is incorporated in Chapter 8 (Water-Quality Targets and Implementation Plan) and in Annex E Benchmark the Benchmark Derivation Reports for Selenium, Annex F Benchmark Derivation Report for Nitrate and Sulphate, and Annex G Evaluation of Potential Ecological Effects Associated with Cadmium
A4-4	**Overall Approach WP 2b Methods for Ecological Effects Assessment**	Clarify the evaluation of interactive effects from various constituents of concern (or COPCs) and other stressors during the effects assessment. Clarify how different COCs effects matrices will be more easily summarized with one another (and ideally cumulatively aggregated in some way).	There are a variety of stressors that could adversely affect aquatic organisms in receiving waters. The proposed effects matrices provide a basis for evaluating effects associated with individual stressors. To evaluate the interactive effects of multiple stressors, it will be necessary to combine the results that are obtained for individual stressors. However, no information has been provided on how such aggregation of effects information will be conducted.	KNC	UBC MOE	4-Feb-2014 (originally TOX WG#1)	Refer to response to Advice Item No. B-4-64.
A4-5	**Overall Approach WP 2b Methods for Ecological Effects Assessment**	For Cd, SO4, and NO3 where invertebrates are sensitive indicators, available bio-assessment data (e.g., field monitoring of macroinvertebrate abundance and composition) should be used to validate predictions in the effects matrix on the effects of mixtures.	The toxicity data used to develop toxicity thresholds for Cd, SO4 and NO3 are not comprehensive. Therefore, predictions of toxicity (or lack thereof) are subject to errors associated with incomplete knowledge and extrapolation from the lab to the field. Such errors can, in part, be addressed by compiling and evaluating effects data from the field (e.g., bio-assessment data) to validate predictions regarding effects from exposure data.	KNC	UBC MOE	4-Feb-2014 (originally TOX WG#1)	To the extent possible, benthic invertebrate data collected as part of the Regional Aquatic Effects Monitoring Program have been compared to the results of the multiple stressor analysis used to support the selection of long-term targets. The purpose of this comparison was to check for consistency between predicted potential effects under current conditions and those observed in the field. Results of the comparison are summarized in Chapter 8 (Water-Quality Targets and Implementation).
A4-6	**Selenium WP 2b Methods for Ecological Effects Assessment**	Comparatively evaluate one-step vs. multi-step models. In particular, evaluate whether the uncertainty (as indicated by the UCL and UPL) in the one-step model is greater than in the multi-stepmodel. Additionally, please present the multi-step models as single figures rather than individual figures for each step (see Adams et al. 1999 for example).	It is recognized that combining uncertainty from each step in a multi-step model is not readily accomplished, as simple multiplicationat each step will result in significantly inflated uncertainty values for the model as a whole. Conversely, the characterization of uncertainty based on only a single step in the multi-step model is likely to underestimate the overall uncertainty. Comparison of the uncertainty in a one-step model vs. a multi-step model will provide some quantification of the maximum amount of this underestimate.	UBC	KNC MOE EC MT Govt	4-Feb-2014 (originally TOX WG#1)	The recommended action has been completed. Refer to response to Advice Items Nos. A4-14 and A2-8. Comparisons between model types and discussion related to uncertainty are provided in Annex E Benchmark Derivation Report for Selenium, (Appendix C: Bioaccumulation Models). Results were also presented at TAC meeting #5 and discussed at Toxicology Working Group meetings #2 and #3. In addition, all models have been carried forward in the subsequent analyses, with the highest modelled value of selenium tissue concentration used to estimate potential effects and then integrated to estimate potential effects on the population.
A4-7	**Selenium WP 2b Methods for Ecological Effects Assessment**	Review selenium bioaccumulation model dataset for locations where samples were taken across multiple trophic levels as an opportunity to further validate the model outputs.	There is substantial uncertainty in the bioaccumulation models. By identifying "m a tchin g" da ta fr om the overall data set, it may be possible to reduce variability in models derived using the data that are most closely matched.	KNC	UBC MOE	6-Feb-2014 (originally TOX WG#1)	A review of the selenium bioaccumulation model dataset identified 15 cases where matched (i.e., close in location and time of sampling) samples were taken across all trophic levels for westslope cutthroat trout and fewer for red-winged blackbirds. These samples represent a relatively small subset of the full dataset, and thus reflect a relatively narrow range of environmental conditions (e.g., aqueous selenium concentrations) compared to the full dataset. Variability in models derived from a reduced dataset may be correspondingly reduced (as indicated in the rationale provided for this comment), but that reduced variability may not reliably characterize real variability in bioaccumulation across the Designated Area. Thus, deriving models from the full dataset remains the more appropriate approach to characterizing selenium bioaccumulation for the purposes of the Plan .
A4-8	**Selenium WP 2b Methods for Ecological Effects Assessment**	As telemetry data for Westslope Cutthroat Trout (WCT) becomes available, continue to assess whether point estimates of selenium exposure concentrations are representative of water concentrations in areas where fish are moving through.	The migratory nature of WCT complicates development of the Se bioaccumulation model because tissue concentrations may not reflect exposure conditions where they are captured. The telemetry data will be useful for determining how water and tissue samples should be collected and evaluated to assess bioaccumulation.	KNC	UBC MOE	6-Feb-2014 (originally TOX WG#1)	The telemetry data being collected for westslope cutthroat trout (WCT) in the upper Fording River will provide a useful dataset in understanding the locations where WCT spend extended periods of time and the locations between which they move. These data in conjunction with other environmental data collected during implementation of the Plan (see Chapter 10 [Monitoring]) will help validate and if necessary refine planning tools such as the site-specific selenium bioaccumulation model for WCT.
A4-9	**Selenium WP 2b Methods for Ecological Effects Assessment**	Check whether there are differences in fish tissue selenium concentrations as a function of fish size (may see difference between age and size across egg tissue).	There is evidence from some studies that Se concentrations are higher in younger/smaller fish. If this is the case here, the egg Se distribution may be biased if the sample data do not reflect the age/size class distribution of instream populations.	UBC	KNC MOE	6-Feb-2014 (originally TOX WG#1)	A potential effect of fish size on fish tissue selenium concentrations was evaluated using multiple regression analysis. The analysis considered fish length as a covariate in step 3 of the three-step bioaccumulation model (i.e., a regression of WCT egg selenium versus invertebrate selenium). Results were presented at Toxicology Working Group (Tox WG) meeting #3. Results of the analysis indicated that there was a tendency for small fish to have slightly higher egg selenium concentrations (approximately 20% higher than average fish), but that this appeared likely to be an artifact of an unbalanced size distribution within the dataset. All but one of the small (<200 mm) fish in the dataset had been sampled from relatively high-selenium environments, in which invertebrate selenium concentrations were greater than 10 mg/kg dry weight and fish tissue selenium concentrations were correspondingly relatively high. Furthermore, all but one of the larger fish in the dataset (>300 mm) had been sampled from relatively low-selenium environments, in which invertebrate selenium concentrations were less than 10 mg/kg dry weight and fish tissue selenium concentrations were correspondingly relatively low. Thus, the apparent statistical effect of fish size on fish tissue selenium concentrations is most simply explained as a statistical artifact. An evaluation was conducted of the strength of evidence for an effect of fish size on bioaccumulation. Results indicated that a statistical effect was present, but could be attributed to an artifact of an unbalanced distribution of sampled fish sizes between high-selenium and low-selenium areas in the underlying dataset. It was agreed at Tox WG meeting #3 that a size effect was not supported.

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A4-10	**Selenium WP 2b Methods for Ecological Effects Assessment**	Review selenium dataset in close proximity to the Order stations (e.g. ~1km upstream and downstream) to relate potential future target water concentration levels with empirical data on selenium tissue concentrations.	It is important to try and validate modelled results wherever there is data given the level of uncertainty associated with the analyses and the development of benchmark.	MOE	UBC KNC	6-Feb-2014 (originally TOX WG#1)	The recommended action has been completed. The integrated effects assessment for selenium (Chapter 8 [Water-Quality Targets and Implementation]) includes upstream, downstream, tributary and off-channel water quality stations within the Management Unit. The assessment uses the selenium bioaccumulation models which were developed with site collected tissue (fish, periphyton, invertebrates) and water quality information to predict future tissue concentrations and potential effects. Going forward, the regional aquatic monitoring program data will be used to validate and update the selenium bioaccumulation models.
A4-11	**Selenium WP 2b Methods for Ecological Effects Assessment**	Where the information is available, preference should be given to characterizing effects using the dose - response data as much as possible rather than for example relying on effects thresholds (EC x).	In the field, exposure data is highly variable, ranging from low levels to levels that may be several multiples of the toxicity thresholds. Dose-response relationships provide a basis for evaluating the magnitude of effects associated with exceedance of toxicity thresholds, not just the frequency of exceedance.	KNC	UBC MOE	6-Feb-2014 (originally TOX WG#1)	Dose-response curves were obtained for reproductive effects to fish and birds and for growth effects to juvenile fish and birds. Dose-response curves to characterize potential reproductive effects to sensitive fish species were obtained for brown trout (as a representative of potentially sensitive fish species that may occur in the Elk River, as recommended by the TAC) and for Westslope cutthroat trout (the only fish species resident in the upper Fording River). The dose-response curve adopted to characterize potential reproductive effects to sensitive bird species was for mallard (the most sensitive bird species identified in a toxicity literature review). Dose-response curves for growth effects were obtained for juvenile chinook salmon (as a representative of the most sensitive fish species, as recommended by the TAC) and juvenile mallard (derived from toxicity data compiled in the toxicity literature review; further details are provided in the Benchmark Derivation Report for Selenium, Appendix D: Toxicity Literature Review). No dose-response curve for effects to invertebrates was identified in the toxicity literature review, nor could such a curve be derived with available data. Therefore, potential effects to invertebrates were evaluated using conservative effects thresholds.
A4-12	**Selenium WP 2b Methods for Ecological Effects Assessment**	Review lentic periphyton database (2009 to 2010-2013) to see if there is a tighter relationship between selenium water concentration and selenium tissue concentration in periphyton based on water residence time (e.g. based on surface water connection/distance from mainstem).	In the field, exposure concentrations measured in water represent snapshots of conditions at the time of sampling. In contrast, periphyton tissue concentrations reflect exposure over the weeks or months prior to sampling. By focussing on exposure data that are more closely matched to the tissue data, it may be possible to reduce variability in the Kd estimates.	KNC		4-Feb-2014	Teck reviewed the available data; however, there was insufficient information to reliably estimate residence time within lentic habitats. Recorded characteristics such as distance from the mainstem and connectivity for fish access were considered, but were not deemed a useful indicator of frequency or duration of connectivity with the mainstem rivers. As discussed in response to Advice Item No.A2-7, lentic and -lotic bioaccumulation models were developed and used as the basis for setting Targets in the Plan.
A4-13	**Selenium WP 2b Methods for Ecological Effects Assessment**	Evaluate whether a piecewise regression selenium bioaccumulation model provides a better for the lentic periphyton relationship (hockey stick) when aqueous Se concentrations are higher levels (vicinity of ~ 70 µg/L) and how this influences the proposed effects thresholds.	In observation of the data in slide 10, right panel (i.e., comparison of previous and updated lentic periphyton models), it appears as if the OLS linear model does not represent the data appropriately and in fact a piecewise regression model may be more appropriate. This has potential to influence trophic transfer in subsequent steps and thus should be considered in a more appropriate way.	Mt Govt	KNC US Govt	4-Feb-2014	This evaluation was completed. As discussed at the Toxicology Working Group meetings #2 and 3, and Technical Advisory Committee meeting #5, improved model performance between selenium concentrations in periphyton and water was achieved through data refinement and the use of a piecewise regression approach. Selenium effects benchmarks included in the Plan reflect these improvements (see Chapter 8 [Water-Quality Targets and Implementation]).
A4-14	**Selenium WP 2b Methods for Ecological Effects Assessment**	Undertaken as assessment of uncertainty (e.g. sensitivity assessment) for periphyton selenium bioaccumulation models (NB:need to check if this is covered in attachment A-7)	Currently, uncertainty has only been considered in the last step of the 3 step models. It should be investigated whether more appropriate techniques for integrating uncertainty can be developed.	US Govt MT Govt		4-Feb-2014	This evaluation was completed. As discussed at Technical Advisory Committee meetings and at the Toxicology Working Group meeting #7, the selenium-bioaccumulation model uncertainty was evaluated through the development of a one-, a two-, and a three-step model (see Annex O Management of Uncertainty in the Selenium Ecological Affects Assessment).
A4-15	**Selenium WP 2b Methods for Ecological Effects Assessment**	For the invertebrate - amphibian bioaccumulation model, undertake a sensitivity analysis to show how the slope and intercept change when the invertebrate data points with the lowest concentrations are removed.	There are a few very low data points in the invertebrate-amphibian bioaccumulation model that visually appear to potentially have excessive leverage on the slope of the model. A sensitivity analysis is needed to evaluate this.	UBC		4-Feb-2014	The recommended action was completed and reported at Toxicology Working Group meeting #2. At TAC meeting #4, Teck summarized the limited toxicity data available for amphibians and indicated uncertainty in pairings of invertebrate and amphibian egg concentrations from available studies. Following discussions with TAC, it was decided that insufficient data were available to undertake a reliable assessment of potential effects on amphibians. As such, no further development of the invertebrate-amphibian bioaccumulation model was undertaken.
A4-16	**Selenium WP 2b Methods for Ecological Effects Assessment**	In addition to using the Upper Prediction Limit and Upper Confidence Limit to compare bioaccumulation model results to selenium toxicity benchmark, provide the full probability distributions of effects (along with benchmark for reference).	It would be more informative and transparent to integrate the entire data distribution rather than using UCLs and UPLs which may be perceived as under- or over-protective.	UBC	KNC	4-Feb-2014	The recommended action was completed. Following this advice, the original proposed approach of characterizing and evaluating upper prediction limits was replaced with an approach based on modelling a full probability distribution of exposures and corresponding potential effects. Variation of individual values around modelled mean fish or bird egg selenium concentrations was characterized by calculating a root mean square deviation (RMSD) for each fitted model. The distributions and residual variance are presented in Annex E Benchmark Derivation Report for Selenium (Appendix C Bioaccumulation Modeling), and were discussed at Working Group meeting #3 and TAC meeting #5.
A4-17	**Selenium WP 2b Methods for Ecological Effects Assessment**	Where there are estimated selenium effects close to toxicity benchmark for both juvenile growth and reproduction endpoints, assess the potential combined effects for a species.	Effects on the growth of fish and their reproduction are not independent. As smaller fish can produce fewer and, in some cases, less viable offspring, it is important to evaluate the combined effects associated with COPC exposures on these endpoints.	KNC	UBC MOE	4-Feb-2014	Available fish toxicity data indicates that the reproductive endpoint is much more sensitive than the juvenile growth endpoint. For sensitive fish species, this is apparent in lower benchmark concentrations calculated for reproductive effects compared to juvenile growth effects. For westslope cutthroat trout (WCT), there are limited toxicity data to characterize the sensitivity of juveniles, but the available data indicate a similar pattern: WCT are less sensitive than the most sensitive species for the reproductive endpoint (i.e., brown trout) and are also less sensitive than the most sensitive species for the juvenile growth endpoint (i.e., chinook salmon). Based on these comparisons, it was concluded that potential effects on fish reproduction would be associated with lower aqueous selenium concentrations than those associated with potential effects on juvenile fish growth. Thus, benchmarks selected to be protective of reproductive effects would be conservatively protective of juvenile growth effects, such that the potential for interactions between endpoints is negligible. For this reason this recommended action was not completed.
A4-18	**Cadmium WP 2b Methods for Ecological Effects Assessment**	Prepare species sensitivity distributions for BLM normalized and hardness normalized cadmium toxicity for two additional scenarios: **(1)** one reflective of lowest hardness conditions at the reference site, and **(2)** one reflective of higher hardness (e.g. 320mg/l). The purpose of this analysis is to evaluate the difference in the slope ofestimate between the BLM ~~vs~~.and hardness approach.	By providing an evaluation of the agreement between the BLM and hardness approaches by normalizing the effect values over a range of water hardness conditions, one can determine if the relative difference in toxicity estimates remains consistent across varying water quality conditions.	KNC	UBC	6-Feb-2014 (originally TOX WG#1)	Teck has incorporated sensitivity distributions for a range of hardness conditions. This was discussed at the Toxicological Working Group meeting #2 and is included at Annex G Evaluation of Potential Ecological Effects Associated with Cadmium.

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A4-19	**Cadmium WP 2b Methods for Ecological Effects Assessment**	Evaluate data on the concentrations of cadmium in sediment cores at Elko (using toxicity data for Hyalella azteca, at a minimum).	Upon release into receiving waters, cadmium can remain dissolved in water or become associated with fine sediment. Such sediments may be transported to downstream areas, where they are deposited in low energy zones (depositional areas). In these areas, sediment-associated cadmium can reach concentrations of concern relative to benthic invertebrates. As Elko Reservoir is one depositional area in the Elk Valley, it is appropriate to evaluate the potential effects of cadmium on this area (and others).	KNC	UBC MOE EC US Govt	6-Feb-2014 (originally TOX WG#1)	Teck evaluated concentrations of cadmium in sediment at Elko reservoir (see Annex K. 1 DRAFT Aquatic Environment Synthesis Report, Section 3.2).
A4-19b	**Cadmium WP 2b Methods for Ecological Effects Assessment**	**Description of Related Alternate (or Addn) Advice:** Evaluate and report on the data for concentrations of selenium, cadmium and additional COPC's in the benthic sediments of Elko and Koocanusa Reservoirs; including stratigraphic coring of sediments to determine depositional rates and some estimation of current and projected load to benthos.	The current effects assessments for selenium and cadmium lacks sufficient data on accumulation in benthic sediments. Data on current condition is necessary to characterize current baseline and evaluate projected benthic sediment levels in both reservoirs (use toxicity data for Hyalella azteca as a minimum). Given the physiochemical dynamics of reservoirs and the uncertainties surrounding storage capacity for metals, more evaluation is needed to effectively monitoring benthic sediment, macro-invertebrates and fish in both reservoirs.	US Govt		19-Feb-2014	Constituent (including selenium and cadmium) concentrations measured in surface sediments within the Designated Area, included all of Lake Koocanusa and Elko Reservoir were evaluated (see Chapter 4 [Baseline Conditions]). As detailed within Chapter 4, sediment concentrations were evaluated against sediment quality guidelines to assess the potential for effects. The evaluation showed that sediment concentrations did not exceed sediment quality guidelines (refer to Chapter 4). For this reason, current or future depositional rates within sediments were not incorporated in the Plan.
A4-20	**Cadmium WP 2b Methods for Ecological Effects Assessment**	Design and implement a laboratory toxicity study to validate the application of the BLM for predicting the chronic toxicity of cadmium to fish and aquatic invertebrates.	The BLM that was developed for cadmium is based on laboratory toxicity and associated water chemistry data. However, much of the data on water quality conditions was estimated because major ion and/or DOC concentrations were not reported by the original investigators. Therefore, there is substantial uncertainty regarding the reliability of the BLM for predicting toxicity within the Elk River, Fording River, and associated tributaries. This uncertainty can be resolved by validating the applicability of the BLM with well-designed laboratory toxicity studies conducted using site water.	KNC	UBC	4-Feb-2014	As noted in the response to Advice Item No. A2-15, the time frame of the Plan development (1 year) did not allow for completion of toxicity testing for cadmium. Instead, Teck relied on the Biotic Ligand Model (BLM) and hardness normalization to show that cadmium concentrations at Order Stations are below benchmarks. The rationale informing the development of benchmarks was presented and discussed at Toxicological Working Group meetings #1, #2, and #3 and captured in the Working Group meeting notes.
A4-21	**Cadmium WP 2b Methods for Ecological Effects Assessment**	In the toxicity database for the Cadmium Biotic Ligand Model, undertake a sensitivity analysis to evaluate whether the assumption of 0.5 and 1 mg/L concentration of DOC is conservative given the DOC complexing capacity of the food provided to test organisms. Consult relevant literature to inform the range of DOC concentrations for sensitivity analysis.	DOC is an important parameter in the BLM model as it serves as a complexing agent, binding to cadmium and therefore reducing bioavailability. A sensitivity analysis should be conducted using a range of estimated DOC concentrations to evaluate changes to the normalized effect values. The sensitivity analysis should be informed by a literature review on the contributions of DOC from feed and the complexing ability of this DOC.	KNC	UBC	4-Feb-2014	Teck has incorporated the sensitivity of the biotic ligand model (BLM) normalization to changes in dissolved organic carbon for the most sensitive three organisms. A review of relevant literature to inform the range of DOC concentrations was completed. This was discussed at Toxicology Working Group meeting #2 (see presentation EVWQP Tox WG Mtg 2 Cadmium).
A4-22	**Cadmium WP 2b Methods for Ecological Effects Assessment**	In addition to showing seasonal variability for the Biotic Ligand Model normalized effects data, provide results on the seasonal variability for the hardness normalized effects data.	It is unclear whether sufficient data will be provided to validate the Cd BLM. Without this validation, it will be important to understand the effects of the Spring freshet on a hardness-only effects (SSD).	UBC		4-Feb-2014	Teck has incorporated the changes in the normalized species sensitivity distribution (SSD) that would be expected from both the biotic ligand model (BLM) and hardness equation approaches as a result of the seasonal changes in hardness (discussed at Toxicology Working Group meeting #2 and included in Annex G Evaluation of Potential Ecological Effects Associated with Cadmium.
A4-23	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	For the nitrate toxicity studies that were excluded on account of having testing conditions under 100 mg/L CaCO3, transform the toxicity effects for species that are not already represented by studies above the 100 mg/L CaCO3 threshold.	It is reasonable to exclude data below the 100 mg/L hardness threshold for species with data available at >100 mg/L. However, species should not be eliminated from the toxicity data analysis solely because data are unavailable at >100 mg/L hardness. For these species, the data should be normalized for hardness.	UBC	KNC	6-Feb-2014 (originally TOX WG#1)	The recommended action has been completed. As discussed at Toxicology Working Group meetings #2 and #3, summarized at TAC meeting #5, and agreed to at TAC meeting #6 , toxicity endpoint data for nitrate have been standardized to water hardness (for species where data were only available at low hardness). The standardized data, in conjunction with testing of site-specific waters, have been used to develop the benchmarks for nitrate that are described in the Benchmark Derivation Report for Nitrate and Sulphate and presented in Chapter 8 (Water-Quality Targets and Implementation).
A4-24	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	Provide more qualifiers for characterizing "responses measurable in the field" to reflect the basis upon which this was determined.	How are you determining what response you will be able to detect in the field?	MOE		5-Feb-2014	Twenty percent is approximately the limit of detection of field measurement techniques used in the regulation of aqueous contaminants based on bioassessment (Suter et al. 1995). The minimum detectable difference varies with species, habitat, and sampling method, but for mobile species differences of less than 20 percent can seldom be reliably detected (Suter et al. 1995). Similar constraints apply to the assessment of laboratory toxicity tests used to infer potential for field responses. For example, US EPA (2013) concludes that "a concentration that causes a low level of reduction in response, such as an EC5 or EC10, is rarely statistically significantly different from the control treatment"; they apply the 20% response criterion to identify a low level of effect to individuals that would not be so severe as to be expected to cause chronic impacts at the population level. For determination of critical effect sizes (i.e., response magnitudes used to specify ranges of benchmarks protective of aquatic life), Teck has considered both the ability to detect responses in the field and the ecological significance of various response sizes. These critical effect sizes were discussed at TAC#6. Suter GW II, Cornaby BW, Hadden CT, Hull RN, Stack M. Zafran FA. 1995. An approach for balancing health and ecological risks at hazardous waste sites. Risk Anal 15: 221-231. United States Environmental Protection Agency. 2013. Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater. EPA-822-R-13-001.
A4-24b	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	**Description of Related Alternate (or Addn) Advice:** The effect sizes used to determine if responses are measurable in the field should be informed by the AEMP design (i.e., based on detectable effect sizes, necessary sample size and sampling frequency) rather than implying that a less than 20% effect is not measurable in the field.	None provided.	KNC	MOE	5-Feb-2014	Refer to response Advice Item No. A4-24. As additional data become available, Teck will evaluate the data and its ability to capture potential effects at the appropriate scale. Adjustments will be made if warranted, as described in Chapter 11 (Adaptive Management).
A4-25	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	When assessing ecological effects of nitrate,consider effects on response variables of potential eutrophication along with toxicity. (i.e., dissolved oxygen, pH, dissolved oxygen, etc.).	While nitrate toxicity is one potential impact to aquatic life within the Elk River (and its tributaries), it is well known that excess nutrients (i.e., eutrophication) has potential to cause many other undesirable water-quality effects including low dissolved oxygen (water column and inter-gravel), diurnal changes in pH, nuisance algal growth, and changes in selenium distribution coefficients between dissolved and particulate phases. These too should be considered as impacts to aquatic life and should be evaluated within the effects matrices proposed for the project.	US Govt	MOE MT Govt	5-Feb-2014	This advice has been incorporated as part of the evaluation of current baseline conditions (see Chapter 4 [Baseline Conditions]).The potential for the initial implementation plan to affect trophic status (eutrophication) within the Designated Area has also been evaluated(see Chapter 6 [Development and Selection of Management Options]).

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A4-26	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	It is requested that an appropriate acknowledgement be made (i.e., caveat emptor) about the potential risk of eutrophication from proposed mine expansions and how eutrophication in Lake Koocanusa could potentially biomagnify selenium accumulation in the reservoir. Consequently, a very forward and concise statement must be prepared in the EVWQP discussing the risk of eutrophication if additional point and non-point phosphorous loads were added to the watershed and acknowledgement that future permitting of phosphorus sources (anywhere in the Koocanusa watershed) could have dramatic effects on reservoir eutrophication including harmful algal blooms, hypoxia in the forebay (more selenite than selenite), and increased bioavailability (and amount) of toxic constituents such as selenium at the base of the food chain.	Lake Koocanusa currently is an oligotrophic system that appears to be phosphorus-limited. In this regard, primary productivity (and pollutant bioaccumulation) are highly dependent on the scarcity of inorganic phosphorus. Mining activities have greatly increased nitrate levels and as a consequence, an adequate understanding of phosphorus controls in the watershed cannot be understated. These must be fully acknowledged along with the effects of what potentially could occur should phosphate sources be unchecked.	Mt Govt	US Govt	5-Feb-2014	Teck evaluated the potential to affect trophic status (eutrophication) within the Designated Area (see Chapter 6 [Development and Selection of Management Options]). Based on this analysis, the initial implementation plan is not anticipated to adversely affect trophic status. As detailed within Chapter 10 (Monitoring), Teck is committed to continue monitoring environmental conditions within the Designated Area. A speculative statement has not been included in the Plan. Selenium, unlike bioaccumulative chemicals such as mercury, does not "biomagnify" up the food chain. The single largest step in tissue selenium accumulation in aquatic environments occurs at the base of the food web (EPA, 2014) (see US Environmental Protection Agency (EPA). 2014. External Peer Review Draft Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater. EPA 822-P-14-001, Office of Water, Office of Science and Technology, Washington, DC. May).
A4-27	**Mitigation Measures/ Management Scenarios**	Provide detailed information about what mitigation measures are being incorporated into the model, the assumptions for these measures, and a verification that these assumptions are consistent with what is occurring or will happen at the mine sites.	It is important to have a clear understanding of exactly which mitigation measures are included in the model (and which are not) and how they have been incorporated into the model (i.e. assumptions employed). It is also important to have confirmation that the mitigations proposed in the plan are consistent with conditions and plans for individual mines. If not these will be important to identify for future requirements and regulatory review. This is especially important for measures such as covers and water treatment that are modeled to commence in the near future. For example, if waste rock covers and reduction of infiltration are employed in the model, does that reflect the experience of actual/planned re-vegetation and reclamation practices on the mines? Does a commitment to a cover/partial cover necessitate re-sloping that could be problematic operationally?	MEM	Mt Govt	5-Feb-2014	Detailed information regarding the mitigation measures incorporated in the model (see Chapter 6 [Development and Selection of Management Options] and 8 [Water-Quality Targets and Implementation Plan]) and the underlying assumptions made (see 'Evaluation of Management Options provided at TAC 4') has been included in the Plan.
A4-27b	**Water Quality Planning Model/Mitigation Measures**	**Description of Related Alternate (or Addn) Advice:** To supplement this advice, it is also recommended that further refinement be done of the GoldSim water quality model. In particular, constructive advice from TAC members (meeting 3) and also 3rd party water-quality model reviews indicate a number of areas of potential improvement which should be integrated into the EVWQP. In particular, the areas that influence the reliability of the model, especially simulating the reduction of net percolation and concomitant changes in geochemical loading terms is critically important to evaluating management scenarios. In this regard, it would be very worthwhile to provide information on what will be done to address these comments. It is recommended that at least a section of the EVWQP plan be devoted to providing details on how the model will be enhanced in the future, primarily the hydrology representation and geochemical source terms, and how they will be refined over time as new information becomes available.	A number of similarities have been noted between previous TAC advice (meeting 3) and the third party review of the GoldSim water-quality model. In particular, independent reviews by AMEC and Schlumberger Water Services echo comments made several TAC members with respect to the empirical hydrologic or geochemical processes in the model (and their ability to make future predictions; see TAC Meeting 3 Advice items A3-3 and A3-4, associated comments in memo form, Advice item B3-2 by MOE, and the 3rd party reviews). Since management action effectiveness is largely being determined using this empirical approach, it is essential that appropriate steps are taken to address these deficiencies and describe how they will be reconciled going forward with the modeling.	Mt Govt	US Govt	5-Feb-2014	Data and information gained through the Research and Development program is intended to help inform a quantitative understanding of dominant geochemical processes occurring in waste rock piles, and be used to help refine the Water Quality Planning Model.
A4-28	**Mitigation Measures/ Management Scenarios**	Determine the influence (i.e., sensitivity) of assumptions made in the bituminous geomembrane (BGM) cover scenario, including the validity of the time-frame in which these covers become effective (i.e., between 8-26 years to reach 75% performance and 40-100 year period to full performance). Additionally, provide the TAC with details on the approach and associated calculations supporting this assertion (i.e., field capacity of spoil piles, hydraulic conductivity, etc.). Finally, after verifying the assumptions, complete a model run to assess the full benefit of the BGM cover options in the Elk Valley by running the model until it reaches a dynamic steady-state (i.e., until the BGM cover reaches its full potential). Only after the BGM has become fully effective, should loading comparisons (or pollutant concentration results) be presented. It is anticipated that concentrations from the BGM treated areas should approach that of natural background levels (assuming negligible flux through the spoils).	Currently, a 20 year model run is being used to evaluate the effectiveness of water-quality management considerations in the Elk Valley including active water treatment, clean water diversions, and bituminous geomembrane (BGM) covers. However, the analysis presented was not equitable as BGM cover in the simulation were not allowed to become fully effective in the model run (i.e., the simulation was terminated at the end of the planning period before the cover was fully efficient). This artificially discounts the effectiveness of BGM treatments and may lead to faulty conclusions about the effectiveness of management strategies in the watershed. In particular, Both the MT Govt and US Govt is concerned that BGM covers may be prematurely dismissed as a remediation strategy when in fact they may provide a suitable mechanism for long-term retention of selenium in the spoil piles (other than active water treatment which may be required for 100's -1000's of years).	Mt Govt	MEM KNC EC US Govt	5-Feb-2014	Teck provided TAC a memo titled "Summary of Current Thinking about Covers" dated March 31, 2014 and distributed at TAC meeting #5. As noted in that memo, Teck continues research and development (R&D) into the potential application of covers as a mitigation measure. A key focus of the R&D work on covers is to understand how covers impact the environmental conditions within, and therefore leach rates from, spoil piles. Results of a model run which includes fully effective covers show a significant improvement in water quality over an unmitigated case; work to support potential application of covers continues as outlined in Chapter 6, Section 6.5.1 (Development and Selection of Management Options).
A4-29	**Water Quality Modelling**	In reporting on the estimates of water quality concentrations forecasted by the Water Quality Planning Model, ensure that the proper caveats are included with these predictions.	The Water Quality Planning Model is limited in its ability to forecast water quality concentrations in the tributaries to the Elk River and Fording River.	MEM	MT Govt US Govt	5-Feb-2014	Teck considered and has incorporated predicted water quality concentrations in Chapter 8.3 (Water-Quality Targets and Implementation) and in Annex D.2 Water Quality Modelling for the Initial Implementation Plan.
A4-30	**Overall Approach Methods for Ecological Effects Assessment**	-Clearly describe the nature (type), magnitude, and spatial extent of effects in each mining-affected tributary under current conditions and under future management scenarios.	Information on the effects within the tributaries under current conditions and under the proposed future management scenarios is required to understand the trade-offs that may need to be considered to balance economic, social, and environmental interests. By clearly documenting effects in each tributary under current conditions and describing how the proposed management scenarios will alter those conditions, the implications of the various management scenarios can be better understood.	KNC	MEM MOE	5-Feb-2014	Current conditions in tributaries are described in Annex K.1 DRAFT Aquatic Environment Synthesis Report, and predicted changes as a result of the base case management scenario are described in Annex H Integrated Assessment Report.
A4-31	**Overall Approach Methods for Ecological Effects Assessment**	With respect to the assessment of current conditions in tributaries, which will be documented in the Regional Aquatic Effects Monitoring Program Synthesis Report, assess the impacts as listed in Section B (Schedule C) of the Ministerial Order.	It is important to consider the requirements in the Order as part of the RAEMP report.	MOE		5-Feb-2014	Integrated assessment of mine influenced tributaries are discussed in Chapter 8 (Water-Quality Targets and Implementation) and Annex H Integrated Assessment Report.

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A4-32	**Calcite** **WP 4**	Develop medium-term and long-term targets for calcite. As no targets have been proposed to date, the following targets are recommended for inclusion in the EVWQP: **1.** Short-term goals: Within three years, survey all streams in the Elk Valley that are affected by coal mining-related activities; map the spatial extent and magnitude (i.e., low, moderate, and high) of calcite formation in all streams; evaluate the effects of calcite formation through the implementation of well-designed field studies that include appropriate effects metrics; complete and document laboratory and field investigations conducted to identify and evaluate candidate calcite management approaches and systems; identify the most effective approaches to managing calcite formation for each type of source area and receiving water stream; and, complete a preliminary calcite management plan. **2.** Medium-term target: Within 10 years, reduce the spatial extent of moderate and high levels of calcite by 50% relative to 2013/2014 levels. **3**. Long-term target: Within 20 years, reduce the spatial extent of moderate and high levels of calcite by 80% relative to 2013/2014 levels.	The Terms of Reference for the EVWQP indicate that medium-term and long-term targets and timeframes need to be established to reduce the rate and control the formation of calcite and manage impacted streams. Therefore, such targets need to be included in the EVWQP.	KNC		5-Feb-2014	Teck has incorporated recommendations from item 1 in the Plan (see Chapter 7 [Calcite Management]). Items 2 and 3 were considered; medium and long- term targets are proposed based on the Calcite Index. The Calcite Index was presented at TAC meeting #6 (refer to TAC Meeting Notes Meeting #6) and is included in Chapter 7 (Calcite Management).
A4-33	**Calcite** **WP4**	Recommend that the narrative objective for calciteformation be expressed in terms of effects.Revise the calcite monitoring program to include metrics that facilitate evaluation of effects on fish and other aquatic organisms associated with calcite formation in receiving waters. A before-after-control-impact approach should be used to evaluate the effects of calcite formation and associated management strategies to control calcite formation. The steps involved in the design of such a monitoring program should include: **1.** Develop a conceptual model for calcite formation in receiving waters; **2.** Identify all receiving waters in the Elk Valley with water quality conditions and/or mining activities potentially sufficient to promote calcite formation; **3.** Classify receiving waters prone to calcite formation based on physical-chemical characteristics and habitat types; **4**. Identify appropriate reference areas for type of receiving water that was identified within the mining-affected areas; **5.** Identify the assessment endpoints and measurement endpoints that will be incorporated into the monitoring program; **6.** Identify a number of representative reaches of each type of receiving water within mining-influenced and reference areas that will be used to support intensive effects monitoring; **7.** Describe the type and frequency of sampling and analysis that will be conducted within each reach; **8.** Describe the type and frequency of monitoringthat will be conducted on other stream reaches to further evaluate the nature, extent, and magnitude of calcite formation; and, **9.** Describe the procedures that will be used to evaluate the resultant data and determine the effects of calcite formation on aquatic organisms.	The Terms of Reference for the EVWQP indicate that medium-term and long-term targets and timeframes need to be established to reduce the rate and control the formation of calcite and manage impacted streams. Therefore, such targets need to be included in the EVWQP.	KNC		5-Feb-2014	Teck has incorporated this advice in its narrative objective (Chapter 7.4 [Calcite Management]). We evaluated the applicability of the steps listed in future calcite study design undertaken during the Plan implementation. The recommended steps represent an appropriate framework for the ongoing evaluation and refinement of the interim targets that are being included in the Plan.
A4-34	**Implementation**	Recommend that a detailed adaptive management framework isbe included as part of the Elk Valley Water Quality Plan. A robust adaptive management framework should include specific triggers and, feedback loops. and specific actions to be taken. The adaptive management framework couldshould also describe the linkages to future regulatory processes.	Understanding the specifics of the adaptive plan (i.e. steps, triggers and actions) will be important for implementation of the plan and demonstrating how the plan will be used and adapted to changing future conditions and how this links to regulatory processes and requirements at each site.	MEM	MOE MT Govt US Govt	5-Feb-2014	This advice is incorporated in the Plan. Chapter 11 (Adaptive Management) includes triggers, feedback loops, and discussion of action pathways.
B4-1	**Water Quality** **WP2b** **Ecological Effects Assessment/Lake Koocanusa**	In addition to modeling and monitoring the concentration of selenium, cadmium, nitrate, sulfate and other contaminants of concern entering Lake Koocanusa, modeled and measured monthly/annual loads entering Lake Koocanusa are also needed to begin to understand current and potential environmental impacts. Load modeling results for selected monitoring sites on the Elk and Fording Rivers will be distributed (by Montana USGS) at the April TAC meeting in the context of initial treatment capacities, selenium concentration, mine expansion, and variations in mean annual discharge.	Lake Koocanusa is a large lentic system that is currently receiving contaminant loadings from mining in the Elk and Fording River Valleys. It is possible that these contaminant loadings will continue during and after coal mining operations have ceased. Initial empirical watershed modeling results have indicated that selenium concentrations, for example, in Lake Koocanusa will not exceed 2ug/L. Little is known about the biogeochemical cycling of selenium in Lake Koocanusa and it is possible that this system may act as a selenium sink that could increase selenium uptake in biota beyond acceptable levels. Although detailed biogeochemical studies of selenium and other contaminants of concern in Lake Koocanusa are considered to be beyond the scope of the current Elk Valley Water Quality Plan, detailed information on the measured and modeled contaminant loads entering this system on monthly and annual time steps are needed to begin to understand present and long-term impacts from mining and the potential interactions between contaminant concentration/loading, reservoir volume, persistence of contaminant sinks, variability in timing of reservoir inputs, and evolving contaminant treatment capacities. In addition, trends in contaminant loads entering Lake Koocanusa will be a more meaningful metric of short- and long-term remediation success in the Elk and Fording Rivers, than simply concentration.	US Govt	MT Govt	19-Feb-2014	Modeled loads have not been used to evaluate potential environmental impacts. The Plan includes current baseline conditions within the reservoir (see Chapter 4 [Baseline Conditions]). Going forward and as detailed in Chapter 8 (Water-Quality Targets and Implementation), Teck has developed a mass balance model for the Designated Area. Trends in constituent load reductions will inform and validate the initial implementation plan.
B4-2	**Overall Approach** **WP2b** **Ecological Effects Assessment/Lake Koocanusa**	A Working Group should be established immediately to define the scope of the assessment that needs to be conducted on Lake Koocanusa. *For additional context refer to MacDonald letter (dated February 18, 2014)*	The TAC has recommended that impacts in Lake Koocanusa be evaluated, under current conditions and under future conditions, under the EVWQP. However, a work package describing the approach that will be used to assess impacts in Lake Koocanusa will not be presented to the TAC until April, 2014. This timing will not provide the members of the TAC sufficient time to provide meaningful input on the approach. Therefore, a Working Group should be established immediately to guide the development of an approach for assessing impacts in Lake Koocanusa.	KNC		19-Feb-2014	This advice was incorporated during the development of the Plan. The TAC Lake Koocanusa Working Group met on May 12, 2014. Meeting Notes are available on the TAC SharePoint site.

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B4-3	**Overall Approach WP2b Ecological Effects Assessment/Lake Koocanusa**	At minimum the scope of the assessment of effects in Lake Koocanusa needs to include the following: **1.** Evaluation of ambient water quality conditions throughout the lake (including evaluation of existing water-chemistry data, surface-water toxicity data, periphyton, zooplankton, and trophic status information, and other related data and information); **2.** Evaluation of ambient sediment quality conditions throughout the lake (including evaluation of existing sediment-chemistry data, sediment-toxicity data, and benthic invertebrate community structure data); **3.** Evaluation of existing invertebrate-tissue chemistry, fish-tissue chemistry, and bird-egg chemistry data; 4. Evaluation of current loadings of COPCs to the lake from all sources; 5. Evaluation of the factors that are currently limiting primary productivity within the lake; and, Identification of long-term monitoring and assessment needs for confirming that loadings of COPCs to the lake are being reduced, that a water quality objective of 2 µg/L for selenium is protective of aquatic organisms and aquatic-dependent wildlife, and that inputs of nutrients are not adversely affecting the trophic status of the lake. *For additional context refer to MacDonald letter (dated February 18, 2014)*	An assessment of current conditions in Lake Koocanusa is required to establish baseline conditions in the lake and to support the evaluation of future permit applications for development projects (i.e., coal mine expansion and other developments). The results of such an assessment and future monitoring are also needed to ensure that international waters, species at risk, and First Nations interests are adequately protected.	KNC		19-Feb-2014	As discussed at TAC meeting #5, concentrations of water quality constituents entering Lake Koocanusa are monitored, as is water quality in the Canadian portion of the lake. This monitoring will continue into the future as part of Teck's Regional Aquatic Effects Monitoring Program.
B4-4	**Selenium WP 2b Methods for Ecological Effects Assessment**	Include bull trout and white sturgeon in the Selenium Effects Assessment and overall effects monitoring for population-level impacts as well as bio-accumulation in individual fish.	Bull trout and white sturgeon are of particular cultural, historical and substance importance. Bull trout are listed as "threatened' under the U.S. Endangered Species Act (U.S. ESA) due to impaired spawning and recruitment across their range and Koocanusa Reservoir is designated as bull trout "critical habitat". White Sturgeon are listed as "endangered" under the U.S. ESA, in the Kootenai River below Libby Dam. The fact that selenium concentrations have risen for the past eight years at Creston, B.C., after the flow of the Kootenai River returns to Canada, is clear evidence of significant effect outside the regional study area.	US Govt	MT Govt	19-Feb-2014	Bull trout and white sturgeon were included in the selenium effects assessment (see Chapter 8 [Water-Quality Targets and Implementation] and its associated technical appendices). With respect to overall effects monitoring, bull trout fish data was included in the assessment of current baseline conditions. The assessment found that bull trout samples did not exceed guidelines within the reservoir (see Chapter 4 [Baseline Conditions]). White sturgeon are not found within the Designated Area. Furthermore white sturgeon are not a species sensitive to selenium (see Tashajian, DH. A. Sogomonyan and S.S.O. Hung. 2006. Bioaccumulation and chronic toxicity of dietary L-selenomethionine in juvenile white sturgeon (Acipenser transmontanus). Aquatic Toxicology 79: 401-409). For these reasons, white sturgeon data was not included in the overall effects monitoring assessment.
B4-5	**Selenium WP 2b Methods for Ecological Effects Assessment**	Include a safety factor in the proposed benchmark for fish and birds. Consider a more conservative (lower) value for the EC10.	An EC10 of 25 mg/kg dw for Westslope cutthroat is not sufficiently protective of aquatic life. A benchmark associated with 10% population lethality is a significant impact for listed species such as bull trout and Westslope cutthroat trout. Management of listed species in the U.S/MT is for EC0 (zero take of individual species) and a separate permitting process is required for mortality impacts to listed species.	US Govt	MT Govt	19-Feb-2014	Selenium effect benchmarks outlined in Chapter 8 [Water-Quality Targets and Implementation] were been developed using the best available science and in consultation with the Technical Advisory Committee and Toxicology Working Group members. Through this process a one-, a two-, and a three-step model was developed using conservative assumptions and considered uncertainties to which Teck selected the most conservative model. A scientifically derived number established the benchmark and as discussed within the Toxicology Working Group applying a safety factor is not required.
B4-6	**Selenium WP 2b Methods for Ecological Effects Assessment**	An safety/uncertainty factor should be applied to the toxicity values being used deriving water-based benchmark from the Se modelling efforts.	1) Whether the multi-step or single (BAF) model of selenium accumulation is part of the final determinations of target levels, both approaches have high levels of uncertainty. For example, each step in the multi-step approach had about 70% unattributed variance (r2 ~30%), which would introduce with confidence bounds around the final numbers. 2) The dose-response curve for Se in reproductive tissues is very steep. Moving from almost no effect to reproductive failure occurs over a narrow range of concentrations. The selected end-point is an EC10, which is not "no effect". Given the uncertainties in the model estimates and the consequences of underestimating the resulting tissue selenium burden (i.e: overestimating a safe target for Se in water), the tissue benchmark for deriving a water concentration should be less than the 25 mg/kg EC10 proposed for WCT.	EC		19-Feb-2014	This advice is incorporated in Annex O Management of Uncertainty in the Selenium Ecological Affects Assessment . This document was developed as part of the TAC Toxicology Working Group.
B4-7	**Overall Approach WP 2b Methods for Ecological Effects Assessment**	[Assessment Methodology] To determine the population effects on a species, suggest first looking at: **1)** effect levels and endpoints for COCs separately for main stem, lentic and tributaries; then **2)** COCs in combination for main stem, lentic, and tributary; Then combine information from main stem, lentic, and tributary to estimate effects on population.	It is important to look at the effects from the COCs on the receptor (by themselves and in combination) for main stem, lentic and tributaries before combining water types since effects may be different for each area based on differences in COC concentrations.	MOE		19-Feb-2014	Teck has developed a proposed approach to assess integrated effects that involves two steps. The first step involves a constituent-specific assessment that is conducted separately for selenium, nitrate, sulphate, and cadmium. The second step involves evaluation of potential interactions among constituents and between constituents and other environmental stressors. In both steps, the evaluation involves multiple locations within a Management Unit, as well as for each Management Unit as a whole.
B4-8	**Overall Approach WP 2b Methods for Ecological Effects Assessment**	[Assessment Methodology] More rationale is needed for determining potential effects to populations when assessing the effects within each habitat.	Critical factors would include levels of effects, endpoints, life history of the organism, indirect effect, food web dynamics, other stressors etc	MOE		19-Feb-2014	This advice was incorporated in the development of the Plan primarily through the work of the Toxicology Working Group. This work is included in Annex H in the Integrated Assessment Report.
B4-9	**Selenium WP 2b Methods for Ecological Effects Assessment**	[Main Report] Clarify what the UPLs actually represent. Periphyton or invertebrates are composite samples. UPLs are supposed to be prediction limits reflecting individual values, but in many cases, the data are composite sample representing averages and so it is not clear what a UPL actually represents.	For example. Consider the equations for Step3 from invertebrates to eggs. Does the UPL represent the [Se] in individual eggs? The range of mean [Se] among fish? This has implications when these UPL are used. The legend says it is the 90th percentile of the modelled values, but what does a 90th percentile of composite averages really mean? This needs to be carefully specified. For example, are the modelled concentrations for eggs in fish that of individual eggs? For birds are they for individual eggs?	MOE		19-Feb-2014	Refer to response to Advice Item No. A4-16. In advancing the selenium analyses, and in response to TAC advice, full distributions of selenium tissue concentrations are now used instead of upper prediction limits (UPLs).

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B4-10	**Selenium WP 2b Methods for Ecological Effects Assessment**	[Appendix C] For future reports and analyses clarify what the "individual" is that is being modelled.	The term "individual" is used throughout the report however it is unclear what is being modelled. The models predict average concentrations for many individuals. The authors claim that UPL are for individuals (e.g. individual eggs in fish? The mean concentration of eggs within a fish? For individual birds? The mean concentration for a clutch of eggs?). This needs to be clarified. Prediction intervals for composite samples cannot be interpreted as representing individuals, and therefore they have no clear meaning.	MOE		19-Feb-2014	Clarifications have been provided in the Annex E Benchmark Derivation Report for Selenium, Appendix C: Bioaccumulation Modeling. Specifically, "individual value" in the context of individual egg selenium data refers to the egg selenium concentration associated with the clutch of eggs produced by a single adult bird or fish. Fish egg samples are collected as an aliquot of a female's clutch or as a whole ripe ovary; in either case, the samples are interpreted to represent the entire clutch (i.e., all eggs from one female). Bird egg samples are collected as individual eggs, but are also interpreted to represent the entire clutch.
B4-11	**Selenium WP 2b Methods for Ecological Effects Assessment**	[Appendix C] The multi-step model fails to predict the [Se] in fish when the [Se water] > 10. The authors note that a similar problem occurred for periphyton. The model does fit for lotic environments at low [Se]. Need to investigate the reasons for model failure and improve the model before using it. Compare the results of the multi-step model to the one-step model.	The multi-step model overestimates [Se in WCT] at low [Se water] and underestimates [Se in WCT] at higher [Se water] concentrations (i.e. at concentrations higher than 10).	MOE		19-Feb-2014	The multi-step model has been refined to address this concern. The model behaviour identified in this advice originated from the inclusion of periphyton data from Clode Pond, Goddard Marsh and the Fording Oxbow. Periphyton samples from these lentic areas exhibited a pattern of selenium bioaccumulation distinct from the remainder of the dataset used in the analysis. In discussion with the Toxicology Working Group, it was decided that these distinct locations would be considered separately, via a separate bioaccumulation model. These data were included in a model that characterizes bioaccumulation in these distinctly lentic environments, as discussed in Benchmark Derivation Report for Selenium, Appendix C: Bioaccumulation Modeling. On the comparison between multi-step and one-step models, please refer to the response to Advice Item No. A4-6.
B4-12	**Overall Approach WP 2b Methods for Ecological Effects Assessment**	[Appendix D] In future reports and analyses, use the correct terms when referring to endpoints.	ECx should not be used to refer to all effects and endpoints as suggested. A 20% effect on growth (IC20) is a very different endpoint than a LC20 (concentration that would be lethal to 20% of the organisms tested).	MOE		19-Feb-2014	This advice is incorporated in the Plan. Text in Appendix D and elsewhere in the Plan has been revised and appropriate terminology used when referring to endpoints.
B4-13	**Overall Approach WP 2b Methods for Ecological Effects Assessment**	[Appendix D] In the development of ecological effects benchmark, we recommended the use of the preference of endpoints provided in the BC and CCME protocol.	The authors are not using the order of preference provided in the BC and CCME protocols. This could have an impact on the conservatism of the proposed ecological effects benchmark.	MOE		19-Feb-2014	Where relevant and appropriate, the benchmarks for sulphate, cadmium, nitrate and selenium have been developed using endpoints selected according to BC and CCME protocols.
B4-14	**Selenium WP 2b Methods for Ecological Effects Assessment**	[Appendix D] For ranking and choosing studies which are used in developing ecological effects benchmark, use the ranks (primary, secondary, unacceptable) provided by the updated BC MOE Se WQG (2014) authored by Beatty and Russo.	The authors of Appendix D are ranking studies incorrectly and are not consistent with the BC and CCME protocols. Studies that are ranked primary in this report were ranked unacceptable by the Ministry. The Ministry has already ranked the Se literature according to BC and CCME protocols.	MOE		19-Feb-2014	The exact BC and CCME protocols were not followed. However; toxicity data compiled from selenium studies were categorized as primary, secondary or excluded, according to the evaluation criteria defined in the Selenium Benchmark Evaluation Report, Appendix D, Section 2.2.1. As acknowledged by the Canadian Council of Ministers of the Environment (CCME 2007), the quality of published toxicity data varies. To derive defensible toxicity benchmarks for selenium, data sources must be scientifically defensible and must align with the scientific community's conceptual model for selenium toxicity (Chapman et al. 2010, BC MOE 2012). Studies that met all evaluation criteria were classified as primary. Studies that did not meet one or more of the evaluation criteria were classified as secondary or excluded. Details supporting the classification of secondary and excluded studies are provided for each receptor group in Section 3.0. In describing effect levels associated with benchmark values, preference was given to data from primary studies. Data from secondary studies were considered if toxicity values were lower than or within the range of values reported in the primary dataset, or if the study was of use in interpretation of the overall dataset. In each case, a rationale is provided for inclusion of these secondary data. Results of the literature review are provided in the Selenium Benchmark Evaluation Report, Appendix D, Section 3.0. The rationale for inclusion or exclusion of reviewed studies is provided either in tabular format or as an annotated bibliography, depending on the receptor group. The rationale for excluding a study is provided either by referring generally to study evaluation criteria or by describing the aspects of that study that rendered the data unacceptable. This information was provided to the Toxicology Working Group through Action Item No. A-89.
B4-15	**Selenium WP 2b Methods for Ecological Effects Assessment**	[Appendix D] For ecological effects benchmarkuse guidelines identified in BC MOE Se WQG (2014) for the no-effects benchmark.	The updated Se WQG identifies thresholds for: - selenium toxicity on fish and birds; - egg/ovary toxicity thresholds; - and whole body toxicity thresholds for reproductive and non-reproductive endpoints in fish. The BC MoE (2014) Se WQGs represent values that are protective and should be used as the no-effects benchmark.	MOE		19-Feb-2014	In development of the selenium benchmarks, and as discussed with the Toxicology Working Group and TAC, studies were ranked based on relevance to the Plan and to conditions in the Elk Valley. In particular, preference was given to field studies (including data collected in the Elk Valley) over laboratory studies since these studies would be more representative of actual selenium speciation and exposure conditions in natural food webs as opposed to artificially-enriched selenium diets used in lab studies. A paper discussing this concept was circulated to TAC members (Rigby et al. 2014). Based on guidance from and discussion with TAC, the benchmark derivation now considers a Level 1 benchmark that represents an exposure concentration associated with 10% effects (i.e., IC10 or EC10), as opposed to a no-effect level as previously proposed. Given that the Level 1 benchmark is not intended to represent a no-effect concentration, the BC MOE Se WQG is not directly applicable. Rigby, M.C., A.D. Lemly, and R. Gerads. 2014. Fish toxicity testing with selenomethionine spiked feed – what's the real question being asked? Environ. Sci.: Processes Impacts 16: 511.
B4-16	**Selenium WP 2b Methods for Ecological Effects Assessment**	[Appendix D] Suggest including the BC MOE whole-body Se toxicity threshold of 4 µg/g (dw) for a protective ecological effects benchmark to protect reproductive and non-reproductive end points in fish.	This threshold was determined to be protective based on a review of the whole-body Se toxicity thresholds for reproductive and non-reproductive endpoints in fish. The whole-body guideline would be protective for both juvenile and adult fish. Beatty and Russo concluded in the BC MOE 2014 WQG update that there was not sufficient toxicity data available to develop a juvenile fish toxicity threshold.	MOE		19-Feb-2014	As discussed in the Annex E Benchmark Derivation Report for Selenium, Appendix D: Toxicity Literature Reviews, potential effects to fish were evaluated separately for reproductive and non-reproductive endpoints, to provide an assessment that was most directly relevant to each and that could incorporate toxicity data from the most sensitive species for each. In addition, this approach allowed the use of dose-response curves for each endpoint rather than a single benchmark value, as discussed in Advice Item No. A4-11. At the recommendation of the TAC, the brown trout dose-response curve was adopted to characterize potential reproductive effects on sensitive fish species, and the chinook salmon dose-response curve was adopted to characterize potential juvenile growth effects on sensitive fish species.

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B4-17	**Selenium** **WP 2b** **Methods for Ecological Effects Assessment**	[Appendix D] Provide rationale on why dietary benchmark are restricted to juvenile birds. Suggest dietary benchmark cover all life stages of birds. Suggest using the interim BC Se dietary guideline as a low effect dietary benchmark for birds.	There are very few published studies for Se toxicity on juvenile birds; however there are some dietary studies available that could be used to develop a dietary benchmark. Ohlendorf (2003) suggested dietary thresholds for Se (based on mallard data) of: EC10 = 4.87 (3.56-5.74), EC20=5.86, and EC50= 8.05 mg/Kg. Ohlendorf and Heinz (2011) suggest that there is an elevated probability of reproductive impairment in sensitive bird species at dietary concentrations of Se is >5.o mg/kg (dw). The Utah Department of Environmental Quality Released a Fact Sheet with Recommended Guidelines for a Water Quality Standard for Selenium in the Great Salt Lake. The recommended Se water quality standard to prevent impairment for aquatic life lies within the ranges of: - 3.6 to 5.7 mg Se/kg for bird diet items - 6.4 to 16 mg Se/kg for bird eggs (see below – taken from http://www.deq.utah.gov/workgroups/gsl_wqsc/docs/2008/May/GSL_FACTSHEET_0520008_ProtectionLevelSelenium_Final.pdf	MOE		19-Feb-2014	Dietary benchmarks were derived to evaluate potential growth effects on juvenile birds and fish because growth effects are most directly and reliably related to dietary selenium concentrations. Conversely, potential reproductive effects on birds and fish are most directly and reliably related to egg selenium concentrations. As a result, fish and bird toxicity data are most often expressed as egg selenium concentrations. Some studies have also reported dietary selenium concentrations associated with effects to fish and birds, but these represent a more indirect exposure measure, and one that entails additional uncertainty in extrapolating to conditions other than those in the toxicity study (e.g., extrapolating a laboratory feeding study to exposure of fish and birds to selenium in the wild). Therefore, the evaluation of potential reproductive effects relative to egg selenium concentrations is the preferred approach, and was the approach adopted in the Plan.
B4-18	**Selenium** **WP 2b** **Methods for Ecological Effects Assessment**	[Appendix D] Suggest that the dietary benchmark that protect fish and birds also need to be considered when developing benchmark for invertebrates.	The BC MoE Se WQG (2014) has an interim dietary guideline of 4 µg/g (dw) which applies to invertebrate tissue. Exceeding this benchmark could result in effects to birds and fish that consume invertebrates. This should be factored into how we review the ecological effects of invertebrate benchmark.	MOE		19-Feb-2014	As discussed in responses to Advice Item Nos. B4-16 and B4-17, potential effects to each receptor were evaluated separately, using toxicity data for the most sensitive species, life stage, and effects endpoint, and with consideration of the exposure route most directly related to that species, life stage, and effects endpoint. Thus, potential effects to fish and birds were evaluated relative to both egg selenium concentrations (for reproductive effects) and dietary selenium concentrations (for juvenile growth effects). Potential effects to invertebrates were evaluated relative to invertebrate tissue selenium concentrations. By considering potential effects to different receptors separately, rather than combining them as suggested by the advice, the evaluation was able to incorporate the most reliable and directly relevant toxicity data for each receptor, and furthermore was able to provide a detailed characterization of potential effects on different taxa within the aquatic ecosystem.
B4-19	**Selenium** **WP 2b** **Methods for Ecological Effects Assessment**	[Appendix D] Suggest that additional toxicity testing for amphibians resident to the Elk Valley is needed to improve the amphibian benchmark proposed.	There is uncertainty in how protective the benchmark proposed for Amphibians are, since they are based on African clawed frogs and Cope's gray tree frogs. No studies were available for species found in the Elk Valley.	MOE		19-Feb-2014	As discussed at TAC meeting #5 and Toxicology Working Group (Tox WG) meeting #7 the available data indicate that amphibians are not more sensitive to selenium than fish and birds, and do not bioaccumulate selenium to a greater extent than fish and birds. Therefore, it was agreed that, for the purposes of the Plan, no further assessment of potential effects of selenium to amphibians would be undertaken.
B4-20	**Selenium** **WP 2b** **Methods for Ecological Effects Assessment**	Evaluate the performance of non-linear models for estimating Kd in lotic and lentic habitats. *For additional context refer to MacDonald letter (dated February 18, 2014)*	The linear model that was presented does not appear to adequately describe the relationship between selenium concentrations in water and selenium concentrations in periphyton. Therefore, alternative models should be developed and evaluated to determine if they explain more of the variability in the underlying data.	KNC		19-Feb-2014	This recommended action has been completed. An evaluation of alternative non-linear forms for each model was performed. For periphyton, a piecewise model was selected as it exhibited improved fit to the data and improved residuals, compared to the linear model. The evaluation and the improved periphyton model were discussed at Toxicology Working Group meeting #2 and are provided in the Annex E Benchmark Derivation Report for Selenium, Appendix C: Bioaccumulation Modeling
B4-21	**Selenium** **WP 2b** **Methods for Ecological Effects Assessment**	Review the underlying data that were used to develop the selenium bioaccumulation model and identify the pairs of water chemistry and periphyton-tissue chemistry data that inspire the highest confidence that the concentrations of selenium in water represent the exposure concentration for the periphyton (i.e., for sampling locations that have the lowest variability in water quality conditions based on samples collected at multiple times throughout the year). *For additional context refer to MacDonald letter (dated February 18, 2014)*	The selenium bioaccumulation model is based on paired measurements of water chemistry and periphyton-tissue chemistry. While the periphyton-tissue chemistry data reflect integration of exposure to selenium over some extended period of time (i.e., weeks to months), the water chemistry data typically represent a point estimate of selenium concentrations (i.e., at time that the sample was collected). This disconnect between exposure concentration and tissue concentration may exp0lain some of the high variability in the Kd estimates.	KNC		19-Feb-2014	An evaluation of methods used in tissue-to-water and tissue-to-tissue data pairing was completed and is reported in the Annex E Benchmark Derivation Report for Selenium, Appendix C: Bioaccumulation Modeling. To assess the impact of data paring decisions on model outcomes, final models were re-derived using primary data pairs only (i.e., including only relatively high-confidence estimates of a synoptic X paired with each Y) for comparison to models derived using primary, secondary, and tertiary data pairs (i.e., including X values that approximate a synoptic value with a greater or less degree of confidence). Results indicated that inclusion of secondary and tertiary data pairs had negligible or minimal effect on model equations, and if anything resulted in models that made higher predictions of selenium bioaccumulation.
B4-22	**Selenium** **WP 2b** **Methods for Ecological Effects Assessment**	Design and implement controlled-laboratory (bioaccumulation tests) and controlled-field studies (artificial stream systems) using site water to confirm or refine the water-to-periphyton model that was developed for use in bioaccumulation modelling. *For additional context refer to MacDonald letter (dated February 18, 2014)*	The Kd model that was developed explains only 30% of the variability in the underlying matching water chemistry and periphyton-tissue chemistry data. Hence, there is substantial uncertainty in the resultant model predictions. Conducting focussed laboratory and/or mesocosm studies would increase confidence in the Kd model and the decisions that are taken based, in part, on the selenium bioaccumulation modelling.	KNC		19-Feb-2014	As discussed in the response to Advice Item No. B4-6, uncertainty in model predictions was accounted for by incorporating elements of conservatism throughout the benchmark derivation analysis. The Annex E Benchmark Derivation Report for Selenium, Appendix C: Bioaccumulation Modeling presents a validation of the final bioaccumulation models that shows that different model forms generally perform well in comparison to each other and to measured selenium data. Furthermore, residual variability around the fitted models was characterized by calculating the root mean square deviation (RMSD), which was then used to model distributions of tissue selenium concentrations for the calculation of total reproductive effects across a population of fish or birds. Future monitoring, bioaccumulation testing, and toxicity testing requirements will be addressed through the regional AEMP. The value of expanding Teck's research and development program to incorporate additional bioaccumulation testing in conjunction with a controlled field study will be evaluated in the future.
B4-23	**Selenium** **WP 2b** **Methods for Ecological Effects Assessment**	As part of an uncertainty analysis, describe the influence of abiotic and biotic factors (i.e., selenium speciation, influence from other contaminants, dietary preferences, temperature, habitat type, species sensitivity, life-stage, food web structure and large foraging distances) on the developed bioaccumulation model. For additional context refer to MacDonald letter (dated February 18, 2014)	Bioaccumulation is influenced by many abiotic and biotic factors that include the amount and form of selenium present, influence of other elements and compounds both natural or introduced from human activities (co-contaminants), dietary preferences, temperature, habitat type, species-specific sensitivity, life stage, and area-specific food web structure (Stewart et al. 2010). These factors make selenium bioaccumulation inherently difficult to understand, as well as to accurately quantify and predict site-specifically, particularly for species that forage over long distances within a watershed (e.g., WCT). Many of these factors, which could result in significant model error and misinterpretation, have not been addressed by the authors. The variability in both the periphyton and benthic invertebrate data is high. This high degree of variability is reflected in the weak model relationships (very low r2 values and high residual variance) seen in the lentic (r2 = 0.35) and lotic (r2 = 0.28) periphyton models, as well as the pooled invertebrate (r2 = 0.33), the pooled amphibian (r2 = 0.36), and spotted sandpiper (r2 = 0.30) models. The data variability is in part the result of the multiple factors that influence selenium exposure and accumulation characteristics in biota, which the authors suggest are not incorporated into the model. However, the authors may not have accounted for the possible error associated with the use of data from 16 different studies conducted over several decades.	KNC		19-Feb-2014	The listed factors are among the likely sources of residual variability in the bioaccumulation models. For the purposes of the Plan, the total variability in measured tissue selenium concentrations, from all sources, was described and considered in evaluating potential effects. As discussed further in the response to Advice Item No. B4-26, various analyses have been presented to the Toxicology Working Group to describe sources of variability and uncertainty in the bioaccumulation models and datasets. But as discussed at TAC meeting #5, this variability is directly reflected in the distribution of modelled egg selenium concentrations, which is, in turn, considered in the calculation of benchmark concentrations for selenium. To the extent that variability may be increased by the listed factors, the calculated benchmarks for selenium presented in the Annex E Benchmark Derivation Report for Selenium directly account for this variability.

