Ministry of Environment and Climate Change Strategy

CLIFF / eApprovals #: [384794 / 12677]

File #: [delete this line if file number not used]

MEETING NOTE

MEETING DATE: Thursday March 10, 2022 at 11 :15 – 12 :00

PREPARED FOR: Honourable George Heyman, Minister of Environment and Climate Change Strategy

TOPIC: Water quality in the Elk Valley and an update on water quality mitigation progress

ATTENDEES: Marcia Smith, Senior VP, Sustainability and External Affairs, Teck
Marcella Munro, Head of Government & Regulatory Affairs, Teck
Jeff Hanman, VP, Sustainable Development, Teck
Scott Maloney, VP, Environment, Teck
Sheila Risbud, Director, FRX Project, Teck

KEY MESSAGES:

- **We acknowledge the extensive efforts to date by Teck to develop and implement new treatment facilities and other water quality mitigations in the Elk Valley. The treatment facilities are showing effective removal of selenium and nitrate, and we look forward to seeing further improvements as the additional facilities come online in the coming months.**
- **We understand that Teck is nearing completion of its next update to the Area Based Management Plan (ABMP) Implementation Plan, which we understand will propose continued substantial investments in new treatment facilities. We appreciate Teck's efforts to attain full compliance as soon as possible; however, we are concerned about predicted non-compliances at a some locations for a few more years, and Teck is strongly encouraged to do everything possible to mitigate these.**
- **The ministry intends to amend the ABMP to reassess the Koocanusa reservoir selenium target, incorporate new knowledge, and improve processes for addressing impacts and managing water quality in the Elk Valley. Teck will be invited to participate in this process and I understand engagement with Teck staff has already commenced.**
- **We encourage Teck to continue focussing on building a strong and trusting relationship with the KNC, to support timely application reviews and effective outcomes from strategic projects including the ABMP amendment.**

KEY FACTS:

- In 2014 ENV approved an Area Based Management Plan (ABMP) for the Elk Valley to stabilize and improve water quality in the mainstem Elk and Fording Rivers. The Plan includes water

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quality targets for selenium (Se), nitrate (NO_3), sulphate (SO_4) and cadmium (Cd), as well as a schedule of mitigation activities that have become regulatory requirements in Teck's effluent discharge permit.

- In recognition of: a) the historical mining context, b) site-specific data; and c) the still-emerging science on how to best manage coal mining contaminants, the ABMP manages the environment on a watershed-wide scale and accepts a higher level of risk than is typically accepted downstream of other mines or industrial discharges. On its own, the ABMP is currently not managing on a tributary-by-tributary level where some localized impacts of mining activities to fish and benthic invertebrates have been observed.
- At present, Teck is operating two active water treatment facilities [Fording River Operations (FRO) –South, and West Line Creek at Line Creek Operations (LCO)] and one saturated rock fill (SRF) at Elkview Operations (EVO). The facilities remove Se and NO_3 and in January 2022, they treated 26,653 m^3/day of water (see Attachment 1).
- The FRO-South facility is still being brought online and treatment capacity will increase in the coming months. Teck is also in the pre-commissioning stage of a second SRF at FRO-North. By the end of 2023, Teck is expected to be treating 77,500 m^3/day, with stabilization and reduction of Se and NO_3 trends also expected (see Attachment 2 for treatment to 2023).
- SRF is a new technology that has been developed by Teck in the Elk Valley. The technology has been carefully reviewed and authorized by the *Environmental Management Act* (EMA) and *Mines Act* permits for use at EVO and FRO. Teck has submitted a Technology Readiness Assessment for SRF technology to document all of the research and development work that has been done, to confirm general applicability of this technology for planning purposes, and to support continued use of SRF technology in the Elk Valley.
- Implementation of the FRO-South treatment facility has been behind schedule, due to a combination of factors including a need to adjust the technology based on upsets and learnings from the first active water treatment facility at LCO, construction challenges, and COVID-19. Other treatment facilities have made progress in accordance with the current permit requirements.
- At present, Teck is updating their ABMP Implementation Plan and schedule for treatment and will be proposing additional SRFs and treatment capacity up to 193,500 m^3/day by the end of 2042 (see Attachment 3). Teck has indicated their intent to be in full compliance as soon as possible, as well as to maintain compliance with the current Se target of 2 ug/L in the Koocanusa reservoir.
- Se and NO_3 levels are now beginning to stabilize and reduce in some areas immediately downstream of operating treatment facilities. However, at times Teck continues to be out of compliance at certain locations, including in the Fording River and Line Creek. They are developing strategies to address these areas. The updated Implementation Plan that Teck is finalizing predicts full compliance with Se and NO_3 limits at all compliance points by 2028.
- Monitoring and assessment programs have revealed that aquatic ecosystems in the most of the mainstems are functioning, but chronic toxicity impacts are present at some locations in

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the Elk Valley, in part because the full mitigation plans have not yet been implemented and in part because a higher level of risk to the environment was accepted when the original ABMP was approved. As water quality in the Elk Valley improves, we expect chronic impacts that we are currently observing will also improve.

- ENV staff are currently working on a draft Ministerial Order to amend the ABMP, including updating the Koocanusa reservoir Se target to reflect the new learnings from the water quality objective (WQO) development process, and developing a new process to consider emerging contaminants and better support adaptive management and continuous improvement.
- BC's draft WQO for the Koocanusa reservoir, which was co-developed by ENV and KNC, is expected to be released for public comment and then finalized at the start of the ABMP Amendment process. The WQO has been developed in accordance with ministry policy and procedures and, as an ENV policy, will inform the ABMP target reassessment. Along with the new WQO, the reassessment will also consider additional monitoring data and impact and risk assessment results, which were not available during the WQO development process, plus other relevant information such as feasibility/achievability and socio-economic factors that are not typically considered during WQO development.

Attachment(s):

- Attachment 1: January 2022 Treatment Data: Facility Performance Reporting for Selenium and Nitrate Provided By Teck
- Attachment 2: Treatment Facilities to 2023
- Attachment 3: Proposed Selenium and Nitrate Treatment Facilities Based on Teck's Draft 2022 Update to the Implementation Plan

Assistant Deputy Minister:	**Alternate contact for content:**	**Prepared by:**
Laurel Nash, ADM	*Tessa Graham, ED*	*A.J. Downie, Director, SE Coal*
EPD	*Regional Operations Branch*	*EPD, ROB*
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Attachments

Attachment 1: January 2022 Treatment Data: Facility Performance Reporting for Selenium and Nitrate Provided By Teck

WLC AWTF, EVO SRF and FRO-S AWTF Performance Summary

Note these calculations use the most recent data available and as such the data may not have undergone final QA/QC. Results may change as data undergoes final QA/QC.

	WLC AWTF	EVO SRF	FRO-S AWTF
Throughput**	7253 m^3/day	16529 m^3/day	2871 m^3/day
Influent nitrate**	17.2 mg/L	20.9 mg/L	34.9 mg/L
Effluent nitrate**	0.22 mg/L	0.88 mg/L	1.56 mg/L
Daily average nitrate load removal**	122 kg/day	286 kg/day	95.0 kg/d
Influent selenium**	228 µg/L	171 µg/L	534 µg/L
Effluent selenium**	12.9 µg/L	8.48 µg/L	24.6 µg/L
Daily average selenium load removal**	1.55 kg/day	2.71 kg/day	1.45 kg/day
Effluent non-selenate*	0.834 µg/L	1.14 µg/L	0.18 µg/L

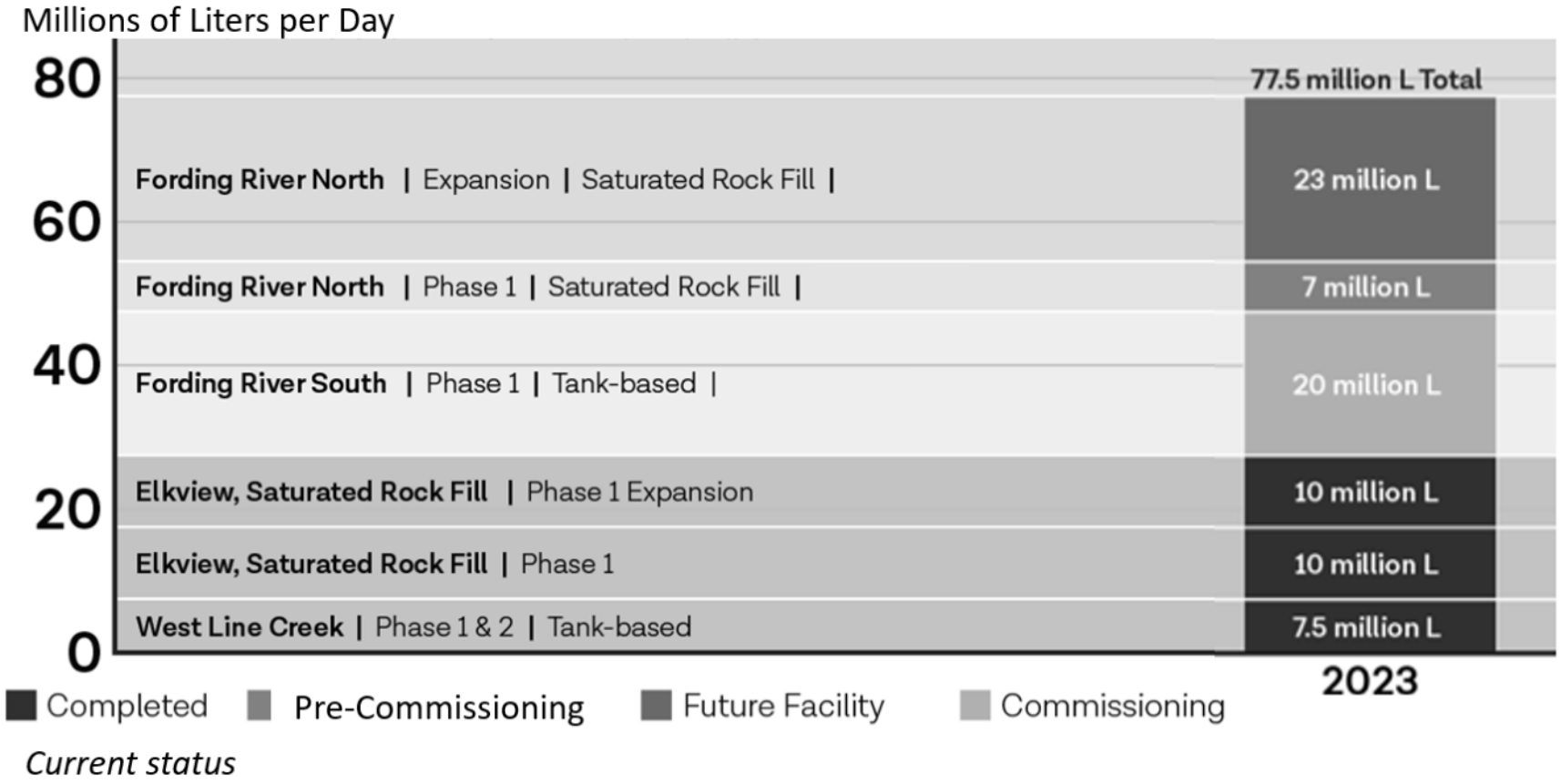
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*Since last update **January

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Attachment 2: Treatment Facilities to 2023



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Attachment 3: Proposed Selenium and Nitrate Treatment Facilities Based on Teck's Draft 2022 Update to the Implementation Plan

Summary of Treatment, Diversions and Conveyance for Selenium and Nitrate

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S	FRO S	20,000	Sep 1, 2022	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	9,500	Dec 31, 2022	Eagle 4 Pit
	FRO-N 1 SRF Phase II	FRO N 1 SRF II	20,500	Dec 31, 2023	Clode, Liverpool, Swift Pit, Post Ponds
	FRO-N 1 SRF Phase III	FRO N 1 SRF III	10,000	Dec 31, 2025	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 2 SRF	FRO N 2 SRF	20,000	Dec 31, 2026	FRO-N 1 SRF sources, Kilmarnock
	Eagle 6 South SRF	E6S SRF	6,500	Jun 30, 2033	Eagle 6 Pit North and South
LCO	WLC AWTF	WLC	7,500	Jan 1, 2020	West Line Creek, Line Creek
	WLC AWTF	WLC	-	June 30, 2023	MSAW
	NLC SRF Phase I	NLC SRF I	12,500	Dec 31, 2025	NLC, NLX, LCO Dry Creek
	NLC SRF Phase II	NLC SRF II	10,000	Dec 31, 2030	NLC, NLX, WLC groundwater
	NLC SRF Phase III	NLC SRF III	17,500	Dec 31, 2033	NLC, NLX, WLC groundwater, Line Creek, LCO Dry Creek
	Conveyance/Supplementation		Up to 30,000	Mar 29, 2023	-
	No Name, Horseshoe and Upper Line Creek Diversions		42,000	Dec 31, 2025	-
GHO	Cougar South Pit SRF	CSP SRF	5,000	Jun 30, 2042	Cougar South Pit, Leask, Wolfram, Thompson, Porter
	Greenhills Creek Treatment	GHC	7,500*	Dec 31, 2027	Greenhills Creek
EVO	EVO SRF Phase I		20,000	Sep 1, 2021	Erickson, Natal
	EVO SRF Phase II		4,000	Sep 30, 2023	EVO Dry
	EVO SRF Phase III		15,000	Dec 31, 2027	Erickson, Natal
	EVO SRF Phase IV		3,000	Dec 31, 2036	EVO Dry
	BRP SRF		5,000	Dec 31, 2042	Baldy Ridge Pit, Erickson, Natal

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* For regional treatment to meet 107517 permit limits and SPOs, 3,000 m^3/day of treatment is required. 7,500 m^3/day is required based on the Federal Direction.

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FW: FOR REVIEW (by Mar 30): Koocanusa Estimates Note

From: Downie, AJ ENV:EX
To: Moore, Sean ENV:EX <Sean.Moore@gov.bc.ca>
Sent: March 25, 2021 11:02:51 AM PDT
Attachments: TAB 19 ENV Estimates Note_Lake Koocanusa_2021 - SPD input.docx

Thanks for the heads-up. I've made a couple minor suggestions and agree we should update this again before estimates to ensure it reflects the latest and greatest….

A.J. Downie
Director, Southeast Coal
Environmental Protection Division
Ministry of Environment and Climate Change Strategy
phone: (778) 671-0133
email: AJ.Downie@gov.bc.ca

Waste Discharge Authorizations Website

From: Moore, Sean ENV:EX <Sean.Moore@gov.bc.ca>
Sent: March 25, 2021 10:27 AM
To: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
Subject: FW: FOR REVIEW (by Mar 30): Koocanusa Estimates Note

Hi AJ- any comments on the Koocanusa Estimates note? As Lisa/Mich noted, we may need to update the note prior to the Estimates debate.
Thanks!
Sean

From: Paquin, Lisa C ENV:EX <Lisa.Paquin@gov.bc.ca>
Sent: March 25, 2021 10:23 AM
To: Moore, Sean ENV:EX <Sean.Moore@gov.bc.ca>
Cc: Ryan-Aylward, Michel ENV:EX <Michel.RyanAylward@gov.bc.ca>
Subject: FW: FOR REVIEW (by Mar 30): Koocanusa Estimates Note

Hi Sean,

I had Mich review and comment on the Lk K note b/c he has much better grasp of the details around this file. He has made some suggested edits for your consideration and also recommends we, in SPD, flag this particular note and make sure it still remains accurate closer to the Estimates Debate.

Please let us know if you would like to discuss.

Cheers, Lisa

From: Ryan-Aylward, Michel ENV:EX <Michel.RyanAylward@gov.bc.ca>
Sent: March 25, 2021 9:30 AM
To: Paquin, Lisa C ENV:EX <Lisa.Paquin@gov.bc.ca>
Subject: RE: FOR REVIEW (by Mar 30): Koocanusa Estimates Note

Morning Lisa,

Thanks for the opportunity to input, birds came up a few times on the periphery of the SeTSC discussions, as I recall mostly because some birds feed on insects and fish in the water, so they are potentially impacted but water/insects/fish are higher up in the chain and therefore were the focus. Both that statement and the one about meeting the target at the border appear to be carried over from last year's estimates note.

I've suggested some changes tracked in the attached and recommend Sean confirm the statement on compliance at the border with EPD and re-confirm it again closer to the debates to ensure Minister isn't caught off guard. Happy to discuss

Thanks,
Mich

From: Paquin, Lisa C ENV:EX <Lisa.Paquin@gov.bc.ca>
Sent: March 24, 2021 3:11 PM
To: Ryan-Aylward, Michel ENV:EX <Michel.RyanAylward@gov.bc.ca>
Subject: FW: FOR REVIEW (by Mar 30): Koocanusa Estimates Note

Hi Mich, do you mind taking a look a this Estimates Note that Sean updated. I was under the impression that Teck isn't consistently meeting the their ABMP requirements. As well, it is the first time I have ever seen references to birds being impacted by Se. I welcome your perspective. L

From: Moore, Sean ENV:EX <Sean.Moore@gov.bc.ca>
Sent: March 24, 2021 2:27 PM
To: Paquin, Lisa C ENV:EX <Lisa.Paquin@gov.bc.ca>
Subject: FOR REVIEW (by Mar 30): Koocanusa Estimates Note

Hi Lisa,
I have updated the estimates note from last June. Could you please review and send me any edits you see fit to the attached by Mar 30?

Thanks,
Sean

Sean Moore, MRM | Director, Watershed Science and Adaptation
Ministry of Environment and Climate Change Strategy

Mobile: 250 896-3341
Office: 778 698-9286
Email: sean.moore@gov.bc.ca

ESTIMATES NOTE (2021) **Confidential** Ministry of Environment and Climate Change Strategy **April 2021**	**Lake Koocanusa Selenium Water Quality Objectives**

KEY FACTS

Lake Koocanusa Selenium (Se) Levels:

- **Coal mining activities in B.C.'s Elk River Valley have resulted in elevated levels of Se downstream in the transboundary waterbody of Lake Koocanusa.**
- Lake Koocanusa is a transboundary reservoir formed by construction of the Libby Dam in 1973 on the Kootenay River near Libby, Montana (MT).
- Elevated Se concentrations can cause embryo mortalities and/or developmental deformities in both fish and birds.
- The current long-term Se target for Lake Koocanusa under Teck's Elk Valley Water Quality Plan (WQP) of ~~two~~ 2 micrograms per litre (µg/L), based on B.C.'s water quality guideline, ~~is met at the B.C.-MT border~~has been occasionally exceeded at the monitoring point in the Canadian portion of the reservoir.
- ~~The basis of the 2 µg/L target does not include some species present in Lake Koocanusa (e.g., burbot) or downstream of the dam (e.g., white sturgeon), and the United States Environmental Potection Agency (US EPA) Se criteria is set at 1.5 µg/L. In consideration of these factors, t~~he Lake Koocanusa Monitoring and Research ~~and Monitoring~~ Working Group ~~(LKRMWG)~~ was established to develop recommendations for aligned site-specific Se benchmarks for B.C. and MT that will be protective of the species in Lake Koocanusa. Those recommendations were received in August, 2020 and inform our ongoing work with Ktunaxa Nation Council to develop a Se Water Quality Objective (WQO).
- Through permit conditions, Teck is accountable for meeting the requirements outlined in the Elk Valley WQP.
- Teck's implementation of the Elk Valley WQP includes water treatment and mitigation actions.

Se ~~Water Quality Objectives (~~WQO~~)~~ for Lake Koocanusa:

- **~~British Columbia~~B.C. is committed to setting a selenium ~~Water Quality Objective~~ WQO for Lake Koocanusa based on the best available science to protect both aquatic and human health, and is dedicated to seeking consensus with the Ktunaxa Nation Council.**
- We worked collaboratively with the Montana Department of Environmental Quality and the Ktunaxa Nation Council to apply an ecosystem scale model for deriving a selenium target in Lake Koocanusa.
- In September, 2020 Montana independently chose selenium criteria for the US

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portion of Lake Koocanusa, resulting in a recommended concentration number that was ~~.~~

- ~~Montana undertook their legal process of review and approval of this number, which has now been~~ approved by the U.S. Environmental Protection Agency in February 2021~~, Region 8.~~.
- Once the selenium ~~Water Quality Objective~~WQO ~~for Lake Koocanusa~~ has been approved for ~~British Columbia~~B.C. it will inform future permitting decisions that may affect water quality of Lake Koocanusa.

Contact: Sean Moore, Director, Watershed Science and Adaptation, Environmental Sustainability and Strategic Policy Division, 778 698-9286

FW: Comprehensive Elk Valley Backgrounder

From: Downie, AJ ENV:EX
To: von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>
Sent: September 21, 2021 4:20:11 PM PDT
Attachments: image001.png, image002.png, Elk Valley comprehensive backgrounder Updated 2021 09_21.docx

See attached for a quick once-over set of comments…

AJ

A.J. Downie
778-671-0133
AJ.Downie@gov.bc.ca

From: von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>
Sent: September 21, 2021 3:47 PM
To: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
Subject: FW: Comprehensive Elk Valley Backgrounder

Hey AJ –

Hate to ask for one more review, but mind taking a quick scan of the attached backgrounder to have as an optional addition to the briefing package? Suspecting we'll need to include in the Minsters package, so won't be wasted work…

From: Goodsell, Todd EAO:EX <Todd.Goodsell@gov.bc.ca>
Sent: September 21, 2021 4:45 PM
To: von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>
Cc: Shepard, Michael EAO:EX <Michael.Shepard@gov.bc.ca>
Subject: Comprehensive Elk Valley Backgrounder

Hi Katie,

Here's an updated document that requires some minor update from ENV and perhaps you? to better describe updated KNC issues/concerns.

I've included a clean version for distribution and tracked version so you can see what I changed.

Let me know once AJ and you have updated. We may have additional changes to the EA related sections after Mike has had chance to review.

Thanks, Todd

Todd Goodsell Project Assessment Director
Environmental Assessment Office
Government of British Columbia
OFFICE: 778-696-2125
MOBILE: 250-682-3591
Twitter.com/BC_EAO

25 YEARS EAO Environmental Assessment Office

PREMIER'S AWARD ORGANIZATIONAL EXCELLENCE 2019 RECIPIENT

The EAO respectfully acknowledges that it carries out its work on the traditional territories of Indigenous nations throughout British Columbia.

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Elk Valley / Qukin ʔamakʔis {*ku-kin am-ak-is*]

Comprehensive backgrounder

Intent: Provide BC leadership a comprehensive scan of issues and initiatives in the Elk Valley in preparation of the September 28, 2021 Leadership Meeting with Ktunaxa.

Issue:

- The Elk Valley, referred to by the Ktunaxa as Qukin ʔamakʔis, is situated in the southeast (SE) corner of British Columbia, within the Core Territory of the Ktunaxa Nation. The Elk Valley is part of a transboundary watershed, whose waters flow across the border through Lake Koocanusa and into Montana.
- Teck Resources' (Teck) four coal mines in SE BC directly employ 3,600 workers and provide jobs to an estimated 7,200 support workers. Over the past three years, these mines have contributed approximately 85% of the Province's mineral taxes with an average of $330M in annual mineral taxes. The mines produce approximately $4B worth of coal annually.
- New proposed projects in the SE, and proposed expansions by Teck, would provide a 15% boost to production annually and extend production in the region decades into the future.
- Without new mine expansions, Teck estimates that the total regional economic loss would be approximately $49B.
- Mining and other natural resource activities in the Elk Valley have resulted in significant environmental impacts which has made regulatory processes for new projects increasingly challenging. Significant economic development opportunities in the SE region are at risk if key stewardship issues are not addressed.

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- Consideration of a new Lake Koocanusa Water Quality Objective (WQO) into regulatory and permitting structures;

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  - ENV ~~continues to work with KNC on developing a~~remains committed to working with KNC to finalize a new WQO for selenium in the reservoir. Technical staff from both organizations have been working on the development of a process to review and update the Elk Valley Area Based Management Plan (ABMP), including a reassessment of the target for Koocanusa reservoir based on the new WQO. Once the ABMP amendment process is initiated, hopefully later this fall, the WQO will go out for public comment prior to its finalization and use in the target reassessment process~~; the next steps in this process include a report back to impacted proponents on their input and public consultation on a proposed WQO that would protect KNC interests~~.
  - ~~WQO are not legal standards, but consideration of the final WQO may result in permit amendments and/or a review and update of the Area Based Management Plan that is currently in place to manage and mitigate water quality impacts in the watershed from coal mining; this is currently under discussion and consideration with KNC.~~
- Development of a cumulative effects framework and specific objectives for valued components to assess and manage cumulative effects in the Elk Valley;
  - The Cumulative Effects Management Framework has been a multi-year collaborative effort to address impacts that may prevent further mining.
- Managing the response to the decline of the Westslope Cutthroat Trout population in the Upper Fording
  - Investigation of cause and population enhancement measures are being developed considering the 95% population crash in 2019.
- Advancing tributary stewardship, including rehabilitation and protection measures, associated with a permit condition for Teck to develop and implement a Tributary Management Plan.

The Ktunaxa Nation – Governance, World View and Perspectives

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Letter of Intent

- In March 2020, the Province signed a Letter of Intent (LOI) with the KNC which commits BC and KNC to work together on three key objectives:
    - Address the fiscal tiering revenue sharing policy as applied to Ktunaxa's ECDA,
    - Enhance the level of investment and commitment to address current and legacy environmental impacts, and
    - Advance the government to government relationship, including structures and processes that enhance shared decision making and developing a vision respecting stewardship and natural resource development in the Elk Valley.
- Significant funding was provided to Ktunaxa through an accompanying funding letter, which includes $23M to address the revenue sharing fiscal gap resulting from fiscal tiering, $2M to continue to advance collaborative stewardship, $3M to address critical environmental threats, and $0.5M to develop a joint vision for stewardship and resource development in the Elk Valley. Additionally, the Province has committed to removing the fiscal tiering provision from the Ktunaxa ECDA moving forward from 2023.

Healing the Land and Stewardship Issues of Critical Concern:

- A key component of the LOI is committing to working collaboratively on key stewardship initiatives to enhance the level of investment and commitment to address critical environmental threats and restore and protect critical habitats.
- Working together to address these stewardship challenges and showing meaningful progress will be critical to enable further project development in the Elk Valley. Advancing these initiatives will enhance the conditions both BC and the Ktunaxa believe are important for robust stewardship and for preventing and managing the impacts relating to mining in Qukin ʔamakʔis.
- Key issues that are currently being collaboratively addressed include:
    - Water Quality:
        - *Elk River Valley:*

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- Elevated selenium (Se) concentrations resulting from decades of coal mining in the Elk Valley is a primary water quality concern.
- Selenium concentrations in the Fording River downstream of the Fording, Greenhills and Line Creek Operations mines ranged from 20-49 µg/L in the last 12 months, which meet the current Site Performance Objective (SPO) target that was set for this site through the Area Based Management Planning process in 2014 (SPO = 51 µg/L, but scheduled to drop to 40 µg/L at the end of 2023). Further upstream in the Upper Fording River, concentrations are higher and have exceeded permitted levels at times.
- Selenium concentrations in the Elk River near Sparwood ranged from 3-16 µg/L in the last 12 months, which are below the SPO of 19 µg/L. All SPOs are significantly higher than background levels, as well as the current BC water quality guidelines to protect aquatic life (2 µg/L) and human health (10 µg/L).
- Teck has experienced delays in implementing some of the mitigations proposed in the ABMP, in part due to water treatment technology challenges. This has resulted in slower than anticipated progress ~~is~~ in achieving some of the water quality targets in the plan, and ongoing water quality non-compliances~~,~~ which ~~is~~ are concerning to KNC. It has been a significant effort for all parties to permit two additional water treatment projects (EVO Saturated Rockfill, permitted in Oct 2020, and FRO Active Water Treatment, ~~likely to be~~ permitted in Jan 2021) considering emerging technologies and new water quality science. Permitting has been initiated on the next major water treatment project, which is a saturated rockfill at the Fording River mine.

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- *Lake Koocanusa:*
  - Lake Koocanusa selenium water column concentrations have been regularly measured from 2015 to the present at various monitoring stations. Selenium concentrations at the Koocanusa Reservoir ABMP order station downstream of the Elk River range from 0.69-2.6 µg/L, with exceedances of the site performance objective (2 µg/L) reported in spring 2018, ~~and~~ 2020 and 2021 when reservoir levels are generally the lowest.
  - Selenium concentrations upstream of the Elk River range from 0.08-0.88 µg/L, with an average of 0.22 µg/L, which is representative of background conditions (not likely influenced by mine discharges into the Elk River).
  - The ENV and KNC joint technical team have proposed a selenium WQO for Lake Koocanusa more stringent than the current provincial Water Quality Guideline for selenium of 2.0 µg/L.

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- ~~The ministry is currently working with Teck and other industry to explain the science behind the proposed WQO. Once this is complete, the proposed WQO will be submitted to the Executive Director of the Water Sustainability Branch for review and approval to go to~~The next step in the WQO development process is a 30-day public ~~consultation~~ comment period before it gets submitted for final approval by the Executive Director of the Water Sustainability Branch of ENV.

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- The proposed selenium WQO in Lake Koocanusa is currently being met 99% of the time in areas of the reservoir not influenced by mine activities (background levels), but only met up to 20% of the time downstream of mine discharges in the reservoir.

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- Cumulative Effects:
  - KNC and BC have jointly developed a terrestrial cumulative effects management framework (CEMF) to guide the development of bench mark objectives and targets for key valued components to assess historic, current and potential impacts in support of environmental assessments, explore and develop a mitigation hierarchy onsite (avoid, minimize and restore on site), and if necessary explore offsetting.
  - Priority valued components for which objectives are being set are: High Elevation Grasslands, Big Horned Sheep, and Westslope Cutthroat Trout. Secondary valued components include: Riparian, Grizzly Bear, and Old Growth Forests.
- Recovery of the Westslope Cutthroat Trout Population:
  - Management of the response to the WCT population decline through the establishment of a working group to lead recovery planning and recommend short- and long-term actions for Westslope Cutthroat Trout in the upper Fording River.
  - Short term actions have been agreed to and an evaluation of cause report will be independently reviewed by year end. Management objectives are being established, and a draft recovery plan for the upper fording will be completed by spring 2021.

- Implementing protection measure for tributaries and watersheds:
    - Advancing the intent and obligations of an EMA permit condition for Teck to develop and implement tributary rehabilitation and protection, including priority areas identified by Ktunaxa knowledge holders.

s.13; s.16

Revenue Sharing

s.16; s.17

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s.16 ; s.17

s.16; s.17

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8

s.16

Other natural resource operations

Canfor Corporation, Galloway Lumber and BC Timber Sales manage timber harvesting operations in the Elk Valley supporting an active logging industry, sustaining two lumber mills in Elkford and Galloway and provide a pulp log supply to the Paper Excellence pulp mill in nearby Skookumchuk.

Due to the Elk Valley`s proximity to Alberta and the US border, guide outfitting, guided fishing, resident hunting and recreation further contribute to jobs and the economic base in the Elk Valley including the communities of Fernie, Sparwood and Elkford.

The Grassy Mountain Project was a proposed open-pit metallurgical coal mine by Benga Mining located in the Crowsnest Pass in Alberta. The project was assessed by a Joint Review Panel convened by the Minister of Environment and Climate Change Canada which concluded the project was not in the public

interest in June 2021 due to overly optimistic mitigation measure effectiveness by the proponent and the likelihood of the project to result in significant adverse effects on water quality, westslope cutthroat trout, whitebark pine, grasslands and biodiversity. In addition, the Panel found Benga's application to be lacking in detail which necessitated multiple rounds of information requestions. The Panel discussed limitations with Benga's approach to cumulative effects assessment resulting in an inability to assess the magnitude of cumulative effects. The Federal Minister issued a decision statement on August 6, 2021 supporting the findings of the Panel to reject. Benga is appealing the decision and two Treaty 7 nations, Stoney Nakoda and Piikani Nation have filed a request to appeal the decision, stating the panel did not properly assess the impact that rejecting the project would have on Aboriginal rights and economic interests related to accommodation of those rights. Ktunaxa was also engaged in the review of the project and has not supported or appealed the decision publicly.

ENV Key Messages and Speaking Notes for DM-KNC Meeting Sept 28

From:	Downie, AJ ENV:EX
To:	von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>
Cc:	Graham, Tessa ENV:EX <Tessa.Graham@gov.bc.ca>
Sent:	September 22, 2021 3:21:01 PM PDT
Attachments:	382308_MtgNote_KNC-BC ENV issues_22Sept2021.docx

Hi Katie,
Sorry for the delay in sending these over. Here are the bullets and speaking notes I'm forwarding up the line within ENV for Laurel and Kevin.
Feel free to includer some or all into the shared materials.
Thanks,
AJ

Ministry of
Environment and Climate
Change Strategy

MEETING NOTE

MEETING DATE: Sept. 28, 2021

PREPARED FOR: Kevin Jardine, Deputy Minister of Environment and Climate Change Strategy

TOPIC: ENV Speaking Notes re: Key Issues identified by KNC in their letters to the ENV Minister and DM

ATTENDEES: Kevin Jardine, Deputy Minister; Laurel Nash, Assistant Deputy Minister

KEY MESSAGES:

s.16

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Withheld pursuant to/removed as

s.13 ; s.16

Page 026 of 281 to/à Page 028 of 281

Withheld pursuant to/removed as

s.16

Assistant Deputy Minister	**Alternate contact for content:**	**Prepared by:**
Laurel Nash	*Tessa Graham*	*AJ Downie*
ADM - EPD	*Executive Director - ROB*	*Director – SE Coal*
250-953-4004	*778 698-3309*	*250-802-7149*

2021-09-28 382308_MtgNote_KNC-BC ENV issues_v22Sept2021

From: Downie, AJ ENV:EX
To: ENV EPRO SE Coal Mining <SEMINING@Victoria1.gov.bc.ca>
Sent: September 23, 2021 2:18:00 PM PDT
Attachments: 2021-09-28 382308_MtgNote_KNC-BC ENV issues_v22Sept2021.docx

Hi everyone,
Just as a FYI, here are some possible speaking points that we've set up the line to our ADM and DM, to inform their visit and meetings with KNC leadership next week.
Cheers,
AJ

Ministry of
Environment and Climate
Change Strategy

MEETING NOTE

MEETING DATE: Sept. 28, 2021

PREPARED FOR: Kevin Jardine, Deputy Minister of Environment and Climate Change Strategy

TOPIC: ENV Speaking Notes re: Key Issues identified by KNC in their letters to the ENV Minister and DM

ATTENDEES: Kevin Jardine, Deputy Minister; Laurel Nash, Assistant Deputy Minister

KEY MESSAGES:

s.16

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Withheld pursuant to/removed as

s.16

Assistant Deputy Minister	**Alternate contact for content:**	**Prepared by:**
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2021-09-24 Follow-up from SE Coal / Dry Creek Briefing - Data and graphs

From:	Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
To:	Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>
Cc:	Graham, Tessa ENV:EX <Tessa.Graham@gov.bc.ca>, Miller, Lana L ENV:EX <Lana.Miller@gov.bc.ca>, Gulbaek-Pearce, Tomesine ENV:EX <Tomesine.GulbaekPearce@gov.bc.ca>
Sent:	September 24, 2021 1:04:24 PM PDT
Attachments:	2021-09-28 382308_MtgNote_KNC-BC ENV issues_v22Sept2021.docx, Water Quality Data and Graphs - SE Coal.pdf

Hello Laurel,

Kevin had a few questions during our briefing with him yesterday which I was unable to answer definitively, regarding current and historic water quality conditions in Lake Koocanusa and in Dry Creek. For your and/or his information, I'm attaching a PDF document with a few graphics here that we've quickly pulled from various sources. I hope they help with interpretation of the water quality issues in the Meeting IN (reattached for your convenience). Please feel free to pass these along to Kevin if you think they would be helpful. If you think he'd prefer something different please let us know (note: I'm off this afternoon and Monday, but Tomesine or Lana may be able to assist in my absence, if needed)

I hope this helps, and I'm happy to answer any follow-up Qs you may have.

AJ

A.J. Downie
778-671-0133
AJ.Downie@gov.bc.ca

WQ Data & Graphs – Elk Valley & Lake Koocanusa

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Figure 7b – WLC AWTF and EVO SRF performance summary – Sept 7

Lake Koocanusa Selenium Predictions

Figures 1 & 2 are Lake Koocanusa (Lake K) graphs presented during the Sept 23 briefing. The grey line shows predictions (monthly and annual average) using the old (2017) Regional Water Quality Model and the blue line shows what the updated 2020 model is now predicting based on model refinements using more data and better calibrations. The unmitigated scenario shows predications of what will happen with Se concentrations based only on already-approved mining as it proceeds through the life of mine over the next 30 or so years. These predictions do not consider any new mines or expansions such as FR-X. The mitigated scenario shows predicted concentrations that would result with implementation of all mitigation projects that were proposed in last "ABMP Implementation Plan" from 2019. Each mitigation project is listed across the top (vertical blue lines) and this figure shows that will take a new treatment plant every 3-4 years just to keep predicted concentrations near or below 2ug/L Se in Lake K.

Figure 1 – Lake Koocanusa selenium unmitigated prediction

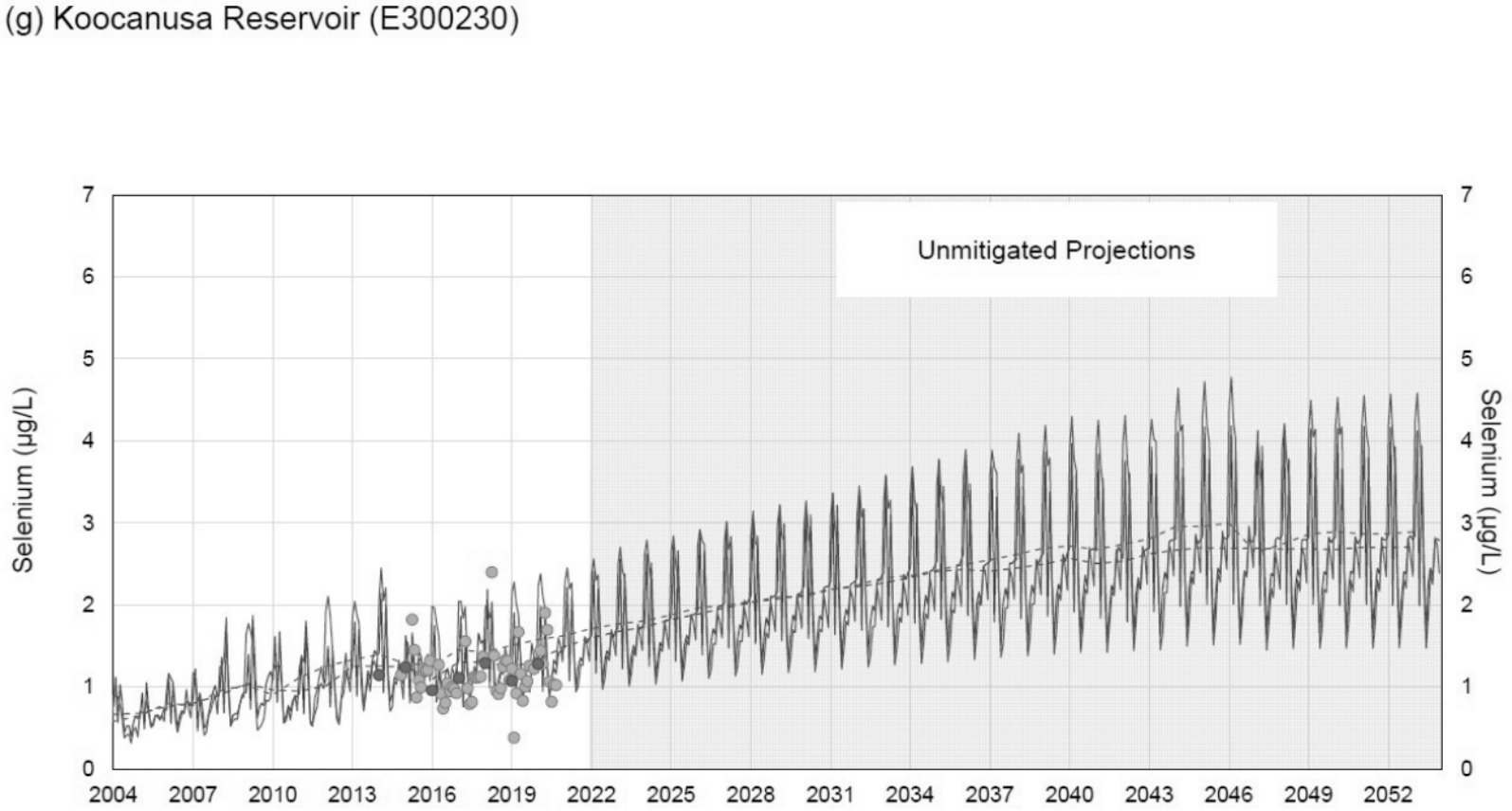
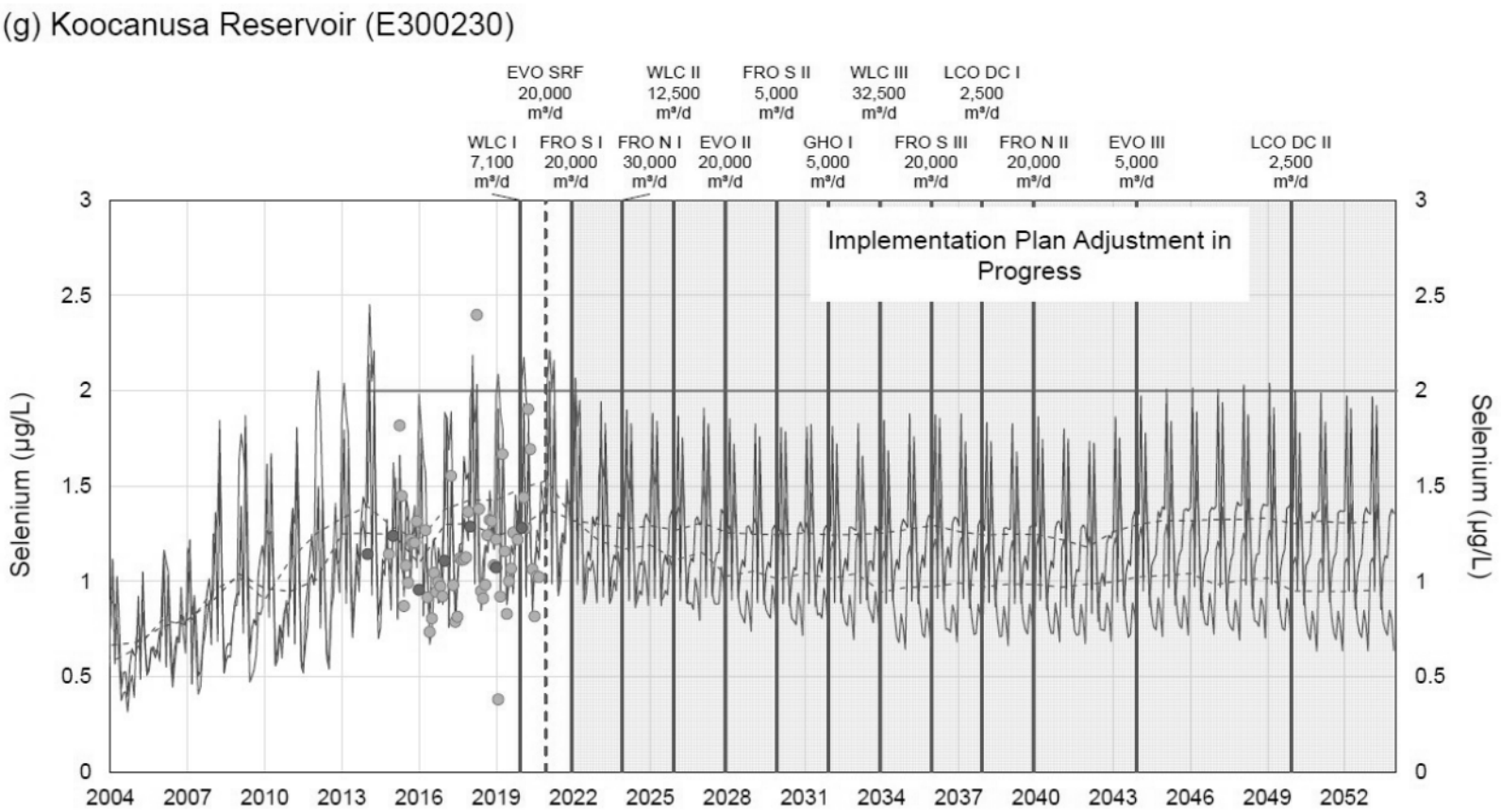


Figure 2 – Lake Koocanusa selenium mitigated prediction for current development



WQ Data & Graphs – Elk Valley & Lake Koocanusa

Selenium Data

Figure 3a comes from our ENV WQO report and shows that Lake K sites downstream of the Elk River have much higher concentrations than upstream sites. Figure 3b is also from our ENV WQO report, and it shows multiple sites on the Elk River, with upstream (reference) sites being very low, middle sites having high and increasing concentrations, and then the lowest site (which is the one shown again in Figure 4) showing slightly lower concentrations due to dilution but still a marked increase over time. Figure 4 is a zoom-in of one decade's worth of data from the lowest site on the Elk River, with the trendline included. These plots clearly demonstrate the obvious significant and growing source of Se to Lake K (these numbers are drastically higher than those in the Kootenay River which is the other major inflow to Lake K and is shown in Blue on the bottom of Figure 3a).

