### RE: 2020 RWQM Update - Round 3 KNC Comments

From: Jessica Mackie <Jessica.Mackie@teck.com>

To: Heather McMahon <a href="mailto:hmcmahon@ktunaxa.org">hmcmahon@ktunaxa.org</a>, Bernadette Lyons

<jsinclair@lgl.com>

Cc: Ally Wade <ally.Wade@teck.com>, Nicolas Francoeur <nicolas.Francoeur@teck.com>,

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Sent: January 22, 2022 7:56:16 AM PST

Attachments: 2020 RWQM KNC Round 3 - Draft Responses for Discussion on 2022Feb04.xlsx, 2020

RWQM Update - Round 3 KNC Comments KNC002.xlsx

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Good morning Heather, Bernadette, Mark and Jesse,

The draft responses to the Round 3 comments from the KNC and their consultants are attached to this email. We can discuss feedback on these draft responses during our meeting on February 4, 2022. Our intention with this approach, is that we discuss your feedback and input and provide final responses that allow us to close this review period and ensure that process/plans to address residual uncertainties are clear.

### Meeting agenda:

- General welcome
- Safety Share
- · Step through remaining open comments in order
- Next steps

I look forward to meeting with you on February 4<sup>th</sup>.

Have a great weekend.

Jessica

### Jessica Mackie

Manager, Water Modelling Water Quality Management

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----Original Appointment----

From: Jessica Mackie

Sent: Tuesday, December 7, 2021 4:30 PM

**To:** Jessica Mackie; Stefan Humphries; Nathaniel Barnes; Dennis Kramer; Bechtold, J.P.; Heather McMahon; Bernadette Lyons; Mark Tinholt; Jesse Sinclair; Justin Paterson

Cc: Ally Wade; Nicolas Francoeur; Bechtold, J.P.; Kyle ENV:EX Terry; Craig, Andrew EMPR:EX; Jutta Hoppe; Thais Lamana;

Kristina Birk

Subject: 2020 RWQM Update - Round 3 KNC Comments

When: Friday, February 4, 2022 10:00 AM-1:00 PM (UTC-07:00) Mountain Time (US & Canada).

Where: Microsoft Teams Meeting

Thank-you Heather and team for working with me to sort out an alternate time for this meeting.

The purpose of this meeting is to have a detailed discussion on the approach to the responses to the KNC round 3 comments on the 2020 RWQM.

A detailed agenda will be provided with the slides and draft responses (for discussion) in advance of the meeting.