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B4-24	**Selenium** **WP 2b** **Methods for Ecological Effects Assessment**	As part of the documentation developed with the bioaccumulation model, provide a description of alternative selenium bioaccumulation models in the scientific literature along with the rationale for choosing the multi-step modelling approach. *For additional context refer to MacDonald letter (dated February 18, 2014)*	The authors do not mention the existence of other selenium accumulation models describing the relationship between selenium exposure and resulting tissue selenium in receptor organisms. There are more complex bi-phasic models that describe a hormetic response to selenium exposure (Beckon et al. 2008, Harding 2008). Harding (2008) suggested that bird selenium data collected in the Elk Valley best fit a hormetic model. A fuller range of possible models could be compared by the authors to determine if another approach might be more robust in describing selenium bioaccumulation in the Elk Valley.	KNC		19-Feb-2014	This recommended action has completed. A literature review on various approaches to model the bioaccumulation of selenium has been undertaken, and is reported in the Annex E Benchmark Derivation Report for Selenium, Appendix C: Bioaccumulation Modeling. (Note that the biphasic model is an exposure-response model, not a bioaccumulation model, and therefore not included in this literature view.) Based on the literature review, a three-step regression model was selected as the preferred approach for the analysis. However, alternative one-step and two-step model forms were also developed and carried through the benchmark derivation analysis. Please refer to the response to Advice Item No. A4-6 on the sensitivity analysis comparing one-step, two-step, and three-step regression models.
B4-25	**Selenium** **WP 2b** **Methods for Ecological Effects Assessment**	Document how the uncertainty and variability observed in each step of the bioaccumulation model is carried forward through the linked equations and how this uncertainty and variability is described in the final equation. In addition, an evaluation of the models should be conducted by plotting the predicted versus observed concentrations, along with a line of unity. *For additional context refer to MacDonald letter (dated February 18, 2014)*	The authors acknowledge that the challenge in multi-step modelling is to account for uncertainty and variability across the multiple linked equations. However, it is unclear how, or if, this was accomplished. The weak r2 values and high residual variance of these models leaves some doubt that they are "acceptable" fits of the data. The authors have not fully explained their decisions to accept these models as "reasonably representative" in light of these weaknesses. It is unclear how all the variability in these models has been accounted for. Additionally, there is no verification of the models (comparison plots of predicted versus observed concentrations).	KNC		19-Feb-2014	The approach to characterizing variability and uncertainty in the bioaccumulation models was discussed at Toxicology Working Group meeting #3, further refined at Toxicology Working Group (Tox WG) meeting #4, and accepted at Tox WG meeting #7. It was agreed at those meetings that variability does not propagate through the linked model equations in a simple, additive way. At each step, there is a degree of spatial and temporal averaging related to mobile species and the chronic accumulation of dietary selenium; this averaging reduces variability from the lower trophic level. To account for this uncertainty in how variability propagates, the approach taken was to characterize variability in model predictions using the actual variability observed in the final receptor tissue selenium concentrations. For example, potential reproductive effects on fish were evaluated with consideration of both the modelled mean egg selenium concentration and the distribution of measured egg selenium concentrations around that modelled mean. As discussed in Advice Item No. A2-8, an evaluation of the models was conducted by plotting model predictions in comparison to observed selenium data. These plots were presented at Tox WG meeting #3 and are reported in Annex E Benchmark Derivation Report for Selenium (Appendix C).
B4-26	**Selenium** **WP 2b** **Methods for Ecological Effects Assessment**	Document the details of uncertainty in matching the samples from 16 different studies used in the bioaccumulation modelling. The documentation should include: - Detailed description of uncertainty due to sample collection (timing, location, methods); - Detailed description of uncertainty regarding sample analysis (composite versus individual); and, - Describe other sources of uncertainty *For additional context refer to MacDonald letter (dated February 18, 2014)*	The reliability of this type of modelling is dependent on accurate, concurrently collected data from key locations and during relevant time periods for all model compartments. In this multi-step model, the data pairings were developed from 16 studies conducted over several decades. However, the authors did not provide sufficient details to fully evaluate how disparate the data pairs might be with respect to sample location, collection method used, and the date and timing of sampling relative to critical periods of selenium sequestration by target organisms. Since much of this detailed information was not provided, the studies cited were quickly reviewed to gain some appreciation of these important aspects. Some data pairs were not collected at the same locations, but no details were provided regarding the actual distance between sample locations and the effect this might have on the accuracy of the model. As well, timing of sample collection was slightly different in each study. As mentioned above, the number of samples used to calculate a mean and/or the number of replicates in a composite value was variable. Based on examination of Table C.1.1, periphyton data collected in the fall of one year was paired with mean water quality from the year prior to or in other cases the year after periphyton sampling occurred. While synoptic water quality values may have been closer in time to periphyton sampling, at least one data pair was two years apart and did not match (lentic periphyton and lotic water). Since aqueous selenium is taken up by primary producers very quickly upon exposure, many of these pairs are unlikely to reflect water quality conditions that were relevant to periphyton selenium uptake. An additional concern is the timing of the periphyton and invertebrate samples relative to measurement of selenium in target organisms (e.g., were invertebrate samples collected in summer or fall paired with WCT tissue samples taken in spring?) Similar problems exist with the periphyton:invertebrate model. Periphyton data reported in Minnow et al. (2011) were collected "throughout the year" (May, June, July and August 2009), while aquatic invertebrates samples were collected in spring, summer or both spring and summer. The time of year that periphyton or invertebrate samples were collected (spring, fall, or throughout the year) could affect the assemblage observed and, hence, the resulting selenium concentrations, since there is a high degree of variability in species-specific selenium accumulation. Golder states that amphibian selenium data were comprised of individual sample results. However, in several studies examined (e.g., Minnow 2006; Minnow et al. 2007, Minnow et al. 2011) amphibian selenium values reflect analysis of 50-150 eggs from an egg mass, not individual eggs. The review also revealed that the historical data from the multiple studies used were generated using several different collection methods. For example, the periphyton data reported in Minnow et al. 2011 (15 data points) resulted from three different methods. In lentic areas, introduced substrates (plates) left for six weeks were sampled, "epipelon" was either scraped from rocks or lifted from pond sediment using a syringe, whereas in lotic areas "epilithon" was collected by scraping cobbles and boulders. In October 2001, EVS (2005) collected periphyton by scraping rocks and invertebrates were collected using a Surber sampler (mesh size not reported). In September 1996, McDonald and Strosher (1998) collected periphyton using either forceps to pull algal mats or a utility blade to scrape algae from rocks, and obtained aquatic invertebrates using a Hess sampler (mesh size not reported). Some periphyton and invertebrate data represent a single composite value while others are the geometric mean of replicate samples. It is very possible that these differing approaches could alter the representativeness of the sample, introducing variability and greater uncertainty in model predictions. Minnow et al. (2007 collected benthic invertebrates using either a petite ponar dredge (lentic areas) or a kick net (lentic and lotic areas). Orr et al. (2012) noted that combining data across multiple studies may have contributed in part to the lower r2 values reported in three lotic trophic transfer models. Since many of the same studies in Orr et al. (2012) were also used here, this could be a significant source of uncertainty in these models.	KNC		19-Feb-2014	Uncertainty in the selenium ecological effects assessment was managed by using relevant and reliable information, adopting the most conservative models and/or data, incorporating additional margins of safety, and using a sensitivity analysis to reduce or account for uncertainty. All sources (and management thereof) of uncertainty were discussed and accepted at the Toxicology Working Group (Tox WG) meeting #7 (June 24, 2014). A summary of how uncertainty was managed in the selenium ecological effects assessment is included in Annex O Management of Uncertainties and Assumptions in the Selenium Ecological Affects Assessment for the Elk Valley Water Quality Plan. Various sources of uncertainty in the bioaccumulation modelling datasets have been evaluated and addressed, including the following: • Uncertainty related to differences in sample timing was discussed at Tox WG meeting #3. A plot of periphyton data coded by sampling season indicated no consistent seasonal differences in the pattern of bioaccumulation. • Uncertainty related to differences in sample location was also discussed at Tox WG meeting #3. A plot of periphyton data coded separately for mainstem and tributary sampling locations indicated no consistent spatial differences in the pattern of bioaccumulation. • Uncertainty related to data pairing decisions (i.e., spatial and temporal matching of samples) was also discussed at Tox WG meeting #3. Periphyton, fish egg, bird, egg, and amphibian egg data were plotted, with different symbols used for primary (i.e., synoptic data from the same location) and secondary or tertiary (i.e., data paired from comparable locations or close in time) data pairings. Fitted models were shown for primary data pairs only, and for all data pairs (i.e., primary, secondary and tertiary). Results indicated that inclusion of secondary and tertiary data pairs had negligible or minimal effect on model equations, and if anything resulted in models that made higher predictions of selenium bioaccumulation. Notwithstanding the efforts described above to evaluate sources of uncertainty, these are expected to result in more, not less, variability in measured selenium data. This, in turn, will produce more, not less, residual variability around the fitted bioaccumulation models, which will in turn be reflected in the calculated RMSD value for each model. As discussed at TAC meeting #5, a higher RMSD results in a wider distribution of modelled egg selenium concentrations, which results in a higher estimate of potential total reproductive effects across a modelled population at a given aqueous selenium concentration. Thus, given that benchmark concentrations for selenium were derived relative to a specified level of potential effect (e.g., level 1 benchmarks were derived to result in <10% total reproductive effects), higher RMSD results in lower benchmarks. □

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B4-27	**Selenium** **WP 2b** **Methods for Ecological Effects Assessment**	Conduct a sensitivity analysis to determine the effects of pooling multiple species (i.e., in the case of the amphibians). *For additional context refer to MacDonald letter (dated February 18, 2014)*	Pooling data for two amphibian species is not a conservative approach given that the two species may have very different selenium bioaccumulation characteristics and toxicity thresholds. By pooling data for these species into one model, relating model predictions to potential selenium effects could be incorrect. Similarly, pooling bird and fish data seems counterintuitive and results in loss of valuable information to predict species-specific responses.	KNC		19-Feb-2014	This recommended action was completed. Analysis of covariance was conducted to test for differences between species within each receptor group. There were differences between fish species (WCT and longnose sucker) and between bird species (red-winged blackbird and spotted sandpiper). Therefore, species were not pooled for the derivation of bioaccumulation models. Methods and results of the analysis of covariance are reported in the Annex E Benchmark Derivation Report for Selenium, Appendix C: Bioaccumulation Modeling. As discussed at Toxicology Working Group meeting #3 and in the response to Advice Item No. A4-15, bioaccumulation models for amphibians were not developed for the purposes of the Plan.
B4-28	**Cadmium** **WP 2b** **Methods for Ecological Effects Assessment**	Recommend providing details about BLM modifications required to predict chronic toxicity endpoints	The BLM is designed to predict acute toxicity in site-specific water. The well-established acute BLM would need to be modified in order to predict chronic toxicity endpoints. The details —specifically, the scientific rationale--for these modifications are necessary to evaluate their appropriateness in establishing WQOs.	MOE		19-Feb-2014	Teck incorporated the application of the cadmium biotic ligand model (BLM) to chronic effects and the consistency of parameters between acute and chronic exposures. This was discussed at Toxicology Working Group meeting #2 and is included in Annex G Evaluation of Potential Ecological Effects Associated with Cadmium.
B4-29	**Cadmium** **WP 2b** **Methods for Ecological Effects Assessment**	Rationale for excluding studies needs more detail. Firm a priori rationale for selecting or rejecting any given published result needs to be applied objectively to the entire literature.	None provided.	MOE		19-Feb-2014	Teck has included rationale for selecting or rejecting published results in Annex G Evaluation of Potential Ecological Effects Associated with Cadmium.
B4-30	**Cadmium** **WP 2b** **Methods for Ecological Effects Assessment**	Provide science-based rationale about how the acute BLM was modified to accommodate chronic endpoints.	More rationale is needed in order to evaluate the proposed BLM-based benchmark.	MOE		19-Feb-2014	As noted in Advice Item No. B4-28, the application of the cadmium biotic ligand model (BLM) to chronic effects and the consistency of parameters between acute and chronic exposures has been incorporated. This was discussed at the Toxicological Working Group meeting #2 and is included in Annex G Evaluation of Potential Ecological Effects Associated with Cadmium.
B4-31	**Cadmium** **WP 2b** **Methods for Ecological Effects Assessment**	Recommend incorporating seasonal variation in MLE.	The MLE appears to be fit ignoring seasonal variations, so changes in the sampling plan (e.g. shifting to/away from areas of high concentration that occur seasonally) could lead to estimates of the distribution which may not be applicable to real life.	MOE		19-Feb-2014	The maximum likelihood estimation (MLE) was used to estimate statistical distributions for data that include cadmium values below detection limits. Seasonal variation was incorporated in the normalized species sensitivity distribution (SSD) for both the biotic ligand model (BLM) and hardness equation approaches (discussed at Toxicology Working Group meeting #2 and included in Annex G Evaluation of Potential Ecological Effects Associated with Cadmium.
B4-32	**Cadmium** **WP 2b** **Methods for Ecological Effects Assessment**	Total cadmium should be used rather than dissolved for comparisons to guidelines.	The BC working water quality guideline for cadmium as well as the CCME water quality guideline for cadmium is for total cadmium, not dissolved cadmium.	MOE		19-Feb-2014	Total cadmium is compared with guidelines. See Annex G Evaluation of Potential Ecological Effects Associated with Cadmium Panel A in Figures 6 through 13.
B4-33	**Cadmium** **WP 2b** **Methods for Ecological Effects Assessment**	How will concentrations of Cd in sediments be factored into the evaluation of potential ecological effects for Cd?	How do sediment concentrations compare with the BC working sediment quality guidelines which are based on the CCME sediment quality guidelines for cadmium?	MOE		19-Feb-2014	Sediments were not factored into the benchmark derivation however, comparison of the BC working sediment quality guidelines were compared to the Canadian Council of Ministers and the Environment (CCME) sediment quality guidelines for cadmium. (see Annex K.1 DRAFT Aquatic Environment Synthesis Report, Section 3.2 distributed to TAC for TAC Meeting #6).
B4-34	**Cadmium** **WP 2b** **Methods for Ecological Effects Assessment**	Design and implement a field study to evaluate the composition (i.e., type) of dissolved organic carbon (e.g., humic substances, polysaccharides, low-molecular weight acids, and high-molecular weight acids) that occurs in the Fording River, Elk River, and tributaries during high flow and low flow conditions. *For additional context refer to MacDonald letter (dated February 18, 2014)*	To support the development of a BLM for cadmium, unmeasured levels of DOC in the water used in laboratory toxicity tests reflected in the cadmium toxicity data set were estimated using a variety of methods. The potential influence of the addition of food to toxicity testing chambers on DOC concentrations was not considered in these estimates of DOC concentrations however. This creates uncertainty in the BLM because DOC may have been underestimated. One argument for not considering feed-related DOC is that such carbon may not be as reactive as the DOC in waters from the Elk Valley. Thus far, no information has been presented on the composition of DOC in Elk Valley receiving waters during various times of the year. The recommended study will provide the information needed to determine the percentage of Elk Valley DOC that is likely to be reactive.	KNC		19-Feb-2014	Teck considered the advice of evaluating the composition of dissolved organic carbons (DOC) that occur in the Fording River, Elk River, and tributaries during high flow and low flow conditions. However, the result of the evaluation was that the suggested fieldwork could not be completed in the timeframe of the Plan development (1 year).
B4-35	**Cadmium** **WP 2b** **Methods for Ecological Effects Assessment**	Design and implement a laboratory toxicity study to validate the application of the BLM for predicting the chronic toxicity of cadmium to fish and aquatic invertebrates. *For additional context refer to MacDonald letter (dated February 18, 2014)*	The BLM that was developed for cadmium is based on laboratory toxicity and associated water chemistry data. However, much of the data on water quality conditions was estimated because major ion and/or DOC concentrations were not reported by the original investigators. Therefore, there is substantial uncertainty regarding the reliability of the BLM for predicting toxicity within the Elk River, Fording River, and associated tributaries. This uncertainty can be resolved by validating the applicability of the BLM with well-designed laboratory toxicity studies conducted using site water.	KNC		19-Feb-2014	As noted in the response to Advice Item No. A2-15, the time frame of the Plan development (1 year) did not allow for completion of toxicity testing for cadmium. Instead, Teck relied on the Biotic Ligand Model and hardness normalization to show that cadmium concentrations at Order Stations are below benchmarks. The rationale informing the development of benchmarks was presented and discussed at Toxicological Working Group meetings #1, #2, and #3 and captured in the Working Group meeting notes.
B4-36	**Cadmium** **WP 2b** **Methods for Ecological Effects Assessment**	The comparison of water quality conditions to normalized effect values should be conducted using both the BLM and hardness-normalized effect values. *For additional context refer to MacDonald letter (dated February 18, 2014)*	Studies conducted on the utility of the BLM in predicting toxicity of cadmium to aquatic organisms during chronic exposure have not shown that the BLM can accurately predict toxicity during chronic exposures. The use of the hardness-normalization procedure has been used in the development of promulgated water-quality guidelines in British Columbia and elsewhere in Canada. Therefore, the effects assessment should include an evaluation conducted using hardness-normalized effect values.	KNC		19-Feb-2014	Teck considered this advice and relied on the Biotic Ligand Model (BLM) and hardness normalization to show that cadmium concentrations at Order Stations are below benchmarks. The rationale informing the development of benchmarks was presented and discussed at Toxicological Working Group meetings #1, #2, and #3 and captured in the Working Group meeting notes.

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B4-37	**Cadmium WP 2b Methods for Ecological Effects Assessment**	Conduct a sensitivity analysis by using the individual toxicity test results (i.e., rather than grouping the effect and endpoint values from multiple studies) in the effects assessment. *For additional context refer to MacDonald letter (dated February 18, 2014)*	A conservative approach would be to use methods consistent with the derivation of water quality guidelines in British Columbia (Meays 2012). In that guidance document, studies are classified as primary or secondary based on study and/or data quality. The results of individual studies are used to identify the lowest effect value from a primary study to serves as the basis for the water quality guideline.	KNC		19-Feb-2014	For the most sensitive organisms in the cadmium database there are few observations included in the Species Chronic Value - 1 for rainbow trout, 2 for Hyalella and 3 for Daphnia. For the two organisms where multiple values are included they are in a fairly narrow range, therefore there will be little change that would result from this sensitivity analysis. The rationale for binding these observations was presented at Toxicity Working Group meeting #2.
B4-38	**Cadmium WP 2b Methods for Ecological Effects Assessment**	The units used in the text, tables, and figures should be consistent within the document; both µg/L and mg/L are used when reporting cadmium toxicity data. *For additional context refer to MacDonald letter (dated February 18, 2014)*	The use of consistent units improves readability and minimizes interpretation errors.	KNC		19-Feb-2014	Teck incorporated consistent use of units throughout Annex G Evaluation of Potential Ecological Effects Associated with Cadmium.
B4-39	**Cadmium WP 2b Methods for Ecological Effects Assessment**	Update Tables 6 and 14 in the document to state that effects are expected below the CCME water quality guideline. *For additional context refer to MacDonald letter (dated February 18, 2014)*	Figures 18 and 22 show that BLM and/or hardness-normalized effects data fall below the CCME water quality guideline (represented as the orange dotted line). These tables should be updated to state that effects are expected to occur below the CCME WQGs.	KNC		19-Feb-2014	Teck has considered this advice and chooses to refer to the Canadian Water Quality Guidelines for the Protection of Aquatic Life for Cadmium (CCME, 2014) for statements regarding expected effects. To note, page 7 of the guideline document states that "Long-term exposure guidelines identify benchmarks in the aquatic ecosystem that are intended to protect all forms of aquatic life for indefinite exposure periods." Canadian Council of Ministers of the Environment (CCME) 2014. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Cadmium. Canadian Council of Ministers of the Environment, Winnipeg.
B4-40	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	Consideration should be given to the potential increase in phosphorus availability with increasing sulphate concentrations.	Pg 8. It is mentioned that Elk and Fording are primarily phosphorus limited based on existing N:P ratios. Several peer-reviewed studies identify the potential of eutrophication associated with sulphate. Increasing sulphate concentrations have the potential to lead to rising P mobilization rates (see Zak et al. 2006), Curtis 1989, Lamers et al. 1998; Lamers et al. 2002; Smolders et al. 2003; Smolders et al. 2006; Van der Welle et al. 2007; Smolders et al. 2010)	MOE		19-Feb-2014	As outlined in Chapter 4 (Baseline Conditions), phosphorus and sulphate concentrations are largely below the BC water quality guidelines. Teck is committed to continue monitoring environmental conditions throughout the Designated Area (see Chapter 10 [Monitoring]). These data will be used to evaluate and validate the performance of the initial implementation plan, and help inform the need to initiate adaptive management measures (see Chapter 11 [Adaptive Management]), if necessary.
B4-41	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	When setting targets, consideration should be given to other water uses such as livestock watering guidelines and human health guidelines, to ensure targets are protective of all water uses.	Ruminant livestock (cattle, sheep, goats) are sensitive to sulphate. High levels of sulphate can be highly toxic and can be linked to polioencephalomalacia (central nervous system disease in ruminants characterised by blindness, ataxia, recumbancy and seizures). A draft update to the CCME livestock watering guideline suggests a sulphate guideline for livestock watering of 500 mg/L for beef and 250 mg/L for dairy cattle. Drinking water guidelines for human health are: - Sulphate: 500 mg/L - Nitrate: 10 mg/L	MOE		19-Feb-2014	The chinook salmon dose-relationship has been used in the Plan to assess potential effects of selenium to juvenile fish in both the Fording and Elk Rivers. This approach is outlined in Annex E Benchmark Derivation Report for Selenium , and is reflected in the integrated assessments completed in support of the long-term selenium targets in MUs 1 to 5 (see Chapter 8 [Water-Quality Targets and Implementation]).
B4-42	**Overall Approach WP 2b Methods for Ecological Effects Assessment**	When quoting reliability of effect estimates (EC10), look into how the effects data were calculated (i.e., look into the design of the toxicity experiment and how the data were analyzed) before concluding that there are no significant differences between lower effects sizes and the control or reference treatment.	Reliability of lower effect estimates (e.g. EC5, EC10) is dependent on what concentrations are tested as well as sufficient sample size to detect effects. The authors suggest that "lower effect sizes are often not significantly different relative to the control or reference treatment" however, it depends on how the effects are calculated (usually you would adjust for effects that occur under controls, however in some cases this may not be done).	MOE		19-Feb-2014	Effect thresholds for sulphate and nitrate have been identified in Annex F Nitrate and Sulphate Benchmark Derivation Report. These have been, applied to the river mainstems and to tributaries.
B4-43	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	Clarify if values for nitrate are (as N)?	It is unclear if nitrate is being reported (as N).	MOE		19-Feb-2014	Nitrate concentrations are reported in mg/L N (nitrate as N) throughout the Plan and supporting documents. For reference, concentrations as "mg/L N" are also the same as the unit "mg/L NO3-N".
B4-44	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	For future reports and as part of the analyses conducted for the development of targets, please note that Table 5-4 in the nitrate/sulphate document contains errors and that values and endpoints mentioned are incorrect.	Examples: The table cites the PESC study for early life stage rainbow trout however, Kennedy re-ran the experiments resulting in more reliable estimates. For amphibians the table cites a 21-d IC20 whereas it is actually an LC25 endpoint. There are several other errors in the table.	MOE		19-Feb-2014	The tables in Chapter 8 (Water-Quality Targets and Implementation) and in the Annex F Benchmark Derivation Report for Nitrate and Sulphate have been checked, and the concentrations and endpoints have been confirmed.
B4-45	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	Please provide a rationale why the most sensitive receptor group to nitrate (which was crustaceans at 3.3 mg/L) was not presented instead of the 5-13 mg/L values presented in the report.	Section 6.1 Nitrate – authors suggest that chronic toxicity ranges from 5 – 13 mg/L N however, Table 5-3 cites low-effects in the Upper Elk R experiment to C. dubia at 3.3 mg/L N.	MOE		19-Feb-2014	The referenced nitrate thresholds for C. dubia in the range of 5 to 13 mg/L were used to reflect nitrate toxicity under water quality conditions present in mine-influenced waters in the Fording and Elk rivers in the Fall 2013 program. The 3.3 mg/L threshold for crustaceans, as referred to in the advice, is associated with testing of upstream waters in the Elk River (i.e., the reference condition) that have a lower hardness and a different ionic composition than mine influenced areas, including nitrate concentrations well below the provincial water quality guidelines.
B4-46	**Overall Approach WP 2b Methods for Ecological Effects Assessment**	Provide rationale for the following conclusions: "measureable effects to sensitive organisms are expected at high concentrations but are "unlikely to translate to population-level effects".	Effect levels and endpoints need to be identified as different endpoints could have different implications (e.g. growth endpoint vs. death). Also to determine the effects on a population you would need to account for life histories of organisms, indirect effects, food-web dynamics and what other potential effects are (e.g. other stressors, response to other substances).	MOE		19-Feb-2014	This advice is incorporated in the Plan at Chapter 8 (Water-Quality Targets and Implementation) in the context of discussing critical effect sizes and minimum levels of effect that are likely to represent ecologically meaningful changes.
B4-47	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	Recommend providing details about how ion ratios represented those expected for the Elk or Fording River receiving environments during "mixture" toxicity testing.	Ionic ratios are known to be important TMFs. Consequently, details about how the toxicity test exposure waters were reflective of the receiving environments is important in order to properly interpret test results.	MOE		19-Feb-2014	See response Advice Item Nos. A2-9 and A2-9a.

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B4-48	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	Explain the potential uncertainties in the exposure concentrations that were developed from water chemistry measurements conducted at the beginning and end of each toxicity test. *For additional context refer to MacDonald letter (dated February 18, 2014)*	Measurements of concentrations of COPCs in water at the beginning and end of toxicity tests provide reasonable estimates of exposure conditions during static toxicity tests. However, such measurements may be inadequate for estimating exposure concentrations for static-renewal or flow-through toxicity tests (i.e., because stock solutions may be remade at various times during the test and there is potential for errors during stock solution preparation). Therefore, some discussion of the potential errors and the procedures that were applied to ensure that exposure concentrations remained consistent during the toxicity tests would be helpful.	KNC		19-Feb-2014	The Plan Annex F Benchmark Derivation Report for Nitrate and Sulphate (Appendix B; Attachment B-1), provides a comparison of measured and nominal concentrations in test waters from the Fall 2013 nitrate/sulphate toxicity study. These results provide evidence of constant exposure conditions throughout the test, including stable concentrations of both nitrate and sulphate over time. The consistency of results across multiple test species, multiple test waters, and between beginning and end of test in all trials, provide evidence for lack of a systematic bias or quality control issue in the laboratory preparations. The potential for errors at intermediate periods during the test (i.e., when measured values of sulphate and nitrate are not available) is discussed below, with details of procedures used to mitigate against errors in the exposure regime. • Sulphate tests – Toxicity test solutions for sulphate tests were prepared by addition of calcium and magnesium sulphates to the site waters to prepare the highest nominal test concentration, and then the unamended site water was used for serial dilution of that highest concentration in order to prepare the remaining target concentrations of sulphate. The highest test concentration was prepared the day prior to test initiation and was allowed 24 hours for the salts to dissolve and the ions to equilibrate prior to initiating the test. Sufficient solution was prepared so that this highest concentration test solution could then be used for all of the test solution renewals throughout the test. The use of the serial dilution method mitigates against measurement errors in the preparation of individual target concentrations. Conductivity measurements, which were recorded on the test solutions on every solution renewal day throughout the tests, provide an additional measure of consistency of the test solution compositions throughout exposure. Conductivity provides a measure of ionic strength of the samples; because calcium, magnesium and sulphate ions contribute significantly to conductivity, this measure provides a good measure of the consistency of test solution preparation. Review of conductivity measurements indicated that the sulphate concentrations were prepared in a consistent manner throughout exposure. • Nitrate tests – Toxicity tests conducted using nitrate amendments entailed preparation of the test solution on the day of test initiation, and on each test solution renewal day, by volumetric addition of a sodium nitrate stock solution into aliquots of the site waters. A single stock solution of nitrate was used throughout each test. Conductivity can also be used to evaluate the daily solution renewals of nitrate, since sodium and nitrate ions also contribute to conductivity. Conductivity measurements for nitrate were in good agreement throughout the tests. Overall, the review of water chemistry data indicates no evidence of errors, bias, or inconsistencies in the exposures of test organisms to either nitrate or sulphate, with no major discrepancies indicative of a potential error in the stock solution preparation. The available data in fact indicate that a consistent and reliable exposure regime was maintained across all tests.
B4-49	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	Conduct an evaluation of the effects on aquatic organisms associated with exposure to major anions and cations (i.e., total dissolved solids; TDS). *For additional context refer to MacDonald letter (dated February 18, 2014)*	The Terms of Reference of the EVWQP indicate that the plan will address the cumulative effects of point and non-point sources of waste on water, aquatic biota, and human consumers, using best available science. Before cumulative effects can be evaluated, the effects of individual stressors need to be determined. To date, little or no information has been compiled on the effects on aquatic organisms associated with exposure to elevated levels of major ions (relative to pre-mining levels; with the exception of sulphate and nitrate). Yet, exposure to elevated levels of major ions (as measured by total dissolved solids, hardness, alkalinity, specific conductance, concentrations of individual ions) has the potential to influence the abundance of individual taxa and/or the diversity/species composition of aquatic communities. Therefore, the effects of major ions on aquatic organisms needs to be evaluated.	KNC		19-Feb-2014	Effects on aquatic organisms were assessed as part of the site specific toxicity testing and mixtures assessment, including for high total dissolved solids (TDS) concentrations associated with base flow conditions in the Fording River. Because site-specific toxicity tests incorporated the contribution of all major ions present in site water, the combined effect of all constituents has been considered. The testing program could not evaluate all combinations of major ions that could occur in foreseeable management scenarios. However, the series of sulphate amendments included addition of substantial additional concentrations of sulphate, calcium, and magnesium, including exposure levels well above those expected under either current conditions or plausible future conditions. In spite of these additions, no significant toxicity was observed up to the maximum concentrations tested in any of the four toxicity tests in Fall 2013.

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B4-50	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	The effects matrix that was developed to interpret water chemistry data for nitrate and sulphate requires additional support from the primary literature. More specifically, a comprehensive review of the literature that links the magnitude of effects observed in laboratory toxicity tests to responses of aquatic organisms in the field needs to be conducted. The results of such a literature review needs to be compiled and used to support the interpretations of toxicity test results presented in the effects matrix (i.e., >IC50 - greater potential for population level effects, etc.). Similarly, the matrix that combines the evaluations conducted with literature-based toxicity thresholds and site-specific toxicity thresholds requires further information to support the interpretation of the results and the associated conclusions (see slides 28 and 30 in presentation). This comment also applies to the assessments of selenium and cadmium. *For additional context refer to MacDonald letter (dated February 18, 2014)*	Our experience is not consistent with the interpretation of toxicity test results presented in the effects matrix. In contrast to the interpretation presented therein, we have observed adverse effects in the field when COPC concentrations exceed an IC20 level. Above an IC50, adverse effects on populations of sensitive species are expected to occur. Therefore, the interpretive framework presented in the effects matrix needs to be supported by empirical data before it can be applied.	KNC		19-Feb-2014	The literature review that supports the toxicity benchmark derivation has been expanded and additional references added. Overall, our review indicates support for the use of laboratory toxicity test results in estimating effects in the field to aquatic organisms. For example, field validation compilations by Eagleson et al. (1990), Environment Canada (1999), and Environment Canada (2005) indicate that toxic levels determined in the laboratory are good predictors of harmful effects to natural (wild) communities. In support of that conclusion, they summarize a large body of information on field validation of toxicity tests, including results from receiving environment monitoring of Canadian pulp mills, metal mining sites, and from mesocosm experiments. Since this advice was provided, the derivation of nitrate and sulphate benchmarks has been discussed further at TAC meetings #4 and #5, and Toxicology Working Group meetings #2 and #3. The critical effect sizes adopted for all receptors and constituents range from 10 to 20 percent, consistent with the guidance of Suter et al. (1995) and Mebane (2010). The Benchmark Derivation Report for Nitrate and Sulphate has also been updated and provides the rationale for selection of benchmark toxicity concentrations at the Order stations. Eagleson, K.W., D.L. Lenat, L.W. Ausley, and F.B. Winborne, 1990. Comparison of measured instream biological responses with responses predicted using the Ceriodaphnia dubia chronic toxicity test. Environ. Toxicol. Chem., 9: 1019-1028. Environment Canada. 2005. Guidance document of statistical methods for environmental toxicology tests. Method Development and Applications Section, Environmental Technology Centre, Environment Canada, Ottawa, Ontario. Environment Canada. 1999. Guidance document on application and interpretation of single-species tests in environmental toxicology. Method Development and Applications Section. Ottawa, Ontario, Rept EPS 1/RM/34. Mebane, C. A. 2010. Cadmium risks to freshwater life: derivation and validation of low-effect criteria values using laboratory and field studies. U.S. Geological Survey, Scientific Investigation Report 2006-5245. 130 pp. Suter GW II, Cornaby BW, Hadden CT, Hull RN, Stack M. Zafran FA. 1995. An approach for balancing health and ecological risks at hazardous waste sites. Risk Anal 15: 221-231.
B4-51	**Nitrate/Sulphate WP 2b Methods for Ecological Effects Assessment**	The potential effects of nitrate enrichment on the trophic status of Elk Valley tributaries, the Fording River, the Elk River, and Lake Koocanusa need to be evaluated. This evaluation needs to consider current conditions of both nitrogen and phosphorus and the potential for additional releases of phosphorus into receiving waters from various municipal, agricultural, and industrial sources. *For additional context refer to MacDonald letter (dated February 18, 2014)*	The evaluation of the effects of nitrate have, thus far, consisted of a toxicological evaluation for aquatic organisms. However, releases of nitrate into surface waters can also result in eutrophication, if nitrogen is a limiting nutrient for aquatic plant growth. It is essential that both the toxicological and eutrophication-related effects of nitrate are assessed in the EVWQP.	KNC		19-Feb-2014	Teck evaluated the potential to affect trophic status (eutrophication) within the Designated Area (see Chapter 6 [Development and Selection of Management Options]). Based on this analysis, the initial implementation plan is not anticipated to adversely affect the trophic status within the Designated Area. Teck will continue to monitor environmental conditions within the Designated Area (see Chapter 10 [Monitoring]) for which the data will be used to monitor environmental conditions and to inform adaptive management measures (see Chapter 11[Adaptive Management]).
B4-52	**Representative Management Scenarios WP 5**	The planning horizon for the EVWQP (i.e., 20 years) is too short to support the identification of the most appropriate long-term solutions to the water quality issues that are evident in the Elk Valley. While 12 to 20 years is an appropriate timeframe for meeting the long-term targets that need to be developed under the EVWQP, planning activities must also consider a longer timeframe (i.e., 140 years and beyond) to ensure that appropriate decisions are made. *For additional context refer to MacDonald letter (dated February 18, 2014)*	One limitation of the approach that is being taken for evaluating the applicability of various management options in the EVWQP is the overall planning horizon. Utilization of a short-term planning horizon during development of the EVWQP creates a bias against mitigation measures that may be appropriate for implementation over a longer time period and those that may result in water quality improvements beyond the 20-year planning horizon. This bias is likely to result in selection of active water treatment in perpetuity to address ongoing water quality issues. Because the potential value of bituminous geomembrane (BGM) covers cannot be demonstrated within a 20-year planning horizon, progressive reclamation activities are likely to proceed with the placement of vegetated covers that may not provide substantial improvements in water quality conditions. A longer planning horizon is required to recognize the potential value of BGM covers and other technologies that required longer timeframes to achieve benefits.	KNC		19-Feb-2014	The Plan planning horizon is determined primarily by the ability to project future mine developments at our operations. The Plan will continue beyond this timeframe, and future changes and opportunities will be addressed through the adaptive management framework. In terms of evaluating the applicability of other management and mitigation options over a longer time horizon, there is good promise in covers and is planning to continue research and development work, and evaluation of global case histories, to define their potential application. Refer to additional discussion in response to Advice Item No.A4-28.
B4-53	**Representative Management Scenarios WP 5**	Adopt placement of BGM covers as best management practice for progressive reclamation at coal-mining operations in the Elk Valley. Doing so will require adoption of the reasonable assumption that BGM covers will reduce infiltration into waste rock storage facilities and that reduced infiltration into these facilities will reduce loadings of selenium and other COPCs to receiving waters. Subsequent research should be focussed on evaluating the efficacy of BGM covers over the longer term. *For additional context refer to MacDonald letter (dated February 18, 2014)*	In the absence of data demonstrating that the BGM covers provide an effective basis for reducing the loadings of selenium and other COPCs into receiving waters, progressive reclamation activities will proceed with the placement of vegetated covers over waste rock storage facilities. Once such covers have been placed, it is virtually certain that the waste rock management facilities will not be retrofitted with BGM covers. Hence, the opportunity to control releases of COPCs at the source will be largely lost. As a result, long-term water quality issues will likely need to rely upon active wastewater treatment in perpetuity. This option is unlikely to be favored by KNC members. Adopting BGM covers as a best management practice would ensure that opportunities for placement of BGM covers are not lost and that this technology can be fully evaluated within the next 20 to 40 years.	KNC		19-Feb-2014	As noted in the response to Advice Item No.A4-28, Teck continues research and development into the potential application of covers as a mitigation measure. The March 31, 2014 memo titled “Summary of Current Thinking about Covers” and distributed at TAC meeting #5 provided a response to the question “What is the potential role of covers in the Elk Valley Water Quality Plan and further assessment of water quality mitigation measures”. Section 5.2 of the memo outlines further assessments recommended to inform consideration of covers as a best management practice. Work to support the potential application of covers continues as outlined in Chapter 6, Section 6.5 (Development and Selection of Management Options).
B4-54	**Representative Management Scenarios WP 5**	Identify opportunities for large-scale trials to evaluate the effectiveness of BGM covers in the Elk Valley. *For additional context refer to MacDonald letter (dated February 18, 2014)*	There are a number of wasterock storage facilities that are currently available for covering and that can be resloped to 3:1 (e.g., Brownie Dump). These facilities should be evaluated to identify at least two that are sufficiently similar to support evaluation of the effectiveness of vegetated vs. BGM covers. Such trials should be initiated in the near term (within the next 10 years) to provide the information necessary to confirm or reject the use of BGM covers as a best management practice for progressive and final reclamation.	KNC		19-Feb-2014	As noted in Section 5.2 in the “Further Assessment” of the March 31, 2014 memo titled “Summary of Current Thinking about Covers” advancing analysis of covers and other mitigation options is underway. At this time, it is not clear that bituminous geomembrane waste rock covers (BGM covers) are the right covers to be testing at full scale. The process of research and development may show that other covers are better suited, and that smaller scale trials are appropriate.

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B4-55	**Representative Management Scenarios WP 5**	Evaluate the potential applications and effectiveness of in situ bioreactors (i.e., located within or immediately down gradient of wasterock storage facilities) in the Elk Valley. *For additional context refer to MacDonald letter (dated February 18, 2014)*	Fluidized-bed reactors have been demonstrated to facilitate removal of selenium from wastewaters in the Elk Valley. While large-scale wastewater treatment systems utilizing this technology are likely to provide near-term solutions to the water quality issues that are evident in the Elk Valley, there may be opportunities to control releases of selenium at or near the source through the application of in-situ bioreactors (such as those that have been designed by Microbial Technologies Inc. and/or Envirogen Technologies).	KNC		19-Feb-2014	Studies of the use of in situ bioreactors are a high priority for research and development (R&D). The R&D program is currently investigating semi-passive (or bioreactor) treatment of water in backfilled pits. The geochemical conditions that develop in these "saturated fills" are favorable for microbial communities that can remove selenium and nitrate. There is preliminary evidence that this process occurs in pits located at our sites. Testing will focus on whether this can be relied upon as a treatment method. Plans for the next two years include laboratory investigation of the underlying microbial and chemical processes, including rate limiting factors and the risk of unfavorable reactions. In 2014, Teck plans a physical hydrogeological investigation of a saturated fill that is believed to be a good candidate for a full scale implementation. Should results of the investigation prove favourable, the installed wells will be used for pilot scale trails in 2015 (see Chapter 6, Section 6.5 [Development and Selection of Management Options]).
B4-56	**Representative Management Scenarios WP 5**	Further detail is needed on how the representative scenarios will be crafted, and more importantly how the "decision surface" will be quantified. At this point it is unclear whether both economics and water quality benefits be considered (without bounds) or whether management options will be constrained a priori based on some pre-determined criteria? These up-front decisions are very important to prevent surprises at the end. Additionally, in finding an "optimal solution", it is important note that a reasonable amount of options must be considered to satisfy the TAC that sufficient rigor has been incorporated (i.e., water treatment, diversions, and both geomembrane and natural covers). Please specify how many different combinations of options will be considered.	At this point it is unclear how the representative scenarios will be framed, what will be considered (i.e., economics, water-quality, etc.) or what will be presented to the TAC to show that a reasonable range of possible management solutions was considered. For example, often in a two-dimension or multi-objective decision problem (i.e., where both economics and water quality benefits are at stake) a suitable approach would be to evaluate a wide enough range of model runs (and corresponding economic analysis) so the pareto frontier (and a "knee") are apparent. By defining the shape of the non-inferior solutions, and describing the relative trade-off between water quality and economics accordingly, suitable decisions (or negotiations) can then be conducted.	MT Govt	US Govt	19-Feb-2014	Included in Chapter 6 (Development and Selection of Management Options) are details on how representative scenarios were crafted and management options were selected.
B4-57	**Representative Management Scenarios WP 5**	[Water Treatment] The EVWQP should provide a discussion of water treatment plant waste, including volumes, characterization, potential water quality and aquatic effects issues, and possible disposal plans. A work plan should be included that outlines information to be collected including information to assess the long term stability and risk mitigation for these materials in the valley.	Active treatment of mine water will produce very large volumes of secondary waste that will require proper handling and long term disposal. Currently little is known about these materials or how to manage them effectively in the long term, which may have significant implications (cost, operations, environmental). A plan to address how and when this information will be obtained should be incorporated into the EVWQP.	MEM		19-Feb-2014	Teck has incorporated an explanation of residuals, the approach to residuals management, and strategy to future technology development into Chapter 6, Section 6.3.2.2 and Section 6.5.2 (Development and Selection of Management Options). A work plan is beyond the scope of the Order, but a residuals management strategy but will be developed in parallel to the implementation of Teck's Active Water Treatment facilities as outlined in the initial implementation Plan.
B4-58	**Mitigation Measures/ Management Scenarios WP 6b**	Model the effectiveness of BGM covers over a period of at least 200 years. This modelling effort should include a range of assumptions regarding the effectiveness of BGM covers in reducing loadings of COPCs to receiving waters from waste rock storage facilities (e.g., 35%, 50%, 65%, and 80% load reductions). *For additional context refer to MacDonald letter (dated February 18, 2014)*	Modelling water quality conditions over a 20-year period necessarily results in a bias against the use of BGM covers to mitigate water quality effects. While active wastewater treatment represents a necessary short-term solution for addressing key water quality issues (i.e., selenium and nitrate) in the Elk Valley, active wastewater treatment in perpetuity is not a preferred long-term solution. Therefore, it is essential to evaluate the potential efficacy of alternative mitigation measures that may provide substantial benefits over the long term. It is likely the BGM covers will provide such long-term benefits, but long-term modelling will be required to evaluate those benefits.	KNC		19-Feb-2014	Teck provided TAC a memo titled "Summary of Current Thinking about Covers" dated March 31, 2014 and distributed at TAC Meeting #5. As noted in that memo, Teck continues research and development (R&D) into the potential application of covers as a mitigation measure. A focus of the R&D work on covers is to understand how covers impact the environmental conditions within, and therefore leach rates from, spoil piles. Results of a model run which includes fully effective covers show a significant improvement in water quality over an unmitigated case; work to support potential application of covers continues as outlined in Chapter 6, Section 6.5.1 (Development and Selection of Management Options).
B4-59	**Ecological Effects Assessment for Tributaries**	Rationale is required for how Management Units were derived.	It is not clear how management units were derived. Management units should be ecologically relevant.	MOE		19-Feb-2014	The rational for the derivation of the management units is provided in Chapter 4 (Baseline Conditions).
B4-60	**Ecological Effects Assessment for Tributaries**	Consider modifying Management Unit 4. Consider splitting the management unit into: 1) above current and future mine influence; and 2) below current and future mine influence.	None provided.	MOE		19-Feb-2014	This advice was incorporated in Chapter 4 (Baseline Conditions).
B4-61	**Monitoring**	Provide a table summarizing the available information on the tributaries monitored under the AEMP including: - water quality ; - loadings; - whether it is fish bearing or not fish bearing; and - biological data.	This will help to identify if there are any data gaps.	MOE		19-Feb-2014	Appendix E of Annex K.1 DRAFT Aquatic Environment Synthesis Report summarizes the requested information (except loads) for all mine-influenced tributaries. Additional detailed data were provided in the main body and appendices of the same document and source reports cited therein.
B4-62	**Ecological Effects Assessment for Tributaries**	Develop a conceptual site model for the tributaries that describes the linkages between all of the potential stressors within the tributaries and all of the ecological receptors that utilize habitats within the tributaries. A similar conceptual site model needs to be developed for the mainstream areas that explicitly recognizes the role that tributaries play in the maintenance of healthy and productive fish communities (i.e., providing spawning habitat, rearing habitat, exporting invertebrates to the mainstem, etc.). *For additional context refer to MacDonald letter (dated February 18, 2014)*	A conceptual site model provides a basis for describing the scope of the study area, identifying physical and chemical stressors, evaluating the transport and fate of COPCs, evaluating the effects of the various COPCs, COPC mixtures, and other stressors identifying potentially complete exposure pathways, identifying ecological receptors, and developing effects hypotheses that link the stressors and receptors. In turn, the CSM supports identification of the measurement endpoints that are most appropriate for evaluating effects on each ecological receptor group. This information will provide a basis for evaluating the adequacy of the data and information that are assembled to evaluate effects in the tributaries, both now and in the future. The CSM must consider such stressors as flow reductions, calcite formation, COPC concentrations, suspended sediments, deposited sediment, and others (e.g., blasting proximal for waterbodies, diversions, etc.).	KNC		19-Feb-2014	A series of conceptual site models (CSMs) applicable to the Elk River watershed and Lake Koocanusa that are presented in the Synthesis Report (Annex K, Chapter 2 [Regulatory Context]). The CSMs describe chemical (e.g., COPCs) and physical stressor pathways and associated interactions with aquatic and aquatic-dependent receptors.
B4-63	**Ecological Effects Assessment for Tributaries**	Provide additional information on the methods that will be used to predict the concentrations of COPCs and the magnitude of other stressors in the future. *For additional context refer to MacDonald letter (dated February 18, 2014* **)**	Information on future water quality conditions and the presence of other stressors is required to evaluate the potential effectiveness of the EVWQP for mitigating effects in the mining-affected tributaries within the Elk Valley. However, little information was provided on the methods that will be used to predict future conditions within each of the tributaries that could be affected by the proposed mitigation measures. Therefore, more information is required on the procedures that will be used for predicting future conditions.	KNC		19-Feb-2014	The methods used to predict future conditions within each of the tributaries is included in the Plan (Chapter 8 [Water-Quality Targets and Implementation] and in Annex H Integrated assessment Report).

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B4-64	**Ecological Effects Assessment for Tributaries**	In addition to evaluating the effects of individual stressors present within the tributaries, the cumulative effects of multiple stressors (including long-term climate change) need to be assessed. Such an evaluation needs to be directed by the development of effects hypotheses (i.e., that emerge from the CSM development process). *For additional context refer to MacDonald letter (dated February 18, 2014)*	Ecological receptors utilizing habitats within the tributaries have the potential to be adversely affected by a number of stressors, including changes in streamflows, changes in water quality conditions, formation of calcite, climate change, and others. While stressor-by-stressor evaluations of effects can provide useful insights into the factors that are causing effects in the tributaries, the effects assessment will be incomplete and underpredictive of effects if a cumulative effects assessment is not conducted. Therefore, the approach to incorporating tributaries into the EVWQP needs to include a multiple stressor analysis within a cumulative effects framework.	KNC		19-Feb-2014	Cumulative effects from multiple stressors are addressed in Chapter 8 (Water-Quality Targets and Implementation) and in Annex H Integrated assessment Report.
B4-65	**Ecological Effects Assessment for Tributaries**	Clearly describe the nature (type), magnitude, and spatial extent of effects in each mining-affected tributary under current conditions and under future management scenarios. *For additional context refer to MacDonald letter (dated February 18, 2014)*	Information on the effects within the tributaries under current conditions and under the proposed future management scenarios is required to understand the trade-offs that may need to be considered to balance economic, social, and environmental interests. By clearly documenting effects in each tributary under current conditions and describing how the proposed management scenarios will alter those conditions, the implications of the various management scenarios can be better understood.	KNC		19-Feb-2014	Annex K.1 DRAFT Aquatic Environment Synthesis Report characterizes current conditions in mine affected tributaries, while the Plan Chapter 8 (Water-Quality Targets and Implementation) and the Annex H Integrated assessment Report provides an assessment of effects within the tributaries under the proposed future management scenarios.
B4-66	**Approach for Calcite Management** **WP 4**	The calcite monitoring program should be able to determine not only the precipitation patterns of calcite within streams that occurs during late summer, but also the seasonal dissolution that might occur during freshet.	Determination/monitoring of seasonal precipitation/dissolution might be an important aspect of the calcite effects assessment, especially if remobilization of trace elements such as Cd is occurring.	MEM		19-Feb-2014	Seasonal dissolution will be addressed through a focused study on selected representative streams, and will be considered within the monitoring and research components of the Adaptive Management described in Chapter 7.7 (Calcite Management). Because of the extent of the calcite monitoring program (350 km of stream), it is not practical to conduct a complete survey twice annually.
B4-67	**Approach for Calcite Management** **WP 4**	The narrative objective that was proposed for addressing calcite formation needs to be revised to focus on managing the problem, rather than understanding the problem. The following narrative objective is recommended for inclusion in the EVWQP: "Manage mine related calcite formation such that stream-bed substrates within the Elk River, the Fording River, and associated tributaries support abundant and diverse communities of aquatic plants, benthic invertebrates, and fish (i.e., comparable to those present in appropriately selected reference areas)." *For additional context refer to MacDonald letter (dated February 18, 2014)*	The Terms of Reference for the EVWQP indicate that narrative objectives need to be articulated to guide calcite management. The narrative objective proposed at the fourth TAC meeting does not meet this requirement.	KNC		19-Feb-2014	Teck has established the Narrative Objective as "to understand and manage mine-related calcite formation such that stream-bed substrates within the Elk River, the Fording River, and associated tributaries (i.e., the Designated Area) can support abundant and diverse communities of aquatic plants, benthic invertebrates, and fish comparable to those in reference areas."(Chapter 7 [Calcite Management]).
B4-68	**Approach for Calcite Management** **WP 4**	Develop medium-term and long-term targets for calcite. As no targets have been proposed to date, the following targets are recommended for inclusion in the EVWQP: **1.** Short-term goals: Within three years, survey all streams in the Elk Valley that are affected by coal mining-related activities; map the spatial extent and magnitude (i.e., low, moderate, and high) of calcite formation in all streams; evaluate the effects of calcite formation through the implementation of well-designed field studies that include appropriate effects metrics; complete and document laboratory and field investigations conducted to identify and evaluate candidate calcite management approaches and systems; identify the most effective approaches to managing calcite formation for each type of source area and receiving water stream; and, complete a preliminary calcite management plan. **2.** Medium-term target: Within 10 years, reduce the spatial extent of moderate and high levels of calcite by 50% relative to 2013/2014 levels. Long-term target: Within 20 years, reduce the spatial extent of moderate and high levels of calcite by 80% relative to 2013/2014 levels. *For additional context refer to MacDonald letter (dated February 18, 2014)*	The Terms of Reference for the EVWQP indicate that medium-term and long-term targets and timeframes need to be established to reduce the rate and control the formation of calcite and manage impacted streams. Therefore, such targets need to be included in the EVWQP.	KNC		19-Feb-2014	As noted in advice Item No. A4-32, Teck has incorporated recommendations from item 1 in the Plan or will in the Plan implementation. This is reflected in Chapter 7 (Calcite Management). In terms of items 2 and 3, Teck has proposed medium and long- term targets based on the Calcite Index.
B4-69	**Approach for Calcite Management** **WP 4**	Conduct a comprehensive review of the scientific literature to identify candidate approaches to evaluating stream-bed substrate quality. The results of this literature search should be used to identify assessment endpoints (e.g., survival and growth of aquatic plants; survival, growth, and reproduction of benthic invertebrates; survival, growth, and reproduction of fish) for evaluating the effects of calcite formation. In addition, these results should be used to identify the measurement endpoints (e.g., abundance of benthic invertebrates and individual taxa; diversity of the benthic invertebrate community, intragravel dissolved oxygen levels, etc.) for evaluating the effects of calcite formation on fish and other aquatic organisms. *For additional context refer to MacDonald letter (dated February 18, 2014)*	The Terms of Reference of the EVWQP indicate that the plan will address the impact of calcite formation. However, methods for evaluating the effects of calcite formation on fish and other aquatic organisms have not been described. Therefore, a literature search should be conducted to support identification and evaluation of candidate impact assessment methods for calcite.	KNC		19-Feb-2014	Teck believes that the Canadian Aquatic Biomonitoring Network (CABIN) method will effectively assess the potential impact of calcite within the aquatic environment. The CABIN method is an integral component of the Regional Aquatic Effects Monitoring Program (RAEMP) developed with input from the Ministry of Environment and Ktunaxa.

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B4-70	**Approach for Calcite Management** **WP 4**	Revise the calcite monitoring program to include metrics that facilitate evaluation of effects on fish and other aquatic organisms associated with calcite formation in receiving waters. A before-after-control-impact approach should be used to evaluate the effects of calcite formation and associated management strategies to control calcite formation. The steps involved in the design of such a monitoring program should include: **1.** Develop a conceptual model for calcite formation in receiving waters; **2.** Identify all receiving waters in the Elk Valley with water quality conditions and/or mining activities potentially sufficient to promote calcite formation; **3**. Classify receiving waters prone to calcite formation based on physical-chemical characteristics and habitat types; **4.** Identify appropriate reference areas for type of receiving water that was identified within the mining-affected areas; **5.** Identify the assessment endpoints and measurement endpoints that will be incorporated into the monitoring program; **6.** Identify a number of representative reaches of each type of receiving water within mining-influenced and reference areas that will be used to support intensive effects monitoring; **7**. Describe the type and frequency of sampling and analysis that will be conducted within each reach; **8.** Describe the type and frequency of monitoring that will be conducted on other stream reaches to further evaluate the nature, extent, and magnitude of calcite formation; and, Describe the procedures that will be used to evaluate the resultant data and determine the effects of calcite formation on aquatic organisms. *For additional context refer to MacDonald letter (dated February 18, 2014)*	None provided	KNC		19-Feb-2014	Teck will evaluate the applicability of the steps listed in future calcite study design undertaken during Plan implementation. The recommended steps represent an appropriate framework for the ongoing evaluation and refinement of the interim targets that are being included in the Plan.
A5-1	**Monitoring**	For the purposes of comparing current conditions to BC Water Quality Guidelines, undertake more frequent sampling (5 samples per 30 days rather than monthly sampling) until it can demonstrated that it is not required during the critical period (ascending & descending of the high concentration periods).	This is consistent with the averaging period recommended in the BC water quality guidelines protocc	MOE	KNC	4-Feb-2014	Two seasonal 5-week periods of seasonal sampling at key locations will be implemented as described in Chapter 10 (Monitoring) of the Plan.
A5-1b	**Monitoring**	Description of Related Alternate (or Addn) Advice: A robust analysis should be carried out to understand when and where the critical period exists in the reservoir, recognizing it may occur at different times than in the Elk River peak (potentially), and perhaps at different spatial locations in the reservoir depending on the pool elevation and associated operation. Additionally, the procedure for how the 5 samples in 30 days are to be evaluated should be better clarified (i.e., when, where, and how) by MOE. In particular, it should be noted what constitutes exceedence of a guideline, whether spatial averaging can be employed so that the guideline (or target) can be exceeded at one location in the reservoir but not in another, and whether any margin of safety will be incorporated reflecting the typical inter-annual variance of observed water-quality data within the reservoir.	The monitoring design should reflect an appropriate interpretation of the 5 in 30 guidance by MOE. For example, a number of strategies could be employed to evaluate compliance. A liberal approach would be to allow the full mixing and dilution of the Kootenay River (i.e., spatial averaging) such that guideline would be exceeded in the Elk Arm but not after full mixing. A conservative approach might argue all points in the reservoir should remain below the guideline or proposed water quality target. Such details require adequate definition up-front as it could have great implications on the target-setting activities throughout the rest of the Elk River watershed.	MT Govt		15-Apr-2014	As outlined in Chapter 10 (Monitoring) of the Plan, monitoring of the reservoir will continue with Plan implementation. Monitoring components will be evaluated at the end of each monitoring cycle to confirm monitoring design for future cycles. Changes to the monitoring design for the reservoir may be revised based on analysis of the data.
A5-2	**Lake Koocanusa Selenium Loading**	When presenting the trace element data collected from bottom sediments in Lake Koocanusa, the size fraction of the particles should be presented. For example, sample meta data should specify if the sediment sample represents a non-sieved sample or a sample that excluded all particles larger than 80 micrometers. This distinction should be made when comparing trace element sediment data in both tablar and graphic formats.	In many situations, particle size can have a large impact on trace element concentration. Smaller particle size fractions can have a larger trace element concentration on a mass per mass basis compared with larger sized particles.	US Govt		2-Apr-14	As detailed within Chapter 4 (Baseline Conditions) and its Annexes, sediment size fractions have been distinguished and presented accordingly within all graphics.
A5-3	**Lake Koocanusa Selenium Loading**	When sampling in Lake Koocanusa, assess (or note) receiving water conditions (i.e. river vs. lake) when samples are collected at the stations above the confluence of the Elk River. This could be done as simplistically as noting flow velocity (or lack thereof), or as sophisticated as measuring the velocity profile with an ADCP	In order to provide context for the reservoir monitoring, it is important to understand conditions under which a sample was collected. Some sites may transition between those that are riverine and lentic, and may not be entirely useful analysis of trends and interpretation of data. In this regard, an ideal compliance point would be a location that was always lentic, is fully mixed (laterally and vertically), and is absent of "transitional" effects.	MT Govt		2-Apr-2014	Field observations and associated notes are an important component of sampling activities. Field personal will continue to document environmental conditions at the time of sampling activities within the Designated Area.
A5-4	**Lake Koocanusa Nitrate Loadings**	Develop a conceptual site model (CSM) for Lake Koocanusa that describes the sources and releases of COPCs, the other stressors in the lake, the environmental transport and fate of COPCs, the ecological and human health effects of COPCs, the potentially-complete exposure pathways, and the ecological receptors and human populations potentially at risk due to exposure to COPCs. Utilize the CSM to identify assessment endpoints for Lake Koocanusa (e.g., survival, growth, and reproduction of benthic fish species), to develop effects hypotheses (i.e., how are the effects on ecological receptors or human health associated with exposure to COPCs likely to be expressed), and to select the measurement endpoints that will provide the most relevant information on the status of the assessment endpoints. The effects hypotheses should include hypotheses regarding the effects of individual COPCs, the effects of COPC mixtures, and the effects of multiple stressors (i.e., interactive and cumulative effects hypotheses; e.g., COPCs, water level alterations, etc.).	A CSM provides a basis for describing the scope of the study area, identifying physical and chemical stressors, evaluating the transport and fate of COPCs, evaluating the effects of the various COPCs and COPC mixtures, identifying potentially complete exposure pathways, identifying ecological receptors, and developing effects hypotheses that link the stressors and receptors. In turn, the CSM supports identification of the measurement endpoints that are most appropriate for evaluating effects on each ecological receptor group. This information will provide the reader with a basis for evaluating the adequacy of the data and information that are assembled to evaluate effects in the lake, now and in the future. The CSM must consider such stressors as flow regulations, reservoir drawdown, COPC concentrations, suspended sediments, deposited sediments, and others.	KNC	MT Govt	2-Apr-2014	A conceptual site model (CSM) is included in Chapters 4 (Baseline Conditions) and Chapter 5 (Human Health and Groundwater) of the Plan. The CSM forms an integral component of environmental monitoring programs for Teck.
A5-5	**Lake Koocanusa**	Consider conducting laboratory bioaccumulation tests for benthic invertebrates to augment or replace the field collected data.	Information on the levels of selenium (and other bioaccumulative chemicals of potential concern [COPCs] e.g., Hg) in benthic invertebrates from Lake Koocanusa is required to evaluate the bioavailability of selenium that is released to the lake and to confirm water/sediment bioaccumulation factors (BAFs) calculated using data from elsewhere in the watershed. See also Appendix B Item #B5-4	KNC		2-Apr-2014	Field collected benthic tissue data are preferred as they provide a direct measure of bioaccumulation for comparison to BC water quality guidelines, can be used to refine bioaccumulation models developed for the Plan, and in turn help validate the initial implementation plan and inform if adaptive measures are required (see Chapter 11 [Adaptive Management]). For this reason, field collected tissue data have been incorporated within monitoring programs (see Chapter 10 [Monitoring]).

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A5-6	**Human Health**	Develop a conceptual model to assess potential risk to groundwater (i.e., look at the source, fate and transport of constituents of concern). Use the model to identify the areas where an investigation of the hydraulic connectivity between surface and groundwater is needed to understand potential threats to groundwater and respond accordingly to achieve the overall goal of protecting groundwater (as included in the Order. Specific recommendations related to a detailed groundwater assessment include: • Recommend adding the assumed fate for contaminants beyond when they have reached the water table. Also consider adding health consequences and toxicity to humans as a result of drinking contaminated groundwater. • Recommend using a case study of potential contamination, using the toxicity and numerical groundwater modelling, to assess the movement and fate of chemical constituents. Consider adding a scenario of a vulnerable aquifer in a community that uses that aquifer as their municipal water supply source and relating effects to long-term human toxicity • Recommend to reference the publicly available data that were used to assess baseline groundwater quality and groundwater quantity information. • Recommend to describe the limitations of these datasets (e.g, the WELLS database is incomplete due to the voluntary nature of well log submission, thus, there are most definitely additional existing wells). • The assessment of water quality data should be focused on baseline water quality of vulnerable aquifers with high consequence wells (i.e., municipal supply wells). • Recommend to highlight the locations of all known community drinking water supply wells on the Hydrogeology map sheets comparing risks and consequences (i.e., community drinking water supply wells vs. a well serving a single dwelling) • Recommend to show locations of mapped/delineated well capture zones/time of travel estimates on the Hydrogeology maps • Recommend installing monitoring wells up-gradient of community drinking water supply wells, and other high consequence receptors (i.e., wetlands, fish-bearing receiving waters)	The Oder includes a goal of protecting groundwater and human health. The proposed approach to date has included monitoring of wells, however, a more comprehensive assessment is needed to identify and understand the movement of groundwater, the potential for contamination and to develop the appropriate response measures to achieve the goal of protecting drinking water sources. The conceptual groundwater model should support these goals through improved understanding of groundwater migration pathways between potential pollutant sources and the receiving waters, and the surface water and groundwater interactions. The basis and data sources for conceptual model development should be documented and described, including discussion of key limitations and data gaps. Interpretation of groundwater monitoring results and the development of future monitoring plans should be conducted within the framework of the conceptual groundwater model. This advice is supported by the Interior Health Authority (IHA).	MOE	IHA	2-Apr-2014	A more comprehensive assessment of groundwater has been completed, including development of a preliminary conceptual model. Potential toxicity to humans has been assessed (see Chapter 5 [Assessment of Protection of Human Health and Groundwater]). Potential source and transport pathways the drinking water are discussed in the drinking water evaluation in the report Summary of Elk Valley Drinking Water Evaluation and Sampling Program provided in Annex L.2 of the Plan. A number of the advice/comments items listed have been addressed, including focus on community wells, reference to publically available data and its limitations, and an assessment of aquifer vulnerability in the floodplain. Limitations and data gaps were also presented. We note that the majority of this work focused on the Elk River floodplain; additional understanding, further conceptual model development and adaptive management strategies are proposed in the document Regional Approach to Protection of Groundwater – Elk Valley Water Quality Plan in Annex L.3 of the Plan.
A5-7	**Human Health**	While preliminary screening assessment of wells is a good first step, there is a need to assess the sources, fate and transport of constituents of concern in order to achieve the long term goal of protecting groundwater. This information will inform monitoring needs and identify additional next steps in the assessment.	To protect the long term use of drinking water sources in the area, the source, fate, and transport of constituents of concern that are now being found in wells in Sparwood for example, needs to be determined. This is related to #A-7, the interaction between surface and groundwater needs to be assessed in order to protect drinking water sources. The conceptual groundwater model should be used to help design monitoring plans that can assess and verify migration pathways and pollutant sources. This advice is supported by the Interior Health Authority (IHA).	MOE	IHA	2-Apr-2014	The conceptual site model identifies potential sources and fate and transport processes for constituents of interest. Based on data collected to date, directly addressing surface water concentrations per the initial implementation Plan (refer to Chapter 8 [Water-Quality Targets and Implementation Plan]) will also serve to protect groundwater. Results of supplemental monitoring planned for 2014 and information obtained through monitoring at the Operations will be used to further determine the source, fate, and transport of constituents. The results will also guide development future monitoring programs and enhance the conceptual site model.
A5-8	**Human Health – Baseline Evaluation**	Explicitly identify data gaps and data quality issues in the results of the baseline assessment and the potential effects assessment. Clearly describe how data quality issues have been addressed and how censored data have been treated in the analyses.	The information needed to conduct a comprehensive (i.e., valley-wide) assessment of effects on human health associated with exposure to COPCs is likely not available. For this reason, it is important to fully identify data requirements and identify gaps in the existing data set. This will facilitate the evaluation of uncertainty in the assessment and help to focus subsequent data collection efforts. In addition, it is important to describe how data quality issues have been addressed in the uncertainty section. Finally, treatment of censored data has the potential to influence the results of the assessment. Therefore, it is essential to fully describe all of the underlying assumptions and treatment methods related to censored data.	KNC	MOE	2-Apr-2014	Data gaps and data quality issues have been identified and addressed. The treatment of censored data has also been described. An uncertainty section in the report provides a summary of data gaps.
A5-9	**Human Health**	Develop a CSM that describes the sources and releases of COPCs, identifies the COPCs that are relevant for assessing effects on human health (i.e., based on the results of the baseline assessment), the environmental transport and fate of COPCs, the potential effects of COPCs on human health, the potentially-complete exposure pathways, and the human populations potentially at risk due to exposure to COPCs. Utilize the CSM to identify assessment endpoints for human health, to develop effects hypotheses (i.e., how are the effects on human health associated with exposure to COPCs likely to be expressed), and to select the measurement endpoints that will provide the most relevant information on the status of the assessment endpoints. The effects hypotheses should include hypotheses regarding the effects of individual COPCs and the effects of COPC mixtures (as relevant for human health assessment).	A CSM provides a basis for describing the scope of the study area, identifying physical and chemical stressors, evaluating the transport and fate of COPCs, evaluating the effects of the various COPCs and COPC mixtures, identifying potentially complete exposure pathways, identifying human populations potentially at risk, and developing effects hypotheses that link the stressors and human populations. In turn, the CSM supports identification of the measurement endpoints that are most appropriate for evaluating effects on human health. This information will provide the reader with a basis for evaluating the adequacy of the data and information that are assembled to evaluate effects on human health, now and in the future.	KNC	MOE	2-Apr-2014	A conceptual site model (CSM) has been developed and provided in both the Annex L Human Health Evaluation of Current Baseline Conditions Report and Chapter 5 (Assessment of Protection of Human Health and Groundwater).
A5-10	**Human Health – Effects Assessment**	For the human health effects assessment, consider an adult and child consumer with high exposure levels to the constituents of potential concern.	None provided.	KNC	MOE	2-Apr-2014	Annex L.1 Human Health Evaluation of Current Baseline Conditions includes adult and child consumers with high exposure levels.
A5-11	**Human Health – Effects Assessment**	For the human health effects assessment, when assessing the exposure to constituents of potential concern, especially selenium, consider the background levels of intake in relevant to the Elk Valley (as opposed to just the average Canadian or BC background intake levels).	The background levels of Se in human populations can vary depending primarily on where their food is grown. For example, local sources of food may have higher levels of Se in food than those coming from other geographic locations. IHA has recommended that this be considered.	MOE		2-Apr-2014	No selenium dietary intake data were available for the Elk Valley or for Alberta. Using Health Canada Total Diet Study data, the food categories contributing the most to selenium intake were identified. The limited available data for local game and organ meats were then used in an analysis to assess Elk Valley background selenium intakes.