Figure 3a – Lake Koocanusa selenium data from WQO multiple sites

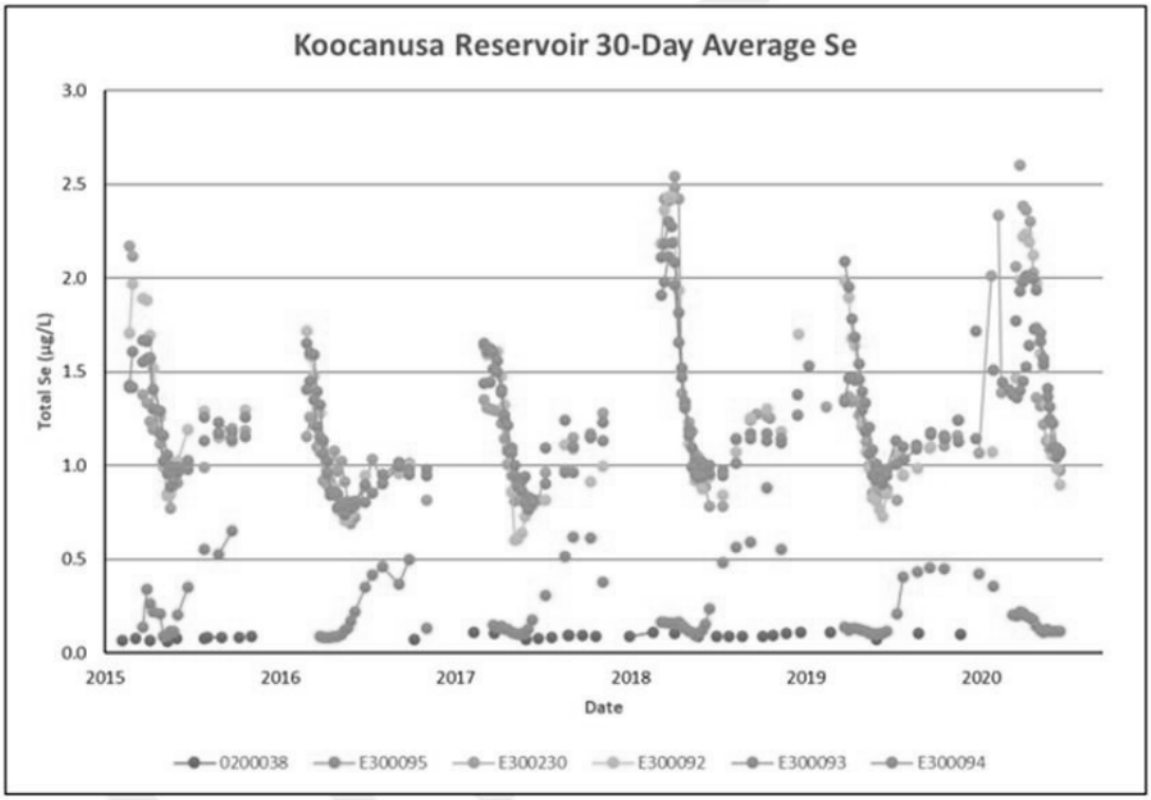


Figure 6. Total Se 30-day average concentrations (µg/L) in Koocanusa Reservoir. Sites are presented from north to south with 0200038 representing conditions in the Kootenay River, E300095 representing conditions upstream of the Elk River, and E300094 being the most southern site near the Canada/US border.

Figure 3b – Elk River selenium data from WQO multiple sites

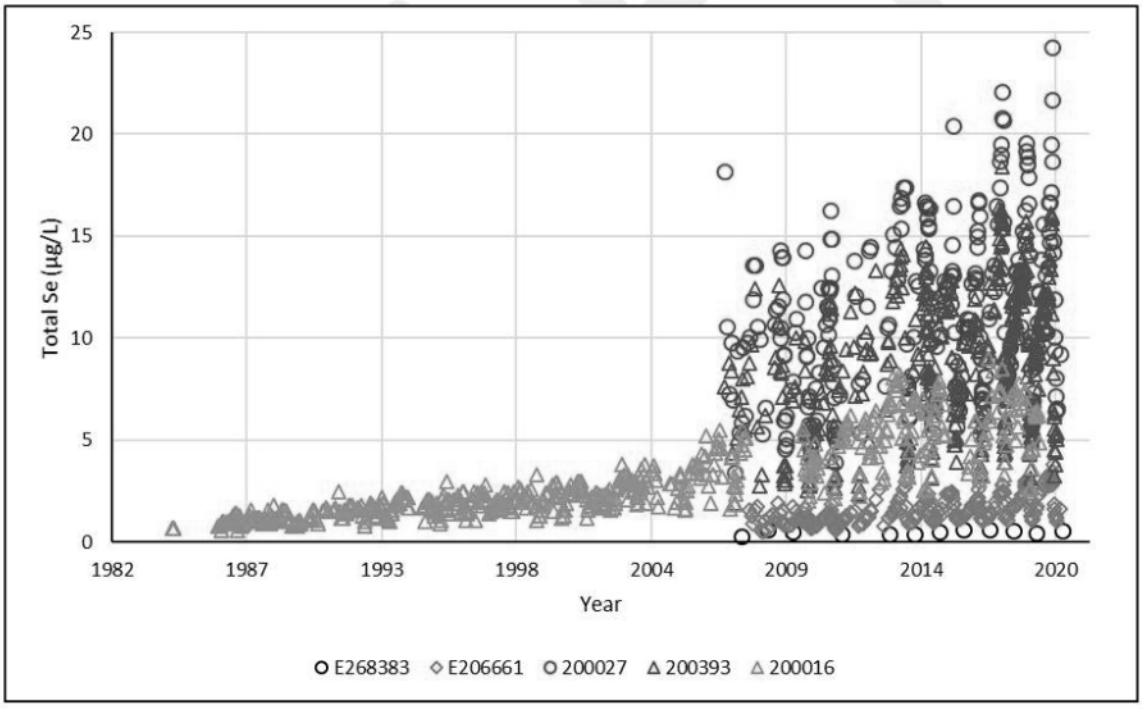
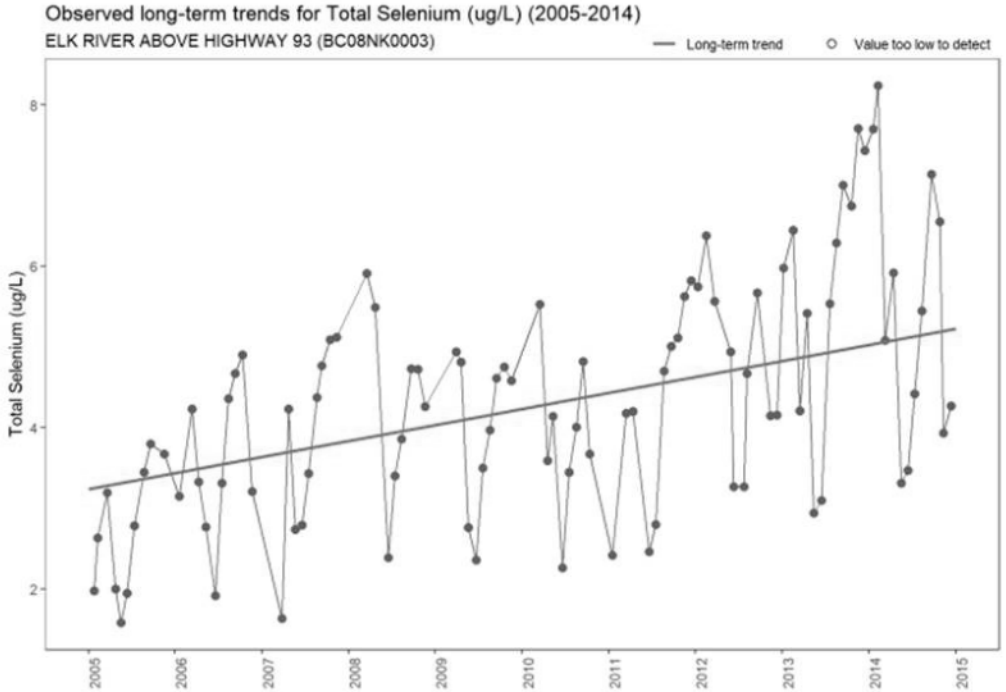


Figure 4. Total selenium concentrations at sites on the Elk River. Sites are ordered upstream to downstream in the legend.

Figure 4 – Se data from lower Elk River



WQ Data & Graphs – Elk Valley & Lake Koocanusa

Selenium and Nitrate Data in Dry Creek

Figures 5 & 6 show what has been happening to Se and Nitrate in Dry Creek, since Line Creek Mine Phase Two began operations. For reference (in Figure 5), the current water quality Site Performance Objective for Se in Dry Creek is 10ug/L (which is BC's drinking water guideline and is 5x the guideline for protection of aquatic life of 2ug/L). Teck is interested in seeing this number increase, perhaps to 70ug/L, which represents a benchmark they developed a few years ago where you may expect to start seeing effects on fish/invertebrates, but below which you may not be able to detect effects. For reference (in Figure 6), BC's nitrate water quality guideline is 3.0mg/L (avg) and 32.8mg/L (max). Current concentrations greatly exceed this, and in fact they also now exceed a site-specific benchmark developed by Teck which represents a concentration at or above which you would expect to see effects on 50% of individuals of sensitive species.

Figure 5 – Dry Creek nitrate concentrations

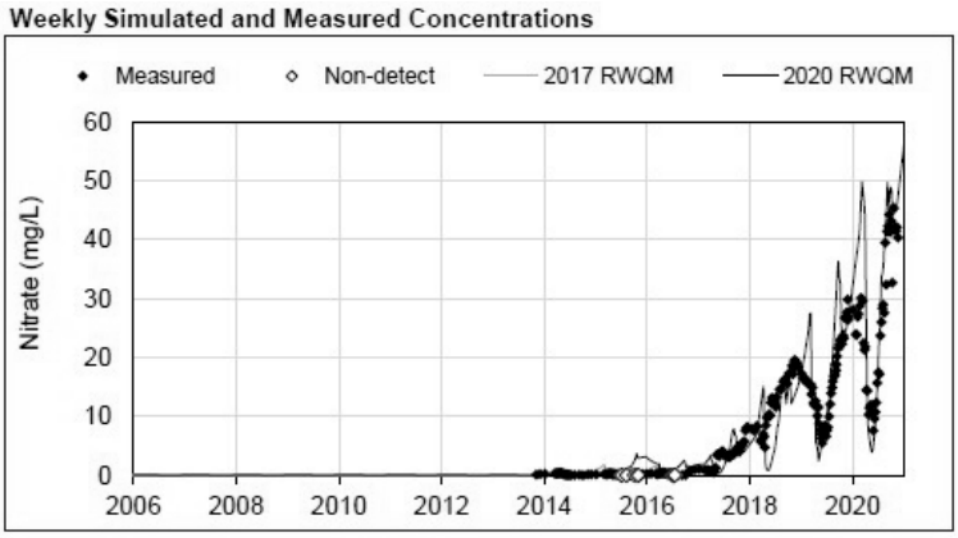
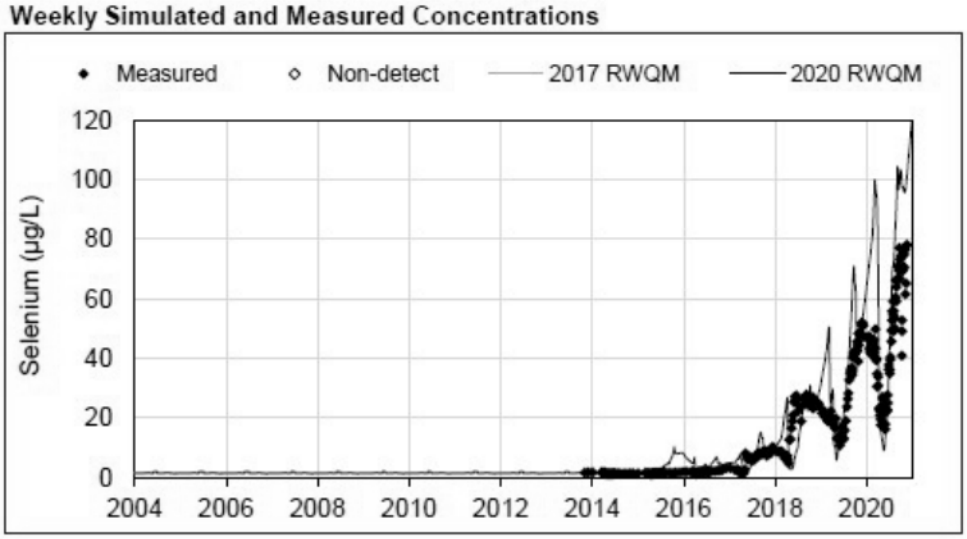


Figure 6 – Dry Creek selenium concentrations



WQ Data & Graphs – Elk Valley & Lake Koocanusa

Treatment Plant Performance Data

Figures 7a and b show some of the performance data from the two major water treatment plants (Active Water Treatment Plant at West Line Creek (WLC) and Saturated Rockfill at Elkview Operations), summarized from 3 week periods in Aug and Sept. As you can see, performance between the two technologies in terms of selenium effluent quality is similar, and effluent concentrations typically range around 10-15ug/L.

Figure 7a – WLC AWTF and EVO SRF performance summary – Aug

Note these calculations use the most recent data available and as such the data may not have undergone final QA/QC. Results may change as data undergoes final QA/QC.

	WLC AWTF	EVO SRF
Throughput*	7314 m^3/day	16263 m^3/day
Influent nitrate*	12.16 mg/L	15.6 mg/L
Effluent nitrate*	0.23 mg/L	1.02 mg/L
Daily average nitrate load removal**	83.0 kg/day	244 kg/day
Influent selenium*	279 µg/L	154 µg/L
Effluent selenium*	12.67 µg/L	12.3 µg/L
Daily average selenium load removal**	1.7 kg/day	1.54 kg/day
Effluent non-selenate*	0.978 µg/L	1.55 µg/L

**three week average*
***August to date*

Figure 7b – WLC AWTF and EVO SRF performance summary – Sept

Note these calculations use the most recent data available and as such the data may not have undergone final QA/QC. Results may change as data undergoes final QA/QC.

	WLC AWTF	EVO SRF
Throughput*	6937 m^3/day	14603 m^3/day
Influent nitrate*	12.44 mg/L	15.44 mg/L
Effluent nitrate*	0.23 mg/L	1.11 mg/L
Daily average nitrate load removal**	84 kg/day	235 kg/day
Influent selenium*	221 µg/L	162 µg/L
Effluent selenium*	9.82 µg/L	14.6 µg/L
Daily average selenium load removal**	1.5 kg/day	2.37 kg/day
Effluent non-selenate*	0.908 µg/L	1.61 µg/L

**three week average*
***August*

FW: KNC-BC leadership meeting Final draft briefing materials

From: Downie, AJ ENV:EX
To: Miller, Lana L ENV:EX <Lana.Miller@gov.bc.ca>, Gulbaek-Pearce, Tomesine ENV:EX (Tomesine.GulbaekPearce@gov.bc.ca) <Tomesine.GulbaekPearce@gov.bc.ca>
Sent: October 21, 2021 8:20:24 AM PDT
Attachments: Oct 21st leadership meeting - Joint Minister briefing 2021 10 18.docx, Appendix 4. LOI Leadership Table ToR 2021 01 21.docx, Appendix 3 - Agenda specific speaking notes (2021 10 19) .docx, Appendix 2 - LOI Leadership Table #2 Oct 21 - BC annotated agenda 2021 10 18.docx

Just a FYI – I think these are the final briefing materials that went up to Ministers for today's call with KNC. I plan to post them to TEAMS and/or share with our full team next week, when we can also report out on the flavour of the discussions and any next steps.

AJ

A.J. Downie
778-671-0133
AJ.Downie@gov.bc.ca

From: von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>
Sent: October 18, 2021 4:58 PM
To: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>; Bailey, Scott EAO:EX <Scott.Bailey@gov.bc.ca>; Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>; Rasmussen, Paul FLNR:EX <Paul.Rasmussen@gov.bc.ca>
Cc: Morello, Ray FLNR:EX <Ray.Morello@gov.bc.ca>; Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>; Shepard, Michael EAO:EX <Michael.Shepard@gov.bc.ca>; Goodsell, Todd EAO:EX <Todd.Goodsell@gov.bc.ca>; Graham, Tessa ENV:EX <Tessa.Graham@gov.bc.ca>; Giles, Wayne IRR:EX <Wayne.Giles@gov.bc.ca>
Subject: KNC-BC leadership meeting Final draft briefing materials

Hi all,

Please find attached "final" draft briefing materials for the Leadership meeting Thursday.

s.16

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Withheld pursuant to/removed as

s.16

FOR INPUT - 2022-03-02 Water Quality MIN Briefing

From: Downie, AJ ENV:EX
To: Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>
Cc: Miller, Lana L ENV:EX <Lana.Miller@gov.bc.ca>, Mann, Baljeet X ENV:EX <Baljeet.Mann@gov.bc.ca>
Sent: March 2, 2022 8:30:41 AM PST
Attachments: 2022-03-02 Water Quality MIN Briefing.docx

Hi Chris,
We are drafting the BN for the multi-minister meeting with Teck. It's due to our ADMO today so I need to move it up the line by early afternoon…. Any thoughts/comments/suggestions?
Lana and Baljeet – this is saved in TEAMS and there are comments for you to look at, and also looking for your input/edits in this version… as soon as you can would be best, and by lunch if possible please!
Thx.
AJ

From: Eckardt, Dana R ENV:EX Dana.Eckardt@gov.bc.ca
Sent: February 24, 2022 3:07 PM
To: von Gaza, Katie IRR:EX Katie.vonGaza@gov.bc.ca; Shepard, Michael EAO:EX Michael.Shepard@gov.bc.ca; Danks, Anthony ENV:EX Anthony.Danks@gov.bc.ca; Nash, Laurel ENV:EX Laurel.Nash@gov.bc.ca; Downie, AJ ENV:EX AJ.Downie@gov.bc.ca; Mattu, Jamin ENV:EX Jamin.Mattu@gov.bc.ca; Trumpy, Chris EMLI:EX Chris.Trumpy@gov.bc.ca
Cc: Carter, Elizabeth S ENV:EX Elizabeth.S.Carter@gov.bc.ca; Paquin, Lisa C ENV:EX Lisa.Paquin@gov.bc.ca; Goodsell, Todd EAO:EX Todd.Goodsell@gov.bc.ca
Subject: RE: CONFIRMED - MGH/MBR MTG: 386166_MO Mtg: Teck Resources - March 10

Hi everyone –

EPD ADMO will take the lead on coordinating materials.

Eapp requests to follow shortly on the topics noted below

1. Update to mitigation of water quality and selenium – assigned to Aj/EPD
2. Fording River Extension Project – assigned to Michael Shepard / EAO
3. CMER – assigned to Anthony / SPD

Request will be for all final approved material be sent back to our office. Timelines will be noted in eapps. Once final material is received, we will move all material forward to the DMO/MO, and ensure material is distributed to attendees

We have a couple of things still to do
- Confirm Minister pre-brief
- Confirm final attendee list

More information to come as we work towards meeting date.

Thanks!
Dana

Dana Eckardt (she/her) | Manager, Planning and Strategic Initiatives
Assistant Deputy Minister's Office | Environmental Protection Division
Ministry of Environment and Climate Change Strategy
778-974-5810 office | 250-818-8916 cell
I acknowledge, with gratitude, the Lekwungen peoples who are the traditional keepers of the land on which I live and work.

Ministry of Environment and Climate Change Strategy

CLIFF / eApprovals #: [384794 / 12677]

File #: [delete this line if file number not used]

MEETING NOTE

MEETING DATE: Thursday March 10, 2022 at 11 :15 – 12 :00

PREPARED FOR: Honourable George Heyman, Minister of Environment and Climate Change Strategy

TOPIC: Water quality in the Elk Valley and an update on water quality mitigation progress

ATTENDEES: Marcia Smith, Senior VP, Sustainability and External Affairs, Teck
Marcella Munro, Head of Government & Regulatory Affairs, Teck
Jeff Hanman, VP, Sustainable Development, Teck
Scott Maloney, VP, Environment, Teck
Sheila Risbud, Director, FRX Project, Teck

s.13

KEY MESSAGES:

- **ENV is planning to amend the Area Based Management Plan for the Elk Valley to reassess the Koocanusa reservoir selenium target, incorporate new knowledge, and improve processes for addressing impacts and managing water quality in the Elk Valley.**
- **Two active water treatment facilities and one saturated rock fill are currently in operation in the Elk Valley, and a second saturated rock fill is expected to be brought online over the next year. These facilities are reducing selenium and nitrate loadings to the environment.**

KEY FACTS:

- In 2014 ENV approved an Area Based Management Plan (ABMP) for the Elk Valley to stabilize and improve water quality in the mainstem Elk and Fording Rivers. The Plan included water quality targets for selenium (Se), nitrate (NO3), sulphate (SO4) and cadmium (Cd), as well as a schedule of mitigation activities that became regulatory requirements in Teck's effluent discharge permit.
- In recognition of: a) the historical mining context, b) a fair bit of site-specific data; and c) the still-emerging science on how to best manage coal mining contaminants, the ABMP manages the environment on a watershed-wide scale and at a higher level of risk than is typically accepted downstream of other mines or industrial discharges. On its own, it doesn't directly manage on a tributary-by-tributary level where localized impacts of mining activities to fish and benthic invertebrates have been observed in some cases.

[If relevant, include the following footer; otherwise, delete] This document may contain information that is protected by solicitor client privilege. Prior to any disclosure of this document outside of government, including in response to a request under the *Freedom of Information and Protection of Privacy Act*, the ministry in possession of this document must consult with the lawyer responsible for the matter to determine whether information contained in this document is subject to solicitor client privilege.

- At present, Teck is operating two active water treatment facilities [Fording River Operations (FRO) - South and West Line Creek (WLC) at Line Creek Operations (LCO)) and one saturated rock fill (SRF) at Elkview Operations (EVO)] to remove Se and NO3. In January 2022, these facilities treated 26,653 m3/day of water and removed a total of 5.71 kg of selenium and 503 kg of nitrate each day. See attachment 1 – Performance Summary.
- The FRO-South facility is still being brought online and will be fully effective in September 2022, when maximum treatment capacities from the three facilities will total 57,000 m3/day.
- Teck is currently in the pre-commissioning stage of the first phase of a SRF (FRO – North), with commissioning expected in March and additional phases are currently in the permitting process. By the end of 2023, it is expected that this second SRF will treat an additional 30,000 m3/day.
- With four treatment facilities in operation by the end of 2023, Teck is expected to be treating 77,500 m3/day, with stabilization and reduction of selenium and nitrate trends also expected.
- Saturated rock fill technology is a new technology that has been developed by Teck in the Elk Valley and has been carefully reviewed and authorized by the Environmental Management Act (EMA) permit and the *Mines Act* permit, for use at EVO and FRO to support achievement of ABMP targets and other permit requirements. Teck has submitted a Technology Readiness Assessment for SRF technology to document all of research and development work that has been done, to confirm it's applicability for planning purposes and to support it's continued use in the Elk Valley.
- Implementation of the FRO-South treatment facility is behind schedule based on requirements in the EMA permit, due to a combination of factors including a need to adjust the technology based on upsets and learnings from the first facility at LCO, construction challenges, and Covid-19. It will be back on track later this year, and other treatment facilities have made progress in accordance with the current permit requirements.
- At present, Teck is in the process of updating their ABMP Implementation Plan and schedule for treatment, and will be proposing additional SRFs and treatment capacity up to 193,500 m3/day by the end of 2042 (See attachment 3). Teck has indicated their intent to be in compliance as soon as possible, as well as maintain compliance with the current selenium target of 2 ug/L in Lake Koocanusa reservoir.
- Se and NO3 levels are beginning to stabilize and reduce in some areas downstream of operating treatment facilities. However, Teck continues to be out of compliance in certain locations, including in the Fording River and Line Creek. They are developing strategies to address these, but the updated IPA is expected to predict occasional non-compliances until 2028 at some sites.
- Monitoring and assessment programs have revealed that chronic toxicity impacts of water quality are occasionally present at some locations in the Elk Valley (especially in tributaries), in part because the full mitigation plans have not yet been implemented and in part because a higher level of risk to the environment was accepted when the original ABMP was approved.

Commented [DAE3]: Trying to create something that's generally correct, but also understandable in plain language. Do you think this works?

Commented [DAE4]: I tried to simplify this, does it still resonate with you guys?

Commented [DAE5]: Is this right lana?

[If relevant, include the following footer; otherwise, delete] This document may contain information that is protected by solicitor client privilege. Prior to any disclosure of this document outside of government, including in response to a request under the *Freedom of Information and Protection of Privacy Act*, the ministry in possession of this document must consult with the lawyer responsible for the matter to determine whether information contained in this document is subject to solicitor client privilege.

- As water quality in the Elk Valley improves, we expect chronic impacts we are currently observing to also improve. However, some of the impacts to the aquatic environment may also be due, in part, to contaminants not managed by the ABMP, including nickel and Total Dissolved Solids (TDS).
- ENV staff are currently working on a draft Ministerial Order to amend the ABMP, including updating the Koocanusa reservoir Se target to reflect the new learnings from the water quality objective (WQO) development process and developing a process to consider emerging contaminants.
- BC's draft proposed WQO for Koocanusa reservoir, which was developed by ENV and KNC, is expected to be released for public comment at the start of the ABMP process, and will be finalized as the first step in a target reassessment process. The WQO, as an ENV policy, will inform the reassessment process which will also consider additional monitoring data, and impact assessment and risk assessment results, which were not included included in the WQO development process, plus other factors such as feasibility/achievability and socio-economic factors.

s.13

Attachment(s):

- [If required, additional background information can be included as an attachment.
-
- Attachment description should match title of document.
- If more than one attachment, please number and list in order of reference in the text of the note.]

Assistant Deputy Minister:	**Alternate contact for content:**	**Prepared by:**
Laurel Nash, ADM	*Tessa Graham, ED*	*A.J. Downie, Director, SE Coal*
EPD	*Regional Operations Branch*	*EPD, ROB*
[Phone number]	*[Phone number]*	*250-802-7149*

Attachments

Attachment 1: Current Treatment Data: January 2022 Treatment Facility Performance Reporting Data for Selenium and Nitrate Provided By Teck

[If relevant, include the following footer; otherwise, delete] This document may contain information that is protected by solicitor client privilege. Prior to any disclosure of this document outside of government, including in response to a request under the *Freedom of Information and Protection of Privacy Act*, the ministry in possession of this document must consult with the lawyer responsible for the matter to determine whether information contained in this document is subject to solicitor client privilege.

WLC AWTF, EVO SRF and FRO-S AWTF Performance Summary

Note these calculations use the most recent data available and as such the data may not have undergone final QA/QC. Results may change as data undergoes final QA/QC.

	WLC AWTF	EVO SRF	FRO-S AWTF
Throughput**	7253 m^3/day	16529 m^3/day	2871 m^3/day
Influent nitrate**	17.2 mg/L	20.9 mg/L	34.9 mg/L
Effluent nitrate**	0.22 mg/L	0.88 mg/L	1.56 mg/L
Daily average nitrate load removal**	122 kg/day	286 kg/day	95.0 kg/d
Influent selenium**	228 µg/L	171 µg/L	534 µg/L
Effluent selenium**	12.9 µg/L	8.48 µg/L	24.6 µg/L
Daily average selenium load removal**	1.55 kg/day	2.71 kg/day	1.45 kg/day
Effluent non-selenate*	0.834 µg/L	1.14 µg/L	0.18 µg/L

Teck

*Since last update **January

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[If relevant, include the following footer; otherwise, delete] This document may contain information that is protected by solicitor client privilege. Prior to any disclosure of this document outside of government, including in response to a request under the *Freedom of Information and Protection of Privacy Act*, the ministry in possession of this document must consult with the lawyer responsible for the matter to determine whether information contained in this document is subject to solicitor client privilege.

Attachment 2: Selenium and Nitrate Treatment and Compliance Projections to 2042

Commented [DAE7]: What goes in here Baljeet? The Lake K graph? Or?

[If relevant, include the following footer; otherwise, delete] This document may contain information that is protected by solicitor client privilege. Prior to any disclosure of this document outside of government, including in response to a request under the *Freedom of Information and Protection of Privacy Act*, the ministry in possession of this document must consult with the lawyer responsible for the matter to determine whether information contained in this document is subject to solicitor client privilege.

Attachment 3: Selenium and Nitrate Treatment Summary Based on Teck's Proposed Draft 2022 Update to the Implementation Plan

Summary of Treatment, Diversions and Conveyance for Selenium and Nitrate

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S	FRO S	20,000	Sep 1, 2022	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	9,500	Dec 31, 2022	Eagle 4 Pit
	FRO-N 1 SRF Phase II	FRO N 1 SRF II	20,500	Dec 31, 2023	Clode, Liverpool, Swift Pit, Post Ponds
	FRO-N 1 SRF Phase III	FRO N 1 SRF III	10,000	Dec 31, 2025	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 2 SRF	FRO N 2 SRF	20,000	Dec 31, 2026	FRO-N 1 SRF sources, Kilmarnock
	Eagle 6 South SRF	E6S SRF	6,500	Jun 30, 2033	Eagle 6 Pit North and South
LCO	WLC AWTF	WLC	7,500	Jan 1, 2020	West Line Creek, Line Creek
	WLC AWTF	WLC	-	June 30, 2023	MSAW
	NLC SRF Phase I	NLC SRF I	12,500	Dec 31, 2025	NLC, NLX, LCO Dry Creek
	NLC SRF Phase II	NLC SRF II	10,000	Dec 31, 2030	NLC, NLX, WLC groundwater
	NLC SRF Phase III	NLC SRF III	17,500	Dec 31, 2033	NLC, NLX, WLC groundwater, Line Creek, LCO Dry Creek
	Conveyance/Supplementation		Up to 30,000	Mar 29, 2023	-
	No Name, Horseshoe and Upper Line Creek Diversions		42,000	Dec 31, 2025	-
GHO	Cougar South Pit SRF	CSP SRF	5,000	Jun 30, 2042	Cougar South Pit, Leask, Wolfram, Thompson, Porter
	Greenhills Creek Treatment	GHC	7,500*	Dec 31, 2027	Greenhills Creek
EVO	EVO SRF Phase I		20,000	Sep 1, 2021	Erickson, Natal
	EVO SRF Phase II		4,000	Sep 30, 2023	EVO Dry
	EVO SRF Phase III		15,000	Dec 31, 2027	Erickson, Natal
	EVO SRF Phase IV		3,000	Dec 31, 2036	EVO Dry
	BRP SRF		5,000	Dec 31, 2042	Baldy Ridge Pit, Erickson, Natal

Teck

* For regional treatment to meet 107517 permit limits and SPOs, 3,000 m^3/day of treatment is required. 7,500 m^3/day is required based on the Federal Direction.

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Ministry of
Environment and Climate
Change Strategy

MEETING NOTE

MEETING DATE: March 10, 2022

PREPARED FOR: Honourable George Heyman, Minister of Environment and Climate Change Strategy
Honourable Bruce Ralston, Ministry of Energy, Mines and Low Carbon Innovation

TOPIC: Water quality in the Elk Valley and an update on water quality mitigation progress

ATTENDEES:
Marcia Smith, Senior VP, Sustainability and External Affairs, Teck
Marcella Munro, Head of Government & Regulatory Affairs, Teck
Jeff Hanman, VP, Sustainable Development, Teck
Scott Maloney, VP, Environment, Teck
Sheila Risbud, Director, FRX Project, Teck
Kevin Jardine, Deputy Minister of Environment and Climate Change Strategy
Laurel Nash, Assistant Deputy Minster, Environmental Protection
Elenore Arend, Associate Deputy Minister, Environmental Assessment Office
Mike Shepard, A/Assistant Deputy Minister, Environmental Assessment Office

KEY MESSAGES:

- **We acknowledge the extensive efforts to date by Teck to develop and implement new treatment facilities and other water quality mitigations in the Elk Valley. The treatment facilities are showing effective removal of selenium and nitrate, and we look forward to seeing further improvements as the additional facilities come online in the coming months.**
- **We understand that Teck is nearing completion of its next update to the Area Based Management Plan (ABMP) Implementation Plan, which we understand will propose continued substantial investments in new treatment facilities. We appreciate Teck's efforts to attain full compliance as soon as possible; however, we are concerned about predicted non-compliances at some locations for a few more years, and Teck is strongly encouraged to do everything possible to mitigate these.**
- **The ministry intends to amend the ABMP to reassess the Koocanusa reservoir selenium target, incorporate new knowledge, and improve processes for addressing impacts and managing water quality in the Elk Valley. Teck will be invited to participate in this process and I understand engagement with Teck staff has already commenced.**

- **We encourage Teck to continue focussing on building a strong and trusting relationship with the KNC, to support timely application reviews and effective outcomes from strategic projects including the ABMP amendment.**

KEY FACTS:

- In 2014 ENV approved an Area Based Management Plan (ABMP) for the Elk Valley to stabilize and improve water quality in the mainstem Elk and Fording Rivers. The Plan includes water quality targets for selenium (Se), nitrate (NO_3), sulphate (SO_4) and cadmium (Cd), as well as a schedule of mitigation activities that have become regulatory requirements in Teck's effluent discharge permit.
- In recognition of: a) the historical mining context, b) site-specific data; and c) the still-emerging science on how to best manage coal mining contaminants, the ABMP manages the environment on a watershed-wide scale and accepts a higher level of risk than is typically accepted downstream of other mines or industrial discharges. On its own, the ABMP is currently not managing on a tributary-by-tributary level where some localized impacts of mining activities to fish and benthic invertebrates have been observed.
- At present, Teck is operating two active water treatment facilities [Fording River Operations (FRO) –South, and West Line Creek at Line Creek Operations (LCO)] and one saturated rock fill (SRF) at Elkview Operations (EVO). The facilities remove Se and NO_3 and in January 2022, they treated 26,653 m^3/day of water (see Appendix 1).
- The FRO-South facility is still being brought online and treatment capacity will increase in the coming months. Teck is also in the pre-commissioning stage of a second SRF at FRO-North. By the end of 2023, Teck is expected to be treating 77,500 m^3/day, with stabilization and reduction of Se and NO_3 trends also expected (see Appendix 2 for treatment to 2023).
- SRF is a new technology that has been developed by Teck in the Elk Valley. The technology has been carefully reviewed and authorized by the *Environmental Management Act* (EMA) and *Mines Act* permits for use at EVO and FRO. Teck has submitted a Technology Readiness Assessment for SRF technology to document all of the research and development work that has been done, to confirm general applicability of this technology for planning purposes, and to support continued use of SRF technology in the Elk Valley.
- Implementation of the FRO-South treatment facility has been behind schedule, due to a combination of factors including a need to adjust the technology based on upsets and learnings from the first active water treatment facility at LCO, construction challenges, and COVID-19. Other treatment facilities have made progress in accordance with the current permit requirements.
- At present, Teck is updating their ABMP Implementation Plan and schedule for treatment and will be proposing additional SRFs and treatment capacity up to 193,500 m^3/day by the end of 2042 (see Appendix 3). Teck has indicated their intent to be in full compliance as soon as possible, as well as to maintain compliance with the current Se target of 2 ug/L in the Koocanusa reservoir.
- Se and NO_3 levels are now beginning to stabilize and reduce in some areas immediately downstream of operating treatment facilities. However, at times Teck continues to be out of

compliance at certain locations, including in the Fording River and Line Creek. They are developing strategies to address these areas. The updated Implementation Plan that Teck is finalizing predicts full compliance with Se and NO_3 limits at all compliance points by 2028.

- Monitoring and assessment programs have revealed that aquatic ecosystems in most of the mainstems are functioning, but chronic toxicity impacts are present at some locations in the Elk Valley, in part because the full mitigation plans have not yet been implemented and in part because a higher level of risk to the environment was accepted when the original ABMP was approved. As water quality in the Elk Valley improves, we expect chronic impacts that we are currently observing will also improve.
- ENV staff are currently working on a draft Ministerial Order to amend the ABMP, including updating the Koocanusa reservoir Se target to reflect the new learnings from the water quality objective (WQO) development process, and developing a new process to consider emerging contaminants and better support adaptive management and continuous improvement.
- BC's draft WQO for the Koocanusa reservoir, which was co-developed by ENV and KNC, is expected to be released for public comment and then finalized at the start of the ABMP Amendment process. The WQO has been developed in accordance with ministry policy and procedures and, as an ENV policy, will inform the ABMP target reassessment. Along with the new WQO, the reassessment will also consider additional monitoring data and impact and risk assessment results, which were not available during the WQO development process, plus other relevant information such as feasibility/achievability and socio-economic factors that are not typically considered during WQO development.

Appendices:

- Appendix 1: January 2022 Treatment Data: Facility Performance Reporting for Selenium and Nitrate Provided By Teck
- Appendix 2: Treatment Facilities to 2023
- Appendix 3: Proposed Selenium and Nitrate Treatment Facilities Based on Teck's Draft 2022 Update to the Implementation Plan
- Appendix 4: Timelines

Assistant Deputy Minister:
Laurel Nash
Environmental Protection Division
250-508-1670

Alternate contact for content:
Tessa Graham
Regional Operations Branch
250-812-3531

Prepared by:
A.J. Downie, Director
SE Coal Team
250-802-7149

Appendix 1: January 2022 Treatment Data: Facility Performance Reporting for Selenium and Nitrate Provided By Teck

WLC AWTF, EVO SRF and FRO-S AWTF Performance Summary

Note these calculations use the most recent data available and as such the data may not have undergone final QA/QC. Results may change as data undergoes final QA/QC.