# Microsoft Teams meeting

s.15; s.17

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No. Author Date  OUC-002 DEC 2009-06-02	Application Society/ Section 2000 PAYOM 2000 DOM	Project Component Discression in Se	Reviewer - Concern/Analysis Obsession  Bracewoods the fore factors a volume * MSS likes per year 122 error for in the concentrate 2003 9000000000000000000000000000000000	Retionale	Text Response  As central investment to KNC-201, extent have been identified in the file consider an unitated file will be serveded through INV. It is advenue total file.	KINC BOUND 2 COMMENT  For FV IRS the undistrest tile has come unad changes to flow rates in later years, but no change to concentrations. The	Ten Round 2 Anguese  The file that was consider through DNY emitted. "2000/00/00/Madder: Brooks Coder Stations Final Indu dos" did not include conjected conventioning of	Round 3 Response  EXC is requesting information on the impacts to Ebusana lands and outers if entirations were not assisted. DIC	Test Roand 3 Response - DRAFT FOR DESCUSSION DURING MICETAGO IN FERNIARY 4, 2022  Common solution  Test appropriate descriptions on a colorate of electricity of the 2001 PA and see will consider the committee on the 2001 PA.  Others
	Update - Results_Order	Milgation	By asseming the hooking/source volume. * SMO(large per rest)22 members in the operationer XXXX INVESTIGATION (INVESTIGATION FOR STATE AND ADMINISTRATION FOR STATE ADMINISTRA		selection to all reduction at the VEC.CATP is in the order of ADD to 9DD tg/year, and a load balance is maintained which can be confirmed with the data the corrected file provided.	To 200 data remains the same. Therefore the difference in load bidance between mitigated and sensitipated for EV_EX1 in 2000 is still 12,000 kg which is much greater than the BKL AWTT reduction. Question remains.	nitrate, seleman, sulphan, hadress, or discoved calmium without milipation. The file contained the following information: - projected PSD morthly average concentrations for ristate, seleminm, sulphale, hardness, and discolined calmium at Order Stations from the 2009 EACON.	agenetistics that Teck is building a mitigation plan so that the scenario of "contriguing" is not resisted. However, is understand the full picture of pressure on the lands and valves in we lead that the data to enotine semilificated projections be provided to SNC. The colcabilism but Teck has refined cannot be verified by SNC's sediminal capacity.	therefore, there is and will be data presented that can be used to understand patential impacts to the Xianana lands if mitigations were not applied. We have provided the fixed worklook entitled "XXXX WXXXII Spidate - Round 3 Comments SVCXXX size which are the paried set of future
	SMOOL FRANCE		ACCOUNT, Providers, in a man reviewers unconstanting that for case the main images in quasi-me way, where which receives on the order of 420 Aglysia. Where does the additional 1 200 Ag of mitigation equal to this amount model? In this expected or unexpected? In these police in the model that under product, in the carls model period.				with misigation improved PD analytic arrange in Resear & Orden Stations from the 2005 RACIA with misigation proprieted PD analytic arrange commonly in relations, from the 2005 RACIA with misigation and the propriete in the propriete arrange in research and propriete analytic ana	programs be previously to the concurrence that recit an entired context or vented by this, 5 stems or open without this. Under the Data analysis accountability and transparency section of permit 307527, KNC again requests that this information by provided for model verification.	In the file for notes on the Business Confidential status for the Information provided and more information on the specifics of the data presented.
			This was just one spot check by the reviewer, similar checks should be done for other COVycors.				updated through the 2019 PA) with mitigation - projected monthly average flows at Order Stations from the 2017 RWQM (as updated through the 2019 PA) with mitigation		
							Unmitigated projections may be provided once the mitigation planning is complete, but will not be included in the methods submission.		
KNC-005 KNC 2023-06-03	3020 PAYON RWQM 3000 Update	8.4 Sensitivity Analysis 8.4 Examples on Climate	Please include the evaluation of the previous 20-year dimate data (i.e., 2000-2018) against 1 in 300-year flow conditions (or ather relevant metrics) to assess model sensitivity to extreme events.	Similar to the comment above, ENC has a low level of comfort in using PSD and PSD as bookends in the model completed the character data are. N exhauster limited in	The 2000 RMQM has the capability to assess the influence of climate variability an concentrations of selenium, subplate, nitrate and cadmium, as destribed in the March 15" outnition. It issues, the model as not been designed to position on the events, such as probabilities may find event on other contractions of the March 15" outnition. It issues, the model as not been designed to position or the events, such as probabilities and events and other probabilities.	Please see response to KNC-002 with respect to reviewing the PSS and PSC-outputs.  The concess alone and address the concess according to this link of classics according to the PACEAS or a second	Comment acknowledged, and Text agrees that consideration of climate change is important in terms of future planning. As noted in megionies to EVC_DII journal 11, the patiential influence of climate change can be evaluated by shanging the climate distanced by the 2020/90/20. Text will enterward to evaluate this influence or climate change can be evaluated by shanging the climate distanced by the 2020/90/20. Text will enterward to evaluate this influence or climate in the invalidation of climate changes or writing the invalidation of climate changes.	Seck will "evaluate the inflamence of director change on antigation planning as part of the next major development, application." This is a refusion planning the property of	An assessment of climate change will be included in the 3002 IPA in the sensitivity analysis section of reporting, as discussed during the 2002 IPA. Open meeting on flowersher 21, 2003.
		Annex D		20 years); and 2) dis not include projected conditions under climate change.		The response dies not address the onesen associated with the task of climate projections in the WASEALs a security John see HASE COY and HASE COSE, in our round 2 response to VASE COSE, NASE requests that climate change is included in a sensitivity ran. KNE has previously respected climate change to included in both the 2014 and 2027 MASEALs.		recommendation into the model. To include it only as a project element moving forward will leave a big pay = 65C needs to understand it in the context of Qubin amaks, not a project.	
		Annex D 2.3 Semiltivity Analysis 2.3.1 Variations in Climate				Indicate office the committee is children to enforce indicate an expensive of the lands and waters in the Shallery Line And the committee is children to the second of the committee of the lands and waters in the conditions to the displaced of the committee of		KNC understands from the Oct 7 IPA Engagment meeting, that based on a comment by set SNY representative, that SNY will be requiring a centifulty analysis for climate change as port of the 2022 PA. Pissue confirm that this is To- undentateding and intent as well."	0
						evaluation of climate change as an important management tool to inform decision making.		undentanding and intent as well?	
06-407 DE 205-40-03	2010 ANCES STORY S	8.4 Semistrity Analysis 8.4 Stratistisms in Climate	The dismate resolutation method may care account for scenarios that haven'th appeared before, such as 3 Life-year events, are patterns about an explay a practically west spars of stories by all prace. On the center has fast, if there is limited to be a same controllation in a dismate between years, so the similar patterns (I) filtre on it a Miss applied cannel and to be registed. <sup>15</sup> The included for final Appearsh imagenet for size registers (III) filtre or it at Miss applied cannel are for size to describe registers (III) filtre or indicates that the secretor is an indicate that the se	that future climate (and thus predigitation and flow)  4 predictions are based on a 'realization' method wherein the	The instruction used to simulate the influence of chindre when locarie with specific infant. Climide is not an independent variable that is adopting sharper from day to day or week to week, it is an autocarrelated variable, whereby perceptation and temperature patterns on a given day or week are influenced by those that same before and meeth to moreth patterns are influenced by broader sold classors, such as ones connects, pastion of the Ear	<ul> <li>But one for method selection is acknowledged. The report would be entit thom an expansion of this resonant puress.</li> <li>this reviewer missed it) as well as limitations (poor and cond) that are associated with the method compared to other this approaches.</li> </ul>	In harve reporting, those will book to include additional details related to the reticulate selection select the climate conditions used to develop hallow projections.	EXC. requests that the P20 and P50 are provided to support OECs review and input on the IPA.	Comment action/edged. Note will be including P33 and P98 polyections, along with P93 projections, at Companies Plants and Chide/15abons as Open part of the 2822/PA submission.
		Annex 8 Table 4-20	ta be repeated? The rationale for Teck's approach sampared to other options needs to be presented and discusser. The report indicates that the method is "more restrictive than a 3-00-year return." Please elaborate what this mean	2008 to 2009 historical climate dataset is looped through in order 2015mes, with each loop starting at a salice quent	nelative to the sun, etc The most evident outcome of this correlation are the seasons experienced in the SIX Yalley and the tendency for weather patterns is go through longer term (i.e., intersemal) we'll and dry systes. In addition, use of the historical climate record allows for experience.	For clatification, the reviewer estimated that while average (typical) concentrations will be similar, the <u>magnitude</u> (not	this agrees that mitigation planning efforts may be all-housed or influenced if posts proposed concentrations are higher than coult set in PLEOTRYCH.  Applicit, depressing on where they exert and whath dives these posts, becaused on connectrations in white, for example, until Early bear to STERMENT.  Application planning than those occurring during shoulder researce when saterated with Efficient active water treatment facilities are numming closer to broad higher and applications of the sateration of the satera		
		Annex D 2.2 Sensitivity Analysis	Notwithstending the sensitivity analysis conducted to evaluate a langer climate distaset (per Table 4 23 Annex II).	from the "20 point" dista set. This method assumes that 1) future climate will be similar to peet climate (see	a surfamily generated climate spenario that may be dominoed or disputed because it in "Retional" and is not grounded in a known or previously experienced condition.	would have significant implications for midgation planning.	their hydroadic capacity, and, thus, there is more limited ability to treat additional water.		
		2.3.1 Variations in Climate	there are other semilitives to the method that need to be evaluated. SNCs reviewer completed a sufferentiary analysis of alternative methods which suggest that depending on how the climate variability is modelled, it won't change trained needs for concentrations much but it must dead for assertant our shallow in peak encounterious is sent.	subsequent comment on climate change)  2) that future month to month and year-to-year weather (rilmans) will follow the same outsets as previously	Eurhor, midigation planning is primarily focused on controlling peak concentrations. The work done in support of comment NY_,007 identified that "Alternative methods," words shares trained peak for representations much had, usually focusing account of peak little in peak representations." This	Description of restrictive return period acknowledged, however given that the P10 and P90 data sets (for both flow and concentration) were not provided (see comment KNC_504). KNC is unable to independently worth (it.)	Teck will comider KNCs request for PSC and PSC information is the context of the SEEL PA submission.		
			given year:  - If the existing climate data is 'sampled' randomly instead of 'soping' the same pattern/order there is an increase.	experienced in the last 20 years.  Based on this method, Se concentrations appear to vary	statement is interprited to mean that alternative methods might change the frequency with which peak concentrations occur but will not drange their magnitude. Given that midgation planning is focused on controlling the magnitude of the peak concentrations, it is unclear from the comment have an	and concernation) were not provided (see converse, 504, 504, 504, 504, 504, 504, 504, 504			
			Acad Service (see executive, see apin conducted to revolve a larger closest desired from "face". 2.5 Janes 18, there are didn't as this in the shade of direct of the service. Since "face the service is realised as additional, engine of the service is the shade of direct of the service. Since "face the service is realised to modelled, at work , which is directly as the service is the serv	any given year OUNC's reviewer specifically reviewed rev PR1 and IC 1010	The statement from restriction from a 5-filtrane return is explained in Econy 8-fertiles 6.5 if related to the idea that combining behaviorable.				
KNC-008 KNC 2021-06-03	3000 PAYOM RWQM 3000 Volume	8.4 Sensitivity Analysis 8.4.1 Variations in Climate	Future flow restrictions are based only on historical climate data. New areaffects of climate strongs considered in using historical data to product but, or radiations? "Climate change" is not one entriored in the reports, soft will a light frontly import noticed weeker, flows, and thus concentrations during the modelling.	Consider that:  1) There is evidence that climate change has already affected the 20 year data recent. If a terrelline was drawn	As rando in response to DVI_DE, climate change was not considered in the projections preceded in Annex D of the ZOD PECED Cipilate. Consideration of climate change would be assumptived through modification of the climate data used by the ZOD PECED respectively. precipitation and air intermental in modification in the climate change in soft or modification and air intermediate intermediate intermediate in the climate change.	<ul> <li>EXF remains of the aginism that climate sharpe should be incorporated now, at the very least as a sensitivity, and Text's response identifies that this could be assumptished. From EXCs perspective, and using climate change will absolutely be a remain ment for an originals that underse fit.</li> </ul>	Sets agrees that consideration of climate shange is important in tensor of future planning, and it is Text's expectation that climate change sensiterations will send it a be discussed in major project applications making forwards. With respect to mitigation planning. Text will endeavor to evaluate the influence of climate changes on mitigation elements as each of the next major development application.	see XXIC 005	See response to KNC-005 Open