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A5-12	**Human Health – Baseline Evaluation**	Contaminants should not be screened out based on comparisons to reference site concentrations. The contaminants should only be screened out from the screening level assessment if there is no evidence that human health guidelines are near limits or are exceeded. However, a different criterion applies for screening contaminants out of monitoring programs. In this case, contaminants should remain as a contaminant of concern if any of the following apply: • the contaminant is being released from the mining operations, • Observed values are within 20% of guideline, • Observed values exceed a guideline, • There is evidence that the amount in the environment is increasing	The information about contaminant loading, fate and transport in the Elk Valley is not fully understood. Therefore, contaminants need to be continually monitored to better understand these processes and the impacts of contaminants on source water. This advice is supported by the Interior Health Authority (IHA).	MOE	IHA	2-Apr-2014	Constituents were not screened out of the human health evaluation (see Annex L.1 Human Health Evaluation of Current Baseline Conditions) based on comparison to reference concentrations. A monitoring program is proposed for constituents associated with mining activity (Chapter 10 [Monitoring]).
A5-13	**Human Health**	Consider the inclusion of an inhalation pathway for human health associated with particulate (dust) when Lake Koocanusa is drawn down.	None provided.	MT Govt	MOE	2-Apr-2014	Potential inhalation of windblown dust from Lake Koocanusa was considered, but not quantified because no MU 6 sediment constituents were retained after the baseline screening in the human health evaluation (see Annex L.1 Human Health Evaluation of Current Baseline Conditions).
A5-14	**Human Health – Baseline Evaluation**	Include fish in the Upper Fording River in the baseline evaluation (in the event that the fishery would be re-opened at some future point).	None provided.	MOE		2-Apr-2014	Data from fish in the Upper Fording River was included in the current baseline evaluation (see Annex L.1 Human Health Evaluation of Current Baseline Conditions) and Chapter 5 (Assessment of Protection of Human Health and Groundwater).
A5-15	**Human Health**	Depending on the timeline to stabilize some constituents in the Plan, may need to re-evaluate some constituents based on trending information where concentration levels are approaching a guideline/benchmark value.	(Same rationale as A-12): The information about contaminant loading, fate and transport in the Elk Valley is not fully understood. Therefore, contaminants need to be continually monitored to better understand these processes and the impacts of contaminants on source water.	MOE		2-Apr-2014	A future monitoring program is proposed to address future concentrations (Chapter 10 [Monitoring]). Human health guideline values were compared with short term and long term targets.
A5-16	**Human Health**	Continue the evaluation of risks to human health annually during implementation of the Plan	None provided.	KNC		2-Apr-2014	Periodic health risk updates are planned (Chapter 10 [Monitoring]). The frequency will be dependent on data availability.
A5-17	**Human Health – Baseline Evaluation**	Include summary statistics for baseline data review to evaluate if the three-year period is adequately capturing historical maxima.	None provided.	KNC	MOE	2-Apr-2014	Data collected within the Designated Area from 2011-2013 were used in the human health evaluation. Since constituents associated with mining activity have been trending up, no analysis of historical maxima was conducted.
A5-18a	**Human Health – Baseline Evaluation**	**Human Health WG Recommendation #1-1:** Include summary statistics for baseline data review to evaluate if the three-year period is adequately capturing historical maxima.	None provided.	MOE	KNC	5-Mar-2014	This advice is included in Annex K.1 DRAFT Aquatic Environment Synthesis Report Appendix A. This information was also considered in the human health evalution.
A5-18b	**Human Health – Baseline Evaluation**	**Human Health WG Recommendation #1-2:** Use the same time period for the ecological and human health baseline data reviews.	None provided.	MOE	KNC	5-Mar-2014	The same time periods were used for both human health and ecological evaluations.
A5-19	**Human Health – Baseline Evaluation**	**Human Health WG Recommendation #1-3:** For the human health baseline review, document the hierarchy of guidelines and specific data that is used.	None provided.	MOE	KNC	5-Mar-2014	The hierarchy of guidelines and specific data that is used in the evaluation is documented in the human health assessment report Annex L.1 and Chapter 5 (Assessment of Protection of Human Health and Groundwater).
A5-20	**Human Health – Baseline Evaluation**	**Human Health WG Recommendation #1-4:** For the baseline review of fish, consider that water quality concentrations of some substances have been increasing every year (e.g. at some locations, selenium water quality concentration is increasing by 8%/year). This would mean that fish samples from early in the 2011-2013 period were exposed to lower selenium water quality concentrations over their lifetime than current water quality concentrations.	None provided.	MOE	MT Govt	5-Mar-2014	The available fish tissue data did not support the requested analysis.
A5-21	**Human Health – Baseline Evaluation**	**Human Health WG Recommendation #1-5:** Consider whether background levels for selenium in the Alberta population are more appropriate than BC background levels.	None provided.	MOE	KNC MT Govt	5-Mar-2014	No background selenium dietary data were available for Alberta. Using Health Canada Total Diet Study data, the food categories contributing the most to selenium intake were identified. Data for local game and organ meats were then used in an analysis to assess Elk Valley background selenium intakes (see Annex L.1 Human Health Evaluation of Current Baseline Conditions).
A5-22	**Human Health**	**Human Health WG Recommendation #1-6:** Document all assumptions for exposure pathways and exposure values.	None provided.	KNC	MOE	5-Mar-2014	All assumptions for exposure pathways and exposure values and equations are provided in Annex L1 Human Health Evaluation of Current Baseline Conditions.
A5-23	**Human Health – Effects Assessment**	**Human Health WG Recommendation #1-7:** For pathways, consider: ☐ irrigation with surface water pathway; ☐ dietary sources specific to the Elk Valley; ☐ consumption of surface water and associated sediment that may get stirred up while swimming; ☐ pathways of specific relevance to First Nations: o consumption of large mammals (e.g. elk, deer, moose) o consumption of non-game fish (as well as game fish)\ o foods harvested from riparian zone.	None provided.	MOE	KNC	5-Mar-2014	A pathway analysis was included. Elk Valley dietary sources and consumption of large mammals was addressed. Secondary pathways, while identified, were not quantified and rationale was provided. The description of this analysis is included in Chapter 5 (Assessment of Protection of Human Health and Groundwater) and in Annex L.1 Human Health Evaluation of Current Baseline Conditions) in the Plan.
A5-24	**Human Health – Effects Assessment**	**Human Health WG Recommendation #1-8:** Use the cancer risk of $1x10^{-6}$ vs. $1x10^{-5}$. Both the Interior Health Authority and the Ministry of Health use a cancer risk of $1x10^{-6}$	None provided.	KNC		5-Mar-2014	The 1x10-5 cancer risk target was retained because that target is used by BC MOE for contaminated land evaluations and for the EAs.
A5-25	**Human Health – Effects Assessment**	**Human Health WG Recommendation #1-9:** Where appropriate, consider the daily food intake of First Nations adults and children separately from the daily intake of the average population.	None provided.	MOE		5-Mar-2014	For fish, the First Nations 95th percentile consumption rates for consumers only were used. The fish consumption estimate for the general population was similar to the First Nations value, so only the First Nations value was used in analyses. First Nations consumption rates for game and organ meat were also considered in the selenium dietary intake evaluation.

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A5-26	**Human Health – Effects Assessment**	**Human Health WG Recommendation #1-10:** As the results come in for the human health assessment, consider how these results may affect water quality target derivations and provide this information to the working group and the TAC	None provided.	MOE		5-Mar-2014	Human health assessment results were considered in the derivation of water quality targets.
A5-27	**Human Health – Effects Assessment**	Document the data gaps in the human health assessment and explain if and how these will be addressed through the monitoring program currently being implemented by Teck	Data collected through Teck's aquatic effects monitoring program and groundwater monitoring program can potentially inform human health assessment if appropriate protocols are used. See: • British Columbia Ministry of Environment. 2012b. Water and air baseline monitoring guidance document for mine proponents and operators. Victoria, BC (CA): • Ministry of Environment. 194p. Accessed on-line at http://www.env.gov.bc.ca/wat/wq/wq_procedure.html, and • Health Canada. 2004. Canadian handbook on health impact assessment: Volume 3: The multidisciplinary team. Ottawa, ON (CA): • Health Canada, Minister of Health, Chapter 8, Food Issues in Environmental Impact Assessment. 32p.	MOE		5-Mar-2014	A discussion of data gaps and planned monitoring programs is included in Chapter 5 (Assessment of Protection of Human Health and Groundwater) and detailed in the human health evaluation in Annex L.
A5-28	**Monitoring**	Develop a CSM for the entire study area that describes the sources and releases of COPCs, the other stressors in the ecosystem, the environmental transport and fate of COPCs, the ecological effects of COPCs, the potentially-complete exposure pathways, and the ecological receptors potentially at risk due to exposure to COPCs.	A CSM provides a basis for describing the scope of the study area, identifying physical and chemical stressors, evaluating the transport and fate of COPCs, evaluating the effects of the various COPCs and COPC mixtures, identifying potentially complete exposure pathways, identifying ecological receptors, and developing effects hypotheses that link the stressors and receptors.	KNC	MOE	3-Apr-2014	A series of conceptual site models (CSMs) applicable to the Elk River watershed and Lake Koocanusa that are presented in the Synthesis Report (Annex K, Chapter 2 [Regulatory Context]). The CSMs describe chemical (e.g., COPCs) and physical stressor pathways and associated interactions with aquatic and aquatic-dependent receptors.
A5-29	**Monitoring**	In the State of the Aquatic Environment (formerly "Synthesis") Report, identify where the information collected and the analyses conducted support or don't support the bioaccumulation modelling results, the associated benchmarks, and the conclusions on the population level effects. The report should also indicate where additional monitoring is needed to help verify the assumptions informing the derivation of targets for the constituents of concern.	Proposed benchmarks for substances of concern (specifically selenium) have a number of uncertainties associated with their derivation. For example, the Level 1 benchmark for Westslope Cutthroat Trout will have a level of effect associated with it. How confident can we be that the predictions are correct and how can the monitoring data help verify the modelling predictions (i.e., help validate modelling)? Linkages between the predictions and actual results should be made where applicable.	MOE		3-Apr-2014	Analysis in Annex K.1 Draft Aquatic Environment Report and analysis to develop se-bioaccumulation models were done consistently utilizing the existing monitoring data. Derived benchmarks associated with the se-bioaccumulation model were used to evaluate current conditions in the synthesis report. Future monitoring as outlined in Chapter 10 (Monitoring) will provide further data to update the se-bioaccumulation model.
A5-30	**Monitoring - Selenium**	For the Spotted Sandpiper 2013 Monitoring Study, do a power analysis for the purposes of evaluating whether the data refutes the selenium toxicity threshold in Harding et al. (2007).	None provided.	UBC		3-Apr-2014	Once the study has been completed, appropriate statistical approaches, such as power analysis, will be used to evaluate the data and compare results to those of Harding et al. (2007).
A5-31	**Selenium Ecological Effects Assessment**	**Toxicology WG Recommendation #1-1:** Develop a two-step model (water to benthos | benthos to fish) and compare against one step and multi-step models	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Selenium Presentation_EVWQP_28Mar2014).
A5-32	**Selenium Ecological Effects Assessment**	**Toxicology WG Recommendation #1-2:** Code periphyton data points by seasonality and by location (e.g. tributary and mainstem) and show on plots	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Selenium Presentation_EVWQP_28Mar2014).
A5-33	**Selenium Ecological Effects Assessment**	**Toxicology WG Recommendation #1-3:** Recommend a combined lentic – lotic periphyton model, if stats bear it out (e.g. diagnostic plots, r2, std error, slopes intercepts, analysis of covariance)	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Selenium Presentation_EVWQP_28Mar2014).
A5-34	**Selenium Ecological Effects Assessment**	**Toxicology WG Recommendation #1-4:** Recommend piecewise model for the water – periphyton model.	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Selenium Presentation_EVWQP_28Mar2014).
A5-35	**Selenium Ecological Effects Assessment**	**Toxicology WG Recommendation #1-5:** Recommend dropping the following periphyton outlier datapoints for the bioaccumulation models: a) 4 high datapoints (Fording River oxbow, Clode pond, Goddard Marsh were considered distinctly lentic and a different mgt issue, also different sampling used) b) 4 lower periphyton points at higher Se water levels (confounding factors from calcite and bryiophytes were believed to have under predicted actual selenium concentrations)	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Selenium Presentation_EVWQP_28Mar2014).
A5-36	**Selenium Ecological Effects Assessment**	**Toxicology WG Recommendation #1-6:** Recommend a piecewise model for the invertebrate – amphibian model and excluding the low invertebrate outlier datapoints associated with Se < 2mg/kg, which were considered unrealistically low.	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Selenium Presentation_EVWQP_28Mar2014).
A5-37	**Selenium Ecological Effects Assessment**	**Toxicology WG Recommendation #3-1:** Recommend to not carry forward with an invertebrate – amphibian bio-accumulation model, at this time, given limited toxicity data, and feeding uncertainty.	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Selenium Presentation_EVWQP_28Mar2014).
A5-38	**Selenium Ecological Effects Assessment**	**Toxicology WG Recommendation #3-2:** Recommend not differentiating WCT size effects into the bio-accumulation model, given low expected significance of effect and uncertainty with the unbalanced datasets.	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Selenium Presentation_EVWQP_28Mar2014).

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A5-39	**Selenium Ecological Effects Assessment**	**Toxicology WG Recommendation #3-3:** Recommend a sensitivity analysis be carried out for the RWBL – Invertebrate model using the 2005 Harding bird egg samples (using different moisture contents).	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Selenium Presentation_EVWQP_28Mar2014).
A5-40	**Selenium Ecological Effects Assessment**	**Toxicology WG Recommendation #3-4:** Recommend a one-step model using bird egg concentrations (sandpiper) vs. Se Aq be developed to review and better understand potential effects.	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Selenium Presentation_EVWQP_28Mar2014).
A5-41	**Selenium Ecological Effects Assessment**	**Toxicology WG Recommendation #3-5:** Recommend using the full dose-response relationship for the most sensitive taxa (C. dubia) to evaluate effects in a manner analogous to using the dose response for Brown Trout in the selenium effects assessment.	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Selenium Presentation_EVWQP_28Mar2014).
A5-42	**Cadmium Ecological Effects Assessment**	**Toxicology WG Recommendation #2-8:** For toxicity studies used to calculate the geometric means, recommend a sensitivity test for the binning of D. magna studies	None provided.	Tox WG		3-Apr-2014	Teck considered this advice and prepared a response in the form of a memo to TAC dated June 17, 2014 titled "Derivation of Cadmium Benchmark". The memo provides a derivation of the cadmium benchmark for protection of the most sensitive toxicological endpoint observed as a result of cadmium exposure to Daphnia magna. The results of the study were also presented at the TAC Toxicology Working Group meeting #3.
A5-43	**Nitrate Ecological Effects Assessment**	**Toxicology WG Recommendation #2-9:** Test whether there is any evidence that the pooled slope hardness relationship asymptotes after 180 mg/L CaCO3.	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Update Ecological Effects assessment for Nitrate and Sulphate).
A5-44	**Nitrate Ecological Effects Assessment**	**Toxicology WG Recommendation #2-10:** For amphibians, undertake a sensitivity assessment whether hardness normalization makes a difference for nitrate effects or not	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Update Ecological Effects assessment for Nitrate and Sulphate).
A5-45	**Nitrate Ecological Effects Assessment**	**Toxicology WG Recommendation #3-6:** For nitrate, in conducting the hardness adjustment of toxicity data from the literature, perform an analysis using the following methods: (1) for toxicity data collected at a test hardness of greater than 182 mg/L CaCO3, instead of assuming a flat relationship at increased hardness, use the combined (pooled) slope estimate for fish/invertebrates to adjust the effect benchmark to a site-relevant value; and (2) rather than adjust to background hardness of 160 mg/L CaCO3, calculate adjusted values for a range of hardness conditions representative of the reaches in the Fording River and Elk River. Determine whether this analysis would influence the selection of an ecologically protective value for each reach.	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Update Ecological Effects assessment for Nitrate and Sulphate).
A5-46	**Nitrate Ecological Effects Assessment**	**Toxicology WG Recommendation #2-11:** Recommend leaving off plants/algae in the SSD for nitrate, since they are not a sensitive taxa and will likely affect the lower end of the distribution.	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Update Ecological Effects assessment for Nitrate and Sulphate).
A5-47	**Sulphate & Nitrate Ecological Effects Matrices**	**Toxicology WG Recommendation #3-7:** Recommend the evaluation of using both Level 1 and Level 2 (toxicity thresholds) for the most sensitive species to define protective values to understand the implications on the effects assessment	None provided.	Tox WG		3-Apr-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #3 (Update Ecological Effects assessment for Nitrate and Sulphate).
A5-48	**Management Scenarios**	Recommend consideration of partial covers and a deeper evaluation as to the potential benefits (and earlier sequencing of partial covers) prior to excluding these mitigation measures from the EVWQP.	None provided.	MEM		3-Apr-2014	The analysis of the benefit of partial covers was considered in evaluating and selecting water quality management options. This analysis was not included directly in Chapter 6 (Development and Selection of Management Options), but is instead outlined below. The initial modeling of BGM covers led to a conclusion that covers would have little effect on water quality of receiving streams over the 20-year time frame that was modelled. That conclusion was largely driven by the fact that the drain down of water beneath even perfect covers would extend over many years or decades. But it was also influenced by a limitation that the initial modeling only considered complete covers, meaning that cover construction could not begin until a waste rock pile was completed. In most cases, that meant that the start of cover construction was many years or decades in the future. TAC members have therefore asked whether there might be a benefit in constructing partial covers, i.e. ones that could be commenced long before the waste rock pile was complete. This question was discussed by an internal Teck group in mid-February 2014.The group looked at the schedule for waste rock deposition arising from the current long term mine plans, and identified areas that could be covered with a high likelihood that they would not later be over-dumped. That review was complicated by the fact that short term mine planners like to have the flexibility to route waste to any available dump, so it was difficult to guarantee that any portion of any dump would really be available for early covering. But the group agreed to take an optimistic view and was able to identify portions of dumps in almost every operation that would be candidates for early covering. The group then looked at the possible benefits of partial covers. The earlier modeling had shown that unless a cover was very effective, it would only reduce the amount of water needing active water treatment, and there would be no benefits to water quality in the receiving streams. The group concluded that a similar pattern would hold for partial covers, i.e. that they might reduce the amount of water needing treatment, but would not improve water quality in the receiving streams. As a result partial covers were not considered for the initial implementation plan. A later meeting, in May 2014, considered other possible benefits from partial covers. That meeting was focused on how Teck could most efficiently move R&D concepts into full scale implementation. In brief, one outcome of that

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							meeting was that partial covers might well be reasonable as pilot scale or first full scale implementations of cover technology. However, that meeting also concluded that cover R&D was several years away from being ready for full scale testing. In summary, Teck believes that partial covers would not affect water quality enough to be a suitable option to the initial implementation plan, but they should be kept in consideration for technology development and future stages of the Plan.
A5-49	**Ecological Effects Matrices**	Recommend using the terminology "Level 1 & 2 Toxicity Thresholds" rather than "Ecologically Protective Values" to characterize water quality concentrations that are meant to be protective of sensitive endpoints.	None provided.	MOE KNC		3-Apr-2014	This advice is incorporated in the Plan. The term "ecologically protective values" is no longer used in the Plan. Instead, water quality benchmarks are characterized as either Level 1 or Level 2 values.
B5-1	**Lake Koocanusa Selenium Loading**	Teck needs to consider the overall plan goals of "stabilizing and reducing" selenium concentrations in setting an appropriate target for the Lake as soon as possible. For example, information presented at the TAC 5 meeting indicate that the first Fording River Operations treatment plant has been delayed to 2018, which is two years later than originally proposed. This likely will result in continued short-term increases in both selenium loadings and concentration in the interim. Since the proposed target of 2 µg/L Se has no margin of safety with regard to the BC guideline, and some debate exists over the levels of selenium in biota of the reservoir, it is advised that the interim target for the reservoir be set as follows: no net increase in concentration until study can be undertaken to determine actual bioaccumulation thresholds for the reservoir. In this regard, the wording "provisional target" should be used which would set Se at current levels (i.e., ~1.13 µg/L, or the current value) and it is believed that this can be achieved with current treatment technology	As reported by Teck in the "Lake Koocanusa – Monitoring Overview" presentation, the current average Se concentration in Lake Koocanusa (based on available monitoring data) is 1.13 µg/L. The long-term Se target in Lake Koocanusa (as set by the Ministerial Order) is 2 µg/L at Site LK2. The Ministerial Order also states "The purpose of the Plan is to describe the operational actions which will be taken by Teck to: (1) immediately begin to stabilize water quality concentrations of selenium, cadmium, nitrate, and sulphate, and the rate of formation of calcite in the designated area; and (2) in the medium-term, reduce the rate of formation of calcite and set targets to demonstrate progressive reduction in water quality concentrations of selenium, cadmium, nitrate and sulphate in the designated area." Setting a Se target of 2 µg/L for Lake Koocanusa will allow the Lake to almost double in Se concentration, which contradicts that Plan goals of "stabilize and reduce" selenium concentrations.	US Govt MT Govt		15-Apr-14	Consistent with the Order and as reiterated by the Order Manager during the sixth Technical Advisory Committee meeting (Victoria, BC), the long-term target for selenium within the reservoir is the BC water quality guideline (WQG). As detailed within Chapter 8 (Water Quality Targets and Implementation Plan), the initial implementation plan identifies selenium water concentrations within the reservoir below the BC WQG. It should be noted and as stated on page 161 of the BC WQG document, the selenium "BC water column guideline to protect aquatic life" is based on a safety factor of 5; and as such, to assume that it has no margin of safety is incorrect. As detailed within Chapter 4 (Baseline Conditions), data collected to date within the reservoir identifies negligible risks. During implementation of the Plan, environmental conditions within the reservoir (e.g., water quality, fish tissue, sediment etc.) will continue to be monitored (see Chapter 10 [Monitoring]). These data will be used to help evaluate and validate the initial implementation plan and its performance, which in turn will inform if adaptive measures are required (see Chapter 11 [Adaptive Management]).
B5-2	**Lake Koocanusa Selenium Loading**	There is a role for independent analysis of environmental data and information related to Elk Valley and Lake Koocanusa. Therefore, it is recommended that an independent bi-national environmental monitoring agency be established to provide guidance and oversight related to the collection, analysis, interpretation, and reporting of data collected within the Elk Valley.	A great deal of data and information has been collected on environmental conditions in the Elk Valley in recent years. In the future, implementation of the Regional AEMP and various mine-related AEMPs will result in collection of additional data and information. To ensure that such data collection is focussed and relevant, that the resultant information is evaluated using appropriate methods and procedures, and that the dissemination of such data and information is timely and accurate, an independent bi-national environmental monitoring agency needs to be established in the Elk Valley.	KNC		15-Apr-2014	The suggestion is outside the scope of the Order. Teck will however continue to share monitoring data as outlined within Chapter 11 (Adaptive Management).
B5-3	**Lake Koocanusa Nitrate Loadings**	Teck must incorporate eutrophication impacts in their ecological effects assessment for nitrate, in particular, the relative importance of their discharge of nitrogen impact on downstream municipalities currently regulated under the National Pollutant Discharge Elimination System (NPDES). For example, work completed by Montana DEQ indicates that a total nitrogen target of target of 275 µg/L is protective of wadeable streams in the Northern Rockies ecoregion of Montana, and concentrations are already exceeding this criterion in both Lake Koocanusa and downstream in the Kootenai River. Similar to our comment regarding selenium, therefore we advise that targets be set to no net increase in nitrate, and is advised that the nitrate toxicity values should be retitled to something other than "ecologically protective" until it is established that these are protective under all circumstances for Lake Koocanusa.	The proposed nitrate concentration of 3-4 mg/L for the Elk River does not consider eutrophication impacts to Lake Koocanusa nor how such loadings may impact downstream wastewater discharges.	US Govt MT Govt		15-Apr-2014	The following have been incorporated in the Plan: 1. For the development and evaluation of nitrate toxicity values, "ecologically protective" language has been replaced with Level 1, Level 2, and Level 3 benchmarks consistent with Technical Advisory Committee advice. 2. The potential for eutrophication within the Designated Area was evaluated and is presented within Chapter 6 (Development and Selection of Management Options). Based on available data, it is not anticipated that the initial implementation plan will adversely affect trophic status within the Designated Area. Furthermore and as detailed in Chapter 10 (Monitoring), environmental monitoring program(s) will collect and evaluate nutrient (e.g., nitrate, total phosphorus etc.) and trophic status (e.g., chlorophyll-a biomass) within the Designated Area. These data will be used to validate that trophic status within the Designated Area is not adversely affected. As detailed in Chapter 2 (Regulatory Context), municipalities within the Designated Area are not regulated under the National Pollutant Discharge Elimination System and as such, this advice was not incorporated into the Plan. Furthermore, reference to the total nitrogen criterion of 275 µg/L in wadeable streams in the Northern Rockies ecoregion of Montana, is not applicable to Lake Koocanusa or the Kootenai River(refer to Section 2.2, Page 2-1 of Suplee and Watson (2013)). Suplee, M.W., and V. Watson. 2013. Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers - Update 1. Helena, MT: Montana Dept. of Environmental Quality.
B5-4	**Lake Koocanusa Monitoring Program Results**	Conduct 28-d to 56-d laboratory bioaccumulation tests with environmental media obtained from Lake Koocanusa. Such tests should be conducted by exposing oligochaete worms *(Lumbriculus variegatus*) to sediment samples obtained from Lake Koocanusa. The overlying water used in the exposures should be near-bottom water from Lake Koocanusa collected from the same locations as the sediment samples.	Information on the levels of selenium (and other bioaccumulative chemicals of potential concern [COPCs] e.g., Hg) in benthic invertebrates from Lake Koocanusa is required to evaluate the bioavailability of selenium that is released to the lake and to confirm water/sediment bioaccumulation factors (BAFs) calculated using data from elsewhere in the watershed.	KNC		15-Apr-2014	Existing sediment data within Lake Koocanusa does not indicate elevated concentrations of bioaccumulative constituents (e.g., mercury or selenium) relative to sediment quality guidelines. Additionally, field collected benthic tissue data are preferred as they provide a direct measure of bioaccumulation for comparison to BC water quality guidelines, help validate the initial implementation plan and inform if adaptive measures are required (see Chapter 11 [Adaptive Management]). For this reason, field collected tissue data have been incorporated within monitoring programs (see Chapter 10 [Monitoring]).
B5-5	**Lake Koocanusa Monitoring Program Results**	Conduct a study to evaluate the effects on peamouth chub associated with accumulation of selenium in ovarian tissues. Such a study should be conducted in a manner that is consistent with the studies that have been conducted to evaluate the effects on westslope cutthroat trout and mountain whitefish associated with accumulation of selenium in ovarian tissues.	Based on the data presented by Teck, it appears that peamouth chub collected in Lake Koocanusa have 10 to 15 µg/kg DW of selenium in their ovaries. This level appears to be lower than effects thresholds for westslope cutthroat trout or more sensitive fish species. However, effects studies have been conducted on only a limited number of species that occur within the watershed. Therefore, it is prudent to evaluate the sensitivity of this species to selenium accumulation in its tissues.	KNC		15-Apr-2014	In consideration that the most sensitive species tested to-date relative to selenium is brown trout (EPA 2014), a probabilistic assessment of potential effects due to selenium was completed for the reservoir using the brown trout concentration-response curve (see Chapter 4 [Baseline Conditions]). This assessment concluded that under existing conditions negligible effects within the reservoir are expected. Teck is committed to continue monitoring of environmental conditions within the reservoir. Monitoring of environmental conditions within the Designated Area will be an integral component of implementing and managing the Plan (see Chapters 10 [Monitoring] and Chapter 11 [Adaptive Management]). US Environmental Protection Agency (EPA). 2014. External Peer Review Draft Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater. EPA 822-P-14-001, Office of Water, Office of Science and Technology, Washington, DC. May.

Table 1:Teck Response to Technical Advisory Committee Advice, meetings #2 to #7 Appendix A and Band Working Group

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B5-6	**Lake Koocanusa Monitoring Program Results**	Water quality monitoring in Lake Koocanusa should include monthly sampling of all water quality variables, including conventional variables, nutrients, major ions, and metals. In addition, at least two 5-in-30 day sampling events (i.e., collect and analyze five water samples within a 30-d period, with samples collected at roughly seven day intervals) should be conducted each year. The 5-in-30 day sampling events should be conducted during the ascending and descending limbs of the hydrograph.	Teck has evaluated the available water chemistry data for Lake Koocanusa and has concluded that there is not enough temporal variability to justify collection of surface water samples more frequently than monthly. However, no data have been collected to evaluate short-term temporal variability in conventional variables, nutrients, major ions, or metals (total or dissolved). Such data are required to evaluate attainment of B.C. water quality guidelines (WQGs; i.e., long-term guidelines). Therefore, it is essential that five surface water samples be collected during a 30-d period during both the ascending and descending limbs of the hydrograph to evaluate attainment of WQGs in Lake Koocanusa.	KNC		15-Apr-2014	This advice has been included as part of the Regional Aquatic Effects Monitoring Program (RAEMP).
B5-7	**Lake Koocanusa Approach to Evaluating and Managing Water Quality Conditions**	Establish short-term targets for cadmium, nitrate, selenium, and sulphate that are consistent with existing levels of these constituents in Lake Koocanusa south of the mouth of the Elk River (i.e., LK2). That is, establish short-term water quality targets that stabilize the concentrations of these COPCs.	The Terms of Reference (ToR) for the EVWQP indicate that the "Plan will immediately establish short-term concentration targets and time-frames to stabilize water quality concentrations for selenium, cadmium, nitrate, and sulphate for stabilization." Therefore, the short-term targets for these constituents should be no higher than existing levels in the lake. The levels of selenium in the lake should never be allowed to reach the maximum concentration target of 2 µg/L in Lake Koocanusa south of the mouth of the Elk River (LK2).	KNC		15-Apr-2014	As outlined in Chapter 4 (Baseline Conditions), current baseline conditions for Order constituents within the reservoir, as determined south of the mouth of the Elk River, are below BC water quality guidelines (WQG). Therefore and as detailed within Chapter 8 (Water-Quality Targets and Implementation Plan), short-term targets are set for Order stations and constituents where long-term targets are greater than BC WQGs. Given that long-term water quality targets within the reservoir are the BC WQGs, short-term targets are consistent with guidelines.
B5-8	**Lake Koocanusa Approach to Evaluating and Managing Water Quality Conditions**	Long-term targets for Lake Koocanusa should include targets for surface-water chemistry, whole-sediment chemistry, invertebrate-tissue chemistry, and fish-tissue chemistry.	The COPCs that were named in the ToR for the EVWQP include substances that partition into surface water (i.e., cadmium, selenium, nitrate and sulphate), substances that partition into sediments (i.e., cadmium), and substances that partition into biological tissues (selenium and, to a lesser extent, cadmium). Therefore, long-term targets need to be established for all of these media types to ensure that the aquatic ecosystem and associated uses are adequately protected.	KNC		15-Apr-2014	Targets for sediment and tissues (invertebrate and fish) are outside the scope of the Order. Monitoring will be an integral component of Plan implementation. For this reason and as detailed within Chapter 10 (Monitoring), Teck will monitor a wide range of medium throughout the Designated Area which includes sediment concentrations and tissues (e.g., benthic invertebrates, periphyton, and fish). These data will be used to monitor environmental conditions and confirm that the initial implementation plan is reducing concentrations in surface water which in turn is also decreasing concentrations in other medium.
B5-9	**Lake Koocanusa Approach to Evaluating and Managing Water Quality Conditions**	The long-term targets that are ultimately selected for Lake Koocanusa should ensure that the concentrations of COPCs in each media type meet the following criteria: 1. Degradation of water quality conditions in the lake should be minimized (i.e., water quality targets established to protect water uses should not be considered to be pollute-up-to levels. All reasonable efforts should be taken to minimize loadings of COPCs to the lake); 2. At minimum, all water uses should be protected at all times throughout the lake; 3. British Columbia WQGs or Montana State water quality standards (whichever is lower) should be selected as long-term targets for all substances, except when existing levels are already below such WQGs. In such cases, existing levels should be adopted as short-term targets. Long-term targets should be established at lower levels to further reduce loadings to the lake; and, 4. The assimilative capacity of the lake should be shared equitably between British Columbia and Montana. Hence, long-term targets should be set at levels that provide British Columbia and Montana with flexibility to accommodate water users within their jurisdiction.	The ToR is clear that short-term targets are required to stabilize water quality conditions at the Order stations. Therefore, further degradation of water quality conditions in the lake should not occur. In the long-term, water management in the lake should focus on protecting existing and future water uses in British Columbia and in Montana. Fair and equitable water use requires that the assimilative capacity of the lake be evaluated and shared equally between the two jurisdictions.	KNC		15-Apr-2014	Long-term water quality targets within Lake Koocanusa are set as the BC water quality guideline (WQG) for the protection of freshwater aquatic life. As a result and based on existing WQGs, setting long-term water quality targets to protect freshwater aquatic life will by default protect waters within the reservoir for different water uses – including wildlife, drinking water, recreation and agriculture. As noted within response to Advice Item No. B5-8, long-term targets are only established for surface water no other medium as suggested within the advice. The following points are intended to address the specific bullets identified within the advice. 1. Teck is taking all reasonable efforts to minimize loadings of constituents within the Designated Area (see Chapter 8 [Water-Quality Targets and Implementation Plan]). Furthermore and as outlined in response to advice No. B-51 Teck does not interpret long-term water quality targets, as a concentration to be attained, but rather as a concentration not to be exceeded in the long-term. 2. Given that the BC WQG for the protection of freshwater aquatic life is lower in concentration than WQGs for other uses (i.e., wildlife, drinking water, recreation and agriculture); and that the long-term water quality targets for Lake Koocanusa are equivalent to the BC WQG for aquatic life, the targets will by default protect other water uses. 3. Water quality targets within the Designated Area are based on criterion in Canada as stated in the Order. As stated by the Order Manager (see Technical Advisory Committee – Meeting #3 Notes – FINAL; page 13) "consideration of assimilative capacity in Lake Koocanusa and international waters values is out of scope for this planning process."
B5-10	**Lake Koocanusa Approach to Evaluating and Managing Water Quality Conditions**	Potential effects on the trophic status of Lake Koocanusa should be fully considered when setting long-term targets for nitrate. Long-term target setting for nitrate should consider inputs of nitrogen from upstream sources, inputs of all forms of nitrogen from the Elk River, existing and future sources of phosphorus, and the forms of phosphorus that occur in the lake and could occur in the lake in the future.	To date, evaluations of the effects of nitrate have focused on development of toxicity thresholds for aquatic organisms. However, releases of nitrate (and other nitrogen species) have the potential to stimulate algal growth and alter the trophic status of receiving waters. Therefore, the potential for eutrophication needs to be considered and evaluated when setting long-term targets for nitrate.	KNC		15-Apr-2014	Given that the long-term water quality target for nitrate within Lake Koocanusa is the BC water quality guideline there is no information to suggest that additional evaluations/assessments are required at this time. As detailed in Chapter 6 (Development and Selection of Management Options), an assessment of trophic status for the Designated Area was completed. Teck is committed to continue monitoring environmental conditions within the Designated Area. Existing and future monitoring program(s) will monitor environmental conditions and will validate and refine planning tools such as water quality model, and inform the need to initiate adaptive management measures (see Chapter 11 [Adaptive Management]).
B5-11	**Lake Koocanusa Approach to Evaluating and Managing Water Quality Conditions**	Water quality objectives should be developed for phosphorus in the Elk River and in Lake Koocanusa. Such WQOs should be established at levels that prevent further degradation of the lake and minimize the potential for changes in the trophic status of the lake.	Mine-associated active wastewater treatment facilities have the potential to release phosphorus into receiving waters in the Elk Valley. In addition, there are numerous other potential sources of phosphorus in the Elk River Valley and elsewhere in the Kootenay River System. As the Elk River and/or Lake Koocanusa are likely to be phosphorus limited under current conditions, it is essential to ensure that discharges of phosphorus from Elk Valley coal mines, in combination with discharges of phosphorus from other sources, do not result in changes in the trophic status of the river or the lake.	KNC		15-Apr-2014	Based on data collected to date, phosphorous concentrations within the Designated Area do not exceed BC water quality guidelines (refer to Chapter 4 [Baseline Conditions]). As detailed in Chapter 6 (Development and Selection of Management Options), an assessment of trophic status for the Designated Area was completed. Based on this assessment it was identified that the trophic status of Lake Koocanusa would not be affected. Teck is committed to continue monitoring environmental conditions within the Designated Area. Existing and future monitoring program(s) will monitor environmental conditions and will validate and refine planning tools such as water quality model, and inform the need to initiate adaptive management measures (see Chapter 11 [Adaptive Management]).
B5-12	**Lake Koocanusa Implementation / Information Sharing**	As noted during the selenium loadings presentation by USGS and MT DEQ, both river and lake modeling methods are available to estimate daily contaminant loadings from the Elk River to Lake Koocanusa, as well as the resultant contaminant concentrations in the reservoir under completely mixed conditions. Cloud-based web applications currently exist that could readily compute and display this type of information in near real-time, in a format that is easily accessible by interested agencies and the general public. It is recommended that a web-site to display this type of information be constructed and maintained for easy access by all interested parties, and to track mitigation effectiveness.	To date (2014) there is no public accessible web site that provides accounting of contaminant concentrations or loads (i.e. nitrate, selenium, etc.) entering Lake Koocanusa from the Elk Valley or the resulting contaminant concentration in the lake. It is important for regulatory agencies, as well as the general public to have access to this information in a simplified form to monitor the progress of "immediate stabilization and future reduction" of contaminants entering Lake Koocanusa. Most of the water quality, stream flow, and limnological data are currently being collected by both Teck and the U.S. that could make this type of information to the general public, and as a result, a more transparent vehicle should be employed to host and share this information.	US Govt MT Govt		15-Apr-2014	A public accessible website with information on the Plan can be viewed at: www.teckelkvalley.com. Suggested information and links to include on this site will be considered during Plan implementation.

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B5-13	**Human Health Approach to Evaluating Effects**	Evaluate the representativeness and completeness of the groundwater chemistry data that have been collected to support the evaluation of effects on human health. This evaluation should include: 1. Mapping of the spatial distribution of groundwater aquifers in the Elk Valley, including shallow-water and deep-water aquifers (including a description of each aquifer); 2. Mapping of the distribution of soil types within the Elk Valley; 3. Geographic distribution of sampled wells compared to the geographic distribution of targeted drinking water wells; 4. Listing of communities in the Elk Valley and description of drinking water sources; 5. Number of wells sampled compared to the number of wells that were targeted for sampling; 6. Depth of each drinking water well that was sampled (i.e., to determine if shallow or deep groundwater was sampled); and, 7. Proximity of each drinking water well from the Fording River, Elk River, or mining-affected tributary (i.e., to determine if the water that was sampled likely represents surface water infiltration or groundwater). For each groundwater source, the uses of the groundwater should be identified (i.e., drinking water, irrigation, livestock watering, etc.).	A groundwater sampling program was undertaken by Teck to provide the information needed to evaluate human exposure to COPCs in drinking water. This sampling program resulted in collection of groundwater chemistry data for about a third of the groundwater wells that were initially targeted for sampling. Because the resultant groundwater chemistry data represent essential information for assessing potential effects on human health, it is critical to determine if they provide a reasonable basis for assessing potential effects on human health. The importance of other pathways (e.g., consumption of garden vegetables, consumption of livestock) may become apparent when the uses of groundwater beyond drinking water sources are considered.	KNC		15-Apr-2014	Groundwater chemistry data were obtained from 89 locations from Elkford to south of Fernie and proximate to Coal Mountain Operations. The locations included sampling both shallow and deep wells in residential areas (i.e., where groundwater wells currently exist) considered to have the highest potential for surface water and or mine-related influences, and represented approximately 50% of the locations targeted for sampling. We note that consent to access private property is required for this sampling, which limits the number of locations to where access is provided. The number of responses received was considered to be successful and the distribution of sample locations provided good spatial information. Groundwater aquifer mapping in the Elk Valley is currently limited to two aquifers in the Fernie area. Information from groundwater programs currently underway at each Operation and supplemental seasonal sampling in the floodplain areas will provide further groundwater information, and will guide the need for additional floodplain aquifer mapping.
B5-14	**Human Health Approach to Evaluating Effects**	Include all of the available data on the concentrations of COPCs in wildlife tissues and plant tissues in the human health effects assessment.	Ktunuxa Nation members utilize a broad range of plant and animal species as part of the traditional lifestyles that are practiced within the Elk Valley. It is important to fully understand the types and quantities of traditional foods that are consumed by members in order to adequately evaluate exposure to COPCs. In addition, it is important to utilize all of the available data and information on the levels of COPCs in traditional food to support estimation of potential effects and to identify data gaps. It is also important to understand other traditional uses of plants and animals that could result in exposure to COPCs (e.g., use of reeds and other plants in basket weaving, use of kidney, liver, and other organs from wildlife species, etc.)	KNC		15-Apr-2014	Summary data for selenium in game and organ meat has been provided. Plants are not a significant source of dietary selenium intake as described in the human health evaluation (Annex L).
B5-15	**Human Health Approach to Evaluating Effects**	Conduct a robust evaluation of the adequacy of the available data for assessing baseline exposure to COPCs in reference areas. This evaluation should include the development of a priori criteria for identifying suitable reference areas, an assessment of the extent to which the selected reference areas satisfy the reference area selection criteria, and an assessment of the adequacy of the available data. The assessment of human health effects should include an explanation of why the selected reference areas are appropriate for evaluating incremental exposure throughout the entire watershed. The implications of selection of alternative reference areas should also be discussed.	Data on the levels of COPCs in environmental media from selected reference areas will be complied to support the baseline evaluation of human health effects. Concentrations of COPCs in reference areas will be compared to data on the levels of COPCs in various management units to identify the COPCs that are carried forward into the effects assessment. Application of inappropriate reference areas could lead to dropping COPCs that should be carried forward into the effects assessment. Therefore, it is important to ensure that reference areas are appropriately selected and meet relevant selection criteria.	KNC		15-Apr-2014	Adequacy of reference areas will be performed in conjunction with the screening level ecological risk assessment for the Annex K.1 DRAFT Aquatic Environment Synthesis Report revision.
B5-16	**Human Health Approach to Evaluating Effects**	In conducting the human health effects assessment, it should be assumed that fishing could resume in the Upper Fording River at some time in the future.	Currently, the westslope cutthroat trout fishery in the Upper Fording River is closed. However, it is possible that this fishery could be reopened at some time in the future. If this is the case, consumption of fish from the Upper Fording River could result in increased exposure to bioaccumulative COPCs.	KNC		15-Apr-2014	The human health evaluation was conducted assuming the fish from the Upper Fording River could be consumed (Annex L.1 Human Health Evaluation of Current Baseline Conditions).
B5-17	**Human Health Approach to Evaluating Effects**	Consider using alternative daily fish intake rates for Ktunuxa Nation members who reside within the Elk Valley (e.g., Tobacco Plains).	The KNC traditional use survey provides important information on consumption rates of fish and other traditional foods. However, the survey did not provide sufficient information on fish consumption rates for Ktunuxa Nation members who reside within the Elk Valley. These members may have higher fish consumption rates than members residing outside the Elk Valley (i.e., due to proximity to the lake and availability of fish in the area).	KNC		15-Apr-2014	The human health evaluation used the 95th percentile fish consumption rate for Ktunaxa Nation consumers only (i.e., including only people who reported eating local fish). This approach should prove protective for members who reside in Elk Valley.

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B5-18	**Evaluation of Interactive and Cumulative Effects of Multiple Stressors**	The following step-wise approach is recommended to facilitate evaluation of the effects of multiple stressors of key ecological receptors in the Elk Valley: **-** Develop a CSM for each area under consideration (note: the CSMs for tributaries, the Fording River, the Elk River, and Lake Koocanusa are likely to have unique elements. Accordingly, separate CSMs should be developed for each ecosystem type. Because management units can include multiple ecosystem types, development of MU-wide CSMs only is not recommended); **-** Identify the stressors that are present in each ecosystem type, including Order-related stressors (i.e., cadmium, selenium, nitrate, sulfate, and calcite), other mining-related stressors (e.g., total dissolved solids [TDS], total suspended solids [TSS], dissolved oxygen [DO], water temperature, streambed substrate composition, flow alteration, etc.), and other stressors (e.g., disease organisms, non-native species, reservoir drawdown, etc.); **-** Screen stressors to identify the stressor-pathway combinations that have the greatest potential for adverse effects (rationale for eliminating stressors from further evaluation needs to be provided); **-** Evaluate the effects of individual stressors to identify the receptors and endpoints that are most likely to be adversely affected by exposure to stressors (e.g., selenium is likely to affect the survival of the embryos of egg-laying vertebrates). The effects matrices that have been developed for the four Order COPCs provide a basis for estimating the magnitude of effects of individual stressors. Tools like the Stress Index Model (Newcombe and MacDonald 1991; MacDonald and Newcombe 1993; Newcombe and Jensen 1996; Newcombe 1997) or Fredle Index Model (MacDonald and McDonald 1987; Caux et al. 1997) provide a basis for evaluating the magnitude of effects for other stressors (e.g., for TSS, deposited sediment). In some cases, the magnitude of effects will need to be estimated using best professional judgement if quantitative tools are not available; - Develop an interactive effects matrix (see Table 1) to help document the effects of individual stressors and to identify potential interactive effects. Utilize the interactive effects matrix to identify interactions among effects and to determine how effects should be summed to estimate cumulative effects. The following advice is offered to facilitate cumulative effects assessment: - For receptors that are likely to be affected by multiple receptors, the combined effects of those stressors should be assumed to be additive (i.e., in the absence of information to demonstrate otherwise). For example, the productivity of westslope cutthroat trout could be adversely affected by exposure to selenium (i.e., through reproductive effects and growth effects). In addition, the productivity of westslope cutthroat trout could be adversely affected by reductions in the abundance of benthic invertebrates. These types of effects are interactive and cumulative because they all have the potential to influence the biomass of trout produced within an area of interest.	The approach to effects assessment in the Elk Valley has focused on evaluating the effects of the individual stressors that were identified in the Order. While this is a key part of the overall effects assessment process, the effects on ecological receptors will be underestimated if the interactive and/or cumulative effects of multiple stressors are not evaluated in a quantitative manner. Therefore, it is essential that the interactive and cumulative effects of multiple stressors be quantitatively evaluated to support the development of the EVWQP	KNC		15-Apr-2014	A multiple stressor assessment has been completed, as outlined in Chapter 8 (Water-Quality Targets and Implementation Plan). The purpose of the multiple stressor analysis was to determine whether the conclusions of the constituent-specific analyses require refinement in consideration of multiple stressors, as part of achieving the overall goal of protecting aquatic ecosystem health. As suggested, conceptual site models were used to guide the analysis. More specifically, the conceptual site models developed in support of the Aquatic Environment Synthesis Report (a draft of which is included in Annex K1 of the Plan) were used to identify potential physical stressors to aquatic biota in the Elk and Fording River watersheds that may work in combination with identified chemical stressors to produce a greater level of effect than would otherwise be expected from considering each stressor in isolation. The analysis considered combined effects of direct toxicity and indirect effects through alteration of food supply, as suggested in the advice. The analysis also considered the potential for additive or synergistic effects among the Order constituents and interactions with potential physical stressors. The analysis was completed using a qualitative approach. It is acknowledged that quantitative approaches are available for evaluating integrated effects from multiple chemical stressors. However, such approaches and models are only reliable when the mechanisms of toxicity are well understood, including knowledge of specific interactions among multiple constituents. For the Order constituents, the mechanistic understanding of toxicity, both individually and in combination, is not at a level to support such an approach. A qualitative approach was also adopted because of the findings of Staztner and Bêche (2010), who caution against the over-quantification of multiple stressor models where a mechanistic understanding of responses is lacking, as is the case here. It is for these reasons that a qualitative approach was used. Finally, the potential for additive responses resulting from multiple stressors has been considered in the selection of benchmarks used to establish target concentrations for each substance. Multiple sources (US EPA 1999, 2013; Suter et al. 1995) indicate that a 20% critical effect size from sublethal chronic toxicity testing is supportable for protection of aquatic life. In recognition of the potential for response-addition from multiple stressors, smaller effect sizes (i.e., 10%) were considered, and are in alignment with recommendations of Mebane (2010) for multiple stressor evaluation for aquatic life. Where response addition for multiple constituents could potentially yield a combined effect size of greater than 20%, follow-up monitoring, additional toxicity testing, and adaptive management will used to address this residual uncertainty (as detailed in Chapter 8 [Water-Quality Targets and Implementation Plan]). Mebane, C.A. 2010. Cadmium risks to freshwater life: Derivation and validation of low-effect criteria values using laboratory and field studies (version 1.2): U.S. Geological Survey Scientific Investigations Report 2006-5245, 130 p. Statzner, B. and L.A. Beche. 2010. Can biological traits resolve effects of multiple stressors on running water ecosystems? Freshwater Biology, 55:80-119. Suter GW II, Cornaby BW, Hadden CT, Hull RN, Stack M. Zafran FA. 1995. An approach for balancing health and ecological risks at hazardous waste sites. Risk Analysis, 15:221-231. U.S. EPA (United States Environmental Protection Agency). 1999. 1999 Update of Ambient Water Quality Criteria for Ammonia. Supersedes 1998 Update. U.S. Environmental Protection Agency, Office of Water (Office of Science and Technology, Washington, D.C.) and Office of Research and Development (Mid-Continent Ecology Division, Duluth, Minnesota). September 1999. U.S. EPA. 2013. Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater. EPA-822-R-13-001.
B5-19	**Regional Aquatic Effects Monitoring Program**	The current RCA model should be re-calculated using, as possible, true reference sites without any upstream disturbances, including timber harvesting	It is somewhat surprising that the RCA assessments comparative sites changed so little between	EC		15-Apr-2014	A different response was indicated by 6 of 13 areas evaluated in 2013 (46%) compared to 2012 (Table 5.4 of the periphyon special investigation report; Minnow 2014). This indicates that the RCA design was able to sensitively detect changes in community composition. Also see response to comment B5-31. Furthermore, a thorough evaluation of candidate reference areas during the design of the 2012 benthic invertebrate community survey indicated that reference areas in the same eco-region having similar stream size and elevation to streams the Elk River watershed are generally limited to those sampled in 2012. The potential influence of anthropogenic disturbances on reference areas was considered during development of the 2012 benthic invertebrate community sampling design by identifying candidate references areas that were upstream of known anthropogenic influences. Helicopter reconnaissance was conducted to verify lack of upstream disturbances at the candidate areas prior to initiating sampling in 2012. The exception was a small amount of historical forestry activity that was evident in some reference watersheds (see Table E.21 in 2012 monitoring report by Minnow 2014). Potential influence of deforestation on benthic invertebrate communities was subsequently evaluated in detail in collaboration with MOE's benthic invertebrate expert, Leon Gaber and a GIS specialist with the MOE. As described in Section 5.1.1 of the 2012 monitoring report (Minnow 2014), deforestation was found to have negligible effect on invertebrate communities. Other habitat variables related to elevation and catchment area, were the dominant factors influencing reference community composition.
B5-20	**Regional Aquatic Effects Monitoring Program**	The 2012 freshet hydrology at the sites should be evaluated to look at the possibility that the community structure was not already flood-affected.	2012 and 2013 given the very dramatic flooding in June 2013. This would seem to suggest that model is rather insensitive. There would seem two possibilities for this – the first that the model was adversely affected by inclusion of non-reference sites, and the second, that flooding prior to sampling in 2012 might have affected the RCA model.	EC		15-Apr-2014	See response to Advice Item No. B5-19.

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B5-21	**Regional Aquatic Effects Monitoring Program**	Utilize the CSM to identify assessment endpoints for the Fording River and associated floodplain, the Elk River and associated floodplain, Lake Koocanusa, and the tributaries. Assessment endpoints must be selected based on the ecosystems, communities, and species that occur, have historically occurred, or could potentially occur at the site. The following factors need to be considered during the selection of assessment endpoints: • The COPCs that occur in environmental media and their concentrations; • The mechanisms of toxicity of the COPCs to various groups of organisms; • The ecologically-relevant receptor groups that are potentially sensitive or highly exposed to the contaminant, based upon their natural history attributes; and, • The presence of potentially complete exposure pathways. Thus, the fate, transport, and mechanisms of ecotoxicity for each COPC or group of COPCs must be considered to determine which receptors are likely to be most at risk. This information must include an understanding of how the adverse effects of the contaminant could be expressed (e.g., reproductive effects in fish) and how the form of the chemical in the environment could influence its bioavailability and toxicity.	It is somewhat surprising that the RCA assessments comparative sites changed so little between	EC		15-Apr-2014	This advice is incorporated into Chapter 10 (Monitoring) linking monitoring and the CSM including identification of assessment endpoints, measurement endpoints and assessment criteria. Future monitoring cycles and detailed study designs will also use this template to make appropriate connections with CSM and identification of monitoring endpoints.
B5-22	**Regional Aquatic Effects Monitoring Program**	Develop a series of effects hypotheses that describe how the effects on ecological receptors are likely to be affected by exposure to COPCs, COPC mixtures, and/or other stressors. It is anticipated that three types of effects hypotheses will be developed. The effects hypotheses should include hypotheses regarding the effects of individual COPCs, the effects of COPC mixtures, and the effects of multiple stressors (i.e., interactive and cumulative effects hypotheses).	2012 and 2013 given the very dramatic flooding in June 2013. This would seem to suggest that model is rather insensitive. There would seem two possibilities for this – the first that the model was adversely affected by inclusion of non-reference sites, and the second, that flooding prior to sampling in 2012 might have affected the RCA model.	KNC		15-Apr-2014	Relevant question/hypotheses will be identified in the study designs for future monitoring cycles. It is likely that, over time, hypotheses will evolve as some questions are answered and new ones arise thereby advancing the understanding of conditions within the watershed.
B5-23	**Regional Aquatic Effects Monitoring Program**	Based on the effects hypotheses that were developed using the various CSMs, identify the measurement endpoints that are most appropriate for evaluating effects in the tributaries, in the Fording River and associated floodplain, in the Elk River and associate floodplain, and in Lake Koocanusa. Develop a table for each type of habitat (e.g., tributary stream; off-channel wetland) that provides a comprehensive listing of: • Receptor groups (e.g., benthic invertebrates); • Assessment endpoints (survival, growth, and reproduction on benthic invertebrates); • Focal species (EPT taxa [Ephemeroptera, Plecoptera, Trichoptera]); • Effects hypotheses (exposure to toxic substances in waters will adversely affect the abundance of sensitive benthic invertebrate species in tributary streams); • Measurement endpoints (abundance and diversity of EPT taxa as measured using standardized kick-net sampling procedures; see Field Sampling Plan and Quality Assurance Project Plan for additional information); • Monitoring variables (identification and counts of individual EPT taxa in kick-net samples); and, • Data interpretation approach (e.g., comparison to reference envelope developed using data on the abundance and diversity of EPT taxa collected in appropriately selected reference areas).	The CSM represents an essential tool for identifying the relationships between stressors and receptors within the regional study area and, hence, for identifying the assessment endpoints that need to be evaluated in the RAEMP. Selection of appropriate assessment endpoints will help to guide the development of the RAEMP. The assessment endpoints should be stated in terms of key attributes of the receptor groups that are potentially affected by mining-related activities (e.g., survival, growth, and reproduction of benthic fish species).	KNC		15-Apr-2014	See response to Advice Item No. B5-21.
B5-24	**Regional Aquatic Effects Monitoring Program**	Include estimates of periphyton biomass and composition of the periphyton community (i.e., percent diatoms, percent blue-greens) in the RAEMP. Periphyton community structure is likely to be a less relevant metric.	Evaluation of the effects of individual COPCs represents one of the analyses that needs to be conducted to determine effects under current conditions and to evaluate the potential benefits associated with various management scenarios. However, it is also important to evaluate the interactive effects of multiple mine-related stressors and the cumulative effects of mine-related stressors and other stressors.	KNC		15-Apr-2014	Mine-related effects on periphyton community composition cannot be reliably assessed at the present time as per data and discussion in Annex K.1 DRAFT Aquatic Environment Synthesis Report.Teck will evaluate Periphyton community structure as a potential monitoring endpoint in coordination with MOE and KNC as we finalize the 2015 RAEMP study design. Periphyton productivity will continue to be assessed through evaluation of biomass and chlorophyll-measurements during Plan implementation.
B5-25	**Regional Aquatic Effects Monitoring Program**	Conduct a laboratory study to evaluate the effects on amphibians associated with accumulation of selenium in their tissues. Such a study should be conducted by exposing oligochaetes to various concentrations of selenium in water and feeding the Se-dosed oligochaetes (i.e., with multiple exposure levels) to leopard frogs prior to spawning. Effects on reproduction should be evaluated.	The CSM supports identification of the measurement endpoints that are most appropriate for evaluating effects on each ecological receptor group. This information will provide the reader with a basis for evaluating the adequacy of the data and information that are assembled to evaluate	KNC		15-Apr-2014	Future studies required to support the EVWQP will continue to be evaluated during Plan implementation. Chapter 10 (Monitoring) and Chapter 11 (Adaptive Management) will guide the triggers and prioritization of these studies.
B5-26	**Regional Aquatic Effects Monitoring Program**	Monitor the levels of fine sediment in streambed substrates within mining-affected tributaries and appropriately selected reference tributaries. Sampling of stream-bed substrates should be conducted using freeze-coring or McNeil coring techniques. Substrates collected in this manner can also be used to evaluate sediment chemistry within the tributaries.	effects in the lake, now and in the future. The CSM must consider all such potential stressors within the habitat type under consideration.	KNC		15-Apr-2014	The 2015 monitoring program focuses on evaluation of sediment chemistry and toxicity on areas where fine sediment is abundant and concentrations of mine-related parameters are likely to be highest (i.e., worst case sediment conditions). Evidence of toxicity in fine sediment samples will prompt further investigation in future cycles, which (depending on specific results) may include substrate sampling in erosional habitats using freeze-coring or McNeil coring techniques. In addition to investigation of potential chemical effects, Teck plans to evaluate potential effects of mining on physical habitat characteristics Potential substrate effects will also be investigated though benthic invertebrate community assessment.
B5-27	**Regional Aquatic Effects Monitoring Program**	Ongoing surface-water toxicity testing should be included as an integral element of the LAEMPs and the RAEMP. A suite of toxicity tests on sensitive species that include sub-lethal endpoints and long-term exposure should be identified for inclusion in the AEMPs. Monitoring stations should be located 100 m downstream of the final point of control for discharges to the tributaries, the Fording River, and the Elk River. Additional monitoring locations should be added if toxicity is observed immediately outside the initial dilution zones for the various wastewater discharges and uncontrolled releases.	Exposure to surface water in the tributaries, in the Fording River, and in the Elk River has the potential to cause adverse effects on fish and other aquatic organisms. While biological monitoring conducted in the field will provide some of the data and information needed to evaluate mining-related effects on aquatic organisms, controlled laboratory studies are also needed to provide additional information on the toxicity of surface waters within the study area. For this reason, a suite of toxicity tests should be used to evaluate surface water toxicity within the study area.	KNC		15-Apr-2014	Teck has incorporated this advice into Chapter 10 (Monitoring) through development of an Ecotoxicological Assessment supporting study with further discussion in Chapter 11 (Adaptive Management). A detailed study design for this program will be developed and finalized in early 2015 to evaluate surface water toxicity within the Elk River watershed.

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B5-28	**Benthic Invertebrate Community Structure**	A Before-After-Control-Impact (BACI) approach should be used preferentially to evaluate the effects of mining activities on BICS. For all mining-affected areas that have data collected upstream and within or downstream of affected areas, compare the results of BICS analyses directly.	A reference envelope approach was developed to support an evaluation of BICS data collected within the Elk Valley. While it is not unreasonable to utilize a reference envelope approach (using appropriately selected reference stations for each ecosystem type; i.e., tributary stream, small river, and river), the approach that has been used to evaluate the data collected in 2012 does not appear to provide a sensitive basis for evaluating mining related effects. That is, the analysis appears to be confounded by the selection of reference stations and the application of the reference station data for developing the reference envelope. A more direct way of evaluating effects is to compare data collected upstream and downstream of the mining activities, at reference and test stations, and/or before and after the mining activities were initiated (i.e., using a BACI-type approach). Currently, data collected within a single stream (e.g., Michel Creek) are compared to data from up to three different groups of reference stations.	KNC		15-Apr-2014	Each mine-exposed area was compared to the group of reference areas that was statistically identified as the best match based on methods described in the literature for that purpose. The upstream reference area of the same stream was not always among the areas determined to be a good match (e.g., lower reaches of Fording River and Michel Creek) because of the large difference in habitat variables related to catchment area and elevation between upstream and downstream areas. This highlights a serious limitation of the upstream-downstream control-impact design, which has increasing potential to generate false positive conclusions of impact (Type II error) as the distance between the mine-exposed area and upstream reference area increases, and also because natural among-area variability is not taken account (i.e., replicate samples within areas represent psuedoreplication not independent samples). Issues related to the interpretability of simple upstream-downstream comparisons has prompted Environment Canada to updated technical guidance for aquatic effects monitoring at mines (Environment Canada (2012) by explicitly recommending that exposed areas be compared to multiple reference areas for greater certainty that observed statistical differences can be interpreted as mine-related and ecologically meaningful.
B5-29	**Benthic Invertebrate Community Structure**	The methods used in 2012 should be revised to facilitate more quantitative evaluation of BICS in the Elk Valley	The approach that was used to evaluate BICS focussed on four primary benthic community metrics, including family richness, EPT proportion, Ephemeroptera proportion, and Chironomidae proportion. In addition, nonmetric multidimensional scaling (NMDS) ordination of benthic invertebrate community data facilitated identification of two axes (Axis 1 and Axis 2) that were also used to evaluate effects on the benthic community. While the descriptions of the methods are not sufficient to fully evaluate the methods that were used, it appears that the BICS analyses are primarily based on proportional, rather than absolute, metrics. This is a major limitation of the sampling and analysis methods. Based on the results of studies conducted in the vicinity of other mine sites, the absolute abundance (rather than relative abundance) of benthic invertebrates, the absolute abundance of sub-groups (e.g., EPT taxa, mayflies, stoneflies, caddisflies, midge), and the absolute abundance of various functional groups (e.g., scrapers, shredders, collectors, predators) provide important and unique information on the effects of anthropogenic activities on the benthic community (e.g., Clements et al. 2000; Maret et al. 2003). Therefore, information on abundance of benthic organisms is essential for evaluating effects on one of the important ecological services that the benthic community performs in stream systems (i.e., providing food to fish and other organisms). Relative proportion of EPT taxa or other proportional metrics can provide information on the structure of the community, but not on the functioning of that community.	KNC		15-Apr-2014	The benthic invertebrate community analysis focused on proportion community data. The CABIN travelling kick sampling method (Environment Canada 2011), which was the method recommended by MOE during study design development, involves a standardized sampling time, not a standardized sampling area. Therefore, the data are evaluated based on organism proportions rather than organism density. Methods that sample a defined area (e.g., Hess, surber, Slace kicknet) cannot be assumed to yield better data because they sample much less total area than the travelling method, even if replicate samples are collected within areas (e.g., the travelling kick method samples the area equivalent to at least 15 [typically about 40] Hess or Surber samples), and thereby better accounts for spatial variability within areas
B5-30	**Benthic Invertebrate Community Structure**	The methods used in 2012 should be revised to facilitate statistical differences in BICS among stations located upstream and downstream of mining activities in the Elk Valley.	The 2012 benthic sampling program was designed to collect a single benthic invertebrate sample at each sampling location. As such, the design did not facilitate evaluation of within station variability in BICS metrics or permit statistical evaluation of the resultant data to assess mining-related impacts using upstream-downstream comparisons. This is a major limitation of the sampling program design. Therefore, it is recommended that alternative sampling methods be adopted to facilitate more transparent statistical analysis of the resultant data.	KNC		15-Apr-2014	The 2012 monitoring program included evaluation of within-area variability through replicate sample collection at one reference and three mine-exposed. Good comparability of results was observed among replicate samples (Table 5.4 in Minnow 2014). Also, the travelling kick method samples the area equivalent to at least 15 (and typically 40 or more) Hess or Surber samples, and thereby accounts for spatial variability within areas. Detailed statistical comparisons of endpoints were completed between mine-exposed and reference areas as described in Sections 2.3.4 and 5.1.3 and Tables 5.1-5.4, E.30-E.32, and E. 39-E.41 of the same report.
B5-31	**Benthic Invertebrate Community Structure**	Re-evaluate the reference areas that were initially selected to support evaluation of the effects of coal mining on BICS using more relevant selection criteria. More specifically, reference areas should meet the following selection criteria: • Land use activities in the vicinity of and upstream of candidate reference stations should be limited in scope and magnitude, such that they would be expected to have little or no influence on BICS metrics; • Physical characteristics of candidate reference stations should be similar to those in the study area (i.e., stream order, gradient, stream flow, water temperature); and, • Chemical characteristics of candidate reference stations should not be affected by mining activities or other local anthropogenic activities (water or sediment chemistry could be affected by long-range transport of atmospheric contaminants). While it may be tempting to use stream-bed substrate composition, particle size distribution, TSS, percent canopy cover, and other habitat factors in the reference site selection process, it is essential to understand that mining activities can and do influence these variables. Therefore, selection of reference stations to match all habitat characteristics of study area stations may result in an underestimate of mining-related effects because mining activities affect stream habitat characteristics. Detailed statistical summaries of the physical and chemical data that have been compiled for reference and test stations will provide a basis for understanding the adequacy of selected reference stations.	The reference areas that were selected to support the evaluation of BICS appear to include stations that have been influenced by forest management and/or other activities. Such areas are not directly relevant for evaluating the actual effects mining-related activities on BICS. Rather, such areas provide a basis for evaluating the incremental effects of mining activities on benthic communities, beyond those that are associated with forest management or other anthropogenic activities. This approach to effects assessment underestimates the effects of mining on the benthic community.	KNC		15-Apr-2014	See response to Advice Item No. B5-19.