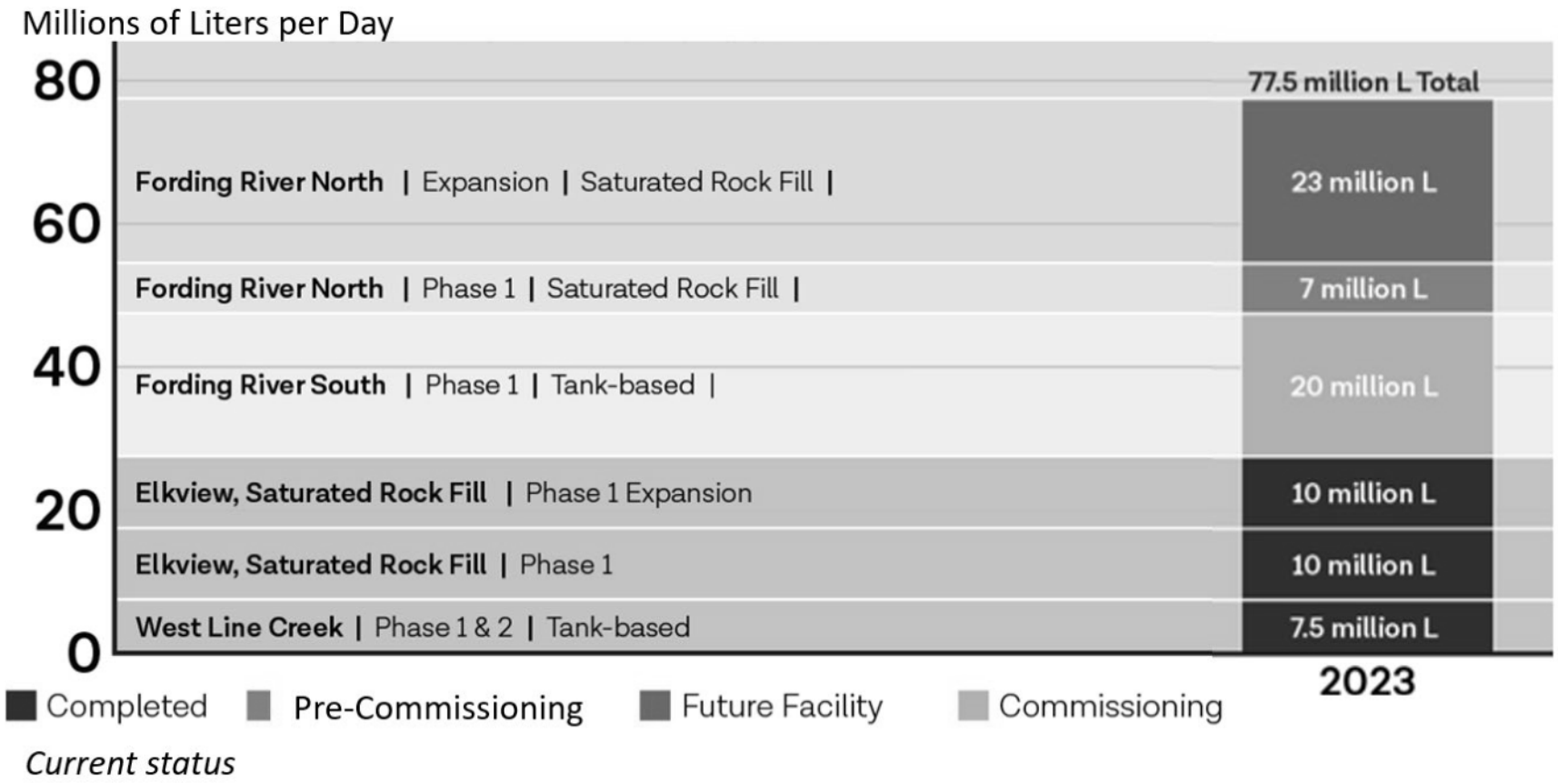
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Effluent non-selenate*	0.834 µg/L	1.14 µg/L	0.18 µg/L

Teck

*Since last update **January

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Appendix 2: Treatment Facilities to 2023



Appendix 3: Proposed Selenium and Nitrate Treatment Facilities Based on Teck's Draft 2022 Update to the Implementation Plan

Summary of Treatment, Diversions and Conveyance for Selenium and Nitrate

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
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Teck

* For regional treatment to meet 107517 permit limits and SPOs, 3,000 m^3/day of treatment is required. 7,500 m^3/day is required based on the Federal Direction.

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Page 081 of 281

Withheld pursuant to/removed as

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FOR ADVICE - Minister Briefing Slides on WQ including ABMP and Compliance

From:	Downie, AJ ENV:EX
To:	von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>
Cc:	Jackson, Jolene EMLI:EX <Jolene.Jackson@gov.bc.ca>, Goodsell, Todd EAO:EX <Todd.Goodsell@gov.bc.ca>, Morello, Ray FLNR:EX <Ray.Morello@gov.bc.ca>, Miller, Lana L ENV:EX <Lana.Miller@gov.bc.ca>
Sent:	March 18, 2022 8:56:26 AM PDT
Attachments:	Min Briefing Slides.pptx

Hi Katie (and colleagues),

I think this is more than you've asked for, but this feels to me like the story that should be told about WQ. We may not need to take a lot of time reviewing the mitigation history, but it feels like information that's valuable for Ministers to be aware of.

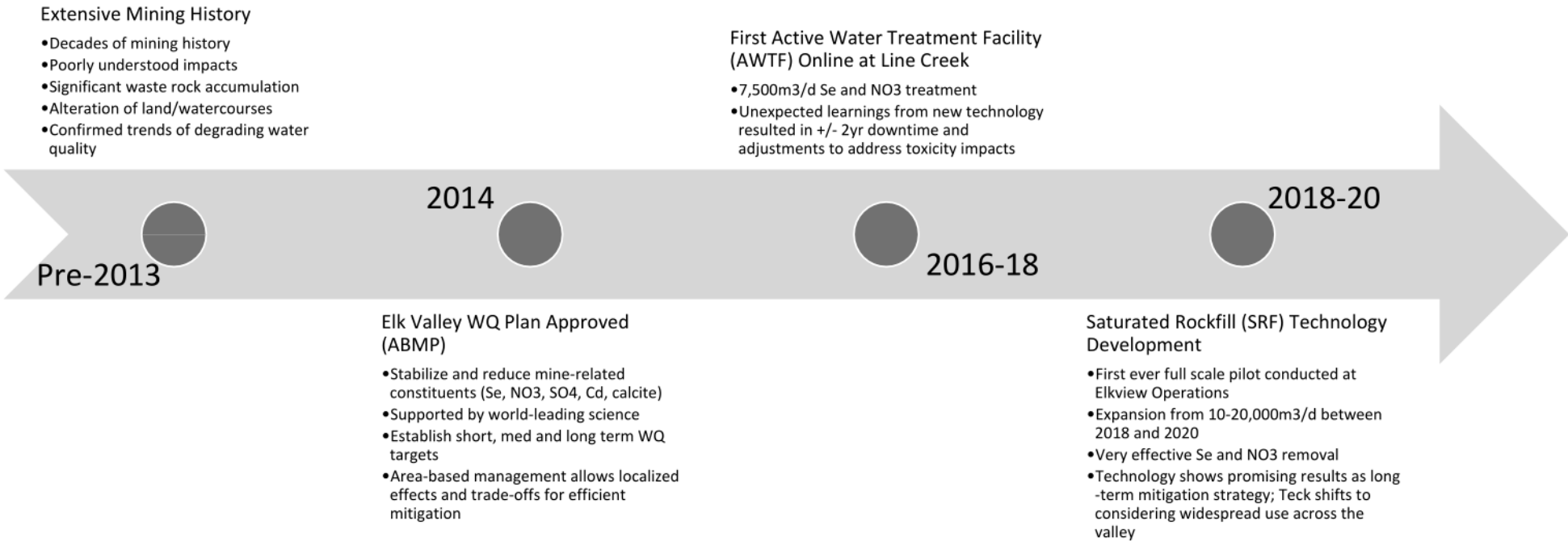
Before I insert these into the deck I wanted to check in and see if you and others feel this is too much information or if it's OK as is. I welcome your input.

Thanks,

AJ

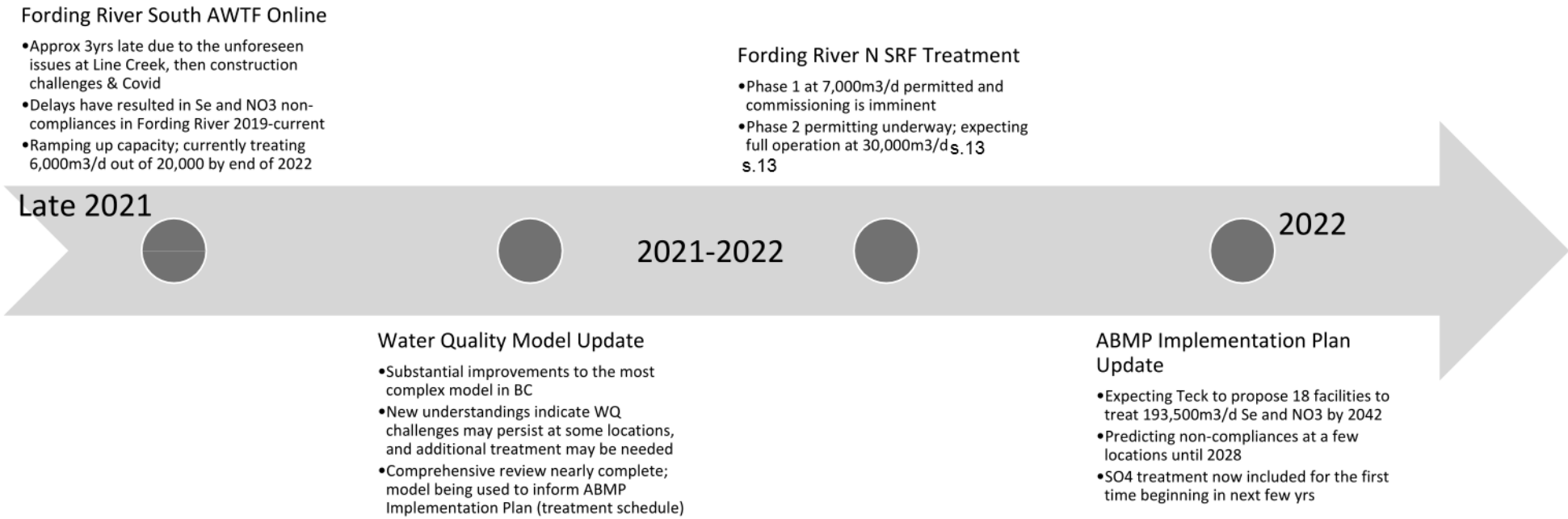
Water Quality

Water Quality - Mitigation History (1 of 2)



2014

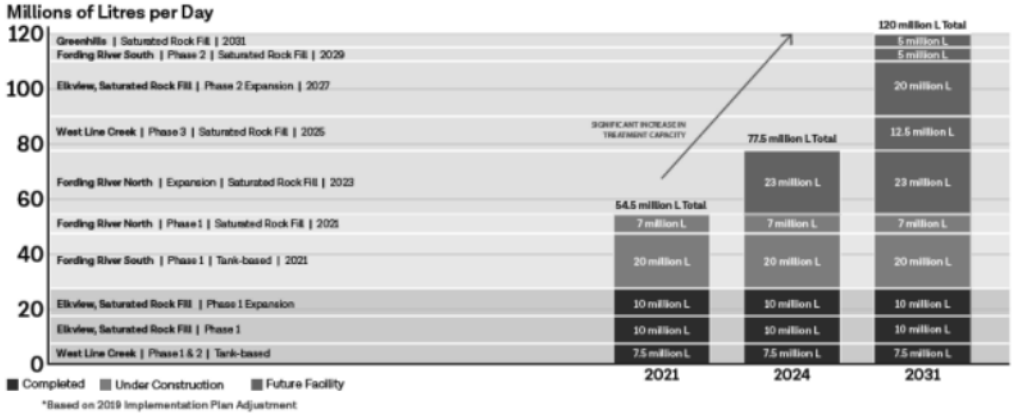
Water Quality - Mitigation History (2 of 2)



2014

Water Quality Mitigation – Current Status

- Water Treatment:
  - current investment implementing ABMP over $1B; will be over $2B by 2031 and more by 2042
  - Treatment capacity:



- Calcite
  - 5 Anti-scalant facilities now operating on tributaries to prevent future concretion of streambeds
  - Remediation projects under development to rehabilitate impacted streams
- Research & Development
  - Extensive investment; Teck is at the global forefront in developing technologies to mitigate coal mining impacts (source control & treatment)

Water Quality Mitigation – Current State of the Environment

- Teck has undertakes extensive monitoring & assessment
  - 7 water quality sites with targets or compliance points; 130+ water quality monitoring sites and many comprehensive assessment programs and special studies
- Water quality (WQ) is starting to stabilize (and reduce) at some target locations and compliance points; expecting full stabilization (and some reduction) by end of 2022 with new treatment facilities
- Mainstem river ecosystems are functioning, but chronic toxicity impacts are still detected; many tributaries are more heavily impacted
- Westslope Cutthroat Trout population crashes (Upper Fording R. and Harmer Cr.) not likely resulting from WQ; however, WQ combines with other mining stressors to create vulnerable populations
- Studies continue to find emerging issues (e.g. Nickel toxicity, Se speciation, etc.); using a structured Adaptive Management Program to respond
- Monitoring & assessment in Lake Koocanusa has not detected ecosystem impacts, although Se levels exceed proposed water quality objective (WQO) and some fish tissue exceeds conservative fish protection thresholds
- Majority of fish tissue samples in Koocanusa (98%) are below proposed WQO threshold for safe consumption

Area Based Management Plan (ABMP) [*aka Teck's Elk Valley Water Quality Plan]*

- Seems to be generally working
  - Plan is driving mitigation measures and provides a strategy for managing cumulative effects to WQ
  - Schedule delays for the major treatment facility in the Upper Fording R. watershed, the highest risk area, has been a challenge; expect to be back on track this year
  - Plan is driving extensive R&D investment, adaptive mgmt. and continuous improvement

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Compliance & Enforcement (C&E)

- ENV's extensive compliance activities are guided by a 4yr plan developed with input from KNC, covering all 26 of Teck's EMA permits
- ENV is coordinating C&E efforts with EMLI and EAO
- KNC is provided with quarterly compliance updates and has access to all inspection records; recently Administrative Monetary Penalty (AP) process now includes KNC input

Compliance & Enforcement (C&E)

- Approx. 170 comprehensive permit inspections since 2015
  - 34 inspections of the Valley-wide EMA Permit
  - Enforcement responses are escalating with more AP referrals for ongoing non -compliances

s.17

- Most WQ non-compliances are from 2 sites (Upper Fording in red box, Line Creek in light blue box). Other WQ sites are largely fully compliant.

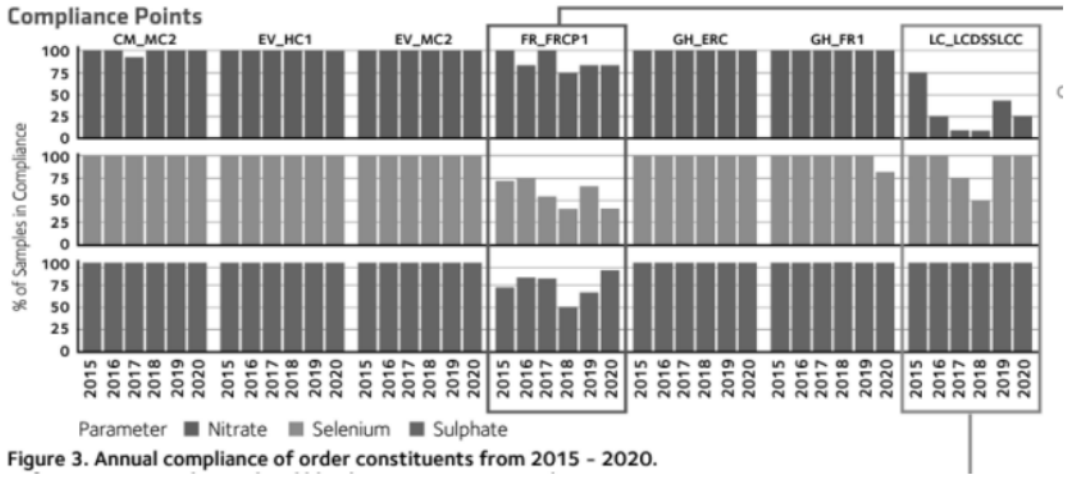


Figure 3. Annual compliance of order constituents from 2015 - 2020.

Key Messages

- Teck has been behind schedule on one major water treatment facility and this has significantly affected compliance with WQ targets in the Upper Fording R.; should be back on track in 2022
- By Dec 2022, Teck will s.13 have stabilized (and started to reduce in some places) Se and NO3 concentrations in the mainstems
- While WQ does not appear to be the cause of the trout population collapse, it is a stressor and is contributing to elevated risk and some chronic impacts in mainstems, and measurable impacts in some tributaries.
- BC shares KNC's concern about the importance of mitigating WQ impacts, and is taking action.
  - BC staff continue to prioritize application reviews for mitigation projects s.13
  - Internal amendments are being made to strengthen environmental protection requirements s.13 s.13
  - Reversal of historic trends will take time, and an incremental approach is needed
- Given the current context of unmitigated historical impacts, careful strategic decisions are needed to maximize the benefits from current and future mitigations; this involves trade-offs and balancing of factors in a unique way
- Updated ABMP will improve use of this tool to manage cumulative effects and WQ, and support transparent decision-making. A review of the Se target in Koocanusa may indicate additional treatment requirements.

FW: Request: materials for March 29th Multi-Minister briefing on state of Elk Valley

From: Downie, AJ ENV:EX
To: Carroll, Deborah ENV:EX <Deborah.Carroll@gov.bc.ca>
Sent: March 21, 2022 3:27:04 PM PDT
Attachments: image001.png, Min Briefing Slides.pptx

AJ

A.J. Downie
778-671-0133
AJ.Downie@gov.bc.ca

Water Quality Timeline:

- Pre-2013 – Decades of mining activity with a relatively poor understanding of risks/impacts; led to stripped mountains, valleys filled with 5km3 of waste rock, extensive alteration of land and watercourses, and degrading WQ trends
- 2014 – ENV Minister approves EVWQP, a plan to stabilize and reduce mine-related contaminants in the watershed. Supported by extensive, world-leading scientific assessment. Valley-wide EMA Permit subsequently issued to Teck. Short, Medium and Long Term Water Quality Targets established for 7 Order Stations, and Limits set at 7 additional Compliance Points for Se, NO3, SO4 and Cd. These mainstem targets range from conservative, low-risk WQG levels at downstream far-field locations, to levels that exceed protective benchmarks in the upper reaches at levels where effects are expected in the Fording River (For context: Fording River Compliance Points for Se have been 60-90ug/L monthly average, dropping to just less than 60 by 2023; WQG = 2ug/L for protection of aquatic life based on sensitive (lake) environments) . The Plan provides for area-based management that includes tacit acknowledgement of localized effects, and supports trade-offs to be made so bigger picture goals can be met most efficiently.
- 2016 (?) – First AWTF comes online at West Line Creek, treating 7500m3/d. An unexpected fish kill results in a shutdown and 2yr effort to assess and re-jig the plant.
- 2018 – WLC AWTF back online with Advanced Oxidation Process (AOP).
- 2018 – Full-scale pilot SRF permitted at EVO – brand new technology, developed by Teck. SRF technology is much more promising as viable long-term treatment option (much more robust than AWTF; less complex infrastructure; uses existing pits; significantly lower capital and operating cost). Authorized at 10,000m3/d. Effective Se removal observed. Ni identified as new concern.
- 2020 – Expansion of EVO-SRF to 20,000m3/d. Shift in Teck's approach to move towards use of SRF much more broadly, instead of AWTF.
- 2021 – Commencement of commissioning of the second AWTF at FRO-S, almost 3 years behind schedule. Delays are primarily due to having to "pause" while issues worked out at WLC, but also construction/contractor issues, which were later compounded by Covid. Currently operating Train 1 at approx. 6,000m3/d. Expect all 3 treatment trains online by end of 2022, at which time it will treat 20,000m3/d
- 2021 – Significant update to the RWQM submitted, currently under review. Model is likely the most complex in BC, resulting from 3yr effort[s.21] Includes much greater understanding of XXXXXXXXX. Has revealed that situation may be slightly more challenging to manage, due to updated understanding of Se release mechanisms and contaminant transport including through groundwater.
- 2021 – Phase 1 FRO-N SRF permitted at 7,000m3/d; commissioning commences.

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- Current 2022 – Teck currently working on an update to their ABMP Implementation Plan – expecting to see a plan with approx. 18 facilities/expansions proposed, treating 193,500 m3/d by 2042. The Plan still predicts non-compliances at a few locations as late as 2028. Plan also includes for the first time, Teck's plan to address SO4,

which to date has not been an issue but will be an issue in the future (so far, they have only been treating Se and NO3).
- Teck has developed and implemented technology to prevent calcite deposition on streambeds, and currently has 5 antiscalant plants operating on tributaries and will continue to deploy this technology. Teck is also developing pilot projects to remediate impacted streams.
- To date Teck has spent approx. $1B on implementing the ABMP, and will have spent well over $2B by 2031.

s.13

- Ongoing – Teck has an extensive R&D program in place; they have been and continue to be at the global forefront in developing technologies and approaches to mitigate coal mining impacts, including source control (use of water diversions, geosynthetic covers, blasting practices, etc.) and treatment.

State of WQ:

- Including the 14 Target Stations and Compliance points, Teck is required to monitor WQ at approx. 130 locations – most comprehensive monitoring and assessment program out there. They also have extensive Regional and Local Aquatic Effects Monitoring Programs to detect and study impacts.
- Starting to see stabilization of Se and NO3 and in some areas, and even some limited reduction. Expect this to be more prevalent by end of this year once more treatment facilities come online.
- Monitoring shows that aquatic ecosystems in mainstems are functioning, but chronic toxicity impacts are present. These should go down as treatment comes online.
- Evaluation of Cause for Fording River WCT population crash of 2019 does not point to WQ; however, it is acknowledged that all stressors including WQ may create vulnerability in the population.
- Many tributaries are heavily impacted. With new applications/proposals we are taking steps to ensure these impacts are understood and where possible mitigated (e.g. calcite anti-scalant).
- A fish population crash was also observed in Harmer Creek in 2019; other tributary populations are small and vulnerable.
- Other issues are emerging and under study: Ni, selenium speciation, groundwater?
- Monitoring and Assessment programs have not detected aquatic ecosystem impacts in Koocanusa, despite Se levels being above the proposed WQO most of the time. Some fish tissue samples are above the conservative threshold noted in the WQO for protection of fish health.
- Majority, but not all, fish tissue samples from Koocanusa are below proposed WQO threshold for safe fish consumption, at Health Canada consumption levels as well as the higher preferred consumption levels for Ktunaxa.

ABMP:

- Seems to be working – it is driving mitigations, although Teck has been behind schedule for first major facility in the Upper Fording River watershed, the highest risk area. Expect Teck to be back on track this year.
- Driving extensive R&D investment, adaptive mgmt. and continuous improvement.

s.13

Compliance:

- ENV's Compliance activities for Teck are guided by a 4 Year Compliance Plan that has been developed with input from KNC. The plan covers all 26 of Teck's SE Coal permits.
    - The Valley Permit (107517) is the key permit which has legally binding commitments to reduce Selenium and contaminant concentrations in the environment. The Valley Permit has quarterly inspections on water quality results, and an annual comprehensive review.
    - Eight effluent permits for specific mining operations are inspected annually.
    - There are 18 other permits for discharges to air, refuse, and explosives that are inspected at least once every four years.

- Ktunaxa Nation Council (KNC) is provided with quarterly compliance updates and has access to all inspection records.
- Recently, the Administrative Monetary Penalty (AP) process is including KNC input in the AP decision-making by providing input to the statutory decision maker to consider.
- There have been approx. 170 comprehensive permit inspections in the SE Coal area since 2015.
  - Total of 34 inspections on the Valley Permit (2 Notices of Compliance, 5 Advisories, 12 Warnings, 13 AMP referrals and 2 Investigations).
  - Enforcement responses are escalating as non-compliances continue; significant penalties are under review and consideration by SDM .
  - Overall, only approx. 30% of all inspections result in a Notice of Compliance (no non-compliances at all; even one administrative non-compliance means that a Notice is not issues).
  - From WQ perspective, in 2020 most data points are within compliance, except at 2 compliance points: In Line Creek – only 25% compliance for NO3 and XX% for Se. In Upper Fording River – only XX% compliance for NO3 and 42% compliance for Se. (Related to delays in FRO-S)

s.13

- Teck has implemented a "Task Force" to develop and implement an action plan to address outstanding and recurring non-compliances.
- Next Steps for ENV (& BC):
  - Continued focus on enhancing interagency compliance coordination, and continued exploration of opportunities for meaningful KNC engagement and participation.
  - Continue with escalated enforcement, per agencies' respective C&E inspection plans and policies, to incentivize compliance
  - Permitting teams will prioritize application reviews for mitigation projects or other applications that are necessary to support Teck in getting back into compliance

AJ

A.J. Downie
778-671-0133
AJ.Downie@gov.bc.ca

From: von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>
Sent: March 16, 2022 1:24 PM
To: Jackson, Jolene EMLI:EX <Jolene.Jackson@gov.bc.ca>; Moore, Sean ENV:EX <Sean.Moore@gov.bc.ca>; Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>; Nelless, Brady ENV:EX <Brady.Nelless@gov.bc.ca>; Constable, Lowell EMLI:EX <Lowell.Constable@gov.bc.ca>; Fekete, Warren EAO:EX <Warren.Fekete@gov.bc.ca>; Danks, Anthony ENV:EX <Anthony.Danks@gov.bc.ca>; Goodsell, Todd EAO:EX <Todd.Goodsell@gov.bc.ca>; Morello, Ray FLNR:EX <Ray.Morello@gov.bc.ca>; Giles, Wayne IRR:EX <Wayne.Giles@gov.bc.ca>
Cc: Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>; Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>; Shepard, Michael EAO:EX <Michael.Shepard@gov.bc.ca>
Subject: Request: materials for March 29th Multi-Minister briefing on state of Elk Valley

Good morning,

I'm seeking assistance in building a slide deck to support a multi-Minister briefing on March 29th. The purpose of this briefing is to provide Ministers an update on the current picture of all things Elk Valley in preparation for the April 11th Leadership meeting with Ktunaxa. The key supporting document for this briefing will be this slide deck, however I am aware of many existing BNs on the topics included, so we may want to also consider updating those and including as supplemental materials. We will also be developing a briefing package for the April 8th leadership meeting briefing, so any supplemental materials can also be used for that.

I've created a draft slide deck and posted it on our SE Teams site, located here: Minister Briefing March 29 - current state.pptx (*please let me know if you're unable to access*)

I'm hope you're able to provide content specific to your area of expertise, focusing on the key messaging we want to convey to Ministers on what is currently happening and/or future projections. This briefing is for Ministers, so less is more. This deck is guaranteed to go through many revisions, so I'm hoping we're able to get a solid starting draft by early next week. Please have your additions done by end of day **Monday March 21st**.

To help guide your input:

- All: please review the general content of the deck. Is anything key missing?
- Slide 6 - Current state Teck plans: **Jolene/Chris**
- Slide 7 – Current state water quality and ABMP: **Sean/AJ** (and team) note: could perhaps split into two slides
- slide 8 – Current state compliance: **AJ/Brady/Lowell/warren (others?)**
- Slide 9 – Current state IJC and CMER – **Anthony**
- Slide 10 – Current state EA assessments – **Todd**
- Slide 11 – Current state stewardship – **Ray**
- Slide 12 – Governance – **Wayne**
- Slide 13: FRX decision - **Todd**

Summary of upcoming briefings:

- March 29th: multi-Minister briefing on state of the Elk Valley
- April 8th: multi-Minister briefing for April 11th Leadership meeting
- April 11th: Ktunaxa-BC Leadership meeting

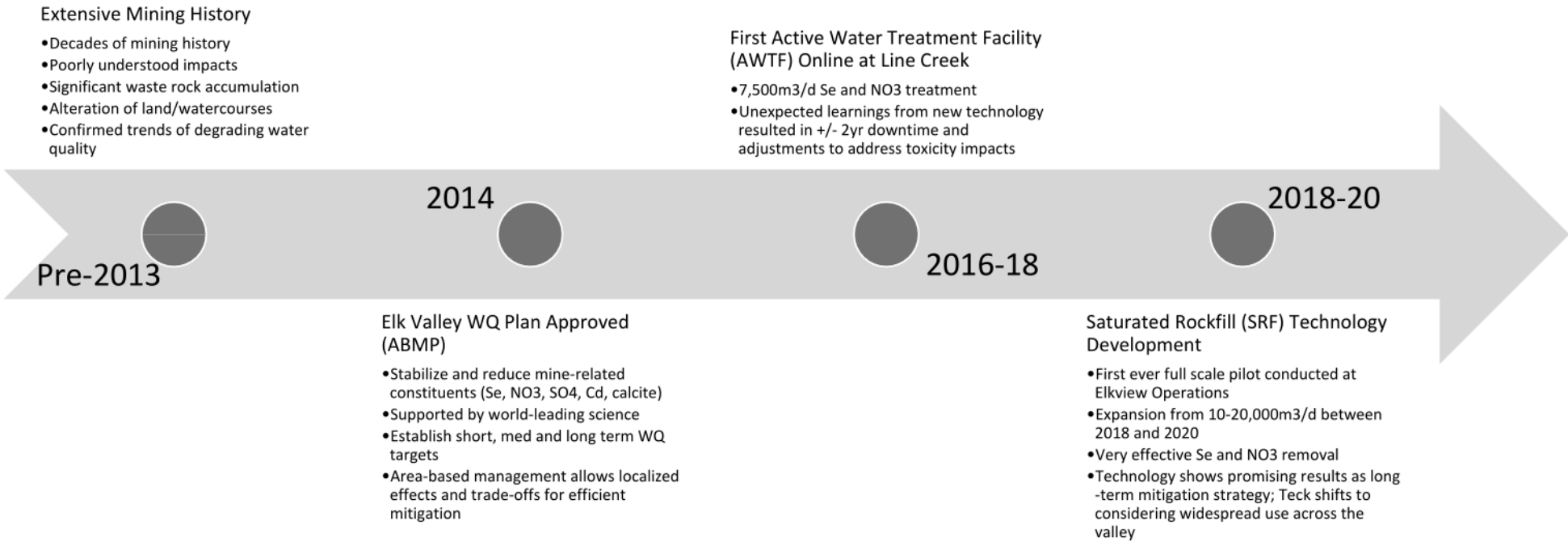
Please reach out if you need further context or clarification – I'm more than happy to chat anytime! Also, please solicit input from anyone else…I took a bit of a guess for some of the topics.

Thanks in advance for your support,

Katie.

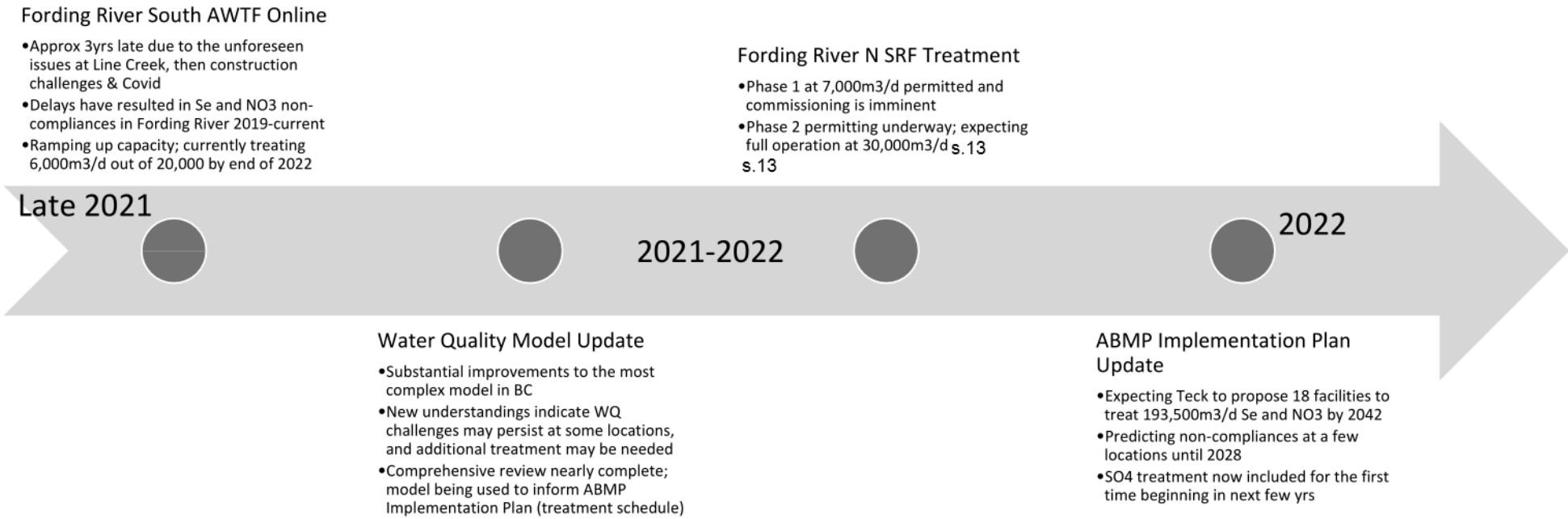
Water Quality

Water Quality - Mitigation History (1 of 2)



2014

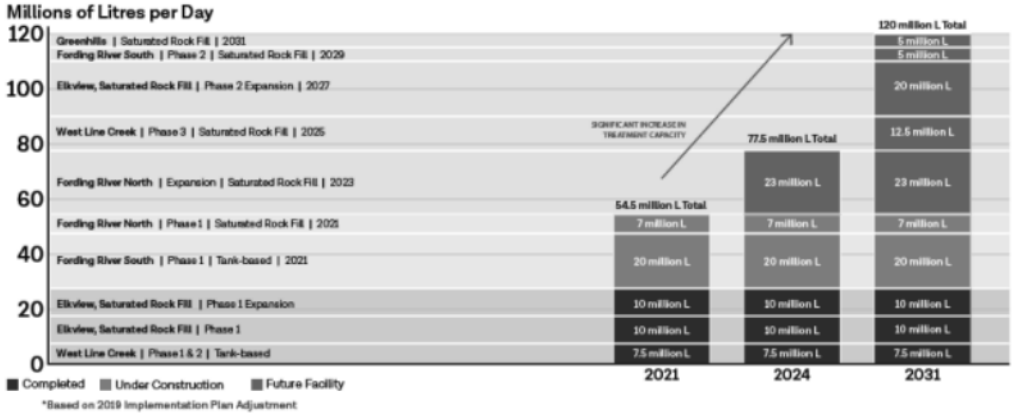
Water Quality - Mitigation History (2 of 2)



2014

Water Quality Mitigation – Current Status

- Water Treatment:
  - current investment implementing ABMP over $1B; will be over $2B by 2031 and more by 2042
  - Treatment capacity:



- Calcite
  - 5 Anti-scalant facilities now operating on tributaries to prevent future concretion of streambeds
  - Remediation projects under development to rehabilitate impacted streams
- Research & Development
  - Extensive investment; Teck is at the global forefront in developing technologies to mitigate coal mining impacts (source control & treatment)

Water Quality Mitigation – Current State of the Environment

- Teck has undertakes extensive monitoring & assessment
  - 7 water quality sites with targets or compliance points; 130+ water quality monitoring sites and many comprehensive assessment programs and special studies
- Water quality (WQ) is starting to stabilize (and reduce) at some target locations and compliance points; expecting full stabilization (and some reduction) by end of 2022 with new treatment facilities
- Mainstem river ecosystems are functioning, but chronic toxicity impacts are still detected; many tributaries are more heavily impacted
- Westslope Cutthroat Trout population crashes (Upper Fording R. and Harmer Cr.) not likely resulting from WQ; however, WQ combines with other mining stressors to create vulnerable populations
- Studies continue to find emerging issues (e.g. Nickel toxicity, Se speciation, etc.); using a structured Adaptive Management Program to respond
- Monitoring & assessment in Lake Koocanusa has not detected ecosystem impacts, although Se levels exceed proposed water quality objective (WQO) and some fish tissue exceeds conservative fish protection thresholds
- Majority of fish tissue samples in Koocanusa (98%) are below proposed WQO threshold for safe consumption

Area Based Management Plan (ABMP) [*aka Teck's Elk Valley Water Quality Plan]*

- Seems to be generally working
  - Plan is driving mitigation measures and provides a strategy for managing cumulative effects to WQ
  - Schedule delays for the major treatment facility in the Upper Fording R. watershed, the highest risk area, has been a challenge; expect to be back on track this year
  - Plan is driving extensive R&D investment, adaptive mgmt. and continuous improvement

s.13

Compliance & Enforcement (C&E)

- ENV's extensive compliance activities are guided by a 4yr plan developed with input from KNC, covering all 26 of Teck's EMA permits
- ENV is coordinating C&E efforts with EMLI and EAO
- KNC is provided with quarterly compliance updates and has access to all inspection records; recently Administrative Monetary Penalty (AP) process now includes KNC input

Compliance & Enforcement (C&E)

- Approx. 170 comprehensive permit inspections since 2015
  - 34 inspections of the Valley-wide EMA Permit
  - Enforcement responses are escalating with more AP referrals for ongoing non-compliances

s.17

- Most WQ non-compliances are from 2 sites (Upper Fording in red box, Line Creek in light blue box). Other WQ sites are largely fully compliant.

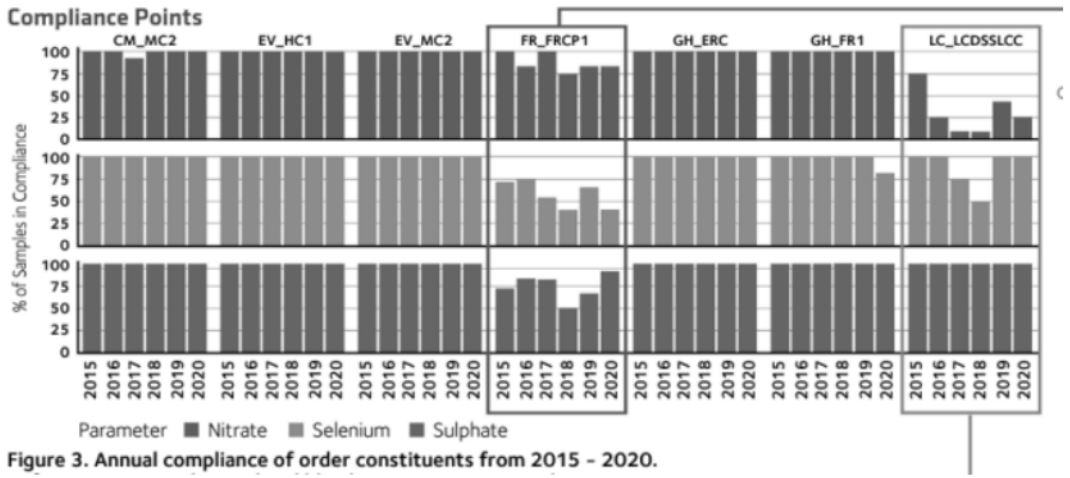


Figure 3. Annual compliance of order constituents from 2015 - 2020.

Key Messages

- Teck has been behind schedule on one major water treatment facility and this has significantly affected compliance with WQ targets in the Upper Fording R.; should be back on track in 2022
- By Dec 2022, s.13 will have stabilized (and started to reduce in some places) Se and NO3 concentrations in the mainstems
- While WQ does not appear to be the cause of the trout population collapse, it is a stressor and is contributing to elevated risk and some chronic impacts in mainstems, and measurable impacts in some tributaries.
- BC shares KNC's concern about the importance of mitigating WQ impacts, and is taking action.
  - BC staff continue to prioritize application reviews for mitigation projects

s.13

  - Internal permit amendments are being made to strengthen environmental protection requirements s.13

s.13

  - Reversal of historic trends will take time, and an incremental approach is needed
- Given the current context of unmitigated historical impacts, careful strategic decisions are needed to maximize the benefits from current and future mitigations; this involves trade-offs and balancing of factors in a unique way
- Updated ABMP will improve use of this tool to manage cumulative effects and WQ, and support transparent decision-making. A review of the Se target in Koocanusa may indicate additional treatment requirements.

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Withheld pursuant to/removed as

s.12 ; s.13 ; s.16

Ministry of Environment and Climate Change Strategy

CLIFF / eApprovals #: [XXXXX / XXXX]

File #: [leave blank if file number not used]

INFORMATION BULLETS

DATE: March 29, 2022

PREPARED FOR: Honourable George Heyman, Minister of Environment and Climate Change Strategy

ISSUE: Water Quality in the SE Coal Block: mitigation history, current state of the environment, and compliance & enforcement

SUMMARY AND KEY MESSAGES:

- The ABMP seems to be generally working:
  - The plan is driving significant investment in WQ mitigation measures, and provides a strategy for adaptively managing cumulative effects
  - Schedule delays for the FRO-S AWTF have been a challenge, resulting in significant continuing localized non-compliances for the past 3yrs; however, Teck expects to be back on schedule with treatment facility construction this year
  - Based on updated models and improved science, Teck is predicting full compliance with ABMP targets by 2028.
- Even with full compliance, the ABMP allows for localized effects in the short and medium term while working towards increased protection and reduced risk over time.
- ENV is in a process to co-develop an amendment to the ABMP with KNC, formally commencing in 2022. s.13

s.13

- Permitting teams will prioritize application reviews for mitigation projects or other applications that are necessary to support Teck in getting back into compliance.

KEY FACTS:

<u>Water Quality: Mitigation History & Timeline</u>

- Decades of mining activity in the SE Coal Block of B.C. led to significant waste rock accumulation, alteration of land and watercourses, poorly understood environmental impacts and degrading water quality (WQ) trends.
- In 2014 the ENV Minister approved an Area Based Management Plan (ABMP), titled the Elk Valley Water Quality Plan, to stabilize and reduce mine-related contaminants in the watershed. The ABMP provides for regional management that allows localized environmental effects and supports trade-offs for efficient mitigation of watershed-scale impacts.