		Annex BTigures 4-36 and	period. That chimate change is not own-mentioned, along with sationally another end object in normal.  Stilling on a strong of the contraction of climate change will not be realized in the short term, these effects will be	through Annex B Figures 4-35 and 4-15, a decreasing trend in total precipitation is possibly evident? More evident is	modeling.	That climate change was not inluced in the IWGM appears to conflict with the statement on page 45 of Teck's most recen			
		+13/1g/rt1+1/100+3	* restliced within the pre-intentinational citied prival (2000). In response to a similar convened on the Worker Bulleto, Visio Main Management Plans, Teck Indicated. There will de consistence in the phase to include climate change in the deposit intention and restlement Plans in 2003 and the federal in new . Relativate and rest steps need to the prevailed. The startery, it should not be that difficult and controlled and rest steps need to the prevailed. The startery, it should not be that difficult in the controlled and restlement and r	Other data sets that could be examined for trends in snow accumulation include the Marrissay Ridge Snow Pillow	you nation in integers in the Linux, commercialized may be included in natural model appears or in support or project appropriation, it are as required.	That dimete change seas not induced in the IRVIDM appears to conflict with the statement on page 45 of feets, must seem Climate Change Confock Spoot (IRIII) that "we regularly incorporate impacts from climate surfability and climate change into our vestor enceloiling".			
		Annex B sections 4.5.2.1 and 4.5.2.2	to add in a semicinity check for climate change by adding a linear namp it a linear increase to 2000 to the Noterical data that, adjust temperature linear linear accounting to the forecasts. Adjustment to interpretative antiprecipitation are already reads in deep its perform 6.5.2.1 and 6.0.2.2 and 6.0.4.2 and 6.0.4.2 and 6.0.4.2 and 6.0.4.2 and 6.0.4.2 and 6.0.4.2.	Station.  11. There is result by explicitly information on climate change.					
		Annex Succion 6.5.1.1		predictions in PDC 2001 (albeit dated now) that fresk/HID has utilized in other applications. The PDC projected a					
		2.2 Sensitivity Analysis 2.2 Sensitivity Analysis		change in median discharge between +17% and +13% by the 2050s period. More importantly, there is larger seasonal suriance that warrants consideration in the model. The					
		Climate		models point to an increase in precipitation of 33-25N in the fall, winter and spring, and a decrease of up to 30N in					
				2000): -increased discharge in the winter period (e.g. 40 to 120%					
X94C-0300 X94C 3000-06-03	3020 PAYCAN RWIQM 3000 Update	4.4 CEM/for Submorged Waste and Saturated	"While dentification occur, slightly above celesium reduction in the redux ladder and is therefore energistically favoured, groundwater monitoring data from backfilled pits at FRO and EVO showed Se/SiO4 ratios consistent with	44	Please see the 2001 F2 Saturated Book FIII Full Scale TRail Performance Report submitted March 2021.	This report will be reviewed and a follow up comment may be included as part of Round 1. Noting that this is a 700 page document, sections where the information can be found would be he lyful in expediting ENCs review.	Teck will continue to evaluate interace rate decay as part of future updates to the RWQM. Once sufficient field scale data is available to support release rate decay, source terms will be refined and conied ferward into subsequent updates of the EWQM.	As per KNC's round 22 comment - the review trans would appreciate the sections of the 2020/2 Saturated Rock Fill full Scale Trial Performance Report submitted Month 2023 be provided. Following this, comment can be also	As incorrect reference was provided in the Reund I reporte. The report containing the groundwater information is provided in MRX (2008)  (Sealastion of Main Stem Macs Redution Mechanisms, Section 3.3.2 includes the supporting information that selenium reduction occurs in the
	Update Annex A – Geothemical Seurce Terror	Rock PE's (589-q), p.50	Sensoned, groundware mountaining data from healthfold pilos at 1900 and 1900 showed by Chotalios consistent work.  970 remined of selection is the presente of reliate concertrations congling from 2000 120 mg Nyl. It does not appear (but descriptional and selection is the presented of reliate concertrations congling from 2000 120 mg Nyl. It does not appear (but descriptionals blooks selection methods by but the reductive processes may amount for electrons as that the reliate of selections methods may be induser to the presence of distance.					The understanding that release decay will be addressed in the 2003 update of the EWCSK.	presents on nilvingen.
			Please provide the data referred to in the paragraph above along with any accordated reporting.						
200C-056 KNC 3305-06-01	3020 PAVQM NIQW 3020	83.1Nitrogen Source	It is XXC's view that a more conservative shoice of litear emulsion values should be incorporated into the model us	The results of the study indicated there were no failures in	The statistical review shawed that 20% of blast holes with liners showed no evidence of teading, 30% showed plausible evidence of teading, and 40%.	As dispossed at the December 9, 2003 PAYON meeting it is KNA's position that a k-tear emulsion value of 0.5 is not	EXCs advise is nated and appreciated. As the 2000 RMO(M is a methods submission, Teck would like to durify that the primary intent of the inclusion of the	It is XXIC understanding based on discussion in the IPA meetings that the knew, emulsion will be set to 1 for the 20	28 No sredit will be disinced for blast heir lining during the development of the 2022/PA, due to new learnings on the assures of nitragen in our Clases
	Update Annex A – Georgemical Source Terms	Term Inputs, p.90	in a fail, a series than a merci concernation of the demonstration of containing containing companies and are more data to individual and instant reduction have to linear use to observed on the catchinents scale. Distinguishments are invested in the catchinents of the Catchinent	27% of the holes tested and 32% and 45% of the holes sampled were categorized as plausible failure or likely	shawed evidence of treating. However, the results needed to be used to calculate patential future extrate isodings to the united of the historical passions of each using linear which is reflected in current water chemistry due to log times. The SOE accomption used means that linear reduce nitable controlled in the co	safficiently conservative and the reduction in initiate loading related to blast heir times should only be incorporated into the model after a reduction has been electrical at the calabrinest scale. EXC is not supportive of nitrate reductions that	Inter integrity information in this sale record was to communicate that this functionality is now available in the 2007/XXM. The specific factor is to execl in planning mitigation will be discoord through early engagement on the next implementation if an Adjustment. A meeting is currently orbital and in the control of t	ROUGH due to Tech's new learnings regarding relate sources (WHA+ ton exchange).	waste risk. Information on the new tearnings was shared through the P3. engagement process on Col 7, 2021 and Nov 29, 2021.
	Seurce Terms		The state of the s	Since emaking holes fall to some degree. However, the learnings of the study can be used to support quantifying	between the observation that RISs of holes showed either plausible or actual evidence of tearing, and the strong expectation that a term liner will have benefit over as long.	# www.ysv ws -allied in the environment being included it militarilian planning.	The state of the s		
				the benefits of lining blast holes because 20% of the liners in the holes sampled remained intact and plausible failures	Another way to consider this is to calculate how the loading from the BDN showing plausible or actual evidence of traving compares to having no liner				
				highlights that a tom liner is not synanymous with a lost liner and the liner still provides benefit at reducing	the loading of ar-united hole to yield a 50% equivalent overall. This is considered highly-conservative because, based on observations, a starris expected to be a small hole.				
				nitrogen loadings to the receiving environment. Based on the findings of the study, lined emulsion hales have a contract this between Wit to ME.*	Uner assumptions will be discussed in the planning assumptions for the next PA and side to compliance will be assessed via a sensitivity analysis. Texture of the particular analysis o				
				Table 34. Symbols and Placeholder Inputs for Used Blast					
				"Intercomplian Effection of tembles hole lines in emplion holes -Unities -0."					
				Based on the information provided in the paragraph above,					
				choice for the place holder input for litear, emulsion. In addition, the RWOM meeting slides from December 9, 2020.					
				note that the data is based on a limited study where only 45, samples had sufficient data to be included in the analysis					
				concentrations has yet to be absensed at the catchment code. ENC newtones to raise recovers researches.			Pieze set the response to DAL AZ 925.		
NAC-017 NAC 2021-01-01	3000 FWGM RNIGM 3000 Update Annex A - Geothemical Source Terms	8.2.2 Weathering Rates, p.394	Here the effects of anticoliant application to mitigate calcification of streambeds been considered when developin the calmium, cobalt and nickel [and possibly manganese and sind) source terms?	"Precipitation of metals forming diselect cations (code)um, cobels, mangemese, nitile), zinc) in celebr is highly significant for maderating loads in surface waters (MacGregor et el.)	The comment is correct that the use of artiscalants could influence metal concentrations because calcitie sequenters metals when it precipitates.  Presention of calcits precipitation therefore will remove an attrougetion link for parameters that are preparatived. Autocalants operate by preventing	The codmism, cobalt and nickel land possibly mangamene and circl sinks related to calcite formation currently in the EWGM should be reduced to reflect the expected fixture antisculant use. Not accounting for antisculant use problems policy formation will provide non-conservative predictions for future codmisms, calculated in circle land possibly	Piezos see the response to DAU_PLOS.	INX agree with CMIL_CCS found I comment the "a rentitivity analysis is performed that considers the effects of anticolant addition systems currently in operation and planned in the future" and strongly recommends the analysis should be done as part of the 2022 PA (sother than delayed to the next idention of the model).	I The 2007 MA Expressed on the management and control of a finders, societism and subships, come of which are influenced by virtue set of a management and control or a finders, societism and subships, come of which are influenced by virtue set of a management and control or an area of the second or an area of the second or a
	Grechemical Source Terms		Could the addition of antiscalant netrobilize metals previously sequestered in (verbed)hock drain/sedimentation pond calcos?	John Robertsching does in surycoc waters (Miccordgor et al. 2012, SNK 2019N/* p. 47	nucleation of calcite nanocystals thereby limiting the formation of calcite concretions in streambeds. The metals advorb so the nanocystals so are nanowed from the dissolved phase but they remain in the water calcine as particulates.	manganese and sind) in the Elk Valley.			acknowledges that the use of artisociants may need to be presidented when looking at mitigation-planning for nidsel, and other constituents, affected by calcite co-procipiation, be that before ar after the release of the 2023-RHQM.
				"Coamsum, cooost and rucket release rotes are denied and the percentage attenuation from adsorption and co- precipitation (with calcite) is subsequently applied at each	Currently, the influence of anticulants on changes to metal concentrations is evaluated on a conditiened basis, to data, this exence has been done as load sale models. The influence of anticulation is not yet accounted fire in the RMSM, because their use has so far been retricted to a few areas. As application of anticulation sequent, the PMSM will be updated accordingly.	Na Carlotte			
				monitoring iscotion. The conceptual model and attenuation factors for these parameters is presented in Section 9.1° p.	application of anticolams expands, the RRIQM will be updated accordingly.				
KNC-020 KNC 2021-96-01	3020 PAYOM RWGM 3000 Update	18 Strengths and Umitations of the 2020		"Coal's mined almost exclusively from a single prological farmation, with well-established relatively uniform regional	The sange in average rates are described in the comment as "wide" but Test considers the rates are well-constrained with a valley-wide average substance release rate of 15 a/40 M/m integr in continuous series of 5 to 36 a/40 M/m integr in continuous series of 4.1	Additional information requested:	Our to the uncertainty in the calculation inputs and the resultant variation occurring from sombining several inputs with their own inherent variation and excertainty, a single hypothesis for inchinidual sites having lower selenium release rates cannot be confidently isolated. Tech would like to re-instant that	Prior to the seat iteration of the RWQM-work should be done to constrain the uncertainty for outstmeets with selection release rates well below the solice wide secrega, including but not limited to FE.CCL GH.LCZ, EV.ECL	White Tech maintains that intrinsic release rates from a unit mass of waste rock should be consistent salley wide, many processes are occuring. Open and individually or concomisately within and/or below a waste rock spoil leading to variability from a catchment to catchment basis. Such processes