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B5-32	**Benthic Invertebrate Community Structure**	Evaluate multi-plate samplers (e.g., Hester-Dendy Samplers) for assessing effects on benthic invertebrates associated with changes in water quality conditions. This approach should be used in conjunction with other approaches to BICS evaluation (i.e., kick sampling).	Habitat characteristics is a factor that can influence the result of BICS evaluations. Multi-plate samplers provide a basis for assessing effects of water quality changes on benthic invertebrates without having to account for habitat alteration or other factors. Hence, the resultant data may have less noise, which may increase sensitivity in the determination of mining-related effects. Therefore, a pilot study should be designed and implemented to determine if multi-plate samples can be used as part of the LAEMPs and/or RAEMP. Because mining activities can affect benthic habitat characteristics and such characteristics can influence the benthic community, monitoring results generated using multi-plate samplers alone could underestimate mining-related effects on the benthic community. Therefore, other approaches to BICS evaluation need to be identified, described, and implemented.	KNC		15-Apr-2014	Control of habitat characteristics is important in a benthic invertebrate community survey. This can be done through careful selection of sampling areas. Environment Canada's (2012) guidance for Environmental Effects Monitoring at mines states "The use of artificial substrates for benthic invertebrate collections is generally not recommended…There is no advantage to be gained from using artificial substrates where conventional sampling techniques provide at least as reliable data without the many drawbacks and difficulties of artificial substrates."
B5-33	**Benthic Invertebrate Community Structure**	Evaluate the implications of relying on specific indicators (e.g., total EPT abundance, abundance of mayflies, abundance of caddisflies, abundance of stoneflies, relative abundance of EPT taxa) and fewer indicators to designate sampling stations as impaired or not impaired.	Using the approach applied in the 2012, each of the BICS metrics measured for a station from the study area was compared to a reference envelope to determine if the station was significantly different from reference conditions. A station was designated as impaired if at least five metrics were significantly different from reference conditions. This appears to be an insensitive method for evaluating the effects of mining on BICS. Accordingly, a sensitivity analysis should be conducted to determine the implications of using sensitive indicators of effects (e.g., abundance of EPT taxa) to designated stations as impaired or not impaired. In addition, the implications of designating stations as impaired if fewer metrics indicate impairment should be investigated.	KNC		15-Apr-2014	Teck considered this advice by reviewing the detailed results and decision criteria associated with the 2012 benthic invertebrate survey reported by Minnow (2014). The statistical comparisons revealed that most reference areas had one or more endpoints that were statistically different from the other reference areas having similar habitat characteristics. That such differences among reference areas were statistically detectable is evidence for the sensitivity of the approach that was used. The criteria used to determine if a mine-exposed area was outside of the reference condition still seem appropriate because mine-exposed areas should not be expected to be any more similar to reference conditions than individual reference areas.
B5-34	**Benthic Invertebrate Community Structure**	The criteria for selecting monitoring stations for inclusion in the Reference Envelope (for the reference criteria approach; RCA) should be provided to the TAC (see information request to Carla Fraser). In addition, summary statistics for each of the habitat variables and water quality variables used in evaluating candidate reference stations and assigning them to groups should be developed and provided to the TAC (see Table 2 in Maret *et al.* 2003 as an example). Such summary statistics should be developed for each group of reference stations and each group of test stations that were linked to the reference group. Summary statistics should include mean, median, standard deviation, range and 5^{th}, 10^{th}, 24^{th}, 50^{th}, 75^{th}, 90^{th}, and 95^{th} percentiles. After review of the material, a sensitivity analysis should be conducted based on any recommendations of the TAC.	The effects assessment for the benthic invertebrate community data is not transparent. The underlying information on the reference sites and the appropriateness of those sites for use in the effects assessment needs to be reviewed in detail. While the underlying data on the water quality and habitat variables for each of the sites has been provided in the AEMP, the criteria used to determine if a reference site was appropriate for use (i.e., selection criteria) was not provided. This information is required to adequately review the approach used by Minnow (2014) in the effects assessment.	KNC		15-Apr-2014	The criteria for reference area selection outlined in the study design (Minnow 2012) and the study report (Minnow 2014) were reviewed. Reference areas were selected to be in the same eco-region as the Elk watershed and accessible by ground transport, have elevation, basin area and gradient in the range exhibited by mine-exposed areas of the Elk watershed, and be upstream of anthropogenic inputs. The exception was a small amount of forestry activity in some reference watersheds. Detailed evaluation by Minnow (2014), completed collaboratively with MOE Benthic Invertebrate specialist and a GIS specialist , concluded there were no influences of forestry or other land uses on reference area community characteristics. (Also see response to comment B5-31).
B5-35	**Benthic Invertebrate Community Structure**	The RCA and subsequent comparison to reference conditions is not transparent and does not appear to be a sensitive method for evaluating the effects to benthic invertebrates in the Elk Valley. Determine the minimum effects size for each BICS metric that was used in the effects assessment (i.e., how much does a metric have to differ from the mean of the reference group before a sample is designated as impaired for that endpoint?).	To determine if stations are unaffected by mining activities, or whether additional investigation was needed to determine if a particular mine-exposed site is affected by mining activities, Minnow (2014) selected twelve community metrics (i.e, six of the community endpoints, including: family richness; proportion of EPT taxa; proportion of Chironomidae taxa, and the non-metric multidimensional scaling [NMDS] axes 1 and 2 predicted by both the BEAST and ANNA models). Non-central F-tests were then used to test each of the mine-exposed sites to determine if the difference between the mean metric (e.g., family richness) in the reference group and the metric at the mine-exposed location were statistically different ($p < 0.1$). In addition, information provided from the non-central F- test was used to determine if the mine-exposed stations were statistically similar (equivalence test) to the reference condition ($p \geq 0.9$). In a preliminary analysis of the proposed reference envelope used in the effects assessment, it was determined that for at least one of the reference stations, it was inconclusive from the equivalence test whether the station represented the mean reference condition for five of the twelve benthic community endpoints (i.e., there is a large amount of variability within the reference sites). Using this information, Minnow (2014) developed criteria to evaluate each of the mine-exposed sites. A mine-exposed site was determined to be unaffected if: • none of the benthic community metrics were statistically different from the reference condition ($p < 0.1$); and, • it was concluded that seven or more of the benthic community metrics were similar to the reference condition using equivalence test ($p \geq 0.9$; i.e., less than or equal to five of the metrics with $p < 0.9$). The thresholds used to determine whether a mine-exposed site requires additional investigation (i.e., more than five endpoints showing deviation from the reference condition) is not a sensitive measure of effect considering the variability observed in the reference condition and the suitability, or lack thereof, of the selected reference stations. The inherent variability in the benthic invertebrate community data at the reference stations is large and spread across multiple benthic invertebrate metrics. This makes it difficult to discern real effects related to mining operations in the Elk Valley. In addition, no information on the relative abundance (i.e., productivity) at the test sites compared to the reference sites were conducted due to the limitations of the CABIN approach. This is a major deficiency in the effects assessment as other researchers (e.g., Hauer and Sexton 2013) have found differences between mine-exposed (i.e., test sites) and upstream reference sites in the Elk Basin.	KNC		15-Apr-2014	It would be useful to use the results of various statistical approaches to define the numerical range of key reference community endpoints. This approach has potential to greatly simplify presentation and interpretation of future benthic invertebrate survey results. This will be explored as part of the 2015 monitoring program, to ensure that the data set includes multiple years of data (thereby accounting for potential inter-annual variability in community characteristics). Summary statistics for reference communities sampled in 2012, including mean, minimum, maximum, and 5th and 95th percentiles were presented in Table E.9 of the 2012 monitoring report (Minnow 2014). Also see the response to Advice Item No. B5-33.

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B5-36	**Benthic Invertebrate Community Structure**	Develop a single reference envelope for each BICS metric that captures 95% of the variability in the underlying data for the selected reference stations. In recognition of the effects hypotheses that are develop, a statistical approach should be applied that recognizes that differences from reference conditions need to be evaluated using a one-tailed test (i.e., calculate 5^{th} or 95^{th} percentiles for the reference data for each metric, depending on the direction of change expected in response to exposure to mining-related stressors).	The methods that were used in the 2012 AEMP document to identify stations that differ from reference conditions are not transparent. There is a need to establish a clearly defined numerical reference envelope for each BICS matrix or multiple numerical reference envelopes if there are several groups of reference stations. To do so, the approach needs to change from one of multiple hypotheses testing to clearly defining the reference envelope that data from the test stations can be compared to.	KNC		15-Apr-2014	Teck has considered this advice in the response to Advice Item No. B5-35.
B5-37	**Benthic Invertebrate Community Structure**	Conduct the evaluation of effects on BICS using a single reference envelope approach.	Currently, two separate procedures are used to define reference conditions within the Elk Valley, including the BEAST and ANNA models. In the 2012 AEMP document, both models are presented and used because they purportedly provide independent lines-of-evidence for evaluating effects on BICS. This is not correct. The data underlying both models are the same and, hence, the evaluations are not independent. Therefore, one method needs to be selected and used in the assessment of BICS. Application of both models unnecessarily complicates the analysis and interpretation of the results.	KNC		15-Apr-2014	Teck has considered this advice in the response to Advice Item No. B5-35.
B5-38	**Benthic Invertebrate Community Structure**	The revised analysis conducted to determine if BICS is adversely affected at sites affected by mining operations (i.e., by comparing the selected community metrics to the range of observed values at the reference sites; presented in Table 5.3) should include all evaluated test sites, regardless of whether they were classified as unaffected in the previous analysis. Furthermore, the test sites should be compared to the distribution of metric values (i.e., 5^{th} to 95^{th} percentiles) for the appropriate reference group (indicated by the BEAST and ANNA models), rather than to the pooled data for all reference stations.	By comparing the test sites to the pooled for all reference groups in this analysis, the sensitivity of the BICS analysis is greatly reduced. The variability in the community structure data due to differences in habitat variables by definition, inflates the distribution (or observed) responses at the reference sites. A more appropriate analysis would be to use the distributions of metric values that are calculated for each of the stratified reference groups (from the BEAST and ANNA models) to evaluate the data from comparable test sites.	KNC		15-Apr-2014	Community metrics for all reference and mine-exposed areas were presented in Appendix Tables E.9 and E.10, respectively, of the 2012 monitoring report (Minnow 2013). Summary statistics, including mean, minimum, maximum, and 5th and 95th percentiles were presented for reference areas in Table E.9.
B5-39	**Benthic Invertebrate Community Structure**	The concentrations of Order (and other) contaminants in benthic invertebrate tissues should be compared to tissue residue benchmarks to evaluate effects benthic invertebrates at the mine-exposed stations.	The evaluation of the invertebrate tissue chemistry data was limited to the comparison of concentrations measured in invertebrates at the mine-exposed stations to the upper limit observed in the reference stations. A more fulsome evaluation should be conducted by comparing the invertebrate tissue concentrations to tissue residue benchmarks (as available) as well as to the reference stations.	KNC		15-Apr-2014	The Screening-level Environmental Risk Assessment (SLERA) compares benthic tissue concentrations to toxicity reference values (benchmarks).
B5-40	**Selenium Ecological Effects Matrices**	Uncertainties in the model should be presented and incorporated in the proposed safe limits for selenium.	The accumulation models, whether the single-step BAF or the multi-step Presser and Luoma models have high degrees of uncertainty as reflected in low r^2 values. The dose-response curve also has some variability. It is not clear how these uncertainties are reflected in generating the draft 52 ug/L Se.	EC		15-Apr-2014	As noted in Advice Item No. B4-5, uncertainty in the selenium ecological effects assessment was managed by using relevant and reliable information, adopting the most conservative models and/or data, incorporating additional margins of safety, and using a sensitivity analysis to reduce or account for uncertainty. All sources (and management thereof) of uncertainty were discussed and accepted at the Toxicology Working Group meeting #7 (June 24, 2014). A summary of how uncertainty was managed in the selenium ecological effects assessment is included in the Management of Uncertainties and Assumptions in the Selenium Ecological Effects Assessment for the Elk Valley Water Quality Plan included as an appendix to the Plan.
B5-41	**Selenium Ecological Effects Matrices**	The dose-response relationship for chinook salmon should be used to evaluate effects on fish associated with dietary exposure to selenium.	For other receptor groups and for selenium in fish tissues, effects will be estimated using concentration-response relationships. A similar approach can be applied for the dietary exposure route in fish by applying the dietary dose-response relationship that has been developed for chinook salmon.	KNC		15-Apr-2014	The recommended action item was completed and presented at TAC meeting #5 (Selenium Ecological Effects Matrices –EVWQP – TAC 5).
B5-42	**Nitrate, and Sulphate Ecological Effects Matrices**	Identify effects thresholds for nitrate and sulphate in the tributaries to the Elk and Fording rivers.	Effects thresholds for nitrate and sulphate were presented for the Elk and Fording rivers. However, no effects thresholds for these COPCs were presented for the tributaries. As effects associated with exposure to these COPCs also need to be evaluated in the tributaries, it is necessary to identify effects thresholds that apply to the tributaries.	KNC		15-Apr-2014	The recommendation has been completed. The site specific benchmarks developed for nitrate and sulphate Annex F Benchmark Derivation Report For Nitrate and Sulphate are applicable for the Designated Area including the mainstem sections of the Fording and Elk Rivers as well as their tributaries.
B5-43	**Nitrate, and Sulphate Ecological Effects Matrices**	For those variables for which the effects thresholds are hardness dependent, the effects thresholds should be established using the 5^{th} percentile hardness value for the receiving water under consideration.	The effects thresholds presented for nitrate and sulphate were calculated using the median water hardness for each of the receiving water bodies.	KNC		15-Apr-2014	Hardness dependence equations have been derived for the Level 1 and Level 2 benchmarks for nitrate in the Fording River (Annex F). Instead of relying on the 5th percentile hardness value, the equations enable the Level 1 and Level 2 benchmarks to be calculated from any hardness condition throughout the year.
B5-44	**Ecological Effects Assessment**	The term "ecologically-protective values" should not be used in the EVWQP. Rather, the terms Level 1 and Level 2 Thresholds should be used.	The Level 1 and Level 2 Thresholds that have been proposed for use in the EVWQP do not represent no effects levels. Rather, they are effects thresholds that were developed using various types of toxicity data. No information is currently available that demonstrates that such effects thresholds are protective of the environment when present alone or in combinations with other stressors. Therefore, it would be misleading to refer to these effects thresholds as "ecologically-protective values"	KNC		15-Apr-2014	Please refer to response to Advice Item A5-49.
B5-45	**Ecological Effects Assessment**	Evaluate the toxicity of mixtures of major ions (e.g., as indicated by TDS, or conductivity) to fish and other aquatic life.	Coal-mining activities result in releases of wastewater with elevated levels of major ions into receiving water systems, including calcium, sodium, potassium, nitrate, sulphate, carbonates, and chloride. While increases in water hardness can mitigate the toxicity of certain COPCs (e.g., cadmium), high levels of major ions, either alone or in combination, can be toxic to aquatic organisms. The potential for toxicity associated with exposure to elevated levels of nitrate and sulphate is being addressed in the EVWQP. However, the potential toxicity of mixtures of major ions has not been addressed. This is important as surface waters in the Elk Valley are known to contain elevated concentrations of major ions and combinations of major ions are likely to be more toxic than any one major ion alone. Accordingly, the toxicity of mixtures of major ions needs to be evaluated to support development of the EVWQP.	KNC		15-Apr-2014	Consistent with the requirements of the Order, efforts have been focused on evaluating the toxicity of Order constituents and establishing targets for those constituents. That said, toxicity associated with total ion content has been indirectly evaluated through the Phase 1 Mixture Toxicity Study and the Fall 2013 site-specific testing program. In both cases, organisms were exposed to mixtures containing varying levels of TDS, the effect of which is reflected in the test results that were used to inform the selection of long-term targets for nitrate and sulphate
B5-46	**Management Scenarios Approach to the Application of Covers Within the Elk Valley Water Quality Plan**	Adopt BGM covers as a best management practice (BMP) for reclaiming all waste rock management facilities in the Elk Valley.	Based on the information that was presented at TAC-5, it appears that BGM covers are likely to provide an effective means of reducing infiltration of precipitation into waste rock piles and, hence, for reducing loadings of COPCs to receiving waters. While it is understood that the benefits of such covers may not be realized for some time into the future, it is apparent that such covers will reduce reliance on active wastewater treatment facilities and reduce long-term liabilities for Teck. Therefore, BGM covers should be adopted as a BMP for reclamation and closure planning and implementation. The results of the ongoing R&D program will likely provide a basis for refining BMPs in the future.	KNC		15-Apr-2014	Teck addressed the recommendation of covers in response to Advice Item No. A 4-28: Teck provided TAC a memo titled "Summary of Current Thinking about Covers" dated March 31, 2014 and distributed at TAC meeting #5. As noted in that memo, Teck continues research and development into the potential application of covers as a mitigation measure. Work to support potential application of covers continues as outlined in Chapter 6, Section 6.5 (Development and Selection of Management Options).

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B5-47	**Management Scenarios Approach to the Application of Covers Within the Elk Valley Water Quality Plan**	Identify opportunities to accelerate research on the effectiveness of BGM covers and other technologies (e.g., *in-situ* semi-passive treatment systems) in terms of reducing COPC loadings and achieving other benefits by conducting large-scale pilot programs in the Elk Valley.	There is an urgent need to better understand the effectiveness of BGM covers and other technologies in terms of reducing COPC loadings to surface waters and groundwater. By identifying areas that can be used now to conduct large-scale trials of BGM covers and/or other technologies, it may be possible to generate the data and information needed to optimize these systems and reduce reliance on active wastewater treatment systems. Such areas should include those that are available for closure now or in the near future and those areas that are available for temporary closure (i.e., placement of additional materials may be anticipated at some time in the future, trial covers could be placed now to accelerate the generation of research results).	KNC		15-Apr-2014	Teck addressed recommendation of BGM covers in response to Advice Item No. B4-54: As noted in section 5.2 "Further Assessment" of the March 31, 2014 memo titled "Summary of Current Thinking about Covers" advancing analysis of covers and other mitigation options are underway. At this time it is not clear that BGM covers are the right covers to be testing at full scale. The process of research and development may show that other covers are better suited, and that smaller scale trials are appropriate. Work to support potential application of covers continues as outlined in Chapter 6, Section 6.5 (Development and Selection of Management Options).
B5-48	**Adaptive Management &**	Include specific triggers for action in the EVWQP. Such action triggers need to be based on the results of monitoring of environmental media in the Elk Valley, identify the management actions that will be taken if the triggers are exceeded, and describe the schedule for implementing each management action. Triggers need to be established for each of the water bodies that are being affected by mining-related activities.	Adaptive management has been identified as a central element of the overall EVWQP. To be effective, adaptive management must include effective monitoring of environmental conditions in the study area, a clearly-defined framework for interpreting monitoring program results, clearly-defined triggers for action, and specific management actions and time frames for implementation of those management actions. In this way, management responses to changes in environmental conditions are defined on an *a priori* basis and schedules for implementing those responses are defined.	KNC		15-Apr-2014	This advice has been incorporated into Chapter 11 (Adaptive Management). The process and timelines for developing details on triggers are specified. Adaptive management does not include a schedule for implementing management actions in response to triggers because adaptive management triggers are intended to 'trigger' a root-cause analysis, the results of which will determine the appropriate management response. This is the essence of adaptive management. The range of potential adaptive management actions are presented in Section 11.2.1 of the Plan.
B5-49	**Lake Koocanusa Public Consultation**	While not strictly technical advice, it seems prudent that Teck also schedule a Phase-2 public consultation in the Montana communities of Eureka and Libby as soon as possible. As part of this public consultation, Teck should include opportunities for presentations by U.S. /Montana government representatives on the TAC, as well as a representative from CSKT to provide their perspectives.	The phase 2 public consultation period runs from April 9-30, 2014. As part of this consultation, Teck will conduct open houses and informational presentations in three Elk Valley communities (Fernie, Elkford, and Sparwood). Neither a Phase-1 or Phase-2 public consultation has been included for Montana communities impacted by the Elk Valley Water Quality Plan.	US Govt MT Govt		15-Apr-2014	As noted, this suggestion falls outside of technical advice and the scope of the Technical Advisory Committee. All information on the consultation process can be viewed at www.teckelkvalley.com. Consultation during Plan development is described in Chapter 3 of the Plan and in accordance with Section 4.0 of the Terms of Reference.
A6-1	**Human Health**	For the human health baseline evaluation, evaluate the available data on metal concentrations in wildlife tissue collected for environmental assessments.	None provided.	KNC (TAC Mtg 5)		3-Apr-2014	Available wildlife data are summarized in the Human Health Evaluation of Current Baseline Conditions report included as Annex L in the Plan.
A6-2	**Synthesis Report**	Recommend longer term (e.g. 42 or 53 day) toxicity tests to assess *Hyalella* endpoints of growth, reproduction, and biomass.	None provided.	KNC	UBC	9-Jun-2014	Teck has incorporated this advice into Chapter 10 (Monitoring) through development of an Ecotoxicological Assessment supporting study with further discussion in Chapter 11 (Adaptive Management). A detailed study design for this program will consider longer term toxicity tests and will be developed and finalized in early 2015 to evaluate surface water toxicity within the Elk River watershed.
A6-3	**Synthesis Report**	For the Screening-level Environmental Risk Assessment (SLERA), include the exposure pathway of benthic invertebrates for amphibians.	None provided.	KNC		9-Jun-2014	Teck has considered this advice and will update of the Screening-level Environmental Risk Assessment (SLERA) accordingly.
A6-4	**Synthesis Report**	For the tissue-based SLERA, use the 95th percentile of the tissue data within a Management Unit (MU) to calculate hazard quotient.	None provided.	UBC	KNC MOE	9-Jun-2014	Advice is being incorporated to update the SLRA and Annex K.1 DRAFT Aquatic Environment Synthesis Report.
A6-5	**Synthesis Report**	Recommend using a more sensitive approach than the Reference Condition Approach (RCA) to evaluate the benthic invertebrate community structure endpoint.	None provided.	KNC		9-Jun-2014	See response to advice Item No. B5-28.
A6-6	**Synthesis Report**	For the integrated data evaluation and production of environmental quality report cards, recommend the consideration of a more conservative definition of "fair" for tissue selenium concentrations.	The current definition of "fair" is a maximum selenium hazard quotient (Se HQ) > 1.0, but a mean Se HQ ≤1.0. For example, for selenium, it may not be considered "fair" because of the steepness in the dose-response curve.	UBC	EC MOE	9-Jun-2014	Advice is being incorporated into the update to the SLRA and Annex K.1 DRAFT Aquatic Environment Synthesis Report.
A6-7	**Synthesis Report**	For the environmental quality categories associated with the Water Quality Index (WQI) and Sediment Quality Index (SQI), align the "fair" category with the "fair" category of the Canadian Council of Ministers of the Environment (CCME).	None provided.	KNC	MOE UBC EC	9-Jun-2014	The suggested changes have been made and will be incorporated into Annex K.1 DRAFT Aquatic Environment Synthesis Report.
A6-8	**Synthesis Report**	Recommend the inclusion of all elevated water constituents in the integrated data evaluation report cards card tables (e.g. Cd, Zn, Co, Ur, Ni, Ammonia).	These summary tables provide a good snapshot of conditions and should be inclusive of all monitoring parameters (i.e. not just the order constituents). Some of these secondary parameters could be important indicators of mine waste geochemistry (e.g. metal leaching from potentially acid rock drainage generating waste rock).	MEM	MOE	9-Jun-2014	A Water Quality Index scenario is included in Appendix D that includes all mine-related constituents observed above guidelines. These results will be incorporated to update Annex K.1 DRAFT Aquatic Environment Synthesis Report, Appendix E report cards if judged to be adequately conservative, but a similar scenario (Group 3) presented in the draft report resulted in better WQI scores (less conservative) than when only the dominant mine-related variables were included.
A6-9	**Synthesis Report**	Include all mine influenced tributaries on the environmental quality report cards cards (e.g. West Line Creek).	Since one of the key issues in the Order is to assess impacts, the current status of all mine affected tributaries in the watershed should be documented	MEM	KNC UBC EC	9-Jun-2014	All mine-related tributaries are will be included in the updated Appendix E report cards as part of Annex K.1 DRAFT Aquatic Environment Synthesis Report.
A6-10	**Synthesis Report**	For the integrated data evaluation and development of management unit report cards, recommend making the process more explicit for how separate lines of evidence are evaluated and an overall rank is determined. For instance, explain how determinations are made when lines of evidence (such as calcite and water quality) are indicating different rankings of environmental quality.	Greater transparency is needed on how the ratings of the overall status of the watershed are determined.	MEM	KNC MOE UBC EC	9-Jun-2014	The "overall" category from the Appendix E report cards will be removed from the updated Annex K.1 DRAFT Aquatic Environment Synthesis Report so that all lines of evidence speak for themselves.
A6-11	**Synthesis Report**	In Appendix E "Report Card" summary tables, provide more information on the calculation in the cell (e.g. denominator of hazard quotient (HQ) calculations).	None provided.	KNC	UBC	9-Jun-2014	Additional explanation will be provided in the update to the synthesis report Appendix E to explain how the data presented in each column were computed and categorized.
A6-12	**Synthesis Report**	Provide Lake Koocanusa data in a similar format as the Appendix E report card tables, and recommend including US data (segregated by species) in these tables.	Lake Koocanusa is a shared international waterbody. As a consequence, its characterization should be done with all available data rather than truncating the analysis based on a political boundary (i.e., the international border). Data from the U.S. side has been provided through the sharepoint site and should be used accordingly.	Mt Govt	US Govt MOE UBC	9-Jun-2014	Relevant Lake Koocanusa data will be summarized in a separate table in the update to the synthesis report card Appendix E.
A6-13	**Lake Koocanusa – Sampling Protocol**	**Lake Koocanusa WG Recommendation #1-2:** Recommend the collection of at least 3 years of data in order to determine if there is a statistical difference between the three sampling locations identified for the LK2 Order Station. (Note. One year of data is likely insufficient for determining if there is a statistical difference between these locations)	None provided.	KNC		12-May-2014	Teck will maintain and continue to collect surface water samples at the monitoring locations identified within the May 2, 2014 sampling protocol for at least 3 years.

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A6-14	**Lake Koocanusa – Sampling Protocol**	**Lake Koocanusa WG Recommendation #1-3:** Ensure that there is an upstream Lake Koocanusa station to serve as a reference outside the immediate influence of the Elk River. There is some indication that the current monitoring station in Lake Koocanusa upstream of the Elk River is influenced through diffusion.	None provided.	KNC MOE MT Govt		12-May-2014	Water samples from monitoring station "RG_WARDB" which is located north of "RG_USELK" will continue to be collected.
A6-15	**Lake Koocanusa – Sampling Protocol**	**Lake Koocanusa WG Recommendation #1-4:** Evaluate whether the Sept. 1 to Oct.15 period is the critical period when there is the greatest potential for stratification in the Reservoir. (Note. It was thought that this period may be too late to capture the thermocline, as current operations typically have the Reservoir drawn down by 20ft by the end of September each year).	None provided.	KNC MOE MT Govt		12-May-2014	Monthly samples will continue to be collected within the reservoir. These data will be used to evaluate and validate whether the Sept. 1 to Oct.15 period is the critical period. Should the data indicate a different period of time for maximum thermal stratification adjustments to the sampling programs changes to the monitoring schedule will be considered.
A6-16	**Lake Koocanusa – Sampling Protocol**	**Lake Koocanusa WG Recommendation #1-5:** For evaluating Lake Koocanusa water quality concentrations against targets, taking an average of the three LK2 sampling sites is not recommended.	None provided.	KNC MOE MT Govt		12-May-2014	A wide range of data evaluation methods and techniques will continue to be available through individual grab samples during Plan implementation.
A6-17	**Lake Koocanusa – Sampling Protocol**	**Lake Koocanusa WG Recommendation #1-6:** Related to Response for Advice # 2-4: Monitoring data on selenium concentrations in fish tissue should be summarized for each individual fish species. Data should not be pooled across fish species for providing summary statistics because selenium bioaccumulation rates vary amongst fish species. This recommendation applies to all summaries of this type of monitoring data, including high-level summaries for public information. Summaries of this monitoring data should also be broken down into sampling periods (i.e. a summary from the same sampling cycle) and not lumped together across all years. This is important for determining if there are any trends through time occurring. Reference sites should be carefully defined and clarified. A map illustrating where the reference and exposed sites is needed.	None provided.	Mt Govt MOE KNC		12-May-2014	This advice has been incorporated in Chapter 4 (Baseline Conditions) and Annex K.2 Evaluation of Element Concentrations Collected from Lake Koocanusa.
A6-18	**Lake Koocanusa – draft response to TAC Advice**	**Lake Koocanusa WG Recommendation #1-7:** Recommend taking water quality samples when sampling biota to help draw relationships between different environmental compartments.	None provided.	MOE		12-May-2014	This advice will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program.
A6-19	**Lake Koocanusa - Monitoring**	**Lake Koocanusa WG Recommendation #1-8:** Assess extending the Burbot sampling period (to as late as the beginning of May) in Lake Koocanusa given recent experience in Arrow and Kinbasket Reservoirs	None provided.	KNC		12-May-2014	This advice will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program.
A6-20	**Lake Koocanusa - Monitoring**	Assess extending the Burbot sampling period (to as late as the beginning of May) in Lake Koocanusa given recent experience in Arrow and Kinbasket reservoirs.	None provided.	KNC (LK WG Mtg 1)	Mt Govt US Govt	12-May-2014	This advice will be incorporated during Plan implementation during the 2015 monitoring of Lake Koocanusa.
A6-21	**Targets – NO3 Benchmark Derivation**	In the near-term, the selection of Level 1 and Level 2 response values should be informed by the results of site-specific toxicity test and the results of toxicity testing that have been published in the literature. These results indicate that *Ceriodaphnia dubia* is the most sensitive receptor for nitrate effects, thus the level 1 and level 2 toxicity benchmarks should be derived using the results of the *C. dubia* site specific tests and a hardness correction should be applied for adjusting these test results to different hardness levels. n the longer term, additional site-specific toxicity tests should be conducted to resolve the residual uncertainties associated with hardness normalization of toxicity test results and effects thresholds for sensitive species of aquatic organisms.	None provided.	KNC (TOX Mtg 6)	UBC MOE Ec	9-Jun-2014	Interactive effects are discussed in Chapter 8 (Water Quality Targets and Implementation Plan) at Section 8.2.3. Additional detail is also included in Annex H Integrated Assessment Report.
A6-22	**Interactive Effects**	Recommend the explicit documentation of what is known about multiple stressors/interactive effects and what the uncertainties are regarding multiple stressors/interactive effects.	None provided.	KNC (TOX Mtg 4)	UBC		Interactive effects are discussed in Chapter 8 (Water Quality Targets and Implementation Plan) at Section 8.2.3. Additional detail is also included in Annex H Integrated Assessment Report.
A6-23	**Interactive Effects**	Recommend that the conclusion for the evaluation of mixture effects is that "there has been no demonstration of mixture effects" as opposed to "mixture effects not expected at benchmark concentrations".	The statement that "mixture effects not expected at benchmark concentrations" goes beyond the data.	MT Govt	MOE KNC	12-May-2014	The text in question has been updated to reflect the residual uncertainty inherent in the mixture analysis (Annex H Integrated Assessment Report).
A6-24	**Long Term Targets – Integrated Assessment**	Recommend validating the methods of the interactive effects assessment with the results of the benthic invertebrate community structure monitoring.	None provided.	KNC	MEM UBC MOE EC	10-Jun-2014	Benthic community monitoring data have been used as a line of evidence to evaluate the potential for interactive effects, as discussed in Section 8.2.3 (Chapter 8 [Water-Quality Targets and Implementation Plan]).
A6-25	**Long Term Targets – Integrated Assessment**	In the qualitative evaluation of multiple stressors, recommend the consideration of all mine-related stressors (both existing and expected future changes), and ensure that all stressors in the Conceptual Site Models are included in the assessment.	None provided.	KNC		10-Jun-2014	Stressors identified in the Conceptual Site Models were considered when completing the multiple stressor analysis summarized in Section 8.2.4 (Chapter 8 [Water-Quality Targets and Implementation Plan]) and discussed in more detail in Annex H Integrated Assessment Report.

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A6-26	**Long Term Targets – Integrated Assessment**	In the integrated effects assessment (IEA) at the management unit scale, assess the effects of direct acute and chronic selenium toxicity in tributaries with high concentration levels.	Some of the high-concentration tributaries have dissolved selenium greater that 400 µg/L – a level where acute toxicity could be of concern. This issue should be investigate and considered within the IEA process.	EC	UBC MOE KNC MEM	10-Jun-2014	Direct acute toxicity: Selenate is the dominant form of selenium in aquatic environments in the Elk Valley (see Annex E Benchmark Derivation Report for Selenium). Acute toxicity of selenate has been evaluated by the US EPA (2004), and found to decrease in the presence of sulphate. The acute water quality criterion defined by the US EPA (2004) is equivalent to 417 µg/L at a sulphate concentration of 100 mg/L. It can be adjusted to different sulphate conditions using the following formula: e(0.5812[ln(sulphate)]+3.357). In the Elk Valley, mine influenced tributaries with high selenium concentrations typically contain sulphate levels at or above 300 to 400 mg/L (see Chapter 4 [Baseline Conditions]). At these concentrations, the acute criterion for selenate is in the order of 790 to 930 µg/L. Predicted selenium concentrations in mine influenced tributaries across all managements units are lower than the acute criterion when adjusted to reflect sulphate concentrations predicted under the initial implementation plan (as reported in Annex H). In all but one mine-affected tributary (EVO Dry Creek), predicted selenium concentrations are also lower than the criterion of 417 µg/L calculated at 100 mg/L sulphate. Thus, direct acute toxicity is not expected to occur as a result of predicted selenium concentrations. Direct chronic toxicity: Chronic selenium toxicity occurs as a result of exposure via food-chain bioaccumulation, not via direct exposure to waterborne selenium (US EPA 2014). Uptake of waterborne selenium by animals is much less than dietary exposure. Thus, the assessment of potential chronic effects via bioaccumulation that is included in Chapter 8 (Water-Quality Targets and Implementation Plan) provides a conservative assessment of potential chronic effects via direct exposure. US EPA. 2004. Draft Aquatic Life Water Quality Criteria for Selenium – 2004. United States Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, DC. US EPA. 2014. External Peer Review Draft Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater 2014. United States Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, DC.
A6-27	**Implementation Plan**	Provide detailed rationales for areas where effects are predicted with the initial implementation of the EVWQP. Examples: - why meeting the level 1 toxicity benchmarks for selenium are not technically/economically achievable would at Order Station FR5. As part of this rationale, provide quantitative plots for how selenium water quality changes at FR5 with additional treatment capacity. - Why achieving the short-term selenium target is not attained until 2023 at Order Station ER2. -Why areas will have increasing concentrations above benchmarks for a period of time before mitigation is implemented (e.g. nitrate at Order Station FR4 and FR5). -Where local scale effects are predicted (i.e. tributaries)	Additional details are needed to ensure transparency of integrated/blended effects assessment for management units and explanation of why certain levels of effects cannot be further mitigated in the watershed.	MEM	EC MOE KNC UBC	10-Jun-2014	Detailed rationale has been added to Chapter 8 (Water-Quality Targets and Implementation Plan) and Annex D2 Water Quality Modelling for the Initial Implementation Plan.
A6-28	**Implementation Plan**	Assess the risks of being greater than the level 1 toxicity benchmark during the planning window.	None provided	MOE	MEM UBC MOE EC	10-Jun-2014	This will be addressed during Plan implementation as described in Chapter 10 (Monitoring) and Chapter 11 (Adaptive Management).
A6-29	**Management Actions**	Recommend having a fulsome description/discussion in the plan of the changes to blasting practices and any preliminary water quality monitoring results demonstrating the benefits of this change for the reduction of nitrate water quality concentrations.	Although the potential effects of changes to blasting practices cannot be quantified and incorporated into the predictive modelling at this time, a fulsome discussion of the scope of the changes to practices that will be/have been made (e.g. all 5 mines?), the data that is available and the future monitoring/evaluation aspects would be useful to demonstrate Teck's intent to mitigate nitrate.	MEM	UBC EC MOE	10-Jun-2014	This advice is incorporated in Chapter 6 (Development and Selection of Management Options). Blasting practices and preliminary water quality monitoring results demonstrate the benefits of the reduction of nitrate in water quality concentrations.
A6-30	**Implementation Plan**	In graphs of water quality modeling results, include the water quality results of an unmitigated scenario alongside the mitigation scenario,	To demonstrate the improvement of water quality over time, an unmitigated scenario should be included on the graphs. Otherwise, the beneficial effects of additional water treatment plants over time cannot be seen	MEM	UBC MT Govt US Govt	10-Jun-2014	Unmitigated scenarios are included on the water quality plots contained in Chapter 8 (Water Quality Targets and Implementation Plan - Figure 8-9).
A6-31	**Implementation Plan**	Provide a graph of water quality for the Michel Creek station along with a summary table of potential effects to Michel Creek and its tributaries similar to the presentation of data for Order Stations and Management Units.	Michel Creek and its tributaries are an important part of the Elk Valley watershed. The potential effects to this area with implementation of the WQP should be clearly presented.	MEM	UBC MT Govt US Govt	10-Jun-2014	Graphs of water quality predictions for Michel Creek are provided in Annex D2 Water Quality Modelling for the Initial Implementation Plan..
A6-32	**Targets – Lake Koocanusa**	Recommend a site-specific ecological assessment of protective selenium levels in Lake Koocanusa to assess whether the 2 µg/L target is protective.	The TAC does not have consensus that 2 µg/L is protective of Lake Koocanusa. The EVWQP process had little analysis on Lake Koocanusa, which is potentially the most sensitive receiving water.	KNC	US Govt UBC MT Govt EC	10-Jun-2014	Teck is committed to maintaining the long-term target for selenium within the reservoir below the BC Water Quality Guideline (see Chapter 8 [Water-Quality Targets and Implementation Plan]) and to continue monitoring environmental conditions throughout the Designated Area (see Chapter 10 [Monitoring]). As detailed within Chapters 10 and 11 (Adaptive Management) of the Plan, data collected through environmental monitoring programs will help validate the initial implementation plan and inform if adaptive measures are required. Should monitoring data indicate that outcomes and objectives of the Plan have the potential of not being met within the Designated Area, or portions thereof, Teck will identify and evaluate corrective measures at such time. For these reasons, a decision to proceed with a site-specific study to set a selenium water quality target for Lake Koocanusa will not be undertaken at this time.

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A6-33a	**Targets**	Recommend setting selenium long-term management targets to be in line with the expected water quality concentrations of the Implementation Plan.	This approach would show Teck's commitment to improving water quality over time and would assist to address uncertainties in the selenium ecological assessment. It would also potentially be helpful for decision making around future projects.	MEM	MOE KNC	10-Jun-2014	Teck is committed to meeting long term target concentrations to fulfill the objectives of the Order. Long term targets are set based on ecologically protective values as described in Chapter 8 (Water-Quality Targets and Implementation Plan). In some locations in the watershed, the water quality model estimates that the initial implementation plan could achieve lower concentrations than the target values. Based on the modelling work, this is required to meet target concentrations at other Order stations, but is not required based on ecologically protective benchmarks defined in Chapter 8 (Water-Quality Targets and Implementation Plan).
A6-33b	**Targets**	US Govt and MT Govt agree with this comment provided long-term targets are demonstrated to be protective of all uses, and are vetted in a site-specific manner, including within Lake Koocanusa.	None provided.		MT Govt Us Govt	10-Jun-2014	See response Advice Item No. A6-33a.
A6-34a	**Monitoring Framework**	Recommend that the EVWQP monitoring program include a component to validate and refine the selenium bioaccumulation models.	None provided.	MOE	KNC UBC EC	10-Jun-2014	This advice has been incorporated into Chapter 10 (Monitoring).
A6-34b	**Monitoring Framework**	US Govt and MT Govt supports this comment provided that bioaccumulation models also are constructed for Lake Koocanusa.	None provided.		MT Govt US Govt	10-Jun-2014	Teck initiated a monitoring program in the reservoir in 2014 including water and biological tissue monitoring and will continue this monitoring through till 2016, Data from this program will be evaluated and inform decisions for future monitoring and modelling.
A6-35	**Monitoring Framework – Benthic Invertebrates**	Recommend synoptic monitoring for calcite and benthic invertebrates, including for *the* 2014 special supporting monitoring study on calcite.	To fully interpret the biological effects and ecological risk of calcite, and given the potential for spatial and temporal variability in calcite formation, synoptic monitoring of calcite and benthic invertebrates is required.	MEM	UBC EC MOE	10-Jun-2014	Synoptic evaluation of benthic invertebrate communities and calcite is planned for both 2014 and 2015.
A6-36	**Monitoring Framework - Sediments**	Conduct a broad survey of sediment chemistry within the study area using sampling methods that facilitate sediment sampling across a range of streambed substrate types (i.e., fine sediment, gravel, and cobbles, etc.).	The available sediment chemistry data for the Elk River watershed were generated using sediment samples collected primarily in depositional areas within the study area. While this information is relevant for assessing sediment quality conditions in the watershed, it does not provide information on many mine-influenced areas that have different stream-bed substrate types (e.g., gravel, cobbles, etc.). Nevertheless, benthic invertebrates are exposed to fine sediment that accumulates in coarser stream-bed substrates. Hence, there is a need to characterize sediment quality conditions in many areas that were not sampled in 2011 and 2013, due to the focus on sampling obviously depositional habitats. It is important to note that sampling of fine sediment in stream-bed substrates that include coarser materials requires different methods than those that are applied in depositional habitats. More specifically, MacNeil corers, freeze-core sampling, modified Besser samplers, and/or alternative methods, combined with sieving to < 2.00 mm, is required to obtain fine sediment for chemical analysis from coarser-grained substrates.	KNC		10-Jun-2014	This information will be considered during development and implementation of future environmental monitoring programs.
A6-37	**Monitoring Framework - Groundwater**	Recommend undertaking a more fulsome groundwater monitoring program beyond just sampling the water quality of wells (e.g. gaining better understanding of groundwater – surface water interactions) – see Ministry of Environment (MOE) comments from TAC Meeting 5.	None provided.	MOE		10-Jun-2014	This advice is addressed in Chapter 5 (Human Health and Groundwater) of the Plan and in Annex L.3 Approach to Protection of Groundwater which details an adaptive management approach to addressing the protection of groundwater. This includes further evaluation of existing data and a potential phased approach to improving understanding of groundwater conditions in the Elk River watershed.
A6-38	**Monitoring Framework - Groundwater**	The trigger for additional groundwater monitoring should be considerably lower than the guideline. The current trigger of within 20% of the guideline is too high.	None provided.	KNC		10-Jun-2014	This advice has been incorporated into the Plan in Chapter 10 (Monitoring) Section 10.3 to include constituents that were within 30% of guideline for ongoing monitoring within the regional groundwater monitoring program.
A6-39	**Monitoring Framework - Reporting**	The human health screening level risk assessment should be done annually.	None provided.	KNC		10-Jun-2014	This advice has been considered and updates to the human health risk assessment will be completed as sufficient data from multiple pathways is available.
A6-40	**Human Health Evaluation – Groundwater Sampling**	Recommend capturing seasonal changes in drawdowns and recharge in evaluation of groundwater (e.g. large drawdowns of water occur in summer for irrigation).	None provided.	MOE IHA		9-Jun-2014	This advice has been incorporated in Chapter 10 (Monitoring).
A6-41	**Human Health Evaluation – Aesthetic Characteristics**	Include an assessment of the effects on aesthetic qualities of surface water and groundwater in the Plan that affect the potability of the resource (e.g. total dissolved solids (TDS), calcium bicarbonate).	None provided.	KNC MOE		10-Jun-2014	Chapter 5 (Assessment of Protection of Human Health and Groundwater) and Annex L.1 Human Health Evaluation of Current Baseline Conditions of the Plan include an assessment of the aesthetic qualities of surface water and groundwater that may affect potability.
A6-42	**Human Health Evaluation**	In the human health assessment, include a qualitative assessment for why plant & animal uptake of water / sediment pathways are determined to be "complete but minor exposure pathways".	None provided.	KNC		10-Jun-2014	Discussion of the basis for identifying plant and animal uptake as secondary pathways is included in Annex L.1 Human Health Evaluation of Current Baseline Conditions of the Plan.
A6-43	**Human Health Evaluation**	Assess human health risks based on predicted future water quality conditions (with both short- and long-term targets).	None provided.	MOE		10-Jun-2014	Discussion of the basis for identifying plant and animal uptake as secondary pathways is included in Annex L.1 Human Health Evaluation of Current Baseline Conditions of the Plan.
A6-44	**Calcite Management - Implementation**	Add calcite management to the immediate implementation steps, as beginning to stabilize calcite should not be limited to only monitoring and implementing pilot projects over the next 10 years	Monitoring and piloting work are not considered "management". Additional measures should be considered for priority tributaries on a shorter term basis. Suggest implementation of treatment technologies should be moved into the immediate time frame so that the medium term target will be met by year 10.	MEM	EC MOE	11-Jun-2014	Calcite management is included in the immediate implementation steps. The medium-term target-setting process identified four streams for treatment in the medium-term (i.e. within ten years). A treatment option on the first of these four streams will be implemented within three years of Plan approval
A6-45	**Calcite Management**	Ensure that the calcite monitoring program has the (statistical) power to detect changes in calcite formation over time within a stream reach.		KNC	UBC	11-Jun-2014	Teck will examine the statistical power of the calcite monitoring program during Plan implementation when reviewing the results from the 2014 and 2015 calcite monitoring programs.
A6-46	**Calcite Management**	Verify the Calcite Index (CI) technique approach by undertaking a multiple path assessment using a number of representative reaches (e.g. 5 times per reach).		KNC	UBC MEM	11-Jun-2014	The calcite monitoring method incorporates triplicate sampling per reach and will be conducted for a minimum of three consecutive years. These data in conjunction with benthic and periphyton monitoring will be used to verify that the Calcite Index (CI) technique is robust and representative to evaluate potential effects.
A6-47	**Calcite Management**	Recommend that calcite monitoring be linked with both biological and physical habitat monitoring.		KNC	MOE	11-Jun-2014	Teck will be designing a special supporting study in 2014 to address biological effects associated with calcite. This study will inform future monitoring endpoints for the Regional Aquatic Effects Monitoring Program.

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A6-48	**Calcite Management - Targets**	Reconsider the medium-term target for calcite to ensure stream reaches that may be approaching a calcite index of 2 are targeted for calcite management.	A calcite index of 2 may not be sufficiently conservative for determining priority streams for mitigation. Need also to have a preventative lens for calcite management (i.e. not just mitigate stream reaches with significant concretion but also prevent degradation), especially when there is significant habitat associated with a stream reach (e.g. Greenhills Creek).	MEM	MOE	11-Jun-2014	As note in Advice Item No. A-52: the medium- term target has been revised based on this advice, and Teck has adopted a lower level of the Calcite Concretion Score to identify priority streams for medium-term action. This will catch streams that have a Calcite Index below 2.0 (See Chapter 7 [Calcite Management]).
A6-49	**Calcite Management - Targets**	The medium- and long-term targets for calcite should be considered interim targets.	There is insufficient information to know what the targets should be.	KNC	UBC	11-Jun-2014	As note in Advice Item No. A-52: the medium- term target has been revised based on this advice, and Teck has adopted a lower level of the Calcite Concretion Score to identify priority streams for medium-term action. This will catch streams that have a Calcite Index below 2.0 (See Chapter 7 [Calcite Management]).
A6-50	**Calcite Management**	Define more explicitly the ecological risks associated with calcite formation and how this will be tested through the program (including the identification of the impact hypotheses to be tested and resolved during the monitoring and implementation of the program)	Non provided.	MOE	UBC EC MOE	11-Jun-2014	As noted in the response to Advice Item No. A-46, a special supporting study will be designed in 2014 that will contain appropriate detail to evaluate ecological risks focused on impacts to periphyton productivity and benthic community structure. The study design will be reviewed with the Ministry of Environment and the Ktunaxa.
A6-51	**Calcite Management**	Define triggers more explicitly and directly link with what concrete actions and activities will be undertaken should they be triggered	Non provided.	MOE		10-Jun-2014	Teck has considered this advice and refined the triggers. Due to the evolving level of knowledge on management options and the site-specific nature of technology selection, it is not practical at this point to define which management option will be employed should a trigger be reached.
A6-52	**Calcite Management**	Recommend revising the Program Goal's "ideal outcome" for calcite management methods to "calcite does not form in the receiving environment above background levels".	The proposed wording would eliminate subjective language of "reducing to acceptable levels". Similar wording should be considered for the long term objective/target.	MEM	MOE	10-Jun-2014	Teck will consider setting the goal to be "calcite does not form in the receiving environment above background levels" in recognition that calcite naturally forms in the reference streams. Teck remains committed to achieving the outcome as described in the Narrative Objective.
A6-53	**Calcite Management**	Recommend the separate reporting of the two terms (pebbles with calcite and pebble concretion) used to estimate the calcite index and recommend that the target aero embeddedness.	In the current formulation of the index, there are two terms which are summed to create the index value. The first represents the calcite coverage, and the second represents the degree of embeddedness. The second term is zero until the first term is greater than 0.7 (70% of pebbles have some calcite). Reporting these scores separately would facilitate an evaluation of whether these factors independently could be linked to habitat effects and could be used to influence target setting.	EC	KNC MEM	10-Jun-2014	Teck will report both terms when reporting the Calcite Index (See Chapter 7 [Calcite Management]).
A6-54	**Management Options**	Add residuals management to the list of topics that will require to future research and potential technology development, given the dominance ofActive Water Treatment Facilities (AWTFs) in the proposed EVWQP. The Elk Valley Water Quality Plan should also include information on the volumes and concepts for waste management, along with future studies needed to assess and prevent adverse effects related to these materials.	Residual waste management from water treatment plants will be a very large issue with implementation of the plan (on the order of hundreds of m3 of waste will be generated per day). It is important for the EVWQP to recognize and document how future management of these materials would occur, and how adverse effects will be assessed and prevented.	MEM	EC	11-Jun-2014	Teck has incorporated an explanation of residuals, the approach to residuals management, and strategy to future technology development into Chapter 6, Section 6.3.2.2 and section 6.5.2 (Development and Selection of Management Options).
A6-55	**Management Options**	Add analysis of the benefit of partial covers to Chapter 4 (Management Options).	It is not clear if and how this was considered in the development of the plan and should be reflected in the Management Options Chapter.	MEM	EC	11-Jun-2014	The analysis of the benefit of partial covers was considered in evaluating and selecting water quality management options. This analysis was not included directly in Chapter 6 (Development and Selection of Management Options), but is instead outlined below. The initial modeling of BGM covers led to a conclusion that covers would have little effect on water quality of receiving streams over the 20-year time frame that was modelled. That conclusion was largely driven by the fact that the drain down of water beneath even perfect covers would extend over many years or decades. This potential application of partial covers was discussed by an internal Teck group in mid-February 2014. The group looked at the schedule for waste rock deposition arising from the current long term mine plans, and identified areas that could be covered with a high likelihood that they would not later be over-dumped. That review was complicated by the fact that short term mine planners like to have the flexibility to route waste to any available dump, so it was difficult to guarantee that any portion of any dump would really be available for early covering. But the group agreed to take an optimistic view and was able to identify portions of dumps that could be candidates for early covering. The group then looked at the possible benefits of partial covers. The earlier modeling had shown that unless a cover was very effective, it would only reduce the amount of water needing active water treatment, and there would be no benefits to water quality in the receiving streams. The group concluded that a similar pattern would hold for partial covers, i.e. that they might reduce the amount of water needing treatment, but would not improve water quality in the receiving streams. As a result partial covers were not considered for the initial implementation plan. To date R&D work related to covers has focused primarily on full covers. Significantly more R&D work is required before the benefit of partial covers can be adequately understood and the technology evaluated against other currently available options. In summary, Teck believes that partial covers would not affect water quality enough to be a suitable option to the initial implementation plan, but they should be kept in consideration for technology development and future stages of the Plan.
A6-56	**Management Options**	Document a more detailed explanation (i.e. more specific criteria that was used) for how decisions were made in the selection of the proposed EVWQP management options and the rationale for their proposed schedule for when they get implemented (i.e. both water treatment and diversions).	It is important that the process of decision making on the implementation plan is well documented. The current chapters contain very high level explanations of decision criteria and assumptions. More details should be captured in Chapter 4 (Management Options), Chapter 7 (Water-QualityTargets and Implementation Plan) and/or in appendixes.	MEM	Mt Govt MOE	11-Jun-2014	Teck has revised Chapter 6, Section 6.3 (Development and Selection of Management Options) to include a detailed explanation for how decisions were made in selection of the proposed EVWQP management options and rationale for their proposal schedule for construction.
A6-57	**Management Options**	Review Chapter 4 (Management Options) and provide context and qualify new goals or criteria that were mentioned in the development and analysis of the management options (e.g. Section 4.4.2. where "*Optimization of clean-water diversion and active water treatment*" and "Minimizing the requirement for long-term active water treatment" is highlighted.	The WQP should be clear and transparent in how the implementation plan was derived. The two new objectives that were added should include an explanation of how these were considered and used.	MEM		11-Jun-2014	Refer to Teck's response to Advice Item No. A6-55: Teck considered this advice and has revised Chapter 6, Section 6.3 (Development and Selection of Management Options) to include a detailed explanation for how decisions were made in selection of the proposed EVWQP management options and rationale for their proposal schedule for construction.
A6-58	**Management Options**	Outline and summarize the decision criteria that will be used to inform different long term management options different from AWTFs.	None provided	KNC	UBC MT Govt	11-Jun-2014	Refer to Teck's response to Advice Item No. A6-55: Teck considered this advice and has revised Chapter 6, Section 6.3 (Development and Selection of Management Options) to include a detailed explanation for how decisions were made in selection of the proposed EVWQP management options and rationale for their proposal schedule for construction.

Table 1:Teck Response to Technical Advisory Committee Advice, meetings #2 to #7 Appendix A and Band Working Group

ID# from Meeting	Category/Theme	Advice/Comment	Rationale (*to be filled in by Originator*)	Originator (Agency) of Advice	Other TAC Member Support	Date Advice Received (dd/mm/yy)	Teck Response
A6-59	**Management Options**	Add phosphorous section to Chapter 4 (Managemtn Options) and how this will be reported on during implementation of the Plan.	A discussion on phosphorus is currently absent. The potential for eutrophication is a key issue that should be addressed and discussed by the EVWQP.	MEM	UBC EC MOE	11-Jun-2014	Teck has revised Chapter 6, Section 6.4.2 (Development and Selection of Management Options) to include a phosphorous section, as well as, how phosphorous will be reported during implementation of the Plan.
A6-60	**Adaptive Management**	Allow for the triggers to be revised and adapted with new information as a component to the adaptive management strategy.	None provided.	UBC		11-Jun-2014	This advice has been incorporated in to Chapter 11 (Adaptive Management).
A6-61	**Adaptive Management**	For the adaptive management plan, provide more specificity about what would represent a trigger and how the triggers will be evaluated. For example, the adaptive management process associated with water quality monitoring should include a specific threshold variation in the expected water quality trend that would trigger a root cause analysis.	There will be a very large reliance on adaptive management over time with implementation of the EVWQP. It is important to show more details around assessment criteria and triggers for evaluation and action. Certain components may be able to be better defined than others.	MEM	KNC MOE Mt Govt	11-Jun-2014	Adaptive management triggers are intended to 'trigger' a root-cause analysis, the results of which will determine the appropriate management response. This is the essence of adaptive management. The range of potential adaptive management actions are presented in Section 11.2.1 of the Plan.
A6-62	**Adaptive Management**	The adaptive management plan needs to more clearly link-back to the overarching objectives (e.g. from the Ministerial Order) and define a hierarchy of sub-objectives (which should include costs, timelines, etc.) and these need to be tied to the conceptual site models and monitoring program (including explicitly identifying the impact hypotheses to be tested), the indicators to be used, the triggers, and the resulting management decisions.	None provided.	KNC	MOE Mt Govt	11-Jun-2014	This advice has been incorporated in to Chapter 11 (Adaptive Management).
A6-63	**Adaptive Management**	Define triggers at other nodes in the system to ensure the adaptive management strategy covers a broader range of locations and analytes.	None provided.	KNC		11-Jun-2014	The advice to define triggers at other nodes in the system is incorporated in Chapter 11 (Adaptive Management). The Order defines the constituents to be addressed by the Plan. Teck monitors for a broad array of analytes throughout the Designated Area as part of the RAEMP as discussed in Chapter 10 (Monitoring).
A6-64	**Adaptive Management**	The adaptive management plan should lay out how the results of the Research & Development program get incorporated into the Implementation Plan. For instance there should be decision criteria for how approaches that are more effective than active water treatment in the long-term (e.g. covers) get implemented.	None provided.	KNC	Mt Govt	11-Jun-2014	This advice has been incorporated in to Chapter 11 (Adaptive Management).
A6-65	**Adaptive Management**	Identify and summarize the "range of actions" that would be associated with the outcome of the root cause analyses that would be expected, without being too prescriptive	None provided.	MOE	MEM	11-Jun-2014	This advice is addressed in Chapter 11 (Adaptive Management).
A6-66	**Adaptive Management**	Recommend that the adaptive management plan include a process for adaptively managing the targets.	Currently there is no specification in the adaptive management section on how new information on underlying process-science (e.g., new evidence such as bioaccumulation modeling done by the U.S. or other researchers on the reservoir) will be used to update existing targets. Furthermore it is unclear how discharge permits will be revised to incorporate new science. If 2 µg/L Se is demonstrated to not be adequately protective of fish in a stratified, poorly oxygenated environment such as in the reservoir, then the adaptive management plan should explicitly state how all targets in the Lake and at other order stations will be revised to accommodate this new information	Mt Govt	Us Govt UBC	11-Jun-2014	This advice has been incorporated in Annex O Management of Uncertainty in the Selenium Ecological Affects Assessment.
A6-67	**Adaptive Management**	Update the models used in the development of the EVWQP as a component to the Adaptive Management strategy and in order to better assess the long term targets There must also be a component in the adaptive management strategy to refine and adjust the long-term targets if necessary, as additional studies and more empirical data become available.	There remain great uncertainties in the process to derive the Se targets and questions remain with respect to the toxicological implications of the elevated nitrate and sulphate, particularly in the upper Fording River.	EC	Mt Govt US Govt	11-Jun-2014	Teck has incorporated the adaptive management diagrams to include feedback loops (Chapter11 [Adaptive Management]).
A6-68	**Adaptive Management**	Describe and document in the EVWQP how the 2ug/l long term selenium target for Lake Koocanusa may be revised if monitoring suggests a problem in the future.	We recommend that it is unwise to take a "wait and see" approach with respect to the relationship between water column Se and fish tissue/ovary concentrations in Lake Koocanusa and disapprove of the approach presented in the EVWQP. We would also like clarity on what actions will be taken by Teck if certain fish species such as longnose suckers, peamouth, or burbot start to show tissue concentrations exceeding BC guideline (note: data already shows this is occurring). As a consequence, the EVWQP should include a discussion of how targets throughout the watershed will be revised to be protective of fish in the reservoir, and ultimately how damages will be compensated to the extent they are quantifiable.	MT Govt	Us Govt	11-Jun-2014	Teck is implementing a robust aquatic effects monitoring program in Lake Koocanusa (Chapter 10 [Monitoring]). Aquatic effects monitoring data will be incorporated into Chapter 11 (Adaptive Management), which includes consideration of revising long-term water quality targets, if required.
A6-69	**Water Quality Planning Model**	Provide a comparison of the concentrations in tributaries estimated through scaling the Water Quality Planning Model results with the results of the finer scale water quality model used for the Line Creek Phase 2 assessment (for the purposes of evaluating the scaling method employed in assessing effects of target concentrations).	The approach used to estimate tributary concentrations in the EVWQP is new and uncertainty and conservatism of this method are not well understood. In order to illustrate conservatism and uncertainty, and understand how well this approach approximates values, tributary concentrations generated by the EVWQP water quality model need to be compared to results that have been calculated using a finer resolution model (i.e. the LCO2 EA water quality model) where the uncertainty and conservatism of inputs (flow, source terms) are understood and concentrations are better constrained.	MEM		10-Jun-2014	Water quality conditions in the tributaries, for the purpose of plan development, were estimated using the method described in Chapter 8, Section 8.2.3.3 (Water-Quality Targets and Implementation Plan). The model does not accurately predict concentrations in all mine-influenced tributaries; however; it can more reliably predict relative changes in water quality in these areas, because this is strongly correlated with changes to waste-rock volume. As such, model predictions for current and long-term conditions were used to proportionally scale values observed in 2013 to provide an estimate of long-term concentrations in mine-discharge tributaries (i.e., long-term concentration in a mine-discharge tributary = current observed concentration × modelled long-term concentration ÷ modelled current concentration).
B6-1	**Review of: Evaluation of the Effects of Selenium on Early Lifestage Development of Mountain Whitefish from the Elk Valley, BC (Nautilus Environmental 2012)**	Priority for Plan Implementation: The study concluded that the threshold for adverse effects for MWF exceeds 32 ug/g dw Se in the eggs; however, there is a lot of uncertainty associated with this conclusion because the study did not include a control group. To address this uncertainty, we recommend that this study be repeated in the future with appropriate controls or, alternatively, a laboratory feeding (with a control group) could be conducted.	In this study the effect of Se on survival and fertilization rates was very difficult to determine because: o Fungal contamination killed a portion of eggs in 2010; however, without a control group, there was no mechanism to determine which deaths were due to the fungus and which (if any) were due to Se. o Collection of unripe eggs in 2011 resulted in much lower fertilization rates; however, without a control group, it is difficult to state with certainty the effect is due to egg maturity and not Se.	MOE		27-Jun-2014	The recommendations provided in this advice will be used in the planning and development of future studies to reduce potential sources of uncertainty.