- The ABMP established short-, medium- and long-term WQ targets for Selenium (Se), Nitrate (NO_3), Sulphate (SO_4) and Cadmium (Cd) that range from B.C. water quality guideline levels which are fully protective) (at downstream sites), to site-specific targets levels that exceed thresholds where effects are expected (but are unlikely to be ecologically significant at the watershed/population level scale).
- After the ABMP was approved, ENV issued a valley-wide permit (the Valley Permit) to Teck under the *Environmental Management Act* to enforce commitments made in the ABMP.
- An implementation plan (i.e. treatment schedule) and the Regional Water Quality Model (RWQM) that support the ABMP must both be updated every three years.
- In 2015, the first Active Water Treatment Facility (AWTF) came online at West Line Creek (WLC), treating up to 7500m^3/d. Unexpectedly, the new technology resulted in toxicity impacts and Teck experienced reduced flows and downtime when the system had to be upgraded and adjusted.
- The challenges with the WLC AWTF, compounded with construction issues and COVID, caused delays in commissioning the second AWTF at Fording River Operations South (FRO-S), which commenced almost three years late in 2021. FRO-S AWTF is expected to be operating at full capacity by the end of 2022, treating 20 000m^3/d.
- In 2018, a full-scale pilot of Saturated Rock Fill (SRF) technology was permitted at Teck's Elkview Operations (EVO) to treat Se and NO_3. SRF technology is more robust, requires less complex infrastructure, and has lower capital and operating costs than AWTFs.
- In 2020, the EVO SRF pilot was expanded, and Teck began shifting their broad treatment approach to include SRFs. In early 2022, commissioning of a second SRF commenced at Fording River Operations North (FRO-N). Full operation at 30,000m^3/d is expected in 2023.
- Teck made significant updates to the RWQM in 2021, compared to the previous version from 2018. The model is likely the most complex and robust in BC. It provides updated projections of Se and NO_3 release and contaminant transport through groundwater. The model has been comprehensively reviewed.
- Teck is applying learnings from the RWQM to develop an implementation plan adjustment (IPA) which is expected to propose 18 facilities and/or expansions and to commit to treating 193,500 m^3/d by 2042 in order to achieve ABMP targets. See Figure 1.
- To date, Teck reports investments of over $1B implementing the ABMP, and by 2031 they will have invested close to $2B.
- The 2022 IPA is still predicting possible Se and NO_3 non-compliances at a few locations as late as 2028.
- For the first time, the 2022 IPA will also include Teck's plan to address sulphate though additional treatment modules at their existing and proposed treatment facilities.
- Teck has also developed antiscalant technology to prevent calcite deposition on streambeds, is currently operating five antiscalant plants over nine tributaries, and is developing pilot projects to remediate impacted streams.
- Teck continues to invest heavily in research and development (R&D) and is at the global forefront in developing source control and treatment to mitigate coal mining impacts.

<u>Water Quality: Current State of the Environment</u>

- Teck is required to monitor WQ at approximately 130 locations, and conducts numerous studies and assess mine-related impacts.

- Monitoring shows that aquatic ecosystems in mainstems are functioning, but chronic toxicity impacts are present in some areas. Many tributaries are heavily impacted both from infill and water quality.
- Monitoring and assessment programs have not detected aquatic ecosystem impacts in the Koocanusa reservoir, despite Se levels being above the proposed Water Quality Objective (WQO) most of the time and many fish tissue samples above the conservative threshold for potential aquatic life impacts. Further species sensitivity threshold studies are underway to better understand any risks posed by Se in the reservoir.
- The majority, but not all, fish tissue samples from Koocanusa are below the WQO threshold for safe fish consumption at Health Canada consumption levels and Ktunaxa preferred consumption levels.
- Studies continue to find other emerging issues in SE Coal, such as Nickel toxicity, that are being addressed using the structured Adaptive Management Program defined in the ABMP.
- Evaluation of Cause for the Upper Fording River Westslope Cutthroat population crash of 2019 (and Harmer Creek crash of 2020) does not point to WQ as a primary factor; however, WQ combines with other mining stressors and may create vulnerability in the population.

<u>Water Quality: Compliance and Enforcement</u>

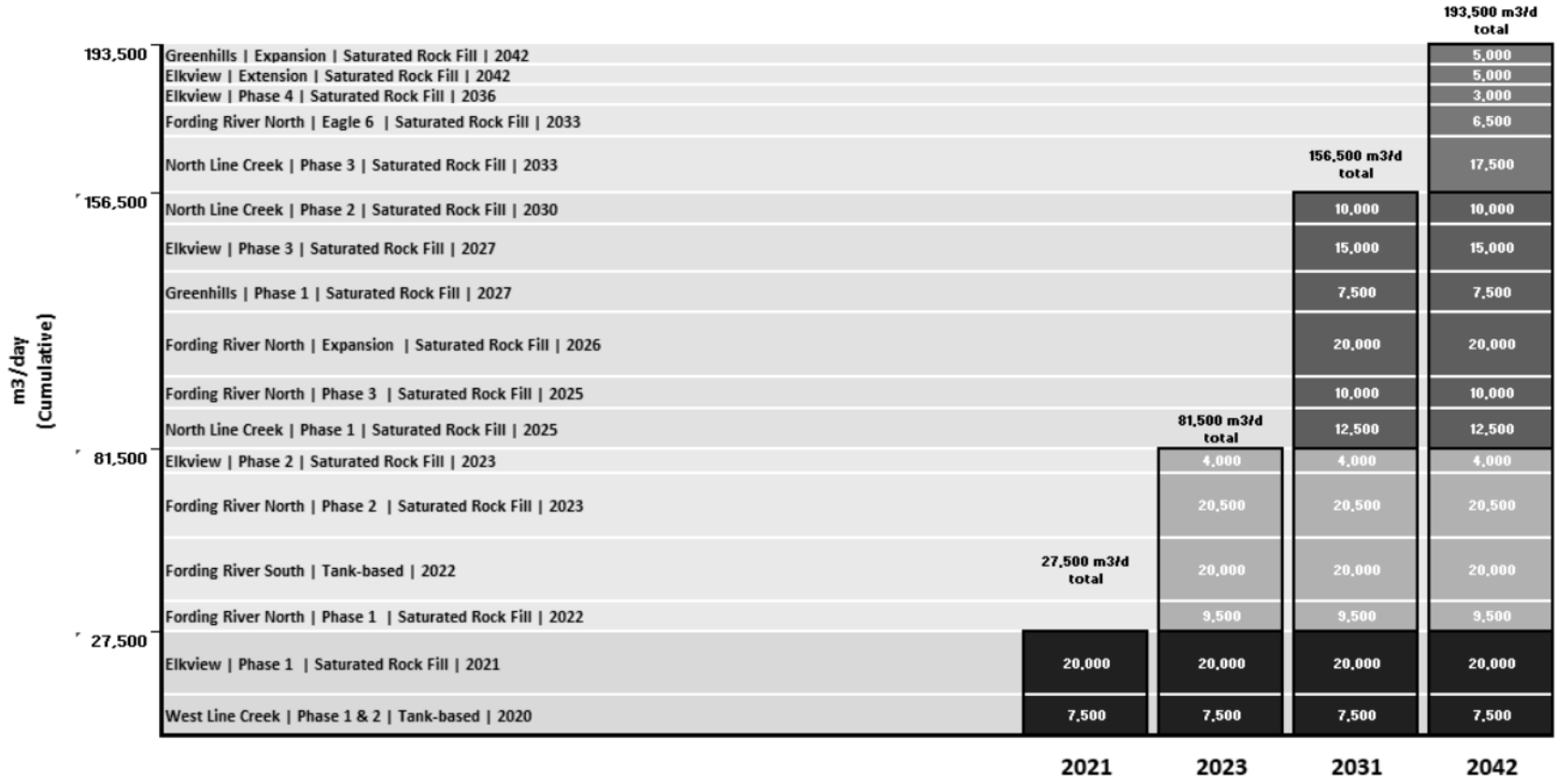
- ENV takes a risked-based approach to compliance and enforcement activities for Teck as guided by ministry policies and procedures. In addition to those policies and procedures a 4 Year Compliance Plan has been developed with input from the Ktunaxa Nation Council (KNC). The compliance plan covers all 26 of Teck's EMA authorizations:
    - The Valley Permit has quarterly inspections on WQ results and an annual comprehensive review
    - Eight effluent permits for specific mining operations are inspected annually
    - Eighteen other authorizations for discharges to air, refuse, and explosives are inspected at least once every four years
- KNC is provided with quarterly compliance updates and all inspection records. Recently, the Administrative Monetary Penalty (AP) process began providing KNC an opportunity to provide input to the statutory decision maker to consider, prior to a final determination on the AP.
- In 2020 most WQ data at compliance points was in compliance, except at two sites: Line Creek had only 25% compliance for monthly NO_3 and 98% for Se; and Upper Fording River had 83% compliance for NO_3 and 42% compliance for Se (related primarily to delays in FRO-S AWTF).
- There have been approximately 170 comprehensive permit inspections in the SE Coal area since 2015, including a total of 34 inspections on the Valley Permit which resulted in two Notices of Compliance, five Advisories, 12 Warnings, 13 AP referrals and two Investigations.
- Enforcement responses are escalating as non-compliances continue. There has been approximately $475K in APs assessed to Teck, s.15

s.15

- Teck has implemented a "Task Force" to develop and implement an action plan to address outstanding and recurring non-compliances.
- WQ is starting to stabilize at some target locations and is expected to improve by the end of 2022 with new treatment facilities coming online.

Assistant Deputy Minister:	Alternate contact for content:	Prepared by:
Laurel Nash, ADM *EPD* *250-508-1670*		*A.J. Downie, SE Coal Director* *Regional Operations Branch, EPD* *250-802-7149*

Figure 1: Treatment Facililities Expected to be Proposed in Teck's 2022 IPA



*In 2021, Teck was treating approx. 27,500 m3/d. As of March 2022 they are permitted to treat 57,000m3/d and are increasing capacity to reach that level. By 2042 they are predicting to need to treat 193,500 m3/d.

Ministry of
Indigenous Relations
and Reconciliation

MEETING BULLETS

DATE: April 11th, 2022

PREPARED FOR: Honourable Bruce Ralston, Minister of Energy and Mines and Low Carbon Innovation
Honourable George Heyman, Minister of Environment and Climate Change Strategy
Honourable Josie Osborne, Minister of Land, Water and Resource Stewardship
Honourable Murray Rankin, Minister of Indigenous Relations and Reconciliation

Deputy Minister Doug Caul, Ministry Indigenous Relations and Reconciliation
Deputy Minister Kevin Jardine, Ministry of Environment and Climate Change
Deputy Minister Fazil Mihlar, Ministry of Energy, Mines and Low Carbon Innovation
Deputy Minister Lori Halls, Ministry of Land, Water and Resource Stewardship
Deputy Minister Rick Manwaring, Ministry of Forests
Associate Deputy Minister, Elenore Arend, Environmental Assessment Office

REGARDING: April 11th Leadership meeting with Ktunaxa.

s.16

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Withheld pursuant to/removed as

s.16

2022-04-07 Pre-brief MATERIALS: Ktunaxa-BC Leadership Meeting

From: Mattu, Jamin ENV:EX <Jamin.Mattu@gov.bc.ca>
To: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
Sent: April 6, 2022 9:56:57 AM PDT
Attachments: 2. Key Messages - April 11th Leadership Meeting.docx, 4. CLIFF#_InfoBullets_SE Coal WQ and Compliance - 29March2022.docx, image001.png, 3. 2022 04 07 KNC governance approach.docx, 1. Agenda Ktunaxa-BC April 11th Leadership meeting - BC annotated internal.docx

---

From: O'Brien, Kellie ENV:EX <Kellie.O'Brien@gov.bc.ca>
Sent: April 6, 2022 9:52 AM
To: Mattu, Jamin ENV:EX <Jamin.Mattu@gov.bc.ca>; Eckardt, Dana R ENV:EX <Dana.Eckardt@gov.bc.ca>; Carter, Elizabeth S ENV:EX <Elizabeth.S.Carter@gov.bc.ca>
Cc: Rhodes, Angie ENV:EX <Angie.Rhodes@gov.bc.ca>
Subject: FW: MATERIALS: Ktunaxa-BC Leadership Meeting

Hi Jamin,

Please find attached materials for tomorrows pre-brief and for Monday's meeting.

Cheers,
K

Kellie O'Brien (she/her) | Senior Executive Assistant to Kevin Jardine
Deputy Minister, Ministry of Environment and Climate Change Strategy
C: 250-886-2150
E: Kellie.O'Brien@gov.bc.ca

Where ideas work

This e-mail is confidential and is intended only for the person(s) to whom it is addressed. Any distribution, copying, or other use by anyone else is strictly prohibited. If you received this e-mail in error, please destroy this e-mail and contact me directly.

From: McCann, Meghan EMLI:EX <Meghan.McCann@gov.bc.ca>
Sent: April 6, 2022 9:46 AM
To: Howie, Matthew IRR:EX <Matthew.Howie@gov.bc.ca>; Blackstock, Sara FLNR:EX <Sara.Blackstock@gov.bc.ca>; Woodberg, Charlotte EAO:EX <Charlotte.Woodberg@gov.bc.ca>; Olsson, Liz V FLNR:EX <Liz.Olsson@gov.bc.ca>; Rhodes, Angie ENV:EX <Angie.Rhodes@gov.bc.ca>
Cc: O'Brien, Kellie ENV:EX <Kellie.O'Brien@gov.bc.ca>
Subject: MATERIALS: Ktunaxa-BC Leadership Meeting

Good morning everyone,

Please see attached materials for tomorrow's pre-brief and Monday's meeting. Please share with your MOs, DMs and staff attending, thanks.

From: von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>
Sent: April 6, 2022 9:23 AM
To: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>; Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>; Shepard, Michael EAO:EX <Michael.Shepard@gov.bc.ca>; Bodnar, Ashley IRR:EX <Ashley.Bodnar@gov.bc.ca>; Morello, Ray FLNR:EX <Ray.Morello@gov.bc.ca>
Subject: April 11th Ktunaxa-BC Leadership Meeting - Briefing materials

"Final" materials for distribution:

Page 133 of 281 to/à Page 146 of 281

Withheld pursuant to/removed as

s.16

RE: Kevin/MGH Check-in Update: 2022-04-14 SE Coal Update

From: Fairweather, Karen ENV:EX <Karen.Fairweather@gov.bc.ca>
To: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>, Miller, Lana L ENV:EX <Lana.Miller@gov.bc.ca>
Cc: Terry, Kyle ENV:EX <Kyle.Terry@gov.bc.ca>
Sent: April 25, 2022 12:50:37 PM PDT
Attachments: 2022 IPA Overview BC KNC_Mtg 5.pdf, 2022 IPA Overview BC KNC_Mtg 6.pdf, 2021-05-18 Compliance Summary_KF.docx

Hi AJ, based on the two presentations we've seen during pre-engagement meetings for the 2022 IPA submission planned for May 31, 2022 (attached) I've updated the document with new projections. Please let me know if you need anything further.

Thanks,
Karen

From: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
Sent: April 25, 2022 8:55 AM
To: Miller, Lana L ENV:EX <Lana.Miller@gov.bc.ca>; Fairweather, Karen ENV:EX <Karen.Fairweather@gov.bc.ca>
Cc: Terry, Kyle ENV:EX <Kyle.Terry@gov.bc.ca>
Subject: FW: Kevin/MGH Check-in Update: 2022-04-14 SE Coal Update
Importance: High

Hi Lana and Karen (and Kyle, since he can likely assist with this)

About a year ago, some information was provided to me about all the ongoing non-compliances. I seem to recall that most if not all are longstanding seasonal non-compliances that were predicted in the last IPA due to the time required to efficiently and effectively bring water treatment facilities online.

I managed the find the file so I'm attaching it to this email. There's no need to update all the exceedance details but for each location listed in the table, can you pls confirm if the "notes" are still accurate? If they are not accurate, or if you have any additional commentary, pls add it using track changes.

If not already noted, could you also please add into the notes column a sentence summarizing what we understand to be the latest prediction for when full compliance will be achieved based on the IPA.

I will need this back today as it sounds like the DM would like a pre-brief before we go meet with the Minister.

Thanks in advance for your assistance.

AJ

A.J. Downie
778-671-0133
AJ.Downie@gov.bc.ca

From: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>
Sent: April 25, 2022 8:44 AM
To: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
Cc: Mattu, Jamin ENV:EX <Jamin.Mattu@gov.bc.ca>; Caunce, Cassandra ENV:EX <Cassandra.Caunce@gov.bc.ca>
Subject: FW: Kevin/MGH Check-in Update: 2022-04-14 SE Coal Update

Good morning AJ.
Lets discuss on our call this morning.
Thanks

Laurel Nash *(she/her)*

Assistant Deputy Minister

Environmental Protection Division
Ministry of Environment &
Climate Change Strategy
☎ (250) 953-4004 or (250) 508-1670
Laurel.Nash@gov.bc.ca

I am grateful to live and work on the beautiful traditional territory of the Lekwungen speaking people and the Songhees, Esquimalt and WSÁNEĆ peoples whose historic relationships with the land and sea continue to this day.

To report an act of pollution, call the RAPP (Report All Poachers and Polluters) line at 1-877-952-7277 or #7277 on the TELUS Mobility Network or report the incident online.

From: Jardine, Kevin ENV:EX <Kevin.Jardine@gov.bc.ca>
Sent: April 25, 2022 8:38 AM
To: Meadows, Jennifer L ENV:EX <Jennifer.Meadows@gov.bc.ca>; Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>; O'Brien, Kellie ENV:EX <Kellie.O'Brien@gov.bc.ca>
Cc: Mattu, Jamin ENV:EX <Jamin.Mattu@gov.bc.ca>
Subject: Re: Kevin/MGH Check-in Update: 2022-04-14 SE Coal Update

Thanks, Jennifer. Prebrief would be great.

Best,
K.
Kevin Jardine, Deputy Minister
Ministry of Environment & Climate Change Strategy
250-361-6753

From: Meadows, Jennifer L ENV:EX <Jennifer.Meadows@gov.bc.ca>
Sent: Monday, April 25, 2022 8:01:11 AM
To: Jardine, Kevin ENV:EX <Kevin.Jardine@gov.bc.ca>; Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>; O'Brien, Kellie ENV:EX <Kellie.O'Brien@gov.bc.ca>
Cc: Mattu, Jamin ENV:EX <Jamin.Mattu@gov.bc.ca>
Subject: Kevin/MGH Check-in Update: 2022-04-14 SE Coal Update

Good morning,

As per below, Minister would like to discuss in more detail KNC opposition to Line Creek proposals and the 3 non-compliance sites at tomorrow's check-in.

Laurel, I would like to schedule a pre-brief with you and Kevin tomorrow am in advance of his check-in.

Kellie, please work with Jamin to schedule.

Kevin, if feel there is not a need for a pre-brief, please advise and we can cancel.

Thank you,
Jennifer

From: Chang, Stephanie ENV:EX <Stephanie.Chang@gov.bc.ca>
Sent: April 22, 2022 3:41 PM
To: Meadows, Jennifer L ENV:EX <Jennifer.Meadows@gov.bc.ca>
Subject: Fwd: 2022-04-14 SE Coal Update

Hi Jennifer,

Could you please add this item below to the agenda for the next 1:1 between MGH and Kevin?

Thanks,

Stephanie

From: Heyman, George ENV:EX <George.Heyman@gov.bc.ca>
Sent: Friday, April 22, 2022 12:06:42 PM
To: Chang, Stephanie ENV:EX <Stephanie.Chang@gov.bc.ca>
Cc: Sather, Kelly ENV:EX <Kelly.Sather@gov.bc.ca>
Subject: Re: 2022-04-14 SE Coal Update

For my next check in with KJ i wouldn't mind a deeper dive into KN opposition to Line Creek proposals as well as the significance (extent) of the 3 non-compliances sites

Sent from my iPad

> On Apr 20, 2022, at 9:05 AM, Chang, Stephanie ENV:EX <Stephanie.Chang@gov.bc.ca> wrote:
>
> Good morning Minister,
>
> See below for latest on SE:
>
> **SE COAL UPDATES FROM ENV FOR APRIL 4TH – APRIL 14TH**
>
> - **WATER TREATMENT PROJECTS AND MAJOR PERMITTING:**
>   - **Line Creek Operations (LCO)**
>
> s.13; s.16
>
> - Teck has provided responses to the screening comments on the C&S Construction and Operations Mines Act and EMA application, which ENV staff are currently reviewing. MMO is expecting to make a screening decision on April 19th.
>
> s.13; s.16
>
>   - **Elkview Operations (EVO)**
>   - EMLI issued a letter on April 12th responding to Teck's Early Works application submitted in November 2021 for the EVO Dry Creek Water Treatment project. Teck has advanced this project with phased applications, including a Mines Act Construction application submitted in December 2021 and a forthcoming Mines Act and EMA Commissioning and Operation application expected in July 2022. EMLI's letter identifies some challenges associated with project splitting, and requests additional information from Teck before a decision on the Early Works application can be made.
> - **COMPLIANCE**
>   - **Non-Compliances**
>   - LCO: Teck exceeded the maximum daily limits for selenium and nitrate on March 28th and the monthly average selenium and nitrate limits for March at the LCO compliance point. They also exceeded their monthly

selenium limit at the outfall of the West Line Creek Active Water Treatment Facility.

- Fording River Operations (FRO): Teck exceeded the FRO compliance point selenium and nitrate monthly average limits in the month of March in the Fording River. They also exceeded the daily maximum nitrate limit on March 30th at this same location
- Greenhills Operations (GHO): Teck exceeded the maximum nitrate limits March 21st and 28th at the compliance point in the Fording River. They also exceeded the monthly average selenium and nitrate limits for March at this same location.

- **ENVIRONMENTAL ASSESSMENTS:**
  - Fording River Extension (FRX): ENV staff submitted minor comments on EAO's draft Readiness Report for the FRX project on April 7th. KNC sent a letter to the EAO on April 8th initiating the dispute resolution process for the draft readiness decision. KNC will use the dispute resolution venue to provide more information supporting their claim of extraordinary adverse effects and their request for termination.

- **ABMP AMENDMENT & LAKE KOOCANUSA:**
  - ENV has received comments on the draft Order and Terms of Reference (TOR) for the ABMP Amendments from US Agencies, who are asking for deeper involvement in multiple topics. Comments from Teck were received earlier, and comments from Canadian federal agencies are still outstanding.
  - ENV staff are developing and assessing options for moving the ABMP Amendments forward, in consideration of early engagement feedback, and results of the BC-KNC Leadership Meeting.

- **• TRANSBOUNDARY ISSUES/RELATIONS:**
  - Staff from ENV, EMLI and IGRS had a call with Global Affairs Canada (GAC) and KNC on April 13th. s.13; s.16

s.13; s.16

Laurel Nash *(she/her)*
Assistant Deputy Minister
Environmental Protection Division
Ministry of Environment &
Climate Change Strategy
☎ (250) 953-4004 or (250) 508-1670
Laurel.Nash@gov.bc.ca

I am grateful to live and work on the beautiful traditional territory of the Lekwungen speaking people and the Songhees, Esquimalt and WSÁNEĆ peoples whose historic relationships with the land and sea continue to this day.

To report an act of pollution, call the RAPP (Report All Poachers and Polluters) line at 1-877-952-7277 or #7277 on the TELUS Mobility Network or report the incident online.

2022 IPA – Final Draft Se & NO_3 Mitigation Plan

Meeting #5 – ENV, EMLI, KNC and Teck

January 20, 2022

Teck

Safety Share

Winter Shoveling Safety Tips

- **Push rather than lift :** Pushing the snow rather than lifting the snow can help reduce strain on your body. When lifting, always bend your knees and use your legs rather than back
- **Choose your shovel wisely** : Ergonomically designed shovels can reduce or eliminate the amount of bending you have to do. Consider using a smaller shovel to break the loads into smaller more manageable chunks
- **Take breaks** : Consider taking a break after 20 to 30 minutes of shoveling, especially when the snow is wet and dense
- **Be timely** : Try to shovel the snow shortly after it falls, the snow will consolidate and be harder to shovel the longer it's on the ground



Shoveling snow can put people at risk for soft tissue injuries as well as the potential risk for heart attacks. Sudden exertion can put a big strain on the heart. Cold weather can also contribute to an increase in heart rate and blood pressure while shoveling. Consider your fitness and risk level, there are options for snow removal services!

Teck

Introductions
Teck, Golder, and SRK

Amanda Thumma
Manager, Water Planning

Jessica Mackie
Manager, Water Modelling

Lucy Eykamp
Manager, Regulatory Approvals

Kristina Birk
Engineer in Training, Water Modelling

Tiffiany Cromey
Senior Mining Engineer, Water Planning

Liz Karbashewski
Manager, Applied Research & Development

Dan L'Heureux
Director, Water Strategy

Adam Langer
Director, Water Projects (effective Feb 1)

James Sandland
Regional Director, Government Affairs

Justin Patterson
Lead, Indigenous Initiatives

Christian Baxter
Director, Environmental Strategy - Teck

J.P. Bechtold
Principal, Senior Water Quality Specialist - Golder

Amanda Snow
Senior Water Quality Specialist - Golder

Teck

Meeting Attendees
ENV, EMLI, KNC

Name	Role	Organization
Andrew Craig	Senior Environmental Geoscientist	EMLI
Colin Squirrell	Senior Projects Lead, MMPO	EMLI
Jolene Jackson	Acting Project Director, MMPO	EMLI
Kelsey Norlund	Manager, Environmental Geoscience & Permitting	EMLI
Sam Barnes	Senior Projects Lead, MMPO	EMLI
AJ Downie	Regional Director, SE Coal Mining	ENV
Karen Fairweather	Senior Environmental Protection Officer, SE Coal	ENV
Kyle Terry	Regional Hydrologist	ENV
Patrick Williston	Senior Environmental Impact Assessment Biologist, SE Coal	ENV
Tomesine Gulbaek-Pearce	Authorizations Section Head, SE Coal Mining	ENV
Bernadette Lyons	Geological & Water Resource Engineer, Waterline Resources Inc	KNC
Brandy Craig	Regulatory Engagement Coordinator	KNC
Erin Robertson	Team Lead Mining Oversight	KNC
Heather McMahon	Water Quality Biologist	KNC
Jesse Sinclair	Aquatic Biologist, LGL Limited	KNC
Kamila Baranowska	Aquatic Biologist	KNC
Mark Tinholt	Environmental Consultant, Owner	KNC

Meeting #5 – Final draft Se & NO_3 Mitigation Plan
Agenda and purpose

Safety & introductions	11:00 AM	15 mins
Status update including follow ups from meeting #4	11:15 AM	15 mins
Final draft Se & NO_3 mitigation plan	11:30 AM	90 mins
Lunch Break	1:00 PM	60 mins
Final draft Se & NO_3 mitigation plan (continued)	2:00 PM	60 mins
Next steps	3:00 PM	15 mins
Meeting end	3:15 PM	

Please note that all start times are in MST.

Meeting Purpose

- Information sharing in preparation for the IPA submission.



Any additions, changes, or feedback?

Teck

Discussion Principles

To generate a darn good conversation

- Actively listen
- Lean in and be curious
- Being authentic and vulnerable makes every conversation easier to say and to hear
- Think outside of your comfort zone
- Be self aware
- Build on others' points
- Criticism will hurt discussion
- Replace the 'but' with 'and'
- Allow a presenter to finish the slide, prior to asking questions
- Keep record for any important topics that are outside of today's discussion

Any additions, changes, or feedback?

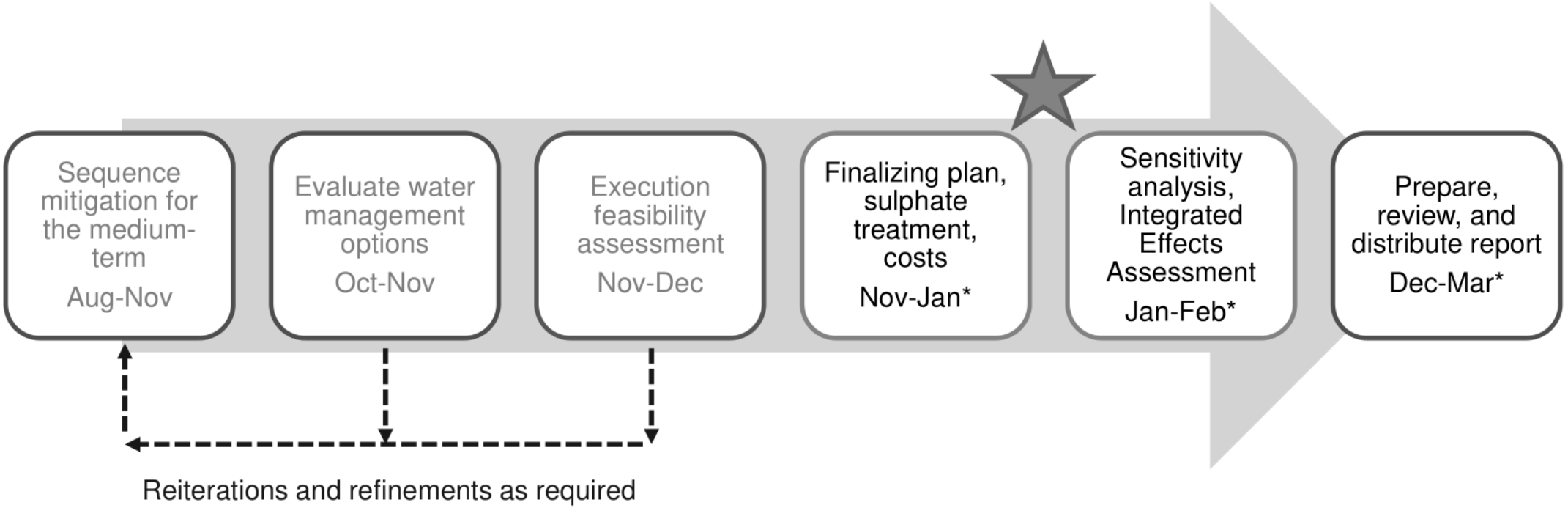
Teck

Status Update Including Follow-up Items from Meeting #4



Teck

Technical Process



Each steps includes sub-steps which are generally SME consultation, technical process, review, update, and accept.

Teck

**Dates are current best estimate and are subject to change.*

BC/KNC Technical Review Process
Meeting schedule

#1 Introduction *April 21*	•Shared understanding of process and approach to inform work planning •IPA overview, early issue identification and setting expectations
#2 Overview and method *Oct 7*	•To provide the team information necessary to prepare for the technical review of the IPA and to review the planning basis. •2022 IPA overview, external engagement and key linkages, technologies background and approach, 2022 IPA input and planning assumptions, next steps
#3 Mitigation plan update *Oct 21*	•To review important projects and scopes related to WQ mitigation planning. •Status updates including follow ups from mtg #2, LCO Line Creek near term non-compliance, development of sulphate treatment technology
#4 Mitigation plan update *Nov 25*	•Information sharing in preparation for the IPA submission. •Sources of nitrate in waste rock, sensitivity analysis overview
#5 Se & NO_3 mitigation plan *Jan 20*	•Information sharing in preparation for the IPA submission. •Status update, final draft Se & NO_3 mitigation plan review
#6 SO_4 mitigation plan *Feb TBD*	•Information sharing in preparation for the IPA submission. •Status update, final draft SO_4 mitigation plan, follow up items on final draft Se & NO_3 mitigation plan •Review schedule and meetings to be determined, anticipated to be similar to the 2020 RWQM approach coordinated by MMO

Teck

CSKT and KTOI Update

Action Items
Meeting #4 on Nov 25

Any additions, changes, or feedback?

Responsible	Action	Status	Requested By	Update
Teck	Send meeting notes and action items	New		
ENV, EMLI, and KNC	Provide any additional feedback on the presentation to Teck (Amanda)	New		
Teck (Jessica)	Teck to set meeting to discuss groundwater in relation to the 2020 RWQM and the Round 3 comments from the KNC (email from Heather on Nov 29)	In progress		A meeting has been set for this discussion on Feb. 4, 2022
Teck (Jessica)	Add a RWQM concordance table into the IPA report submission	New		Will be included in the final IPA documentation
Teck (JP Golder)	For the climate change sensitivity analysis, evaluate variability in years and utilizing 8.5 representative concretion pathway until 2050	New		
Teck (Jessica)	Include sensitivity analysis where water availability is reduced to mimic groundwater bypass investigate how the use of instream sinks effects the RWQM (email from Heather on Nov 29)	New		Teck confirmed the sensitivity analysis will be included in the final IPA submittal documentation
Teck (Jessica)	Include instream sinks sensitivity analysis specific to 2020 RWQM KNC comment (KNC_057)	New		Teck confirmed the sensitivity analysis will be included in the final IPA submittal documentation

Final Draft Se & NO_3 Mitigation Plan



Teck

Execution Feasibility Process

- **Goal:** have a mitigation plan that can be feasibly executable that meets compliance as soon as possible
- **Process:** Held workshops with subject matter experts and key stakeholders, reviewed site by site planning assumptions and execution timelines over the 10-year timeframe, assessed for any fatal flaws
- **Scope:** Evaluated timing, labour, materials, current available information, existing and planned infrastructure, sources (location, concentration, flows), nitrate and selenium influent, water management
- **Key outcomes:** FRO-N SRF expansion and new cell (2025, 2026), advanced EVO SRF future phases, which include EVO Dry Creek treatment (2023, 2036), FRO Eagle 6 South SRF (2033), project timing shifts (both later and earlier), no constraint on facilitates spaced every 2 years
- **Next steps**: Develop and submit the LCO DC BAT 2, finalize and submit 2022 IPA, projects and permitting teams to advance mitigation projects including permitting process, continue to learn and adjust using the Adaptive Management Plan

Se & NO_3 mitigation plan overview

- The plan is aggressive but achievable and is designed to meet full compliance as quickly as possible.
- Teck recognizes our legal and regulatory requirements under Permit 107517 under the *Environmental Management Act* and C-permits under the *Mines Act*.
- The permit limits and site performance objectives in permit 107517 were developed based on the best knowledge at the time of the EVWQP.
- Teck acknowledges the original EVWQP schedule has been delayed to adapt to new and critical learnings such as development of the AOP process to reduce selenium speciation and bioaccumulation; the effects of lag times on constituent release from waste rock; and understanding the influence of groundwater in the system.

Draft Summary of Treatment, Diversions and Conveyance

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S *	FRO S	20,000	Dec 31, 2021	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	9,500	Dec 31, 2022	Eagle 4 Pit
	FRO-N 1 SRF Phase II	FRO N 1 SRF II	20,500	Dec 31, 2023	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 1 SRF Phase III	FRO N 1 SRF III	10,000	Dec 31, 2025	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 2 SRF	FRO N 2 SRF	20,000	Dec 31, 2026	FRO-N 1 SRF sources, Kilmarnock
	Eagle 6 South SRF	E6S SRF	6,500	Jun 30, 2033	Eagle 6 Pit North and South
LCO	WLC AWTF	WLC	7,500	Jan 1, 2020	West Line Creek, Line Creek
	WLC AWTF	WLC	-	June 30, 2023	MSAW
	NLC SRF Phase I	NLC SRF I	15,000	Dec 31, 2025	NLC, NLX, LCO Dry Creek
	NLC SRF Phase II	NLC SRF II	10,000	Dec 31, 2030	NLC, NLX, WLC groundwater
	NLC SRF Phase III	NLC SRF III	5,000	Dec 31, 2032	LCO Dry Creek
	NLC SRF Phase IV	NLC SRF IV	10,000	Dec 31, 2033	NLC, NLX, WLC groundwater, Line Creek
	Conveyance/Supplementation		Up to 30,000	Mar 29, 2023	-
	No Name, Horseshoe and Upper Line Creek Diversions		42,000	Dec 31, 2025	-
GHO	Cougar South Pit SRF	CSP SRF	5,000	Jun 30, 2042	Cougar South Pit, Leask, Wolfram, Thompson, Porter
EVO	EVO SRF Phase I *		20,000	Jan 1, 2021	Erickson, Natal
	EVO SRF Phase II		4,000	Sep 30, 2023	EVO Dry
	EVO SRF Phase III		20,000	Dec 31, 2027	Erickson, Natal
	EVO SRF Phase IV		3,000	Dec 31, 2036	EVO Dry
	BRP SRF		5,000	Dec 31, 2042	Baldy Ridge Pit, Erickson, Natal

Additional Treatment Considered for ECCC Direction

Site	Treatment Vessel	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
GHO	Greenhills Creek Treatment	GHC	7,500	Dec 31, 2027	Greenhills Creek

* The fully effective dates for FRO AWTF-S and EVO SRF Phase I will be adjusted for final 2022 IPA, based on current commissioning schedules

Teck

Treatment and Compliance Summary for the Fording River Compliance Point

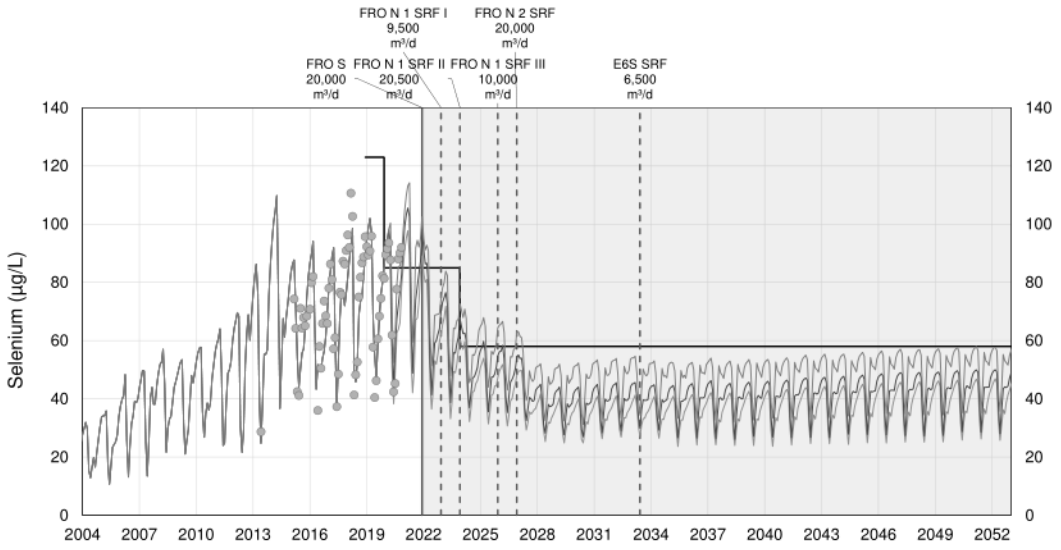
Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S *	FRO S	20,000	Dec 31, 2021	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	9,500	Dec 31, 2022	Eagle 4 Pit
	FRO-N 1 SRF Phase II	FRO N 1 SRF II	20,500	Dec 31, 2023	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 1 SRF Phase III	FRO N 1 SRF III	10,000	Dec 31, 2025	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 2 SRF	FRO N 2 SRF	20,000	Dec 31, 2026	FRO-N 1 SRF sources and Kilmarnock
	Eagle 6 South SRF	E6S SRF	6,500	Jun 30, 2033	Eagle 6 Pit North and South

Stabilization and reduction of selenium and nitrate concentrations is projected to begin when FRO AWTF-S is fully effective, with incremental future reductions with each additional phase of treatment added and long-term stabilization below the compliance limit.

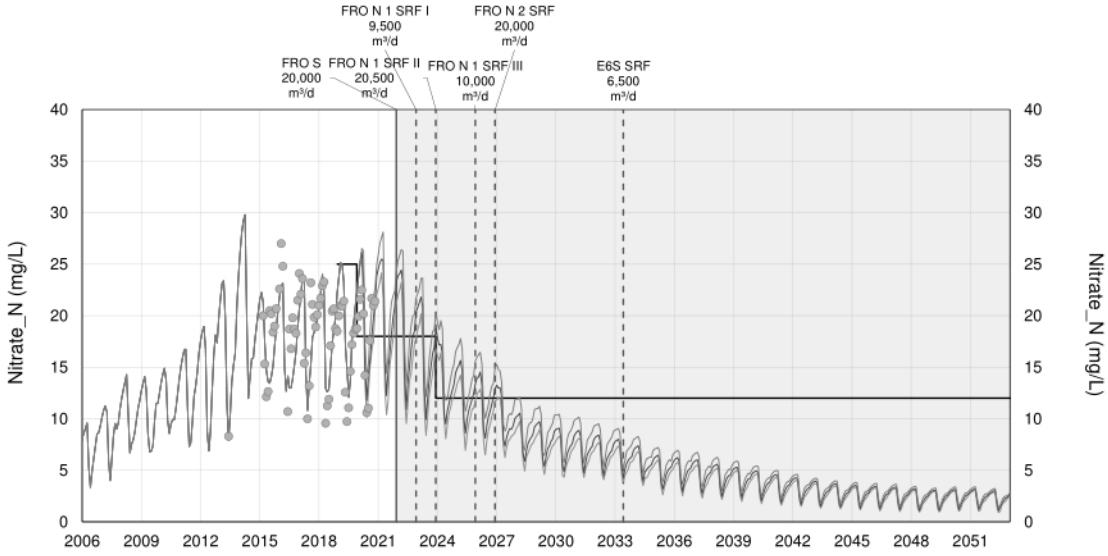
- Compliance projected to be maintained at the Fording River Compliance Point (FR_FRABCH) for:
  - Selenium – in 2023 and mid-year 2027 onwards
  - Nitrate – mid-year 2028 onwards

FRO Compliance Point
(Fording River, 100 m u/s of Chauncey Creek) (FR_FRABCH; E223753)

Selenium



Nitrate



Projected P90 Monthly Average Concentrations
Projected P10 Monthly Average Concentrations
Site Performance Objective

Projected P50 Monthly Average Concentrations
Monthly Average Measured Concentrations
Limit

Teck

Treatment and Compliance Summary for the Fording River Downstream of Greenhills Creek

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S *	FRO S	20,000	Dec 31, 2021	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	9,500	Dec 31, 2022	Eagle 4 Pit
	FRO-N 1 SRF Phase II	FRO N 1 SRF II	20,500	Dec 31, 2023	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 1 SRF Phase III	FRO N 1 SRF III	10,000	Dec 31, 2025	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 2 SRF	FRO N 2 SRF	20,000	Dec 31, 2026	FRO-N 1 SRF sources and Kilmarnock
	Eagle 6 South SRF	E6S SRF	6,500	Jun 30, 2033	Eagle 6 Pit North and South
LCO	WLC AWTF	WLC	7,500	Jan 1, 2020	West Line Creek, Line Creek
	WLC AWTF	WLC	-	June 30, 2023	MSAW
	NLC SRF Phase I	NLC SRF I	15,000	Dec 31, 2025	NLC, NLX, LCO Dry Creek
	NLC SRF Phase II	NLC SRF II	10,000	Dec 31, 2030	NLC, NLX, WLC groundwater
	NLC SRF Phase III	NLC SRF III	5,000	Dec 31, 2032	LCO Dry Creek
	NLC SRF Phase IV	NLC SRF IV	10,000	Dec 31, 2033	NLC, NLX, WLC groundwater, Line Creek
	Conveyance/Supplementation		Up to 30,000	Mar 29, 2023	-
	No Name, Horseshoe and Upper Line Creek Diversions		42,000	Dec 31, 2025	-

Additional Treatment Considered for ECCC Direction

Site	Treatment Vessel	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
GHO	Greenhills Creek Treatment	GHC	7,500	Dec 31, 2027	Greenhills Creek

Treatment included in table are representative of all treatment for LCO, FRO, and GHO Greenhills Creek; the shaded boxes are overlying phases of LCO treatment that do not influence selenium and nitrate concentrations at this location.