	Annex A - Geochemical	RMQM Source Term Update, p.138	As the weathering rates, and in turn O release rates, are expected to be consistent across the valler, piezes provide for of potential reasons for the vide range of selenium and sulphone release rates presented in Table St. Sulphone and Selenium Release Rates for Permanently Capaced Water Rock by Chainage, p. 112.	<ul> <li>greathernizel characteristics which allows the methods to be applied throughout the life Valley. The weathering rates are</li> </ul>	mg/BCM/year (range 0.6 to 7.7 mg/BCM/year). The coefficient of variation on the averages is about 50% for both parameters.	Ted's response does not address the specific cardyments referenced in the original comment. What is the hypothesis for why administrations rates well below the valley wide average for certain cardyments including. FR_CCS, GR_SC2, EV_CCS and EV_CCS.	while there is satisfility the valley-wide average selenium refease rate is canadered to be well constrained with the coefficient of satisfion being only 50%.	CM_CCL. To make sure that 5e leading to the receiving environment from these pathments is not being underropresented in the model. Please darify how this uncertainty will be resolved for the 2023 EMGM.	Indude: - groundwater bysse;
		8.2.2 Weathering Rates, p. 112	are serious necessar seems or remaining capation reside notes by comings, p. 1.1.  Specifically for the catchinects with selenium release rates well below the visites wide average including FR, CCI, PM, ICCI, PM, ICCI and CM, CCS.	differences in empirical robots rates at the catchment scale can be attributed to other processes that can be studied. The	update, new individualing a state in the second of the sec	II January Car			age of water rock (depletion of enventary of constituents of interest and/or creation of coption steed
			en-Licz, tv_tict and en_ccs.	outcomes of these studies can be applied to reduce alfferences in catchmant specific release rates to converge on a resistant source form." a 158	variability because rates are convected for the lag time. Percitual variability has been evolution and could reflect a number factors such as water composition judication of lear breefs of the other needsy farmations), water rest age resulting in decreasing rates with time, waster during construction.  Individual affective bedreibes and air entire and effect of enclanation. The overall finding is that the influence of times claims on average rates cannot be a constituted in the influence of times for the constitute cannot be a constituted in the influence of times for the constitute cannot be a constituted in the influence of times for the constitute cannot be a constituted in the influence of times for the constitute cannot be a constituted in the influence of times for the constitute cannot be a constitute of the constitute of times and the constitute of times and the constitute of times are constituted in the constitute of times and the constitute of times are constituted in the constitute of times and the constitute of times are constituted in the constitute of times and times are constituted in the constitute of times and times are constituted in the constitute of times and times are constituted in the constitute of times are constituted in the constitute of times are constituted in the constitute of times and times are constituted in the constitute of times are constituted in the co				Text agrees that additional work should be completed to better constrain the range of interact rates of constituents of interest at the stabilitient sole, and this work is already underway. This work is led by both the applied R&D and Regional Educationing groups in order to understand the relative contribution of these different conservers, with the abstrate of instituence for these forestings into the R&DAD Hayarov, at this time.
					be quantified.				Test cannot commit on which of these processes will be implemented in the next ITWEM/update, as this depends upon the outcomes of the BSD and monitoring programs. The current approach to source termio safficient, as it is mgo all these processes occurring into a consolidated source
XNC-023 XNC 3025-06-03	3000 PAVQM RVAQM-3000 Vipdate Annex 6 -	3.3.8 Storage p.20	There are several tributary and mainstem valley bottom apailers that contribute to apailer storage in the EWGM study area. SWC his repeatedly noted as part of the Regional Groundwater Mexitoring Program (RGMY) that the	"In catchments with waterbodies, or with large around pater another storage patential, storage changes	We agree and administrate them is storage potential in the safety bottom aguifers, including the noted ER Siver valley bottom. However, the storage that would be of investage to the SNOW has all the forestage to the SNOW has all the forestage.	EVC agrees the storage that would be of importance to the RMQM would be the change in storage, not the absolute storage. Specifically related to the change in contaminant load stored in the audies the large scale of the footing and II	We note that there are a number of accomptions related to KNC's assertions of considerable aquifer volumes in the potential bypace tables, including to be desired presenting and homogenetity of course protectly extend to be only including the potential protection of the potential protection as the potential protection of the potential protection as the potential p	The Bypack Patential tables presented by KRC in the Reund I comments, are not solely based on regional mapping uniform so supervised in Tech's Bound 2 response. At each location presented in the tables applicable information for	Test does not disagree with ENCs indisation that in the absence of the specific information the most announced as a powerful as a powerful or the absence of the specific information the most announced as a powerful or should. Open the most announced as a powerful or should be that there is extended for bounced of the current motivates monitoring braidings. However, we do
	Annex 8 - Hydralogy		potential for significant down valley aquifer flow and storage is being underestimated, particularly in the Elk River valley.	occur seasonally and one alterwate year flows from the cetchment. There are few networky occurring stange	While we admosting the PACIM coungition that groundwater flow at maintainer flow manitaring stations maintained by ECCC (WSC) is small to	Yalley bettern aquifers needs to be considered.	mapped, it is well known that there can be considerable betweepenedy within a certain sedimentary factor. In particular, this ideposits can vary addity in grain size and permeability. In addition, even though mapping at surface indicates a material type, that does not mean that same material type extends to	boreholes (Telk and public sources) and crass section produced by Telk were reviewed. The aquifer dimensions (widths and depths along a cross section perpendicular to flew) presented in the table reflect that information. Th	note that the assemption should be 'reasonable' as XXX have indicated, which would mean using available information and understanding from order studies that could be canaldered as analogues.
	Modeling		The Elk River valley bottom againer is very large and has significent storage potential. There is potential for significal groundwater layers of all surface verter quality monitoring stations and the two Witter Survey of Canada (MSC).	tt. See comments related to Appendix B of Annex St Surface	reappages and that measured most is consisted response status out that apartners seemed years at measuroscopic, may potential instructions at substantiace from maintenant waters qualify a taken into account at specified locations through several mechanisms clouded in the Water Quality Component of the 2000/860AT. These mechanisms include interflow reversion and a meterolous area on the Fanding Rover maintenant.	As noted in the typus patients used submitted with the round one committee (typus) indicate part, based on particular mapping, the fluxed sand and gravel unit in the DR Valley bottom ranges in valid from 400m to 2000m and in depth from 30 m to 60 m. There is a sensitive fail would not of water stored in that aquifer, even a small change in mining.	the definor surraise. And, make indicated in numerous lows inventige that the surrous imaging, used for make calculation have considerable undergrainty since the mapping was completed at a regional scale. Drilling data from numerous boreholds in the valley bottom sediments have demonstrated this.	NNC has been consistent in their advice that in the absence of site-specific information the most conservative	Teck communicated at the D4 3001 Groundwater Working Group meeting that a review will be conducted in 2002 of available groundwater information and identifying data gaps related to potential buyons at each main stem monitoring location and MSC station. To track this, Teck will
			monitoring stations used to generate the RWQM flows in the SIX River. Not accounting for the flow and load by passing the mainstein surface water monitoring stations in the PWQM adds considerable uncertainty to the mode	Water-Groundwater Partitioning Information for additional discussion.	The RWQMIs based on current knowledge and studies related to groundwater flow and load transport in the Distalley are origing. The current	to lated constituent concentration from background represents a significant load. This load (and moving forward changes to this load considering upstream influx of non-mine contest water) needs to be quantified.	ENC's assertion that considerable volumes of water stored in the aquifer should therefore be tempered with this uncertainty. Even if the volumes are taken at face value, it is also nated that if there are fine grained deposits the storage night be high, the transmissibility would be low and therefore the change in	reasonable assumption should be made and that assumptions made should be validated through performance monitoring. The cansensative reasonable assumption in this case is that there is potential for groundwater togots.	be adding a new key uncertainty to the AMP under the appropriate management question to address how uncertainties related to patential of bypass of main stem reades and delays related to aquifer storage sould impact the performance of the EMCSM.
					understanding is that down valley transport of missing related constituents course primarily shough surface water or local dualities groundwater system under their through cleep florage that shough regional scrie appliers. Hawever, as additional data are collected, Teck will canduit a review to support nehrometris of the regional COM and incorporate tool future NECEM registers, as appropriate.	The Round 2 response to KNC 003, highlights that there is a significant selenium load moving in groundwater just apstream of the PC2 that conitally needs to be quantified and included in the load battone calculations. The fluvid cands	ance tainty related to patential load in main stem valley bottom againers and as stated in the QI GRIG meeting finds will be undertaking a review of certain nodes in the RIXQM where this may be important. Relevant additional investigations will be considered to fill data gaps. Test proposes to discuss findings	valley bottom equifiers over distances and timescales not currently opesidered in the model can not be discounted based on available information.	
						The Envirol 2 regions is 160 CeO, highlights fait there is a significant oriention lead moving in grandwaster just, spativasm of IE_PCI his containty needs to be quantified and included in the calculations coloration. The fluvol cand and greats near IC_PCI are mapped as 250 invade and 25 or deep, belowing conservations in the surfact cand great legality when measured as with IC_DOS_CREATE and IC_DOS_CREATE in October 2000 larged from 21 to 20 tags. and for convenientions remainize and from the ICC_CREATE of ICC_DOS_CREATE in October 2000 larged from 21 to 20 tags.	of such review, identified gaps (if any) and next steps to the GWG.  As envirously initiated, the PACSAI's based on surrent broadeder and studies related to proundwater flow and load intersect in the ISS Valley are encoun	Cload ligazoling the maintern surface water quality mentioning stations in groundwater should be quantified bio on groundwater monitoring. The potential for Cloting in equility transpersional dishorbe quantified is support the examption made in the TRACE LIFE INSMASSIES, 42, 53, 75, 800.	el
								essumption made in the EWGM, (see RWGM/IS KNC_A4_53_ST_REptf)	
NC-38 NC 335-96-03	3000 MARQUE MARQUE 3000 Update Annex 6 -	A.S. Accounting for Changes to Pit Seepage and Groundwater Flows	There is considerable uncertainty in these EA pit dewatering groundwater models used as inputs to the RISQM.	Table 2-5: Summary of Key Changes to the Flow Component of the 2020 Regional Water Quality Model p.6	The EA-model outputs have net kees checked-against operational pil dewatering recents. Until resettly, pil dewatering recents were spane. (Floris is improve data management around pil dewatering activities are underway.)	The uncertainty related to the pit elevatoring estimates used in the BMQM-should be sharly stated - ESC Notices requesting information in pit devatoring states 2000 and only size under some energy Test should have information on No. The devatoring and water reasoning energy laws playford in global control on water quality, at loss been demonstrated in	Instantial pril dewatering-rates and points of disphage will be informed by available monitoring data in the next SMQA-spaker. Fature pit dewatering information, and the potential influence of belong grade pits on local groundwater and surface water flows, will be based on model projections developed brough individual project applications, environmental accessments or modelling exercises undertaken specification and in the SMQA-spaker.	Pill dewateting models should be verified by performance monitoring (groundwater levels)-passing, operational devastering and/or seepage cellsection nates and quality). It is not clear from Teck's Round Z engiance if monitoring class will be used to improve the representation of pils not illestion of the RRQM. Please clarity.	Whenever available and all quality decread adequate for motiviling purposes, Tesh will use monitoring data to adherite and radiable the Open hydrology component of the 2023 RWSM for historical pit water management, settings. For future site conditions, where an open pit is planned downspraident from major netharps boundaries (x.g. the Forling Kiver), groundwater sequester rates into these pits will be informed by external
	Update Annex 8 – Hydralogy Modelling	(Pit Seepage Calculations) p.89	There is considerable uncertainty in these BA pit demailering groundwater models used as inputs to the RRIQM.  Has the applicability of these models here swiffled against pit most borong groundwater levels, operational dewatering representation and/ or coopage cell-coord Presept provide.	"Alt seepage rates incorporated reletive to baseline conditions, using results from project specific groundwater		several instance. In the next iteration of the RMQM pit dewatering estimates should be based on monitoring data and future projected increases or decreases rather than unsetfied EA modeling esercises.			modelling rossits, produced as part of individual project applications and environmental assessments.
			dewatering requirements and/ or seepage concision? Prease previou.	or permit amendment applications (e.g., Swift, Couper Pt Extension, Boldy Ridge Extension)* 8.5					