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B6-2	**Review of Updated Appendix D (Se Report) (received May 14)**	Priority for Plan Submission: We recommend a more consistent application of the decision criteria be applied to the literature.	There are inconsistencies in the application of the decision criteria related to including or excluding literature in the development of Se benchmarks. o some studies that re-analyzed data from other studies were considered primary (Adams et al. (2003)), whereas, other papers were excluded (Skorupa and Ohlendorf (1991), Heinz (1996), US DOI (1998), Skorupa (1999), Seiler et al. (2003), Wayland et al. (2007), Beckon et al. (2008), and Ohlendorf and Heinz (2011)). o DeForest and Adams (2011) was excluded but DeForest et al (1999) was considered primary.	MOE		27-Jun-2014	Decision criteria were applied consistently. Studies were included that reported new data, or new analyses of existing data that updated or expanded previous analyses (e.g., by combining data from multiple studies). Studies were excluded that simply re-reported previous results, or re-analyzed a subset of existing data (i.e., where a more complete analysis is presented elsewhere).
B6-3	**Review of Updated Appendix D (Se Report) (received May 14)**	Priority for Plan Submission: We recommend that rationale be provided for the % moisture used by Golder to convert ovary wet weight to dry weight (e.g. Bryson et al. (1985) - 80-81% moisture; Hermanutz et al. (1992) – 85% moisture).	In several instances Golder has chosen high % moisture content to convert ovary wet weight to dry weight (e.g. Bryson et al. (1985) - 80-81% moisture; Hermanutz et al. (1992) – 85% moisture). The USEPA (2004) adopted 76% as the moisture content in bluegill egg/ovary which was an average of those used by Gillespie and Baumann (1986) and Nakamoto and Hassler (1992), to convert egg/ovary bluegill data reported by Hermanutz et al. (1996).	MOE		27-Jun-2014	The moisture content used to convert data from Bryson et al. (1985) was taken from Bryson et al. (1985); as noted in Appendix D, this value is study-specific, not a "chosen" value. The moisture content used to convert data from Hermanutz et al. (1992) was taken from Gilespie and Baumann (1986), which is the only other selenium toxicity study with bluegill that reports % moisture. We were not aware of the Nakamoto and Hassler (1992) moisture data because that study is not a toxicity study and, therefore, was not included in the literature review. A note has been added to Appendix D confirming that adoption of the alternative moisture content value used by US EPA (2014) does not change the conclusions of the review concerning selenium toxicity to fish. Note that the recommendation of the Toxicology Working Group was to adopt brown trout toxicity data to represent sensitive fish species. Although they do not occur in the Elk Valley, brown trout are more sensitive than bluegill and more relevant to Canadian waters than a warm-water centrarchid species.
B6-4	**Ecological Effects Assessment – Lake Koocanusa - Selenium**	It is recommended that the science and rationale for the proposed selenium target in Lake Koocanusa be further elaborated on in the EVWQP. Specifically, it should be discussed how the 2 µg/L water column target will result in compliance with the B.C. or ovary fish tissue guideline. The linkage between these two numbers has not yet been defined. In particular, Draft Chapter 7, Section 7.2.2.2 states "Because bioaccumulation rates and toxicity vary widely, the BC MOE recommends site specific assessments of selenium bioaccumulation and toxicity." Why has this approach not been taken for Lake Koocanusa?	Existing data shows that at least one fish species (mean of longnose sucker) in Lake Koocanusa currently exceeds the B.C. fish tissue selenium of 4 µg/g dw (U.S. data) at an average lake concentration of 1.13 µg/L. It is likely that with increasing concentrations up to 2 µg/L (as shown in TAC meeting 6), the fish tissue concentrations (and ovaries) will also continue to increase. It is unclear why one would conclude that 2 µg/L will be protective in a stratified potentially poorly oxygenated system, without additional scientific basis (i.e., site-specific assessment such as recommended by MOE). Further explanation should be provided in the EVWQP as to why such an approach was taken for the entire Elk Valley, but not for Lake Koocanusa.	U.S. Govt MT Govt		20-Jun-2014	Chapter 6 (Development and Selection of Management Options) has acknowledged the potential for eutrophication within the Designated Area, with screening level analyses presented within Annex I.1 Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status and Annex I.2 Modelled Total Phosphorus Concentrations in the Elk and Fording Rivers.
B6-5	**Ecological Effects Assessment – Lake Koocanusa - Nitrate**	Recommend adding language in the Plan to acknowledge the potential for eutrophication impacts, monitor for impacts, and set targets to protect from impacts.	There is no discussion in the draft plan of potential eutrophication issues related to elevated nitrogen (and potentially phosphorus) and how this can enhance bioaccumulation through increased primary productivity and perhaps reduced oxygen content at the sediment-water interface of stratified systems. Furthermore, the nitrate target of 3 mg/L is an order of magnitude higher than the Montana Department of Environmental Quality considers adequate to protect streams from eutrophication related impacts, and may become troubling for existing NPDES permit holders.	U.S. Govt MT Govt		20-Jun-2014	Chapter 6 (Development and Selection of Management Options) has acknowledged the potential for eutrophication within the Designated Area, with screening level analyses presented within Annex I.1 Modelled Total Phosphorus Concentrations in the Elk and Fording Rivers.
B6-6	**Targets – Lake Koocanusa - Selenium**	Teck needs to explain how a selenium target of 2 µg/L in Lake Koocanusa is compliant with the Order requirement to, "immediately begin to stabilize water quality concentrations of selenium, cadmium, nitrate, and sulphate, and the rate of formation of calcite in the designated area".	Average existing selenium concentrations in Lake Koocanusa are approximately 1.13 µg/L. The selenium target set in the Order is 2 µg/L. Information presented at the TAC 6 meeting indicates that the 2 µg/L target is a "pollute up to" level. In other words, Teck is not required to "stabilize and reduce" concentrations in Lake Koocanusa, but rather can increase concentrations up to 2 µg/L. The U.S. and MT Governments do not agree with this approach, and suggest instead that Teck set an interim "hold the line" selenium target in the lake until further scientific evidence can be developed to define appropriate selenium targets that are protective of aquatic life and birds throughout the watershed including Lake Koocanusa (such as is done throughout the rest of the Elk Valley).	U.S. Govt MT Govt		20-Jun-2014	Section 3.11(a) of the Terms of Reference states that "[t]he long-term targets for selenium will include a concentration target for selenium of 2 ug/L in Lake Koocanusa…"; 2 ug/L is the value adopted in the Plan for the long term selenium target in Lake Koocanusa. The 2 ug/L value is consistent with current BC Water Quality Guidelines and is considered an acceptable contaminant level. Teck will be undertaking monitoring and further scientific work to ensure that the selenium concentrations in Lake Koocanusa remain protective of aquatic life and birds. The language "immediately begin to stabilize water quality concentrations of selenium, cadmium, nitrate, and sulphate, and the rate of formation of calcite in the designated area" pertains to the development of short-term water quality concentration targets. Teck's actions, including the operation of the West Line Creek Active Water Treatment Facility and implementation of the Plan will immediately begin to stabilize water quality concentrations.
B6-7	**Targets – Lake Koocanusa - Selenium**	It should be documented in EVWQP, at a minimum in both the executive summary as well as Chapter 2, that there has not been scientific consensus amongst members of the TAC about the proposed target for Lake Koocanusa (2 µg/L Se).	The draft chapters in the plan do not adequately capture the lack of TAC consensus regarding the Lake Koocanusa selenium and nitrate targets. The draft Plan suggests that there was TAC agreement on this topic; however, this is not factually based. Note that other TAC disagreements (Section 7.2.2.3) are mentioned in the draft plan, and this too should be adequately documented.	U.S. Govt MT Govt		20-Jun-2014	Reference to consensus or lack of consensus of the TAC is not included in the Plan. Reference to the TAC process and to decisions made with TAC input are included.
B6-8	**Water Quality Planning Model**	Please provide additional information in the EVWQP regarding model bias and its impacts to predicted concentrations in Lake Koocanusa. In particular, it is unclear whether the model bias correction factor was based on all years simulated in the model for Order Station ER5, or only the bias for a certain period of record. It is most representative to use the average monthly bias calculated over the entire simulation period. Additionally, it is important to differentiate between concentration bias, and loading bias, which are flow dependent. For example, the model has virtually no concentration bias during the period of highest loading (May-September, relative bias ~1), whereas during low loading but higher concentration (winter months), the model is highly biased (bias ~1.5). A narrative description on how these interactions influence the Lake Koocanusa mixing calculation, and associated water-quality, should be included.	Draft Chapter 7 (Targets) states that the selenium watershed model has a positive bias (i.e., over-predicts concentrations) in the Elk River and subsequently Lake Koocanusa by ~ 1 µg/L. Teck has performed a monthly bias correction to make the predictions from the model more realistic. While it is always preferred to calibrate the model to minimize bias (to the extent possible), it appears as if this was not possible in this instance. As a consequence, further discussion should be included about the net cause of the bias (i.e., was it related to poor flow representation during the winter period, inadequacies in estimation of monthly geochemical terms in the model, etc.) and if there are any foreseeable problems with the use of a bias correction factor in the future (as opposed to recalibration of the model or better representation of its processes).	U.S. Govt MT Govt		20-Jun-2014	This has been clarified in Chapter 8 (Water-Quality Targets and Implementation Plan) and is described in Annex D1 Water Quality Modelling Methods. In addition, the water quality model will continue to be updated as described in Chapter 11 (Adaptive Management) to improve predictions.

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B6-9	**Water Quality Planning Model**	Please provide a detailed explanation of how the Lake Koocanusa selenium and nitrate concentrations were generated in the modeling (i.e., methods). We would also like a time series of modeled loads, flows, and concentrations under both the (1) unmitigated and (2) proposed future clean water diversion and active water treatment scenarios, ensuring that all future mine expansions are in fact included in the modeling results. Also, please explicitly state the assumptions used in the active water treatment and diversion scenario so that load reductions can be verified (i.e., how much mass or potential mass are each of these practices removing from the system). The following results should be provided: monthly flows, loadings, and concentration at the Elk River mouth (ER5), along with whatever other assumptions were made about the state of the reservoir or inflows to it, and associated reductions from management options.	It is unclear how Teck is generating the modeled selenium and nitrate concentrations in Lake Koocanusa. To comment on the scientific validity of the approach, the TAC should be provided with this information. At a minimum, methods and assumptions used in this approach need to be described. Furthermore, it would be useful to have a time-series of the modeling results so that we can verify them against our own model estimates. Lastly, it must be described how Teck is accounting for the loads from the Kootenay River and how the mixing calculations are being completed. For example, what assumptions are being made about the inflow concentration, seasonal variability, etc.?	U.S. Govt MT Govt		20-Jun-2014	A detailed explanation of how the Lake Koocanusa selenium and nitrate concentrations were generated in the model is included in Annex D.1 Water Quality Modelling Methods. Time series of loads and concentrations are provided in Annex D.2 Water Quality Modelling to Support the Initial Implementation Plan under both unmitigated and the initial implementation plan scenarios. The mine plans included in the Plan are described in Annex D.5 Site Conditions. The Plan will be updated as described in Chapter 11 (Adaptive Management) in response to updates to mine plans in the future. Flows are described in Annex D.3 Hydrology Report.
B6-10	**Implementation Plan**	Teck needs to describe in the Plan how the modeled increasing trends in nitrate and selenium (which are predicted to occur for several years going forward), and modeled exceedances of the proposed Order Station targets, are compliant with the Order.	Draft Chapter 7 (Targets), and presentations distributed by Teck, show that modeled selenium and nitrate concentrations will continue to increase over the next 1-5 years (prior to new treatment plants coming online) at several stations in the Elk Valley and Lake Koocanusa. Sometimes, these predicted increases result in concentrations exceeding proposed targets at Order stations in the Elk Valley. This is contrary to the order which states that Teck must "immediately begin to stabilize water quality concentrations of selenium, cadmium, nitrate, and sulphate, and the rate of formation of calcite in the designated area". Also, this is in direct violation of the currently proposed targets (where modeled results show this to be the case).	U.S. Govt MT Govt		20-Jun-2014	Teck has immediately begun, through construction of the LCO WLC AWTF, to stabilize selenium and nitrate concentrations. The next treatment plant at Fording River is in the scoping stage and is being advanced as quickly as practical to ensure that sound decisions are managed during design. As described in the Terms of Reference (S. 3.5), short term targets are defined based on technical achievability rather than effects.
B6-11	**Implementation Plan**	Similar to the information on water treatment, the Initial Implementation Plan should include more information on the timing and volumes of water that will be diverted and managed.	All aspects of the mitigation that form the basis of the initial implementation plan need to be fully described (not just water treatment).	MEM		20-Jun-2014	More information on the timing and volumes of water that are planned for diversion, and how this water will be managed, has been added to Chapter 8 (Water-Quality Targets and Implementation Plan).
B6-12	**Implementation Plan**	The WQP should make specific reference to water quality (main stems and tributaries) and mitigation associated with future mining areas (e.g. CMO2 and EVO Baldy Ridge).	To support future regulatory decision making in the watershed, the WQP should include information on future mining areas and/or include discussion on how these will be assessed.	MEM		20-Jun-2014	The Plan includes all future mining areas (including CMO2 and EVO Baldy Ridge) that are included in Teck's current life of mine plans (+20 years) and water quality modelling projections include contributions from these mining areas. The initial implementation plan was developed assuming that these mine plans go forward as forecast. Mitigation has been allocated based on a regional approach as described in Chapter 8 (Water-Quality Targets and Implementation Plan). As described in Chapter 11 (Adaptive Management), the Plan will be adaptively managed; input into the adaptive management process includes the consideration of changes to mine plans as appropriate.
B6-13	**Management Scenarios**	If additional mining or water management scenarios have been added to the WQP since the beginning of the planning process, these should be fully described (e.g. EVO pit dewatering).	Transparency of all scenario inputs to the WQP is important and will provide clarity for the implementation phase.	MEM		20-Jun-2014	All mining and water management scenarios are described in Annex D2 Water Quality Modelling for the Initial Implementation Plan, and Annex D5 Site Conditions. This includes revised EVO Pit Dewatering plans.
B6-14	**Monitoring**	Include a section that discusses other monitoring that is ongoing or will be undertaken in the valley that will be utilized to inform adaptive management and future updates to the WQP.	The monitoring chapter is focussed on monitoring for ecotoxicology, aquatic effects, human health and groundwater. A section should be added that includes the other types of monitoring that is/will be ongoing in the watershed (e.g. water quality and hydrology monitoring to update geochemical source term development and refinement of water quality planning tool, calcite monitoring, reclamation monitoring, etc.)	MEM		20-Jun-2014	Advice has been incorporated into the Plan in Chapter 10 (Monitoring).
B6-15	**Monitoring (Draft Chapter 9) General**	Priority for Plan Submission: Recommend that hypotheses/questions are identified and related to measurement endpoints.	Measurement end-points need to be linked to hypotheses/questions so that the efficacy of the endpoint can be evaluated.	MOE		27-Jun-2014	This advice has been incorporated into Chapter 10 (Monitoring) linking monitoring and the CSM including identification of assessment endpoints, measurement endpoints and assessment criteria. Future monitoring cycles and detailed study designs will also use this template to make appropriate connections with CSM and identification of monitoring endpoints. Key questions/hypothesis will be considered and developed during detailed study designs for future monitoring cycles.
B6-16	**Monitoring (Draft Chapter 9) Calcite**	Priority for Plan Submission: Recommend that the calcite monitoring program describe how new areas that have been affected by calcite deposition will be detected.	Need a method to determine if the area impacted by calcite deposition is increasing.	MOE		27-Jun-2014	Teck has incorporated into the Plan that all stream reaches downstream of mining activity will be subject to monitoring. This will allow for detection of any new calcite precipitation.
B6-17	**Monitoring (Draft Chapter 9) Lake Kookanusa**	Priority for Plan Implementation: MOE recommends adding continued sampling of Lake Kookanusa to the RAEMP Monitoring Program for at least 3 consecutive years.	A longer period of baseline data is necessary to evaluate current conditions.	MOE		27-Jun-2014	This advice has been incorporated into the Plan in Chapter 10 (Monitoring). Lake Koocanusa monitoring program commenced in 2014 and will continue through to 2016. Data from this supporting study will be evaluated to inform future monitoring endpoints for the reservoir as part of the RAEMP.
B6-18	**Monitoring (Draft Chapter 9) Periphyton**	Priority for Plan Implementation: MOE recommends that periphyton monitoring be conducted during peak biomass, as opposed to the end of season. □	Unless monthly biomass measurements have been assessed and it was found that September is the time of peak biomass, I would infer that it is more likely to be in early- to mid-August in the Elk River watershed.	MOE		27-Jun-2014	Proposed timing for monitoring has been proposed based on previous sampling results that collected periphyton biomass samples in August, September and October. Timing for future periphyton monitoring will be considered during development of the supporting study for calcite and the 2015 RAEMP.
B6-19	**Monitoring (Draft Chapter 9) Sediment**	Priority for Plan Implementation: MoE recommends that the sediment monitoring program includes a long-term evaluation of mine-related contaminant trends throughout the Elk River watershed	Historic sediment data from the Elk Valley is sparse, and insufficient data (i.e., one year of good quality data) are currently available to evaluate trends. Sediment sampling should be focussed on collecting data to evaluate trends rather than only focussing on areas with demonstrated toxicity and contaminants > SQGs.	MOE		27-Jun-2014	This advice has been incorporated and sediment monitoring will continue at some frequency as part of the ongoing RAEMP.
B6-20	**Draft Aquatic Environment Synthesis Report 2014**	The WQI index, as implemented in the assessment should be re-named to distinguish this application as an unintended variant of the CCME version.	Several comments: 1) The use of site-specific guidelines intended for application in the CCME WQI are background levels for variables which there is either 1) no existing guideline or where 2) the background levels exceed an existing approved guideline. 2) The benchmark values used in the assessment are neither "background" nor protective of sensitive water uses. Since the most sensitive water use in the upper Fording River is apparently not aquatic life, then other uses, such as drinking should be used as the benchmark. 3) CCME guidance suggests a minimum of 10 variables in the index calculation, while only the 4 order variables were included in the Teck version of the index.	EC		20-Jun-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.

Table 1:Teck Response to Technical Advisory Committee Advice, meetings #2 to #7 Appendix A and Band Working Group

ID# from Meeting	Category/Theme	Advice/Comment	Rationale (*to be filled in by Originator*)	Originator (Agency) of Advice	Other TAC Member Support	Date Advice Received (dd/mm/yy)	Teck Response
B6-21	**Draft Aquatic Environment Synthesis Report 2014 General Advic**	Priority for Plan Submission: Recommend that the report include all available data to achieve its stated objectives. Sub-recommendations include: • Evaluate long-term data to evaluate trends in CoIs over time; and • Include data and interpretation related to 2013 periphyton and fish community studies, amphibian and bird surveys, which is not included in the draft report.	One of the key questions of the AEMP was "How are conditions changing over time?" However, the Synthesis Report provides no information with respect to long term trends for CoIs. The report should rely on all data as much as possible to illustrate the changes that have taken place over the past two decades. The assessment should include trends of parameters over the entire period of record, even if they are below guidelines, and include parameters which may not have guidelines (e.g., hardness). In addition, results presented for sediment, periphyton and fish population studies are incomplete and there are no data presented related to amphibian and bird surveys.	MOE		27-Jun-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B6-22	**Draft Aquatic Environment Synthesis Report 2014 General Advice**	Priority for Plan Submission: Recommend that Teck conducts a review of the report to ensure that all statements are supported by evidence and that all summary statistics are correct.	Many of the statements made in the report do not reference data in support of the statement. For example, on page 2-12, the report suggests that calcite formations incorporate trace elements such as Cd and Se. The report needs to provide clarity to statements like this and support them with sufficient evidence. Also data tables need to be reviewed for errors. For example, tables A2-1, A2-2, and A2-3 show many 95th percentile values greater than the maximum value reported for the data set.	MOE		27-Jun-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B6-23	**Draft Aquatic Environment Synthesis Report 2014 Overall Comment – Sampling Design Descriptions**	Priority for Plan Submission: Recommend that sampling design descriptions associated with the data presented for water, sediment, and biota be included in the report. This should include study objectives, sampling and analytical methods, # of sites, # of replicates from each site, parameters assessed. This information is key to understanding and interpreting study results.	There are limited details provided, which make the interpretation difficult. For example: • Details are needed to evaluate the 2011 and 2013 sediment studies, including objectives, methodology, etc. The studies evaluated in this section used different methods and sampled sediments in different habitats (i.e., lotic vs. lentic sediments), which might make it difficult to compare data. • Clarification is required on the extensive annual monitoring completed between 1999 and 2013 and how methodology, sites, etc. compared with AEMP. It is not clear when full tissue metals assessment and community composition were assessed.	MOE		27-Jun-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B6-24	**Draft Aquatic Environment Synthesis Report 2014 Overall Comment – Reference Data**	Priority for Plan Submission: Recommend providing data for all reference stations so suitability of each station can be evaluated.	Section 3.1.2.3 describes the pooling of reference data from 8 sites across all management units. The data are presented in box and whisker plots with no differentiation between sites within the plot. It is possible that the sites are quite different from one another making the pooling of data inappropriate. Also, reference sites should be located up gradient from all coal mining operations but it is difficult to evaluate this based on the scale of map given in the report and the lack of data. For example, FR_UFR1 and FR_KC4 appear to be within the bounds of the Fording River Operation (Map 3.1-2); LC_DC1 appears to be downstream from the Line Creek Operation and LC_GRCK as tributaries that reach into the Line Creek Operation (Map 3.1-3); and although difficult to tell from the map it appears that GH_BR_F and GH_Wolf are both on streams that have tributaries that reach into the Fording River Operations (Map 3.1-4).	MOE		27-Jun-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B6-25	**Draft Aquatic Environment Synthesis Report 2014 Overall Comment – Figures**	Priority for Plan Submission: Recommend that the report includes figures showing contaminant levels in water, sediment and biological tissues to support discussion of spatial and temporal trends. Figures should include error bars, and relevant guidelines and thresholds, where appropriate.	Graphical depiction of data will facilitate interpretation of current conditions, and spatial/temporal trends. The existing approach provides a very high level overview of CoIs, but results in omission of key information.	MOE		27-Jun-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B6-26	**Draft Aquatic Environment Synthesis Report 2014 S 1.2**	Priority for Plan Submission: Recommend that the report summarize best available data in a conclusion section to t answer the key questions posed in section 1.2.	In the introduction, six key questions are listed as the main drivers behind the RAEMP program. However, there is no discussion or summary that brings together the multiple lines of evidence to begin to answer these questions. As with all technical or scientific studies, a conclusion/summary section is necessary that will revisit the initial questions and provide answers where possible supported by the data, and if the questions cannot be addressed, then a modification of the methodology or sampling design should be recommended.	MOE		27-Jun-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B6-27	**Draft Aquatic Environment Synthesis Report 2014 Section 2.3.2.2**	Priority for Plan Submission: Recommend that clarification be provided with respect to data availability for zooplankton in the reservoir.	It would appear that data is not available from "the past 10 years", but rather 1997 – 2007.	MOE		27-Jun-2014	There has been no recent data collected for zooplankton in the reservoir as per information provided in Annex K.1 DRAFT Aquatic Environment Synthesis Report. Teck will be sampling zooplankton this summer as part of the 2014 Lake Koocanusa monitoring program.
B6-28	**Draft Aquatic Environment Synthesis Report 2014 Section 3.1**	Priority for Plan Submission: Recommend that evidence used to determine the status of TOC, DOC, TSS, and turbidity be included in the document.	It is unclear why TOC, DOC, TSS, and turbidity were excluded from the assessment.	MOE		27-Jun-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report . This advice will be considered to inform the revisions to the Report.
B6-29	**Synthesis Report S 3.1.2.4**	Priority for Plan Submission: Recommend that Teck provide an explanation as to why the CoIs identified by Minnow and PLA (2012) were not also identified in this report.	From the information provided it is difficult to tell whether or not it is just a difference in methodologies or if conditions have changed.	MOE		27-Jun-2014	This advice will be incorporated into Annex K.1 DRAFT Aquatic Environment Synthesis Report revision as results will be compared to past water quality evaluations (e.g., Minnow and PLA 2012) to highlight and explain key similarities and differences.
B6-30	**Draft Aquatic Environment Synthesis Report 2014 Section 3.1.5**	Priority for Plan Submission: There is insufficient data for meaningful interpretation of water quality information provided for MU 6. MOE recommends conducting a complete review and analysis on seasonal datasets for multiple years (if available). MOE also recommends all future sampling in Lake Koocanusa to be conducted at least monthly during the ice-free season.	Limited 2013 data is included in this document (and the appendices). As a result, a complete review	MOE		27-Jun-2014	Monthly water quality monitoring in the reservoir was initiated in 2013 by Teck and all of this information was evaluated as part Annex K.1 DRAFT Aquatic Environment Synthesis Report. Additional evaluation of this information as well as the US Lake Koocanusa was completed to assess current baselines conditions and is incorporated in the Plan in Chapter 4 (Baseline Conditions) and Annex K.2 Evaluation of Element Concentrations Collected from Lake Koocanusa.

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B6-31	**Draft Aquatic Environment Synthesis Report 2014 Section 3.1.5**	Priority for Plan Submission: MOE recommends evaluating nitrogen (especially TN and NO3) as a potential CoI in regards to nutrient enrichment, along with phosphorus (an identified COPC) in MU 6.	Changes in nitrogen may lead to community composition changes in algal communities within Lake Koocanusa. Shifts from P-limitation to N-limitation (or co-limitation), can alter cyanobacteria populations and species composition, which in turn could lead to other changes in trophic structure within a lake. Also, while elevated levels (e.g., >500 µg/L) of total nitrogen can be associated with eutrophication, the inorganic forms (e.g., nitrate) are more likely to be taken up directly by algae and should generally, be of more concern. While nitrate is considered a primary CoI in other MUs, it is not included within Lake Koocanusa. This is an accurate assessment as far as toxicity is concerned, however, nitrate as a nutrient source and a constituent that may lead to eutrophication is not evaluated.	MOE		27-Jun-2014	This advice was incorporated into the evaluation of current baseline conditions in Lake Koocanusa as part of Chapter 4 (Baseline Conditions) of the Plan and Annex K.2 Evaluation of Element Concentrations Collected from Lake Koocanusa.
B6-32	**Draft Aquatic Environment Synthesis Report 2014 Section 3.2 & Appendix B**	Priority for Plan Submission: Recommend that sediment results be presented based on individual station location (in addition to MU) and the sampling date (i.e., 2011 vs. 2013) should be clear. Data from individual stations should be compared to appropriate SQGs.	Compiling all data based on MU over-simplifies the assessment and makes it difficult to determine spatial trends effects of the individual mines and discharges.	MOE		27-Jun-2014	The sediment quality assessment and Section 3.2 of Annex K.1 DRAFT Aquatic Environment Synthesis Report will be re-evaluated to streamline the evaluation steps and more clearly characterize and summarize sediment quality on a localized and constituent-specific basis (i.e., identify specific locations where mine-related parameters are above effects benchmarks). To support the step of comparing concentrations in mine-exposed areas to reference concentrations, Teck has provided plots showing the distribution of data at each reference station relative to the 95th percentile for each constituent to verify that the 95th percentile values are not biased by results for specific samples or stations; these plots will be incorporated into the Synthesis Report. Results will be compared over time for areas that have been sampled more than once.
B6-33	**Draft Aquatic Environment Synthesis Report 2014 Section 3.2.2.4**	Priority for Plan Submission: Recommend that additional discussion on study limitations of sediment toxicity studies is provided.	As noted by MoE in comments provided to Teck Apr 30/14, the sample size for sediment toxicity testing was too small (i.e., 3 receiving environment sites and 1 settling pond) to make definitive conclusions regarding sediment toxicity.	MOE		27-Jun-2014	Annex K.1 DRAFT Aquatic Environment Synthesis Report clearly states that there are limited sediment toxicity results to date. Future monitoring as part of the RAEMP will include additional toxicity sampling and evaluation as per details in the Plan in Chapter 10 (Monitoring).
B6-34	**Draft Aquatic Environment Synthesis Report 2014 S 3.3**	Priority for Plan Submission: Recommend reporting spatial distribution of calcite index results.	Table 3.2-12 summarizes the kilometres of stream bed affected by calcite deposition. However, to evaluate the potential impacts and cumulative effects associated with calcite deposition, information is needed on spatial distribution of impacts relative to mining operations.	MOE		27-Jun-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Synthesis Report or to inform future monitoring programs and reporting.
B6-35	**Draft Aquatic Environment Synthesis Report 2014 Section 3.4.2**	Priority for Plan Implementation: MOE recommends the continued assessment of the feasibility of monitoring periphyton communities, to complement other ongoing biomonitoring activities following a weight of evidence approach.	Section 3.4.2 primarily focuses on the inter-laboratory comparison of taxonomy and enumeration for split samples. It is unclear why this component was even conducted in the first place, and is something that can be overcome by choosing an appropriate set of standardized field and laboratory methods. There are several examples from the US, Europe, New Zealand, that have been successfully used in a variety of biomonitoring studies. A recent Canadian approach that could be adapted easily for use in BC is the Algal Bioassessment Protocol (ABP) by the Ontario Ministry of Environment (OMOE 2011). The ABP was designed to complement other water monitoring programs already in place in Ontario, such as the Provincial Water Quality Monitoring Network, the Ontario Stream Assessment Protocol and the Ontario Benthos Biomonitoring Network. The ABP identified that high resolution taxonomic identification of diatom communities was the optimal approach to periphyton biomonitoring. It also provides standardized methods for sample collection, lab prep, counting and identification, and data analysis A well designed, multi- assemblage biomonitoring program can provide valuable information on the risks to, and impacts on biological communities and overall stream health (Carlisle et al. 2008). Periphyton is at the base of the food chain, and their exclusion from a sampling program would be inappropriate. As a result, it is important to continue monitoring the biological community (periphyton) that is most sensitive to nutrient enrichment and responds the quickest to such changes (Stevenson et al., 2010). References: Carlisle, D. M., Hawkins, C. P., Meador, M. R., Potapova, M., and Falcone, J. (2008). Biological assessments of Appalachian streams based on predictive models for fish, macroinvertebrate, and diatom assemblages. Journal of North American BenthologicalSociety, 27, 16–37. Stevenson, R.J., PAN,Y and Van Dam, H. 2010. Assessing environmental conditions in rivers and streams with diatoms. In: The Diatoms: Applications for the Environmental and Earth Sciences, 2nd Edition, eds. John P. Smol and Eugene F. Stoermer. Cambridge University Press. 686 pgs. OMOE (Ontario Ministry of the Environment Environmental Monitoring and Reporting Branch). 2011. An Algal Bioassessment Protocol for use in Ontario Rivers. Last revision date: December 2011.	MOE		27-Jun-2014	This advice is being considered as part of development for the 2015 RAEMP study design. Discussions are ongoing with MOE to evaluate and define periphyton monitoring endpoints for the Elk River watershed.
B6-36	**Draft Aquatic Environment Synthesis Report 2014 Section 3.4-3.8**	Priority for Plan Submission: Recommend that the screening evaluation for identifying COPCs for tissue samples be fully described and relevant references including those to approaches adopted by other jurisdictions should be included.	Methodology and assumptions built into the screening evaluation need to be fully transparent so that the results can be interpreted. For example, it is unclear whether comparing the 95% UCL of the mean to benthic invertebrate and fish TRVs will adequately identify all areas that are at risk due to mining related constituents.	MOE		27-Jun-2014	The Screening-level Environmental Risk Assessment (SLERA) will be updated to first screen data relative to the reference 95th percentiles and thereby identify mine-related constituents in tissues. The report will clearly describe the reference data included versus excluded from the 95th percentile calculations (e.g., exclude data for mobile species sampled in reference areas located close to mine-exposed areas) and will present plots showing reference data distributions by area, species, and tissue type relative to the corresponding 95th percentile. For comparisons to Toxicity Reference Values (TRVs), the 95th percentile of data within each MU will be used rather than the UCL of the mean. Observed concentrations for individual species, tissue types, and locations will represent the numerators in hazard quotient (HQ) calculations. An attachment to the SLERA describes the various TRVs considered (and cites literature sources) and provides justification for the values chosen values. A table will be included in Appendix E of the Synthesis Report that summarizes the selenium TRVs that were chosen and literature sources (i.e., these values represent the denominator in HQ calculations. Potential dietary effects of selenium to amphibians will be addressed. All of this work will be included in the update and finalization of Annex K.1 DRAFT Aquatic Environment Synthesis Report.

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B6-37	**Draft Aquatic Environment Synthesis Report 2014 Section 3.6.1.2**	Priority for Plan Submission: Recommend that screening for fish include any CoIs identified in sediments or lower trophic levels, as water is not the only exposure pathway for fish	COPCs only included constituents identified in the surface water evaluation.	MOE		27-Jun-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. This advice will be considered to inform the revisions to the Annex K.1 DRAFT Aquatic Environment Synthesis Report.
B6-38	**Environment Synthesis Report 2014 Section 4**	Priority for Plan Submission: Recommend that a detailed methodology with rationale for all assumptions be given for each column presented in the MU evaluation report cards (Tables E1-E5).	It is not clear how the data in each column is calculated. A detailed methodology is needed to interpret the results.	MOE		27-Jun-2014	This advice will be incorporated into the revisions to Annex K.1 DRAFT Aquatic Environment Synthesis Report.
B6-39	**Environment Synthesis Report 2014 Section 4**	Priority for Plan Submission: Recommend that a list of rules are presented that describe how the "overall ranking" column is calculated, if this overall ranking is included in the report.	Currently there is no discussion given on how the multiple lines of evidence are evaluated to identify an overall ranking.	MOE		27-Jun-2014	This advice will be incorporated into the revisions to Annex K.1 DRAFT Aquatic Environment Synthesis Report.
B6-40	**Environment Synthesis Report 2014 Section 4**	Priority for Plan Submission: Recommend that the classification of calcite index values into good, fair and poor is suspended until additional research is conducted to determine the impacts of calcite on benthic populations.	The current classification is not based on scientific evidence. Further study is needed.	MOE		27-Jun-2014	This advice will be incorporated into the revisions to Annex K.1 DRAFT Aquatic Environment Synthesis Report.
B6-41	**Draft Aquatic Environment Synthesis Report 2014 Section 4.8**	Priority for Plan Implementation: MOE recommends completing a comprehensive multi-trophic level biological monitoring program on Lake Koocanusa to complement the water quality sampling.	As with the Elk River watershed, a weight of evidence approach is prudent to determine any potential impacts of mining activities on biological communities within downstream environments such as Lake Koocanusa.	MOE		27-Jun-2014	A comprehensive multi-trophic level biological monitoring program on Lake Koocanusa was initiated in January 2014. This program involves three separate monitoring cycles in the year to capture various monitoring endpoints (e.g., to correspond with fish species spawning, plankton and benthic invertebrate activity in the reservoir). The study design for this program has been provided to MOE and KNC with approval of scope of work provided by MOE.
B6-42	**Draft Aquatic Environment Synthesis Report 2014 Section 4.8**	Priority for Plan Submission: Recommend that data used for the evaluation of Lake Koocanusa (MU6) be referenced and clarification provided for zooplankton and fish data.	Section 4.8 seems to be missing data for burbot, which contained the highest measured concentration of Se in fish, which will skew these findings. The source for zooplankton data (Section 4.9.3), along with site locations, should be clarified.	MOE		27-Jun-2014	Annex K.1 DRAFT Aquatic Environment Synthesis Report update will include clarification of all data used in evaluation of conditions within the reservoir. Chapter 4 (Baseline Conditions) included an evaluation of all data from both the Canadian and US portions of the reservoir. Details of the evaluation are provided in Annex K.2 Evaluation of Element Concentrations Collected from Lake Koocanusa.
B6-43	**Draft Aquatic Environment Synthesis Report 2014** **Appendix C**	Priority for Plan Implementation: Attachment A : Periphyton concentrations from within the Elk Valley, BC – Selenium MOE recommends adding periphyton tissue selenium as a COPC, and conducting further analyses. MOE also recommends considering adding a component to analyze diatom frustule deformities.	While there is no referenced TRV for selenium in periphyton tissue, further evaluation of the bioaccumulation of selenium in algal tissue is warranted. Visually, the data plots indicate that there may be statistically significant differences (note that significance is not indicated on the plots), between reference sites and those in MU 1, 2 and 3. Considering periphyton is at the base of the food chain, this apparent increase in tissue selenium is concerning. Furthermore, metal contamination has been shown to contribute to diatom frustule (external layer made of silica [cell walls]) deformities, and an examination of the proportional abundance of these deformities has the potential to be used as a measure of metal contamination (e.g., Falasco et al., 2009; Duong et al., 2010). Although these references do not specifically test for effects of high selenium concentrations, they do indicate the potential for the bioaccumulation of selenium to affect diatom growth and morphology. References: Falasco, E, Bona, F, Ginepro, M, Hlúbiková,D, Hoffmann, L and Ector, L. 2009. Morphological abnormalities of diatom silica walls in relation to heavy metal contamination and artificial growth conditions. Water SA 35(5): 595-606. Duong, TT., Morin, S., Coste, M., Herlory,O., Feurtet-Mazel, A. and Boudou, A. 2010. Experimental toxicity and bioaccumulation of cadmium in freshwater periphytic diatoms in relation with biofilm maturity. Science of The Total Environment, vol. 408, p. 552-562.	MOE		27-Jun-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B6-44	**Draft Aquatic Environment Synthesis Report 2014 Appendix C**	Priority for Plan Submission: Recommend describing the data that was used to calculate the Exposure Point Concentration for each component (sample locations, dates, species, etc.)	Currently it is not clear what data are used to determine the EPC	MOE		27-Jun-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B6-45	**Draft Aquatic Environment Synthesis Report 2014 Appendix D**	Priority for Plan Submission: Recommend the use of approved WQGs in the calculation of WQ Index values.	WQI values should not be calculated using benchmark values given that the validity of these benchmarks has not yet been confirmed. Using these may lead to inaccurate index values. For example, following standard approaches, the WQG of 2 µg/L would be applied to all waterbodies. In this assessment values of 19 µg/L is applied in MU1 and 52 µg/L is used in MUs 2 – 5. Also, cadmium and zinc should be included in the WQI using hardness based guidelines	MOE		27-Jun-2014	This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting. The site-specific benchmarks that have been developed based on input from the TAC and toxicity working group. These values have been used to evaluate water quality in this region as there is good technical rational for those values in consideration of effects to aquatic organisms which is what the report card is intended to evaluate. A detailed criterion for each category and line of evidence is included in the Appendix E of Annex K.1 DRAFT Aquatic Environment Synthesis Report and will be provided in the final version of this report.
B6-46	**Draft Aquatic Environment Synthesis Report 2014 Appendix D**	Priority for Plan Submission: Recommend using the low SQG as the threshold for calculating the SeQG.	The low SQG are "safe levels of substance that will protect aquatic life". A "good" ranking under the SeQG means that, "conditions rarely depart from natural or desirable levels". Using the low SeQG is consistent with the CCME definitions.	MOE		27-Jun-2014	This advice will be incorporated into the update on Annex K.1 DRAFT Aquatic Environment Synthesis Report which will include one of the sediment quality index scenarios presented in Appendix D will use the low sediment quality guideline or reference 95th percentile, whichever is higher, so that results are not solely based on high sediment quality guidelines.

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B6-47	**Review of: Phase 1 Mixture Toxicity Testing and Phase 2 Site-specific Toxicity Testing**	Priority for Plan Implementation: Amphibians were not considered in the mixture toxicity study We recommend that amphibians be included in future toxicity work.	Amphibians are known to occur in the area of interest. The authors of the report suggest that the three test species that were considered (i.e., Ceriodaphnia dubia, Hyalella azteca, and Oncorhynchus mykiss) were more sensitive than amphibians precluding the latter's inclusion in the study. However, toxicant mixtures represent a complex exposure medium which may or may not result in species-specific responses. At least some evidence should be available to demonstrate that results from the three chosen test species will still be protective for amphibians.	MOE		27-Jun-2014	Chapter 10 (Monitoring) outlines a toxicology supporting study that will be designed and implemented during Plan implementation. The need for amphibian toxicity testing will be considered during the development of a detailed study design. Consistent with the procedure employed within the RAEMP the need for additional and/or future studies on toxicity assessments will be guided using the Data Quality Objective process.
B6-48	**Review of: Phase 1 Mixture Toxicity Testing and Phase 2 Site-specific Toxicity Testing**	Priority for Plan Submission: Recommend that Fig. 1 in the mixture toxicity study provide some statistical support for the apparent modifying influence of Ca and Cl.	This data is necessary to interpret the results.	MOE		27-Jun-2014	Figure 1 of the Phase 1 Mixture Toxicity Study provided to the TAC (available on TAC SharePoint) illustrates the response of lake trout and rainbow trout exposed to varying levels of nitrate in lab control waters and lab waters supplemented with calcium and chloride. The results generated using calcium and chloride supplementation were not used to develop the nitrate benchmarks outlined in the Plan. As such, they are of limited relevance, and further investigation and interpretation of these data are not required to support the Plan.
B6-49	**Review of: Phase 1 Mixture Toxicity Testing and Phase 2 Site-specific Toxicity Testing**	Priority for Plan Submission: In the Site-Specific Toxicity Data Report (Nautilus Environmental 2014), where river waters were spiked with either SO4 or NO4, only raw data were provided for the nitrate toxicity tests. We recommend an analysis of effects based on data presented. □	Tables 13 and 14 demonstrate reproduction impairment in C. dubia with increasing NO4 concentrations. However, no attempt is made to establish the NO4 concentration that induces the effect.	MOE		27-Jun-2014	The Site-Specific Toxicity Data Report is a data report, without interpretation. Interpretation of the data is provided in Annex F Benchmark Derivation Report for Nitrate and Sulphate, Appendix B of the Plan.
B6-50	**Review of: Phase 1 Mixture Toxicity Testing and Phase 2 Site-specific Toxicity Testing**	Priority for Plan Implementation: In the site-specific toxicity data report, the authors chose to test rainbow trout using a non-standard method (Lazorchak and Smith, 2007). We recommend this study be repeated using a standard protocol for a long-term test on rainbow trout.	In using this protocol, no discernible effect of nitrate was observed. However, it is uncertain if that's because there's no effect of nitrate or the protocol used was simply not sensitive enough to detect an effect.	MOE		27-Jun-2014	A long-term test using rainbow trout has already been completed for nitrate. It was completed as part of the Phase 1 Mixture Toxicity Study (provided to TAC and available on TAC SharePoint), and results of this test were considered in the development of the nitrate benchmarks discussed in the Plan.
B6-51	**Calcite Management Plan (Draft Chapter 5)**	Priority for Plan Implementation: Recommend that Teck looks at ecological value of all reaches showing CI>0.50 and manage based on this information.	Stream reaches showing calcite indices (CI) over 2.0 may not necessarily be the most valuable reaches to focus on for management. Until more is known, it may be more beneficial to the Elk Valley aquatic populations to focus treatment on stream reaches with high (or high potential) ecological value, rather than simply starting with all of the most highly affected stream reaches.	MOE		27-Jun-2014	Teck will consider incorporating this advice during Plan implementation. For the purposes of the Plan and consistent with TAC advice received during TAC meeting #6, Teck has incorporated the use of the concretion score as a method of identifying priority streams for target setting.
B6-52	**Calcite Management Plan (Draft Chapter 5)**	Priority for Plan Submission: Recommend clarifying how "receiving environment" was determined, in terms of eliminating stream reaches from potential management in Figure 9. (E.g. Smith Pond Outlet)	While historically "receiving environment" has often been defined as locations below sedimentation ponds, this may not always be appropriate for parameters other than TSS, including calcite. Discussion of an initial dilution zone for calcite precipitation may be valuable to clarify how an impacted tributary may interact with the main stem and how this will be managed.	MOE		27-Jun-2014	Teck has clarified the determination of "receiving environment" in the Plan (see Chapter 7 (Calcite Management), although in applying the decision framework, it is necessary to consider the stream reaches on a case-by-case basis. For example, the Smith Pond Outlet is not considered part of the receiving environment because the pond typically does not overflow.
B6-53	**Calcite Management Plan (Draft Chapter 5)**	Priority for Plan Submission: Recommend providing a summary of data collected on the reference streams.	Teck has stated that all reference streams show CI<0.50 – to support this statement a table clearly summarizing reference stream reaches and CI values is needed.	MOE		27-Jun-2014	Teck has incorporated a table into Annex J.3 2013 Calcite Monitoring Program that clearly summarizes the reference stream reaches and CI values.
B6-54	**Assessment of Protection of Human Health and Groundwater (Draft Chapter 6) Groundwater**	Priority for Plan Implementation: Recommend that further information be compiled, related to but not limited to, the identification and characterization of: - Aquifers - Hydraulic gradients - Recharge areas Geologic structures such as faults	There is limited information on the groundwater resources and hydrogeology of the Elk Valley area. This makes it difficult to actively manage and protect groundwater resources in the Valley.	MOE		27-Jun-2014	The drinking water evaluation provided valuable insight into groundwater resources and aquifer vulnerability in the Elk River floodplain. The drinking water evaluation and a preliminary hydrogeological conceptual model are presented in Annex L.2 Elk Valley Groundwater Summary Report. The understanding developed from the drinking water program provided sufficient information to support the existing strategy of surface water management will protect groundwater in the Elk River floodplain as shallow groundwater is hydraulically connected to surface water. Additional evaluation of groundwater and existing management strategies is proposed Annex L.3 Regional Approach to Protection of Groundwater.
B6-55	**Assessment of Protection of Human Health and Groundwater (Draft Chapter 6) Groundwater**	Priority for Plan Submission: Recommend identifying uncertainties associated with estimates and predictions used in groundwater assessment.	Many aspects of hydrogeologic parameters estimates, conceptual/numerical model predictions, and impact predictions may be significantly affected by unexpected hydrogeologic or geologic conditions or insufficiently conservative parameters used in the analyses. For example: Unexpected high groundwater or surface water flow volumes during freshet, which may cause pulses in contaminants and may affect the receiving environment more than expected, • Lowered or increased groundwater levels at distances significantly greater than indicated by the models, which for example could be the result of sustained groundwater pumping at certain times of the year, • Groundwater quality degradation at significantly greater distances and at greater concentrations than predicted, which may affect down-gradient groundwater users and discharge areas, and Detection of contaminated groundwater at unexpected locations, which may affect down-gradient groundwater users and discharge areas	MOE		27-Jun-2014	A discussion of data gaps and uncertainties is presented in Annex L.2 Elk Valley Groundwater Summary Report.. Additional analysis of uncertainties will be presented in a regional hydrogeological conceptual model based on existing information as proposed in Annex L3 Regional Approach to Protection of Groundwater.
B6-56	**Assessment of Protection of Human Health and Groundwater (Draft Chapter 6) Groundwater**	Priority for Plan Submission : Recommend that rationale be provided for carrying forward constituents that are not compared to guidelines	Several parameters (phenanthrene, inorganics) are carried forward for analysis without basis. These parameters are later eliminated from analysis for lack of guideline values	MOE		27-Jun-2014	The rationale for evaluating constituents lacking guidelines is provided in Annex L.1 Human Health Evaluation of Current Baseline Conditions. When a guideline was not available for a constituent, it was carried forward for further consideration to avoid omission of constituents that may contribute to total risk. In most cases, the lack of a guideline reflected the lack of a toxicity reference value and low toxicity of a particular constituent.

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B6-57	**Assessment of Protection of Human Health and Groundwater (Draft Chapter 6) Groundwater**	Priority for Plan Submission : Recommend that rationale be provided for carrying forward constituents that are not compared to guidelines	Several parameters (phenanthrene, inorganics) are carried forward for analysis without basis. These parameters are later eliminated from analysis for lack of guideline values	MOE		27-Jun-2014	Refer to response Advice Item No. B6-56.
B6-58	**Assessment of Protection of Human Health and Groundwater (Draft Chapter 6) Groundwater**	Priority for Plan Implementation : Recommend that the groundwater parameter suite include major drinking water quality parameters (metals and organics), similar to the parameter suite for surface water monitoring for wells on public supplies.	The groundwater monitoring parameter suite is limited to 10 inorganic constituents, many with no guideline value. Because groundwater is primarily used for drinking water, the parameter suite is not adequate to evaluate the potability of the source water and potential human health risks. For example, arsenic is a groundwater constituent of concern that was found to exceed guidelines in surface waters, but is absent from the groundwater suite. At a minimum, the report should discuss the rationale for groundwater parameter suite.	MOE		27-Jun-2014	An evaluation of sampling parameters for the drinking water sampling program was conducted by reviewing summarized historical watershed surface water sample data and comparing them with the Guidelines for Canadian Drinking Water Quality (GCDWQ) developed by Health Canada (2012). Antimony, arsenic, and lead were constituents also identified above drinking water guidelines in surface water; however, in very few samples (i.e., six or less) and only where other constituents (specifically selenium) were elevated. These constituents and select others included in the list, have a number of other anthropogenic and natural sources and therefore the potential for ambiguous or unknown sources is higher. Selenium was confirmed to be the main indicator of mining influences with the highest potential to exist at concentrations above drinking water guidelines, the remaining parameters were selected to include Order constituents and other constituents for general chemistry.
B6-59	**Assessment of Protection of Human Health and Groundwater (Draft Chapter 6) Groundwater**	Priority for Plan Submission: Recommend that all relevant details and rationale of the groundwater quality monitoring study be provided in the report or through reference to other reports.	There is no information about the goals and design of the groundwater quality monitoring study, including sampling protocols and QA/QC.	MOE		27-Jun-2014	Goals, objectives, design of the study, sampling protocols, and QA/QC procedures are included in Annex L.2 Elk Valley Groundwater Summary Report.
B6-60	**Assessment of Protection of Human Health and Groundwater (Draft Chapter 6) Groundwater**	Priority for Plan Submission: Recommend that an appraisal of the limitations of the groundwater monitoring study be provided in terms of implications on the human health assessment	There is no discussion or assessment of the monitoring program in terms of its adequacy to characte	MOE		27-Jun-2014	Limitation, data gaps, and uncertainties are included in Chapter 5 (Assessment of Protection of Human Health and Groundwater) and in Annex L.2 Elk Valley Groundwater Summary Report. The groundwater monitoring study achieved a high rate of response and participation by well owners, ensuring that a representative dataset was available for analysis in the human health assessment. Selenium was the only constituent exceeding guidelines, and a program is in place to provide replacement water to affected residents. Even the highest reported well selenium concentrations did not exceed health-based benchmarks. While seasonal variation is not fully characterized, the lack of any wells exceeding health-based benchmarks suggests that further monitoring would not change the conclusions of the human health evaluation.
B6-61	**Assessment of Protection of Human Health and Groundwater (Draft Chapter 6) Groundwater**	Priority for Plan Implementation: Recommend that a more comprehensive description and assessment of potential migration pathways for constituents of concern between mine activities and the groundwater supply aquifers be included. This should include a description of regional groundwater flow patterns and recharge areas, groundwater interactions with surface waters, the effects of groundwater withdrawals on the SW/GW interactions, and the mobility of mine related constituents. Once all potential pathways are identified, the assessment should clearly explain why or why not each of these pathways can potentially affect human health of existing and future groundwater users. Recommend presenting this information in the form of a conceptual model to allow for an assessment of combined risks to groundwater	Section 1.6 describes potential migration pathways for mine related constituents to reach GW supplies. However, much of the discussion focuses on the Elk River Valley floodplain, where there could be losing stream conditions down gradient from river meanders. Other potential pathways were not discussed. For example: • the location of potential groundwater recharge areas down gradient from mine influenced activities, groundwater recharge areas along stream channels in upland areas, along alluvial fans, and grade breaks; • water wells in the flood plain can potentially induce infiltration from the river into the aquifer depending on their location, pumping rate and depth; and • Cumulative pumping from the surficial aquifer can potentially change the nature of SW/GW interactions from gaining to losing stream conditions. None of these potential pathways were discussed.	MOE		27-Jun-2014	The respective Operations are assessing source transport pathways within and adjacent to their property boundaries to improve understanding of groundwater at an operational (local) level and confirm groundwater flow and quality regimes in upland areas. The regional monitoring program included one sampling event, and a quarterly sampling program is underway to further assess conditions in floodplain areas. The information obtained through the additional investigations plan will be used to confirm migration pathways, evaluate existing management strategies in the context of these pathways, and develop supplemental management strategies as required and described in Annex L.3 Regional Approach to Protection of Groundwater.
B6-62	**Assessment of Protection of Human Health and Groundwater (Draft Chapter 6) Groundwater**	Priority for Plan Submission: Recommend that the conclusion that groundwater will be protected through protection of surface water quality be substantiated through the inclusion of relevant data and evidence.	The conclusion that GW will be protected through protection of surface water quality does not appear to be fully supported by the evidence reviewed in this section of the report. There is no indication that there has been a comprehensive characterization of the GW flow system, including identification of recharge areas in the upland areas, and a comprehensive source analysis of mine and non-mine sources. Without such knowledge it is not accurate to dismiss other potential migration pathways within and outside of the floodplain area.	MOE		27-Jun-2014	Annex L.1 Human Health Evaluation of Current Baseline Conditions and Annex L.2 Elk Valley Groundwater Summary Report provide information to support the existing strategy of surface water management for mine-related constituents to protect groundwater in the Elk River floodplain as shallow groundwater is hydraulically connected to surface water. Additional characterization and assessment of groundwater on the regional scale, including the floodplain, is included in Annex L.3 Regional Approach to Protection of Groundwater.
B6-63	**Assessment of Protection of Human Health and Groundwater (Draft Chapter 6) Human Health**	Priority for Plan Submission : The Plan needs to clearly identify where, when, and the magnitude of exceedances of generic health-based guidelines for short and long-term targets. Please note these are MOE or Health Canada guidelines and not the risk-based guidelines provided by Environ (referred to as pathway specific benchmarks)	Decisions related to the protection of public health require specific information about where guidelines may be exceeded. This allows public health agencies to identify risks and determine actions as appropriate. The MOE uses generic health-based guidelines as the benchmark for ensuring public health protection. If these guidelines are exceeded, the authority lies with Medical Health Officers to determine what action, monitoring or investigations are necessary.	MOE		27-Jun-2014	The current baseline evaluation step of the human health assessment includes a screening of surface water data using generic MOE and Health Canada guidelines. The results of this screening are included in Chapter 5 (Assessment of Protection of Human Health and Groundwater) and Annex L.1 Human Health Evaluation of Current Baseline Conditions.

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B6-64	**Adaptive Management – (Draft Chapter 10)** **Objectives**	Priority for Plan Submission: The Adaptation Management Framework will be very important in implementing the EVWQP. It is recommended that the framework clearly links to the overarching (Order) objectives (and a lower tier of more specific objectives), monitoring specific to the EVWQP, the Regional Aquatic Effects Monitoring Plan, and the critical uncertainties that are associated with the current EVWQP implementation plan. It should also link to the impact hypotheses that are to be tested in the monitoring program during the implementation of the Plan.	Advice was provided as to the main items that should be included in the AM framework. Examples of similar frameworks that should be used to guide the development of the AM are included below. The BCHydro Water Use Plans (https://www.bchydro.com/about/sustainability/conservation/water_use_planning.html) provide an approach to adaptive management (often without explicit reference). They identify clear objectives and adaptive approaches for meeting the objectives. Also further studies are identified to help reduce uncertainties. For example the Bridge River Water Use Plan – https://www.bchydro.com/about/sustainability/conservation/water_use_planning/lower_mainland/bridge_river.html. Western Forest Strategy – Adaptive Management Summary – http://www.for.gov.bc.ca/hfd/library/FIA/2010/LBIP_6903009.pdf BC Ministry of Forest Lands and Natural Resource Operations Adaptive Management Initiatives – http://www.for.gov.bc.ca/HFP/amhome/index.htm References[http://www.ncbi.nlm.nih.gov/pubmed/17205914] https://circle.ubc.ca/bitstream/id/21174/18%20Love%20Paper.pdf http://www.fs.fed.us/pnw/pubs/pnw_gtr654.pdf ftp://ftp.for.gov.bc.ca/HFP/external/!publish/Web/AMHOME/SUMMARY/Amsumms.htm Gregory, R., Ohlson, D., and J. Arvai. Deconstructing Adaptive Management: Criteria for Applications to Environmental Management. Ecological Applications, 16(6), 2006, pp 2411-2425	MOE			This advice has been incorporated in the Chapter 11 (Adaptive Management). Chapter 11 includes clear links to the Order objectives, more specific objectives related to adaptive management of the Plan during implementation, and clear linkages to the RAEMP, and work to address uncertainties. Key questions/hypothesis will be considered and developed during detailed study designs for future monitoring cycles and analyses for adaptive management.
B6-65	**Adaptive Management – (Draft Chapter 10) Links to Monitoring**	Priority for Plan Submission: It is recommended that further details be given that will clarify how the adaptive monitoring plan will be linked to ongoing monitoring. Sub-recommendations include: • more consideration be given to how frequent monitoring results should be evaluated; and • the adaptive management approach integrates with cumulative effects assessment monitoring.	It is unclear in Chapter 10 whether the frequency of evaluating the monitoring results is appropriate for all monitoring and whether this would enable effective adaptive management. If impact hypotheses are added, different monitoring and evaluation frequencies may need to be considered (i.e., different monitoring programs treated differently but appropriately for what is being monitored). Also, adaptive management is very much about protection of populations and the cumulative effects impact to these populations. This is a key monitoring component	MOE			Subsequent to TAC Meeting #6, Chapter 11 (Adaptive Management) was updated to provide clear linkages between adaptive management and ongoing monitoring.
B6-66	**Implementation and Adaptive Management (Draft Chapter 10) Uncertainty and Research**	Priority for Plan Submission: It is recommended that the Adaptive Management plan identify uncertainties related to the development of targets and to any gaps in the science and information used to develop these targets. It is further recommended that priority research necessary to fill these gaps is identified	The concept of uncertainty is not identified as a key issue. As the water quality targets themselves are uncertain, any uncertainties or risks should be addressed in the adaptive management approach. Uncertainties identified are focused on treatment technology and source control R&D. There is nothing about additional research on gaps in science, looking at uncertainly, etc.	MOE			Chapter 11 (Adaptive Management) identifies supporting studies to address uncertainties in the water quality targets, including a ecotoxicology supporting study, updates to the water quality and bioaccumulation models, incorporation of future advances in sciences and ongoing review and adaptive management of monitoring data.
B6-67	**Adaptive Management – Diagrams**	Priority for Plan Submission: It is recommended that the adaptive management diagrams represent a feedback loop.	The AM process is ongoing and cyclical. Once decisions are made and adaptation is implemented, the process of monitoring, evaluation, decision and adaptation begin again.	MOE			The adaptive management process diagram in Chapter 11 (Adaptive Management) includes a feedback loop.
B6-68	**Adaptive Management Targets**	Priority for Plan Submission: Recommend linking the adaptive management plan to the monitoring plan to assess the frequency of the adaptive management cycle for review/calibration given the frequency of monitoring and anticipated detection of trends.	Targets are based on models that need to be tested and verified. A clear description of the adaptive management cycle and monitoring.	MOE			Chapter 11 (Adaptive Management) and Chapter 10 (Monitoring) are linked and both utilize a common monitoring table that links monitoring and assessment endpoints through the conceptual site model.
A7-1	**Chapter 1 Introduction**	Clarification needed for statement that "To date, studies and monitoring conducted by Teck indicate that selenium concentrations generally remain below levels that would affect populations of fish and other sensitive animals in the mainstem of the Elk River and the Fording River below Josephine Falls." . - Revise to reflect that selenium concentrations in some places are at levels that could affect a fish species population.	The word generally is too vague. Please clarify. From our understanding, there is at least one Order location, and numerous tributaries, where concentrations will still exceed critical effects levels.	MT Govt	EC	8-Jul-2014	This advice is incorporated in Chapter 1 (Introduction) of the Plan.
A7-2	**Chapter 4 Current Baseline Conditions**	Provide engineering type schematics with baseline water quality concentrations for selenium and nitrate in the body of Chapter and all four in the annex.	Facilitates the evaluation of monitoring data.	MOE	UBC	8-Jul-2014	A schematic of the water quality monitoring stations has been incorporated into the Plan in Chapter 4 (Baseline Conditions) to support data tables with selenium and nitrate concentration evaluations.
A7-3	**Chapter 4 Current Baseline Conditions**	Related to the highlight bullet "Selenium and nitrate are the two constituents that most frequently exceed B.C. water quality guidelines in the Fording and Elk rivers; however, toxicity tests have not shown adverse effects on sensitive aquatic life" (Pg. 4-2, line 22-23): - Add text that the bioassessment data did show impacts in tributaries.	Improves technical accuracy of statement.	UBC	EC	8-Jul-2014	This advice has been accepted and incorporated into the Plan in Chapter 4 (Baseline Conditions) in the Chapter overview section to clarify that bioassessment data has determined effects in some mine-influenced tributaries.
A7-4	**Chapter 4 Current Baseline Conditions**	Regarding the highlight bullet "Data collected to date indicate that selenium in fish tissues is below levels that would be harmful to fish populations" (Pg. 4-2): - refine wording to reflect that this conclusion depends on what datasets you do or do not include - consider that for some species, we do not know their sensitivity, so making a broad statement on this point is beyond what we know at this time.	Improves technical accuracy of statement.	UBC	MT Govt	8-Jul-2014	Summary bullets have been updated in Chapter 4 (Baseline Conditions) to improve technical accuracy of statements by reporting exceedances per fish species.

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A7-5	**Chapter 4 Current Baseline Conditions**	Regarding the highlight bullet "Data collected to date indicate that selenium in fish tissues is below levels that would be harmful to fish populations" (Pg. 4-2): - Add text that selenium concentrations in some species are approaching or exceeding guidelines (e.g. Longnose Sucker and Peamouth Chub)	Improves technical accuracy of statement.	MT Govt		8-Jul-2014	Summary bullets have been updated in Chapter 4 (Baseline Conditions) to improve technical accuracy of statements by reporting exceedances per fish species.
A7-6	**Chapter 4 Current Baseline Conditions**	AdviceInclude a table of the guidelines that were used to screen surface-water chemistry data from the Elk Valley in the main body of the report.	The first step of the evaluation of existing surface water chemistry data involves screening against Water Quality Guidelines (WQGs). The reader needs to know what WQGs were used in the screening process.	KNC	EC	8-Jul-2014	This advice had been incorporated in the revision to Chapter 4 (Baseline Conditions) to clarify guidelines used in comparison. The revised DRAFT Aquatic Environment Synthesis Report will include these revisions (See Annex K.1 DRAFT Aquatic Environment Synthesis Report).
A7-7	**Chapter 4 Current Baseline Conditions**	Develop a single, consolidated conceptual site model (CSM) that includes both physical and chemical stressors (Figure 4.2).	The current baseline conditions chapter of the Elk Valley Water Quality Plan (EVWQP) describes a CSM for the designated area. However, this CSM does not include physical stressors. This makes it difficult to develop hypotheses regarding the interactive effects of multiple stressors or the cumulative effects of multiple anthropogenic activities. Therefore, a single, consolidated CSM that includes both physical and chemical stressors needs to be developed.	KNC		8-Jul-2014	This advice has been incorporated by updating Figure 4-2 of the Plan (Chapter 4 [Baseline Conditions]) with a statement regarding consideration of physical stressors in the appropriate pathway.
A7-8	**Chapter 4 Current Baseline Conditions**	Include a table in Chapter 4 that provides a means of identifying the data used to evaluate current baseline conditions. This table needs to describe the data available for media type for each of the tributaries and mainstem by management unit (KNC to provide example)	Presentation of the information in this way provides a broad perspective on the data that were used to facilitate a cursory characterization of current baseline conditions and supports subsequent identification of data gaps.	KNC		8-Jul-2014	This advice is incorporated in Appendices A, B and C of Annex K.1. DRAFT Aquatic Environment Synthesis Report. The volume of data of these Appendices precluded their inclusion as part of Chapter 4 (Baseline Conditions).
A7-9	**Chapter 4 Current Baseline Conditions**	Consider, for Synthesis Report, a sensitivity analysis that uses flow-weighted averages (Pg. 4-8, Line 12-13).	None provided.	KNC		8-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring reporting.
A7-10	**Chapter 4 Current Baseline Conditions**	In addition to reporting the frequency of exceedance, calculate and report the maximum hazard quotients based on a comparison of measured Constituent of Interest (CoI) concentrations to each of the selected WQGs for each sampling station in each Management Unit (MU). The results of this analysis need to be tabulated and presented in the text of the main report for all analytes. . (eg. Table 4.1)	Most of the underlying surface water chemistry data used in the evaluation of existing water quality conditions were obtained from grab samples collected on a monthly or less frequent basis. Therefore, all of these results (with the exception of samples collected as part of a 5-in-30 day sampling event) should be considered to represent mean monthly concentrations of the CoIs in surface water and should be compared to long-term WQGs. Hence, exceedance of a long-term WQGs in one or more surface water samples represents a condition that could adversely affect aquatic organisms. This analysis will provide relevant information on current water quality conditions.	KNC		8-Jul-2014	This advice has been incorporated into Chapter 4 (Baseline Conditions) tables in Section 4.3 on surface water evaluation.
A7-11	**Chapter 4 Current Baseline Conditions**	Remove high non-detects prior to identifying COPCs.	High non-detect values (i.e., samples with non-detect concentrations that are higher than the respective screening threshold) should be excluded prior to identifying Constituents of Potential Concern (COPCs) to reduce the probability of falsely identifying COPCs.	KNC		8-Jul-2014	This advice was not incorporated as it would have eliminated constituents being identified as potentially exceeding guidelines. For the purposes of the Plan, constituents with elevated analytical detection limits (e.g., polycyclic aromatic hydrocarbons in sediments) were identified as an uncertainty and conservatively as exceeding their respective guidelines.
A7-12	**Chapter 4 Current Baseline Conditions**	In Section on fish populations (S. 4.3.5), include summary of information on Longnose Sucker.	Improves communication of technical data.	MOE	MT Govt	8-Jul-2014	Information on the longnose sucker population work completed in 2013 has been included in Chapter 4 (Baseline Conditions) and more detail can be found in Annex K.1 DRAFT Aquatic Environment Synthesis Report.
A7-13	**Chapter 4 Current Baseline Conditions**	Regarding summary text of Figure 4.15 "Cumulative distribution of fish ovary selenium concentrations from Lake Koocanusa in relation to concentration-response data for brown trout": - the statement that the total risk to fish populations is 1.4% is not an accurate statement on the risk to each species. Consider having a table with the integrated risk for each species in Ch. 4. - If Table can not be provided, remove Figure 4.15 and related text.	None provided	UBC	MT Govt	8-Jul-2014	Figure 4.15 and supporting text has been removed from Chapter 4 (Baseline Conditions).
A7-14	**Chapter 4 Current Baseline Conditions**	Recommend using the draft USEPA water quality criteria in addition to the use of the draft fish tissue criteria (Pg. 4-36)	Makes the evaluation more comprehensive. It should be noted that both water and tissue criteria are draft at this time.	MT Govt		8-Jul-2014	This advice has been accepted and incorporated into the Plan Chapter 4 (Baseline Conditions).
A7-15	**Chapter 4 Current Baseline Conditions**	In addition to using the upper confidence level of the mean, use the 95th percentile of the exposure for the calculation of hazard quotients for all management units. If this can not be done, provide a suitable caveat.	Due to the steepness of the Se dose response relationship, hazard quotients based on the upper confidence level of the mean may underestimate risk estimates.	UBC		8-Jul-2014	This advice has been accepted and incorporated into the Plan Chapter 4 (Baseline Conditions).
A7-16	**Chapter 4 Current Baseline Conditions**	Reference Areas: For the evaluation of Se fish tissue concentrations, recommend changing "comparison to reference areas" to "comparison with non mine-influenced water bodies" with a disclaimer (i.e., footnote) stating that these sites have not been evaluated to determine if they are appropriate reference areas in terms of hydrological and biogeochemical similarity. Recommend that as part of the Local Aquatic Effects Monitoring Program (LAEMP) and Regional Aquatic Effects Monitoring Program (RAEMP), a process to develop selection criteria, identify candidate reference areas, and evaluate the appropriateness of those reference areas (in terms of hydrological and biogeochemical similarity) is conducted.	These sites have not been evaluated to determine if they are appropriate reference areas in terms of hydrological and biogeochemical similarity.	KNC	UBC MT Govt MOE	8-Jul-2014	This advice has been accepted and incorporated into the Plan Chapter 4 (Baseline Conditions) and Annex K.2 Evaluation of Element Concentrations Collected from Lake Koocanusa.