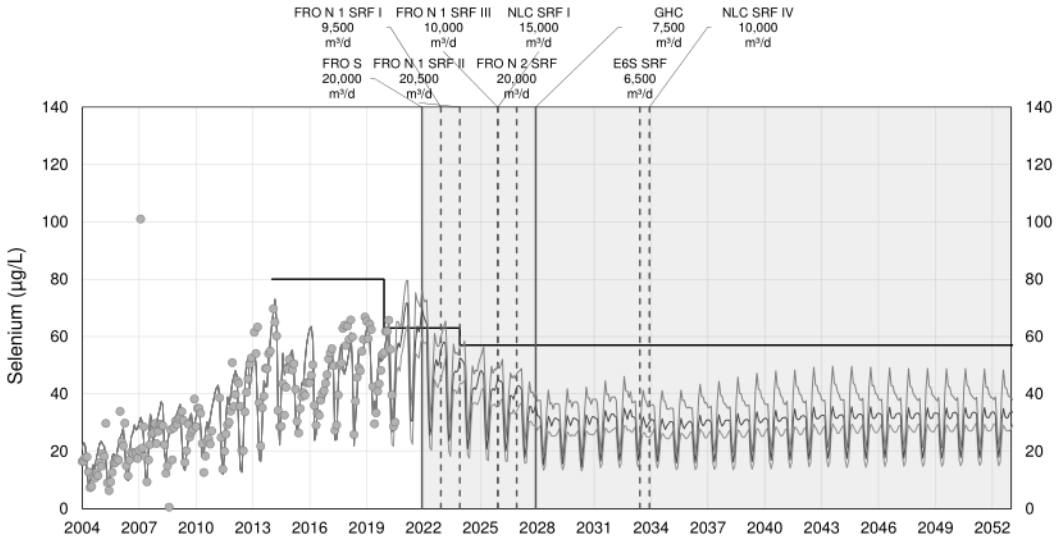
Stabilization and reduction of selenium and nitrate concentrations is projected to begin in the Fording River when FRO AWTF-S is fully effective, with incremental future reductions with each additional phase of treatment added and long-term stabilization below the compliance limit/SPO.

- Compliance projected to be maintained at GHO Fording River Compliance Point (GH_FR1) for:
  - Selenium – mid-year 2024 and onward
  - Nitrate – mid 2026 and onward

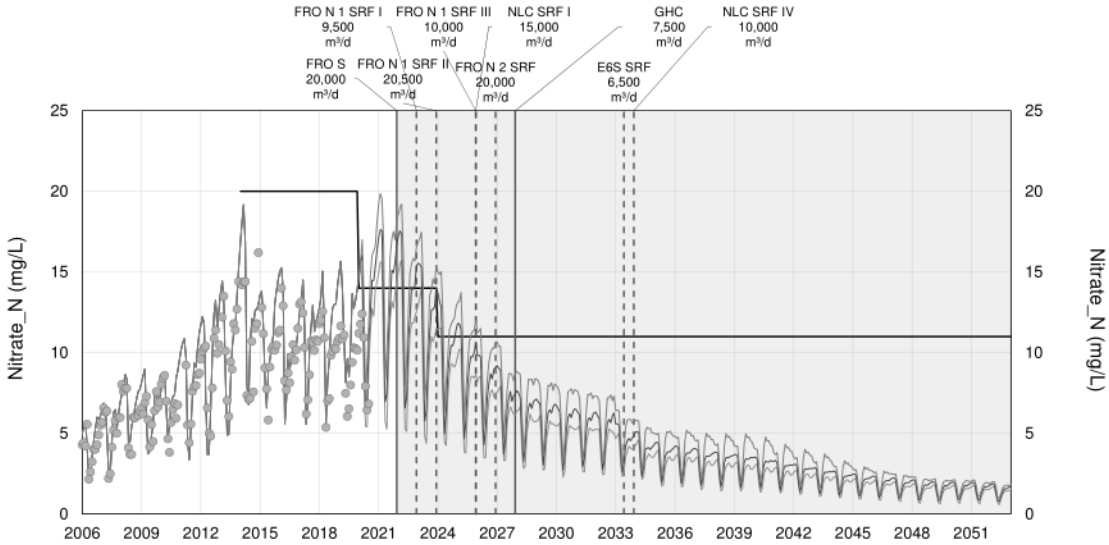
Teck

GHO Fording River Compliance Point
(GH_FR1; 0200378)

Selenium



Nitrate



Projected P90 Monthly Average Concentrations
Projected P10 Monthly Average Concentrations
Site Performance Objective

Projected P50 Monthly Average Concentrations
Monthly Average Measured Concentrations
Limit

Teck

Treatment and Compliance Summary in Line Creek at the Compliance Point

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
LCO	WLC AWTF	WLC	7,500	Jan 1, 2020	West Line Creek, Line Creek
	WLC AWTF	WLC	-	June 30, 2023	MSAW
	NLC SRF Phase I	NLC SRF I	15,000	Dec 31, 2025	NLC, NLX, LCO Dry Creek
	NLC SRF Phase II	NLC SRF II	10,000	Dec 31, 2030	NLC, NLX, WLC groundwater
	NLC SRF Phase III	NLC SRF III	5,000	Dec 31, 2032	LCO Dry Creek
	NLC SRF Phase IV	NLC SRF IV	10,000	Dec 31, 2033	NLC, NLX, WLC groundwater, Line Creek
	Conveyance/Supplementation		Up to 30,000	Mar 29, 2023	-
	No Name, Horseshoe and Upper Line Creek Diversions		42,000	Dec 31, 2025	-

Treatment included in table are representative of all LCO treatment; the shaded box is overlying a phase that is specific to LCO Dry Creek only.

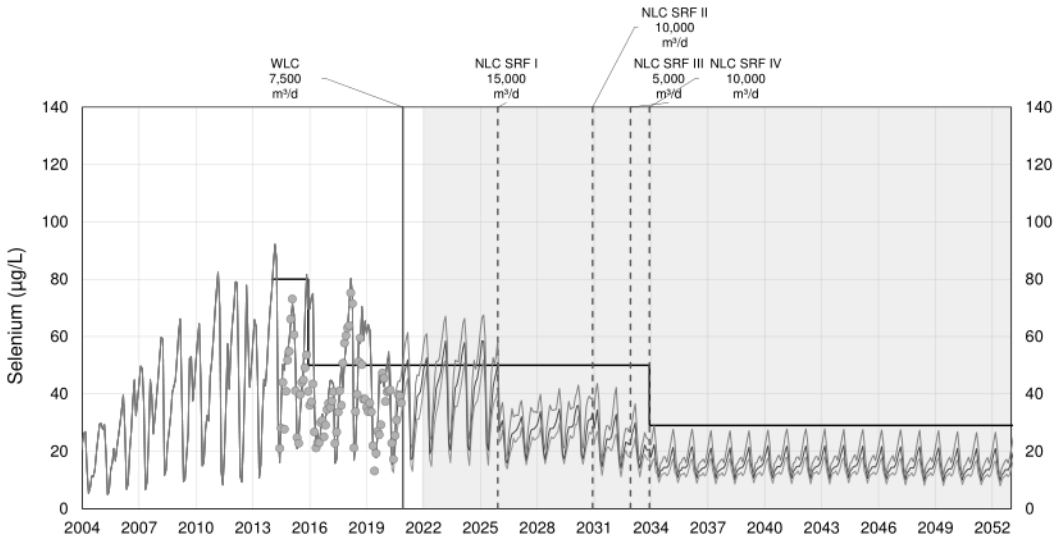
Stabilize of selenium and nitrate concentrations in Line Creek with current operation of WLC AWTF, projected reduction with NLC SRF Phase I, and further reduction with each additional phase of treatment.

- Compliance maintained at the Line Creek Compliance Point (LC_LCDSSLCC) for:
  - Selenium – in 2026 and onward
  - Nitrate – in 2026 and onward

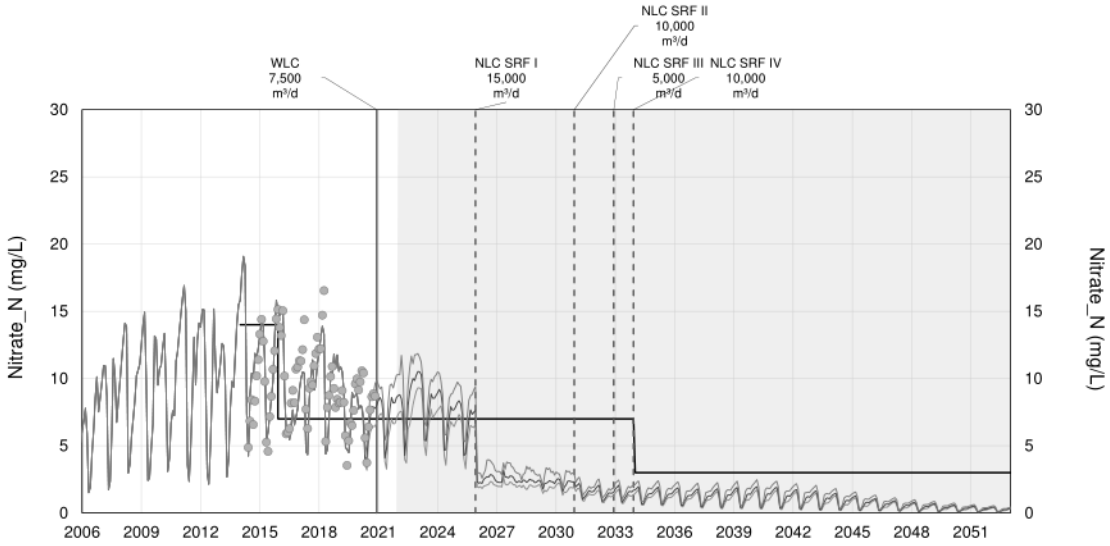
Teck

LCO Compliance Point
(LC_LCDSSLCC; E297110)

Selenium



Nitrate



Projected P90 Monthly Average Concentrations
Projected P10 Monthly Average Concentrations
Site Performance Objective

Projected P50 Monthly Average Concentrations
Monthly Average Measured Concentrations
Limit

Teck

Treatment and Compliance Summary for the Fording River Downstream of Line Creek

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S *	FRO S	20,000	Dec 31, 2021	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	9,500	Dec 31, 2022	Eagle 4 Pit
	FRO-N 1 SRF Phase II	FRO N 1 SRF II	20,500	Dec 31, 2023	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 1 SRF Phase III	FRO N 1 SRF III	10,000	Dec 31, 2025	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 2 SRF	FRO N 2 SRF	20,000	Dec 31, 2026	FRO-N 1 SRF sources and Kilmarnock
	Eagle 6 South SRF	E6S SRF	6,500	Jun 30, 2033	Eagle 6 Pit North and South
LCO	WLC AWTF	WLC	7,500	Jan 1, 2020	West Line Creek, Line Creek
	WLC AWTF	WLC	-	June 30, 2023	MSAW
	NLC SRF Phase I	NLC SRF I	15,000	Dec 31, 2025	NLC, NLX, LCO Dry Creek
	NLC SRF Phase II	NLC SRF II	10,000	Dec 31, 2030	NLC, NLX, WLC groundwater
	NLC SRF Phase III	NLC SRF III	5,000	Dec 31, 2032	LCO Dry Creek
	NLC SRF Phase IV	NLC SRF IV	10,000	Dec 31, 2033	NLC, NLX, WLC groundwater, Line Creek
	Conveyance/Supplementation		Up to 30,000	Mar 29, 2023	-
	No Name, Horseshoe and Upper Line Creek Diversions		42,000	Dec 31, 2025	-

Additional Treatment Considered for ECCC Direction

Site	Treatment Vessel	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
GHO	Greenhills Creek Treatment	GHC	7,500	Dec 31, 2027	Greenhills Creek

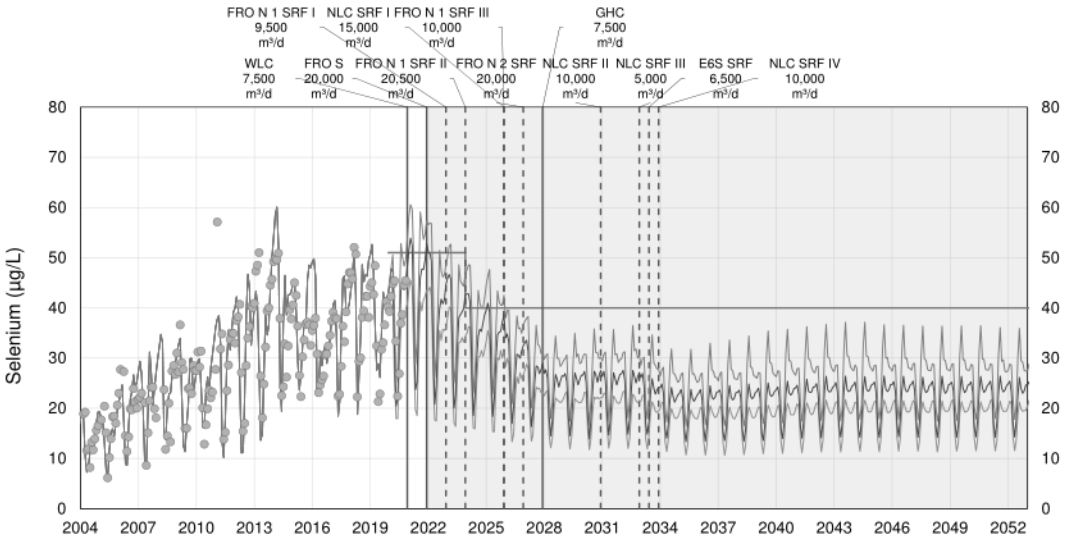
Stabilization and reduction of selenium and nitrate concentrations is projected to begin in the Fording River when FRO AWTF-S is fully effective, with incremental future reductions with each additional phase of treatment added and long-term stabilization below the SPO for LC_LC5.

- Compliance projected to be maintained for the LC_LC5 Order station for selenium in 2026 and onward
- Compliance projected to be maintained for the LC_LC5 Order station for nitrate

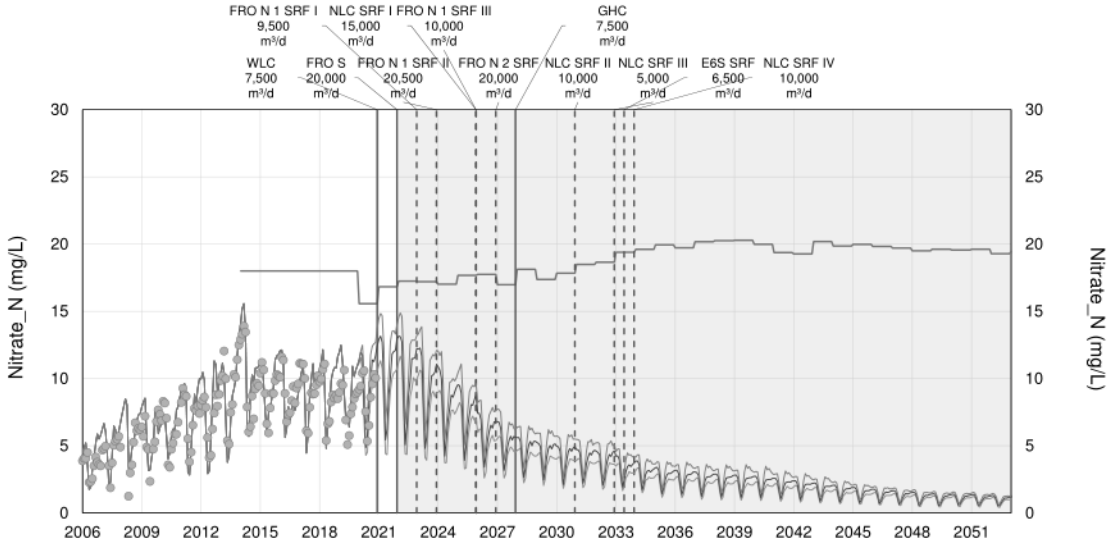
Teck

Fording River d/s of Line Creek
(LC_LC5; 0200028)

Selenium



Nitrate



Projected P90 Monthly Average Concentrations
Projected P10 Monthly Average Concentrations
Site Performance Objective

Projected P50 Monthly Average Concentrations
Monthly Average Measured Concentrations
Limit

Teck

Treatment and Compliance Summary in the Elk River Downstream of GHO

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
GHO	Cougar South Pit SRF	CSP SRF	5,000	Jun 30, 2042	Cougar South Pit, Leask, Wolfram, Thompson, Porter

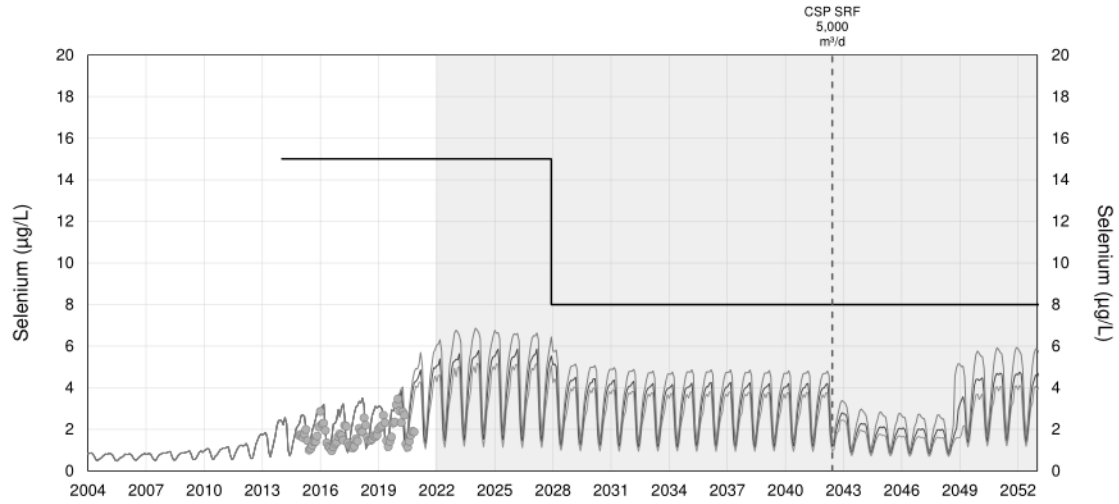
Additional Treatment Considered for ECCC Direction

Site	Treatment Vessel	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
GHO	Greenhills Creek Treatment	GHC	7,500	Dec 31, 2027	Greenhills Creek

- Compliance is projected to be maintained for selenium and nitrate at the GHO Elk River Compliance Point (GH_ERC) and the Elk River Order Station (GH_ER1)
- Stabilization is projected to be achieved through management/treatment of the Cougar South Pit

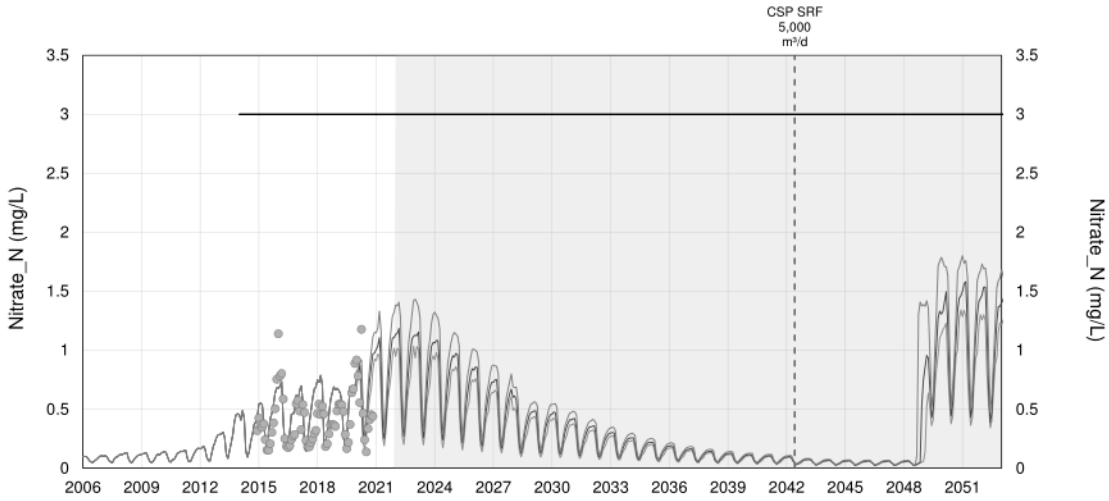
GHO Elk River Compliance Point
(GH_ERC; E300090)

Selenium



Projected P90 Monthly Average Concentrations
Projected P10 Monthly Average Concentrations
Site Performance Objective

Nitrate

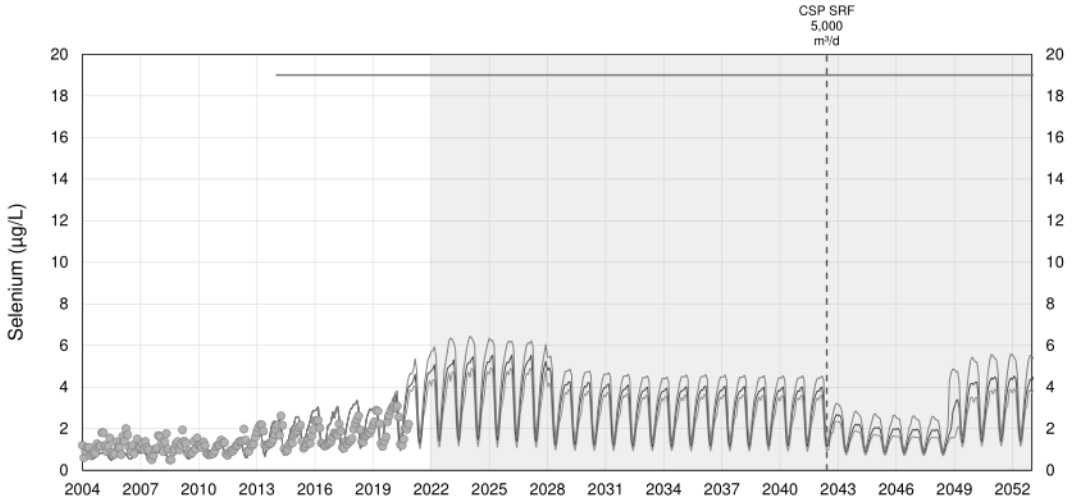


Projected P50 Monthly Average Concentrations
Monthly Average Measured Concentrations
Limit

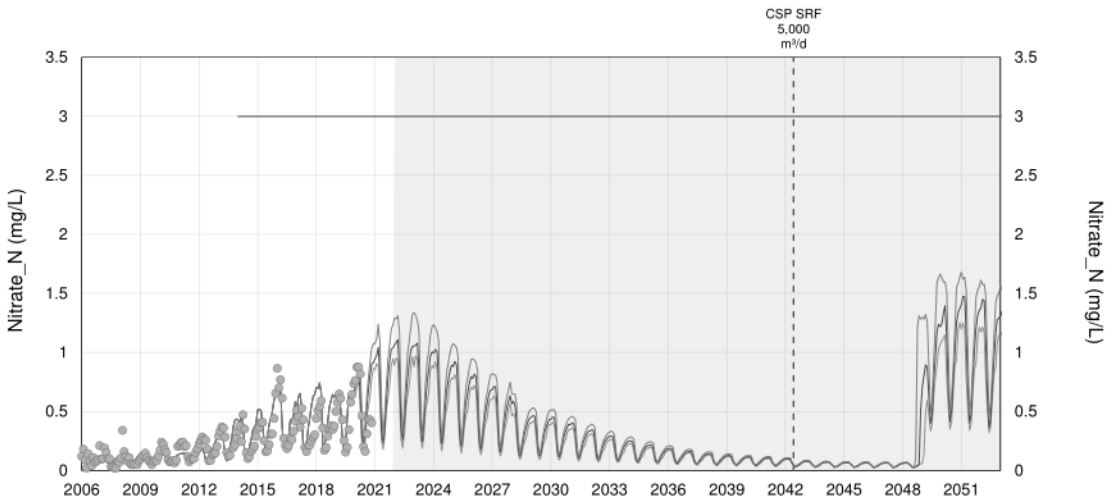
Teck

Elk River u/s of Boivin Creek
(GH_ER1; E206661)

Selenium



Nitrate



Projected P90 Monthly Average Concentrations
Projected P10 Monthly Average Concentrations
Site Performance Objective

Projected P50 Monthly Average Concentrations
Monthly Average Measured Concentrations
Limit

Teck

Treatment and Compliance Summary in the Elk River downstream of the Fording River

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S *	FRO S	20,000	Dec 31, 2021	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	9,500	Dec 31, 2022	Eagle 4 Pit
	FRO-N 1 SRF Phase II	FRO N 1 SRF II	20,500	Dec 31, 2023	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 1 SRF Phase III	FRO N 1 SRF III	10,000	Dec 31, 2025	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 2 SRF	FRO N 2 SRF	20,000	Dec 31, 2026	FRO-N 1 SRF sources and Kilmarnock
	Eagle 6 South SRF	E6S SRF	6,500	Jun 30, 2033	Eagle 6 Pit North and South
LCO	WLC AWTF	WLC	7,500	Jan 1, 2020	West Line Creek, Line Creek
	WLC AWTF	WLC	-	June 30, 2023	MSAW
	NLC SRF Phase I	NLC SRF I	15,000	Dec 31, 2025	NLC, NLX, LCO Dry Creek
	NLC SRF Phase II	NLC SRF II	10,000	Dec 31, 2030	NLC, NLX, WLC groundwater
	NLC SRF Phase III	NLC SRF III	5,000	Dec 31, 2032	LCO Dry Creek
	NLC SRF Phase IV	NLC SRF IV	10,000	Dec 31, 2033	NLC, NLX, WLC groundwater, Line Creek
	Conveyance/Supplementation		Up to 30,000	Mar 29, 2023	-
	No Name, Horseshoe and Upper Line Creek Diversions		42,000	Dec 31, 2025	-
GHO	Cougar South Pit SRF	CSP SRF	5,000	Jun 30, 2042	Cougar South Pit, Leask, Wolfram, Thompson, Porter

Additional Treatment Considered for ECCC Direction

Site	Treatment Vessel	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
GHO	Greenhills Creek Treatment	GHC	7,500	Dec 31, 2027	Greenhills Creek

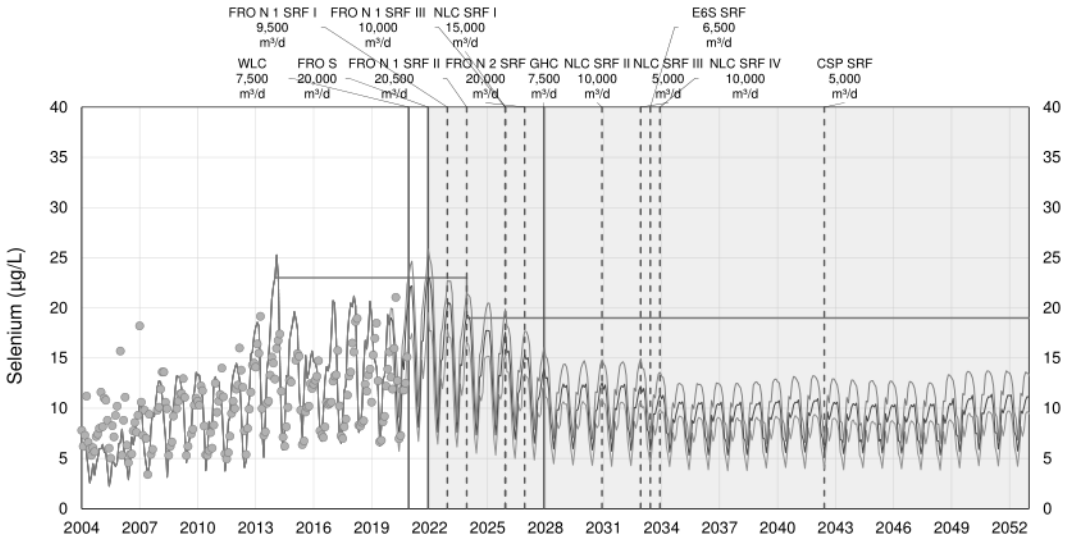
Stabilization and reduction of selenium and nitrate is projected to begin in the Elk River when FRO AWTF-S is fully effective, with incremental future reductions with each additional phase of treatment added and long-term stabilization below the SPO at EV_ER4.

- Compliance is projected to be maintained at the EV_ER4 Order station for:
  - Selenium – in 2023 and in 2026 and onward
  - Nitrate – in 2027 and onward

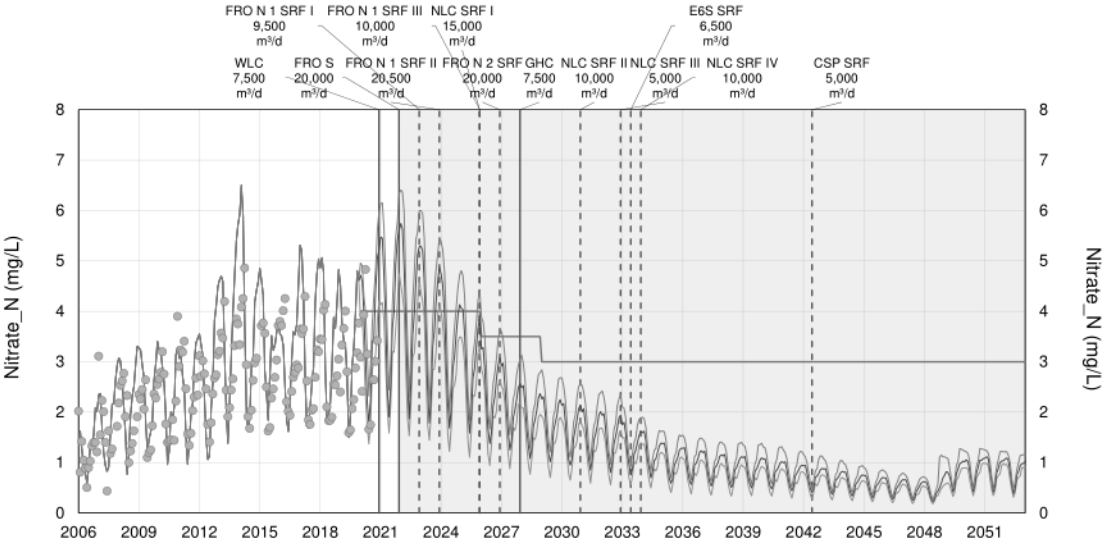
Teck

Elk River u/s of Grave Creek
(EV_ER4; 0200027)

Selenium



Nitrate



Projected P90 Monthly Average Concentrations
Projected P10 Monthly Average Concentrations
Site Performance Objective

Projected P50 Monthly Average Concentrations
Monthly Average Measured Concentrations
Limit

Teck

Treatment and Compliance Summary for Harmer Creek

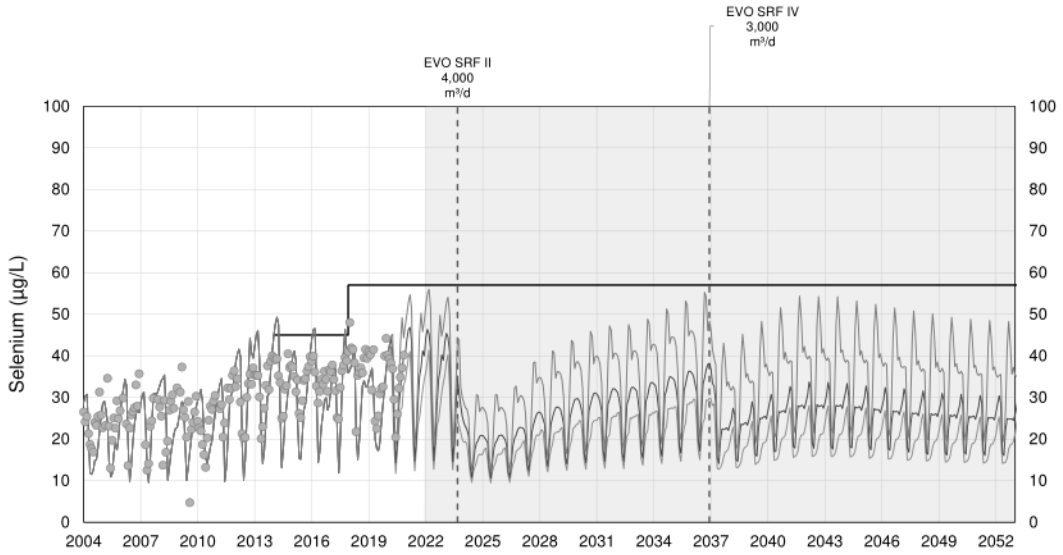
Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
EVO	EVO SRF Phase I *		20,000	Jan 1, 2021	Erickson, Natal
	EVO SRF Phase II		4,000	Sep 30, 2023	EVO Dry
	EVO SRF Phase III		20,000	Dec 31, 2027	Erickson, Natal
	EVO SRF Phase IV		3,000	Dec 31, 2036	EVO Dry
	BRP SRF		5,000	Dec 31, 2042	Baldy Ridge Pit, Erickson, Natal

Treatment included in table are representative of all EVO treatment; the shaded boxes are overlying phases that are relevant to compliance in Michel Creek.

- Compliance is projected to be maintained through the future at the EVO Harmer Compliance Point (EV_HC1)
- Stabilization achieved through future water treatment in the EVO SRF
- 2022 IPA planning aligned with the Water Quality Management Plan that is required pursuant to the Environmental Assessment Certificate condition

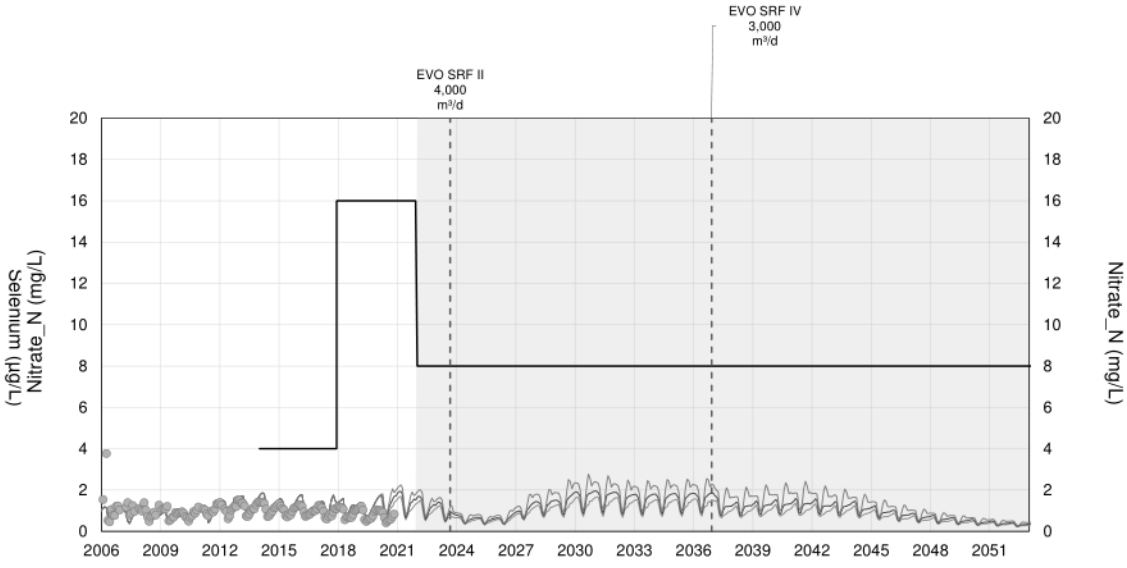
EVO Harmer Compliance Point
(EV_HC1; E102682)

Selenium



Projected P90 Monthly Average Concentrations
Projected P10 Monthly Average Concentrations
Site Performance Objective

Nitrate



Projected P50 Monthly Average Concentrations
Monthly Average Measured Concentrations
Limit

Teck

Treatment and Compliance Summary for Michel Creek at the EVO Compliance Point

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
EVO	EVO SRF Phase I *		20,000	Jan 1, 2021	Erickson, Natal
	EVO SRF Phase II		4,000	Sep 30, 2023	EVO Dry
	EVO SRF Phase III		20,000	Dec 31, 2027	Erickson, Natal
	EVO SRF Phase IV		3,000	Dec 31, 2036	EVO Dry
	BRP SRF		5,000	Dec 31, 2042	Baldy Ridge Pit, Erickson, Natal

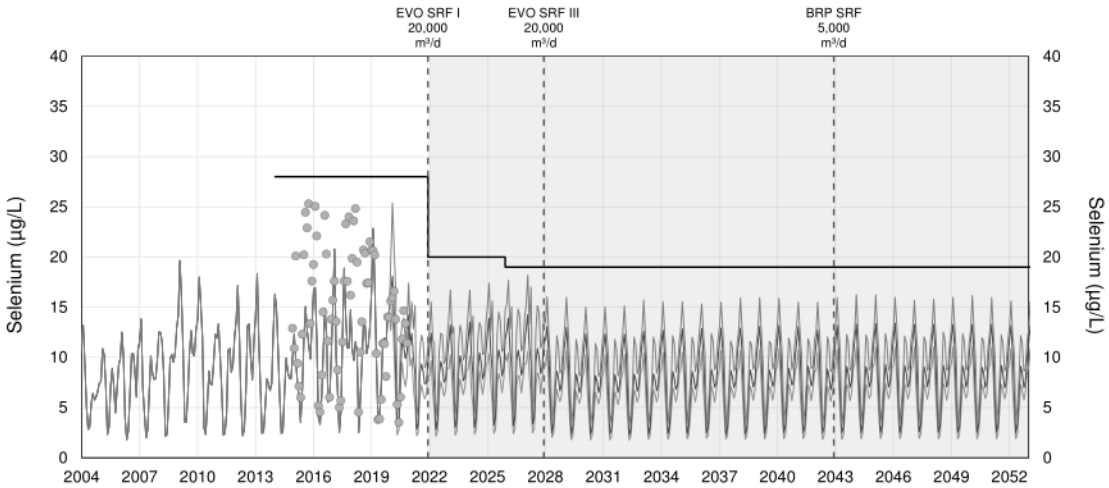
Treatment included in table are representative of all EVO treatment; the shaded boxes are overlying phases that are relevant to compliance in EVO Dry Creek.

Stabilization of selenium and nitrate concentrations began with operation of EVO SRF in mid-2021, and further reduction and stabilization is projected to occur with next large phase of treatment in the EVO SRF (Phase III).