				1					
OCAR DV	2000 PACEAL PROPER STOR	SSDday Pres	The fine communication was considered union a consequently in the contract of	er A table nating the death, of the rest trees of order	As infinited in the recovers to DEC COS, additional enumbrater flats are below collected through the DEC COS, additional enumbrater flats are	EX about orders that additional work to exact the enterties the exact the enterties to the exact the enterties the enterties the enterties that additional work to exact the enterties the enterties that additional work to exact the enterties that additional work the enterties that additional work that additional work the enterties that additional work the enterties that additional work that additional work that additional work the enterties that additional work that a	The analysis in numbers in modules a communicion of future flow registration, depressed a review WY Modules do Not Marchael III	If it is been a recision that since the encorductor accurate	Comment asknowledged and will be considered in future reporting.
	3000 RWC6M RWC9M 3000 Update Annex 8 – Hydrafogy Modelling	Projections, p.323	partitioning is assumed to be small to negligible (i.e., where there is expected to be little difference between surful flow and total watenhed flow).	ex surficial sediments at each of the CPs and OSs is attached as Attachment I - Ayeans Potential Adf , the table gives a very	groundwater peritioning and bigozo, including at the noted BMSA/nodes, and will be interpreted and summerized throughte amusi reporting process. Kand potential, so it relates to bigues and inter- basis transport of mine-affected water() a., source-transport], will be assessed in the 2001	refers to the specific analysis discussed in this appendix.	model underliet both numerical models. Thus, the two sets of flow projections being compared both income neglipble groundester bypass. It is advanced edged that this assumption may require self-enemat, but such refinement would apply equally to both model services. As a result, it is unclear how.	the model the comparison is still valid, the statement:	Option of the control
	Modelling		NMC does not agree that the groundwater particioning can be considered small to negligible at the locations used in the flave comparison. Groundwater typess shough the valley bottom surficial appliers should be quantified and included the model for IPE 25CC, IEC, COE, DCC, COE, DCC, MCD, and ICC, DCC, DCC, MCD, MCD, MCD, MCD, MCD, M	Notes related to the locations used for the flow compensors are presented below:	response to ENC-NZS.	groundwater partitioning is assumed to be small to negligible (i.e., where there is expected to be little difference between our task of total watershed flow)" implies that anountees because does not add any windows to be the end total watershed flow)" implies that anounterable because does not add any windows to the counterable because does not add any windows to the counterable because does not add any windows to the counterable because does not add any windows to the counterable because does not add any windows to the counterable because does not add any windows to the counterable because the cou	to use an invariant or the assumption regards or enterwise changes the concusions are related to bow each model represents instrument flow and distribution thereof over the course of the year.	The flow comparison was completed using a representative future year (i.e., 2623) and locations where groundwate partitioning is assumed to be a mail to negligible (i.e., where there is expected to be fittle difference between surface fi and state watershad flow).	bw
			included the model for (FR_MCS), (LC_SC4), (LC_SC5), (Er_MCS) and (Ev_SR5). While the potential for issue/spains or inter-docint transfer related to high kinst potential bedrack aguster present should be considered at (GH_CC1) and (EV_SC4).	Cataract Creek (GH_CCC) — potential lesses/gains or inter- lessin towarks related to high hand potential bedrook.		Emparison. All the locations used in the analysis have the potential for groundwater byposs some likely have quite significant groundwater byposic (as noted in the original comment) this adds uncertainty to the flow comparison.		thould be charged for future MMS2M documentation. A statement like: "The flew companion was completed using representative Muter year E.e., 2003 and locations where charges to governmenter partitioning were not made	p.
						Answer or properly accommenges and accommended, Dato see found 2 response to ESC-000]		representative future year (i.e., 2005) and locations where changes to groundwater partitioning were not made between model we conn. to provide a kallot samparisan." This alternative statement would be assurate and not rely smoothfeel assumption of the groundwater partitioning.	90
				Henrella Greek (FR, HCL) - potential for groundwater hypos due to sufficial agailer and waste reck deposits in the creek bettern.					
				Harmer Creek (IV_HCI) – potential losses/gains or inter- bosin transfer related to high karst potential bedrock.					
				Une Creek upstream of Process Plant (LC_LE4) - located on the Line Creek alluvial fan aquiller, considerable groundwater underflow potential.					
				groundwater anderflow potential.					
				groundwater monitoring at this location as part of the BGMF or SSSMP, however the current hydrogeological.					
				Abouth of Ferding Wever (IC, IC) — there is currently no groundwater membering at this isolation as part of the KIABP or SSSMP, however the current hydrogenelogical interpretation by MSC in the 2023 Armatil for valve KIABP and SSSAMP Aerwall Report is that there is Stick 43 or of send and grand underlying the Fording Nover at this location (Drawing 40).					
				(Drawing 46).					
109C-044 109C 2003-96-03	JUST PAYON RINGM 3005 Update Annual C - M'	Table 1.3-1: Summary of Key Changes to the Wate Quality Component of the 2009 Regional. p. 7	*Proteglier reservoirs have been edited to account for the temporary stronge end/unstaid release of extent from ediponet basis and subsurface flow poths that according the maintenant of the ER Riser, Foreign Riser, Line Creek and McKell Creek*	A table noting the depth, width and type of valley fill sufficial sediments at each of the CPs and OSs is attached as through Potential pdf, the tights share a serial simple.	The filters—makes a trape of the desirable of our files—should be add in each or the part of \$1.0 Mer. Note the nation of our files—and the part of the part of \$1.0 Mer. Note the nation to our reasonable in the contract of the part of	The statement "Storage within those flow pooks is considered "sergionary" because water and most making along those or flow paths are not permissionally lost from the system. Instead, they make through the subscriptor flow paths, eventually instruming to surface, "media to be careful."	Presses see the response to DVV_R2.000, which contains a discussion of the potential influence of appreciable groundwater bypass on future projections and mitigation planning.	Please one attached mome, EWOM/REXXC_44,53_57_66.pdf, where XXIC/Waterline outlines some questions/sancerns regarding Teck's DYV_REX.525 response memo and groundwater storage.	This is desired on the few or a most of agreement formation. In NET Care This print is about an office activation on the few or a most of agreement formation personnel by the Care This print is all the care This print is a second or a most of a most of agreement of the Care This print is a discussion of the Care This print is a second or a most of agreement of the Care This print is a discussion of the Care This print is a second or a most of a most of agreement of the care This print is a second or a most of agreement of the care This print is a second or a most of agreement of the care This print is a second of the care This print is a
	Quality Mindelling	the 3000 Regional, p. 7	Groundwater flow in the main stem and tributary valley bottom aquifies is not limited to the "temperary" storage	indication of the potential for groundwater bypess.	Storage within those Executes is considered "bengowy" Occase water and mass moving along these flew parts are not permanently lost from the system, increase, the move through the sphare face flew parts. restrictly returning to carbon.	Y ENC has previously varied concerns that longer flew paths and longer-term losses of more related contaminants to the	For the the MMI we are currently investigating the use of an analytical tool phtale instages of suphase (IA-6 and IA-C) to differentiate sources of suphase (IA-6 and IA-C) to differentiate sources of suphase instances as was or than source). Supplies to be a content of two inclusions a source the Taxable post to be been described to those ships because in place (IA-6 and IA-C) to see the supplies of IA-6 and IA-C) and IA-6 and		on how begans may influence the stems of the presented equations. It is not that Waterlies in increment, it is in increment, in the wide with other analysis seems to ignore considerations related to increment, in the increment, in the order that the analysis seems to ignore considerations related to increment analysis of manutain flow manifolding
			Groundwater flow in the main stem and tributary safety bottom aguifers is not finited to the "temposory" storage noted above. There is potential for a down valley flow component of groundwater flow at ment locations in the ma- stem safety lottom aguifers and the larger tributary creek bottom aguifers.	and RO_EUXORES, see attached KNC ROMP 2020 Update Comments pill Comment 2, 4, 17, 38 and 60 for details.	The law I and the data from 1.4.11 data not indicate that dawn withey subsurface flow is limited to looking reactive. Softway, the law I and codes that worker and excess surface and softwar foot floor parks within gaining and I color procedure of the maintains watersource.	grownwarer system are being overlooked. EXE agrees that the mass moving is groundwater is likely not generatedly lost to the system but it may be delayed in the system for timescides that are not properly accounted for in the current EXCSA Specifically, that load Reduction factors [Table 1.4.10] are being included in the model when the load may be	exemple on the second control of the second		seasons, we vego as the "etick" water is material and have the "exist" water would affect both load and concentration is relevant; the interpretation presented by Waterline appears to focus on load without consideration of usinchertal effects on uncertainties.
			Orwands start bapase, and down walling grounds after flow and CI transport is not limited to lesing reaches of water courses and can corar whenever a walling bottom equilier is present. There is potential first significant grounds after bypase of most Compliance Forks (CDI) and Order Societies (CDI).		notes to service and searches to depart vertical particular to single service of the control of	delayed in larger times sile groundwater pethways.	Teck would like to identify that quantification of scienium and nitrate load loss undertaken in work on Hapsthesis 2:in not included to a companion of suitplus loads. Highorhesis 2 is also includes a desirable existation of compline water themshal, including stable loadspan of scienges and tribrate, to anotate the desirable of which copies or recoded in lates convincence.		TexiX response to the resummendations presented in the memo are as follows:  Be: "Increasing groundwater monitoring at MSC Stations, compilance points, order stations and monitoring stations where load reduction factors.
					and key findings. Your had programs will continue to be incorporated into the EACQU as appropriate and as they become avoidable.  These shouldest in the programs in EAC, SELVE, Used DV, AM with subsection.	factors in Table 1.4-29, is that the Salphate load can be used to extinue the removal of Rittors and Salenium. This assumption is based on the idea that sulphate behaves concervatively in surface water and government but it also	The Court of the C		Text) reagrees to the resonancial less presented in the memo are a follows:  The "transing reuniform continging ARX Stations, resolutions prime, refer raisless and nominating stations where load reduction factors are applied."  As indicated in the respect as comment MBXS ESS, a relief of grandwaster related information at main stem nodes and MSX, takions will be conducted only all the conduct divingual on sex the lythocate rainly in the ARX.
					Roce also wher is the response to EME_DELECT_ID and EME_DM with reference to an going proveheater characterisation at regional Compliance Points and Order aboves their a recently so part of the EGAP.	Also promption of the BBDM and Make belows the religion (1985), the was consistent of the third could harden belows the religion (1985), the was consistent of the religion of the second of the religion of the relig			Re: "Callect additional groundwater and surface water quantity and quality monitoring data from the natural areas contributing to mainstern
						Into question whether the Land Padustion Fastors used represent actual uninnum and sitrosts look sets deliberated for the target and delayed or simply lood not accounted for due to groundwater layous of the surface water monitoring station. By not			sieres* Teck is studying the potential contributions for natural sources in the MMI, and if considerable will consider expanding that is other areas.
						accounting for groundwater topses of the CPs and OS, the RRIQM may be underestimating the selentum load reading Economic Recovors.			Re: "Developing a 3D groundwater mode/s), capable of calculating the load in a variable concentration solute plume and solute flux though a ones- socious of propordiouslar in New, to better understand and quartify the potential storage and transport of Clin the main stem valley bettern againters."
						Hypothesis 1 of the MBI "Hypothesis 1: The more leading of suightete in groundwater systems in the DBI Holley is not influenced by hisposchemical			A 3D numerical groundwater model should only be developed where sufficient data exist and a solid conceptual understanding to present, which is not the cose at many of main stem-nodes, periousing deventions of the confluence of the Fending liver and GN River. As indicated in comment
						to sulphible). By according for updrate lead both specially and impropelly jamundenest strange and sulphible reduction to sulphible), By according for updrate lead both specially and impropulely jamundenest stranges and trevel intest, actual selection and nitrote load loss due to biographemical processes can be quartified in regardenis 3." (SNR, 2018).			The "Description of Equal Processing of Equal
						Appeles a Life May process and the Appeles App			Re: "As part of the Implementation Plan Adjustment (PA) an estimate of what additional mitigation would be required if the load reduction famous even one used in the model should be associated."