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A7-17	**Chapter 4 Current Baseline Conditions**	Do not include the integrated data evaluation report cards from the Synthesis Report in an appendix to the Plan until such time that they can be properly developed (i.e. in a manner consistent with the Conceptual Site Model and effects hypotheses) and validated. at this stage, just iFor Plan submission, include a placeholder for the report card tables and caveats on the description text.	The evaluation of overall environmental quality was summarized in the draft watershed report cards that were presented at TAC-Meeting 6. Each of the indicators of environmental quality used in the evaluation has a number of limitations that make it inappropriate for use at this time. For example, the Water Quality Index (WQI) is not sufficiently described and is inconsistent with the CCME (2001) WQI. The calcite index is not linked to biological effects; so, the classifications that were selected are arbitrary. The benthic invertebrate community structure analysis is strongly affected by the selection of reference station and the treatment/analysis of associated data. The benchmarks for calculating the metrics for assessing selenium in tissues are incompletely described. Collectively, these limitations render the various metrics of uncertain value for characterizing environmental quality conditions in the Elk Valley. Moreover, insufficient and inappropriate rationale has been provided on how the various metrics have been considered together to develop an overall rank for a sampling station. Importantly, key mining-related stressors that could substantially affect ecological receptors have not been evaluated in the report card [e.g., stream-bed substrate quality, Total Suspended Solids (TSS), changes in streamflow, exposure to groundwater during surface water recharge (i.e., during base flow periods), etc.]. Therefore, the integration of multiple data types and associated report card are not reliable tools for evaluating existing environmental conditions in the Elk Valley.	MOE	UBC EC KNC	8-Jul-2014	This advice is incorporated into Annex K.1 DRAFT Aquatic Environment Synthesis Report and a cover memorandum was generated explaining ongoing updates to Report.
A7-18	**Chapter 4 Current Baseline Conditions**	Recommend changing the title of the “Canadian Water Quality Index” to another title.	The methods of the Canadian Water Quality Index were not followed to calculate the WQI values in this chapter.	EC	UBC	8-Jul-2014	This advice will be considered as part of the update to Annex K.1 DRAFT Aquatic Environment Synthesis Report. See response Action Item No. B6-20 for additional details.
A7-19	**Annex K. 2**	Add text that the frequency of exceedances may not reflect the actual differences in mean concentrations between exposed and non-mine affected areas, e.g.potentially influenced by the # of samples (S. 1.2.1).	The text seems to suggest that non-mine impacted (reference) fish, have Se concentrations that routinely exceed the guideline, more so than the fish in Lake Koocanusa. The statement is misleading as the percent of exceedances are strongly influenced by the a few species of fish that have a high number of samples (see follow-up in item # 20 for further advice).	MT Govt		8-Jul-2014	The frequency of exceedances is not based on mean concentrations nor is it a reflection of potential differences between ‘reference; non-mine influenced’ fish tissue samples or those collecting within the reservoir. The frequency of samples exceeding a guideline is based on individual species and the total number of samples for that species. Therefore adding the suggested text would not provide clarity.
A7-20	**Annex K. 2**	Add text in this section describing differences between the mean selenium concentration in tissue (muscle and ovary) of the exposed areas (i.e. Lake Koocanusa) and non-mine impacted areas, specifically addressing why mean in Lake Koocanusa appears to be higher than non-mine impacted sites in nearly all species. Also note whether the difference is statistically significant. (S. 1.2.3).	It is worth noting that the fish in Lake Koocanusa, when compared to non-mine impacted areas (regardless of whether or not they are “true” reference), appear to show elevated tissue concentrations in both ovaries and muscle. Please conduct a statistical test comparing the means of the non-mine impacted vs. Lake Koocanusa (exposed areas) by species type.	MT Govt		8-Jul-2014	Data collected to date within the reservoir and from “reference” (non-mine influenced) monitoring stations is temporally misaligned and as noted within Advice Item A7-19 unbalanced based on the number of samples. For these reasons comparing means to evaluate if there is a statistically significant difference is confounded and introduces uncertainty into the analysis which may or may not be biologically relevant. This can be illustrated by evaluating ovary tissue data for westslope cutthroat trout. By looking at all the data for this species and comparing mean ovary selenium concentrations between reservoir and non-mine influenced (“reference”) areas, it would have been concluded that there is no statistically significant difference. However, by only evaluating data for this species when reference and reservoir samples were collected in the same year, there is a statistically significant difference with ovary tissue samples in the reservoir being lower than in reference conditions. As outlined within Chapter 10 (Monitoring), Teck will continue to collect tissue data within the reservoir and reference areas so as to reduce this uncertainty and gain a better understanding of environmental conditions within the reservoir.
A7-21	**Annex K. 2**	Regarding the summary conclusion: “The strongest line of evidence for evaluating potential risks due to selenium is the concentration in fish ovaries; data available to date indicates that selenium risks to fish in Lake Koocanusa are negligible”: - Clarify given that the data does not support this conclusion (& ensure clarification is reflected in the body of the Plan) - Based on a t-test of the mean selenium tissue selenium concentrations in both ovaries and muscle for Lake Koocanusa and non mine-exposed sites (assuming data normally distributed), please use the p-value to support or refute the contested statement.	Improves technical accuracy of statement.	MT Govt		8-Jul-2014	The evaluation being performed in relation to the potential for selenium risks is not associated with concentration in non-mine influences tissue samples and potential differences (i.e., p- values) relative to Lake Koocanusa samples; but rather is based on the dose-response relationship for the most sensitive fish species tested to date and the corresponded EC10 (brown trout), and the cumulative frequency distribution for individual fish species within the reservoir. Further to technical advice received during TAC meeting 7, integrated risks have been presented for individual species and calculated for peamouth chub separately, as ovary selenium concentrations are greater in this species compared to other species captured within Lake Koocanusa.
A7-22	**Annex K. 2**	Regarding the summary conclusion: “A total of 6% of ovary selenium samples collected from Lake Koocanusa exceeded the BC Ministry of Environment (BCMOE) guideline of 11 mg/kg dw, and 1% exceeded the draft US Environmental Protection Agency (USEPA) criterion of 15.2 mg/kg dw.” (S. 4): - Recommend that this analysis follows the MOE standard practice to compare individual species to guideline and remove the analysis based on grouping of fish species, and reflect this analysis in the text (& ensure this is reflected in the body of the Plan)	While summary statistics are useful in some instances, in this case, it would also be suitable to report the total number of exceedances on a fish by fish basis (perhaps in a table).	MT Govt	UBC	8-Jul-2014	Summary statistics are presented for each year of data collection per species within Tables 1 and 2 for muscle and ovary tissue data. Summary statistics within the tables include: “N” (number of samples), “min” (minimum concentration reported), “max” (maximum concentration reported),”Avg.” (average concentration for that species for that year), “Std. Dev.” (standard deviation for that species for that year), number of samples exceeding guidelines/criteria, and the frequency of exceedances per guideline/criteria. These tables have also been brought forward in Chapter 4 (Baseline Conditions). These tables and summary statistics have been brought forward in addition to grouping of fish species which is required to perform the summary statistics required under Advice Item No. A7-20.
A7-23	**Annex K. 2**	Regarding the summary conclusion: “Selenium exceeded the WQG in 3 of 125 samples”: - Include how many samples exceed the draft US EPA water quality criteria (& ensure this is reflected in the body of the Plan)	Improves communication of results.	MT Govt		8-Jul-2014	This advice is incorporated in Chapter 4 (Baseline Conditions) In addition the frequency of exceedances as compared to the draft 2014 EPA water quality criteria are also included.
A7-24	**Chapter 5 Human Health & Groundwater**	Reword the general statement that “managing of surface water will protect groundwater”: - More evidence needs to be presented if this statement is made – such as data and analysis on the connections between surface water and groundwater.	Insufficient evidence has been presented to make this statement.	MOE	KNC	8-Jul-2014	This advice has been incorporated in the Plan at Chapter 5 (Assessment of Protection of Human Health and Groundwater).
A7-25	**Chapter 5 Human Health & Groundwater**	For Plan Implementation: Undertake additional studies to get more comprehensive information on: - groundwater flow system - GW-SW interaction - GW quality	None provided.	MOE	KNC	8-Jul-2014	Additional investigation is underway in the floodplain areas through the quarterly sampling program, and each Operation is conducting a groundwater monitoring program which will provide I additional information regarding groundwater flows, gw/sw interactions, and groundwater quality.

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A7-26	**Chapter 5 Human Health & Groundwater**	Provide details and rationale on the groundwater monitoring suite and limitations of groundwater dataset.	None provided.	MOE		8-Jul-2014	An evaluation of sampling parameters for the drinking water sampling program was conducted by reviewing summarized historical watershed surface water sample data and comparing them with the Guidelines for Canadian Drinking Water Quality (GCDWQ) developed by Health Canada (2012). Antimony, arsenic, and lead were constituents also identified above drinking water guidelines, however in very few samples (i.e., six or less) and only where other constituents (specifically selenium) were elevated. The constituents and select others included in the list have a number of other anthropogenic and natural sources and therefore the potential for ambiguous or unknown sources is higher. Selenium was confirmed to be the main indicator of mining influences with the highest potential to exist at concentrations above drinking water guidelines, the remaining parameters were selected to include Order constituents and other constituents for general chemistry. Limitations of the data set are included in Annex L.2 Elk Valley Groundwater Summary Report.
A7-27	**Chapter 5 Human Health & Groundwater**	Explicitly identify data gaps and discuss uncertainties associated with the human health assessment (i.e., present this important information as a bulleted list in the Chapter and in the accompanying report). For additional context and Appendix 2, refer to D. MacDonald (TAC Member for KNC) letter (dated July 11, 2014). *For additional context and Appendix 2, refer to D. MacDonald (TAC Member for KNC) letter (dated July 11, 2014).*	Information on data gaps and uncertainties is essential for understanding how much confidence can be placed in the results of the human health risk assessment. In addition, this information is needed to support the design of monitoring programs to address data gaps and/or supporting studies to address uncertainties. Additional comments on the assessment of protection of human health and groundwater draft and on the associated human health evaluation of current conditions are provided in Appendix 2.	KNC		8-Jul-2014	This advice has been incorporated in Chapter 5 (Assessment of Protection of Human Health and Groundwater) and Annex L.2 Elk Valley Groundwater Summary Report.
A7-28	**Annex L**	Check the accuracy of all of the calculations used to evaluate potential effects on human health under baseline conditions. *For additional context and Appendix 2, refer to D. MacDonald (TAC Member for KNC) letter (dated July 11, 2014).*	As presented, at least some of the calculations used in the evaluation are not reproducible. Therefore, the underlying equations, benchmarks, and exposure point concentrations should all be checked to assure their accuracy (see Appendix 2 for more information).	KNC		8-Jul-2014	This advice has been incorporated and all calculations and formulae were double-checked, refer to Annex L of the Plan.
A7-29	**Annex L**	Include toddler as a receptor in the evaluation of potential effects on human health under baseline conditions.	According to Health Canada (2010) guidance, toddlers would normally be considered to be the critical receptor for threshold chemicals at a site where all age classes are present. Therefore, toddlers need to be included the evaluation of potential effects on human health under baseline conditions.	KNC		8-Jul-2014	The toddler age group could reasonably be included in the drinking water and fish ingestion pathways (it is assumed the toddler will not spend an appreciable amount of time swimming relative to the child and is not considered for exposure via swimming). With consideration of the toddler (age 6 mo – 4 yrs), the pathway-specific screening results and hazard/risk calculations for the drinking water and fish tissue pathways are minimally impacted: • The fish ingestion pathway-specific screening value does not change with inclusion of the toddler, resulting in no additional exceedances of the benchmark value for arsenic and selenium. Revaluation of cancer risks (arsenic only) with inclusion of the toddler in the composite intake equation does not result in increased cancer risk for fish ingestion. • Inclusion of the infant and toddler in derivation of the drinking water pathway-specific benchmarks results in selenium exceeding the benchmark in MU-1 and MU-2 where previously no constituents exceeded benchmarks for drinking water. Hazard quotients for selenium in these two MUs (HQ=0.2) remain less than the MOE threshold of 1. • Inclusion of the infant and toddler in estimating cancer risk for surface water ingestion as drinking water results in a slight change in results. Cancer risks for dissolved arsenic do not result in values greater than MOE's threshold of 1E-05. Risks for total arsenic do not change in MU-1 through MU-5. In MU-6, cancer risk increases from 1E-05 to 2E-05. Nevertheless, arsenic concentrations in surface water are consistent with regional background and Elk Valley reference area arsenic concentrations. Incorporation of the toddler age group does not change the conclusions of the human health evaluation. Future human health evaluations will consider the toddler age group for drinking water and fish ingestion.
A7-30a	**Chapter 6 Management Options**	Advice: Add that geomembrane covers were considered as a management option in the planning process	It's important to be able to follow the rationale for why water treatment and water diversion were chosen for the initial Implementation Plan.	MEM	MT Govt	8-Jul-2014	This advice is incorporated in the Plan in Annex D.2 Water Quality Modelling for the Initial Implementation Plan and Chapter 6 (Development and Selection of Management Options).
A7-30b	**Chapter 6 Management Options**	As a follow-up, please describe why they were excluded at this time since they appear to provide the greatest water-quality benefit, but at the highest implementation cost.	None provided	MT Govt		8-Jul-2014	This advice is incorporated in the Plan at Chapter 6 (Development and Selection of Management Options).
A7-31	**Chapter 6 Management Options**	Important to include how the Implementation Plan actions were chosen from the table of complete management options reviewed by the TAC.	Improves rationale behind Implementation Plan and reduces questions around "what more could be done to improve water quality".	MEM	MT Govt	8-Jul-2014	This advice has been incorporated into the Plan and linkages between Chapter 6 (Development and Selection of Management Options) and Chapter 11 (Adaptive Management) clarified.
A7-32	**Chapter 6 Management Options**	Regarding management of residuals from water treatment plants, clarify that the information collected will be used to assess long-term sustainability, disposal strategies, and detailed design of future facilities.	None provided.	MEM		8-Jul-2014	The following text was added to Chapter 6 (Development and Selection of Management Options) to incorporate this advice. "Information gathered through R&D on residuals will inform and facilitate the permitting and design of future active water treatment facilities and the long term residuals management strategy."
A7-33	**Chapter 6 Management Options**	For the description of the approach to assess management options: - Clarify whether modeling was done for geomembrane covers and who was involved with the assessment of management options. - Clarify the main driver behind choice of management options (cost and/or water quality benefits).	This information provides context to the reader to know the process by which management options were evaluated, and what specific actions were proposed. It will be very helpful to understand the decision-making process upon which scenarios were selected (was it solely cost, water quality benefit, etc.?)	MT Govt	MEM	8-Jul-2014	This advice is incorporated in the Plan is outlined in Annex D.2 Water Quality Modelling for the Initial Implementation Plan to the Plan and Chapter 6 (Development and Selection of Management Options).

Table 1:Teck Response to Technical Advisory Committee Advice, meetings #2 to #7 Appendix A and Band Working Group

ID# from Meeting	Category/Theme	Advice/Comment	Rationale (*to be filled in by Originator*)	Originator (Agency) of Advice	Other TAC Member Support	Date Advice Received (dd/mm/yy)	Teck Response
A7-34	**Chapter 7 Calcite Management**	For the purposes of describing current conditions, classify streams into three categories using the calcite monitoring data that were collected in 2013 (Appendix 5), including: 1. Unaffected Streams - These streams have calcite levels consistent with those observed in reference streams. Such streams have CIC values and CIP values less than or equal to the upper limit of background, as defined by the 95th percentiles calculated for reference sites. The 95th percentile value for CIC is 0.05, while the 95th percentile value for CIP is 0.345 (see Appendix 5). 2. Moderate-Affected Streams - These streams have calcite levels that are intermediate between unaffected streams and highly affected streams (i.e., CIP of 0.35 to <0.75 or CIC of >0.05 to <0.5); 3. Highly-Affected Streams - These streams have at least 75% of the pebbles showing evidence of calcite formation (i.e., CIP 0.75) or at least 25% of the streambed showing evidence of concretion (i.e., CIC 0.5). *For additional context and Appendix 5, refer to D. MacDonald (TAC Member for KNC) letter (dated July 11, 2014).*	A calcite index (CI) as developed to provide a basis for classifying streams in the Elk Valley based on the presence of calcite (CIP) and the degree of concretion of the streambed (CIC), where CI = CIP + CIC. The three classifications that were developed included a low CI range (0 to 0.99), a mid-CI range (1.0 to 1.99), and an upper CI range (2.00 to 3.00). While these range of CI values provide one means of classifying streams relative to calcite content, an alternate classification system that considers the potential effects may be more appropriate in the near-term. The unaffected classification identified above defines the reference envelope using the indicators incorporated into the CI. The highly-affected streams would be expected to have substantial reductions in benthic invertebrate productivity and/or reduced egg-to-fry survival rates for salmonids (i.e., with a high incidence of calcite or substantial concretion of streambed substrates) (see Appendix 5 for more analysis).	KNC		8-Jul-2014	Teck will consider this advice during plan implementation, as more data are collected, and more is learned about the range of reference conditions. Teck will continue to use the bins reported in the plan (i.e. 0 to 1, 1 to 2, 2 to 3) to effect year-on-year comparisons.
A7-35	**Chapter 7 Calcite Management**	Provide a definition of "receiving environment" or rename the term to something more accurate, (e.g. mine-influenced streams for calcite) (Pg. 7-14). *For additional context and Appendix 5, refer to D. MacDonald (TAC Member for KNC) letter (dated July 11, 2014).*	In this chapter of the EVWQP, the term receiving environment refers to portions of the streams downstream of constructed works, such as settling ponds, culverts, and similar structures. This term should be replaced with a term that more accurately describes these mine works.	KNC	MOE	8-Jul-2014	This advice is incorporated in the Plan at Chapter 7 (Calcite Management).
A7-36	**Chapter 8 Targets**	Regarding the highlight bullet: "The B.C. Water Quality Guidelines for aquatic health, or their equivalent, have been set as the long-term water quality targets for selenium, nitrate, sulphate and cadmium at most order stations in the Elk Valley" (Pg. 8-2, line 14-19): - Revise and expand the statement to reflect that the selenium target is not equivalent to WQGs for all but one Order Station, and characterize the cadmium target as a level 1 benchmark that offers a similar level of protection as the Canadian Council of Ministers of the Environment (CCME) WQG. - Revise any other statements made in the Plan to be consistent with this advice.	Improves communication of how targets have been set.	MOE	KNC UBC	9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).
A7-37	**Chapter 8 Targets**	Provide definition of "maximum average monthly concentration", and change "average" to "mean" (Pg. 8-5). In definition provide additional information that describes that the monthly concentrations frequently or usually consist of one sample collected per moth.	The metrics used in the EVWQP should be clearly defined, including the methods used for calculating the metrics.	KNC		9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).
A7-38	**Chapter 8 Targets**	Regarding the sentence: "Identify "critical effect sizes" commonly accepted in toxicological literature that describe a level of effort to individuals that does not result in changes to populations or communities of sensitive aquatic species.": - Change "does not result" to "unlikely to result" and ensure this change is made throughout the Plan.	As originally stated, the statement is too strong.	UBC		9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).
A7-39	**Chapter 8 Targets**	Regarding the statement: "The US EPA identifies 20% as a critical effect size for most cases. It represents an effect that is statistically distinct from reference or control conditions, but is not expected to cause meaningful and measurable changes in a population (US EPA 1999, 2013)" (Pg. 8-10): - Since this citation is related to effects in laboratory studies, this citation should be used in relation to the development of benchmarks but not in managing effects at a management unit scale. - Ensure change is made throughout document (e.g. Pg. 8-26 and any reference to birds) and related Annexes (e.g. Annex E) Please also review the application of Suter et al. 1995 and Mebane 2010 to assure that these references are not being used out of context of the research.	Improves technical accuracy of statement and ensures that critical effect sizes are not taken out of context. .	MT Govt		9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).
A7-40	**Chapter 8**	Regarding the statement "The rate of selenium bioaccumulation rates varies in relationship to environmental conditions. It tends to be higher in still-water (lentic areas) exhibiting lower oxygen content. Lower bioaccumulation rates are observed in flowing, well-oxygenated (lotic) systems" (Pg. 8-11): - Add explanation that there is overlap of selenium bioaccumulation rates between lotic and lentic areas.	Provides a more comprehensive explanation of the variability in selenium bioaccumulation relationships.	UBC		9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).
A7-41	**Chapter 8**	Revise the number of bird species represented in the dataset from "37 bird species" to the actual # of bird species in the toxicity dataset (should be around 5 species) and reflect the change in the total # of species represented in the dataset (Pg. 8-11, 8-15 & throughout).	Improves technical accuracy.	UBC	KNC EC	9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).
A7-42	**Chapter 8**	Remove the statement "Consistent with guideline derivation procedures" (Pg. 8-11, Line 29-31). Also remove statement on Pg. 5 in Annex E.	Provides a more accurate description of methodology applied to develop toxicity benchmarks.	MOE	EC	9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).

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A7-43	**Chapter 8**	Add "interim" to level 1 and level 2 nitrate benchmarks.	The Toxicology Working Group (working group to the TAC) recommended that the site-specific toxicity testing results for Ceriodaphnia dubia be used to support the development of interim targets for the Elk Valley. However, additional long-term toxicity tests conducted with the amphipod, midge, and rainbow trout, and toxicity tests conducted with amphipods were also recommended to be completed and the results incorporated into the target derivation process.	KNC		9-Jul-2014	All water quality targets established under the Plan have been developed based on the state of the current science, and are based on conservative assumptions such that adverse effects to sensitive aquatic receptors would not be expected. Chapter 11 (Adaptive Management) includes a process for periodic review or water quality benchmarks and targets, including a ecotoxicology supporting study to validate the nitrate benchmarks. We considered the advice, but for reasons outlined above, it is not necessary to add an interim label to the nitrate benchmark.
A7-44	**Chapter 8**	Regarding statement "Although nitrate and sulphate could theoretically work in combination to create osmotic stress, the nitrate benchmarks (Section 8.2.5) are a small component of the total dissolved solids (TDS) content of waters in the Designated Area": - Can not equate a constituent's contribution to total dissolved solids to the potential effect on osmoregulation.	Improves technical accuracy of statement.	UBC		9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).
A7-45	**Chapter 8**	Regarding section on interactive effects and the mechanisms of action of the Order constituents, with the exception of selenium, the mechanisms of action for these constituents are poorly understood, so this section should not infer that these constituents have very different mechanisms of action from selenium (Pg. 8-21).	Improves technical accuracy of the analysis of interactive effects.	UBC		9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).
A7-46	**Chapter 8**	Statement that "Mixture effects are considered unlikely" is too strong considering uncertainties around mechanisms of action for the 4 Order Constituents (Pg. 8-21, Line 31).	Improves technical accuracy of the analysis of mixture effects.	UBC	MOE	9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).
A7-47	**Chapter 8**	In Plan Implementation: Recommend that an integrated effects assessment based on current concentrations be completed similar to the approach used in support of the long-term target development.	Rationale: The approach that is being used to determine integrated effects for the long-term targets should also be completed based on current concentrations. The long-term integrated effects assume you are starting with robust healthy populations; however, this may not be the case depending on the current integrated effects in the management units.	MOE		9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).
A7-48	**Chapter 8**	Update Table 8-11 and related text to say <10% is the assessment criteria goal for birds and amphibians (Pg. 8-28, Line 25, Table 8-11, & throughout document).	The same effect level (<10%) as used for fish should also be used for birds and amphibians.	UBC	KNC MOE EC	9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).
A7-49	**Chapter 8**	For statements such as "concentrations less than the Level 2 benthic community benchmark are met through the majority of the Management Unit (MU), including in the mainstem subunits of the Elk and Fording rivers": - Define "majority" of MU - Clarify what parts of the mainstem	Improves technical clarity of document.	MOE		9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).
A7-50	**Chapter 8**	Clarify that the target of 40 µg/L in Lower Fording River (MU 2) is not a level 1 benchmark and bring forward the rationale that the 12% effect size is still protective but has a lower margin of safety. Also provide more information in this paragraph on why the level 1 benchmark is not achievable.	This clarification would iImproves the technical clarity and transparency of the EVWQP.	KNC	MEM EC	9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).
A7-51	**Chapter 8**	Clarify the rationale behind the choice of >50% for the goal related to "Proportion of management unit with concentrations <Level 1 benchmark for most sensitive endpoint" in the Integrated Assessment for selenium (Table 8-11).	Improves documentation of methodology.	MOE		9-Jul-2014	This advice is incorporated in Chapter 8 of the Plan (Water-Quality Targets and Implementation Plan).
A7-52	**Chapter 8**	Throughout the Plan, and this Chapter in particular, ensure text is clear that water treatment was designed to meet water quality targets at Order Stations and was not designed for meeting water quality targets in tributaries. Suggested language: "The initial implementation plan was developed by iterating a range of treatment options to identify the scenario that represents the least treatment required to achieve the concentration target at the Order Stations".	Improves technical clarity of document.	MEM		9-Jul-2014	This advice has been incorporated in the Plan to clarify that water treatment was designed to meet water quality targets at the Order Stations.
A7-53	**Chapter 8**	Advice: In Table 8-14 (the table with details of the Implementation Plan): - clarify and describe more clearly the details of management options that make up the implementation plan (e.g. Greenhills Creek is diverted and treated at Elk River side). - include details in this table on the watershed associated with treatment and diversion.	Improves utility of the table, especially for future regulatory use.	MEM		9-Jul-2014	Table 8-14 in the Initial Implementation Plan (Water-Quality Targets and Implementation Plan), has been revised. Additional detail is also available in Annex D2 Water Quality Modelling for the Initial Implementation Plan.
A7-54	**Chapter 8**	Regarding sentence: "The relationship between treatment volume and maximum monthly concentrations under high flows at FR5 (Figure 8-12) indicates that the Level 1 benchmark is not achievable for MU-2." -Define "maximum monthly concentrations".	Improves technical clarity	MEM		9-Jul-2014	A definition of maximum monthly concentration was added to the beginning of Chapter 8 (Water-Quality Targets and Implementation Plan).
A7-55	**Chapter 8**	For water quality modeling plots: - Include predicted water quality plots for selenium, nitrate and sulphate for all Order Stations, and explain why a plot is not provided for cadmium. - Need higher resolution and larger graphs – too difficult to see where the range of averages overlap. - Need unmitigated case reflected on all graphs. - Add y-axis labels to right-hand side of the graphs. - Provide context and legend up front for the plots.	The water quality plots are an important outcome of the EVWQP process.	MEM	EC	9-Jul-2014	Predicted water quality plots for selenium, sulphate, and nitrate are provided for all Order Stations (see Appendix D.2 Water Quality Modelling for the Initial Implementation Plan). An explanation for why plots are not provided or required for cadmium is included in Chapter 8 (Water-Quality Targets and Implementation Plan). The graphs have been updated to have higher resolution, print larger; include the unmitigated case, an additional y axis as requested. An introductory explanation and legend has been added to Chapter 8 (Water-Quality Targets and Implementation Plan). □
A7-56	**Chapter 8**	Sulphate water quality concentrations are predicted to continue to rise and are predicted to eventually exceed the water quality guideline at certain locations in the Elk Valley with the initial Implementation Plan. Provide rationale for not addressing these issues in the EVWQP and explain what future work will be done to determine if water quality treatment for sulphate is necessary.	All reasonable and practical mitigation measures should be taken to minimize loadings of the order constituents to receiving waters (i.e., to ensure that concentrations of these COPCs are maintained at the lowest practical levels). However, no measures have been proposed to address increasing concentrations of sulphate. This needs to be corrected in the EVWQP.	KNC	EC	9-Jul-2014	Rational and an explanation of what future work will be done to decide if treatment is required for sulphate has been added to Chapter 8 (Water-Quality Targets and Implementation Plan).
A7-57	**Chapter 8**	Add more rationale for the water quality concentrations of the initial Implementation Plan: - e.g. Order Station ER2 – why the short-term level benchmark isn't met until 2023.	Improves rationale behind Implementation Plan and reduces questions around "what more could be done to improve water quality".	MEM		9-Jul-2014	Detailed rationale has been added to Chapter 8 (Water-Quality Targets and Implementation Plan) and Annex D2 Water Quality Modelling for the Initial Implementation Plan.

Table 1:Teck Response to Technical Advisory Committee Advice, meetings #2 to #7 Appendix A and Band Working Group

ID# from Meeting	Category/Theme	Advice/Comment	Rationale (*to be filled in by Originator*)	Originator (Agency) of Advice	Other TAC Member Support	Date Advice Received (dd/mm/yy)	Teck Response
A7-58	**Chapter 10 Monitoring**	For Table 10-1, the Conceptual Overview of the Aquatic Effects Monitoring Program: - Separate benthic invertebrate community structure and benthic invertebrate tissue sampling - Indicate both sampling and reporting frequency - Add supporting studies as a row - include a complete list of biological monitoring components for Lake Koocanusa	Facilitates the communication and evaluation of the monitoring program.	MOE	KNC EC	9-Jul-2014	Table 10.1 in Chapter 10 (Monitoring) has been updated along with supporting text throughout the Chapter.
A7-59	**Chapter 10 Monitoring**	Incorporate sampling of selenium concentrations in periphyton and benthic invertebrate tissue on an annual basis.	Provides an indicator for selenium concentrations in sensitive receptors (birds, fish, amphibians), without the adverse impacts that may result if these sensitive receptors were monitored annually.	UBC	KNC EC MT Govt	9-Jul-2014	Text has been included in Chapter 10 (Monitoring) both in the Periphyton and Benthic Invertebrate monitoring sections as well in Table 10.1.
A7-60	**Chapter 10 Monitoring**	In the Conceptual Site Model Table, express the "Effect" column as assessment endpoints and include all of the measurement endpoints.. Link adaptive management triggers to assessment endpoints and measurement endpoints that will be outlined in the Monitoring Chapter	Provides consistency and connections between conceptual site modelCSMs, proposed monitoring under RAEMP, and adaptive management triggers	KNC	UBC MOE	9-Jul-2014	Measurement endpoints have been identified in Table 10.3 in Chapter 10 (Monitoring) and cross-referenced with Chapter 11 (Adaptive Management) of the Plan.
A7-61	**Chapter 10 Monitoring**	Add a map of monitoring locations for sediment quality and benthic invertebrates.	Facilitates the evaluation of monitoring for these components.	MOE		9-Jul-2014	Figure 10.3 for benthic invertebrate monitoring locations has been included in Chapter 10 (Monitoring). A sediment figure has not been included at this time but will be included in the final detailed study design for the 2015 RAEMP as sampling locations are still being evaluated.
A7-62	**Chapter 10 Monitoring**	Provide breakdown of the frequency and location of monitoring for Lake Koocanusa (similar to what was done for management units 1-5).	Facilitates the communication and evaluation of the monitoring program.	MOE	MT Govt	9-Jul-2014	Additional subsections have been included in Chapter 10 (Monitoring) Section 10.2.7 to provide additional information on monitoring in Lake Koocanusa. Table 10.3 was also updated to show frequency of monitoring within the reservoir.
A7-63	**Chapter 10 Monitoring**	Add a summary reference subsection on the additional supporting studies and incorporate the longer-term toxicity tests that were recommended through the Toxicology Working Group into the ecotoxicology assessment section.	None provided.	MOE		9-Jul-2014	Text and Table 10.1 have been updated in Chapter 10 (Monitoring) to include additional supporting study considerations. As per text in Section 10.6.2, a study design will be developed for a supporting study on ecotoxicology assessment which will consider methodology for specific toxicity tests including longer-term methods as per advice received from TAC.
A7-64	**Chapter 10 Monitoring**	Recommend that groundwater monitoring is undertaken for the purposes of gaining information to facilitate the protection of groundwater (especially aquifers) even if groundwater is not currently being used as a drinking water source.	Need to protect future uses of groundwater.	MOE		9-Jul-2014	Teck has addressed this in the Plan and included Annex L.3 Approach to Protection of Groundwater which details an adaptive management approach to addressing the protection of groundwater. This includes further evaluation of existing data and potential phased approach to improving our understanding of groundwater conditions in the Elk River watershed.
A7-65	**Chapter 11 Adaptive Management**	Advice: In the adaptive management chapter: Provide more details on: - Provide more detail on the Ffrequency of monitoring, analysis (adaptive management loop) and reporting to regulatory agencies and the Public for all monitoring components - Outline the factors that would result in increased frequency of adaptive management analysis - Include feedback loops associated with new treatment coming on line (e.g. do loop before and after bringing treatment facilities on line)	The details of adaptive management are important for the Implementation Phase, especially for permitting.	MEM	KNC MOE MT Govt EC	9-Jul-2014	This advice is incorporated in the Plan in Chapter 11 (Adaptive Management) and Chapter 10 (Monitoring).
A7-66	**Chapter 11 Adaptive Management**	In development of the full adaptive management evaluation methodology: - Recommend including triggers closer to sources.	None provided.	MEM	MOE KNC MT Govt EC	9-Jul-2014	This advice has been incorporated in Chapter 11 (Adaptive Management) in Sections 11.2.1 and Table 11-1.
A7-67	**Chapter 11 Adaptive Management**	Clarify the timeline and process for trigger development and reporting. Ensure consistency between Ch. 10 and Ch. 11.	Clarifying this information improves technical clarity of the document and facilitates evaluation of the adaptive management framework.	KNC	MEM MT Govt EC	9-Jul-2014	This advice has been incorporated in Section 11.9 of the Plan. Timelines and process are consistent in Chapter 10 (Monitoring) and 11 (Adaptive Management).
A7-68	**Chapter 11 Adaptive Management**	Provide a specific timeframe for when the Water Quality Planning Model will be updated.	Specification of a model post-audit frequency will let decision-makers know how often model updates are expected.	MEM	MT Govt	9-Jul-2014	.Timeframes (i.e., every-three years) have been incorporated in Chapter 11 (Adaptive Management).
A7-69	**Monitoring**	**Toxicology WG Recommendation #6-1:** Recommend the design and implementation of a robust monitoring program to monitor selenium tissue concentrations in water, periphyton, invertebrates, fish, and birds for the purposes of validating the selenium bioaccumulation models for the Elk Valley and validating the toxicity benchmarks derived by these models. To reduce uncertainty in the selenium bioaccumulation models, recommend that the monitoring program undertakes better measurement of selenium water concentrations on a temporal basis to enable better estimation of selenium exposure for periphyton, invertebrates, fish and birds.	None provided.	MOE UBC KNC		9-Jun-2014	The recommended advice topic is included in Annex O Management of Uncertainty in Selenium Ecological Affects Assessment. This advice will be reviewed and considered in the development of monitoring design plans during Plan implementation
A7-70	**Selenium Bioaccumulation Modeling & Monitoring**	**Toxicology WG Recommendation #6-2:** Recommend the definition of clear hypotheses for bioaccumulation model verification that would be tested through the monitoring program, and the inclusion of associated triggers in the adaptive management plan that would require the re-evaluation of targets depending on the results of the hypotheses testing.	None provided.	MOE UBC KNC		9-Jun-2014	The recommended advice topic is included in Annex O Management of Uncertainty in Selenium Ecological Affects Assessment. This advice will be reviewed and considered in the development of monitoring design plans during Plan implementation
A7-71	**Selenium Toxicity Benchmarks**	**Toxicology WG Recommendation #6-3:** Recommend that selenium toxicity benchmarks presented at TAC Meeting #6 be described as a "best estimate with residual uncertainties" and recommend that these values are not described as "protective".	None provided.	MOE KNC		9-Jun-2014	This advice is incorporated into Chapter 8 (Water-Quality Target and Implementation Plan) and Annex E Selenium Benchmark Derivation Report and Annex O Management of Uncertainty in Selenium Ecological Affects Assessment.

Table 1:Teck Response to Technical Advisory Committee Advice, meetings #2 to #7 Appendix A and Band Working Group

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A7-72	**Nitrate Ecological Effects Assessment**	**Toxicology WG Recommendation #6-4:** Recommend the following process for deriving nitrate benchmarks: - base the benchmarks on the results of site-specific toxicity testing for the most sensitive species (C. dubia); - adjust the C. dubia results using the hardness normalization procedure to derive site-specific nitrate benchmarks; - recognize uncertainties in the hardness normalization procedure and conduct additional toxicity testing to confirm the hardness relationship. This approach is recommended instead of using a Species Sensitivity Distribution (SSD) approach because the site-specific tests resulted in a more conservative benchmark.	None provided.	MOE UBC KNC		9-Jun-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #6 and incorporated into Annex F Benchmark Derivation Report for Nitrate and Sulphate of the Plan.
A7-73	**Nitrate Ecological Effects Assessment**	**Toxicology WG Recommendation #6-5:** Recommend the documentation of the results of the SSD in the Plan appendices along with a description of the uncertainties in the SSD approach.	None provided.	MOE UBC KNC		9-Jun-2014	This advice is incorporated into Annex F Benchmark Derivation Report for Nitrate and Sulphate of the Plan.
A7-74	**Nitrate Ecological Effects Assessment Monitoring**	**Toxicology WG Recommendation #6-6:** Recommend the use of the pooled hardness relationship for the evaluation tables in the Nitrate Benchmark Derivation Report with the caveat that there are a number of uncertainties in this relationship (such as the lack of information on the nitrate-hardness toxicity relationship for some species).	None provided.	MOE UBC KNC		9-Jun-2014	The recommended action item was completed and presented at Toxicology Working Group meeting #6 and incorporated into Annex F Benchmark Derivation Report for Nitrate and Sulphate of the Plan.
A7-75	**Selenium – Residual Uncertainties in the Se Effects Assessment and Follow-up Studies**	**Toxicology WG Recommendation #7-1:** Recommend the following study objective to address the uncertainty of "effect of fish size on selenium bioaccumulation" in the EVWQP selenium ecological effects assessment: Objective of Study: Test whether there is an effect of fish size on selenium bioaccumulation when there is a more balanced dataset of the range of fish sizes.	Previous work suggested there may be a difference in bioaccumulation between small sized fish and larger sized fish	MOE		24-Jun-2014	The recommended advice topic is included in Annex O Management of Uncertainty in Selenium Ecological Affects Assessment. This advice will be reviewed and considered in the development of monitoring design plans during Plan implementation.
A7-76	**Selenium – Residual Uncertainties in the Se Effects Assessment and Follow-up Studies**	**Toxicology WG Recommendation #7-2:** Recommend the following study objective to address the uncertainty of "seasonality of invertebrate selenium concentrations relative to the period of uptake by WCT" in the EVWQP selenium ecological effects assessment: Study Objectives: 1. Assess temporal variability in selenium invertebrate concentrations for multiple sites (within the bounds of health and safety restrictions) 2. If variability exists, gain understanding of: a. the critical period that affects selenium concentrations in fish eggs (timing of egg provisioning), and, b. the link between dietary variability and variability in selenium egg concentrations.	At least some (perhaps much) of the variability in the Se bioaccumulation model describing trophic transfer from invertebrates to fish may be the result of matching samples that are not appropriately linked temporally. Understanding the temporal link between invertebrate Se and consequent egg Se will reduce uncertainty in the model.	MOE UBC		24-Jun-2014	The recommended advice topic is included in Annex O Management of Uncertainty in Selenium Ecological Affects Assessment. This advice will be reviewed and considered in the development of monitoring design plans during Plan implementation.
A7-77	**Selenium – Residual Uncertainties in the Se Effects Assessment and Follow-up Studies**	**Toxicology WG Recommendation #7-3:** Recommend the following study objective to address the uncertainty of "habitat use by fish" in the EVWQP selenium ecological effects assessment: Objective of Study: Use the results of the Westslope Cutthroat Trout Telemetry Study in the Upper Fording River to evaluate the effect of habitat use on the conclusions of the integrated effects assessment for management units in the Elk Valley.	For the integrated assessment, Teck has made the assumption that fish use habitat in proportion to the area. The telemetry data will provide data on fish use patterns which can be used to refine the assessment.	MOE UBC		24-Jun-2014	The recommended advice topic is included in Annex O Management of Uncertainty in Selenium Ecological Affects Assessment. This advice will be reviewed and considered in the development of monitoring design plans during Plan implementation.
A7-78	**Selenium – Residual Uncertainties in the Se Effects Assessment and Follow-up Studies**	**Toxicology WG Recommendation #7-4:** Recommend the following study objective to address the uncertainty of "representativeness of Westslope Cutthroat Trout (WCT) and Red-winged black bird (RWBL) bioaccumulation models to other species" in the EVWQP selenium ecological effects assessment: Objective of Study: Further evaluate the assumption that other species are adequately characterized by the Westslope Cutthroat Trout and Red-winged black bird bioaccumulation models. **Comments on Study Design:** - Need synoptic sampling (which can be done for fish, but is harder for birds) - When designing sampling related to bird bioaccumulation: -Think carefully about measurement of exposure for birds and the size of territory that would require sampling (Carl Schwarz) - Consider that bioaccumulation variability between bird species is low (Kevin Brix) - Variability in bird egg selenium concentration is tied to short-term diet of invertebrates; a composite sample of invertebrates should potentially be the same biomass as a daily food intake for the bird species (Paul Paquin)	Data is not available to make bioaccumulation models for all sensitive species. A WCT bioaccumulation model is being used to estimate bioaccumulation for all fish species. A red-winged blackbird model is being used to estimate bioaccumulation for all bird species.	MOE UBC		24-Jun-2014	The recommended advice topic is included in Annex O Management of Uncertainty in Selenium Ecological Affects Assessment. This advice will be reviewed and considered in the development of monitoring design plans during Plan implementation.
A7-79	**Selenium – Residual Uncertainties in the Se Effects Assessment and Follow-up Studies**	**Toxicology WG Recommendation #7-5:** Recommend the following study objectives to address the uncertainties of "sensitivity of amphibians to selenium and bioaccumulation of selenium by amphibians" in the EVWQP selenium ecological effects assessment: **Study Objectives:** 1. Assess sensitivity of amphibians to selenium (esp. metamorphosis endpoint) 2. If sensitivity is found, assess selenium bioaccumulation in amphibians.	The assessment of amphibians in the EVWQP was very limited due to lack of adequate data. Additional studies to address this uncertainty are needed.	MOE UBC		24-Jun-2014	The recommended advice topic is included in Annex O Management of Uncertainty in Selenium Ecological Affects Assessment. This advice will be reviewed and considered in the development of monitoring design plans during Plan implementation.

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A7-80	**Selenium – Residual Uncertainties in the Se Effects Assessment and Follow-up Studies**	**Toxicology WG Recommendation #7-6:** Recommend the following study objectives to address the uncertainties related to "potential interactive effects of selenium on multiple endpoints and with other stressors" in the EVWQP selenium ecological effects assessment: Study Objectives: 1. Develop population models (which is to protect against population crashes due to interactive effects and multiple stressors) 2. Separate effects due to interactive effects of selenium on multiple endpoints and multiple stressors through lab studies (this is to protect against long-term (15-year) small declines due to interactive effects and multiple stressors) 3. Assess toxicity for new endpoints and species that have not yet been measured with site water that is spiked to match short-term and long-term target levels (nitrate, sulphate, cadmium, and selenium) **Comments on Study Objectives:** - While this is a high priority uncertainty to address, it is recognized that addressing this uncertainty is a difficult and long-term goal.	The combined effects from multiple stressors on multiple endpoints may be higher than those predicted from individual stressors. There needs to be consideration of other stressors that are not included in the evaluation table (e.g. changes in stream-bed substrate and composition).	MOE UBC		24-Jun-2014	The recommended advice topic is included in Annex O Management of Uncertainty in Selenium Ecological Affects Assessment. This advice will be reviewed and considered in the development of monitoring design plans during Plan implementation.
A7-81	**Selenium – Residual Uncertainties in the Se Effects Assessment and Follow-up Studies**	**Toxicology WG Recommendation #7-7:** Recommend the following study objective to address uncertainty related to the "frequency and timing of sampling that is needed to characterize selenium concentrations in water for the purposes of modeling selenium bioaccumulation" in the EVWQP selenium ecological effects assessment: **Study Objective:** 1. Determine the temporal lag between Se concentrations in the water and consequent Se concentrations in fish eggs with the objective of identifying the critical period (both timing and duration) in which water Se should be sampled for bioaccumulation modeling. 2. Determine the extent to which variability in water Se within the critical period influences subsequent fish egg Se allowing for an analysis of sampling frequency. Recommendations on studies: This study is likely best accomplished through a series of experiments to determine pharmaco-kinetic parameters in a model food chain for the system. The study should consider the kinetics of Se uptake and depuration from water to periphyton, water and food to a model invertebrate, water and food to westslope cutthroat trout. It will be important to characterize Se kinetics to fish ovaries, not just the whole body of the fish. This study should be undertaken using radio-isotopic tracers.	See rationale for Recommendation 2	MOE UBC		24-Jun-2014	The recommended advice topic is included in Annex O Management of Uncertainty in Selenium Ecological Affects Assessment. This advice will be reviewed and considered in the development of monitoring design plans during Plan implementation.
A7-82	**Selenium – Lake Koocanusa**	**Toxicology WG Recommendation #7-8:** Recommend the following study objective to address uncertainty related to selenium bioaccumulation in Lake Koocanusa: Study Objective: Collect data to allow for the development of a selenium bioaccumulation model for Lake Koocanusa.	Because data are currently limited, a Se bioaccumulation model for the Lake was not developed.	MOE UBC		24-Jun-2014	The recommended advice topic is included in Annex O Management of Uncertainty in Selenium Ecological Affects Assessment. This advice will be reviewed and considered in the development of monitoring design plans during Plan implementation.
A7-83	**Selenium Evaluation (Integrated Effects) Tables for Management Units**	**Toxicology WG Recommendation #7-9:** Add a column in the selenium evaluation tables with the predicted tissue concentration.	This information in the table will help to assess the models.	KNC MOE UBC		24-Jun-2014	The spreadsheet calculates a distribution of tissue concentrations to evaluate integrated effects based on water quality concentrations to assist in developing targets. The spreadsheet does not predict a single tissue concentration that could be added as a column in the table.
A7-84	**Multiple Stressor Effects Assessment**	**Toxicology WG Recommendation #7-10:** The effects assessment for multiple stressors should consider the stressor of habitat loss due to mining projects.	Many uncertainties exist in the habitat compensation process (such as habitat enhancement/ expansion may not occur in the same management unit), therefore, the stressor of "habitat loss" due to mining projects should be included in the multiple stressor evaluation even if habitat loss will be compensated.	KNC		24-Jun-2014	This advice is incorporated in Annex H Integrated Assessment Report.
A7-85a	**Cadmium**	**Toxicology WG Recommendation #7-11a:** Cadmium Benchmark Recommendation (Alternative #1): Recommend that the level 1 (EC10) cadmium benchmark is derived by taking a geomean of the EC10 cadmium concentrations from Barata and Baird (2000) and the EC16 cadmium concentration from Biesinger and Christensen (1972).	The study by Barata and Baird (2000) did not measure Cd concentrations in the exposure. As a result, these data are unreliable and should not be used by themselves to set benchmarks or WQG but should be averaged with other, more reliable data. Following recommendation #2: The CCME guidance would rely only on this unreliable studies to set the benchmark while the draft BC WQG uses a different reliable study, but then applies a safety factor that brings the WQG exactly back to the value obtained using the Barata and Baird study (i.e., effectively relies on an unreliable study to set the benchmark).	UBC		24-Jun-2014	The recommended advice is incorporated into Chapter 8 (Water-Quality Targets and Implementation Plan) and Annex G Evaluation of Potential Ecological Effects Associated with Cadmium in the Elk and Fording Rivers.
A7-85b	**Cadmium**	**Toxicology WG Recommendation #7-11b:** Cadmium Benchmark Recommendation (Alternative #2): Recommend that either the draft BC WQG is used as the level 1 cadmium benchmark or that the cadmium derivation benchmark process follows CCME guidance and does not take the geomean of the EC10 cadmium concentrations from Barata and Baird (2000) and the EC16 cadmium concentration from Biesinger and Christensen (1972).	None Provided.	KNC MOE		24-Jun-2014	The recommended advice is incorporated into Chapter 8 (Water-Quality Targets and Implementation Plan) and Annex G Evaluation of Potential Ecological Effects Associated with Cadmium in the Elk and Fording Rivers.
A7-86	**Cadmium**	**Toxicology WG Recommendation #7-12:** Recommend that the cadmium benchmarks are not characterized as "equivalent to water quality guidelines" if the derivation method takes a geomean of the EC10 cadmium concentrations from Barata and Baird (2000) and the EC16 cadmium concentration from Biesinger and Christensen (1972).	Taking a geomean of these studies is not consistent with CCME guidance for guideline development, thus the benchmark should not be characterized as "equivalent to water quality guidelines".	KNC MOE		24-Jun-2014	The recommended action item is incorporated into Chapter 8 (Water-Quality Targets and Implementation Plan) and Annex G Evaluation of Potential Ecological Effects Associated with Cadmium in the Elk and Fording Rivers.

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A7-87	**Site-Specific Toxicity Testing for Nitrate**	**Toxicology WG Recommendation #7-13:** Recommend the following site-specific toxicity testing is undertaken to address uncertainties related to the derivation of level 1 toxicity benchmarks for nitrate: 1. Test amphibian larvae cultured in the lab and run the test through to metamorphosis to evaluate the effects of nitrate on amphibians (suggested species is leopard frog); 2. Long-term tests (42-d) with the amphipod, Hyalella azteca should be conducted with site-water to evaluate the effects of nitrate on the growth and reproduction of this species; 3. Long-term toxicity tests (i.e., life-cycle tests) with the midge, Chironomus dilutus, should be conducted with site water to evaluate the effects of nitrate on the reproduction and emergence of this species; 4. Long-term early life-stage toxicity tests with a salmonid species (e.g., rainbow trout, Oncorhynchus mykiss) should be conducted with site water at various hardness levels (i.e., the Elk River and the Fording River) to better understand the sensitivity of this family to nitrate toxicity in the study area, and the relationship between water hardness and toxicity; 5. Toxicity tests conducted with site-water should be conducted with waters collected at various times of the year to evaluate seasonal variability in the toxicity of nitrate to sensitive aquatic species; and, Recommendations on studies: - The site-specific toxicity tests should be conducted in a manner that provides explicit information on the role of water hardness in modifying the toxicity of nitrate. - The results from all of the above tests should be used to validate the interim site-specific nitrate benchmarks derived for the Elk Valley Water Quality Plan; - The sensitivity testing for amphibians, Hyalella Azteca, Chironomus dilutes, and Oncorhynchus mykiss should be done prior to the toxicity tests with site water to evaluate seasonal variability in toxicity for sensitive aquatic species. - The toxicity tests with site water to evaluate seasonal variability in toxicity for sensitive aquatic species should be part of the long-term monitoring program.	Long-term tests typically result in lower estimates of the statistical endpoints as the exposure duration (to the substance of interest) is longer and more appropriate for applying to field conditions. In addition, and importantly, we are recommending these long-term toxicity tests (i.e., 42-d Hyalella azteca and life-cycle Chironomus dilutus tests) to understand the effects of nitrate on effects endpoints that are expected to be more sensitive than survival or growth. In the 42-d Hyalella Azteca test, reproduction is also assessed (not available in the shorter 14-d test). In the life-cycle Chironomus dilutus test (typically ranging from 53 to 60-d), emergence and reproduction are also assessed (not available in the shorter 10-d test).	KNC MOE UBC		24-Jun-2014	Chapter 10 (Monitoring) outlines a toxicology supporting study that will be designed and implemented during Plan implementation. The need for further toxicity testing to address uncertainties related to nitrate benchmarks will be considered during the development of a detailed study design. Consistent with the procedure employed within the RAEMP the need for additional and/or future studies on toxicity assessments will be guided using the Data Quality Objective process.
A7-88	**Monitoring Objectives/Key Monitoring Questions**	**Monitoring WG Recommendation #1-1:** Recommend that the monitoring program supports an adaptive management process with quantitative triggers.	None Provided	MOE		17-Jun-2014	Table 10.3 has been added to Chapter 10 (Monitoring) to detail measurement and assessment endpoints to link with a similar table in Chapter 11 (Adaptive Management). Triggers associated with this table have been detailed in Chapter 11 (Adaptive Management).
A7-89	**Monitoring Objectives/Key Monitoring Questions**	**Monitoring WG Recommendation #1-2:** Recommend the addition of the following key questions to the RAEMP: * Are Elk Valley Water Quality Plan Objectives being met? * Are the water quality targets and timelines in the EVWQP being met ? * Are any early-warning triggers (in the adaptive management plan) being reached? * Are planning tools making the right predictions and are assumptions still valid? * What are current loads to receiving waters in the Elk Valley and how are they changing over time? * Is there a change over time in trophic status?	None Provided.	Monitoring WG		17-Jun-2014	These additional key questions will be considered during the development of the detailed study design for the 2015 RAEMP currently under development.
A7-90	**Reference Areas**	**Monitoring WG Recommendation #1-3:** Recommend evaluating whether an appropriate reference dataset exists for comparison with Lake Koocanusa fish tissue (Note that there may not be an appropriate reference dataset for this purpose).	None Provided.	Mt Govt		17-Jun-2014	As per discussions at TAC 7 meeting, non-mine influenced fish tissue will be used as current reference conditions for fish from Lake Koocanusa. Consideration for additional reference monitoring areas will be considered during Plan implementation and development of detailed study designs.
A7-91	**Reference Areas**	**Monitoring WG Recommendation #1-4:** Recommend the following actions are taken when defining reference conditions: * define criteria that will be used to evaluate and choose reference sites; * consider temporal, spatial characteristics, and for biota, consider life history aspects. * Have at least 3 years of water quality data, and conduct 5/30 sampling events at a minimum during low flows and high flows	None Provided.	KNC MOE		17-Jun-2014	Criteria for reference station selection will be detailed as part of detailed study designs during Plan implementation.
A7-92	**RAEMP and EVWQP Monitoring Lake Koocanusa**	**IMonitoring WG Recommendation #1-5:** n reporting monitoring results, recommend being clear on whether fish are from Lake Koocanusa or management unit 6, or whether effects are occurring in Lake Koocanusa or management unit 6.	None Provided.	MT Govt UBC		17-Jun-2014	Chapter 4 (Baseline Conditions) and Annex K.2 Evaluation of Element Concentrations Collected from Lake Koocanusa contain all data including fish tissue for Lake Koocanusa and K.1 DRAFT Aquatic Environment Synthesis Report contains information from MU6.
A7-93	**RAEMP and EVWQP Monitoring Lake Koocanusa**	**Monitoring WG Recommendation #1-6:** Recommend an additional monitoring station in Lake Koocanusa upstream of the Elk River and downstream of Sand Creek.	The purpose of this monitoring station is to have a station within the lake upstream of the Elk River Arm that is unlikely to be influenced by discharges from the Elk River and far enough into the lake that fine sediment from the Kootenay River has had an opportunity to settle out.	KNC		17-Jun-2014	This advice will be considered after the evaluation of the first year of water quality data from Lake Koocanusa monitoring to determine whether current upstream stations are providing appropriate reference conditions.
A7-94	**RAEMP and EVWQP Monitoring Lake Koocanusa**	**Monitoring WG Recommendation #1-7:** Recommend providing a rationale in the EVWQP for why surface water toxicity testing is not being done in Lake Koocanusa.	None Provided.	KNC		17-Jun-2014	This advice will be considered during development of the detailed study design for the ecotoxicology assessment supporting study for implementation in 2015.

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A7-95	**RAEMP and EVWQP Monitoring Lake Koocanusa**	**Monitoring WG Recommendation #1-8:** Alternative recommendations on sediment toxicity testing in Lake Koocanusa: Alternative recommendation #8a (supported by KNC): Recommend sediment toxicity testing for Lake Koocanusa (upstream and downstream of Elk River) for the purposes of defining baseline conditions. The objective of such sampling would be to obtain synoptic near-field, mid-field, and far-field toxicity test results (i.e., along a potential concentration gradient) that could be used to establish baseline conditions and, potentially, develop concentration-response relationships. Alternative recommendation #8b (supported by MOE and K. Brix): Examine sediment toxicity testing closer to sources to evaluate if Lake Koocanusa sediment toxicity testing is needed.	#8b Rationale: If no sediment toxicity is observed closer to sources, it is unlikely sediment toxicity associated with the mine will be observed in the Lake.			17-Jun-2014	This advice will be considered during development of the detailed study design for the ecotoxicology assessment supporting study for implementation in 2015. Proposed approach is consistent with Chapter 11 (Adaptive Management) and use of triggers for additional actions.
A7-96	**RAEMP and EVWQP Monitoring Lake Koocanusa**	**Monitoring WG Recommendation #1-9:** Recommend the following actions are taken to allow for the development of a Lake Koocanusa selenium bioaccumulation model: * Collect zooplankton in the field for tissue analysis; * Consider doing controlled lab studies on the phytoplankton from the lake. These studies should be performed on species representative of the phytoplankton community in the Lake (i.e., not necessarily Selenastrum) to assess inter-species variability.	Separation of phytoplankton from other seston in the field is extremely difficult and a major source of variability in estimating Kds. Developing Kds in the laboratory will result in more reliable data and allow for evaluation of how different water quality parameters (e.g., P, SO4) effect Se uptake into phytoplankton.	UBC KNC		17-Jun-2014	The 2014 Lake Koocanusa Biological Monitoring Program will capture plankton data in 2014 but will also continue in 2015 and 2016 to begin to capture the necessary data to support the potential development of bioaccumulation models if required.
A7-97	**RAEMP and EVWQP Monitoring Lake Koocanusa**	**Monitoring WG Recommendation #1-10:** Recommend monitoring zooplankton and fish tissue in Lake Koocanusa annually for three years.	There is currently limited data for the Lake and a more frequent sampling program than every 3 years is needed. After this 3 year period, the data should be evaluated to determine if switching to monitoring every 3 years is reasonable.	UBC KNC		17-Jun-2014	The 2014 Lake Koocanusa Biological Monitoring Program will capture plankton data in 2014 but will also continue in 2015 and 2016.
A7-98	**RAEMP and EVWQP Monitoring Lake Koocanusa**	**Monitoring WG Recommendation #1-11:** Recommend sampling benthic invertebrates in Lake Koocanusa.	Benthic invertebrates are eaten by Peamouth Chub.	MT Govt UBC		17-Jun-2014	Benthic invertebrates will be sampled in summer 2014 as part of the 2014 Lake Koocanusa Biological Monitoring Program.
A7-99	**RAEMP and EVWQP Monitoring Lake Koocanusa**	**Monitoring WG Recommendation #1-12:** Recommend a monitoring approach for LK that defines and tests hypotheses.	None Provided.	KNC UBC		17-Jun-2014	Updates to the 2014 Lake Koocanusa Biological Monitoring Program will evaluate linkages with the CSM and any need to update key questions associated with the monitoring program for the reservoir.
A7-100	**RAEMP 2015 and EVWQP Monitoring-General Elk Valley**	**Monitoring WG Recommendation #1-13:** Within the Monitoring design document, recommend including comprehensive tables with performance criteria for measurement and analyses for each of the components.	None Provided.	KNC		17-Jun-2014	Table 10.3 has been added to Chapter 10 (Monitoring) to provide measurement and assessment endpoints for all monitoring components proposed in the Plan.
A7-101	**RAEMP 2015 and EVWQP Monitoring-General Elk Valley**	**Monitoring WG Recommendation #1-14:** Monitoring Design Framework: Recommend a monitoring design framework that includes hypotheses based on a single conceptual site model (CSM should provide sufficient text to describe differences between constituent groups and each mining area and describe all stressors).	None Provided.	KNC		17-Jun-2014	Table 10.3 has been added to Chapter 10 (Monitoring) to provide measurement and assessment endpoints for all monitoring components proposed in the Plan. Key questions for each monitoring endpoint will be included in the detailed study designs that will be developed during Plan implementation for the RAEMP and any supporting studies.
A7-102	**RAEMP 2015 and EVWQP Monitoring-General Elk Valley**	**Monitoring WG Recommendation #1-15:** Frequency of Monitoring: Consider having key indicators and core stations that are monitored every year for periphyton and benthic invertebrates. Note – advice needed on the location of these core stations.	None Provided.	KNC MOE		17-Jun-2014	Chapter 10 (Monitoring) has been updated to include annual monitoring of periphyton and benthic invertebrates at key locations. Details of locations and timing will be included in the study design for the supporting study during Plan implementation.
A7-103	**RAEMP 2015 and EVWQP Monitoring-General Elk Valley**	**Monitoring WG Recommendation #1-16:** Timing of Sampling: Consider what special studies are needed to confirm the critical timing of sampling for each receptor.	None Provided.	MOE UBC		17-Jun-2014	Future studies required to support the EVWQP will continue to be evaluated during Plan implementation. Chapter 10 (Monitoring) and Chapter 11 (Adaptive Management) will guide the triggers and prioritization of these studies.
A7-104	**RAEMP 2015 and EVWQP Monitoring-General Elk Valley**	**Monitoring WG Recommendation #1-17:** Water Quality: Recommend weekly water quality monitoring during high and low flow periods.	None Provided.	MOE KNC		17-Jun-2014	Weekly monitoring at key water quality stations during peak/low flow periods has been incorporated into existing regional water quality monitoring program. Additional stations will be considered during RAEMP and supporting study design development during Plan implementation.
A7-105	**RAEMP 2015 and EVWQP Monitoring-General Elk Valley**	**Monitoring WG Recommendation #1-18:** Sediment: For all sediment toxicity testing, recommend the use of the most sensitive long-term sediment toxicity tests (e.g. 42-day tests with Hyallela and consider new recommendations for feeding).	The 10-14 day tests previously used by Teck are considerably less sensitive than the 42-d test.	KNC UBC		17-Jun-2014	Teck has incorporated this advice into Chapter 10 (Monitoring) through development of an Ecotoxicological Assessment supporting study with further discussion in Chapter 11 (Adaptive Management). A detailed study design for this program will be developed and finalized in early 2015 to evaluate surface water toxicity within the Elk River watershed.
A7-106	**RAEMP 2015 and EVWQP Monitoring-General Elk Valley**	**Monitoring WG Recommendation #1-19:** Periphyton: Recommend existing periphyton community structure data be further evaluated to evaluate between-lab variability in reporting of abundance for broad taxonomic groups (e.g., green algae, blue-green algae, diatoms, etc.).	None Provided.	KNC		17-Jun-2014	Broad taxonomic group evaluation of periphyton community structure was completed as part of the 2013 Periphyton and community structure supporting study and summary of the group comparison was provided to the Technical Advisory Committee as a follow-up to an action item during TAC meeting #7.
A7-107	**RAEMP 2015 and EVWQP Monitoring-General Elk Valley**	**Monitoring WG Recommendation #1-20:** Benthic Invertebrates: Recommend a study to compare the BACI and CABIN approach at a number of core locations. Use multiple stressor data to evaluate the sensitivity of the BACI and CABIN approach. For the BACI approach, use an experimental design with hypothesis testing (use data from study area and other areas to identify maximum number of replicate samples that need to be collected at each station).	Note: KNC and UBC have both identified purposes for this study: KNC: The purpose of the study is to evaluate whether the BACI approach should be used instead of the CABIN approach. The following are concerns with the CABIN approach: * Limitations for hypothesis testing * composite kick sampling gives no statistical power * abundance of organisms by taxonomic groups is not evaluated explicitly UBC: The purpose of the study is to evaluate whether different results are obtained by the BACI and CABIN approaches. Both approaches have strengths and weaknesses. It will be useful to understand if significantly different results are obtained between the two approaches and the factors that drive any observed differences.	KNC UBC		17-Jun-2014	Chapter 10 (Monitoring) defines the ecosystem monitoring program and briefly mentions the BACI approach to benthic monitoring as it will be considered during development of the detailed study design for the 2015 RAEMP. Study designs are meant to be adaptive to allow consideration of changing conditions and data from previous monitoring. For this reasons, detailed monitoring designs are not included in the Plan.

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A7-108	**RAEMP 2015 and EVWQP Monitoring- General Elk Valley**	**Monitoring WG Recommendation #1-21:** Calcite: Where possible, target areas for calcite monitoring with consistent levels of calcite (from year to year) and be careful to not choose unique calcite sites.	Temporal variation in calcite formation will make it difficult to assess the dose-response of the biota to calcite.	UBC		17-Jun-2014	As outlined within the September 2013 "Approach and Methodology to Monitor and Assess Calcite Impact" report, calcite monitoring is conducted in all mine-affected tributaries so as to avoid the selection and monitoring of "unique calcite sites". Furthermore, the calcite monitoring program will help determine and evaluate temporal variability of calcite formation, if any. Where possible supporting biological monitoring will include areas that have consistent levels of calcite year after year.
A7-109	**RAEMP 2015 and EVWQP Monitoring- General Elk Valley**	**Monitoring WG Recommendation #1-22:** For calcite and benthic invertebrate monitoring: * recommend quadrant sampling to ensure non-disturbance of stream-bed and synoptic sampling; * include comprehensive physical habitat characterization (depth, flow, gradient).	None provided.	KNC		17-Jun-2014	Chapter 10 (Monitoring) defines the ecosystem monitoring program and briefly mentions the BACI approach to benthic monitoring as it will be considered during development of the detailed study design for the 2015 RAEMP. Study designs are meant to be adaptive to allow consideration of changing conditions and data from previous monitoring. For this reasons, detailed monitoring designs are not included in the Plan
A7-110	**RAEMP 2015 and EVWQP Monitoring- General Elk Valley**	**Monitoring WG Recommendation #1-23:** Calcite: Recommend an analysis of the other factors contributing to calcite deposition to inform parameters that are measured during calcite monitoring (and could inform questions around cause and effect for calcite).	None provided.	KNC		17-Jun-2014	Teck accepts this advice to be incorporated during plan implementation. As part of ongoing research, and as outlined in the adaptive management section of Chapter 7 (Calcite Management), Teck will continue to analyze the factors leading to calcite deposition. This work will be supported by additional studies as necessary to prove hypotheses around cause and effect for calcite. Where practical, this may lead to changes in data collected during calcite monitoring activities.
A7-111	**Integrated Data Evaluation 'Reports Cards'**	**Monitoring WG Recommendation #1-24:** Recommend that the Synthesis Report clearly documents the methods (including rationale for methods) for each column in the Integrated Data Evaluation Table .	None provided.	MOE KNC		17-Jun-2014	The draft report presented at TAC Meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. This advice will be considered to inform the revisions to Annex K.1 DRAFT Aquatic Environment Synthesis Report or to inform future monitoring programs and reporting.
A7-112	**Integrated Data Evaluation 'Reports Cards'**	**Monitoring WG Recommendation #1-25:** Recommend removing the column of "overall rank" in the Integrated Data Evaluation Table.	None provided.	MOE KNC UBC		17-Jun-2014	The overall ranking for the report cards will be removed in the final Annex K.1 DRAFT Aquatic Environment Synthesis Report and as per TAC advice, the report cards have been pulled from the draft report.
A7-113	**Integrated Data Evaluation 'Reports Cards'**	**Monitoring WG Recommendation #1-26:** Consider the presentation of an overall rank according to each environmental receptor (WQ, benthos, fish, birds) rather than an integrated overall rank across multiple receptors. (Note, D. MacDonald also suggested that there might be other ways to organize the table to show multiple stressors by receptor).	None provided.	KNC		17-Jun-2014	The draft report presented at TAC Meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. This advice will be considered to inform the revisions to Annex K.1 DRAFT Aquatic Environment Synthesis Report or to inform future monitoring programs and reporting.
A7-114	**Integrated Data Evaluation 'Reports Cards'**	**Monitoring WG Recommendation #1-27:** Consider which index should be used for calcite (1st term & 2nd term or combined) in the Integrated Data Evaluation tables.	None provided.	Monitoring WG		17-Jun-2014	The draft report presented at TAC Meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. This advice will be considered to inform the revisions to Annex K.1 DRAFT Aquatic Environment Synthesis Report or to inform future monitoring programs and reporting.
A7-115	**Integrated Data Evaluation 'Reports Cards'**	**Monitoring WG Recommendation #2-1:** Recommend that documentation clearly states that the Synthesis Report's Water Quality Index is different than the Canadian Water Quality Index (especially on summary documentation such as the Report Cards).	None provided.	MOE		26-Jun-2014	The draft report presented at TAC Meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. This advice will be considered to inform the revisions to Annex K.1 DRAFT Aquatic Environment Synthesis Report or to inform future monitoring programs and reporting.
A7-116	**Integrated Data Evaluation 'Reports Cards'**	**Monitoring WG Recommendation #2-2:** Recommend the inclusion of Cd and Zn in the Synthesis Report's Water Quality Index.	None provided.	MOE		26-Jun-2014	The water and sediment quality indices will be updated based on re-analysis of water and sediment quality data as part of the update to Annex K.1 DRAFT Aquatic Environment Synthesis Report . Results will be presented for scenarios involving different groups of constituents (e.g., primary only versus primary and secondary COPCs) and the scenario representing an appropriately inclusive list of mine-related constituents and conservative index scores will be transferred to Appendix E "report card" tables. Data will be provided for all mine-influenced tributaries. The methods, as well as guidelines or site-specific benchmarks, used for the index calculations will be clearly described and justified. One of the sediment quality index scenarios presented in Appendix D will use the low sediment quality guideline or reference 95th percentile, whichever is higher, so that results are not solely based on high sediment quality guidelines. The "fair" water and sediment categories will be aligned with those of CCME and a "marginal" category will be added that also aligns with CCME.
A7-117	**Integrated Data Evaluation 'Reports Cards'**	**Monitoring WG Recommendation #2-3:** Recommend the inclusion of Cd and Zn in the Synthesis Report's Water Quality Index. In Step 1 of the surface water evaluation process for each management unit, recommend the use of a more sensitive screening statistic than median concentrations (e.g. monthly max average).	None provided.	MOE		26-Jun-2014	This advice will be considered through the updating and finalizing of the Annex K.1 Annex K.1 DRAFT Aquatic Environment Synthesis Report. The Canadian Water Quality Guidelines for Protection of Aquatic Life CCME Water Quality Index (WQI) 1.0 User's Manual was used to provide guidance on the use of the WQI for the report card evaluation. The user's manual specifically states that "at least four variables, sampled a minimum of four times, be used". Teck ran the WQI with multiple combinations of variables including the 4 Order constituents, all identified COPCs and all variables to determine which was most sensitive to picking up water quality changes based on "the professional judgment of the user to determine which and how many variables should be included in the CCME WQI to most adequately summarize water quality in a particular region" as per the User's Manual. The site-specific benchmarks that have been developed based on input from the TAC and working groups have been used to evaluate water quality in this region as there is good technical rational for those values in consideration of effects to aquatic organisms which is what the report card is intended to evaluate.
A7-118	**Integrated Data Evaluation 'Reports Cards'**	**Monitoring WG Recommendation #2-4:** Recommend using the lower sediment quality guideline in the Synthesis Report's Sediment Quality Index.	None provided.	MOE		26-Jun-2014	The water and sediment quality indices in Annex K.1 Annex K.1 DRAFT Aquatic Environment Synthesis Report will be updated based on re-analysis of water and sediment quality as part of the finalization of Annex K.1 Annex K.1 DRAFT Aquatic Environment Synthesis Report. Results will be presented for scenarios involving different groups of constituents (e.g., primary only versus primary and secondary COPCs) and the scenario representing an appropriately inclusive list of mine-related constituents and conservative index scores will be transferred to Appendix E "report card" tables. Data will be provided for all mine-influenced tributaries. The methods, as well as guidelines or site-specific benchmarks, used for the index calculations will be clearly described and justified. One of the sediment quality index scenarios presented in Appendix D will use the low sediment quality guideline or reference 95th percentile, whichever is higher, so that results are not solely based on high sediment quality guidelines. The "fair" water and sediment categories will be aligned with those of CCME and a "marginal" category will be added that also aligns with CCME.