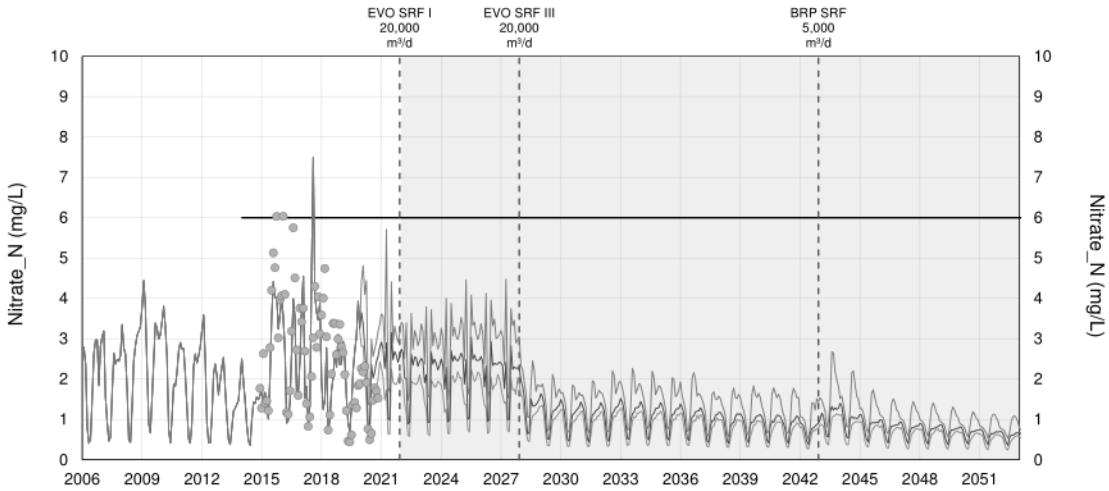
- Compliance is projected to be maintained for selenium and nitrate through the projected future

EVO Michel Creek Compliance Point
(EV_MC2; E300091)

Selenium



Nitrate



- Projected P90 Monthly Average Concentrations
- Projected P10 Monthly Average Concentrations
- Site Performance Objective
- Projected P50 Monthly Average Concentrations
- Monthly Average Measured Concentrations
- Limit

Teck

Treatment and Compliance Summary in the Elk River downstream of all Operations

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S *	FRO S	20,000	Dec 31, 2021	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	9,500	Dec 31, 2022	Eagle 4 Pit
	FRO-N 1 SRF Phase II	FRO N 1 SRF II	20,500	Dec 31, 2023	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 1 SRF Phase III	FRO N 1 SRF III	10,000	Dec 31, 2025	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 2 SRF	FRO N 2 SRF	20,000	Dec 31, 2026	FRO-N 1 SRF sources, Kilmarnock
	Eagle 6 South SRF	E6S SRF	6,500	Jun 30, 2033	Eagle 6 Pit North and South
LCO	WLC AWTF	WLC	7,500	Jan 1, 2020	West Line Creek, Line Creek
	WLC AWTF	WLC	-	June 30, 2023	MSAW
	NLC SRF Phase I	NLC SRF I	15,000	Dec 31, 2025	NLC, NLX, LCO Dry Creek
	NLC SRF Phase II	NLC SRF II	10,000	Dec 31, 2030	NLC, NLX, WLC groundwater
	NLC SRF Phase III	NLC SRF III	5,000	Dec 31, 2032	LCO Dry Creek
	NLC SRF Phase IV	NLC SRF IV	10,000	Dec 31, 2033	NLC, NLX, WLC groundwater, Line Creek
	Conveyance/Supplementation		Up to 30,000	Mar 29, 2023	-
	No Name, Horseshoe and Upper Line Creek Diversions		42,000	Dec 31, 2025	-
GHO	Cougar South Pit SRF	CSP SRF	5,000	Jun 30, 2042	Cougar South Pit, Leask, Wolfram, Thompson, Porter
EVO	EVO SRF Phase I *		20,000	Jan 1, 2021	Erickson, Natal
	EVO SRF Phase II		4,000	Sep 30, 2023	EVO Dry
	EVO SRF Phase III		20,000	Dec 31, 2027	Erickson, Natal
	EVO SRF Phase IV		3,000	Dec 31, 2036	EVO Dry
	BRP SRF		5,000	Dec 31, 2042	Baldy Ridge Pit, Erickson, Natal

Additional Treatment Considered for ECCC Direction

Site	Treatment Vessel	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
GHO	Greenhills Creek Treatment	GHC	7,500	Dec 31, 2027	Greenhills Creek

Stabilization and reduction of selenium and nitrate concentrations is projected to begin in the Elk River when FRO AWTF-S is fully effective, with incremental future reductions with each additional phase of treatment added and long-term stabilization below the SPO at the EV_ER1, RG_ELKORES and RG_DSELK Order stations.

Selenium compliance:

- Compliance is projected to be maintained at EV_ER1 and RG_ELKORES
- Compliance is projected to be achieved by 2028 onward

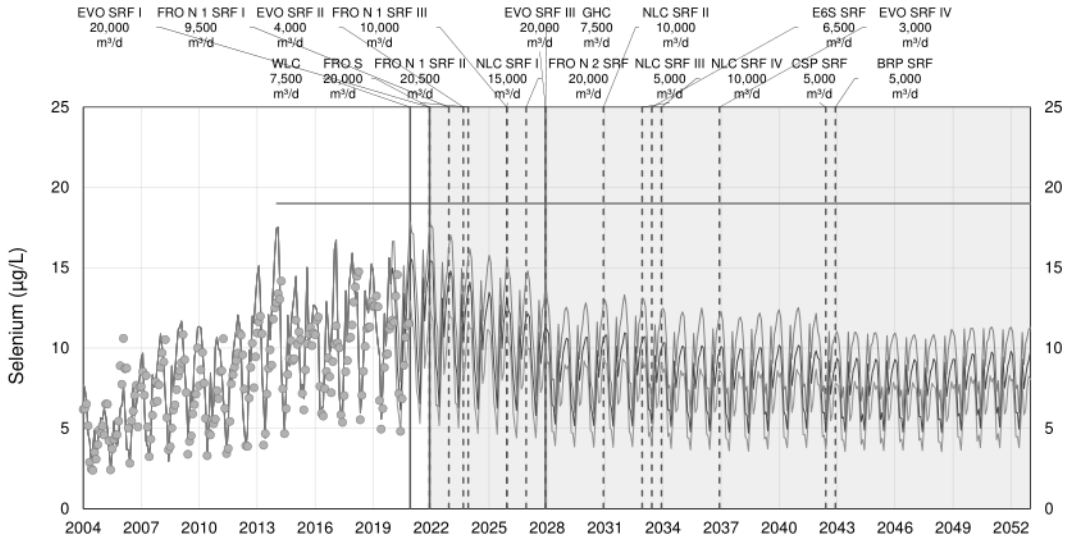
Nitrate compliance:

- Compliance for nitrate is projected to be achieved by 2026 and onward at EV_ER1
- Compliance is maintained at RG_ELKORES and RG_DSELK

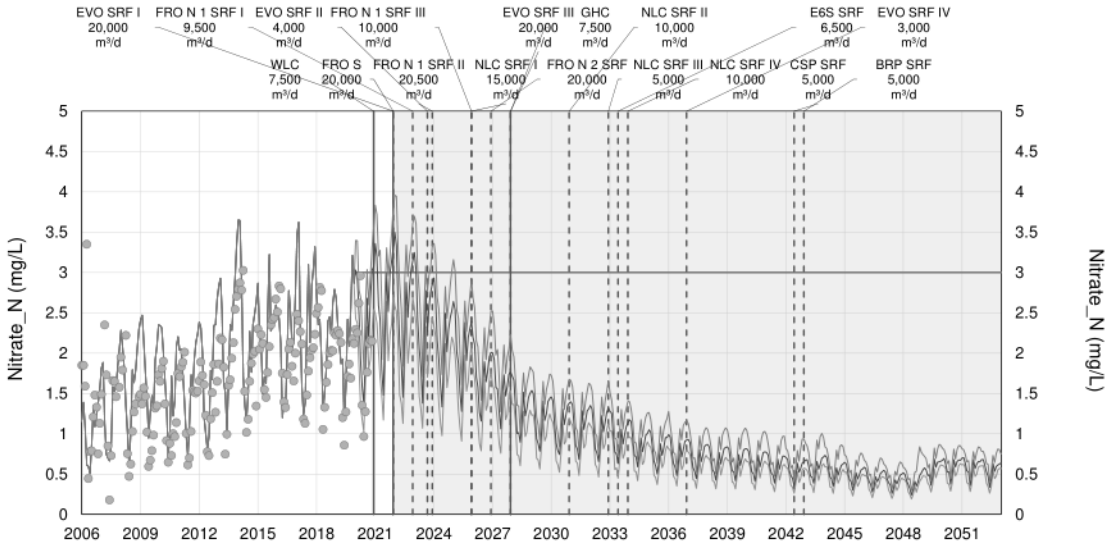
* The fully effective dates for FRO AWTF-S and EVO SRF Phase I will be adjusted for final 2022 IPA, based on current commissioning schedules

Elk River d/s of Michel Creek
(EV_ER1; 0200393)

Selenium



Nitrate



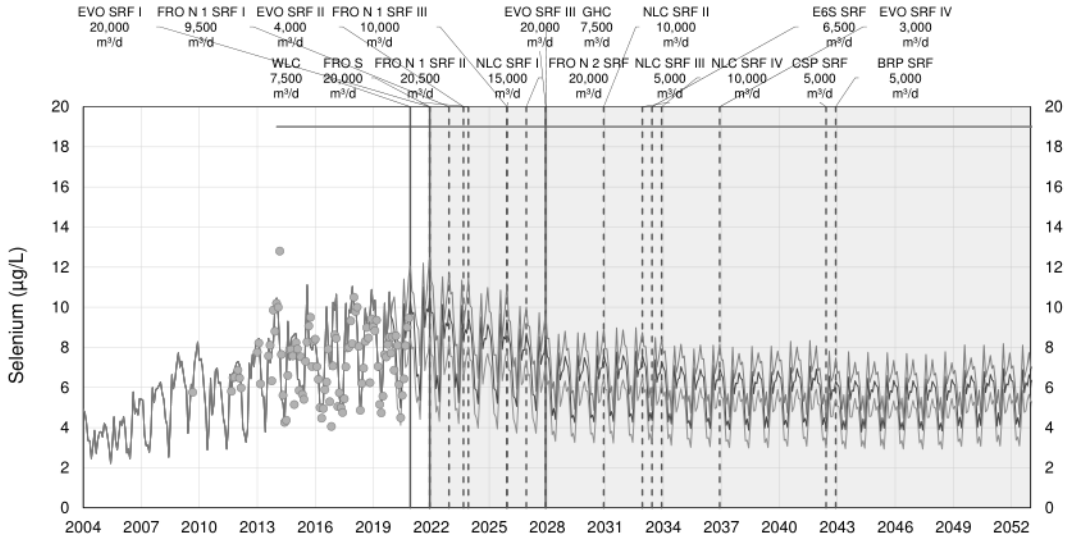
Projected P90 Monthly Average Concentrations
Projected P10 Monthly Average Concentrations
Site Performance Objective

Projected P50 Monthly Average Concentrations
Monthly Average Measured Concentrations
Limit

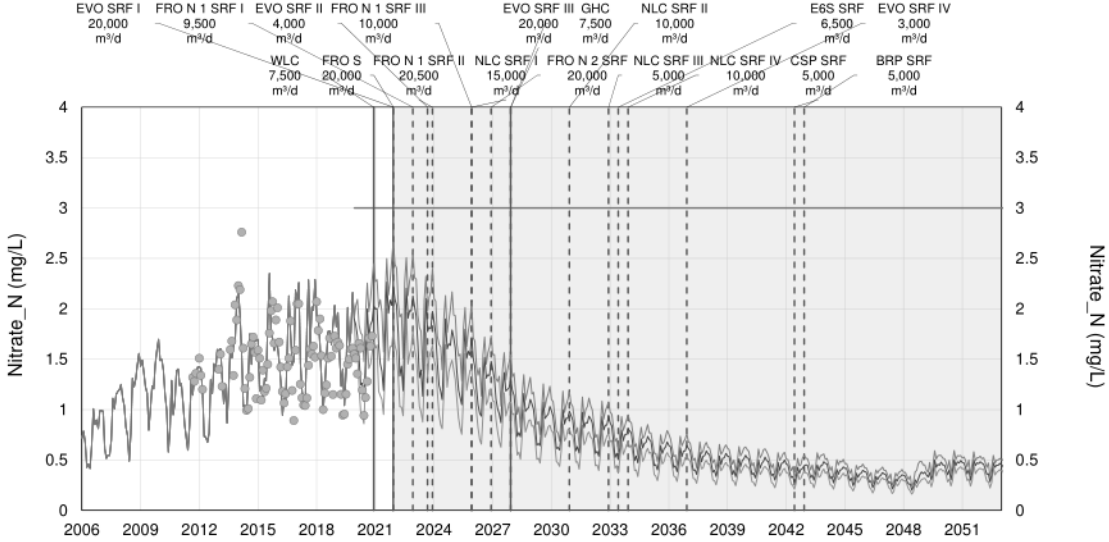
Teck

Elk River at Elko Reservoir
(RG_ELKORES; E294312)

Selenium



Nitrate



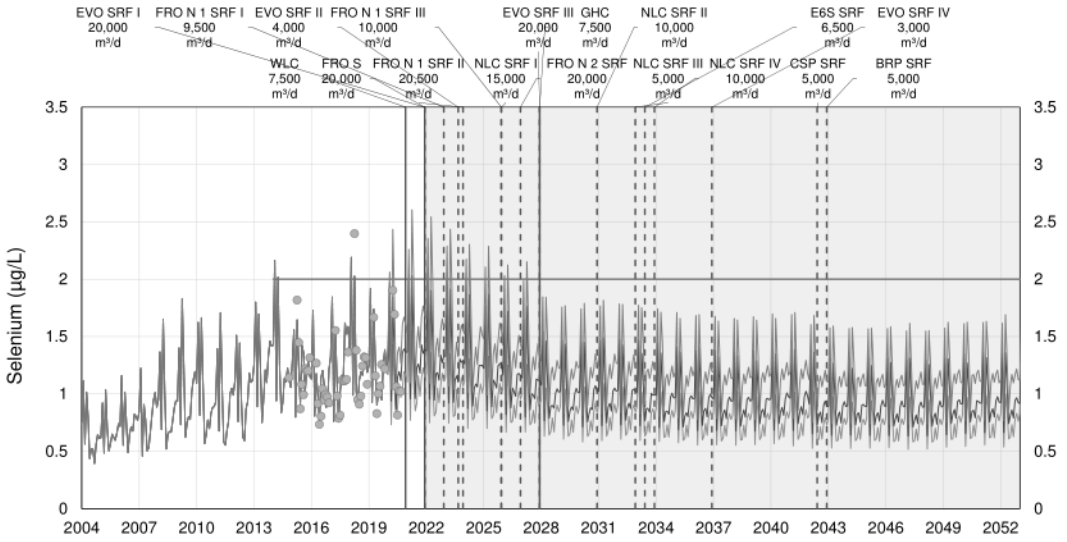
Projected P90 Monthly Average Concentrations
Projected P10 Monthly Average Concentrations
Site Performance Objective

Projected P50 Monthly Average Concentrations
Monthly Average Measured Concentrations
Limit

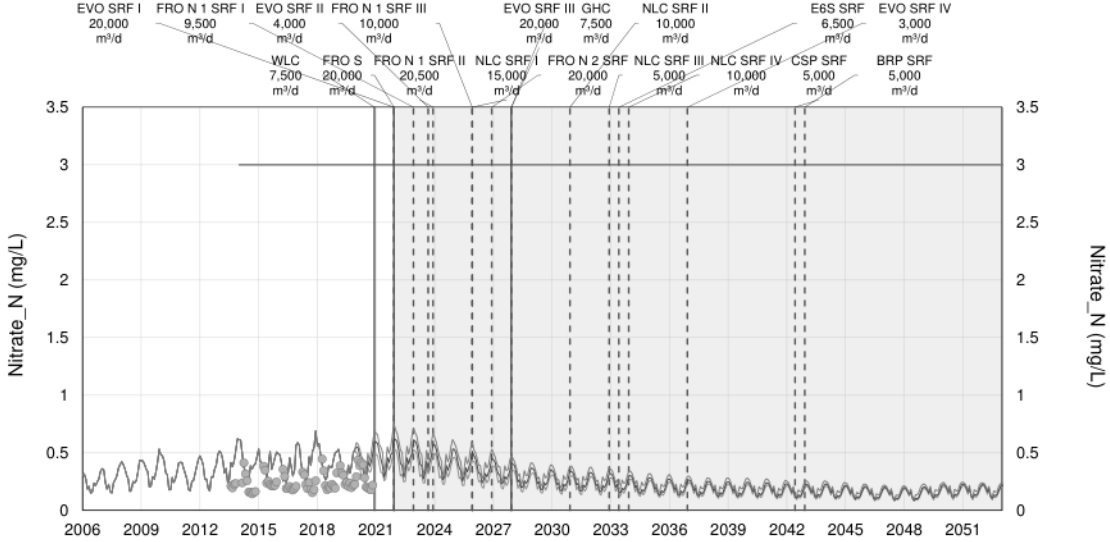
Teck

Koocanusa Reservoir
(RG_DSELK; E300230)

Selenium



Nitrate



Selenium (µg/L)

- Projected P90 Monthly Average Concentrations
- Projected P10 Monthly Average Concentrations
- Site Performance Objective

Nitrate_N (mg/L)

- Projected P50 Monthly Average Concentrations
- Monthly Average Measured Concentrations
- Limit

Teck

Compliance and Se + NO_3 mitigation plan summary

- The plan achieves the primary objective of the EVWQP to stabilize and reduce Se and NO_3 in 2022.
- The plan is aggressive but achievable and is designed to meet full compliance as quickly as possible.
- With our FRO-S AWTF and FRO-N SRF facilities coming online, water quality and compliance will improve substantially in 2022.

Lunch time
Planned for 1:00–2:00 PM

Lunch Break



Teck

Next steps



Teck

Next steps

- Se + NO3 mitigation plan questions, responses, and final updates
- Sulphate mitigation plan
- Sensitivity analysis
- Integrated Effects Assessment
- Reporting
  - Plain language executive summary
  - Main report and appendixes
  - AMP MQ1 and 3 Evaluation Report
- Schedule submittal review with MMO

Record of action items and other important items

Teck

Action items
Meeting #1 on April 21

Responsible	Action	Status	Requested By	Comments
ENV, EMLI, and KNC	Send Teck (Amanda) a list of IPA technical reviewers	Complete	May 18, 2021	
Teck	Schedule Meeting #2 Overview which is proposed for May (now anticipated to occur in early June)	Complete	May 20, 2021	Meeting was Oct 7 due to the KNC pause
Teck	Follow up on The Boundary Waters Treaty	Complete	Oct 7, 2021	Presented in Oct 7 meeting
Teck	Recommend a process (SE Coal, AMP) to discuss near term non-compliances	Closed	Oct 21, 2021	LCO near term compliance presented in Oct meeting, FRO near term compliance will be part of the IPA final mitigation plan
Teck	Consider the interaction between the Koocanusa Reservoir target, CMER, and the 2021 IPA	Complete	Oct 7, 2021	Presented in Oct 7 meeting
Teck	Send meeting notes and action items	Complete	April 30, 2021	Emailed May 6
ENV, EMLI, and KNC	Provide any additional feedback on the presentation to Teck (Amanda)	Complete	May 18, 2021	No comments received
KNC	US Tribes engagement on IPA	Closed	Oct 7, 2021	Update in Oct 7 meeting, see meeting #3 action items

Action items
Meeting #2 on Oct 7

Responsible	Action	Status	Requested By	Comments
Teck (Amanda)	Send meeting notes and action items	Planned	Nov 26, 2021	In progress
ENV, EMLI, and KNC	Provide any additional feedback on the presentation to Teck (Amanda)	Complete	Nov 1, 2021	None to date
Teck (Amanda)	Follow up on the Federal Direction amended dates on FRO-S and Kilmarnock clean water diversion (via email)	Complete	Oct 21, 2021	Email sent on Oct 21
Teck (Justin, James)	Reassess our external communication approach for engagement with US and Canadian tribes	In progress	Nov 25, 2021	In progress, reached out to KTOI and CSKT, KTOI responded & meeting TBD
Teck (Jessica)	Provide graphs to illustrate the range in treated flow, up to the design or planned capacity, for each facility	In progress		Will be included in the final IPA submittal documentation
Teck (Jessica)	Provide up-to-date WLC AWTF selenium effluent concentrations to support future AWTF selenium effluent assumptions	In progress		Will be included in the final IPA submittal documentation
Teck (Jessica)	Provide information on how deep water is accounted for in SRFs planned in the IPA	In progress		Will be included in the final IPA submittal documentation
Teck (Jessica)	In consultation with SRK, add entrainment water assumptions to the planning basis table and provide a formal response of how entrainment water is accounted for in the RWQM/IPA	In progress		Will be included in the final IPA submittal documentation
Teck (Amanda)	Provide insight into Teck's water quality mitigation strategy in relation to AWTFs and SRFs	Complete	Oct 21, 2021	Presented on Oct 21 mtg
Golder (JP) / Teck (Jessica)	Send pre-read information on new learnings on the source of nitrate and schedule time to discuss approach to the sensitivity assessment	Complete	Nov 18, 2021	Provided in Nov 25 presentation (sent ppt Nov 18)
Teck (Jessica)	Update the 2020 RWQM response tables to acknowledge that mitigation planning in this IPA will not include projected improvements to future nitrate concentrations due to changes in blasting practices as a result of new learnings on the sources of nitrate	In progress		Will be included in final response table for the 2020 RWQM
Teck (Jessica)	Include a climate change evaluation in the IPA	Planned		Will be included as a sensitivity analysis in the final IPA submittal documentation

Action items
Meeting #3 on Oct 21

Responsible	Action	Status	Requested By	Comments
Teck (Amanda)	Send meeting notes and action items	Planned	Nov 26, 2021	
ENV, EMLI, and KNC	Provide any additional feedback on the presentation to Teck (Amanda)	In progress	Nov 26, 2021	Included 1 new action item
Teck (Amanda)	Update and reissue the slide deck for KNC maps, additional considerations on SRF/AWTF slides, clarification on IPA/Engineering process slides, and use of previous over historical	In progress	Nov 26, 2021	Will be sent with the meeting notes
Teck (Jessica)	Provide an update on the approach for nitrate source terms	Closed	Nov 25, 2021	Reviewed in Nov 25 presentation
Teck (Amanda & Liz)	Schedule a meeting to review Se and NO_3 technologies that have been evaluated within our R&D program	In progress	Jan 20, 2022	Included in Jan 20 presentation
Teck (Jessica)	FRO-N Phase I & Phase 2 discussion in Oct 25 meeting	Transferred	Oct 25, 2021	Reviewed in FRO-N Phase I SRF permit application meeting on Oct 25
Teck (Nick)	Provide information on the LCO MSAW to WLC pipeline AHA scope including constituents, multi-stressors, chronic tox inclusion, fish species and age considerations	Transferred		AHA to be communicated through the permitting of the MSAW to WLC pipeline, meeting planned for Dec
Teck (Amanda)	Provide information on the feasibility of the # of facilities planned to be constructed over the next few years	In progress		Included in Jan 20 presentation
Teck (Jessica)	Provide the planning assumptions for the performance of the LCO WLC AWTF, FRO AWTF-S, EVO SRF and FRO SRF-N (email from Heather on Oct 27)	Planned		Final planning assumptions Will be included in the final IPA submittal documentation

Record of important topics outside of IPA technical review

- Item 1

2022 IPA – Final draft SO4 mitigation plan

Meeting #6 – ENV, EMLI, KNC and Teck

February 14, 2022

Teck

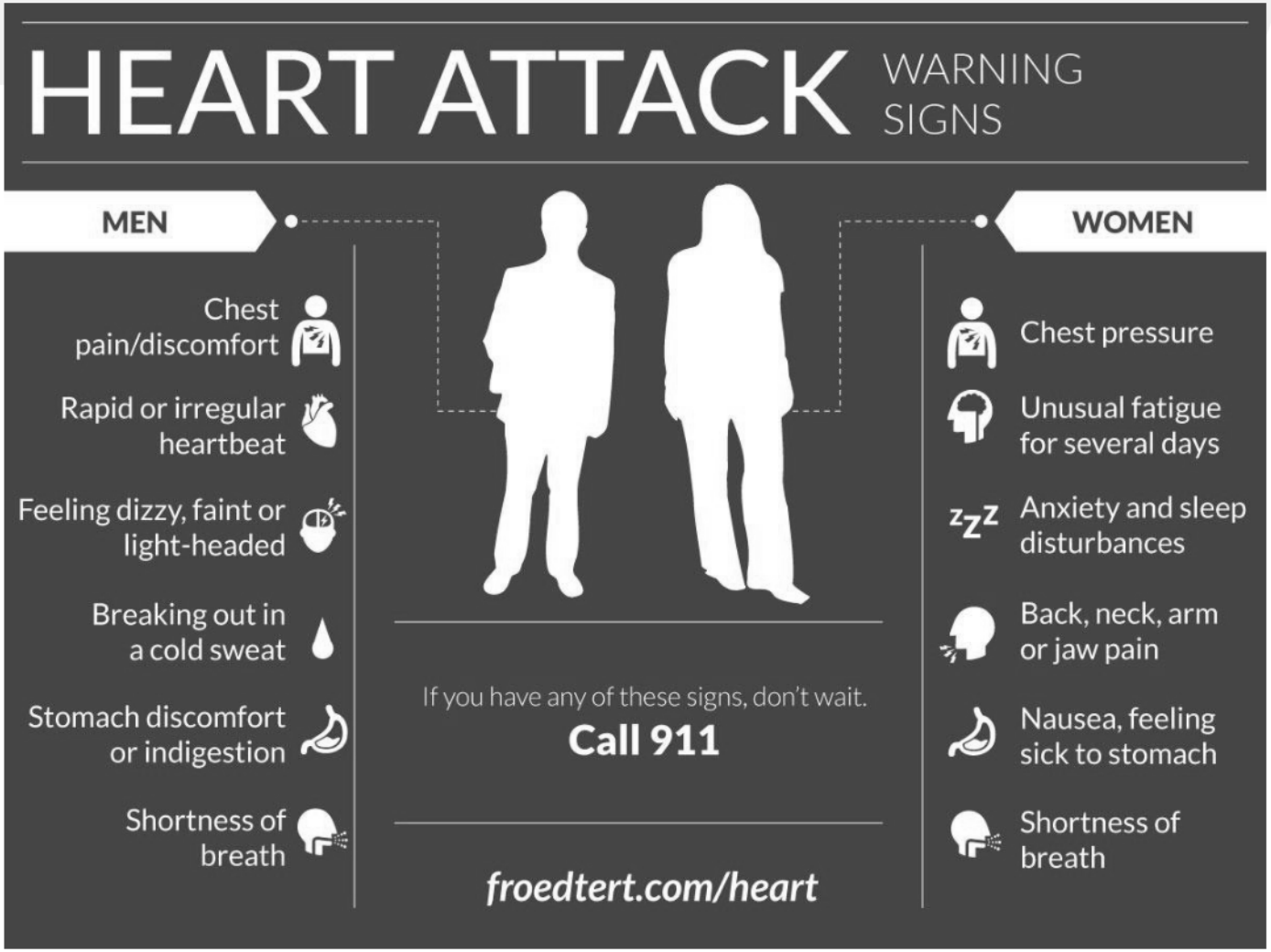
Safety Share

7 STEPS TO A HEALTHIER HEART

You don't have to make big changes to reduce your heart attack and stroke risk. Here are 7 healthy habits that could save your life:



HEART ATTACK WARNING SIGNS



Teck

Introductions
Teck and Golder


Amanda Thumma
Manager, Water Planning


Jessica Mackie
Manager, Water Modelling


Lucy Eykamp
Manager, Regulatory Approvals


Kristina Birk
Engineer in Training, Water Modelling


Tiffiany Cromey
Senior Mining Engineer, Water Planning


Liz Karbashewski
Manager, Applied Research & Development


Dan L'Heureux
Director, Water Strategy


Adam Langer
Director, Water Projects


James Sandland
Regional Director, Government Affairs


Justin Patterson
Lead, Indigenous Initiatives


Christian Baxter
Director, Environmental Strategy


Katie Campbell
Project Engineer, Water Planning


J.P. Bechtold
Principal, Senior Water Quality Specialist - Golder


Amanda Snow
Senior Water Quality Specialist - Golder

Teck

Meeting Attendees
ENV, EMLI, KNC

Name	Role	Organization
Andrew Craig	Senior Environmental Geoscientist	EMLI
Colin Squirrell	Senior Projects Lead, MMPO	EMLI
Jolene Jackson	Acting Project Director, MMPO	EMLI
Kelsey Norlund	Manager, Environmental Geoscience & Permitting	EMLI
Sam Barnes	Senior Projects Lead, MMPO	EMLI
AJ Downie	Regional Director, SE Coal Mining	ENV
Baljeet Mann	Authorizations Section Head, SE Coal Mining	ENV
Karen Fairweather	Senior Environmental Protection Officer, SE Coal	ENV
Kyle Terry	Regional Hydrologist	ENV
Lorna Green	Water Treatment Specialist	ENV
Patrick Williston	Senior Environmental Impact Assessment Biologist, SE Coal	ENV
Bernadette Lyons	Geological & Water Resource Engineer, Waterline Resources Inc	KNC
Erin Robertson	Team Lead Mining Oversight	KNC
Heather McMahon	Water Quality Biologist	KNC
Jesse Sinclair	Aquatic Biologist, LGL Limited	KNC
Kamila Baranowska	Aquatic Biologist	KNC
Mark Tinholt	Environmental Consultant, Owner	KNC

Welcome

Any opening comments or messages to add?

Meeting #6 – Final draft SO_4 Mitigation Plan
Agenda and purpose

Safety & introductions	10:30 AM	10 mins
Status update	10:40 AM	5 mins
Final draft SO_4 mitigation plan	10:45 AM	30 mins
Final draft Se & NO_3 mitigation plan	11:15 AM	70 mins
Next steps	12:25 PM	5 mins
Meeting end	12:30 PM	

Please note that all times start times and in MST.

Meeting Purpose:
Information sharing in preparation for the IPA submission.



Any additions, changes, or feedback?

Teck

Discussion Principles

To generate a darn good conversation

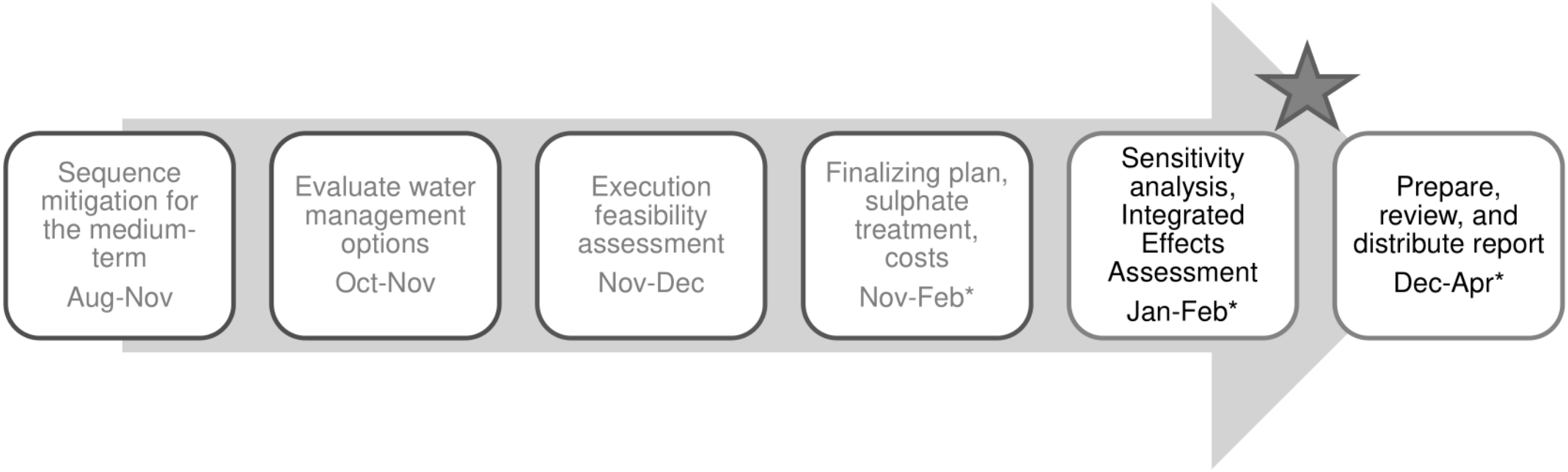
- Actively listen
- Lean in and be curious
- Being authentic and vulnerable makes every conversation easier to say and to hear
- Think outside of your comfort zone
- Be self aware
- Build on others' points
- Criticism will hurt discussion
- Replace the 'but' with 'and'
- Allow a presenter to finish the slide, prior to asking questions
- Keep record for any important topics that are outside of today's discussion

Any additions, changes, or feedback?

Teck

s.13; s.16

Technical Process



Teck

**Dates are current best estimate and are subject to change.*

BC/KNC Technical Review Process
Meeting schedule

#1 Introduction *April 21*	•Shared understanding of process and approach to inform work planning •IPA overview, early issue identification and setting expectations
#2 Overview and method *Oct 7*	•To provide the team information necessary to prepare for the technical review of the IPA and to review the planning basis. •2022 IPA overview, external engagement and key linkages, technologies background and approach, 2022 IPA input and planning assumptions, next steps
#3 Mitigation plan update *Oct 21*	•To review important projects and scopes related to WQ mitigation planning. •Status updates including follow ups from mtg #2, LCO Line Creek near term non-compliance, development of sulphate treatment technology
#4 Mitigation plan update *Nov 25*	•Information sharing in preparation for the IPA submission. •Sources of nitrate in waste rock, sensitivity analysis overview
#5 Se & NO_3 mitigation plan *Jan 20*	•Information sharing in preparation for the IPA submission. •Status update, final draft Se & NO_3 mitigation plan review
#6 SO_4 mitigation plan *Feb 14*	•Information sharing in preparation for the IPA submission. •Status update, final draft SO_4 mitigation plan, follow up items on final draft Se & NO_3 mitigation plan •Review schedule and meetings to be determined, anticipated to be similar to the 2020 RWQM approach coordinated by MMO

Teck

CSKT and KTOI Update

Action Items
Meeting #5 on Jan 20

Any additions, changes, or feedback?

Responsible	Action	Status	Requested By	Update
Teck	Send meeting notes and action items	New		
ENV, EMLI, and KNC	Provide any additional feedback on the presentation to Teck (Amanda)	New		
Teck (Warn, Dan/Adam, Rory)	Provide information on mixing of treated waters returned to multiple sources with respect to fish	New, transferred		Teck's Fish Team is conducting a literature review in regard to mixing of treated waters and potential impacts on fish.
Teck (Jessica)	Include information on the treated volumes of water in the final IPA submission	New	IPA submittal	Will be included as a section in the final IPA report
Teck (Amanda S Golder)	Include projections graphs that show the unmitigated results in the final IPA submission	New	IPA submittal	Will be included as a section in the final IPA report
Teck (Jessica / Amanda T)	Include information on near term non-compliances such as why they are occurring, what has been done, and what is considered to be done	New	IPA submittal	Will be included as a section in the final IPA report
Teck (Dennis)	Provide information on the Elkford town well near Boivin Creek that has increasing selenium concentrations at 5-7 µg/L and compare to the GH_ER1 4-6 µg/L. *Action transferred to Teck Groundwater team*	New, transferred		Discussed during Feb 4, 2022 2020 RWQM meeting, with follow-up email from Nathaniel Barnes. Next steps to be determined after the information is available to Teck and other stakeholders
Teck (Jessica)	Include both the RWQM and Koocanusa module projection graphs	New	Feb 14 and IPA submittal	Included in today's presentation and will be included in the final IPA report

Previous action items

- Climate change sensitivity analysis

Final Draft $S0_4$ Mitigation Plan



Teck

2022 IPA Mitigation Plan Overview

- The plan is aggressive but achievable and is designed to meet full compliance as quickly as possible.
- Teck recognizes our legal and regulatory requirements under Permit 107517 under the *Environmental Management Act* and C-permits under the *Mines Act*.
- The permit limits and site performance objectives in permit 107517 were developed based on the best knowledge at the time of the EVWQP.
- Teck acknowledges the original EVWQP schedule has been delayed to adapt to new and critical learnings such as development of the AOP process to reduce selenium speciation and bioaccumulation; the effects of lag times on constituent release from waste rock; and understanding the influence of groundwater in the system.

Draft Summary of Treatment, Diversions and Conveyance for Sulphate

Site	Treatment Vessel/Associated Diversion	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated/Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S	FRO S	7,500	Dec 31, 2026	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	12,500	Dec 31, 2030	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
LCO	WLC AWTF Phase I	WLC I	2,500	Dec 31, 2025	West Line Creek, MSAW, Line Creek
	WLC AWTF Phase II	WLC II	2,500	Dec 31, 2030	West Line Creek, MSAW, Line Creek
	WLC AWTF Phase III	WLC III	2,500	Dec 31, 2035	West Line Creek, MSAW, Line Creek
	No Name, Horseshoe, and Upper Line Creek Diversions		42,000	Dec 31, 2025	-
	LCO Dry Creek Phase I	LCO DC I	2,500	Dec 31, 2029	LCO Dry Creek
	LCO Dry Creek Phase II	LCO DC II	2,500	Dec 31, 2032	LCO Dry Creek
	LCO Dry Creek Phase III	LCO DC III	2,500	Dec 31, 2037	LCO Dry Creek
	Conveyance/Supplementation		Up to 30,000	Mar 29, 2023	-
EVO	EVO Dry Creek Phase I	EVO DC I	2,500	Dec 31, 2033	EVO Dry Creek
	EVO Dry Creek Phase II	EVO DC II	5,000	Dec 31, 2038	EVO Dry Creek

Treatment and Compliance Summary for the FRO Compliance Point

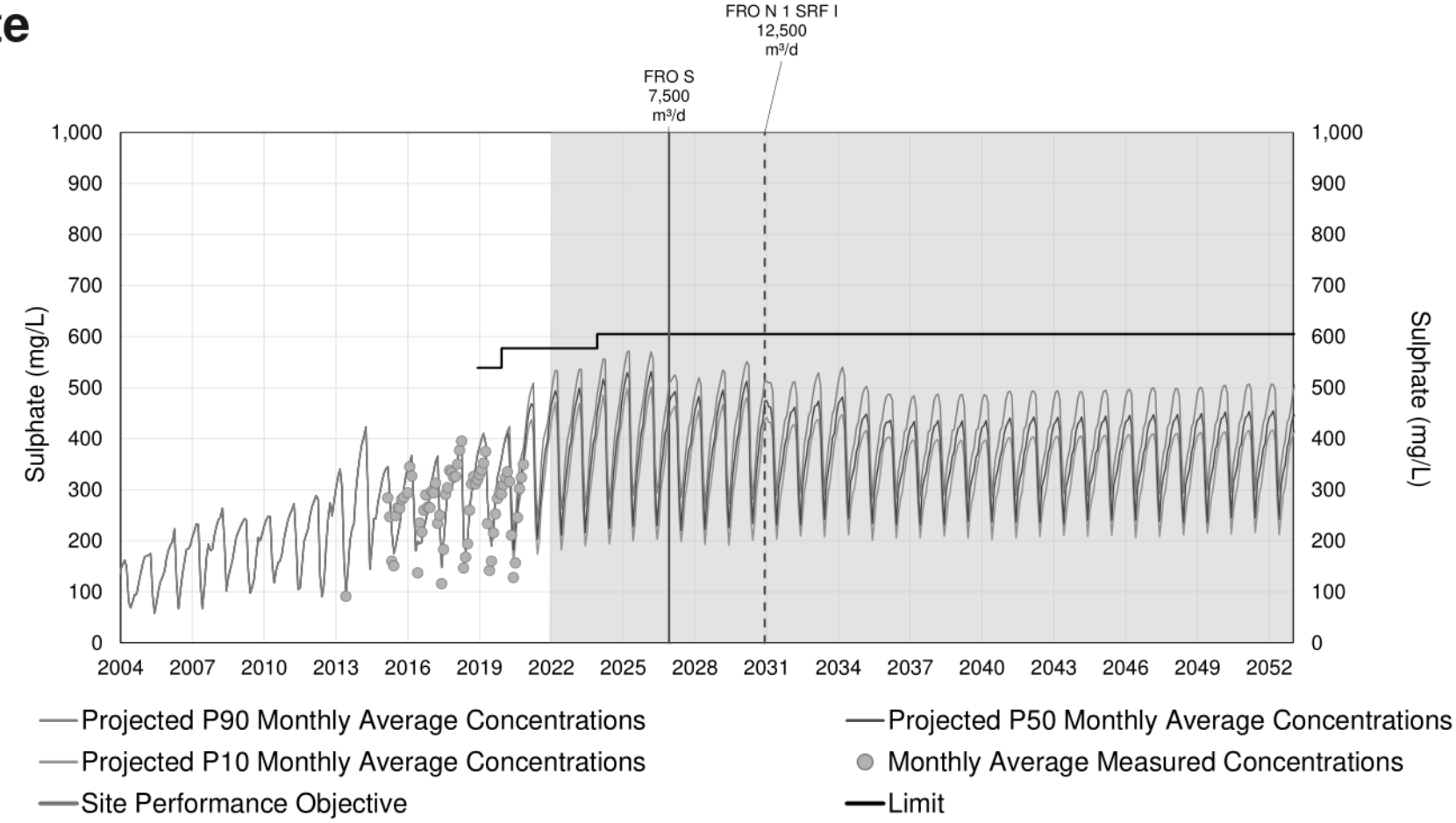
Site	Treatment Vessel/ Associated Diversion	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated/Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S	FRO S	7,500	Dec 31, 2026	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	12,500	Dec 31, 2030	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond

Stabilization of sulphate concentrations is projected to begin when FRO AWTF-S is fully effective, with an incremental future reduction with each additional phase of treatment added and long-term stabilization below the Compliance Limit.