No. Author Date As	epitation Don	ocument/ I		Struiteurer - Concerny Analysis, Obscussion			ENC ROUND 2 COMMENT			Teck Round 3 Response - DRAFT FOR DISCUSSION DURING MICETANS ON FIDERLAMF 4, 2022  Co.
KNC-946 KNC 3005-96-95 300	COO PANCES AND COO PANCES AND COO COO COO COO COO COO COO COO COO CO	MQW 3000 1 pdate nnex C - Water sality Modelling	1.4.2.1 Waste Book, p.23	"Sindler the 2017 RASAM, the 2000/2010AF or Amyer broad it the sharpe in whoster many associated with each yearly volume of a mist everly placed rate a spool totalent, the misself broads the shall requisitive attract mass in the spool over- time, accounting for more added through upod growth and many less through wood and "P-13".		The 200 RWSU/in not currently configured to automatically generate the information reposited (i.e., valley and a communic of considerable mass deposited, tribused and artifulg at Taxicamusa Reservoid, Consideration will be given to adding this functionality during the next model update.	OSC requests that this information is provided for dearly demonstrate the valley underloading, looses and to inform visitinest needs of Order Constituents.	As provised, total, the regarded information council be saidly generated. Consideration of how best to produce the information in specifics will be as form saided in the next Widelian council and the said of th	CXC, appreciates that the information is not currently an output, Based on our orderstanding of the model: this information can be generated through this model. We request this information be generated and provided, as it is important information for the Kassanusa Order Station.	The DCV respond involves a bill more than simply addings for identification that the made to greate as a they walls fulfaced cheer of next.  In the billion is required to the property of the
				The sealing or direct health is equal trade of death in presentable, this stocked for a derivate wide splicits. Places provides a set of grass in the other presented is two presentable is death, presenting the death position and set all so followed Splittless deposition, with a set of the sealing for each flave search (1911, 1956 and 200) over the time period residual of the Splittless and the sealing for each flave search (1911, 1956 and 200) over the time period residual flavor (1911, 1956 and 200). The seal of the seal of contributed that a the set the model death transmission to the seal of the seal of contributed that a the set the model death transmission is the seal of t						material who state of a visible wide Materia bear. The most efficient general material was a series of authorises appoil for and operation specific authorises who will be a most efficient general for a series of authorises appoil for a series of a series of a series of a series and a series
				red PRI que the terr prival redeficil S. 200 to 200.						ange until men met tre until se met tre until se part of det er until ble to part de se met de vider des des besteurs, verseurs at delayer, for der de part of the se de part of the delayer of the se des des des des des des des des des
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		MGM-3000 2 god she come C - Motor R come C - Motor R come	Metonials, p.50	Unto a handler and an in a cours man graft for the eart on bifures shore the Leither Distribution of the state and the course of the state and		An electric feet founder anniet of personnel and an electric freelings of the state of the security of the sec	Plant profiles colonical of the oldered reach stack, by specifiers, other separated to see the bit dischards super- scription.	Control and the National Action of the Section of t	The content of the co	7
996-593 996 203-96-93 XG			63	an actual for the course the large of the course of the course the large of the course	Canada flow stations on the Life Weer used to derive model from it is stacked as Absolutionest 1 - Ripsess Patential gdf. the table gives a very simple indication of the potential flow groundwater legistes. Groundwater bigsess, it howes to course of Gr. [EE, [V. [ES] and MD, [EXCEPTS, see alliabled OVG 65MP 2000 options Comments gdf Commercit 2, 4, 17, 18 and 60 for details.		permission agency assemble of the analysis in the color by administrative better than 1997.  I statistically a statistical of the color by administrative better than 1997.  I statistically a statistical of the color by administrative better than 1997.  I statistically a statistical of the color by administrative better than 1997.  I statistical of the color by administrative bett	The color of the c	Rese on antividence, 1909/UNA, [3] of the 100 med Jameses.	Metal responsibilities and the control of the contr
06. July 400 July 100				And the selection stage from Main. I Sell Ref. (III for the processor And ordinate processor and the selection of the selection of the sell Ref. (III for the little selection of the sell Ref. (III for the little selection of the sell Ref. (III for the little selection of the s			Joint as their dependent of the DE (2) and ME (2) and M	Assess of an individual reason of the control of th	The state of the s	The control of the co
604C 3005-96-93 300	And Gas		Witnese and Selentum, a 68 Table 1.4-19: Load Reduction Factors Applied in the Fording liver and Eliciliver		for which there is uncertainty.	(man)		This was delivery to NEW or recognised only freign on the 1950s or region in the country. Such a fix an act of interest than company, and the country to the 1950s or region of the country to the countr		for reports the hand I coppered to CE CES.
2-857 MHC 3025-96-95 303	COO PAYON RNS Upo Ann	pdate // pda	I.4.13 Instream Looses of Victorie and Selenium, p.69	"The selections and induces only applied to water leaving Stimanus C Evek Is over to the 2000 MMAN. It applies year, younged to all these of the Ros parts couldness doze in Section 1.6.8. The individuals selection section and individual bits processes that occur as water moves through the subsourface, analogous to that which occurs in an 1970.		Attenuation is assigned to the floor good paths judicing Edmants Coeth to the Fording Wave agreement of EVE/2, because the measured intervention and excluded a Coeth Co	The their Balance Investigation (MBI) has not progressed from the point of the skills to distify the load removed mechanisms to a quantify the load removed. Until the hills study has progressed to that point it is to be early to conduct that the load has been removed apartness of Gir. (PCL, as this sensitives ingeness that a poundwater larguesting GIL (PCL).	The dischowledges and understands that the inclusion of imprease sinks is an area of discomfort for the MMC. Please see the response to ENV_82009 for a discussion of the potential influence of mainstern groundwater byposs on future projections and mitigation planning.	NO. response to Tech: DVV_REXXX—Groundwater bypass of Maintain Flow Monitoring Stations mema is detailed the attached memo, RWEM REXXED, M. St. ST. 68. pdf. Additional commentary specific to RVC_ST and the upper Fording are provided here.	<ul> <li>As a point of duelfication, the following interneers is incorrect: "The load reduction factors at IR, IPA, IR, IPA and along the Klimannock oppositudester flow poth were included in the 2008 EMOM assuming that groundwater reported to surface by IRH, IPC2 and that there was no significant groundwater legace of IRI, IPA were added to take the Familing Flow maintenant IRI, IRI 20 and IRI, IPA were added to</li> </ul>
				The confidence of the build is sense to the leaf day to contract of this continues of the contract of the cont			The second secon		facility from could in strains applie preparation of the deviable entires to station, the rest facility and preparation of the station of th	A regard of collection, the share grower to a regard of the collection of the collec
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KWC-071 KWC 3000-96-03 300	COO MAYOM No.	wigw3320 pdate nnex 0	General	These grandet for melet outges for visite in Avera Dir is an appendix in Avera (I). The model outgests should provide comparisors to the current limited magazine be all benchmeds.	Considering the concerns related to elevated stake in area of the tilt valley I.e., Mohai Creek, reaches at the first land, Minch and programs of subplace bondings in the first land, Minch and programs of subplace bondings in the fix valles, understanding stakel projections are orbital for planning purposes. HG41346	1 The 2000/2002/2004 (seed two an comprised with a fines on divider contributions), contribution, or through an elit sightent. Other contributions, so in the processor life ring shaded to the model. A copyrif discoverenting the set-up and stall hard use of the model for throse other contributions all the provided corror trade.	back you for the update. The response does not provide a tendent for incorporation of diese constituents (including stand) the understands that were on incorporation of their constituents have been desirable part to be understand by the specialists that this information will be an elibel to support the opporting PA. Reset confirm that model outputs for statel (seed other constituents) will be completed and incorporated into the opporting PA.	The IR A will be Rescaled on Order constituents. The series and additionates of the 2009/80/20/or other constituents should be complete to GAZEEL, with a set up and collaboration report released to Communities of interest before Exceedings 2021.	Thank you fire this: the comment can be closed with the receipt of the collisation report by Grozenider XXX.	The regard to quantition has delibered on Circure der 16, 2003.