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A7-119	**Integrated Data Evaluation 'Reports Cards'**	**Monitoring WG Recommendation #2-5:** Recommend undertaking an analysis of the ecological impacts for sites that have a mean selenium hazard quotient ≤ 1 and a maximum selenium hazard quotient > 1 to evaluate whether the impacts warrant the categorization of "fair" in the Synthesis Report's Integrated Data Evaluation Report Cards.	If the analysis finds effects in the area of 10%-15%, then "fair" is a reasonable description.	UBC		26-Jun-2014	For the tissue classification in the Appendix E "report card" tables in Annex K.1 Annex K.1 DRAFT Aquatic Environment Synthesis Report, justification will be provided to support the "fair" category. This will include example tables or plots showing how a few elevated tissue concentrations within an area affect the overall classification of risk to verify that overall risks are not be under-represented.
A7-120	**Integrated Data Evaluation 'Reports Cards'**	**Monitoring WG Recommendation #2-6:** Recommend providing a sub-table to the Report Cards that provides more detailed information on selenium tissue hazard quotients (HQs) for vertebrates – such as HQs by fish species (MOE – did you also suggest breaking the data down by monitoring station?)	None provided.	MT Govt MOE		26-Jun-2014	Updated Screening-level Environmental Risk Assessment (SLERA) results will be transferred to Appendix E tables in Annex K.1 DRAFT Aquatic Environment Synthesis Report. New Appendix E tables will be created to summarize the vertebrate tissue selenium (as HQs by location, species, and tissue type). Vertebrate selenium data will be discussed on an MU, rather than area-specific, basis, because their mobility means that tissue concentrations do not always correspond to conditions at the precise location of capture.
A7-121	**Integrated Data Evaluation 'Reports Cards'**	**Monitoring WG Recommendation #2-7:** Recommend that the preface to the Integrated Data Evaluation Report Cards clearly outlines where further information can be found on (1) the methodology and assumptions and (2) underlying data.	None provided.	MOE		26-Jun-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. This advice will be considered to inform the revisions to Annex K.1 DRAFT Aquatic Environment Synthesis Report or to inform future monitoring programs and reporting.
A7-122	**EVWQP Monitoring**	**Monitoring WG Recommendation #2-8:** Recommend that a commitment to report constituent loads is made in the Plan.	Reporting constituent loads facilitates further analysis around understanding the fate and transport of constituents of potential concern (esp. in regards to Lake Koocanusa).	MT Govt		26-Jun-2014	This advice is incorporated in Chapter 11 (Adaptive Management). Water quality monitoring data at Order stations will be collected monthly and assessed annually to determine if concentrations, loadings and trends of constituents are consistent with predictions and remain on track to meet water-quality targets and timeframes.
A7-123	**EVWQP Monitoring**	**Monitoring WG Recommendation #2-9:** Add content in the EVWQP Monitoring Chapter on other monitoring programs that can be used to inform the EVWQP adaptive management process.	None provided.	MOE MEM		26-Jun-2014	Chapter 10 (Monitoring) provides details on other monitoring programs completed and how data from these programs will be considered during Plan implementation.
A7-124	**Adaptive Management**	**Monitoring WG Recommendation #2-10:** Provide an analysis of the uncertainty in the water quality predictions for tributaries by comparing the estimates derived from the Water Quality Planning Model results with the estimates of finer scale water quality models that have been developed.	None provided.	MEM		26-Jun-2014	The advice will be incorporated into model updates during Plan implementation, which is described in Chapter 11 (Adapticve Management).
A7-125	**Adaptive Management**	**Monitoring WG Recommendation #2-11:** Recommend that early warning triggers are defined for selenium tissue concentrations at a level that is conservative enough to be protective considering the residual uncertainties and gaps (e.g. Lake Koocanusa) in the selenium ecological effects assessment.	None provided.	MOE MT Govt		26-Jun-2014	As described in Chapter 11 (Adaptive Management), Adaptive management triggers related to monitoring will be developed and evaluated in a three-year Plan report, which will be developed in parallel with the second cycle of the RAEMP interpretive report.
A7-126	**Human Health Assessment**	**Human Health WG Recommendation #2-1:** Recommend undertaking further sampling of selenium concentrations in game meats including organs that are consumed by local residents.	The human health Risk assessment provided by Environ indicates that for some residents, the daily intake may be approaching Health Canada's recommended upper intake level for Se. The contribution from sources other than fish is not known for residents of the Elk Valley. There is information indicating that Se concentrations in organ meat may be a significant source of Se. This needs further investigation to understand how this may influence the already relatively high daily intake estimated by Environ for residents in the Elk Valley.	MOE		26-Jun-2014	As discussed at TAC meeting #6, Teck is exploring options to conduct additional game biopsy tissue sampling with the assistance of local hunters. While selenium concentrations are greater in organ meats than in other meats, most people typically eat less organ meats than other meats. Our preliminary analysis suggests that organ meat may not be a significant source of selenium except for those people who eat a large amount of organ meats. As such, it will be important to understand selenium concentrations in tissues most often consumed (i.e., primarily muscle as well as in organ tissue).
A7-127	**Human Health Assessment**	**Human Health WG Recommendation #2-2:** Recommended making the necessary improvements to sampling design to facilitate seeing trends (if any exist) in selenium, cadmium and arsenic fish tissue concentrations by different species and locations in the Elk Valley.	Ongoing monitoring of contaminants in media that humans are exposed to is necessary to protect public health. While it is anticipated that contaminant levels will stabilize, Se and Cd are bioaccumulating substances and the fate and transport in the environment are not fully understood. Therefore ongoing monitoring is essential to provide current data for consideration of appropriate advisories.	MOE		26-Jun-2014	Ongoing monitoring of selenium will continue as part of the Regional Aquatic Effects Monitoring Program. Based on data collected to date there is no evidence that mining operations have affected arsenic or cadmium concentrations in water or fish. As discussed in the human health evaluation at TAC meeting #6, arsenic concentrations in fish tissue down-gradient of mining operations were not elevated with respect to reference area tissue concentrations. Also, cadmium in fish tissue was well below the health-based benchmark value protective of a high-end fish consumer. "Fate and transport" are not considered as a data gap, or the rationale for continued monitoring.
A7-128	**Human Health Assessment**	**Human Health WG Recommendation #2-3:** 3 Recommend that the Human Health Chapter in the EVWQP be clear on where and when selenium (and the other contaminants listed in the order) water quality concentrations are expected to be above the BC Drinking Water Quality Guidelines.	Public health is protected by maintaining contaminant levels below Health Canada guidelines. If these are exceeded, health officials may need to recommend further actions to protect public health. Therefore, there needs to be a clear understanding of where guidelines are exceeded. Please note that health-based guidelines are MAXIMUM ACCEPTABLE CONCENTRATIONS (not averages).	MOE		26-Jun-2014	This advice is incorporated in the Plan at Chapter 5 (Assessment of Protection of Human Health and Groundwater) with revisions added.
A7-129	**Human Health Assessment**	**Human Health WG Recommendation #2-4:** Recommend that the EVWQP use the current BC Drinking Water Quality Guideline and does not refer to the draft Canadian Drinking Water Quality Guideline.	Health Canada drinking water guidelines may be adopted by the BC Ministry of Health as a drinking water guideline and by the BC Ministry of Environment as a source water quality guideline. However, the review process by Health Canada and the provincial agencies is not yet completed and therefore the current guideline (10 µg/L) must be used for this plan. Health Canada, although in the process of reviewing technical information regarding selenium, has not made a decision whether the MAC for selenium will be changed. BC Ministry of Health would review and determine whether BC would adopt any change to the Health Canada guidelines. Therefore the current guideline (10 µg/L) must be used for this plan.	MOE		26-Jun-2014	The current WQG of 10 µg/L was used in the initial, baseline human health evaluation (Step 1). In the effects assessment (Step 2), a health-based tolerable upper intake level was used to develop a benchmark value. Any discussion of the proposed Health Canada guideline of 50 µg/L in Chapter 5 (Assessment of Protection of Human Health and Groundwater) is for completeness in considering the best available science and policy for evaluation of human health effects.
B7-1	**Human Health and Groundwater Chapter 5 Human Health**	Suggest replacing the term "conservative health-protective benchmarks" with the more commonly used "risk-based" benchmarks.	This is the commonly used term in Canada and BC to identify a benchmark established based on risk rather than generic default values. In this report, the unknowns include for example, fish consumption patterns, contaminant levels in backyard produce, contaminant levels in country foods, and locations of individual water supply intakes. Therefore, the benchmarks are established based on logical assumptions and therefore, are risk-based. The term "conservative health-protective benchmarks" is not clearly understood.	MOE		11-Jul-2014	This advice will be taken into consideration in future iterations of human health assessment reports.

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B7-2	**Human Health and Groundwater Chapter 5 Human Health** **Page 5-17**	Recommend assessing hardness using the calcium carbonate guideline (previously provided to ENVIRON). If impacts to the taste, odour and suitability of surface and groundwater from mining impacts is not provided in this section, please indicate where it is provided in the report.	As described in the Terms of Reference (TOR), protection of groundwater is an objective (Section 3.3 d). Aesthetic water quality guidelines are developed to protect the usefulness of water resources for multiple uses including domestic supply. The influences of mining activities on the quality of water used for domestic supply is an important aspect to understand as this may affect not only suitability of a source but also treatment costs as well as costs if alternate sources are required. There was discussion at TAC 6 that although hardness (measured as calcium carbonate) and sulphate would be assessed in groundwater and surface water, however this assessment may not be contained in the human health section. If not, please be clear where this assessment will be located in the report.	MOE		11-Jul-2014	The evaluation of current baseline water quality parameters provided in Attachment 2 of Annex L.1 Human Health Evaluation of Current Baseline Conditions shows that many guideline values are exceeded for surface water in both Plan areas and reference areas. Given that surface water is not currently used as a drinking water supply, no further analysis of potability was conducted.
B7-3	**Water Quality Targets and Implementation Plan Chapter 8 Section 8.2.5**	**Plan Implementation:** Recommend that the effects of feeding inhibition of D. magna be considered in the cadmium assessment.	The Canadian Council of Ministers of the Environment (CCME) used the EC10 feeding inhibition endpoint as the most sensitive endpoint to create their guideline.	MOE		11-Jul-2014	The effect of feeding inhibition is already considered in the cadmium (Cd) assessment. In CCME's WQG document for Cd, it is acknowledged that reproduction and feeding inhibition are equally sensitive endpoints: "Overall, the most sensitive invertebrate species was the cladoceran, Daphnia magna, with hardness-adjusted 7-day EC10 values (for both reproduction and feeding inhibition) of 0.045 µg/L (Barata and Baird, 2000)." – CCME (2014) There is only one study with a reported effect concentration for D. magna feeding inhibition (i.e. Barata and Baird 2000), making it difficult to evaluate the reliability/reproducibility of this endpoint. However, an equally sensitive endpoint (i.e. reproduction) from Barata and Baird (2000) is adequately represented in the scientific literature. It is more appropriate to use an endpoint (i.e. reproduction, in this case) for which there are additional supporting data (e.g. Biesinger and Christensen 1972). In summary, reproduction and feeding inhibition are equally sensitive. Therefore, basing the Cd assessment on D. magna reproduction effectively considers the impact of Cd on feeding inhibition. Barata, C. and Baird, D.J. 2000. Determining the ecotoxicological mode of action of chemicals from measurements made on individuals: Results from instar-based tests with Daphnia magna Straus. Aquatic Toxicology 48: 195-209 Biesinger, K.E. and Christensen, G.M. 1972. Effects of various metals on survival, growth, reproduction, and metabolism of Daphnia magna. Journal of the Fisheries Research Board of Canada 29:1691-1700. Canadian Council of Ministers of the Environment (CCME) 2014. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Cadmium. Canadian Council of Ministers of the Environment. Winnipeg.
B7-4	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend that the findings and conclusions are reviewed and analyses are re-run.	The memo states that "This memorandum presents an analysis of the potential for phosphorus discharge from the biological treatment facilities to affect the trophic status of Lake Koocanusa". However, the findings and conclusions are not substantiated by the analyses that were conducted and the data provided. The following are deficiencies found in this regards: • The title of the memo implies that phosphorus loading will be analyzed; however, there is very little loading data at all. o There are no daily, monthly or yearly loading calculations. o There is no calculation of current phosphorus loading from the Elk River to the lake, and no comparison to future increases in loading from the treatment process effluent. o Table 2 provides estimated concentration data, but no loading data. • Equation 1 does not represent a mass balance; it is simply the cumulative addition of phosphorus concentration. This equation does not represent a method to determine Lake Koocanusa phosphorus concentration. The conclusion that "active water treatment using biological treatment technology and the associated phosphorus discharge will not change the trophic status of Lake Koocanusa" is unsubstantiated by the data provided. The methods used in this memo are not appropriate to make such a conclusion. Furthermore, phosphorus is only one component of determined trophic status. Lakes are complex systems and there are other physical, chemical and biological factors that influence trophic status that were not examined (i.e., Chl-a, secchi depth, nitrogen, N:P ratios, etc.).	MOE		11-Jul-2014	The analysis presented in the memorandum is intended to be a screening calculation to assess if potential increases in phosphorus concentrations resulting from the initial implementation plan have the potential to change the trophic status of the reservoir or not. The analysis was never intended to represent a mechanistic model for the reservoir. The very conservative screening analysis performed confirms that that a mechanistic model is not required nor warranted at this time; but does support continued monitoring of water quality within the reservoir consistent with practices as outlined within Chapter 10 (Monitoring) and through the Regional Aquatics Effects Monitoring Program.
B7-5	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend using flow data and water quality from the same station at the mouth of the Elk River.	Flow data from Fernie will be quite different than flow data >60km downstream near Lake Koocanusa. Loading calculations will be vastly underrepresented as flows downstream will be greater than those upstream.	MOE		11-Jul-2014	The record for flow data at the mouth of the Elk River (5 years) is not as robust as the record reported at Fernie (46 years) to complete the conservative screening analysis. As additional data are collected refinements per the adaptive management framework continued refinements will be evaluated and incorporated as appropriate.
B7-6	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend using in-situ phosphorus data from Lake Koocanusa rather than "calculated" data.	The assumption that phosphorus concentrations can be accurately calculated using river water concentrations is flawed. The lake is a complex system with a variety of physical, chemical and biological factors that influence water quality and trophic status. Water quality data exists for the lake, and that data should be used here.	MOE		11-Jul-2014	In-situ data for the reservoir at the time of writing are limited. For instance, there have been a total 59 measurements over five distinct sampling locations, and two different depths collected to date. Therefore and on average, approximately six data points within the photic zone of the reservoir per sampling location are available and as is the case with ortho-phosphate 100% are non-detects. Furthermore, the analysis presented in the memorandum is intended to be a screening calculation to assess if potential increases in phosphorus concentrations resulting from the initial implementation plan have the potential to change the trophic status of the reservoir or not. The analysis was never intended to represent a mechanistic model for the reservoir. The very conservative screening analysis performed confirms that that a mechanistic model is not required nor warranted at this time; but does support continued monitoring of water quality within the reservoir consistent with practices as outlined within Chapter 10 (Monitoring) and through the Regional Aquatics Effects Monitoring Program.
B7-7	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend providing clarification and rationale for why river flow is expressed as CMS/km^2 of drainage area.	River flow data should be compared directly to phosphorus concentration data. There is no need for area based normalization.	MOE		11-Jul-2014	As noted in Annex I.1 Evaluation of Phosphorus Concentrations in the Elk and Fording Rivers, river flow is normalized by drainage, to facilitate a comparison of phosphorus variability with flow.

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B7-8	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend using spring phosphorus values (before stratification occurs) in analyses along with seasonal averages.	Spring phosphorus is a key component of analyzing trophic status for lakes with water residence times of >6 months. Refer to: Nordin, R.N. 1985. Water Quality Criteria for Nutrients and Algae – Technical Appendix. Water Management Branch, Ministry of Environment. Victoria BC. 104 pp.	MOE		11-Jul-2014	At the time of preparing the Plan and the memorandum (Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status), spring water quality (nutrient) data within the reservoir were not available. Nutrient data collection efforts within the reservoir were initiated in August 2013, therefore the recommendation was not possible to consider.
B7-9	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend using flow periods other than low flow conditions for loading analyses. Consider using actual flow conditions compared to actual concentrations, along with average and "worst-case" high flow conditions.	The use of low-flow conditions may be appropriate to determine localized impacts of effluent on a receiving environment, but is not appropriate when analyzing nutrient loads. Using low flow conditions severely underestimates the load of nutrients on downstream environments.	MOE		11-Jul-2014	As noted within response to Advice Item No. B7-4, the analysis performed was a very conservative evaluation to identify the potential of if the initial implementation adversely affecting trophic status within the reservoir. As such, the relevant period of time for consideration is the growing season. The analysis was not intended to evaluate loads into the reservoir or to be a mechanistic model for the reservoir. For the purposes of the Plan, Teck has developed the Elk Valley Water Quality Planning model which can evaluate loads. As noted within Chapters 10 (Monitoring) and 11 (Adaptive Management), through continued monitoring activities during Plan implementation, these models will be refined and such analysis performed if warranted.
B7-10	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend re-running the model using a Total cumulative approach for Discharge (by year and season) and total loadings vs. average conditions approach.	Average conditions do not represent the total loadings to the environment.	MOE		11-Jul-2014	The analysis presented in the memorandum is intended to be a screening calculation to assess if potential increases in phosphorus concentrations resulting from the initial implementation plan have the potential to change the trophic status of the reservoir or not. The very conservative screening analysis performed confirms that that a mechanistic model is not required nor warranted at this time; but does support continued monitoring of water quality within the reservoir consistent with practices as outlined within Chapter 10 (Monitoring) and through the Regional Aquatics Effects Monitoring Program.
B7-11	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend providing Effluent Q and P loading data and estimates	There is no data on the projected effluent loading (Q). This makes it impossible to review the model.	MOE		11-Jul-2014	The analysis presented in the memorandum is intended to be a screening calculation to assess if potential increases in phosphorus concentrations resulting from the initial implementation plan have the potential to change the trophic status of the reservoir or not. The very conservative screening analysis performed confirms that that a mechanistic model is not required nor warranted at this time; but does support continued monitoring of water quality within the reservoir consistent with practices as outlined within Chapter 10 (Monitoring) and through the Regional Aquatics Effects Monitoring Program.
B7-12	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend being specific on hydrologic summary terms and labels	Many graphs and tables omit specific unit labels (e.g., cms). It is difficult to review the model without knowledge of the units of specific variables and how those variables were calculated (i.e., Annual Avg, Critical Summer Season, growing season). It appears that the three WSC data were added together, but this is the reviewer's assumption, as it is not stated in the text. The report needs to provide more specifics for review.	MOE		11-Jul-2014	This advice has been addressed in Annex I.1 Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status.
B7-13	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend being more specific on sample locations.	Cannot evaluate sample site vs. effect on loading (i.e., BC08NG008 is not shown on the map).	MOE		11-Jul-2014	This advice has been addressed in Annex I.1 Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status.
B7-14	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend assessing of current concentration in the upper lake be done directly on the lake vs. the input streams which are far removed from the confluence to the lake	The sample locations appear to be far removed from the lake. What is the concentration in the lake on an annual and seasonal basis? What is the volume? How much P will be added yearly compared to what is resident in the lake?	MOE		11-Jul-2014	See response to Advice Item No. B7-8.
B7-15	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend the Mass balance equation (1), be clarified and data examples provided (i.e., effluent conc and Q's). Discuss why a simple comparison of Effluent Conc/ Discharge to River Q and Conc is not used.	The variables in the equation are not specified and the reviewer cannot determine why a simple comparison of Effluent Conc/ Discharge to River Q and Conc is not used. Why does the eqn roll the effluent Loadings and Q' into the mass balance vs using it separately for a comparison.	MOE		11-Jul-2014	See response to Advice Item No. B7-4.
B7-16	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Provide rationale for the statistics used.	It is odd to break a distribution in half and have slopes running in two different directions on one graph. The significance of the regressions is not made available for the reviewer to adjudicate. Nor is the standard deviation or variance.	MOE		11-Jul-2014	Rationale has beed provided in Annex I.1 Evaluation of Phosphorus Concentrations in the Elk and Fording Rivers, also refer to Advice Item No. B7-4.
B7-17	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend not lumping the WSC station discharges together in the model, but to model each separately in relation to effluent Q and Loadings.	Discharge is key to diluting effluent concentrations. By lumping discharge together a greater dilution ratio is created. It is impossible therefore for the review to adjudicate if certain parts of the tributaries to upper lake will exceed permissible P loadings.	MOE		11-Jul-2014	See response to Advice Item No. B7-4.
B7-18	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Provide rationale as to why the 1 in 10 year flow is selected.	Report lacks a rationale as to why the derived 1 in 10 year statistic is used. Report states as it compares to 1979.	MOE		11-Jul-2014	Rationale has beed provided in Annex I.1 Evaluation of Phosphorus Concentrations in the Elk and Fording Rivers, also refer to Advice Item No. B7-4.
B7-19	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend providing the ratios of flow / loadings of treated effluent to natural flow.	Treatment of 7500-30000 m#/day equates to roughly .090-.350 m3/s. The stated flow is 143 m3/s. It is more meaningful to draw comparison of overall loading and dilution to the environment.	MOE		11-Jul-2014	See response to Advice Item No. B7-4.
B7-20	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend that worked examples for table 2 and 3 (with data) be provided.	It is difficult to review the results provided without a more specific knowledge of how they were calculated.	MOE		11-Jul-2014	See response to Advice Item No. B7-8.

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B7-21	**Memo: Evaluation of Phosphorus Loads on Upper Lake Koocanusa Trophic Status**	Recommend the model be revised and made available for review again.	Much information on the model parameters and specifics were not available to reviewers in order to properly evaluate the model.	MOE		11-Jul-2014	See response to Advice Item No. B7-4.
B7-22	**Annex E. Benchmark Derivation report for Selenium**	Recommend adding confidence intervals for benchmark concentrations for Selenium (Pg.6, Table 3-1)	Measures of uncertainty should always be included with estimates. Reporting confidence intervals will help when determining the uncertainty associated with the effects estimates.	MOE		11-Jul-2014	Uncertainty associated with the selenium effect estimates has been explicitly evaluated through the completion of sensitivity analyses and the generation of upper confidence intervals on the effect estimates. The sources of uncertainty and the mechanisms used to address those uncertainties are documented in the Plan and have been discussed extensively with the Toxicological Working Group. As such, the provision of confidence intervals on the values listed in Annex E Benchmark Derivation report for Selenium Table 3-1 are not required to address the underlying rationale.
B7-23	**Annex K.1 Aquatic Environment Synthesis Report**	Reorganize the Synthesis Report to present the relevant information on existing conditions in the watershed on a receptor-by-receptor basis. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The Terms of Reference of the EVWQP indicate that the plan will use the best available science to evaluate the impacts and cumulative effects of point and non-point sources of waste on water quality, aquatic biota, and human consumers. Currently, the Synthesis Report includes sections on a variety of topics (i.e., water quality, sediment quality, calcite, tissues chemistry), but does not provide a basis for evaluating effects or cumulative effects arising from single or multiple stressors. To do so, the report would be structured in a manner that is more consistent with the conceptual site model(s), whereby multiple lines-of-evidence would be used to evaluate the effects and potential effects for each receptor group. For example, the evaluation of effects on benthic invertebrates under current conditions should rely on data on surface water chemistry, surface water toxicity, sediment chemistry, sediment toxicity, benthic invertebrate community structure, stream-bed substrate composition, and calcite index.	KNC		11-Jul-2014	A primary outcome of the evaluation was to identify the frequency and location of samples exceeding medium-specific (e.g., surface water, sediment, tissue etc.) guidelines. Structuring the data and associated analyses in this format was intended to facilitate the review in relation to the Order and specific requirements outlined within the approved Terms of Reference (refer to paragraph 3.4). Teck will in consultation with MOE and the Ktunaxa Nation Council consider restructuring future reports.
B7-24	**Annex K.1 Aquatic Environment Synthesis Report**	Evaluate environmental quality conditions for all water bodies within the study area, including mine works, when considering bioaccumulative substances (such as selenium). *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	For toxic substances, it is reasonable to exclude mine works from the evaluation of current conditions. However, bioaccumulative contaminants have the potential to cause adverse effects on ecological receptors within the mine works when those areas represent an attractive nuisance for wildlife (e.g., Clode Pond). Therefore, the effects of bioaccumulative chemicals of potential concern (COPCs) need to be evaluated within such areas as part of the overall assessment of existing environmental conditions in the Elk Valley.	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B7-25	**Annex K.1 Surface Water Quality Section 3.1**	Develop a table that identifies all of the potentially mining-influenced tributaries to the Elk and Fording Rivers (i.e., by management unit; MU) and identifies the water quality sampling stations on each tributary. This table should also include sampling stations on the Elk River and the Fording River. The analyte groups that were measured at each station should also be identified (i.e., conventional variables, major ions, nutrients, metals, PAHs, others). *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The maps 3.1-2 to 3.1-7 provide useful information on the locations of surface water sampling stations within the study area. However, the reader also needs to understand the spatial extent of sampling stations relative to coal- mining activities. Accordingly, there is a need to provide a more complete understanding of the extent to which mining-influenced tributaries have been sampled. Such a table will provide a basis for identifying all the water bodies that have been influenced by mining activities in the Elk Valley.	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B7-26	**Annex K.1 Surface Water Quality Section 3.1**	Include a table of the water quality guidelines (WQGs) that were used to screen surface-water chemistry data from the Elk Valley in the main body of the report. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The first step of the evaluation of existing surface water chemistry data involves screening against WQGs. The reader needs to know what WQGs were used in the screening process.	KNC		11-Jul-2014	This advice will be incorporated into the final version of Annex K.1 Draft Aquatic Environment Synthesis Report.
B7-27	**Annex K.1 Surface Water Quality Section 3.1**	Prior to initiating screening of the existing water quality data, the underlying surface-water chemistry data need to be evaluated to determine if minimum data requirements are met. To complete this step, minimum data requirements need to be established. Such minimum data requirements need to consider spatial coverage within the MU (i.e., all mining-influenced tributary and mainstem reaches need to have been sampled), temporal coverage (i.e., were the results of at least two 5-in-30 day sampling events available for each mining-influenced tributary and mainstem reach), and minimum number of samples per sampling location and analyte (e.g., at least 10 samples should be available for a location before using the results to screen out an analyte). *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	One of the key tenets of screening-level assessments is to avoid screening out analytes prematurely. To avoid doing so, it is important to ensure that enough data are available to provide a fulsome evaluation of water quality conditions. Establishment of minimum data requirements provides a transparent basis for ensuring that screening does not result in inappropriate elimination of analytes.	KNC		11-Jul-2014	More than 825,000 surface water quality data measurements, for 73 constituents, collected from 94 sampling locations throughout the Designated Area were evaluated to assess current baseline conditions. As part of the evaluation, maximum concentrations were used to screen against chronic water quality guidelines (WQGs). If only one measurement was identified as exceeding the WQG, it was conservatively carried forward for further analysis. This approach is more conservative than suggested by the advice. It is also important to note that the evaluation performed was to provide context in the development the Plan - i.e., to ensure that the Plan is addressing the primary constituents of interest.
B7-28	**Annex K.1 Surface Water Quality Section 3.1**	Provide clear rationale for identifying primary and secondary chemicals of interest (CoIs) for each MU. In addition, describe the underlying rationale for the methods that were selected for identifying primary and secondary CoIs. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	In the second step of the surface-water evaluation process, median concentrations of CoIs were calculated and used to classify the CoIs into two categories, primary and secondary. The rationale for doing so is not provided in the draft document. Moreover, this step in the process is unnecessary and may result in screening out CoIs that should be included in the assessment of existing conditions in the Elk River watershed.	KNC		11-Jul-2014	The water quality assessment and Section 3.1 will be re-evaluated to streamline the evaluation steps and more clearly characterize and summarize water quality on a localized and constituent-specific basis (i.e., identify specific locations where mine-related parameters are above effects benchmarks based on individual sample results rather than station medians). To support the step of comparing concentrations in mine-exposed areas to reference concentrations, Teck has provided plots showing the distribution of data at each reference station relative to the 95th percentile for each constituent to verify that the 95th percentile values are not biased by results for specific samples or stations; these plots will be incorporated into finalized Aquatic Environment Synthesis Report. In addition, concentration trends will be plotted and discussed at key locations for the Order constituents. Results will be compared to past water quality evaluations (e.g., Minnow and PLA 2012) to highlight and explain key similarities and differences.
B7-29	**Annex K.1 Surface Water Quality Section 3.1**	In addition to reporting the frequency of exceedance of WQGs, calculate and report maximum hazard quotients based on a comparison of measured COPC concentrations to each of the selected WQGs for each sampling station in each MU. The results of this analysis need to be tabulated and presented in the text of the main report for all analytes. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	: Most of the underlying surface water chemistry data used in the evaluation of existing water quality conditions were obtained from grab samples collected on a monthly or less frequent basis. Therefore, all of these results (with the exception of samples collected as part of a 5-in-30 day sampling event) should be considered to represent mean monthly concentrations of the CoIs in surface water and should be compared to long- term WQGs. Hence, exceedance of a long-term WQG in one or more surface water samples represents a condition that could adversely affect aquatic organisms. This analysis will provide relevant information on current water quality conditions.	KNC		11-Jul-2014	This advice has been incorporated into Chapter 4 (Baseline Conditions) as discussed at TAC #7; and will be incorporated into the final version of the Aquatic Environment Synthesis Report.

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B7-30	**Annex K.1 Surface Water Quality Section 3.1**	Present the results of the analysis of reference water quality conditions in the main text of the report. This analysis needs to include a description of the criteria that were used to identify candidate reference stations and to evaluate the adequacy of candidate reference stations. In addition, the reference concentrations that were calculated for all analytes should be tabulated and presented in the main report. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	In the third step of the evaluation of surface-water chemistry data, the surface-water chemistry data from the study area are compared to reference concentrations of CoIs. However, examination of the information presented at TAC-6 indicates that reference concentrations are not reported for most analytes in surface water. In addition, it appears that inappropriate procedures have been used to calculate reference concentrations. For example, reference concentrations of 18 NTU and 40 mg/L were reported for turbidity and TSS, respectively. This is inappropriate because both analytes exhibit substantial temporal (i.e., high flow vs. low flow) and spatial (i.e., tributary vs. mainstem) variability (See Table 3.1-1). Therefore, it is inappropriate to calculate a single reference concentration for these variables. In addition, the reference concentrations presented in Table 3.1-3 appear to have been unduly affected by apparent outliers or data from inappropriate reference stations (e.g., selenium, copper, uranium, phenanthrene, pyrene). Selection of inappropriate reference concentrations has the potential to influence the results of the screen	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B7-31	**Annex K.1 Surface Water Quality Section 3.1**	Establish reference concentrations using data on the measured concentrations of CoIs in surface water only. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The available data on the concentrations of CoIs at reference stations includes both measured concentrations and non-detect results. Because high non-detect results have the potential to bias high the estimates of reference concentrations, it is essential to either eliminate non-detect data from the analysis prior to calculating reference concentrations or screen non-detect data for reference stations against WQGs prior to calculating reference concentrations (i.e., non-detect data with detection limits greater than WQGs should not be used to establish reference concentrations).	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B7-32	**Annex K.1 Surface Water Quality Section 3.1**	Eliminate the evaluation of the frequency of exceedance of reference concentration (i.e., 10% of concentrations need to be greater than the reference concentration for a CoI to be carried forward) from the CoI refinement process. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The frequency of exceedance criterion has the potential to result in elimination of numerous CoIs that should be evaluated in the detailed evaluation. For example, ammonia in all MUs, cadmium in MU-3, zinc in MU-3 and 4, cobalt, and uranium in MU-1. However, this approach completely ignores the magnitude of exceedance of the reference concentration.	KNC		11-Jul-2014	When evaluating environmental data it is critical to consider background/reference data. As a result, background/reference data will not be removed from the analysis but rather calculations will be revisited to ensure that constituents are not prematurely removed from further analysis.
B7-33	**Annex K.1 Surface Water Quality Section 3.1**	Conduct a sensitivity analysis by calculating flow-weighted average concentrations to represent reference conditions for the Elk River downstream of the confluence of the Fording River (represented by the average of GH_ER2 and FR_UFR1) and the Elk River downstream of the confluence of Michel Creek (represented by the average of GH_ER2, FR_UFR1, and CM_MC1). If applicable, incorporate the flow-weighted average concentrations into the background comparison analysis. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Background surface water concentrations estimated by taking the arithmetic mean of the background concentrations from multiple upstream locations may be over- or under-estimated depending on the differences in the flow conditions of each of the streams being incorporated in the average. Therefore the flow-weighted average concentrations may provide a better estimate of background conditions for stations that are influenced by multiple streams.	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B7-34	**Annex K.1 Surface Water Quality Section 3.1**	Re-evaluate the list of CoIs that require detailed evaluation after revising the procedures for refining the CoI list, as described in Section 3.1.2 of the Synthesis Report. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The procedures that are described for CoI refinement (Section 3.1.2 of the Synthesis Report) are not appropriate. Application of these procedures will result in screening out a number of CoIs for various MUs and/or altogether. As the analysis of current water quality conditions needs to be robust and defensible, it is essential that the CoI refinement steps be repeated using more appropriate procedures.	KNC		11-Jul-2014	The water quality assessment and Section 3.1 will be re-evaluated to streamline the evaluation steps and more clearly characterize and summarize water quality on a localized and constituent-specific basis (i.e., identify specific locations where mine-related parameters are above effects benchmarks based on individual sample results rather than station medians). To support the step of comparing concentrations in mine-exposed areas to reference concentrations, Teck has provided plots showing the distribution of data at each reference station relative to the 95th percentile for each constituent to verify that the 95th percentile values are not biased by results for specific samples or stations; these plots will be incorporated into the finalized Aquatic Environment Synthesis Report. In addition, concentration trends will be plotted and discussed at key locations for the Order constituents. Results will be compared to past water quality evaluations (e.g., Minnow and PLA 2012) to highlight and explain key similarities and differences. A summary statistics table showing mean, median, maximum, 95th percentile, % detects >sample-specific guideline, and ratio of 95th percentile to guideline will also be included in the updated report.
B7-35	**Annex K.1 Surface Water Quality Section 3.1**	Any CoI that exceeds a WQG in two or more surface water samples from an MU needs to be evaluated in the detailed evaluation of water quality conditions. In addition, any analyte for which WQGs are not available or for which insufficient data are available to characterize concentrations in all mining-influenced tributaries and all mainstem stations need to be evaluated in the detailed evaluation. The total number of samples for which data exist for each analyte in each MU needs to be reported. In addition, tables that provide summary statistics for each analyte in each MU and for each analyte in the reference samples need to be included in the Synthesis Report (i.e., n, number samples with detected concentrations, minimum, maximum, mean, geomean, and 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentiles). *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The procedures that are described in Section 3.2.1 for refining the list of CoIs appears to have the potential for inappropriate elimination of certain substances that could be adversely affecting water quality conditions in the study area. In addition, the results of the screening steps are not fully presented in the Synthesis Report (i.e., results are presented only for those analytes that exceeded WQGs or reference concentrations). Summary statistics are required to provide additional perspective on the screening-level analysis of the underlying water quality data.	KNC		11-Jul-2014	The water quality assessment and Section 3.1 will be re-evaluated to streamline the evaluation steps and more clearly characterize and summarize water quality on a localized and constituent-specific basis (i.e., identify specific locations where mine-related parameters are above effects benchmarks based on individual sample results rather than station medians). To support the step of comparing concentrations in mine-exposed areas to reference concentrations, Teck has provided plots showing the distribution of data at each reference station relative to the 95th percentile for each constituent to verify that the 95th percentile values are not biased by results for specific samples or stations; these plots will be incorporated into the revised Aquatic Environment Synthesis Report. In addition, concentration trends will be plotted and discussed at key locations for the Order constituents. Results will be compared to past water quality evaluations (e.g., Minnow and PLA 2012) to highlight and explain key similarities and differences. A summary statistics table showing mean, median, maximum, 95th percentile, % detects >sample-specific guideline, and ratio of 95th percentile to guideline will also be included in the updated report.
B7-36	**Annex K.1 Surface Water Quality Section 3.1**	Evaluate the potential effects of cadmium using hardness-based WQGs, including the draft BC WQG that was recently released by BCMOE. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The Toxicology Work Group (TWG) provided a number of recommendations regarding the evaluation of cadmium in the EVWQP. More specifically, the TWG recognized the inherent uncertainty in the application of a biotic ligand model (BLM) for cadmium because: 1. No numerical WQGs have been established in Canada using the BLM; 2. No numerical WQC have been established in the United States using the BLM; and, 3. No site-specific toxicity testing has been conducted to evaluate the applicability of the BLM for cadmium in the Elk Valley. Accordingly, it was agreed that evaluations of the potential effects of cadmium on aquatic organisms would be evaluated using hardness-normalized WQGs and the BLM for cadmium. Hence, the Synthesis Report needs to be revised to include an evaluation of the effects of cadmium using the hardness-normalized WQGs.	KNC		11-Jul-2014	With the exception of including the draft BC WQG recently released which clearly states "Draft for review only – do not cite", this advice has been incorporated into Chapter 4 (Baseline Conditions) and will also be incorporated into the update for Annex K.1 DRAFT Aquatic Environment Synthesis Report.

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B7-37	**Annex K.1 Surface Water Quality Section 3.1**	The detailed evaluations of water quality conditions should be revised to report both the frequency of exceedance of the site-specific toxicity thresholds and the magnitude of exceedance of the site-specific toxicity thresholds. The results for tributary stations and for mainstem stations should be reported separately. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The evaluations of existing water quality conditions presented in Section 3.1.3 of the Synthesis Report are focused on determination of the number of stations within each MU that have exceedances (i.e., maximum and median concentrations) of the site-specific toxicity thresholds. While these results may provide relevant information for evaluating water quality conditions, they provide no information on the frequency or magnitude of exceedance of the selected toxicity thresholds. Because effects on aquatic organisms are likely to be influenced by both the frequency and magnitude of exceedance of the selected toxicity thresholds, the frequency and magnitude of exceedance of the toxicity thresholds need to be reported for each analyte at each station, then summed for all tributaries within an MU.	KNC		11-Jul-2014	A summary statistics table showing mean, median, maximum, 95th percentile, % detects >sample-specific guideline, and ratio of 95th percentile to guideline will also be included in the update to the Annex K.1 DRAFT Aquatic Environment Synthesis Report.
B7-38	**Annex K.1 Surface Water Quality Section 3.1**	Evaluate the potential effects of zinc on aquatic organisms using hardness- based WQGs. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	To date, there has been no discussion among the members of the TWG or the Technical Advisory Committee (TAC) regarding the application of a BLM to evaluate the effects of zinc on aquatic organisms. There is inherent uncertainty in the application of a BLM for zinc because: 1. No numerical WQGs have been established in Canada using a BLM for zinc; 2. No numerical WQC have been established in the United States using the BLM for zinc; and, 3. No site-specific toxicity testing has been conducted to evaluate the applicability of the BLM for zinc in the Elk Valley. Accordingly, evaluations of the potential effects of zinc on aquatic organisms should be evaluated using hardness-normalized WQGs for zinc. Hence, the Synthesis Report needs to be revised to include an evaluation of the effects of zinc using the hardness-normalized WQGs.	KNC		11-Jul-2014	Evaluation of hardness-normalized water quality guidelines was included in the Chapter 4 (Baseline Conditions) and will also be included in the update to Annex K.1 DRAFT Aquatic Environment Synthesis Report.
B7-39	**Annex K.1 Surface Water Quality Section 3.1**	Revise the Section of the Synthesis Report on toxicity tests (i.e., Section 3.1.4) to provide additional information on the toxicity tests that were conducted, on the number of samples that were tested, and on the limitations of the toxicity testing program. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The toxicity testing programs that were conducted in 2013 provide relevant information for evaluating current water quality conditions within the study area. However, the description of the toxicity testing that was done is insufficient to enable the reader to fully understand the work that was done or its implications. For example, while the species tested are identified in the text, the duration of exposure and endpoints measured are not. Therefore, this section of the report needs to be revised to provide more information on the studies that were conducted and the associated results.	KNC		11-Jul-2014	Methods of sample collection will be briefly described for each sample type described in the update to Annex K.1 DRAFT Aquatic Environment Synthesis Report (Section 3.0).
B7-40	**Annex K.1 Surface Water Quality Section 3.1**	Revise Section 3.1.5.1 of the Synthesis Report to provide additional information on the sampling locations that are discussed, the magnitude of the exceedances of WQGs, and the forms of phosphorus that were evaluated. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Section 3.1.5.1 of the Synthesis Report describes the results of the evaluation of phosphorus in MU-6. Concentrations of phosphorus in the lake downstream of the Elk River are compared to the levels that were measured at an upstream location. However, the upstream station is not identified and it could be the lake station that is potentially influenced by phosphorus loadings from the Elk River. Therefore, comparisons should explicitly describe concentrations that were measured at Wardner. Currently, the discussion focuses on median concentrations at each station. However, it is also important to discuss ranges and distributions of phosphorus data when comparing stations. Furthermore, the current discussion does not describe the phosphorus species that was measured. Therefore, the discussion should describe the species that was measured (TP, TDP, OP) and discuss the limitations of the data for evaluating biologically-available phosphorus in the lake.	KNC		11-Jul-2014	This advice has been incorporated as part of the evaluation of current baseline conditions (refer to Chapter 4 [Baseline Conditions]) and will be incorporated into the final version of Annex K.1 DRAFT Aquatic Environment Synthesis Report.
B7-41	**Annex K.1 Surface Water Quality Section 3.1**	The discussion of selenium concentrations in Lake Koocanusa (Section 3.1.5.2) needs to be revised to reflect the limitations of the data relative to comparison to the B.C. WQG for water and to reference concentrations. Because only monthly water quality data are available, each measurement should be compared to the WQG to evaluate attainment with WQGs. In addition, selenium concentrations in the lake should not be compared to the 95th percentile of reference locations. Rather, concentrations in the lake should be compared to data from the site at Wardner (minimum, maximum, mean, distributions).	The long-term WQG for selenium in water is 2 µg/L. Attainment of the WQG is evaluated using the results of five surface water samples collected within a 30-d period. The WQG is not intended to be compared to a median concentration at any station or for multiple stations. Such comparisons provide a biased evaluation of water quality conditions in the lake.	KNC		11-Jul-2014	Comparison of data to water quality guidelines for selenium in Lake Koocanusa has been included in Chapter 4 (Baseline Conditions), including comparison to upstream reference stations in Lake Koocanusa and Kootenay River upstream of the reservoir. This information will also be incorporated into the final version of Annex K.1 DRAFT Aquatic Environment Synthesis Report.
B7-42	**Annex K.1 Surface Water Quality Section 3.1**	The conclusion that no constituents were classified as COPCs in Lake Koocanusa must be revised based on a more objective evaluation of water quality conditions in the lake. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The evaluation of water quality conditions in Lake Koocanusa was based on inappropriate statistical analysis of the data prior to comparison to WQGs. Because water samples collected on a monthly basis must be considered to represent average conditions for the month, the data for each monthly surface-water sampling result must be compared to the corresponding long-term WQG. In addition, the evaluation of water quality conditions in the lake relied on inappropriate comparisons of in-lake concentrations to pooled reference stations from the Elk River watershed and Lake Koocanusa. Because the Kootenay River and the Elk River represent the primary sources of surface water to the lake, data from the Elk River at the mouth and each sampling station in the lake must be compared to the data that were collected at Wardner. This will provide a more accurate evaluation of the influence of contaminant loadings from the Elk River on water quality conditions in Lake Koocanusa.	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring reporting.
B7-43	**Annex K.1 Sediment Quality Section 3.2**	Develop and present a table that summarizes the sediment chemistry data for reference stations. This analysis needs to include a description of the criteria that were used to identify candidate reference stations and to evaluate the adequacy of candidate reference stations. In addition, the reference concentrations that were calculated for all analytes should be tabulated and presented in the main report. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The comparison of data from mining-influenced areas to reference area concentration data is a key step in the COPC identification process for sediments (i.e., as described in Section 3.2.2 of the Synthesis Report). However, the data that were used to calculate reference area concentrations were not presented in the main body of the Synthesis Report. For this reason, a summary of the reference area concentration data needs to be presented (i.e., minimum, mean, SD, maximum, 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentiles). Because inclusion of inappropriate reference stations can influence the reference area concentrations that are calculated, the selection criteria for reference stations needs to be fully described.	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring reporting.

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ID# from Meeting	Category/Theme	Advice/Comment	Rationale (*to be filled in by Originator*)	Originator (Agency) of Advice	Other TAC Member Support	Date Advice Received (dd/mm/yy)	Teck Response
B7-44	**Annex K.1 Sediment Quality Section 3.2**	The reference area data should be screened (i.e., to remove samples with non-detected concentrations above the benchmarks) before they are used to estimate reference area concentrations for the various COPCs. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Based on the information presented in Table 3.2.4, most of the measurements of PAH concentrations in sediments from reference areas were less than the detection limit (<DL). Treatment of these <DL results can substantially influence the reference area concentrations that are estimated from the underlying data. Because a <DL should not be used to determine if a SQG has been exceeded unless the DL is lower than the SQG, <DL measurements with DLs that are greater than the interim sediment quality guideline (ISQG) should be eliminated from the data set prior to data analysis. After DL screening, the remaining data in the data set should be evaluated using an appropriate outlier analysis. Outliers should be removed from the data set prior to data analysis. Following screening, the remaining data should be evaluated to determine if sufficient data are available to calculate a reference area concentration (i.e., minimum of 10 samples).	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B7-45	**Annex K.1 Sediment Quality Section 3.2**	Re-evaluate the COPCs following implementation of a more robust approach to the estimation of reference area concentrations. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Based on a review of the information presented in Section 3.2.2, a number of COPCs have been screened out of the assessment as a result of selecting inappropriate reference area concentrations (e.g., 1.78 mg/kg DW for phenanthrene). Therefore, the COPC refinement step needs to be repeated after more appropriate reference area concentrations have been estimated.	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B7-46	**Annex K.1 Sediment Quality Section 3.2**	In Section 3.2.2.4, explicitly acknowledge the limitations of the toxicity test results in terms of evaluating the effects of sediment-associated COPCs on benthic invertebrates. In addition, the description of the toxicity testing results presented in Section 3.2.2.4 does not agree with Table 3.2.7 (i.e., text refers to testing at multiple stations per location, while the table does not). This discrepancy needs to be corrected. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Two toxicity tests were utilized to evaluate the toxicity of Elk Valley sediments to benthic invertebrates. In total, six sediment samples were tested, including two reference area samples, one mine workings sample, and three mining influenced samples. This represents an extremely limited data set for characterizing sediment toxicity in the study area. In addition, the two toxicity tests that were selected were of short duration and measured a limited number of endpoints. Therefore, the results of the toxicity testing conducted to date do not provide a basis for characterizing sediment toxicity in the study area.	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B7-47	**Annex K.1 Sediment Quality Section 3.2**	Conduct long-term toxicity tests with midge (life-cycle) and amphipods (42-d) to evaluate sediment toxicity in future sediment quality assessments. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Benthic invertebrates are continuously exposed to sediment-associated contaminants throughout their life cycles. Such exposure to sediment- associated COPCs can adversely affect the survival, growth, biomass, and reproduction of benthic invertebrates. Accordingly, long-term toxicity tests that evaluate survival, growth, biomass, and reproduction need to be conducted to provide a basis for assessing effects on these receptors.	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B7-48	**Annex K.1 Sediment Quality Section 3.2**	Revise the summary of the Elk River watershed evaluation of sediment quality conditions to provide a more balanced assessment of current conditions. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The text of Section 3.2.2.5 indicates that sediment quality conditions are generally acceptable throughout most of the study area. This conclusion is not supported by the existing data and information for several reasons. First, the available sediment chemistry data indicate that COPC concentrations consistently exceed ISQGs and frequently exceed probable effect levels (PELs; i.e., Cadmium, Nickel, fluorene, naphthalene, and phenanthrene). Hence, the concentrations of COPCs are frequently sufficient to adversely affect the survival, growth, biomass, and/or reproduction of benthic invertebrates. The magnitude of exceedance of the SQGs also needs to be considered in this evaluation (i.e., in addition to the frequency of exceedance). Second, limited short-term sediment toxicity data showed that the survival of benthic invertebrates was impaired in at least one exposure area. In addition, the toxicity tests did not evaluate effects in long-term exposures or effects on reproduction, rendering them of limited value for assessing sediment quality conditions. Third, the benthic invertebrate community structure data were not considered in the sediment quality assessment. Even with the insensitive methods that were used in the benthic invertebrate community structure analysis, impairment of the benthic invertebrate community was demonstrated at numerous locations throughout the Elk Valley. As benthic invertebrate communities are likely responding to multiple stressors, including sediment quality conditions, such data should have been used in the sediment quality assessment.	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B7-49	**Annex K.1 Sediment Quality Section 3.2**	Describe the effects of stream-bed substrate composition on benthic invertebrates and fish in the Elk Valley. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The section of the report on sediment quality focuses on sediment chemistry and sediment toxicity. However, stream-bed substrate composition represents a key factor influencing egg-to-fry survival rates for salmonid fishes. In addition, stream-bed substrate composition can affect benthic invertebrate community structure and the abundance of benthic invertebrates. Therefore, there is a need to characterize existing conditions in the Elk Valley and describe the effects of sedimentation on these receptors.	KNC		11-Jul-2014	This advice will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program. Current information on substrate composition will be summarized, where available, in the update to the Annex K.1 DRAFT Aquatic Environment Synthesis Report.
B7-50	**Annex K.1 Sediment Quality Section 3.2**	Revise Section 3.2.3 of the Synthesis Report to explicitly describe the limitations of the existing data for evaluating sediment quality conditions in Lake Koocanusa. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Sediment chemistry was the only line of evidence used to evaluate sediment quality conditions in Lake Koocanusa. Based on the information presented in Table 3.2.8, the conclusion that sediments in the lake pose negligible potential for harm to aquatic biota is based on comparison of total metal concentrations in sediments to SQGs. The number of samples evaluated is not identified. In addition, the magnitude of the exceedances of SQGs is not described. Furthermore, no data are presented on the concentrations of PAHs in lake sediments. Importantly, no sediment toxicity, benthic invertebrate community structure, or sediment bioaccumulation data were presented for the lake. Therefore, the conclusion that was reached regarding sediment quality conditions in the lake is, at best, only very poorly supported by relevant and appropriate data. At worst, this conclusion is misleading and potentially wrong. At minimum, this section of the document must be revised to explicitly recognize the limitations in the available data and information.	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B7-51	**Annex K.1 Calcite Section 3.3**	Use concretion status (CIC) as a primary metric for the evaluating effects of calcite on benthic invertebrates and fish. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The calcite index currently includes two metrics that are combined in the calculation. One of the metrics provides information on the presence/absence of calcite. The second metric provides information on embeddedness of the streambed substrate. The second metric (i.e., concretion status) is likely to be more biologically relevant than the first metric. Therefore, the concretion status alone (and other metrics) should be used to evaluate the potential effects of calcite on fish and invertebrates.	KNC		11-Jul-2014	This advice has been incorporated and was used to help define targets for calcite formation, see Chapter 7 (Calcite Management) of the Plan.

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B7-52	**Annex K.1 Calcite Section 3.3**	Evaluations of the effects of calcite formation on stream-resident biota should include robust monitoring of habitat quality variables (including physical and chemical variables; e.g., intra-gravel DO, velocity, etc.) and biological effects (e.g., benthic invertebrate community structure and abundance; salmonid egg-to- fry survival rates; etc.). *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	To date, calcite monitoring has focused on determining the distribution and spatial extent of calcite formation. As such, no data have been generated on the effects of calcite on ecological receptors. This is a major limitation relative to evaluating the effects of calcite on benthic invertebrates, fish, and other aquatic organisms. This data gap also makes it difficult to evaluate the interactive effects of multiple stressors or the cumulative effects of anthropogenic activities.	KNC		11-Jul-2014	The Terms of Reference require the Plan to define on-going ecosystem and ecotoxicology assessment programs that would be implemented on approval of the Plan. Chapter 10 (Monitoring) defines this program and associated monitoring objectives including biological monitoring concurrent with calcite monitoring to evaluate effects on biota. Study designs will be developed during Plan implementation to detail appropriate methodology, measurement and evaluation endpoints associated with protection of aquatic ecosystem health. Study designs are meant to be adaptive to allow consideration of changing conditions and data from previous monitoring. For these reasons, detailed monitoring designs are not included in the Plan.
B7-53	**Annex K.1 Calcite Section 3.3**	Compile the available periphyton community structure data on a broad taxonomic basis, including green algae (Chlorophyta), blue-green algae (Cyanophyta), flagellate chrysophytes (Xanthophyceae and Chrysophyceae), diatoms (Bacillariophyceae), and other algae. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The existing periphyton community structure data appear to be limited value due to difficulties that the labs experience while sorting samples and identifying species. While these difficulties appear to limit the value of the benthic invertebrate community structure data, a more simplistic analysis may yield more useful results. For this reason, the existing data should be re- analysed to determine the relative abundance of major periphyton taxa.	KNC		11-Jul-2014	Periphyton community data was provided to TAC in response to this advice and a subsequent action item (See TAC SharePoint folder Periphyton Group Variability 2013 Interlab Study). Due to a lack of lab standardization process for periphyton community structure to the group level does not provide any further certainty on community structure and potential effects.
B7-54	**Annex K.1 Periphyton Section 3.4**	Detailed advice related to the collection and interpretation of benthic invertebrate samples was provided by KNC following TAC-5. It is not clear that this advice was considered during preparation of the Aquatic Synthesis Report. Therefore, the benthic invertebrate section of the report should be revised to incorporate the advice that was provided previously. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	There are numerous limitations to the underlying benthic invertebrate community structure data that were reported in the Aquatic Synthesis Report. In addition, the data analyses that were conducted are not at all transparent and do not appear to provide a sensitive basis for evaluating effects on benthic invertebrate communities within the study area.	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B7-55	**Annex K.1 Benthic Invertebrates Section 3.5**	Present the tabulated results of the benthic invertebrate community structure assessment in the main body of the report. Present the results separately for the two years of sampling. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The description of the results of the benthic invertebrate community structure assessment does not appear to be supported by a tabulated summary of the available data. The text references Table 3.4-5; however, that table does not appear in the list of tables or in the tables themselves. Therefore, the description of community structure and health (Section 3.5.2) is not supported by data or the results of data analyses.	KNC		11-Jul-2014	.The summary results of the benthic invertebrate community structure have been included in a table within Chapter 4 (Baseline Conditions) of the Plan. Additional details will be considered at the time of revisions to Annex K.1 DRAFT Aquatic Environment Synthesis Report.
B7-56	**Annex K.1 Benthic Invertebrates Section 3.5**	In the tabulated results of the benthic community structure data, identify unaffected reference stations and reference stations that may have been affected by logging, road construction, or other anthropogenic activities. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	A reference envelope-type approach has been used to evaluate the benthic invertebrate community structure data that have been collected within the study area. The underlying assumption of this type of analysis is that benthic communities at reference locations represent conditions in areas that have not been adversely affected by mining or other human activities. However, benthic communities are known to respond to a number of stressors, including fine sediment that is mobilized by various activities within a watershed. Inclusion of "reference stations" that have been affected by non- mining-related activities expands the size of the reference envelope and decreases the power to detect mining-related effects. Therefore, it is essential that only appropriate reference sites are used to define reference conditions within the Elk Valley.	KNC		11-Jul-2014	Detailed evaluation of the benthic invertebrate community structure was provided to the TAC meeting #6 with the 2012 AEMP Report. Additional detail will be considered at the time of revisions to Annex K.1 DRAFT Aquatic Environment Synthesis Report.
B7-57	**Annex K.1 Fish Tissue Section 3.6**	Present the dietary toxicity reference values (TRVs) for fish and aquatic- dependent birds in the main text of the Aquatic Synthesis Report. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The text of the report provided hazard quotients (HQs) that were calculated for fish or aquatic-dependent birds, using the selected dietary TRVs for fish and birds. However, these TRVs do not appear to be presented in the text of the report. Therefore, the TRVs that were selected for use in the screening-level assessment must be identified, along with the underlying rationale for their selection.	KNC		11-Jul-2014	An attachment to the Screening-level Environmental Risk Assessment (SLERA) in Annex K.1 DRAFT Aquatic Environment Synthesis Report describes the various TRVs considered (and cites literature sources) and provides justification for the values chosen values. A table will be included in Appendix E of the updated report that summarizes the selenium TRVs that were chosen and literature sources (i.e., these values represent the denominator in HQ calculations.
B7-58	**Annex K.1 Fish Tissue Section 3.6**	For the evaluation of Se fish tissue concentrations, change the "comparison to reference areas" to "comparison with non-mine influenced water bodies" with a disclaimer (i.e., footnote) stating that these sites have not been evaluated to determine if they are appropriate reference areas in terms of hydrological and biogeochemical similarity. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The concentrations of selenium in fish tissues from reference areas have been calculated and used in the tissue screening evaluation. While information on reference tissue concentrations can be relevant in assessments of fish tissue quality, there is substantial uncertainty in the estimates of reference concentrations of selenium in the Elk Valley (i.e., because fish are mobile and fish collected in reference areas may have been exposed to selenium in mine-affected areas. Therefore, comparison to reference selenium concentrations could inappropriately result in screening out species or areas that may be a concern from the standpoint of selenium bioaccumulation (Appendix 1).	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The suggested wording change has been incorporated into Chapter 4 (Baseline Conditions).
B7-59	**Annex K.1 Fish Tissue Section 3.6**	Provide the additional rationale for selecting large-scale suckers (LSU) as sentinel species for evaluating mining-related effects on fish. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Although some rationale is provided for selecting LSU as a sentinel species, no information was provided on their potential to bioaccumulate selenium or to be responsive to other stressors associated with mining activities. Before selecting sentinel species, it is helpful to develop effects hypotheses. Such hypotheses are essential for identifying measurement endpoints (i.e., indicators and metrics) that can be used to evaluate mining- related effects. Currently, this type of linkage to the conceptual site model is missing from this section of the Aquatic Synthesis Report.	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B7-60	**Annex K.1 Amphibians Section 3.7**	Present the dietary TRVs for amphibians in the text of the Aquatic Synthesis Report. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The text of the report provided HQs that were calculated for amphibians, using the selected dietary TRVs for fish. However, these TRVs do not appear to be presented in the text of the report. Therefore, the TRVs that were selected for use in the screening-level assessment must be identified, along with the underlying rationale for their selection.	KNC		11-Jul-2014	Potential dietary effects of selenium to amphibians will be incorporated into the final version of the Annex K.1 DRAFT Aquatic Environment Synthesis Report.
B7-61	**Annex K.1 Amphibians Section 3.7**	For the evaluation of Se egg-mass concentrations, change "comparison to reference areas" to "comparison with non-mine influenced water bodies" with a disclaimer (i.e., footnote) stating that these sites have not been evaluated to determine if they are appropriate reference areas in terms of hydrological and biogeochemical similarity. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The concentrations of selenium in eggs from reference areas have been calculated and used in the tissue screening evaluation. While information on reference tissue concentrations can be relevant in assessments of tissue quality, there is substantial uncertainty in the estimates of reference concentrations of selenium in the Elk Valley	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.