- Compliance projected to be maintained at the FRO Compliance Point (FR_FRABCH) for sulphate

FRO Compliance Point
(Fording River, 100 m u/s of Chauncey Creek) (FR_FRABCH; E223753)

Sulphate



Teck

Treatment and Compliance Scenario for LCO Dry Creek

Site	Treatment Vessel/ Associated Diversion	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated/ Added
LCO	LCO Dry Creek Phase I	LCO DC I	2,500	Dec 31, 2029	LCO Dry Creek
	LCO Dry Creek Phase II	LCO DC II	2,500	Dec 31, 2032	LCO Dry Creek
	LCO Dry Creek Phase III	LCO DC III	2,500	Dec 31, 2037	LCO Dry Creek
	Conveyance/ Supplementation	-	Up to 30,000	Mar 29, 2023	-

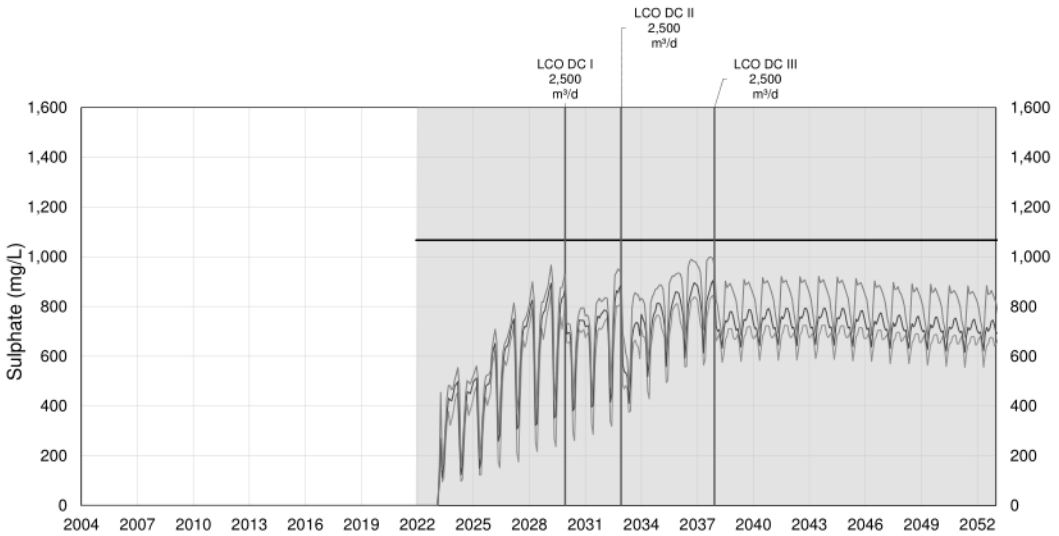
Stabilization and reduction of sulphate concentrations is projected to begin when conveyance and supplementation is fully effective, with incremental future reductions with each phase of treatment added and long-term stabilization below the discharge criterion and SPO.

- Compliance projected to be maintained for the conveyance water for sulphate
- Compliance projected to be maintained at LC_DCDS from mid-year 2023 and onward

LCO Dry Creek

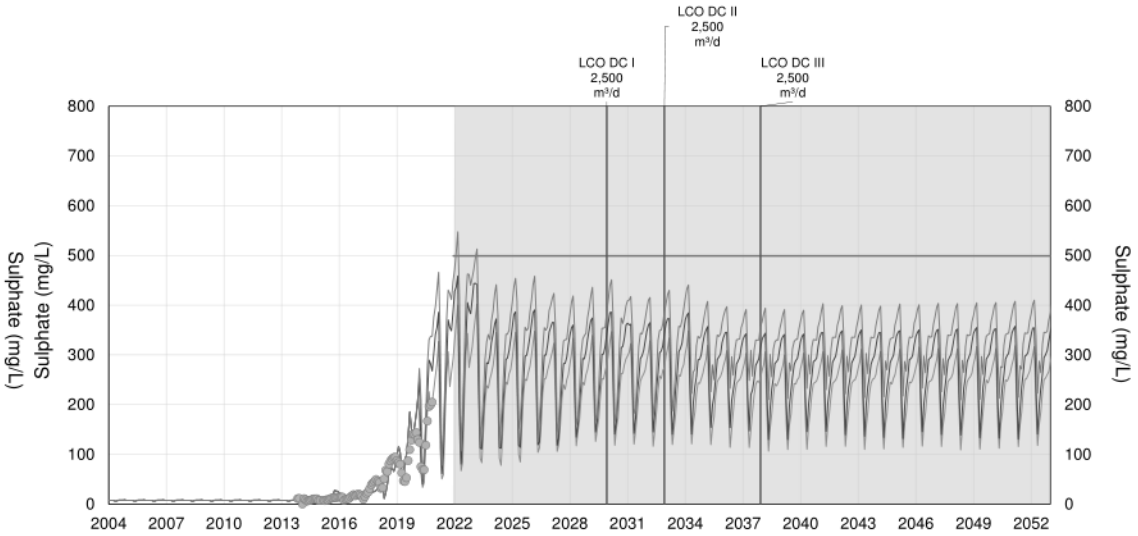
Sulphate

Conveyance Water



Projected P90 Monthly Average Concentrations
Projected P10 Monthly Average Concentrations
Site Performance Objective

LCO Dry Creek downstream of the Sedimentation Ponds (LC_DCDS)



Projected P50 Monthly Average Concentrations
Monthly Average Measured Concentrations
Limit

Teck

Treatment and Compliance Scenario for the Fording River downstream of Greenhills Creek

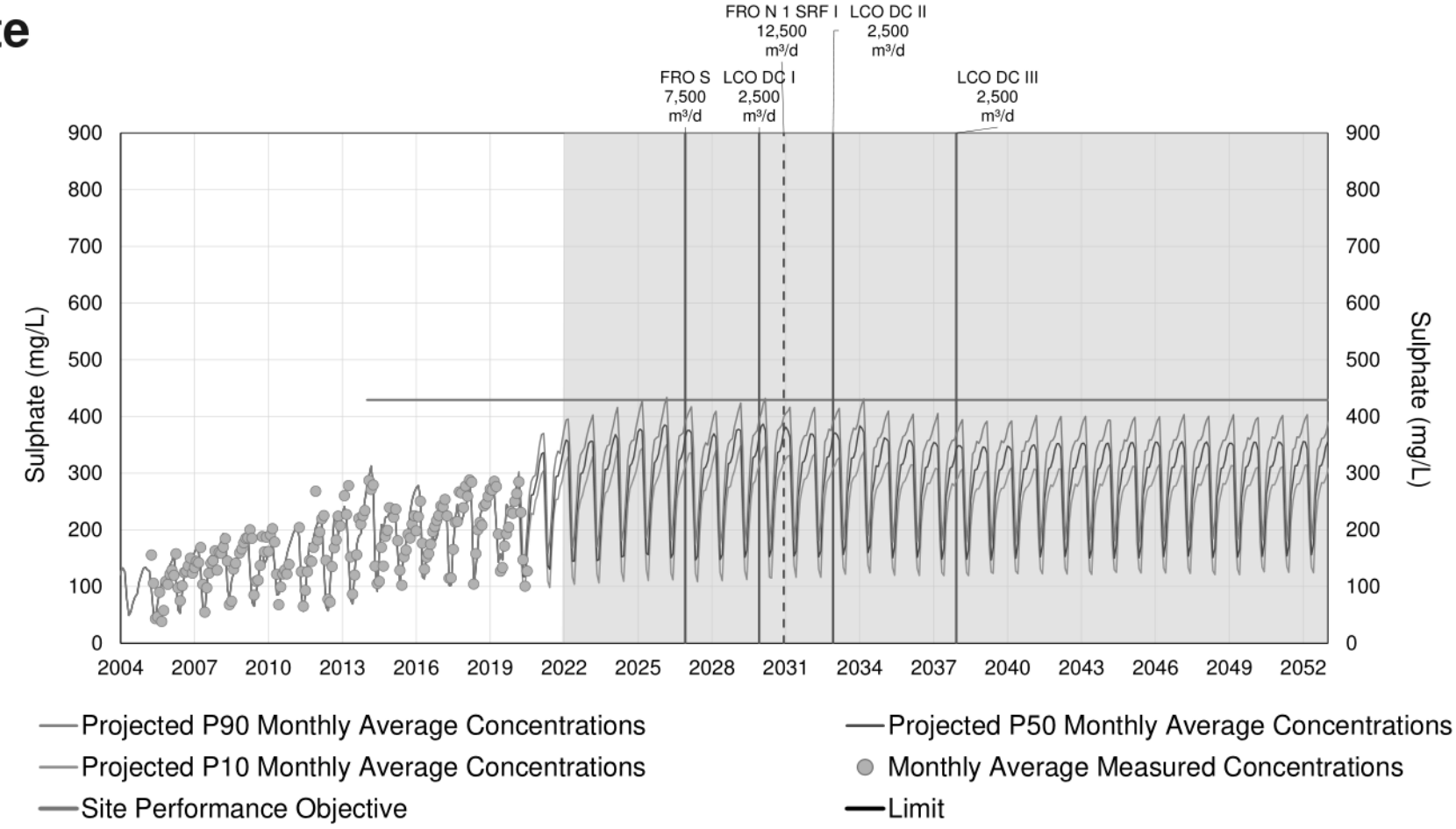
Site	Treatment Vessel/ Associated Diversion	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated/Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S	FRO S	7,500	Dec 31, 2026	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	12,500	Dec 31, 2030	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
LCO	LCO Dry Creek Phase I	LCO DC I	2,500	Dec 31, 2029	LCO Dry Creek
	LCO Dry Creek Phase II	LCO DC II	2,500	Dec 31, 2032	LCO Dry Creek
	LCO Dry Creek Phase III	LCO DC III	2,500	Dec 31, 2037	LCO Dry Creek
	Conveyance/ Supplementation		Up to 30,000	Mar 29, 2023	-

Stabilization of sulphate concentrations is projected to begin when FRO AWTF-S is fully effective, with incremental future reductions with each additional phase of treatment added and long-term stabilization below the Compliance Limit.

- Compliance projected to be maintained at the GHO Fording River Compliance Point (GH_FR1) for sulphate from mid-year 2034 and onward

GHO Fording River Compliance Point
(GH_FR1; 0200378)

Sulphate



Teck

Treatment and Compliance Scenario at LCO Compliance Point

Site	Treatment Vessel/ Associated Diversion	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated/ Added
LCO	WLC AWTF Phase I	WLC I	2,500	Dec 31, 2025	West Line Creek, MSAW, Line Creek
	WLC AWTF Phase II	WLC II	2,500	Dec 31, 2030	West Line Creek, MSAW, Line Creek
	WLC AWTF Phase III	WLC III	2,500	Dec 31, 2035	West Line Creek, MSAW, Line Creek
	No Name, Horseshoe, and Upper Line Creek Diversions	-	42,000	Dec 31, 2025	-

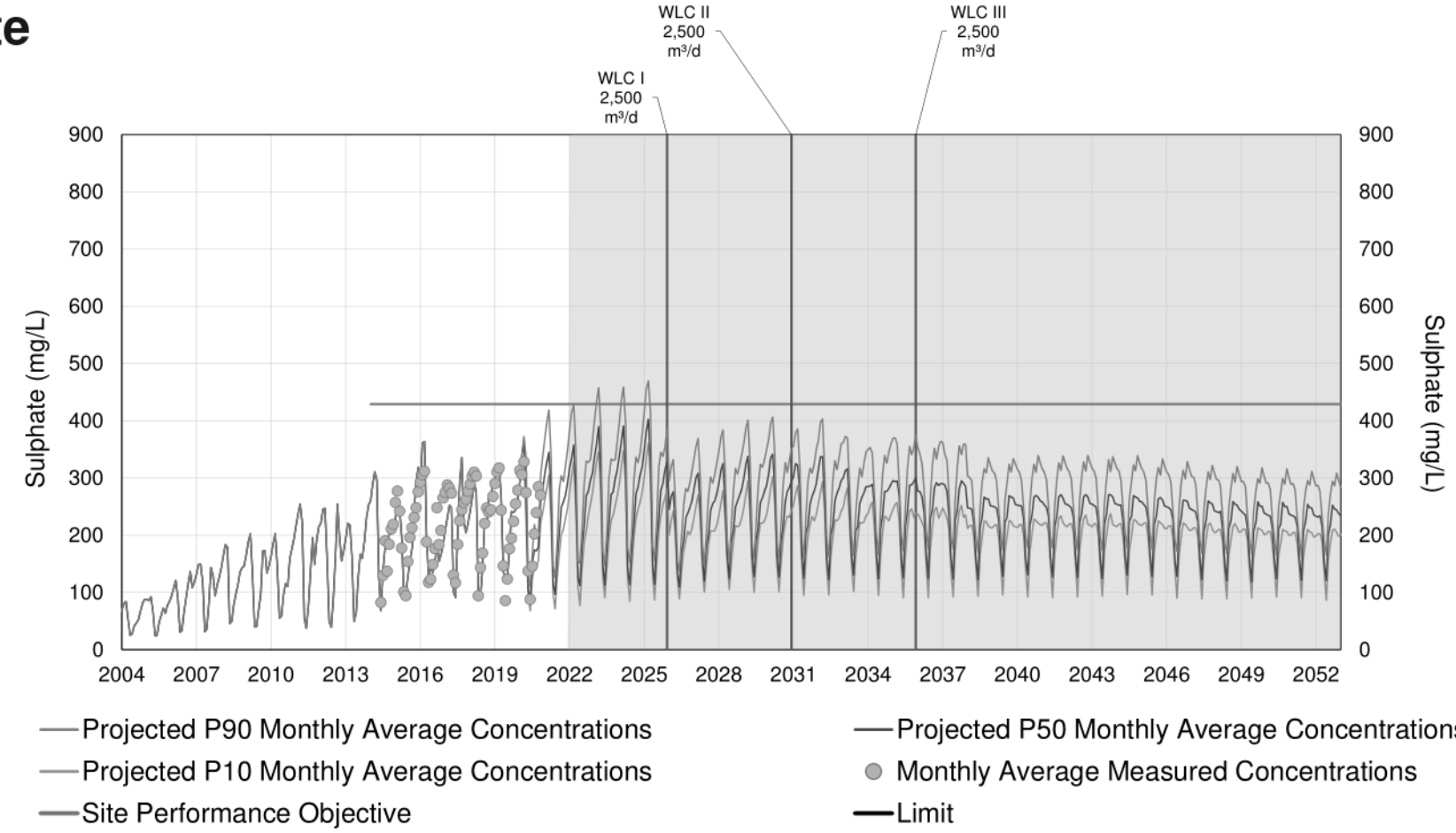
Stabilization of sulphate concentrations is projected to begin when WLC AWTF is fully effective, with incremental future reductions with each additional phase of treatment added and long-term stabilization below the SPO.

- Compliance maintained at the Line Creek Compliance Point (LC_LCDSSLCC) from 2026 and onward

Teck

LCO Compliance Point
(LC_LCDSSLCC; E297110)

Sulphate



Teck

Treatment and Compliance Scenario in the Fording River downstream of Line Creek

Site	Treatment Vessel/Associated Diversion	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated/Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S	FRO S	7,500	Dec 31, 2026	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	12,500	Dec 31, 2030	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
LCO	WLC AWTF Phase I	WLC I	2,500	Dec 31, 2025	West Line Creek, MSAW, Line Creek
	WLC AWTF Phase II	WLC II	2,500	Dec 31, 2030	West Line Creek, MSAW, Line Creek
	WLC AWTF Phase III	WLC III	2,500	Dec 31, 2035	West Line Creek, MSAW, Line Creek
	No Name, Horseshoe, and Upper Line Creek Diversions		42,000	Dec 31, 2025	-
	LCO Dry Creek Phase I	LCO DC I	2,500	Dec 31, 2029	LCO Dry Creek
	LCO Dry Creek Phase II	LCO DC II	2,500	Dec 31, 2032	LCO Dry Creek
	LCO Dry Creek Phase III	LCO DC III	2,500	Dec 31, 2037	LCO Dry Creek
	Conveyance/Supplementation		Up to 30,000	Mar 29, 2023	-

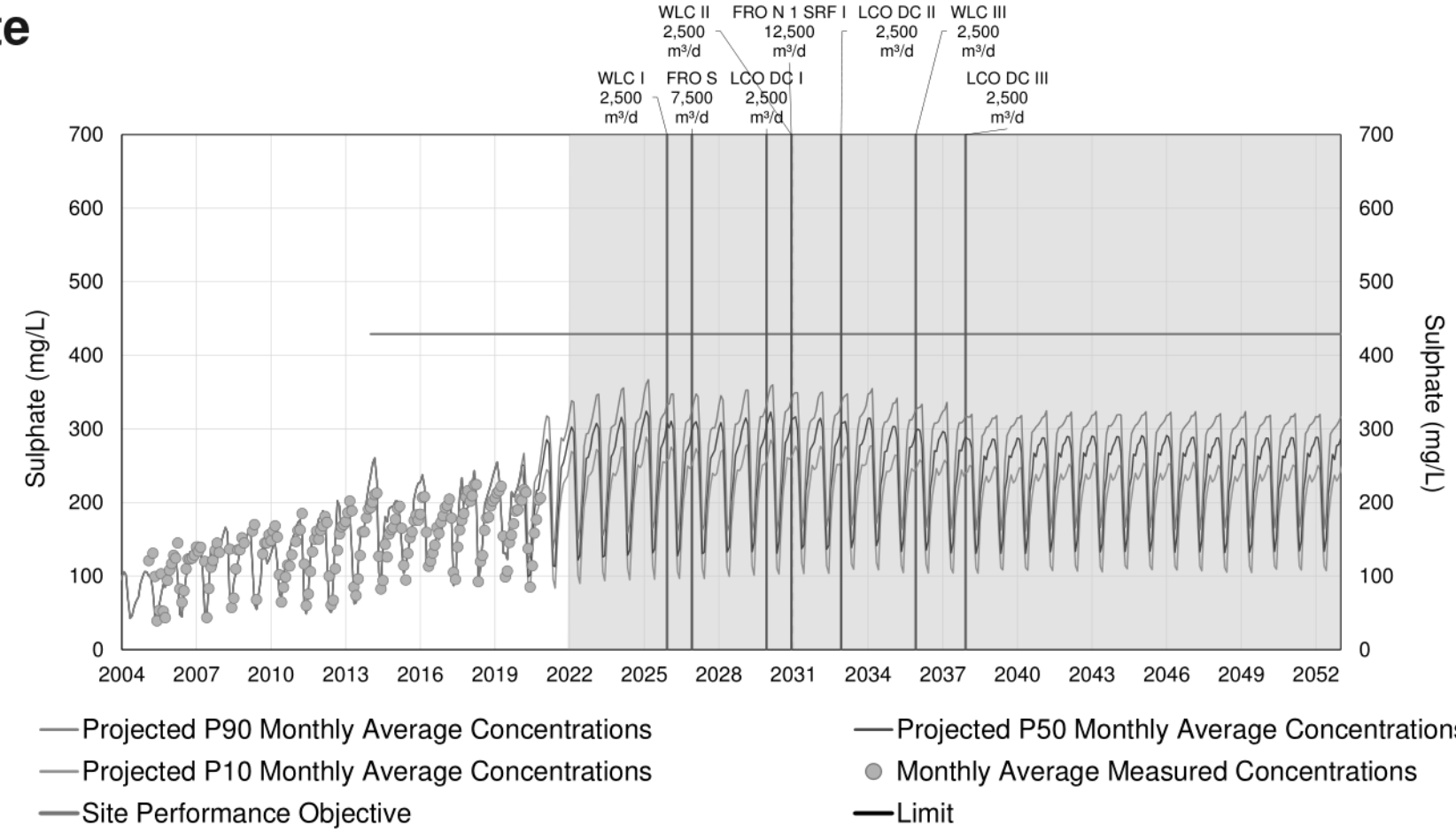
Stabilization and reduction of sulphate concentrations is projected to begin when FRO AWTF-S is fully effective, with incremental future reductions with each additional phase of treatment added and long-term stabilization below the SPO.

- Compliance projected to be maintained for the LC_LC5 Order station for sulphate

Teck

Fording River d/s of Line Creek
(LC_LC5; 0200028)

Sulphate



Teck

Treatment and Compliance Scenario for Harmer Creek

Site	Treatment Vessel/ Associated Diversion	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated/ Added
EVO	EVO Dry Creek Phase I	EVO DC I	2,500	Dec 31, 2033	EVO Dry Creek
	EVO Dry Creek Phase II	EVO DC II	5,000	Dec 31, 2038	EVO Dry Creek

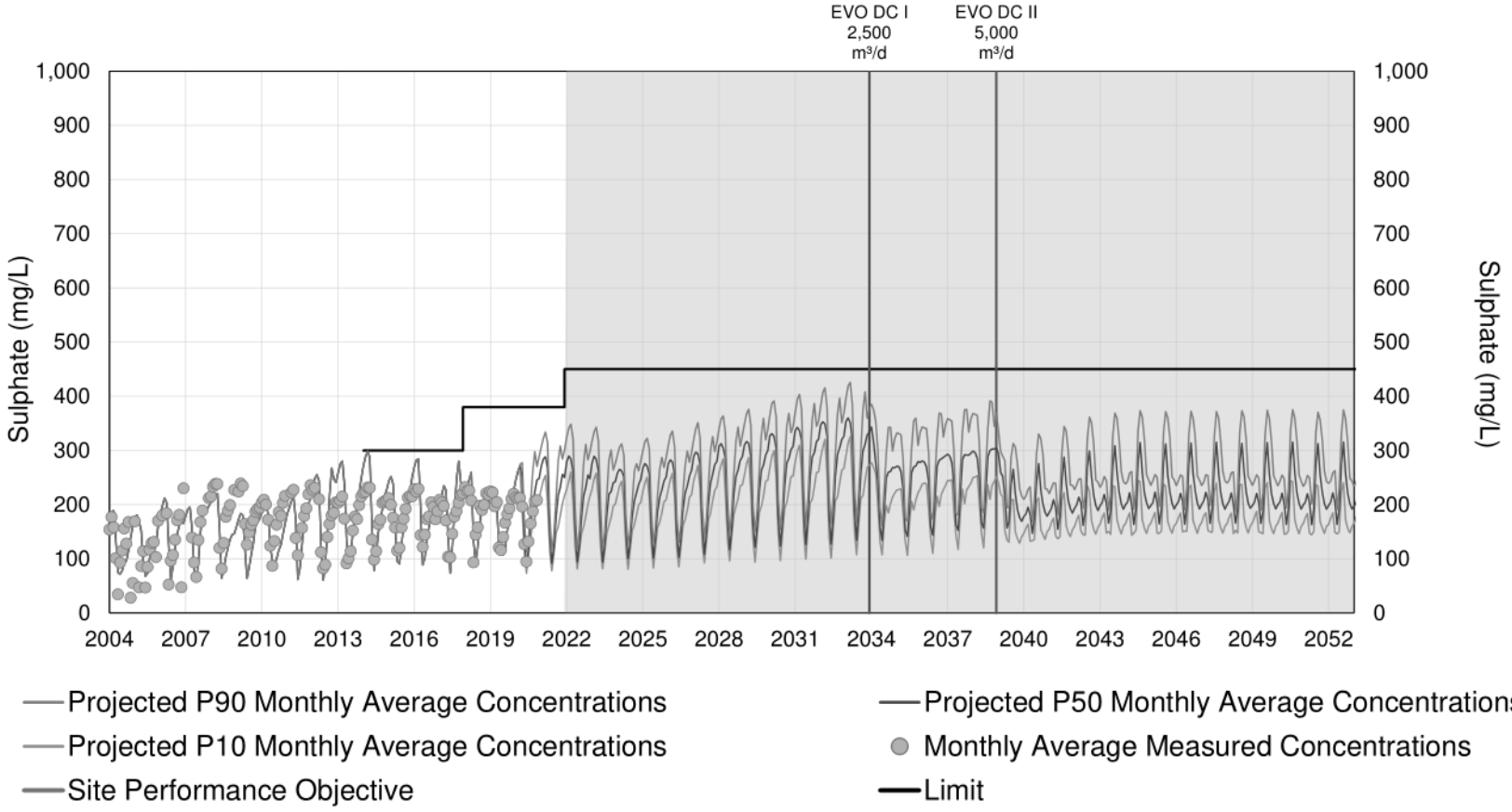
Stabilization and reduction of sulphate concentrations is projected to begin when treatment of EVO Dry Creek is fully effective, with an incremental future reduction with each additional phase of treatment added and long-term stabilization below the Compliance Limit.

- Compliance projected to be maintained at EV_HC1 for sulphate

Teck

EVO Harmer Compliance Point
(EV_HC1; E102682)

Sulphate



Teck

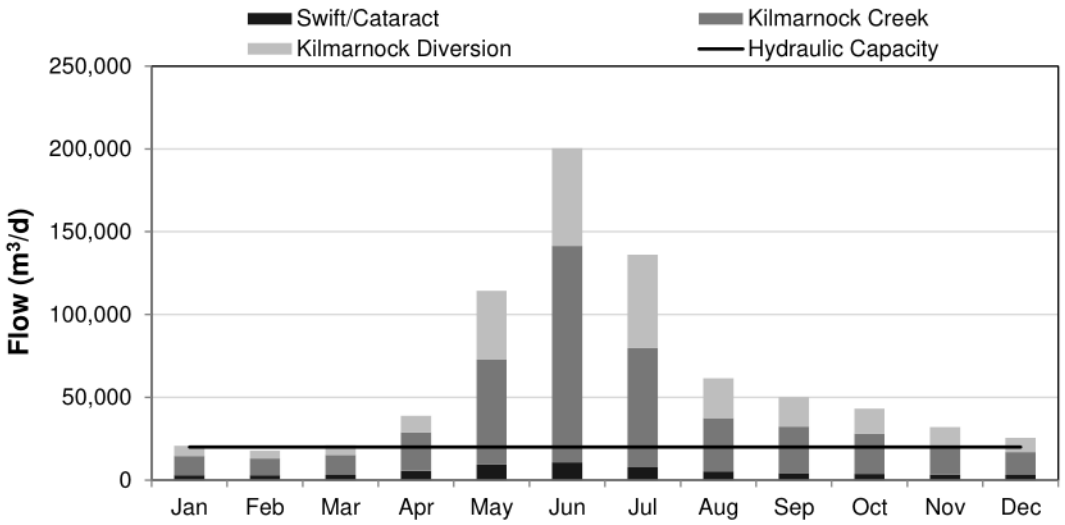
Final draft Se & NO_3 mitigation plan follow up



Teck

Overview of Water Treatment Modelling

- Source waters targeted for treatment are directed to each treatment vessel sequentially from the source with the highest selenium concentration to the source with the lowest selenium concentration
- Water volume treated at each treatment vessel based on:
  - Water availability
  - Hydraulic capacity
  - Nitrate design load removal



Source: Annex F, 2019 IPA.

Figure 1: Monthly Hydrograph of Flows Available for Treatment at the Fording River Operations Active Water Treatment Facility South

Summary of Treatment, Diversions and Conveyance for Selenium and Nitrate

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S	FRO S	20,000	Sep 1, 2022	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	9,500	Dec 31, 2022	Eagle 4 Pit
	FRO-N 1 SRF Phase II	FRO N 1 SRF II	20,500	Dec 31, 2023	Clode, Liverpool, Swift Pit, Post Ponds
	FRO-N 1 SRF Phase III	FRO N 1 SRF III	10,000	Dec 31, 2025	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 2 SRF	FRO N 2 SRF	20,000	Dec 31, 2026	FRO-N 1 SRF sources, Kilmarnock
	Eagle 6 South SRF	E6S SRF	6,500	Jun 30, 2033	Eagle 6 Pit North and South
LCO	WLC AWTF	WLC	7,500	Jan 1, 2020	West Line Creek, Line Creek
	WLC AWTF	WLC	-	June 30, 2023	MSAW
	NLC SRF Phase I	NLC SRF I	12,500	Dec 31, 2025	NLC, NLX, LCO Dry Creek
	NLC SRF Phase II	NLC SRF II	10,000	Dec 31, 2030	NLC, NLX, WLC groundwater
	NLC SRF Phase III	NLC SRF III	17,500	Dec 31, 2033	NLC, NLX, WLC groundwater, Line Creek, LCO Dry Creek
	Conveyance/Supplementation		Up to 30,000	Mar 29, 2023	-
	No Name, Horseshoe and Upper Line Creek Diversions		42,000	Dec 31, 2025	-
GHO	Cougar South Pit SRF	CSP SRF	5,000	Jun 30, 2042	Cougar South Pit, Leask, Wolfram, Thompson, Porter
	Greenhills Creek Treatment	GHC	7,500*	Dec 31, 2027	Greenhills Creek
EVO	EVO SRF Phase I		20,000	Sep 1, 2021	Erickson, Natal
	EVO SRF Phase II		4,000	Sep 30, 2023	EVO Dry
	EVO SRF Phase III		15,000	Dec 31, 2027	Erickson, Natal
	EVO SRF Phase IV		3,000	Dec 31, 2036	EVO Dry
	BRP SRF		5,000	Dec 31, 2042	Baldy Ridge Pit, Erickson, Natal

Teck

* For regional treatment to meet 107517 permit limits and SPOs, 3,000 m^3/day of treatment is required. 7,500 m^3/day is required based on the Federal Direction.

Treatment and Compliance Scenario for LCO Dry Creek

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
LCO	NLC SRF Phase I	NLC SRF I	12,500	Dec 31, 2025	NLC, NLX, LCO Dry Creek
	NLC SRF Phase II	NLC SRF II	10,000	Dec 31, 2030	NLC, NLX, WLC groundwater
	NLC SRF Phase III	NLC SRF III	17,500	Dec 31, 2033	NLC, NLX, WLC groundwater, Line Creek, LCO Dry Creek
	Conveyance/ Supplementation		Up to 30,000	Mar 29, 2023	-

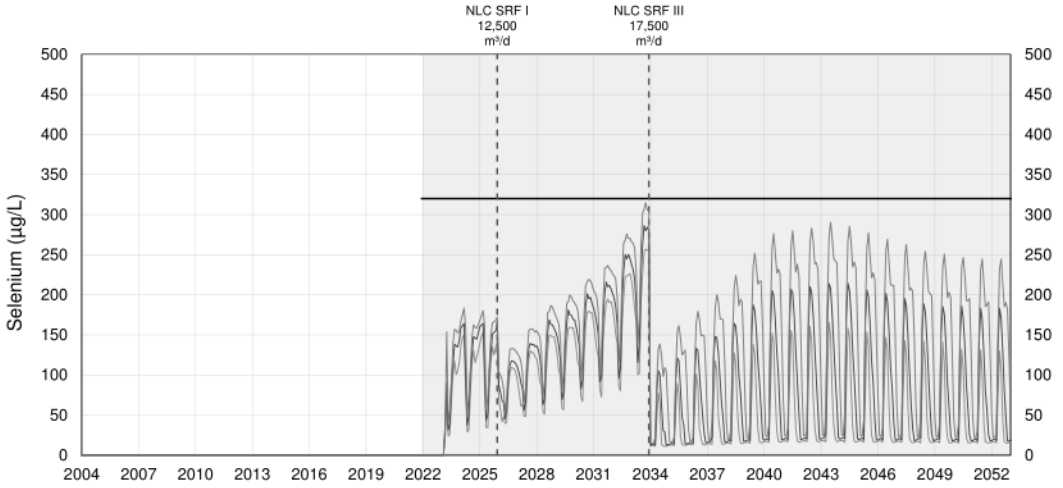
Stabilization and reduction of selenium and nitrate concentrations is projected to begin when conveyance and supplementation is fully effective, with incremental future reductions with each phase of treatment added and long-term stabilization below the discharge criteria and SPO.

- Compliance projected to be maintained for the conveyance water for selenium and nitrate
- Compliance projected to be maintained at LC_DCDS for:
  - Selenium - mid-year 2023 and onward
  - Nitrate - mid-year 2024 and onward

LCO Dry Creek

Selenium

Conveyance Water

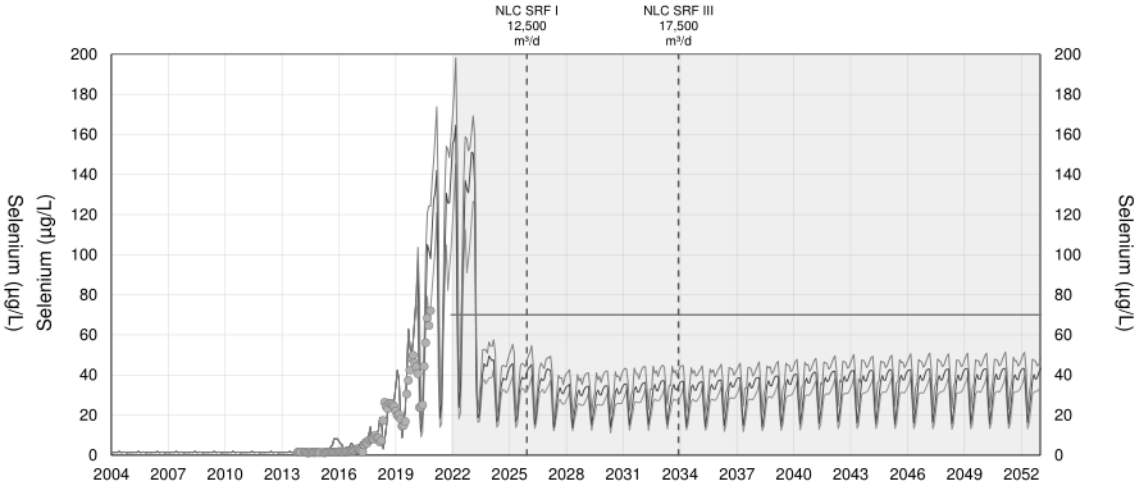


Projected P90 Monthly Average Concentrations

Projected P10 Monthly Average Concentrations

Site Performance Objective

LCO Dry Creek downstream of the Sedimentation Ponds (LC_DCDS)



Projected P50 Monthly Average Concentrations

Monthly Average Measured Concentrations

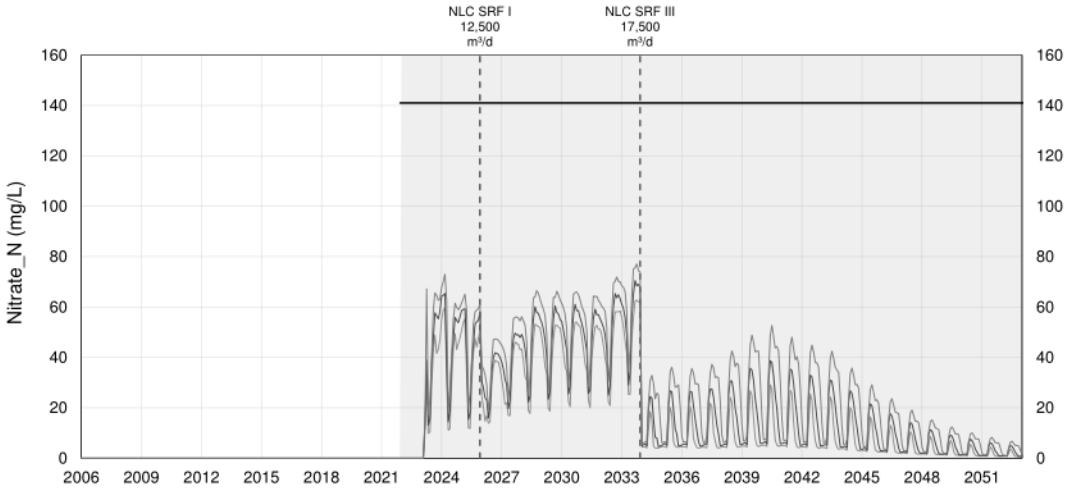
Limit

Teck

LCO Dry Creek

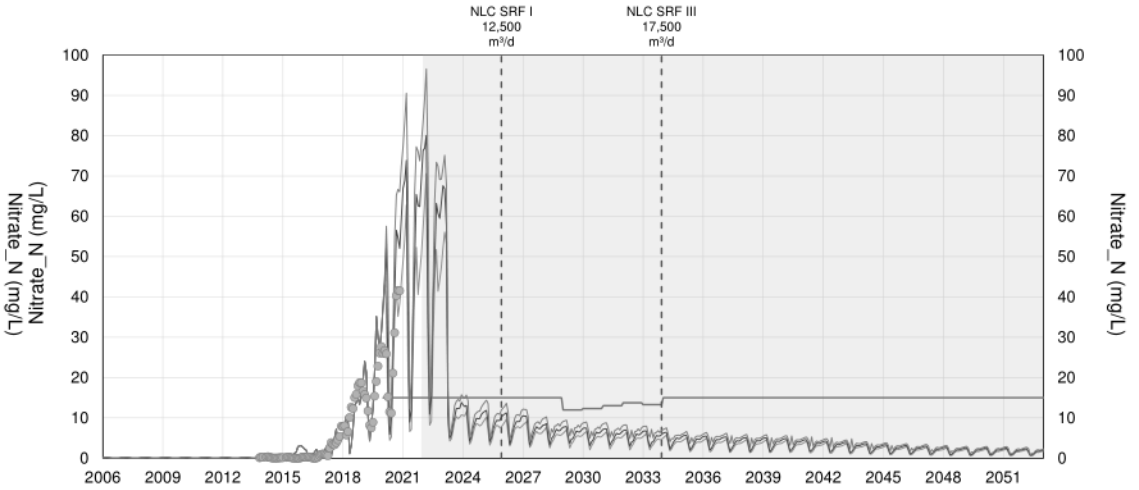
Nitrate

Conveyance Water



Projected P90 Monthly Average Concentrations
Projected P10 Monthly Average Concentrations
Site Performance Objective

LCO Dry Creek downstream of the Sedimentation Ponds (LC_DCDS)



Projected P50 Monthly Average Concentrations
Monthly Average Measured Concentrations
Limit

Teck

Treatment and Compliance Scenario at Koocanusa Reservoir

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S	FRO S	20,000	Sep 1, 2022	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	9,500	Dec 31, 2022	Eagle 4 Pit
	FRO-N 1 SRF Phase II	FRO N 1 SRF II	20,500	Dec 31, 2023	Clode, Liverpool, Swift Pit, Post Ponds
	FRO-N 1 SRF Phase III	FRO N 1 SRF III	10,000	Dec 31, 2025	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 2 SRF	FRO N 2 SRF	20,000	Dec 31, 2026	FRO-N 1 SRF sources, Kilmarnock
	Eagle 6 South SRF	E6S SRF	6,500	Jun 30, 2033	Eagle 6 Pit North and South
LCO	WLC AWTF	WLC	7,500	Jan 1, 2020	West Line Creek, Line Creek
	WLC AWTF	WLC	-	June 30, 2023	MSAW
	NLC SRF Phase I	NLC SRF I	12,500	Dec 31, 2025	NLC, NLX, LCO Dry Creek
	NLC SRF Phase II	NLC SRF II	10,000	Dec 31, 2030	NLC, NLX, WLC groundwater
	NLC SRF Phase III	NLC SRF III	17,500	Dec 31, 2033	NLC, NLX, WLC groundwater, Line Creek, LCO Dry Creek
	Conveyance/Supplementation		Up to 30,000	Mar 29, 2023	-
	No Name, Horseshoe and Upper Line Creek Diversions		42,000	Dec 31, 2025	-
GHO	Cougar South Pit SRF	CSP SRF	5,000	Jun 30, 2042	Cougar South Pit, Leask, Wolfram, Thompson, Porter
	Greenhills Creek Treatment	GHC	7,500*	Dec 31, 2027	Greenhills Creek
EVO	EVO SRF Phase I		20,000	Sep 1, 2021	Erickson, Natal
	EVO SRF Phase II		4,000	Sep 30, 2023	EVO Dry
	EVO SRF Phase III		15,000	Dec 31, 2027	Erickson, Natal
	EVO SRF Phase IV		3,000	Dec 31, 2036	EVO Dry
	BRP SRF		5,000	Dec 31, 2042	Baldy Ridge Pit, Erickson, Natal

Stabilization and reduction of selenium and nitrate concentrations is projected to begin when FRO AWTF-S is fully effective, with incremental future reductions with each additional phase of treatment added and long-term stabilization below the SPO.

Selenium:

- Compliance is projected to be achieved by 2028 with the 2020 RWQM
- Compliance is projected to be maintained with the Koocanusa Reservoir Module

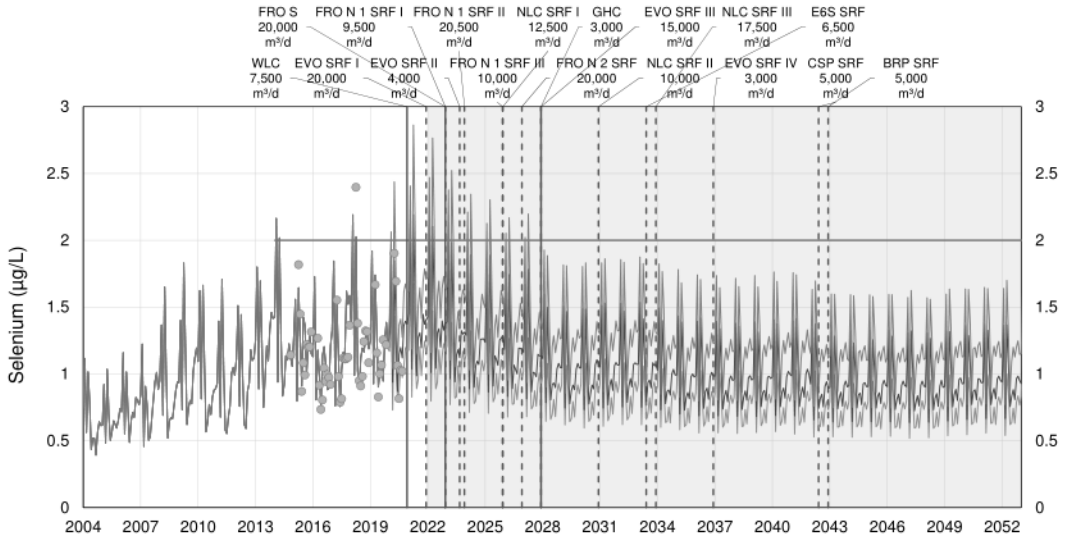
Teck

* For regional treatment to meet 107517 permit limits and SPOs, 3,000 m^3/day of treatment is required. 7,500 m^3/day is required based on the Federal Direction.