### 2020 Regional Water Quality Model (RWQM) Update, Submitted March 19, 2021 by Teck Coal Limited

### Business Confidential - Please do not distribute this further than EMLI, ENV and the KNC and their consultants tasked to review the RWQM.

This workbook is provided to to meet the Ktunaxa Nation Council in response to a request for model projections in the Round 3 comment KNC R3\_002.

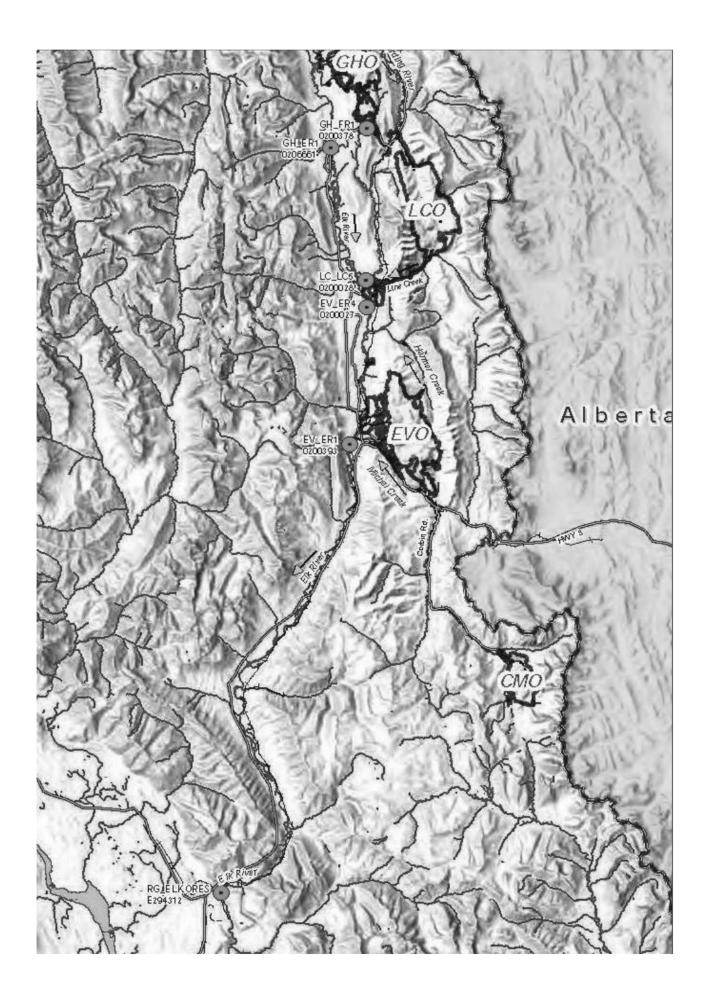
These results are interim and provided in advance of completing the 2022 Implementation Plan Adjustment; these results should not be used to assess compliance with Site Performance Objectives.

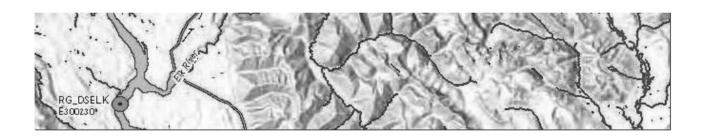
Workbook Information
This workbook contains model projections for selenium from 2019 thorugh 2053 from the 2020 RWQM for the EMA Permit 107517 Order Stations.
The results presented in this file are for one future climate realization, which is based on the paste 20 years of climate inputs, cycled through through the future simulation period.
Results for the Koocanusa RG\_DSELK Order Station included in this file have not been processed through the Koocanusa Module for the 2020 RWQM; this is representative of one of the 20 simulations that is input to the Koocanusa Module.
Each tab contains projections for a single location. Tabs are organized from upstream to downstream.
Each tab contains median (PSO) average monthly future projections (2019) owneards for selenium, nitrate, sulphate, cadmium and hardness.