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B7-62	**Annex K.1 Evaluation of Environmental Quality Section 4**	Describe the data that were considered in the evaluation of environmental quality in the context of the CSM (i.e., describe the data that were used to evaluate effects on each receptor group). *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The text of the report generally describes the data that were used to evaluate environmental quality in the Elk Valley. However, this description is not linked to the CSM for the site or effects hypotheses. Therefore, the data that are directly relevant to each receptor group need to be identified and used to evaluate effects on that receptor group (e.g., surface-water chemistry data and periphyton community data are relevant for evaluating effects on periphyton). The evaluation of environmental quality is not useful for evaluating current conditions in the abstract.	KNC		11-Jul-2014	The individual lines of evidence within MUs will be discussed in the updated Section 4 of Annex K.1 DRAFT Aquatic Environment Synthesis Report. The discussion will also comment on the extent to which existing data answer the key questions identified for the Regional Monitoring Program (listed in Section 1.2 of the Synthesis Report) and link with the CSMs where appropriate.
B7-63	**Annex K.1 Evaluation of Environmental Quality Section 4**	Provide a more complete description of the water quality index (WQI) that was developed for use in the Elk Valley. Provide the rationale for altering the water quality classification system that was developed by the CCME (2001). *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	It appears that the site-specific WQI includes the site-specific water quality benchmarks that were developed during the EVWQP process. However, different water quality benchmarks were developed for each receptor group. Therefore, it would seem to be appropriate to develop a separate WQI for each of the receptor groups that are considered in the evaluation. It is not clear, from the description of the WQI provided, that multiple WQIs were developed and used in the assessment. Therefore more information is needed to fully describe the WQI and the rationale for its use in the assessment.	KNC		11-Jul-2014	This advice will be considered through the updating and finalizing of the Annex K.1 DRAFT Aquatic Environment Synthesis Report. The Canadian Water Quality Guidelines for Protection of Aquatic Life CCME Water Quality Index (WQI) 1.0 User's Manual was used to provide guidance on the use of the WQI for the report card evaluation. The user's manual specifically states that "at least four variables, sampled a minimum of four times, be used". Teck ran the WQI with multiple combinations of variables including the 4 Order constituents, all identified COPCs and all variables to determine which was most sensitive to picking up water quality changes based on "the professional judgment of the user to determine which and how many variables should be included in the CCME WQI to most adequately summarize water quality in a particular region" as per the User's Manual. The site-specific benchmarks that have been developed based on input from the TAC and working groups have been used to evaluate water quality in this region as there is good technical rational for those values in consideration of effects to aquatic organisms which is what the report card is intended to evaluate.
B7-64	**Annex K.1 Evaluation of Environmental Quality Section 4**	Eliminate the description of the approach for interpreting overall environmental quality by area within management units. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The approach to evaluating overall environmental quality by area within management units is not appropriate. To be useful, this evaluation needs to be conducted first on a receptor-by-receptor basis, where individual and then multiple stressors are evaluated. Subsequently, the results that were generated for each receptor group for the tributaries, for the off-channel habitats, and for the mainstem reaches within each MU can be discussed collectively. Finally, the results for all receptor groups can be discussed collectively. The current approach is not consistent with the CSM and does not provide a basis for evaluating effects hypotheses.	KNC		11-Jul-2014	The final version of Annex K.1 DRAFT Aquatic Environment Synthesis Report will remove the overall ranking category for integrated assessment for MU's.
B7-65	**Annex K.1 Recommendations for Future Studies and Monitoring Section 5**	Revise the section of the report that indicates that there are no data gaps. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Although a substantial amount of information has been collected to support the evaluation of current conditions in the Elk Valley, it is incorrect to indicate that there are no major data gaps. Some of the key data gaps include (but are not limited to): 1. Distribution of freshwater mussels within the Elk River watershed, Lake Koocanusa, and appropriately selected reference areas; 2. Effects of contaminants associated with mining-activities on the survival, growth, and reproduction of freshwater mussels; 3. Effects of calcite formation and presence on the distribution and abundance of freshwater mussels; 4. Levels of selenium in the tissues of burbot in Lake Koocanusa; 5. Bioaccumulation of selenium in aquatic plants, aquatic invertebrates, and fish in Lake Koocanusa; 6. Effects of egg/ovary selenium on the reproduction of peamouth chub, burbot, and bull trout; 7. Effects of nitrate on the survival, growth, and reproduction of mayflies; 8. Effects of multiple stressors and nutrient addition on periphyton abundance and community structure (i.e., at the highest taxonomic levels); 9. The effects of multiple stressors on the benthic invertebrate abundance and community structure; 10. The sensitivity of the CABIN-Reference Envelope Approach to benthic invertebrate community structure assessment; and, 11. Critical levels of aquatic plant nutrients in Lake Koocanusa. Therefore, the report needs to be revised to identify key data gaps that need to be addressed by future monitoring and supporting studies.	KNC		11-Jul-2014	The draft report presented at TAC meeting #6 requires significant revisions based on advice received from the Technical Advisory Committee at TAC meeting #7. The finalized Synthesis Report will inform future monitoring cycles associated with the Regional Aquatic Effects Monitoring Program and will be submitted to the Order Manager. See Annex K.1 DRAFT Aquatic Environment Synthesis Report. This advice will be considered to inform the revisions to the Report or to inform future monitoring programs and reporting.
B7-66	**Chapter 4 Current Baseline Conditions**	Revise Sections 4.3 and 4.4 of the EVWQP (i.e., Existing Data and Evaluation of Environmental Quality) based on the advice that was provided on the Aquatic Synthesis Report. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Detailed advice was provided to facilitate revision of the Aquatic Synthesis Report. This advice demonstrated that the data and approaches used to evaluate the existing status of surface water quality, sediment quality, periphyton communities, benthic invertebrate communities, fish communities, amphibian communities, and avian communities had limitations that needed to be addressed. As Sections 4.3 and 4.4 of the EVWQP are based, in large measure, on the Aquatic Synthesis Report, there is a need to revise this chapter of the Plan accordingly.	KNC		11-Jul-2014	This section of the Chapter 4 (Baseline Conditions) has been revised to reflect the fact that revisions to Annex K.1 DRAFT Aquatic Environment Synthesis Report.
B7-67	**Chapter 4 Current Baseline Conditions**	Explicitly identify data gaps and uncertainties in Chapter 4 of the EVWQP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Data gaps and uncertainties associated with the evaluation of existing environmental conditions in the Elk Valley need to be explicitly identified to maintain transparency in the EVWQP process.	KNC		11-Jul-2014	Data gaps and uncertainties associated with the purpose of Chapter 4 (Baseline Conditions) (i.e., to provide context for the development of the Plan) have been incorporated. The full breadth of data gaps and uncertainties are incorporated as part of the advice accepted for Annex K.1DRAFT Aquatic Environment Synthesis Report.
B7-68	**Chapter 5 Assessment of Protection of Human Health and Groundwater**	Provide a clear and consistent rationale for the selection of guidelines and TRVs used in the human health evaluation. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	It is essential that the rationale for the selection of guidelines and TRVs is cleared documented in the evaluation. In addition, the procedures that were used to derive guidelines or TRVs need to be described to provide transparency in the evaluation process.	KNC		11-Jul-2014	This advice has been incorporated in Annex L.1 Evaluation of Protection of Human Health and Groundwater for the Plan.

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B7-69	**Chapter 5 Assessment of Protection of Human Health and Groundwater**	Present the complete results of the screen that was conducted for surface water, sediments, and fish tissues. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The current evaluation presents the screening results for only those substances that exceeded the selected guidelines. The evaluation would be strengthened by including tabulated summaries for all media types that include all measured COPCs, maximum concentrations, the selected guideline, and associated HQ. Substances for which no guidelines are available should be included in the tabulated summaries to ensure that uncertain COPCs are consistently identified. In addition, substances that could have been released into the environment (i.e., as identified using the CSM for human health), but were not measured, need to be included in the summary and identified as uncertain COPCs. This approach will provide greater transparency in the assessment.	KNC		11-Jul-2014	This advice has been incorporated in Annex L.1 Evaluation of the Protection of Human Health and Groundwater for of the Plan.
B7-70	**Chapter 5 Assessment of Protection of Human Health and Groundwater**	Re-evaluate the risks to human health associated with exposure to bromide in surface water. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The results of the evaluation indicated that the maximum concentration of dissolved bromide in surface water exceeded the guideline for total bromide. This result should have resulted in identification of bromide as a constituent of concern that required more detailed evaluation (i.e., if dissolved bromide exceeded a guideline, then total bromide would also exceed the guideline). Therefore, the effects of bromide on human health need to be re-evaluated. If no human-health based guideline is available for bromide, this CoI needs to be identified as an uncertain COPC and brought forward into the risk assessment.	KNC		11-Jul-2014	This advice is incorporated in Chapter 5 (Assessment of Protection of Human Health and Groundwater) and has been identified as a data limitation. Additional details are included Annex L.1 Evaluation of the Protection of Human Health and Groundwater.
B7-71	**Chapter 5 Assessment of Protection of Human Health and Groundwater**	Evaluate the significance of indirect pathways for those COPCs that tend to accumulate or biomagnify in the environment. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The assumption that secondary or indirect exposure pathways are all minor and do not need to be evaluated may flawed. For substances that tend to accumulate or biomagnify in the environment, uptake by wildlife and consumption of game meat could provide an important source of exposure. Similarly, uptake by riparian plants and subsequent consumption of these plants could result in significant exposure to substances that accumulate in plants. Therefore, these secondary pathways need to be evaluated. If insufficient data are available to conduct a comprehensive spatial evaluation for certain COPCs, then this must be identified as a data gap that needs to be addressed. Information on traditional land use practices by KNC members and associated traditional ecological knowledge should be used to inform the evaluation of secondary exposure pathways.	KNC		11-Jul-2014	This advice has been incorporated in the Plan in Chapter 5 (Assessment of Protection of Human Health and Groundwater) and Annex L.1 Evaluation of the Protection of Human Health and Groundwater as additional detail on bioaccumulative constituents was made available (e.g., wild game meat). Future human health risk assessments will consider any additional data collected to support the evaluation of secondary pathways.
B7-72	**Chapter 5 Assessment of Protection of Human Health and Groundwater**	The effects of TDS should be evaluated relative to human health and potability of drinking water supplies. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Total dissolved solids (TDS) has the potential to adversely affect drinking water supplies. Therefore, TDS needs to be addressed in the assessment of protection of human health and groundwater.	KNC		11-Jul-2014	This advice was incorporate into the Plan. An evaluation of TDS is included in Chapter 5 (Assessment of Protection of Human Health and Groundwater) and in Annex L.1 Human Health Evaluation of Current Baseline Conditions.
B7-73	**Chapter 6 Management Options**	Validate the water quality model to confirm that it provides an accurate basis for predicting COPC concentrations in Lake Koocanusa, using data on COPC levels in the tributaries and other source areas. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The evaluation of management options was, in part, based on water quality modeling that provided a basis for "if this-then that" evaluations of various scenarios. Therefore, the water quality model plays a fundamental role in the evaluation and selection of mitigation options in the EVWQP. Therefore, the accuracy of the model as it relates to model predictions in Lake Koocanusa is a key uncertainty in the EVWQP process. To reduce this uncertainty, the concentrations of COPCs in surface water in Lake Koocanusa that are predicted using the model should be compared to actual measurements of surface water quality in Lake Koocanusa as more data become available. This needs to be conducted annually as new data are generated. This type of water quality model validation is also needed for the riverine components of the watershed and associated tributaries.	KNC		11-Jul-2014	The water quality model was validated using existing data. As outlined within Chapter 11 (Adaptive Management) the model will be refined as additional data are collected and made available during Plan implementation.
B7-74	**Chapter 7 Calcite Management**	A conceptual site model has been presented that links calcite formation to effects on ecological receptors. Use the CSM to develop environmental effects hypotheses, interactive effects hypotheses, and cumulative effects hypotheses that explicitly consider the potential effects of calcite and other stressors on aquatic receptors. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Calcite represents an important physical stressor for ecological receptors utilizing habitats in tributaries and, to a lesser extent, main stem areas. Development of a CSM provides a systematic basis for formulating environmental effects hypotheses, interactive effects hypotheses, and cumulative effects hypotheses that explicitly consider the potential effects of calcite and other stressors on aquatic receptors. Such hypotheses are needed to guide monitoring and assessment activities relative to calcite in the future.	KNC		11-Jul-2014	The advice is incorporated and considered in Chapter 4 (Baseline Conditions), Chapter 10 (Monitoring) and Annex K.1 DRAFT Aquatic Environment Synthesis Report. of the Plan. Chapter 7 (Calcite Management) of the Plan is not intended to evaluate potential effects of calcite to ecological receptors but rather presents the framework and establishes targets to limit calcite formation within the Designated Area. Calcite targets have been developed in consideration of potentials effect to ecological receptors.
B7-75	**Chapter 8 Water Quality Targets and Implementation Plan**	Adopt the draft B.C. WQG for dissolved cadmium as the long-term water quality target for cadmium. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The Toxicology Working Group evaluated a number of options for selecting benchmarks for cadmium for the protection of aquatic life. Toxicity- based targets that are equivalent to the B.C. WQGs offer a higher level of protection relative to WQGs established by the CCME. Ultimately, it was recommended by KNC and BCMOE that the draft BC WQGs for dissolved cadmium be selected for use in evaluating current conditions in the Elk Valley and for establishing a long-term target for cadmium.	KNC		11-Jul-2014	The draft BC WQG for cadmium include the caveat "Draft for review only – do not cite". For this reason, this advice has not been incorporate into the Plan.
B7-76	**Chapter 8 Water Quality Targets and Implementation Plan**	The B.C. WQGs and site-specific benchmarks for cadmium, nitrate, selenium, and sulphate should not be regarded as "pollute up to numbers." Rather, all reasonable and practical mitigation measures should be taken to minimize loadings of these substances to receiving waters. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Ecological receptors utilizing aquatic and riparian habitats in the Elk Valley have the potential to be exposed to a variety of physical and chemical stressors. The effects of some, but not all, of these stressors have been evaluated in the EVWQP. These evaluations have resulted in the adoption of WQGs for certain COPCs (i.e., sulphate) and development of site-specific benchmarks for other COPCs (i.e., cadmium, nitrate, and selenium). These benchmarks have been established at EC10 levels for specific receptors and do not include application of uncertainty factors. The effects of various other stressors, such as calcite, TSS, intragravel dissolved oxygen, deposited sediment, water temperature, etc., have not been quantitatively evaluated. In addition, the interactive effects of multiple stressors and the cumulative effects of multiple anthropogenic activities have not been quantitatively evaluated. Therefore, there is still a substantial amount of residual uncertainty about the level of protection that the WQGs and site-specific benchmarks provide, when interactive and cumulative effects are considered. Accordingly, all reasonable and practical mitigation measures should be taken to minimize loadings of these substances to receiving waters (i.e., to ensure that concentrations of these COPCs are maintained at the lowest practical levels).	KNC		11-Jul-2014	The initial implementation plan incorporates reasonable and practical mitigation strategies that reflect the current understanding of selenium and nitrate management. These measures will limit loading of selenium and nitrate to the receiving environment. Cadmium levels are currently well below and are expected to remain below long-term targets. Similarly, sulphate concentrations are predicted to remain below water quality guidelines in the lower Fording and Elk Rivers, levels that are protective of aquatic life. In the upper Fording River, sulphate concentrations will likely increase from current conditions. However, they will be managed to maintain in-stream concentrations below the long-term target, which is associated with a similar level of protection as the BC WQG. The initial implementation plan is expected to produce conditions that are protective of aquatic life, with residual uncertainty being addressed through on-going monitoring and adaptive management.

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B7-77	**Chapter 8 Water Quality Targets and Implementation Plan**	Adopting BC MoE tissue guidelines as long-term benchmarks and targets for the EVWQP is the most appropriate approach to protect aquatic organisms against the effects of selenium. Adoption of BC MoE WQGs for selenium in for other media (water, sediment, dietary) could also be helpful in an adaptive management framework to protect unimpacted areas and serve as long-term assessment goals in impacted areas of the Elk Valley where mitigative measures are undertaken (also see Appendix 6 and 7). *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The B.C. WQGs are more conservative than the proposed water quality targets, account for multiple sources of uncertainty, and are aligned with recommended Se toxicity thresholds, criteria and benchmarks published by other regulatory jurisdictions. Although dietary tissue benchmarks for juvenile fish and birds is not recommended (because diet is not a direct measure of toxicity), if dietary benchmarks are adopted they should be consistent with BC's WQG. The implementation of dietary benchmarks should be part of an adaptive management framework to provide an early alert in management units where new mining activities may pose a risk to sensitive organisms.	KNC		11-Jul-2014	As directed by the Order, the Plan balances environmental, social, and economic considerations. Long-term targets for selenium derived within the Plan achieve this balance by providing protection of the aquatic ecosystem of the Elk Valley, while still remaining technically achievable. Environmental protection was achieved by deriving targets with the best available science and site-specific data in an analysis aligned with that used by BC MOE to derive tissue guidelines. In particular, selenium tissue benchmarks developed for the Plan were derived from the same (e.g., bird reproduction) or similar (e.g., fish reproduction) toxicity data used to develop the BC MOE tissue guidelines. Both analyses focused on the lowest reported chronic, sublethal EC10 from a relevant and reliable study. However, whereas BC MOE applied a generic safety factor to account for uncertainty, the Plan explicitly evaluated and addressed the various sources of uncertainty throughout the derivation of benchmarks. The BC MOE tissue guidelines that result from application of a two-fold safety factor are highly conservative screening values that are similar to tissue concentrations observed at some reference locations, and thus effectively serve to identify a departure from reference conditions. In contrast, the tissue benchmarks derived in the Plan are scientific best estimates of a threshold for effects to the most sensitive species, with inherent conservatism to account for uncertainty. As such, the tissue benchmarks derived in the Plan represent an appropriate basis for achieving environmental protection within the context of the balance of environmental, social, and economic considerations required by the Order. As discussed in Chapter 8 (Water-Quality Targets and Implementation Plan), selenium concentrations in water cannot be reduced to guideline levels in the Elk and Fording Rivers. Use of these values in the adaptive management framework would therefore not be useful.
B7-78	**Chapter 8 Water Quality Targets and Implementation Plan**	A comprehensive quantitative assessment of cumulative impacts from coal mining to aquatic life should be conducted for the Elk Valley that incorporates additional studies on a wider range of resident fish, bird and amphibian species. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The assessment of interactive effects in the EVWQP is qualitative and too subjective. There is also a lack of quantitative information on the cumulative effects on a wide range of species exposed to effluents and habitat disturbance from coal mining.	KNC		11-Jul-2014	Water quality targets established under the Plan have been developed based on the state of the current science, and are based on conservative assumptions such that adverse effects to sensitive aquatic receptors would not be expected. As outlined within Chapter 10 (Monitoring) of the Plan, continued monitoring of environmental conditions within the Designated Area for a wide range of receptors will continue to be an integral component of Plan implementation (see Chapter 11 [Adaptive Management]). Teck expects the Plan to be adaptive reflecting changing circumstances, technologies, science, and results of on-going monitoring and assessment programs. As additional data are collected they will be evaluated to ensure that Plan objectives are met.
B7-79	**Chapter 10 Monitoring**	Develop a monitoring framework for the Elk Valley that will provide the data and information needed to thoroughly evaluate the effects of mining activities on the aquatic ecosystem. The steps involved in this process should include: 1. Develop a single conceptual site model (CSM) that describes sources and releases of contaminants, identifies physical and chemical stressors of potential concern, describes environmental transport and fate processes, describes the expected ecological effects of physical and chemical stressors (based on literature-based information and other studies), identifies potentially-complete exposure pathways, identifies receptors potentially at risk. 2. Use the CSM to develop hypotheses regarding the effects of individual stressors, the interactive effects of multiple stressors, and the cumulative effects of stressors associated with multiple human activities. 3. Identify assessment endpoints (e.g., survival, growth, and reproduction of fish) that need to be evaluated using the results of monitoring programs. 4. Identify measurement endpoints (e.g., egg-to-fry survival of cutthroat trout) that will provide a basis for evaluating the status of each assessment endpoint. 5. Design monitoring programs to guide the collection of data for each measurement endpoint, including spatial and temporal considerations. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The monitoring chapter of the EVWQP currently includes descriptions of the monitoring requirements identified in the Terms of Reference for monitoring objectives for the EVWQP, and for monitoring objectives for the RAEMP. However, the monitoring that is described does not appear to have been informed by a consolidated CSM or focused on providing the information needed to test an ecological effects hypothesis. This represents a major limitation of the design of the monitoring programs that are described in this chapter of the EVWQP. This limitation can be effectively addressed by following and documenting a systematic data quality objectives process, as described above (see USEPA 2000; 2006; MacDonald et al. 2009a; 2009b; 2009c; 2009d; 2009e; 2009f; MacDonald et al. 2009g; Zajdik et al. 2009; Clark et al. 2010).	KNC		11-Jul-2014	Chapter 10 (Monitoring) of the Plan presents a monitoring program on the conceptual site model. Table 10.3 was updated to include monitoring and assessment endpoints to make appropriate linkages between monitoring and the CSMs. There are elements of the advice that are better suited to a study design typically employed within a sampling and analysis plan and routinely applied as part of the Regional Aquatic Effects Monitoring Program. As a result, the advice will also be considered during future environmental monitoring programs.
B7-80	**Chapter 10 Monitoring**	Revise the EVWQP to identify a monitoring framework that includes three types of monitoring programs (rather than media types and special studies), including: 1. Surveillance network monitoring programs (i.e., which are also referred to as Mine Site Monitoring Programs) that are conducted to provide data and information on the status and trends of environmental conditions within mine works, including effluent quality monitoring, seepage monitoring, on-site groundwater monitoring, etc. (as required under EMA permitting); 2. Local AEMPs (LAEMPs) that are conducted in the immediate vicinity of individual projects to provide data and information of the effects of mining activities on the aquatic environment and aquatic-dependent wildlife. Typically, such AEMPs would be expected to include surface water monitoring, sediment quality monitoring, biological monitoring, etc. (as required under EMA permitting). 3. RAEMP that is conducted throughout the Elk River watershed and Lake Koocanusa to provide data and information on the effects of mining activities on the aquatic environment and aquatic-dependent wildlife. The RAEMP will need to include a number of program elements including surface water monitoring, sediment quality monitoring, biological monitoring, and special studies. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*		KNC		11-Jul-2014	Figure 10.1 and supporting text in Chapter 10 (Monitoring) provide the necessary content to explain the various monitoring inputs that will be considered when assessing aquatic ecosystem health. The Terms of Reference require the Plan to define on-going ecosystem and ecotoxicology assessment programs that would be implemented on approval of the Plan as per Chapter 10 (Monitoring).

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B7-81	**Chapter 10 Monitoring**	Clearly identify all of the goals of the RAEMP. Rationale: Whitfield (1988) described the goals and data collection designs for water quality monitoring. More specifically, Whitfield (1988) identified five reasons for conducting water quality monitoring, including: 1. Assessment of the status and trends in environmental conditions; 2. Evaluation of compliance (i.e., attainment) with water quality objectives or standards; 3. Estimation of mass transport; 4. Assessment of environmental effects and impacts; and, 5. General surveillance. As monitoring programs need to be specifically designed to achieve each of these monitoring goals, it is essential to clearly define monitoring goals prior to designing the RAEMP. Based on discussions convened among the members of the Monitoring Working Group, it is apparent that the RAEMP has the following goals: 1. Assessment of the status and trends in environmental conditions (Data and information generated from status and trends monitoring will inform the adaptive management program); 2. Evaluation of attainment of short-term, medium-term, and long-term water quality targets (and associated triggers) for cadmium, nitrate, selenium, and sulphate (Data and information generated from targets attainment monitoring will inform the adaptive management program); 3. Evaluation of the narrative targets that have been established for calcite (Data and information generated from targets attainment monitoring will inform the adaptive management program); and, 4. Assessment of environmental effects of activities associated with coal mining in the Elk Valley (Data and information generated from environmental effects monitoring will inform the adaptive management program); 5. Assessment of the cumulative environmental effects associated with coal mining and other anthropogenic activities in the Elk Valley, including climate change (Data and information generated from cumulative effects monitoring will inform the adaptive management program); and, 6. Validation of key tools that were developed to support the EVWQP, including water quality models, bioaccumulation models, and site- specific benchmarks for water and other environmental media (Data and information generated during validation of key tools will inform refinement of the EVWQP and the adaptive management program). These goals need to be incorporated into the monitoring chapter of the EVWQP. For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).	None provided.	KNC		11-Jul-2014	Goals of the RAEMP are outlined in Annex K.1 DRAFT Aquatic Environment Synthesis Report, Section 1.2. Data collected under the RAEMP program will be used to assess the status and trends of environmental conditions within the Designated Area. These data will be used to inform progress toward attainment of water quality targets, refine site-specific models developed during Plan development (e.g., selenium-bioaccumulation and water quality models), and inform and refine the calcite monitoring program (refer to Chapter 7 [Calcite Management]).
B7-82	**Chapter 10 Monitoring**	As part of the LAEMP and RAEMP, develop selection criteria, identify candidate reference areas (referred to control stations in the design of BACI-type monitoring programs), and evaluate the appropriateness of those reference areas (in terms of hydrological and biogeochemical similarity) that will be included in the environmental effects and cumulative effects monitoring elements of the RAEMP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	A BACI-based monitoring program design should be used in the RAEMP to evaluate the environmental effects associated with coal mining activities and the cumulative effects associated with all anthropogenic activities. This type of monitoring necessitates identification and evaluation of candidate reference stations that are potentially appropriate for used in the RAEMP. To ensure that the selection of reference stations is conducted in a transparent and appropriate manner, it is necessary to establish selection criteria on an a priori basis. Such selection criteria should include: 1. The reference station should be located in the sample body of water as the effluent discharge (Environment Canada 2004; e.g., the reference stations for Michel Creek should be located within the Michel Creek drainage basin). If a suitable reference station is not available within the same water body, then the reference stations should be located in the nearest comparable drainage basin (Environment Canada 2004); 2. The characteristics of riparian areas adjacent to reference stations should be similar to those at the mining-influenced stations prior to the implementation of mining activities; 3. The stream order, streambed substrate types, hydrological characteristics of reference stations should be similar to those at the mining-influenced stations prior to the implementation of mining activities; 4. Water quality characteristics at reference stations should be similar to those at the mining-influenced stations prior to the implementation of mining activities (i.e., based on baseline monitoring activities). When baseline data are not available, water quality characteristics at reference stations should be similar to those in the nearest comparable drainage basin; 5. Sediment quality characteristics at reference stations should be similar to those at the mining-influenced stations prior to the implementation of mining activities (i.e., based on baseline monitoring activities). When baseline data are not available, sediment quality characteristics at reference stations should be similar to those in the nearest comparable drainage basin; 6. Tissue chemistry at reference stations should be similar to those at the mining-influenced stations prior to the implementation of mining activities (i.e., based on baseline monitoring activities) and clearly not affected by exposure to discharges from mine sites (i.e., for mobile species). When baseline data are not available, tissue chemistry at reference stations should be similar to those in the nearest comparable drainage basin that has clearly not been affected by exposure to discharges from mine sites (i.e., for mobile species); and, 7. Surface water toxicity and sediment toxicity at reference stations should be within the range defined for acceptable negative control samples used in laboratory toxicity tests (as defined in Environment Canada, USEPA, and/or ASTM standard methods).	KNC		11-Jul-2014	Consideration of reference stations is considered for all monitoring programs conducted under the RAEMP and/or LAEMP. Details are outlined within specific study designs but generally the following characteristics are considered desirable for an aquatic reference area: • Up-gradient from the study site or from mining-based activities (if possible within the same watershed) • Comparable physical and geological setting as the study site • Similar sediment grain size distribution and sediment total organic carbon content as the study site • Similar water depth and flow as the study site • Uncontaminated (un-impacted due to mining-based activity). Reference areas satisfying some or all of the above-listed characteristics are considered useful for both sediment toxicity evaluations and other types of analyses. It is recognized within the scientific community that although the above-listed characteristics are desirable they are not all necessary or at times practical, to attain for a reference station. For that reason a reference-envelope approach is often employed in the evaluation of environmental data.

Table 1:Teck Response to Technical Advisory Committee Advice, meetings #2 to #7 Appendix A and Band Working Group

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B7-83	**Chapter 10 Monitoring**	Include an additional monitoring station in Lake Koocanusa downstream of Sand Creek and outside the potential influence of discharges from the Elk River (i.e., located upstream of the existing monitoring station that is located upstream of the Elk Arm of Lake Koocanusa). *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The purpose of this monitoring station is to provide a reference station in the lake that is far enough upstream that it is unlikely to be influenced by discharges from the Elk River and far enough into the lake that fine sediment from the Kootenay River has largely settled out of the water column.	KNC		11-Jul-2014	As outlined in Chapter 10 (Monitoring), there is currently a water quality monitoring station (RG_WARDB) located north of RG_USELK, which is upstream of the mouth of the Elk River in Lake Koocanusa. In addition, water quality data from the Kootenay River near Fenwick (Station Number: BC08NG0009) is available and will routinely be downloaded and evaluated. As a result and at this time an additional monitoring station north of the mouth of the Elk River in Lake Koocanusa was not added. Should monitoring data as collected under the RAEMP suggest that an additional monitoring station is warranted within the reservoir, this advice will be reconsidered.
B7-84	**Chapter 10 Monitoring**	Expand the RAEMP to include ongoing groundwater monitoring, both in the immediate vicinity of mining activities and in downstream areas. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Groundwater resources have a number of uses in the Elk Valley, including drinking water supplies, irrigation, and livestock watering. In addition, groundwater recharge may represent an important component of the streamflow of the tributaries, the Fording River, and or the Elk River at certain times of the year. Therefore, it is important to characterize groundwater quality and quantity in the Elk Valley in the immediate vicinity of mining activities and in downstream areas. Teck initiated groundwater sampling activities in 2013. These results, in conjunction with the CSM, should be used to design an ongoing groundwater monitoring program for the Elk Valley.	KNC		11-Jul-2014	Groundwater monitoring will be completed as per details in the Plan in Chapter 10 (Monitoring). Data collected as part of the groundwater monitoring both at the regional and operational level will be considered in the evaluation of conditions in the Elk River watershed. Annex L.3 Approach to Protection of Groundwater has been included as a supporting document to the Plan and details further evaluation of groundwater resources throughout the watershed
B7-85	**Chapter 10 Monitoring**	Conduct a gradient-based sediment toxicity testing program within the Elk Valley and Lake Koocanusa as a supporting study under the RAEMP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	To date, only limited sediment toxicity data have been collected within the Elk Valley, including short-term toxicity tests with amphipods (14-d tests with Hyalella azteca) and midge (10-d tests with Chironomus dilutus). This is not sufficient to evaluate toxicity to benthic invertebrates in longer-term exposure or to evaluate reproductive effects. Implementation of this program should involve the collection of fine sediment (i.e., <2.00 mm) at near-field, mid-field, and far-field stations located throughout the study area (including Lake Koocanusa) to establish baseline conditions. By sampling along a potential concentration gradient, it may be possible to develop concentration-response relationships and site-specific sediment toxicity thresholds for selected COPCs.	KNC		11-Jul-2014	As outlined in Chapter 4 (Baseline Conditions) the potential for sediment toxicity within the Designated Area is not anticipated. However, and as outlined in Chapter 10 (Monitoring), additional sediment toxicity tests are planned within the Designated Area. Based on the nature of system, any sediment toxicity tests performed will be conducted along a gradient.
B7-86	**Chapter 10 Monitoring**	Evaluate the distribution and abundance of freshwater mussels within the Elk River watershed, Lake Koocanusa, and appropriately selected reference areas as a supporting study under the RAEMP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Freshwater mussels represent key components of aquatic communities. To date, no information has been presented on the distribution or abundance of freshwater mussels in the Elk River, tributaries to the Elk River, or Lake Koocanusa. As freshwater mussels are known to be sensitive to a variety of physical, chemical, and biological stressors, including those that are associated with mining activities, it is essential to obtain information on the distribution and abundance of freshwater mussels in mining-influenced and appropriately selected reference areas.	KNC		11-Jul-2014	This advice has been considered and qualified professionals familiar with the area were consulted. Based on communications with Shari Weech, Ph.D. and Mike Robinson, MSc, RPBio, freshwater mussels are not present within the Elk Valley watershed based on sampling activities conducted to date. For this reason, monitoring mussels in the Designated Area is not included in the Plan.
B7-87	**Chapter 10 Monitoring**	Evaluate the effects of selected contaminants (i.e., cadmium, selenium, nitrate, and sulphate) associated with mining-activities on the survival, growth, and reproduction of freshwater mussels (in water-only exposures) as a supporting study under the RAEMP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	A series of toxicity tests have been conducted to evaluate the toxicity of nitrate and sulphate to aquatic plants, aquatic invertebrates, and fish. The results of these toxicity tests have provided the data and information needed to derive site-specific water quality benchmarks for these water quality variables. However, no toxicity testing has been conducted to evaluate the toxicity of these COPCs or other water quality variables on freshwater mussels. For this reason, it is appropriate to design and implement a toxicity testing program to determine if the water quality benchmarks that have been developed for the protection of other aquatic species would also be protective of freshwater mussels.	KNC		11-Jul-2014	See response to Advice Item No. B7-86.
B7-88	**Chapter 10 Monitoring**	Evaluate the effects of calcite formation and presence on the distribution and abundance of freshwater mussels as a supporting study under the RAEMP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Calcite formation has the potential to alter the quality of streambed substrates and, hence, decrease their suitability for inhabitation by freshwater invertebrates and their use by fish for spawning and incubation. A study is currently being designed to evaluate the effects of calcite formation and presence on benthic macroinvertebrates. However, such a study is unlikely to be designed to assess effects on freshwater mussels. For this reason, the scope of the proposed study should be expanded to ensure that freshwater mussels are identified and enumerated at all of the mining-influenced and reference stations that are examined. Survey methods relevant to freshwater mussels will need to be employed to ensure that relevant data are generated on the effects of calcite formation and presence on the distribution and abundance of freshwater mussels (e.g., Smith et al. 2003; Angelo et al. 2007).	KNC		11-Jul-2014	See response to Advice Item No. B7-86.
B7-89	**Chapter 10 Monitoring**	Evaluate the effects of egg/ovary selenium on the reproduction of peamouth chub, burbot, and bull trout as a supporting study under the RAEMP. In addition, the effects of egg/ovary selenium on the reproduction of mountain whitefish should be re-evaluated using a broader range of tissue concentrations than was obtained in the Nautilus Environmental (2012) study, including inclusion of control fish. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Data on the toxicity of tissue-associated selenium are available for a number of freshwater fish species. However, matching tissue chemistry and reproductive success data are not available for several key species that utilize habitats in Lake Koocanusa, including peamouth chub, burbot, and bull trout. This data gap makes it difficult to determine if the long-term target for selenium in water is likely to be protective of all fish species that utilize habitats in Lake Koocanusa. Generation of concentration-response data for these additional fish species will provide greater certainty that the targets, based on toxicity to brown trout, are protective of peamouth chub, burbot, and bull trout. Re-evaluation of the toxicity of selenium to mountain whitefish will provide improved confidence that the targets that are set for selenium will also protect mountain whitefish.	KNC		11-Jul-2014	As outlined in Chapter 10 (Monitoring), fish tissue data will be collected within Lake Koocanusa in 2014 (as well as 2015 and 2016) which includes burbot and peamouth chub. Future studies required to support the Plan will continue to be evaluated during Plan implementation in consultation with MOE and KNC.
B7-90	**Chapter 10 Monitoring**	Evaluate the levels of selenium in the tissues of burbot and bull trout in Lake Koocanusa as a supporting study under the RAEMP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	To date, no data have been reported on the levels of selenium in the tissues of burbot collected in the Canadian portion of Lake Koocanusa. Because these species are utilized by KNC members and others as an important food source, it is important to document the levels of selenium in the tissues of these species. Whenever possible, non-lethal sampling methods (e.g., muscle plugs) should be used to obtain tissue samples. In addition, sampling opportunities may exist when KNC members are harvesting these species.	KNC		11-Jul-2014	Burbot tissue sampling was initiated in 2014 within Lake Koocanusa to evaluate selenium and metal concentrations within the tissue as part of the 2014 Lake Koocanusa Biological Monitoring supporting study to the RAEMP. This monitoring will continue in 2015 and 2016 to provide additional information on fish. Additional coordination with KNC on sampling will be discussed for future monitoring (i.e., 2015 and 2016).

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B7-91	**Chapter 10 Monitoring**	Evaluate the accuracy of the selected bioaccumulation models (i.e., water to invertebrate tissues) by refining estimates of exposure point concentrations of selenium (i.e., concentrations in water based on weekly or more frequent measurements conducted during key seasons) and tissue concentrations of selenium (i.e., by collecting multiple replicate data at exposure stations) as a supporting study under the RAEMP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Currently, there is considerable uncertainty in the estimates of exposure for the matching surface-water chemistry and tissue chemistry data that have been used to develop the bioaccumulation models. That is, it is not clear that surface-water chemistry data collected on the same date that a tissue sample is collected (or an annual average calculated from monthly samples) represents the relevant exposure concentration for evaluating bioaccumulation. Therefore, a more focused study needs to be conducted to better define the relationship between exposure and tissue concentrations in benthic invertebrates. Consideration should be given to using multiplate samplers to collect periphyton and invertebrates for tissue analysis and to high-frequency samplers for collecting surface-water samples.	KNC		11-Jul-2014	As outlined in Chapter 10 (Monitoring), there are efforts to increase the frequency of sampling activities (e.g., surface water) during critical periods of the year (e.g., low- and high-flows). Water quality samples will continue to be synoptically captured with biological monitoring endpoints during future sampling associated with the RAEMP. These data will be used will be used to refine models, including selenium-bioaccumulation models, refer to Chapter 11 (Adaptive Management) of the Plan. Consideration for any additional water quality and benthic invertebrate sampling will be considered during the development of future RAEMP cycles and supporting studies during Plan implementation.
B7-92	**Chapter 10 Monitoring**	Evaluate the bioaccumulation of selenium in the tissues of aquatic plants, aquatic invertebrates, and fish in Lake Koocanusa as a supporting study under the RAEMP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Synoptically-collected water chemistry and tissue chemistry data have been collected from lentic and lotic habitats within the Elk River watershed to support bioaccumulation modelling of selenium. Comparable data have not been collected in Lake Koocanusa. Therefore, a study should be designed and implemented to collect exposure and tissue chemistry data to determine if the Elk Valley bioaccumulation model(s) provides a basis for accurately predicting bioaccumulation in Lake Koocanusa. All three major ecosystem (plants, invertebrates, and fish) need to be addressed in this study.	KNC		11-Jul-2014	As outlined in Chapter 10 (Monitoring), 2014 monitoring activities within Lake Koocanusa will include surface water, plankton, invertebrates, and fish tissue. All of the data will be used to better understand the potential for bioaccumulation of selenium in the reservoir.
B7-93	**Chapter 10 Monitoring**	Evaluate the effects of multiple stressors and nutrient addition on periphyton abundance and community structure (i.e., at the highest taxonomic levels) throughout the Elk Valley as a supporting study under the RAEMP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	A variety of physical (e.g., fine sediment, flow, calcite formation), chemical (e.g., sulphate, N:P ratios, etc.), and biological stressors (e.g., grazing) can influence the abundance and community structure of periphyton in Elk Valley streams and rivers. To date, no information has been presented on the effects of multiple stressors on periphyton abundance and community structure in tributary streams or in the Elk and Fording rivers. Therefore, a study is needed to evaluate the effects of multiple stressors on primary productivity in lotic habitats within the Elk watershed.	KNC		11-Jul-2014	As outlined in Chapter 10 (Monitoring), 2014 monitoring activities within the Designated Area include surface water (including nutrients), periphyton biomass, and periphyton and benthic invertebrate tissue. Selenium concentrations in key areas which will help evaluate the potential effects associated with multiple stressors. As discussed at Technical Advisory Committee meeting # 5, periphyton community structure is not a meaningful measurement endpoint at this time. A significant amount of laboratory method standardization work is required prior to this measurement endpoint being useful in the evaluation of environmental conditions. As outlined within Chapter 11 (Adaptive Management), Teck will continue to track scientific advancements, and should this measurement endpoint become useful in the future it will be considered.
B7-94	**Chapter 10 Monitoring**	Design and implement a supporting study to evaluate the relative sensitivity of the CABIN-based sampling methods, replicate Serber-based sampling methods, and multiplate sampling methods for evaluating the effects of water quality and other stressors on benthic invertebrate community structure, abundance, and biomass. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	A CABIN-based approach has been used to evaluate the effects of mining activities on benthic invertebrates within the Study Area. This method provides a standard approach to biological monitoring and assessment that can be used across Canada to evaluate aquatic ecosystem health. However, the approach was not designed to support hypothesis testing or to provide a quantitative impact assessment tool. Borisko et al. (2007) reported that such rapid bioassessment tools are coarse and are unlikely to detect subtle impacts to the benthic community. This is because such methods that lack replication have insufficient statistical power to detect subtle differences (Kerans et al. 1992). Rapid bioassessment methods are better suited to the detection of major impacts or gross impairment (Kilgour et al. 2005). As benthic invertebrate sampling in the Elk Valley should be designed to detect subtle, as well as gross, impacts, a study needs to be designed and implemented for the sensitivity of various sampling methods and levels of replication for detecting mining-related effects in Elk Valley streams. See Beatty et al. (2006) for further information on the design of such a study.	KNC		11-Jul-2014	The Canadian Aquatic Biomonitoring Network (CABIN) method will assess the potential impact of calcite within the aquatic environment. The CABIN method is an integral component of the Regional Aquatic Effects Monitoring Program (RAEMP) developed with input from the Ministry of Environment and Ktunaxa.
B7-95	**Chapter 10 Monitoring**	Evaluate the effects of multiple stressors on the benthic invertebrate abundance and community structure in streams and rivers within the Elk Valley. Monitoring should be conducted annually at core stations and every three years at all of the other stations as a supporting study under the RAEMP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	A variety of physical (e.g., fine sediment, flow, calcite formation), chemical (e.g., sulphate, nitrate, cadmium, etc.), and biological stressors (e.g., predation) can influence the abundance and community structure of benthic invertebrates in Elk Valley streams and rivers. Monitoring of benthic invertebrate communities to date has utilized a general biomonitoring approach (i.e., a CABIN-based reference envelope monitoring program). While such monitoring provides information on the status of the benthic invertebrate community, this type of monitoring is not sufficiently sensitive to detect subtle effects on benthic invertebrates exposed to multiple stressors. Accordingly, a before-after/control-impact (BACI) design needs to be used to evaluate the effects of mining activities on the benthic community. For streams that are already affected by discharges from a mine, a control-impact (CI) design will need to be applied. For all new mines, a BACI-type design should be utilized. To support the design of ongoing BACI and CI monitoring and to calibrate the data that have been collected to date using the CABIN-based approach, a number of core monitoring stations should be sampled in 2014 using the CABIN sampling protocol, a CI-based replicate-sampling protocol (using Surber samplers; 10 replicates/station), and multi-plate sampler (e.g., Hester- Dendy samplers for mainstem locations; for example, see Letovsky et al. 2012). The resultant data should be used to identify the minimum number of replicate samples that need to be collected at each station to detect subtle effects on the benthic invertebrate community using the BACI- and/or CI- based sampling designs.	KNC		11-Jul-2014	As outlined within Chapter 10 (Monitoring), benthic community structure monitoring and evaluation will be included as one of the key assessment endpoints associated with the RAEMP. Annual monitoring will be coordinated with the Calcite monitoring plan as per Chapter 7 (Calcite Management) and watershed-wide monitoring will be done as per previous cycles of the RAEMP on a three year cycle. This data will be used to evaluate the effects, if any, of multiple stressors in streams and rivers within the Elk Valley. □
B7-96	**Chapter 10 Monitoring**	Determine critical levels of aquatic plant nutrients (ammonia, nitrite, nitrate, phosphorus) in Lake Koocanusa as a supporting study under the RAEMP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The water quality targets for nitrate are based on the toxicity of nitrate to aquatic invertebrates and fish. However, nitrate is an important aquatic plant nutrient that can contribute to changes in the trophic status of receiving waters. As there are already numerous sources of phosphorus in the Elk Valley and active water treatment plants could represent additional sources of phosphorus, it is important to determine the levels of nitrate (as well as ammonia and nitrite) that would protect against eutrophication in Lake Koocanusa. It is likely that in-situ limnocorral-based investigations would provide one of the most means of establishing nutrient-based WQOs for nitrate in Lake Koocanusa.	KNC		11-Jul-2014	As outlined within Chapter 10 (Monitoring), nutrients (ammonia, nitrite, nitrate, phosphorus) will continue to be captured on a weekly/monthly frequency (depending on time of year). This data will be evaluated as part of the surface water monitoring program within Lake Koocanusa and inform the need for any further supporting studies to evaluate nutrients in Lake Koocanusa.

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B7-97	**Chapter 10 Monitoring**	Develop a site-specific WQO (benchmark) for phosphorus (i.e., total phosphorus (TP), total dissolved phosphorus (TDP), and/or orthophosphate phosphorus (OP) in Lake Koocanusa; i.e., using limnocorrals) as a supporting study under the RAEMP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Section 3.1.5.1 of the Synthesis Report describes the results of the evaluation of current phosphorus levels in Lake Koocanusa. These results indicate that about one-third of the samples from MU-6 had phosphorus concentrations above the selected WQG. This is a concern because operation of active water treatment plants (AWTPs) in the Elk Valley is likely to result in releases of additional phosphorus into receiving waters. Therefore, loadings of phosphorus to Lake Koocanusa are likely to increase in the coming years. Considering the loadings of nitrogen to the lake that are already occurring, increases in phosphorus loadings have the potential to increase the frequency and/or magnitude of algal blooms in the lake and/or alteration of the trophic status of the lake. Site-specific WQOs for phosphorus would provide critical information for managing releases of nutrients to the lake.	KNC		11-Jul-2014	As outlined in Chapter 4 (Baseline Conditions), there is no need to develop a site-specific water quality objective (benchmark) for phosphorus (i.e., total phosphorus, total dissolved phosphorus, and/or orthophosphate phosphorus in Lake Koocanusa as they are generally below the water quality guideline or are a reflection of concentrations from the Kootenay River (which is outside the Designated Area). Nevertheless and as outlined within Chapter 10 (Monitoring) of the Plan, surface waters within the reservoir will be monitored for nutrients concentrations and evaluation of this data will inform the need for any further evaluation of nutrients in Lake Koocanusa.
B7-98	**Chapter 10 Monitoring**	Evaluate the bioaccumulation of selenium in amphibian species from the Elk Valley as a supporting study under the RAEMP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	While there is a considerable amount of data available to evaluate linkages between concentrations of selenium in surface water and the concentrations of selenium in benthic invertebrate tissues, there is uncertainty in the relationship between dietary selenium levels and egg selenium concentrations in amphibians. Therefore, a laboratory study should be conducted to evaluate bioaccumulation in a surrogate species (i.e., by feeding leopard frogs invertebrates with different concentrations of selenium). This study should be linked to the effects study described below.	KNC		11-Jul-2014	Chapter 10 (Monitoring) outlines a toxicology supporting study that will be designed and implemented during Plan implementation. The need for amphibian toxicity testing will be considered during the development of a detailed study design. Consistent with the procedure employed within the RAEMP the need for additional and/or future studies on toxicity assessments will be guided using the Data Quality Objective process.
B7-99	**Chapter 10 Monitoring**	Evaluate the effects of selenium bioaccumulation on the reproductive success of amphibians in a laboratory study (i.e., using leopard frogs) as a supporting study under the RAEMP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	There is still considerable uncertainty regarding the effects of selenium on the reproductive success of amphibians in the Elk Valley. For this reason, toxicity testing with a surrogate species should be conducted to evaluate the effects of selenium bioaccumulation on reproductive success (i.e., from egg to metamorphosis).	KNC		11-Jul-2014	Chapter 10 (Monitoring) outlines a toxicology supporting study that will be designed and implemented during Plan implementation. The need for amphibian toxicity testing will be considered during the development of a detailed study design. Consistent with the procedure employed within the RAEMP the need for additional and/or future studies on toxicity assessments will be guided using the Data Quality Objective process.
B7-100	**Chapter 11 Adaptive Management**	Develop a stand-alone adaptive management plan that provides specific information on the adaptive management triggers and associated management actions, in addition to the chapter of the EVWQP that addresses adaptive management. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	An adaptive management plan represents an essential element of the overall adaptive management framework that will be applied in the Elk Valley. While the chapter of the EVWQP that addresses adaptive management and plan implementation provides important information on the proposed adaptive management framework, a stand-alone adaptive management plan will be more amenable to periodic update and refinement as new data and information becomes available. Therefore, it is more likely that a stand-alone AMP can be consistently used to guide future management decisions than the EVWQP itself. The stand-alone AMP should be revised, at minimum, every three years.	KNC		11-Jul-2014	Chapter 11 (Adaptive Management) includes provisions for periodic review of the Plan on a three-year cycle. Adaptive management of the Plan can be accomplished without the need to develop a stand alone adaptive management plan.
B7-101	**Chapter 11 Adaptive Management**	Define the objectives for the adaptive management component of the EVWQP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	A definition of adaptive management is provided in the EVWQP. However, clearly defined objectives for the adaptive management component of the EVWQP are not provided. Such objectives are required to inform the development of a responsive adaptive management framework.	KNC		11-Jul-2014	The objective statement has been incorporated into Chapter 11(Adaptive Management).
B7-102	**Chapter 11 Adaptive Management**	Provide an overview of the CSM for the site and the associated environmental effects, interactive effects, and cumulative effects hypotheses in the adaptive management chapter of the EVWQP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Adaptive management provides a systematic process for learning during implementation of the EVWQP to confirm that the objectives are being met and to adjust management actions if required. To be effective, the adaptive management component of the plan must be linked to key indicators of environmental quality conditions and informed by the results of focused environmental monitoring programs. The CSM and associated effects hypotheses identify the assessment endpoints that are likely to be affected by stressors associated with coal mining activities and/or other anthropogenic activities. In addition, the CSM and associated effects hypotheses inform the selection of measurement endpoints (i.e., environmental variables) that will be used to evaluate the status of the assessment endpoints.	KNC		11-Jul-2014	This advice has been incorporated into Chapter 11(Adaptive Management) as follows: • The adaptive management triggers have been updated to reflect the CSM and monitoring and assessment endpoint (Table 11-1). • Triggers will be structured to address specific questions rather than hypotheses. Questions will be consistent with effect pathways and key effects monitoring questions will be consistent with effect pathways and key effects monitoring questions.
B7-103	**Chapter 11 Adaptive Management**	Identify the assessment endpoints (i.e., indicators of environmental quality conditions) and measurement endpoints (i.e., metrics) that will be used to inform management decisions under the EVWQP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The EVWQP currently identifies the monitoring components (e.g., water quality monitoring at order stations, periphyton monitoring, ambient sub- lethal toxicity tests, groundwater monitoring, and human health assessment) that will be considered in the adaptive management plan. However, these components are not sufficiently specific to provide a basis for explicitly identifying the assessment endpoints (e.g., survival, growth, and reproduction of westslope cutthroat trout) and measurement endpoints (e.g., concentrations of selenium in cutthroat trout eggs/ovaries) that will be used to support management decisions in the Elk Valley. Therefore, assessment endpoint and measurement endpoints need to be explicitly identified in the adaptive management framework.	KNC		11-Jul-2014	The assessment and measurement endpoints related to adaptive management triggers have been incorporated into Table 11-1 of Chapter 11 (Adaptive Management).
B7-104	**Chapter 11 Adaptive Management**	Identify the targets (if relevant) and triggers for action in the adaptive management framework. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	Triggers for use in adaptive management are identified in the EVWQP, including trends and concentrations compared to predictions, targets, and timeframes, chlorophyll-a trends and guidelines, critical effects sizes, trends and drinking water guidelines, and changes in health risk results. However, these triggers are not sufficiently specific to guide decision making under the EVWQP. Therefore, the triggers for action need to be identified in the EVWQP (e.g., If a the target of selenium in cutthroat trout is the EC10 for cutthroat trout, then a trigger needs to be set below the target value that provides sufficient time to implement management actions to ensure that the target is not exceeded).	KNC		11-Jul-2014	This advice accepted and incorporated into in Chapter 11 (Adaptive Management) as follows: • Table 11-1 has been updated to be more specific on the basis for establishing targets • The process and timelines for development of specific adaptive management triggers to guide decision making is provided in Section 11.9.

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B7-105	**Chapter 11 Adaptive Management**	Identify the management actions that will be taken if one or more of the triggers for action are exceeded during the implementation phase of the EVWQP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The EVWQP currently includes an adaptive management decision flow chart that generally describes how the triggers would be used within the adaptive management framework. However, this information is not sufficiently specific to determine what actions would be taken if a trigger is exceeded during Plan implementation. Therefore, the adaptive management plan must identify the specific actions that would be taken for each of the triggers that are included in the AMP. This lack of specificity represents a key uncertainty that needs to be addressed because, without further information, there is no way of knowing what actions would be taken when targets are exceeded.	KNC		11-Jul-2014	This advice has been incorporated into Chapter11 (Adaptive Management) as follows: • Adaptive management triggers are intended to 'trigger' a root-cause analysis, the results of which will determine the appropriate management response. This is the essence of adaptive management. The range of potential adaptive management actions are presented in Section 11.2.1.
B7-106	**Chapter 11 Adaptive Management**	Identify the metrics and associated triggers that would lead to implementation of passive mitigation measures, semi-passive mitigation measures, and cover installation under the EVWQP. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The EVWQP currently identifies research and development as part of the overall adaptive management framework for the Elk Valley. However, clear linkages between environmental monitoring and the implementation of alternative mitigation options are not provided in the Plan. Therefore, it is not possible to determine what metrics or triggers will be used to facilitate incorporation of new technologies or alternative existing technologies into the Plan.	KNC		11-Jul-2014	Adaptive management of alternative mitigation options is described in Chapter 11 (Adaptive Management) Section 11.3, including adaptive management triggers. Incorporation of alternative mitigation into the Plan will be triggered when new technologies are ready to be considered for broader application within existing mine development areas and for future mine plans, as opposed to environmental monitoring.
B7-107	**Chapter 11 Adaptive Management**	Establish an independent environmental monitoring agency to provide guidance and oversight related to the collection, analysis, interpretation, and reporting of data collected within the Elk Valley. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	A great deal of data and information has been collected on environmental conditions in the Elk Valley in recent years. In the future, implementation of the Regional Aquatic Effects Monitoring Program (AEMP) and various mine-related AEMPs will result in collection of additional data and information. To ensure that such data collection is focused and relevant, that the resultant information is evaluated using appropriate methods and procedures, and that the dissemination of such data and information is timely and accurate, an independent environmental monitoring agency needs to be established in the Elk Valley.	KNC		11-Jul-2014	The suggestion is outside the scope of the Order, however and as detailed within Chapter 11(Adaptive Management), Teck will continue to share monitoring data with the Ministry of Environment (MOE), the Ktunaxa Nation Council, and Montana state government.
B7-108	**Chapter 2 Regulatory Context**	Describe the regulatory context of the EVWQP, including its relationship to federal and provincial legislation, regulations, and policies, to other plans relevant to the Elk Valley, and to future permitting of Teck-lead and other development projects in the Elk Valley. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The Terms of Reference for the EVWQP indicate that the Plan will outline the current regulatory context applicable to selenium, cadmium, nitrate, and sulphate in water and calcite formation in the Designated Area. While this chapter provides a description of the provincial and federal environmental legislation that are relevant to managing the environment in B.C., this chapter should fully describe the regulatory context of the EVWQP. The text in Chapter 2 provides little information on the regulatory context for the EVWQP.	KNC		11-Jul-2014	This advice has been incorporated in the Plan at Chapter 2 (Regulatory Context).
B7-109	**Chapter 2 Regulatory Context**	The EVWQP should be reviewed and revised at least every five years to provide a current and relevant plan for permitting new projects and amending permits for existing projects. *For additional context refer to D. MacDonald (TAC Member for KNC) letter (dated July 11. 2014).*	The Terms of Reference for the EVWQP indicate that the Plan will propose for periodic BCMOE review and approval of amendments to the Plan. Given the timing of the proposed mitigation actions, it is reasonable to expect that the EVWQP will need to be updated at least every five years. This is important because there are numerous data gaps and uncertainties that need to be addressed during implementation of the Plan. The results of monitoring, special studies, and mitigation research and development are likely to influence both the water quality targets that have been established under the Plan and the mitigation that is selected to address water quality concerns. The Plan needs to be updated to reflect the new information and to inform permitting of new and existing projects.	KNC		11-Jul-2014	As outlined within Chapter 11 (Adaptive Management), Teck expects the Plan to be adaptive reflecting changing circumstances, technologies and science, and results of on-going monitoring and assessment programs.
B7-110	**Annex K.1 Synthesis Report**	Consider spatial distribution and temporal fluctuations of constituents when using the 95th percentile of reference site data to identify constituents of potential concern (COPC) in the evaluation process.	The evaluation process applied to water quality and sediment to identify COPC rely on a comparison to the 95th percentile of reference site data collected across all stations in the designated area and for all three years. For some constituents, high background concentrations at one or a few stations increases the 95th percentile which may not be appropriate for other areas of the watershed that have low baseline concentrations. Also, due to hydrological fluctuations throughout the year, some constituents are naturally elevated during high or low water. Comparisons with reference data should be done for the same season so that seasonal changes can be detected.	MOE		14-Jul-2014	The water quality assessment and Section 3.1 will be re-evaluated to streamline the evaluation steps and more clearly characterize and summarize water quality on a localized and constituent-specific basis (i.e., identify specific locations where mine-related parameters are above effects benchmarks based on individual sample results rather than station medians). To support the step of comparing concentrations in mine-exposed areas to reference concentrations, Teck has provided plots showing the distribution of data at each reference station relative to the 95th percentile for each constituent to verify that the 95th percentile values are not biased by results for specific samples or stations; these plots will be incorporated into the finalized Aquatic Environment Synthesis Report. In addition, concentration trends will be plotted and discussed at key locations for the Order constituents. Results will be compared to past water quality evaluations (e.g., Minnow and PLA 2012) to highlight and explain key similarities and differences. A summary statistics table showing mean, median, maximum, 95th percentile, % detects >sample-specific guideline, and ratio of 95th percentile to guideline will also be included in the updated report.
B7-111	**Annex K.2**	Table 1: Recommend that the average tissue concentration for each species by location and sampling cycle be compared to the BC tissue guidelines for Selenium.	Table 1 and Section 1.2.1 report the frequency of individual samples exceeding the BCMOE guidelines for fish tissue. The BCMOE selenium guideline recommends for each species and sample cycle, to compare a mean of ≥ 8 fish tissue samples in a representative area to the guidelines. (BC MOE Companion Document to: Ambient Water Quality Guidelines for Selenium Update 2014). For example, in Table 1 the reference location for bull trout in 2009 reports 14% of reference samples exceeding the BC WQG, however, the average of the 7 samples is 2.2 mg/kg dry weight which does not exceed the BC WQG of 4.	MOE		14-Jul-2014	Annex K.2 Evaluation of Element Concentrations Collected from Lake Koocanusa has been updated to include details on comparison to selenium tissue guidelines for each species sampled in the reservoir where n≥8.

Table 1:Teck Response to Technical Advisory Committee Advice, meetings #2 to #7 Appendix A and Band Working Group

ID# from Meeting	Category/Theme	Advice/Comment	Rationale (*to be filled in by Originator*)	Originator (Agency) of Advice	Other TAC Member Support	Date Advice Received (dd/mm/yy)	Teck Response
B7-112	**Chapter 5 Human Health and Ground Water**	Recommend as part of the Adaptive Management Plan that monitoring, assessing, and communicating environmental levels compared to human health guidelines (drinking water, food consumption, etc.) be incorporated annually or as information becomes available. This is a critical step in the protection of human health.	The TOR (Section 3.3 c) identifies protection of human health as an objective of this plan. As discussed during the Human health Working Group meeting June 19, 2014: Public health is protected by maintaining contaminant levels below MOE source water guidelines. If these are exceeded, health officials may need to recommend further actions to protect public health to avoid or reduce excessive exposure of contaminants in the environment (i.e. do not drink advisory, health assessment). Therefore, there needs to be a clear understanding of contaminant levels in the various media, when and where guidelines are exceeded, along with the frequency, and duration. The chapter on human health does not yet make it clear how the plan will address on-going human health protection. As an example, the final section of this report (5.8) states that levels of Selenium in the Upper Fording exceed both the current and proposed drinking water guideline and that this section of river should not be used for drinking water. This type of advice should be issued and communicated to the public by health officials. Further, this section also mentions that the Se guideline is not a health-based guideline but is based on dietary intake. The latter is in fact a health-based guideline and part of the dietary intake is from water. Again, these types of conclusions need to be made from health officials. As part of the adaptive management framework, a clear monitoring strategy that will ensure public	MOE		14-Jul-2014	Chapter 10 (Monitoring) includes discussion on updating the assessment of protection of human health as data becomes available from the various monitoring programs.
B7-113	**Human Health Evaluation Report**	Recommend that the consultants be more explicit about the methods of their calculation of risk. For each calculation, all of the inputs should be provided in a single table in one section, rather than in several tables.	This may be available in appendices, but it is not clear in this report	IHA		15-Jul-14	This advice was incorporated in Chapter 5 (Assessment of Protection of Human Health and Groundwater). Tables with assumptions are provided within each section to make it easier to follow the text within the section.
B7-114	**Human Health Evaluation Report**	The risk assessment should use a more fulsome exploration of potential risk of exposure to both Selenium and Arsenic, combining exposures from all sources estimated locally where possible (i.e., water, fish, country foods, locally grown and purchased foods). For estimated parameters (e.g., selenium content in diet) a sensitivity analysis that includes both worst case scenario and most likely scenario should be conducted.	Country foods and locally grown foods may be particularly important additional sources of these elements should they be grown with water that has elevated selenium and arsenic.	IHA		15-Jul-14	This advice is partially incorporated in Chapter 5 (Assessment of Protection of Human Health and Groundwater). The limited available data for selenium in locally caught game was included in the final version of the risk assessment, as were estimates of other dietary selenium intakes. Other local foods are unlikely to have high enough selenium concentrations to alter total dietary selenium intake. The dietary intakes were added to upper bound estimates of selenium intake from local fish consumption. As more local game data are collected, these estimates may be further developed in subsequent risk assessments, and a sensitivity analysis can be added. There is no evidence that arsenic in Elk Valley fish and water are related with mining activities. For this reason, and consistent with the requirement of the Order, arsenic will not be monitored as a component of Plan implementation.
B7-115	**Human Health Evaluation Report**	Worst case scenario should represent the fish consumption of potential high consumers in the area. Consumption greater than 200g/day as classified as high consumer by Health Canada (2004) should be used.	Fish consumption rates reported in the dietary study for Ktunaxa Diet Study are 23-45 g/day, makes them low to moderate fish consumers according to Health Canada assessment. It would be helpful to examine the methods and results of this study. In addition other potential moderate to high fish consumers should be identified and assessed	IHA		15-Jul-14	Worst case scenarios are not typically included in risk assessments. Instead, reasonable maximum exposures are assessed by selecting one or more upper bound exposure parameters. As described in the March 27 Human Health Evaluation Work Plan, selection of the 95th percentile fish consumption rate for consumers only from the Ktunaxa study represents a reasonable maximum exposure for Elk Valley residents. This value (43 grams/day) is close to twice the 95th percentile for the entire sampled population (22 grams/day). The assumed value of 43 grams/day is also slightly more than the Canadian adult high consumer (40 g/day) identified by Health Canada (2007).
B7-116	**Human Health Evaluation Report**	Where the dietary intake of arsenic is unknown, a sensitivity analysis should be conducted including calculations for worst case scenario and likely scenario. Estimates of the arsenic content for all dietary sources should be made.	The arsenic content of cooking water can affect the concentration in foods and this should be accounted for in the risk analysis.	IHA		15-Jul-14	There is no evidence that arsenic in Elk Valley fish and water are related with mining activities. For this reason, and consistent with the requirement of the Order, arsenic will not be monitored as a component of Plan implementation.
B7-117	**Human Health Evaluation Report**	Speciation of arsenic in fish tissue should be considered. Rationale: In some ecosystems the percent of total arsenic as inorganic arsenic can vary by several fold (e.g., Lower Columbia River, Tetra Tech 1996, data as reported in USEPA 2003), and it is not known whether that is occurring in these MUs. Such variation occurs in contaminated ecosystems, and Elk River Valley may be one such contaminated site.	None provided.	IHA		15-Jul-14	There is no evidence that arsenic in Elk Valley fish is related with mining activities. There is also ample evidence that the average percent of total arsenic that is inorganic in freshwater finfish is not more than 10 percent (Schoof and Yager 2007), a finding that has been accepted by several US state in deriving arsenic ambient water quality criteria (e.g., Oregon and Maine). For these reasons, and consistent with the requirement of the Order, arsenic in fish tissue will not be monitored as a component of Plan implementation.
B7-118	**Monitoring for Groundwater**	Recommend using the current Health Canada guideline for selenium 0.01 mg/L rather than the benchmark 0.047 mg/L as long term target for surface and groundwater sources.	This is the current Health Canada Maximum Acceptable Concentration for Selenium in drinking water sources.	IHA		15-Jul-14	This advice is addressed in Annex L.1 Human Health Evaluation of Current Baseline Conditions and is considered for Plan implementation. As stated in Annex L. 1, based on guidance from the Ministry of Environment, values for drinking water, irrigation, and livestock watering will be used as default objectives for future protection of groundwater. Actual values have not been provided as they are subject to change over time. The guideline that is current at the time of monitoring will be used and updated as appropriate.
B7-119	**Monitoring for Groundwater**	Recommend undertaking a more fulsome groundwater monitoring program beyond just sampling the water quality of wells (e.g. gaining better understanding of groundwater – surface water interactions). Further hydrogeological assessment is required to have a better understanding of groundwater flow directions and velocities and the fate, transport, and travel times of constituents in subsurface media	None provided.	IHA		15-Jul-14	This advice is addressed in Annex L.3 Regional Approach to Protection of Groundwater.
B7-120	**Monitoring for Groundwater**	Recommend the fish tissue assessment for arsenic and selenium levels be conducted annually rather than in 3 years	Timely monitoring of contaminants in media that humans are exposed to is necessary to protect public health. While it is anticipated that contaminant levels will stabilize, contaminate fate and transport in the environment are not fully understood. Current data is required to provide appropriate advisories. The current levels would then be used to update the human health risk assessment	IHA		15-Jul-14	There is no evidence that arsenic in Elk Valley fish and water are related with mining activities. For this reason, arsenic will not be monitored as part of Plan implementation and consistent with the requirements of the Order. Adjustment to the frequency of fish tissue assessment for selenium will be assessed and adjusted through the adaptive management framework.

Appendix A and Appendix B – Cited references from Technical Advisory Committee

TAC meeting #2, Appendix B:

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Hogstrand, C., N. Webb and C. M. Wood (1998). "Covariation in regulation of affinity for branchial zinc and calcium uptake in freshwater rainbow trout." J. Exp. Biol. **201**: 1809-1815.

MacDonald, D. 2013. Letter to Lynn Kriwoken (*TAC Chair from MOE*) from Donald MacDonald (dated October 31, 2013). MacDonald Environmental Services Ltd (MESL). *Representative on the TAC for Ktunaxa Nation Council.*

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TAC meeting #3, Appendix B:

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Appendix A and Appendix B – Cited references from Technical Advisory Committee

MacDonald, D. 2013. Letter to Lynn Kriwoken (*TAC Chair from MOE*) from Donald MacDonald (dated December 3, 2013). MacDonald Environmental Services Ltd (MESL). *Representative on the TAC for Ktunaxa Nation Council.*

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TAC meeting #4, Appendix B:

MacDonald, D. 2014. Letter to Lynn Kriwoken (*TAC Chair from MOE*) from Donald MacDonald (dated February 18, 2014). MacDonald Environmental Services Ltd (MESL). *Representative on the TAC for Ktunaxa Nation Council.*

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TAC meeting #5, Appendix B:

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Appendix A and Appendix B – Cited references from Technical Advisory Committee

Table 1. Matrix for Evaluating Interactive Effects and Cumulative Effects within the Regional Study Area - Kilmarnock Creek

Receptor	Life Stage	Endpoints Affected	Stressor (Estimate of Proportion of Population Affected)										
			Cd	Se	NO3	SO4	Calcite	Total Order Stressors	Water Hardness	TSS	Deposited Sediment	Water Temperature	Total - All Stressors
Aquatic Plants													
- Periphyton	All	Growth											
- Bryophytes	All	Growth											
- Macrophytes	All	Growth											
Benthic Invertebrates													
- Stoneflies	All	S,G,R											
- Caddisflies	All	S,G,R											
- Mayflies	All	S,G,R											
- Combined EPT Taxa	All	S,G,R	0.15	0	0.15	0	0.35	**0.65**					
Fish													
- Westslope CT	Egg-Fry	S	0.08	0.31	0.1	0	0.05	**0.54**					
	Fry - SA	G											
	SA-Adult	G											
- Mountain White	Egg-Fry	S											
	Fry - SA	G											
	SA-Adult	G											
Amphibians	Egg-Tadpole												
Birds													
- Red-Winged BB	Egg-Hatch												
	Hatch-Fledge												
	Fledge-SA												
- Spotted SP	Egg-Hatch												
	Hatch-Fledge												
	Fledge-SA												

Note: CSM will identify stressors, receptors, and life stages that need to be included in the table.
Note: The simplest assumption is that the effects of multiple stressors on a receptor are additive
Note: TSS effects can be evaluated using the Stress Index Model.
Note: Deposited sediment can be evaluated using geometric mean diameter or Fredle Index.
Note: Other Stressors are a few examples only.

TAC meeting #6, Appendix B:

None provided.

Appendix A and Appendix B – Cited references from Technical Advisory Committee

TAC meeting #7, Appendix B:

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