All projections included in this workbook include planned mitigation consistent with Teck's 2019 IPA with the EVO SRF replacing phase 1 of the EVO AWTF.
Please note that Teck is aware of the SPO exceedances in these projections and is actively working to resolve.

An adjustment to the IPA is in progress and these projections should be considered integring.

An adjustment to the IPA is in progress and these projections should be considered interim.





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### RE: 2020 RWQM Update - Round 3 KNC Comments

From: Jessica Mackie <Jessica.Mackie@teck.com>

To: Heather McMahon <hmcmahon@ktunaxa.org>, Bernadette Lyons

<blyons@waterlineresources.com>, Mark Tinholt <5.22 , Jesse Sinclair</p>

<jsinclair@lgl.com>

Cc: Ally Wade <Ally.Wade@teck.com>, Nicolas Francoeur <Nicolas.Francoeur@teck.com>,

Bechtold, J.P. <J.P.\_Bechtold@golder.com>, Terry, Kyle ENV:EX <Kyle.Terry@gov.bc.ca>, Craig, Andrew EMPR:EX <Andrew.Craig@gov.bc.ca>, Jutta Hoppe <Jutta.Hoppe@teck.com>, Thais Lamana <Thais.Lamana@teck.com>, Kristina Birk <Kristina.Birk@teck.com>, Stefan

Humphries <Stefan.Humphries@snclavalin.com>, Nathaniel Barnes

<Nathaniel.Barnes@teck.com>, Dennis Kramer <Dennis.Kramer@teck.com>, Bechtold, J.P. <JP\_Bechtold@golder.com>, Justin Paterson <Justin.Paterson@teck.com>, Craig, Andrew

EMLI:EX <Andrew.Craig@gov.bc.ca>

Sent: January 31, 2022 4:06:13 PM PST

Attachments: KNC Rd3\_2020RWQM GW response discussion.pdf

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Hi Heather, Bernadette, Mark and Jesse,

SNC pulled together the attached slides to help guide us through the groundwater focused draft responses in our discussion this Friday.

Best regards, Jessica

From: Jessica Mackie

Sent: Saturday, January 22, 2022 8:56 AM

**To:** Heather McMahon <a href="mailto:hmcmahon@ktunaxa.org">hmcmahon@ktunaxa.org</a>; Bernadette Lyons <a href="mailto:blyons@waterlineresources.com">blyons@waterlineresources.com</a>; Mark Tinholt ; Jesse Sinclair <jsinclair@lgl.com</a>

Cc: Ally Wade <Ally.Wade@teck.com>; Nicolas Francoeur <Nicolas.Francoeur@teck.com>; Bechtold, J.P. <J.P.\_Bechtold@golder.com>; Terry, Kyle ENV:EX (Kyle.Terry@gov.bc.ca) <Kyle.Terry@gov.bc.ca>; Craig, Andrew EMPR:EX <Andrew.Craig@gov.bc.ca>; Jutta Hoppe <Jutta.Hoppe@teck.com>; Thais Lamana <Thais.Lamana@teck.com>; Kristina Birk <Kristina.Birk@teck.com>; Stefan Humphries <Stefan.Humphries@snclavalin.com>; Nathaniel Barnes <Nathaniel.Barnes@teck.com>; Dennis Kramer <Dennis.Kramer@teck.com>; Bechtold, J.P. <JP\_Bechtold@golder.com>; Justin.Paterson@teck.com>

Subject: RE: 2020 RWQM Update - Round 3 KNC Comments

Good morning Heather, Bernadette, Mark and Jesse,

The draft responses to the Round 3 comments from the KNC and their consultants are attached to this email. We can discuss feedback on these draft responses during our meeting on February 4, 2022. Our intention with this approach, is that we discuss your feedback and input and provide final responses that allow us to close this review period and ensure that process/plans to address residual uncertainties are clear.

Meeting agenda:

- · General welcome
- Safety Share
- Step through remaining open comments in order
- Next steps

I look forward to meeting with you on February 4<sup>th</sup>.

Have a great weekend.

### Jessica

### Jessica Mackie

Manager, Water Modelling Water Quality Management

Teck Coal Limited

Direct Phone: 1.250.425.3355 Mobile: 1.250.425.4626

eMail: Jessica.Mackie@teck.com

www.teck.com

----Original Appointment----

From: Jessica Mackie

Sent: Tuesday, December 7, 2021 4:30 PM

To: Jessica Mackie; Stefan Humphries; Nathaniel Barnes; Dennis Kramer; Bechtold, J.P.; Heather McMahon; Bernadette

Lyons; Mark Tinholt; Jesse Sinclair; Justin Paterson

Cc: Ally Wade; Nicolas Francoeur; Bechtold, J.P.; Kyle ENV:EX Terry; Craig, Andrew EMPR:EX; Jutta Hoppe; Thais Lamana;

Kristina Birk

Subject: 2020 RWQM Update - Round 3 KNC Comments

When: Friday, February 4, 2022 10:00 AM-1:00 PM (UTC-07:00) Mountain Time (US & Canada).

Where: Microsoft Teams Meeting

Thank-you Heather and team for working with me to sort out an alternate time for this meeting.

The purpose of this meeting is to have a detailed discussion on the approach to the responses to the KNC round 3 comments on the 2020 RWQM.

A detailed agenda will be provided with the slides and draft responses (for discussion) in advance of the meeting.

\_\_\_\_\_

# Microsoft Teams meeting

s.15; s.17

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# 2020 RWQM KNC Round 3 Comments GroundwaterRelated Open Comment Discussion

February 4, 2022



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### RE: 2020 RWQM Update - Round 3 KNC Comments

From: Thais Lamana <Thais.Lamana@teck.com>

To: Jessica Mackie < Jessica. Mackie@teck.com >, Stefan Humphries

<Stefan.Humphries@snclavalin.com>, Nathaniel Barnes <Nathaniel.Barnes@teck.com>,
Dennis Kramer <Dennis.Kramer@teck.com>, Bechtold, J.P. <JP\_Bechtold@golder.com>,

Heather McMahon <a href="mailto:hmcmahon@ktunaxa.org">hmcmahon@ktunaxa.org</a>, Bernadette Lyons

<sshaw@srk.com>

Cc: Ally Wade <ally.Wade@teck.com>, Nicolas Francoeur <nicolas.Francoeur@teck.com>,

Bechtold, J.P. <J.P.\_Bechtold@golder.com>, Terry, Kyle ENV:EX <Kyle.Terry@gov.bc.ca>, Craig, Andrew EMPR:EX <Andrew.Craig@gov.bc.ca>, Jutta Hoppe <Jutta.Hoppe@teck.com>, Kristina Birk <Kristina.Birk@teck.com>, Donnelly, Chris ENV:EX <Chris.Donnelly@gov.bc.ca>,

Barnes, Samuel EMPR:EX <Samuel.Barnes@gov.bc.ca>, Cam Jaeger

<Cam.Jaeger@teck.com>, Barnes, Samuel EMLI:EX <Samuel.Barnes@gov.bc.ca>, Craig,

Andrew EMLI:EX <Andrew.Craig@gov.bc.ca>

Sent: February 17, 2022 10:12:51 AM PST

Attachments: RWQM KNC R3Comment10 Context Feb 17 2022 Rev1.pdf

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Hi team,

Please find attached Shannon's slides.

Thais

----Original Appointment-----

From: Jessica Mackie < Jessica. Mackie@teck.com>

Sent: Tuesday, February 8, 2022 11:25 AM

**To:** Jessica Mackie; Stefan Humphries; Nathaniel Barnes; Dennis Kramer; Bechtold, J.P.; Heather McMahon; Bernadette Lyons; Mark Tinholt; Jesse Sinclair; Justin Paterson; Shaw Shannon EXT

Lyons, Wark Hillor, Jesse Silician, Justin Paterson, Silaw Silamon LAT

Cc: Ally Wade; Nicolas Francoeur; Bechtold, J.P.; Kyle ENV:EX Terry; Craig, Andrew EMPR:EX; Jutta Hoppe; Thais Lamana;

Kristina Birk; Donnelly, Chris ENV:EX; Barnes, Samuel EMPR:EX; Cam Jaeger

Subject: 2020 RWQM Update - Round 3 KNC Comments

When: Thursday, February 17, 2022 11:00 AM-3:00 PM (UTC-07:00) Mountain Time (US & Canada).

Where: Microsoft Teams Meeting

The purpose of this meeting is to continue our detailed discussion on the draft responses to the KNC round 3 comments on the 2020 RWQM.

The GWG team has graciously given up a portion of their reserved meeting time for us to finish this conversation.

## Microsoft Teams meeting

Join on your computer or mobile app

s.15; s.17

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# 2020 RWQM, KNC Review Comment 10 Context: Concurrent NO<sub>3</sub> & Se removal

February 17, 2022

DRAFT FOR DISCUSSION PURPOSES



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