Koocanusa Reservoir
(RG_DSELK; E300230)

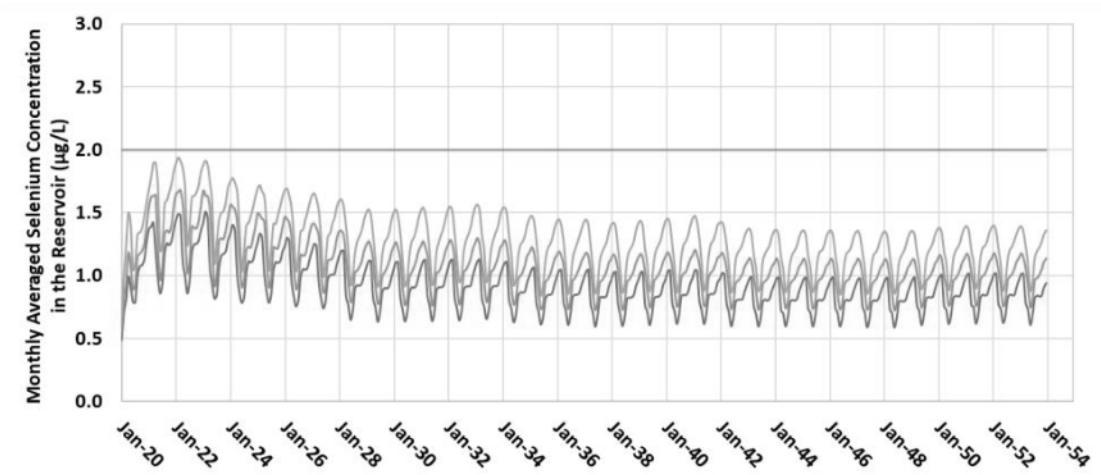
Selenium

2020 RWQM



Projected P90 Monthly Average Concentrations
Projected P10 Monthly Average Concentrations
Site Performance Objective

Koocanusa Reservoir Module



Projected P50 Monthly Average Concentrations
Monthly Average Measured Concentrations
Limit

Teck

Final Draft Se & NO3 Mitigation Plan Follow Up

- No formal questions received
- Open the floor to any questions now

Compliance and Se + NO_3 mitigation plan summary

- The plan achieves the primary objective of the EVWQP to stabilize and reduce Se and NO_3 in 2022.
- The plan is aggressive but achievable and is designed to meet full compliance as quickly as possible.
- With our FRO-S AWTF and FRO-N SRF facilities coming online, water quality and compliance will improve in 2022.

Next steps



Teck

Next steps

- 2022 IPA mitigation plan questions, responses, and final updates
- Sensitivity analysis
- Integrated Effects Assessment
- Reporting
  - Plain language executive summary
  - Main report and appendixes
  - AMP MQ1 and 3 Evaluation Report
- Schedule submittal review with MMO

Record of action items and other important items

Teck

Action items
Meeting #1 on April 21

Responsible	Action	Status	Requested By	Comments
ENV, EMLI, and KNC	Send Teck (Amanda) a list of IPA technical reviewers	Complete	May 18, 2021	
Teck	Schedule Meeting #2 Overview which is proposed for May (now anticipated to occur in early June)	Complete	May 20, 2021	Meeting was Oct 7 due to the KNC pause
Teck	Follow up on The Boundary Waters Treaty	Complete	Oct 7, 2021	Presented in Oct 7 meeting
Teck	Recommend a process (SE Coal, AMP) to discuss near term non-compliances	Closed	Oct 21, 2021	LCO near term compliance presented in Oct meeting, FRO near term compliance will be part of the IPA final mitigation plan
Teck	Consider the interaction between the Koocanusa Reservoir target, CMER, and the 2021 IPA	Complete	Oct 7, 2021	Presented in Oct 7 meeting
Teck	Send meeting notes and action items	Complete	April 30, 2021	Emailed May 6
ENV, EMLI, and KNC	Provide any additional feedback on the presentation to Teck (Amanda)	Complete	May 18, 2021	No comments received
KNC	US Tribes engagement on IPA	Closed	Oct 7, 2021	Update in Oct 7 meeting, see meeting #3 action items

Action items
Meeting #2 on Oct 7

Responsible	Action	Status	Requested By	Comments
Teck (Amanda)	Send meeting notes and action items	Planned	Nov 26, 2021	In progress
ENV, EMLI, and KNC	Provide any additional feedback on the presentation to Teck (Amanda)	Complete	Nov 1, 2021	None to date
Teck (Amanda)	Follow up on the Federal Direction amended dates on FRO-S and Kilmarnock clean water diversion (via email)	Complete	Oct 21, 2021	Email sent on Oct 21
Teck (Justin, James)	Reassess our external communication approach for engagement with US and Canadian tribes	In progress	Ongoing	Teck met with KTOI and CSKT in Dec and is working to schedule a presentation review of the IPA. Teck will will share the 2020 RWQM when the review is complete and will share the IPA submittal. KNC is included in these conversations.
Teck (Jessica)	Provide graphs to illustrate the range in treated flow, up to the design or planned capacity, for each facility	In progress	IPA submittal	Will be included in the final IPA submittal documentation
Teck (Jessica)	Provide up-to-date WLC AWTF selenium effluent concentrations to support future AWTF selenium effluent assumptions	In progress	IPA submittal	Will be included in the final IPA submittal documentation
Teck (Jessica)	Provide information on how deep water is accounted for in SRFs planned in the IPA	In progress	IPA submittal	Will be included in the final IPA submittal documentation
Teck (Jessica)	In consultation with SRK, add entrainment water assumptions to the planning basis table and provide a formal response of how entrainment water is accounted for in the RWQM/IPA	In progress	IPA submittal	Will be included in the final IPA submittal documentation
Teck (Amanda)	Provide insight into Teck's water quality mitigation strategy in relation to AWTFs and SRFs	Complete	Oct 21, 2021	Presented on Oct 21 mtg
Golder (JP) / Teck (Jessica)	Send pre-read information on new learnings on the source of nitrate and schedule time to discuss approach to the sensitivity assessment	Complete	Nov 18, 2021	Provided in Nov 25 presentation (sent ppt Nov 18)
Teck (Jessica)	Update the 2020 RWQM response tables to acknowledge that mitigation planning in this IPA will not include projected improvements to future nitrate concentrations due to changes in blasting practices as a result of new learnings on the sources of nitrate	In progress		Will be included in final response table for the 2020 RWQM
Teck (Jessica)	Include a climate change evaluation in the IPA	Planned	IPA submittal	Will be included as a sensitivity analysis in the final IPA submittal documentation

Action items
Meeting #3 on Oct 21

Responsible	Action	Status	Requested By	Comments
Teck (Amanda)	Send meeting notes and action items	Planned	Nov 26, 2021	
ENV, EMLI, and KNC	Provide any additional feedback on the presentation to Teck (Amanda)	In progress	Nov 26, 2021	Included 1 new action item
Teck (Amanda)	Update and reissue the slide deck for KNC maps, additional considerations on SRF/AWTF slides, clarification on IPA/Engineering process slides, and use of previous over historical	In progress	Nov 26, 2021	Will be sent with the meeting notes
Teck (Jessica)	Provide an update on the approach for nitrate source terms	Closed	Nov 25, 2021	Reviewed in Nov 25 presentation
Teck (Amanda & Liz)	Schedule a meeting to review Se and NO_3 technologies that have been evaluated within our R&D program	Planned		
Teck (Jessica)	FRO-N Phase I & Phase 2 discussion in Oct 25 meeting	Transferred	Oct 25, 2021	Reviewed in FRO-N Phase I SRF permit application meeting on Oct 25
Teck (Nick)	Provide information on the LCO MSAW to WLC pipeline AHA scope including constituents, multi-stressors, chronic tox inclusion, fish species and age considerations	Transferred		AHA to be communicated through the permitting of the MSAW to WLC pipeline, meeting planned for Dec
Teck (Amanda)	Provide information on the feasibility of the # of facilities planned to be constructed over the next few years	Complete		Reviewed in Jan 20 meeting
Teck (Jessica)	Provide the planning assumptions for the performance of the LCO WLC AWTF, FRO AWTF-S, EVO SRF and FRO SRF-N (email from Heather on Oct 27)	Planned	IPA submittal	Final planning assumptions will be included in the final IPA submittal documentation

Action Items
Meeting #4 on Nov 25

Responsible	Action	Status	Requested By	Update
Teck	Send meeting notes and action items	Planned		
ENV, EMLI, and KNC	Provide any additional feedback on the presentation to Teck (Amanda)	Planned		
Teck (Jessica)	Teck to set meeting to discuss groundwater in relation to the 2020 RWQM and the Round 3 comments from the KNC (email from Heather on Nov 29)	In progress		Discussed in Feb. 4, 2022 meeting. A follow up meeting is scheduled for Feb. 17, 2022.
Teck (Jessica)	Add a RWQM concordance table into the IPA report submission	Planned	IPA submission	Will be included in the final IPA documentation
Teck (JP Golder)	For the climate change sensitivity analysis, evaluate variability in years and utilizing 8.5 representative concretion pathway until 2050	To be discussed on Feb 14		We will run climate change with two scenarios – one with RCP 4.5 and one with RCP 8.5. We will not be combining them into one scenario. We are evaluating the development of a defensible method to look at increased within-year variability that may occur with climate change. We will continue to investigate this item outside of the 2022 IPA.
Teck (Jessica)	Include sensitivity analysis where water availability is reduced to mimic groundwater bypass investigate how the use of instream sinks effects the RWQM (email from Heather on Nov 29)	Planned	IPA submission	Sensitivity analysis will be included in the final IPA submittal documentation
Teck (Jessica)	Include instream sinks sensitivity analysis specific to 2020 RWQM KNC comment (KNC_057)	Planned	IPA submission	Sensitivity analysis will be included in the final IPA submittal documentation

Record of important topics outside of IPA technical review

- Item 1

File: Permit 107517
Date: May 18, 2021

PERMIT 107517
COMPLIANCE SUMMARY, ORDER STATION and COMPLIANCE POINT EXCEEDANCES
(February 1, 2021 – May 17, 2021)

As per projections presented in the 2019 Implementation Plan Adjustment (IPA), exceedances of Order Station Site Performance Objectives (SPOs) for selenium and nitrate are expected until the next three scheduled water treatment facilities are commissioned. Exceedances of selenium and nitrate limits at Compliance Points are also linked to water treatment implementation and expected to occur until the associated treatment facilities are commissioned.

For the most part, recent Order Station SPOs and Compliance Point limit exceedances are expected because the Forder River Operation-South Active Water Treatment Facility (FRO-S AWTF) and Elkview Operation Saturated Rock Fill (EVO SRF) have not yet been fully commissioned. It is anticipated that as these two facilities come online and move through commissioning, most SPOs and limits will be met. The remaining exceedances are anticipated to be addressed by the commissioning of the FRO-North and Line Creek Operation Phase III treatment facilities.

The following is a summary of Permit 107517 Order Station SPO and Compliance Point limit exceedances that have occurred since February 1, 2021. Unexpected exceedances have been highlighted.

LOCATION	EXCEEDANCE SUMMARY	NOTES
FRO Compliance Point, New Location (Post-March 11, 2021)	• The 85 ug/L monthly average selenium limit was exceeded in March (113 ug/L) and April (102 ug/L). • The 18 mg/L monthly average nitrate limit was exceeded in March (28.7 mg/L) and April (24.8 mg/L).	*Selenium exceedances are expected until the FRO-S AWTF is commissioned.* *Nitrate exceedances are expected until the FRO-S AWTF is commissioned. The modelled high flow scenario indicates potential seasonal exceedances until FRO-N AWTF is commissioned.*
FRO Compliance Point, Old Location FR_FRCP1 E300071 (Pre-March 11, 2021)	• The 23 mg/L daily maximum nitrate limit was exceeded on two occasions: 34.8 mg/L on February 23 and 25.9 mg/L on March 2. • The 19 mg/L monthly average nitrate limit was exceeded in February (34.8 mg/L) and March (24 mg/L). • The 106 ug/L daily maximum selenium limit was exceeded on three occasions. These exceedances ranged from 208 ug/L (February 23) to 140 ug/L (March 9). • The 90 ug/L monthly average selenium limit was exceeded in February (208 ug/L) and March (145 ug/L). • The 620 mg/L monthly average sulfate limit was exceeded in February (811 mg/L).	*Exceedances are expected at this location because hydrological conditions do not provide adequate mixing at all times.* *The location of the FRO CP was amended on March 11, 2021 to address this issue.*

Commented [KF1]: Change to:
Selenium exceedances are projected until the FRO-S AWTF is operational. The modelled high flow scenario indicates potential seasonal exceedances until three phases of FRO-N SRF, and FRO-N 2 SRF become operational by mid 2027.
Nitrate exceedances projected until mid 2028.

Commented [KF2]: Still accurate.

LCO Compliance Point LC_LCDSSLCC E297110	• There have been 13 exceedances of the 9 mg/L daily maximum nitrate limit. These exceedances range from 9.56 mg/L (February 1), to 11.7 mg/L (March 23). • There have been 3 exceedances of the 7 mg/L monthly average nitrate limit. These exceedances range from 10.74 (March) to 10 mg/L (February).	*Selenium and nitrate exceedances are expected until the next scheduled water treatment facility at Line Creek Operation is commissioned in 2025.*
GHO Fording River Compliance Point 0200378 FR4 Order Station GH_FR1 0200378	• There have been 3 exceedances of the 78 ug/L daily maximum selenium limit. These exceedances range from 82.4 ug/L (March 16), to 79.7 ug/L (April 6). • There have been 3 exceedances of the 63 ug/L monthly average selenium limit. These exceedances range from to 73 ug/L (March), 68.4 ug/L (April).	*Selenium exceedances are expected until the FRO-S AWTF is commissioned.*
FR5 Order Station LC_LC5 0200028	• The 51 ug/L limit selenium monthly average was exceeded on three occasions. These ranged from 57.5 ug/L (March), to 53.4 ug/L (February).	*Selenium exceedances are expected until the FRO-S AWTF is commissioned.*
ER2 Order Station EV_ER4 0200027	• The 4.0 mg/L monthly average nitrate limit was exceeded on two occasions: March (5.3mg/L) and April (5.8 mg/L). • The 23.0 ug/L monthly average selenium limit was exceeded on two occasions: March (23.5 ug/L) and April (24.7 ug/L).	*The modelled high flow scenario projects seasonal exceedances of selenium at this location until FRO-S AWTF is commissioned. Exceedances are not unexpected.* *Nitrate exceedances are expected until the FRO-S AWTF is commissioned.*
ER3 Order Station EV_ER1 0200393	• The 3.0 mg/L monthly average nitrate limit was exceeded on two occasions: March (3.2 mg/L) and April (3.16 mg/L).	***Nitrate exceedances are not expected at this location.*** *However, the modelled high flow scenario approaches the monthly average nitrate limit seasonally until 2021. An additional precision point was added to the nitrate limit in the Permit on March 11, 2021 and is likely contributing to exceedances.* *Nitrate levels are projected to decrease when FRO-S AWTF is commissioned.*
E300230 Koocanusa Reservoir Order Station	• The 2 ug/L monthly average selenium limit was exceeded in April (2.59 ug/L).	*Selenium exceedances are expected until FRO-S AWTF and EVO SRF are commissioned.*

Commented [KF3]: Change to:
Selenium and Nitrate exceedances until 2026, when the next scheduled water treatment facility (NLC SRF Phase I) at Line Creek Operation is operational.

Commented [KF4]: Change to:
Selenium exceedances projected until mid 2024, until the FRO-S AWTF and FRO-N SRF Phase I & II are operational.
Nitrate exceedances projected until mid 2026, until the FRO-N SRF Phase III is operational.

Commented [KF5]: Change to:
Selenium exceedances projected until 2026, until the FRO-S AWTF, FRO-N SRF Phase I, II, III, and NLC SRF Phase I are operational.

Commented [KF6]: Change to:
The modelled high flow scenario projects seasonal exceedances of selenium until 2026, except in 2023, until the FRO-S AWTF, FRO-N SRF Phase I, II, III, and NLC SRF Phase I are operational.
Nitrate exceedances are projected until 2027, when the FRO-N 2 SRF is operational.

Commented [KF7]: Change to:
Nitrate exceedances are projected until 2026, until the FRO-S AWTF, FRO-N SRF Phase I, II, III, and NLC SRF Phase I, and EVO SRF Phase II are operational.

Commented [KF8]: Change to:
Selenium exceedances are projected until 2028 with the 2020 RWQM. Compliance is projected to be maintained with the Koocanusa Reservoir Module. Stabilization and reduction of Se & NO3 projected to begin when FRO-S AWTF if fully effective, with incremental future reductions with each additional phase of treatment added.

PERMIT 107517 - ORDER STATION and COMPLIANCE POINT EXCEEDANCES

Teck's 2019 mitigation plan (called the Implementation Plan Adjustment, "IPA") predicted seasonal nitrate and selenium exceedances for some Order Station Site Performance Objectives (SPOs) and Compliance Point limits, until the next few major water treatment facilities were fully commissioned. Teck's 2022 update, which is still under development, is expected to provide similar predictions.

Figure 1 is an excerpt from Teck's 2021 Annual Report, showing actual compliance rates in 2021 for SPO and Compliance locations.

Many of the most significant exceedances since 2019 have resulted from the multi-year delay in the Fording River Operations-South Active Water Treatment Facility (FRO-S AWTF), which was caused by needing to address unforeseen issues and new learnings at the first AWTF on Line Creek, followed by construction challenges and then Covid delays. Other exceedances should largely be addressed following the commissioning of the next 2 saturated rockfill treatment facilities at Fording River North and Line Creek– scheduled to be fully operational by approx. 2026. Table 1 summarizes anticipated timelines for achieving full compliance.

Full compliance at all locations is expected by 2028, once 145 million liters per day of water is being treated. For context, for most of 2021 Teck was only able to treat 27.5 million liters per day in 2 facilities. By early 2022 Teck is now permitted to treat up to 57 million liters per day in 4 facilities and they are still commissioning the newest 2 facilities.

See below for a graphic of treatment facilities that are expected to be proposed in Teck's 2022 IPA, increasing treatment capacity from 27.5 million liters per day in 2021 to over 193.5 million by 2042 through 17 new or expanded facilities.

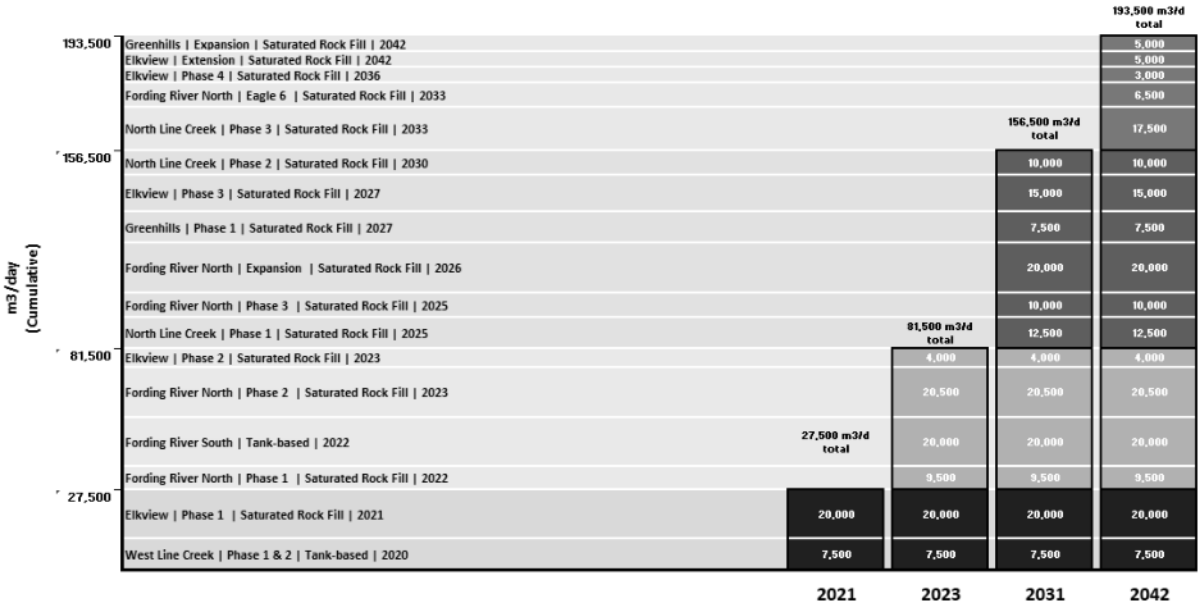


Figure 1 – 2021 Compliance Rates as Reported by Teck in their 2021 Annual Report

Table 14. Compliance record for order stations in 2021.

Location Code	EMS ID	Selenium	Nitrate	Sulphate	Cadmium
GH_FR1[1]	0200378	50%	58%	100%	100%
LC_LC5	0200028	75%	100%	100%	100%
GH_ER1	E206661	100%	100%	100%	100%
EV_ER4	0200027	83%	83%	100%	100%
EV_ER1	0200393	100%	83%	100%	100%
RG_ELKORES	E294312	100%	100%	100%	100%
RG_DSELK	E300230	83%	100%	100%	100%

[1] GH_FR1 is both an order station and a compliance point.

Table 15. Compliance record for compliance points in 2021.

Location Code	EMS ID	Selenium Daily Max	Selenium Monthly Average	Nitrate Daily Max	Nitrate Monthly Average	Sulphate Monthly Average	Cadmium Monthly Average
FR_FRCP1[1]	E300071	0%	0%	50%	0%	67%	100%
FR_FRABCH[2]	E223753	--	42%	--	33%	100%	100%
GH_FR1[3]	0200378	92%	50%	97%	58%	100%	100%
GH_ERC	E300090	--	100%	--	100%	100%	100%
LC_LCDSSLCC	E297110	100%	100%	65%	25%	100%	100%
EV_HC1	E102682	--	100%	--	100%	100%	100%
EV_MC2	E300091	--	100%	--	100%	100%	100%
CM_MC2	E258937	--	100%	--	100%	100%	100%

Note: A dash indicates where no limit was in effect.
[1] FR_FRCP1 was a compliance point from January 1 to March 10, 2021; this compliance record therefore reflects only three months.
[2] FR_FRABCH was a compliance point from March 11, 2021 onward; this compliance record therefore reflects only nine months.
[2] GH_FR1 is both an order station and a compliance point.

Table 1 – Anticipated Timelines for Full Compliance

LOCATION	EXCEEDANCE DETAILS	ANTICIPATED TIMELINE FOR FULL COMPLIANCE
FRO Compliance Point (new Fording River location)	• Monthly average nitrate and selenium exceedances and daily max nitrate exceedances	Selenium exceedances projected until the FRO-S AWTF is fully operational (summer 2022). The modelled high flow scenario indicates potential exceedances until three phases of FRO-N SRF, and FRO-N 2 SRF become operational by mid 2027. Nitrate exceedances projected until mid 2028.
LCO Compliance Point (Line Creek)	• Daily max and monthly average nitrate exceedances	Selenium and nitrate exceedances projected until 2026, when the next scheduled water treatment facility (NLC SRF Phase I) at Line Creek Operation is operational.
GHO Fording River Compliance Point	• Daily max and monthly average nitrate and selenium exceedances	Selenium exceedances projected until mid 2024, until the FRO-S AWTF is fully operational and FRO-N SRF Phase I & II are operational. Nitrate exceedances projected until mid 2026, until the FRO-N SRF Phase III is operational.
FR5 Fording River Order Station	• Selenium exceedances	Selenium exceedances projected until 2026, until the FRO-S AWTF, FRO-N SRF Phase I, II, III, and NLC SRF Phase I are operational.
ER2 Elk River Order Stations	• Nitrate and selenium exceedances	The modelled high flow scenario projects seasonal exceedances of selenium until 2026, except in 2023, until the FRO-S AWTF, FRO-N SRF Phase I, II, III, and NLC SRF Phase I are operational. Nitrate exceedances are projected until 2026, until the FRO-S AWTF, FRO-N SRF Phase I, II, III, and NLC SRF Phase I, and EVO SRF Phase II are operational.
Koocanusa Reservoir Order Station	• Selenium exceedances	Selenium exceedances are projected until 2028 with the 2020 RWQM. Compliance is projected to be maintained with the Koocanusa Reservoir Module. Stabilization and reduction of Se & NO3 projected to begin when FRO-S AWTF if fully effective, with incremental future reductions with each additional phase of treatment added.

2022-04-26 ENV Review of Narwhal Article

From: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
To: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>
Cc: Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>
Sent: April 26, 2022 8:53:09 AM PDT

Hello Laurel,

We have conducted a cursory review of this article and can offer a few quick thoughts/perspectives.

Note - We weren't sure exactly what Kevin may be looking for, but I'm happy to discuss these details further, or produce something specific if needed.

1. Throughout the article there is reference to and concern about the continued rise in the levels of Se. While there is acknowledgement of the treatment that Teck is working on and that they are trying to solve the problem, they don't acknowledge that the ABMP is meant to stabilize and reduce levels of Se (and other coal mining contaminants).

    - We are still in the stabilize phase, given the delays in the treatment, but expect to start to see levels reduce in the upper watersheds over the next few years as more treatment facilities come online. We are not sure how long/if that will also translate to a decrease in Se in the Reservoir and the downstream watershed. Other briefing materials we have recently produced summarize the extensive investments that Teck has recently made, and continues to make: Teck is currently permitted to treat 57M liters/day for selenium and nitrate and will have invested over $2B in water treatment, to achieve their expected treatment requirement of 193.5M liters/day by 2042. Their new saturated rockfill technology is showing effective treatment of selenium and nitrate and is a more robust and cheaper technology than the active water treatment plants that are also being used in the valley. They are at the global forefront in developing technologies for both treatment and source control of coal mining impacts.

2. The article does a good job of presenting the concerns we have also been hearing from stakeholders downstream of the Libby dam – and even acknowledges the impact of the dam itself. There is a very different tone from the guide interviewed from the Elk Valley – a more positive outlook on the issue – compared to the tribes and guides downstream of the reservoir in the US.

    - There are some interesting comments about the habitat restoration work they are doing down south, and the possibility for Se impacts because they are creating wetlands and connecting them to the river (related to burbot downstream of the dam). They also acknowledged Se levels in the rivers are below the US Standards. Not considered or discussed is the fact that fish may also depurate Se (i.e. the Se is essentially flushed from their bodies) when they move away from more contaminated environments – this may or may not be relevant if juvenile burbot with higher Se levels from the wetlands move to other, cleaner habitats to spawn…. possibly reducing risks/impacts.

3. The quotes from the TPIB chief note that they are not eating the fish – this is consistent with what we have heard from KNC, but not aligned with our data that indicates the fish are safe to consume. It doesn't appear the authors of the story sought any information/advice from human health professionals or human health risk assessors.

    - Teck is nearing completion of a comprehensive human health risk assessment which examines, among other things, the safety of fish for consumption. While the final report is still pending, it does not appear that fish in Koocanusa reservoir pose a risk to consumers. Once this report is released, it will provide important information regarding risks, as characterized by professional risk assessors.

4. A lack of confidence/understanding in our regulatory regime is reflected both by the author and the comments made by groups in the US. This is in part apparent with their discomfort in BC's reliance on responsible parties for things like the WCT Evaluation of Cause Report – they imply/don't believe that consultants paid by the mines will present real/valid data, and thus they don't likely understand the extensive review process that this report (and other reports) and its findings went through.

s.13

5. Biology aspects of the story seem generally ok when they are talking to the scientists. Where they fall apart/speculate more is when they are talking to the guides – For example, the guide mentions 10 rainbow trout have been caught with gill plate defects over 3 years – he probably caught 100s-1000s of fish over that time, so 10 fish is likely a very low proportion – and those defects can be caused by many other things – they are not diagnostic of Se issues.

6. The story indicates mountain whitefish being above the USEPA tissue guideline – this is likely true, but Teck's work has shown mountain whitefish are some of the least sensitive fish to Se (while the tissue guideline is likely based on protecting the most sensitive species). Furthermore, Se measurements in their eggs depend on the stage of the egg development. So depending on how "ripe" the eggs are, the data may over-represent the risk.

7. They indicate effects of Se on fish have been seen in the Fording river – this is true, but the statement is a little misleading as it suggests there are impacts throughout the Fording – We don't think this is true – it's pretty location-specific where impacts have been detected.

8. The story noted BC's silence on finishing the WQO. The timing of next steps for the WQO is currently under discussion within BC, and hopefully we will have more information to share soon. They also discussed Teck's challenge of the MT standard, but did get into the details surrounding that challenge and some of the technical concerns raised by Teck (which may or may not be valid).

9. The story highlights some of the non-compliances with EMA permit requirements. What is not fully described is that most WQ data at compliance points has been in compliance, except a couple of sites which have been particularly problematic for Teck. Many of the most significant non-compliances have been related to delays in FRO-S AWTF.

s.16

As a general comment, if we want "our" story told we may want to consider supporting our scientists/staff to talk to the Narwal/press about our concerns and why we think our regulatory system, for the most part, is working. Or find some other way to get our story out there. We tend to provide dry facts and very short responses to inquiries – we don't tell a compelling story, so our perspective is often under represented in media articles.

From: Jardine, Kevin ENV:EX <Kevin.Jardine@gov.bc.ca>
Sent: April 25, 2022 10:15 AM
To: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>; Corns, Paul GCPE:EX <Paul.1.Corns@gov.bc.ca>; Dessouki, Tarik ENV:EX <Tarik.Dessouki@gov.bc.ca>; Austin, Joyce ENV:EX <Joyce.Austin@gov.bc.ca>; Danks, Anthony ENV:EX <Anthony.Danks@gov.bc.ca>; Avila, Amy EAO:EX <Amy.Avila@gov.bc.ca>; Meadows, Jennifer L ENV:EX <Jennifer.Meadows@gov.bc.ca>
Cc: Meadows, Jennifer L ENV:EX <Jennifer.Meadows@gov.bc.ca>; Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
Subject: Re: FYI

Just a verbal on the days presented, some broader context and especially what's missing and misinterpreted, pls, Laurel.

Best,
K.
Kevin Jardine, Deputy Minister
Ministry of Environment & Climate Change Strategy
250-361-6753

From: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>

Sent: Monday, April 25, 2022 10:13:45 AM
To: Jardine, Kevin ENV:EX <Kevin.Jardine@gov.bc.ca>; Corns, Paul GCPE:EX <Paul.1.Corns@gov.bc.ca>; Dessouki, Tarik ENV:EX <Tarik.Dessouki@gov.bc.ca>; Austin, Joyce ENV:EX <Joyce.Austin@gov.bc.ca>; Danks, Anthony ENV:EX <Anthony.Danks@gov.bc.ca>; Avila, Amy EAO:EX <Amy.Avila@gov.bc.ca>; Meadows, Jennifer L ENV:EX <Jennifer.Meadows@gov.bc.ca>
Cc: Meadows, Jennifer L ENV:EX <Jennifer.Meadows@gov.bc.ca>; Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
Subject: RE: FYI

Thanks would you like a response to the article?

Laurel Nash *(she/her)*
Assistant Deputy Minister
Environmental Protection Division
Ministry of Environment &
Climate Change Strategy
☎ (250) 953-4004 or (250) 508-1670
Laurel.Nash@gov.bc.ca

I am grateful to live and work on the beautiful traditional territory of the Lekwungen speaking people and the Songhees, Esquimalt and WSÁNEĆ peoples whose historic relationships with the land and sea continue to this day.

To report an act of pollution, call the RAPP (Report All Poachers and Polluters) line at 1-877-952-7277 or #7277 on the TELUS Mobility Network or report the incident online.

From: Jardine, Kevin ENV:EX <Kevin.Jardine@gov.bc.ca>
Sent: April 25, 2022 10:05 AM
To: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>; Corns, Paul GCPE:EX <Paul.1.Corns@gov.bc.ca>; Dessouki, Tarik ENV:EX <Tarik.Dessouki@gov.bc.ca>; Austin, Joyce ENV:EX <Joyce.Austin@gov.bc.ca>; Danks, Anthony ENV:EX <Anthony.Danks@gov.bc.ca>; Avila, Amy EAO:EX <Amy.Avila@gov.bc.ca>; Meadows, Jennifer L ENV:EX <Jennifer.Meadows@gov.bc.ca>
Cc: Meadows, Jennifer L ENV:EX <Jennifer.Meadows@gov.bc.ca>; Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
Subject: Re: FYI

Thx, Laurel. As usual, what's presented isn't the whole story. We've got to try and break the narrative where it's inaccurate and everywhere else augment it with nuance.

Best,
K.
Kevin Jardine, Deputy Minister
Ministry of Environment & Climate Change Strategy
250-361-6753

From: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>
Sent: Monday, April 25, 2022 9:49:28 AM
To: Jardine, Kevin ENV:EX <Kevin.Jardine@gov.bc.ca>; Corns, Paul GCPE:EX <Paul.1.Corns@gov.bc.ca>; Dessouki, Tarik ENV:EX <Tarik.Dessouki@gov.bc.ca>; Austin, Joyce ENV:EX <Joyce.Austin@gov.bc.ca>; Danks, Anthony ENV:EX <Anthony.Danks@gov.bc.ca>; Avila, Amy EAO:EX <Amy.Avila@gov.bc.ca>; Meadows, Jennifer L ENV:EX <Jennifer.Meadows@gov.bc.ca>
Cc: Meadows, Jennifer L ENV:EX <Jennifer.Meadows@gov.bc.ca>; Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
Subject: RE: FYI

Absolutely.

Laurel Nash *(she/her)*
Assistant Deputy Minister
Environmental Protection Division
Ministry of Environment &
Climate Change Strategy
☎ (250) 953-4004 or (250) 508-1670
Laurel.Nash@gov.bc.ca

I am grateful to live and work on the beautiful traditional territory of the Lekwungen speaking people and the Songhees, Esquimalt and WSÁNEĆ peoples whose historic relationships with the land and sea continue to this day.

To report an act of pollution, call the RAPP (Report All Poachers and Polluters) line at 1-877-952-7277 or #7277 on the TELUS Mobility Network or report the incident online.

From: Jardine, Kevin ENV:EX <Kevin.Jardine@gov.bc.ca>
Sent: April 25, 2022 9:44 AM
To: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>; Corns, Paul GCPE:EX <Paul.1.Corns@gov.bc.ca>; Dessouki, Tarik ENV:EX <Tarik.Dessouki@gov.bc.ca>; Austin, Joyce ENV:EX <Joyce.Austin@gov.bc.ca>; Danks, Anthony ENV:EX <Anthony.Danks@gov.bc.ca>; Avila, Amy EAO:EX <Amy.Avila@gov.bc.ca>; Meadows, Jennifer L ENV:EX <Jennifer.Meadows@gov.bc.ca>
Cc: Meadows, Jennifer L ENV:EX <Jennifer.Meadows@gov.bc.ca>
Subject: Re: FYI

Thx, Laurel. Can the team please be prepared to respond to some of the data and observations quoted in the article at tomorrow's pre-brief? I'd like to be in a position to directly address them with MGH.

Best,
K.
Kevin Jardine, Deputy Minister
Ministry of Environment & Climate Change Strategy
250-361-6753

From: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>
Sent: Monday, April 25, 2022 9:29:07 AM
To: Corns, Paul GCPE:EX <Paul.1.Corns@gov.bc.ca>; Jardine, Kevin ENV:EX <Kevin.Jardine@gov.bc.ca>; Dessouki, Tarik ENV:EX <Tarik.Dessouki@gov.bc.ca>; Austin, Joyce ENV:EX <Joyce.Austin@gov.bc.ca>; Danks, Anthony ENV:EX <Anthony.Danks@gov.bc.ca>; Avila, Amy EAO:EX <Amy.Avila@gov.bc.ca>
Cc: Meadows, Jennifer L ENV:EX <Jennifer.Meadows@gov.bc.ca>
Subject: FW: FYI

FYI

Laurel Nash *(she/her)*
Assistant Deputy Minister
Environmental Protection Division
Ministry of Environment &
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From: Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>
Sent: April 25, 2022 9:17 AM
To: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>; von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>; Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>; Goodsell, Todd EAO:EX <Todd.Goodsell@gov.bc.ca>
Cc: Shepard, Michael EAO:EX <Michael.Shepard@gov.bc.ca>; Morello, Ray FLNR:EX <Ray.Morello@gov.bc.ca>
Subject: FYI

https://thenarwhal.ca/teck-resources-coal-transboundary/

Chris Trumpy
Executive Lead
Mines Competitiveness and Authorizations Division

Office: (778) 698-7295
Cell: (250) 415-7754

FW: Follow-up: Teck Compliance Overview

From: Downie, AJ ENV:EX
To: Nelless, Brady ENV:EX <Brady.Nelless@gov.bc.ca>
Sent: April 28, 2022 10:41:15 AM PDT
Attachments: 2022-04-25 Valley Permit WQ Compliance Summary.docx

Just a heads-up that earlier this week on short notice I had to pull some compliance info for the DM to update the Minister, so attached is what I provided to Laurel and I think she passed it along to Kevin.

Wondering if you and I should huddle up at some point to do some brainstorming in relation to below.

AJ

A.J. Downie
778-671-0133
AJ.Downie@gov.bc.ca

From: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>
Sent: April 28, 2022 10:22 AM
To: Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>; Nelless, Brady ENV:EX <Brady.Nelless@gov.bc.ca>; Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>; Goodsell, Todd EAO:EX <Todd.Goodsell@gov.bc.ca>; Forsdick, Doug O ENV:EX <Doug.Forsdick@gov.bc.ca>; Laughland, Gwenda J ENV:EX <Gwenda.Laughland@gov.bc.ca>
Subject: FW: Follow-up: Teck Compliance Overview

Hi wondering if we can have a discussion about this proposed option?
Thanks

Laurel Nash *(she/her)*
Assistant Deputy Minister

Environmental Protection Division
Ministry of Environment &
Climate Change Strategy
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Laurel.Nash@gov.bc.ca

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From: Jardine, Kevin ENV:EX <Kevin.Jardine@gov.bc.ca>
Sent: April 28, 2022 10:14 AM
To: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>; Danks, Anthony ENV:EX <Anthony.Danks@gov.bc.ca>
Subject: RE: Follow-up: Teck Compliance Overview

Thanks very much for this, Laurel. s.13
s.13

K.

From: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>
Sent: April 28, 2022 9:34 AM
To: Jardine, Kevin ENV:EX <Kevin.Jardine@gov.bc.ca>; Danks, Anthony ENV:EX <Anthony.Danks@gov.bc.ca>
Subject: FW: Follow-up: Teck Compliance Overview

Good morning.
We are meeting with Teck this morning to go over this. Thought you would be interested in seeing this. Let me know if you have any questions. Thanks

Laurel Nash *(she/her)*
Assistant Deputy Minister

Environmental Protection Division
Ministry of Environment &
Climate Change Strategy
☎ (250) 953-4004 or (250) 508-1670
Laurel.Nash@gov.bc.ca

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To report an act of pollution, call the RAPP (Report All Poachers and Polluters) line at 1-877-952-7277 or #7277 on the TELUS Mobility Network or report the incident online.

From: Mattu, Jamin ENV:EX <Jamin.Mattu@gov.bc.ca>
Sent: April 28, 2022 9:12 AM
To: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>
Subject: FW: Follow-up: Teck Compliance Overview

From: James Sandland <James.Sandland@teck.com>
Sent: April 28, 2022 6:45 AM
To: Erin Robertson <erobertson@ktunaxa.org>; Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>; Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>; Goodsell, Todd EAO:EX <Todd.Goodsell@gov.bc.ca>
Cc: Robin Sidsworth <Robin.Sidsworth@teck.com>; Mattu, Jamin ENV:EX <Jamin.Mattu@gov.bc.ca>; Nelless, Brady ENV:EX <Brady.Nelless@gov.bc.ca>
Subject: RE: Follow-up: Teck Compliance Overview

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

Morning folks,

Once again, sorry for the delay in getting this material out to you. Look forward to the conversation later today.

Kind regards,
James

From: James Sandland
Sent: Wednesday, April 27, 2022 12:35 PM
To: Erin Robertson <erobertson@ktunaxa.org>; Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>; Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>; Goodsell, Todd EAO:EX <Todd.Goodsell@gov.bc.ca>
Cc: Robin Sidsworth <Robin.Sidsworth@teck.com>
Subject: Follow-up: Teck Compliance Overview

Hi Folks,

Hope your week is going well so far. Quick note to apologize for net getting the slide deck over to you end of last week for this briefing tomorrow as I had stated I would do – mea culpa. It is taking a bit longer to put together with some staff

members being away. The deck is currently getting some final touches and I will send that over to you as soon as I can and by end of day.

Just to note, we are not necessarily looking for anything specific from any of you on this piece, it is basically information sharing to show how we are managing things. So don't feel pressured to have specific questions or answers on things. However, we always appreciate constructive feedback. We can also do a deeper dive on things in the coming weeks if you and/or any of your respective staff would like to drill down into things more, once you've had a chance to see the deck, talk through it a bit and digest things for yourselves.

The purpose for tomorrow's meeting is really just to provide an overview of compliance with a bit of a focus on the Env Mgmt. Act permit. It's a chance to show where we are at, where we have come from and where we are going and of course to reiterate that compliance is very important to us as a company.

Robin and I are not experts here, so I have invited Karen Hanna from Teck as she is the project lead and has the right knowledge to provide the overview.

Look forward to connecting tomorrow and look out for that email with material later today.

Kind regards,
James

James Sandland

Regional Director Government Affairs
Teck Resources Limited
+1.250.425.3359

FW: Elk Valley Water Quality Bullets

From:	Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
To:	Carroll, Deborah ENV:EX <Deborah.Carroll@gov.bc.ca>
Cc:	Miller, Lana L ENV:EX <Lana.Miller@gov.bc.ca>, Neufeld, Alison ENV:EX <Alison.Neufeld@gov.bc.ca>, Tamblyn, Jillian ENV:EX <Jillian.Tamblyn@gov.bc.ca>, Green, Lorna ENV:EX <Lorna.Green@gov.bc.ca>
Sent:	May 2, 2022 2:26:40 PM PDT
Attachments:	4. CLIFF#_InfoBullets_SE Coal WQ and Compliance - 29March2022.docx, 2022-04-21 ENV Estimates Note SE BC Initiatives.docx, 2022-03-10 386166_MGH MBR MtgNote for Teck - WQ and Treatment.docx

As mentioned, here are some of our recent info notes on WQ-related topics.

AJ

A.J. Downie
778-671-0133
AJ.Downie@gov.bc.ca

From: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
Sent: April 29, 2022 8:05 PM
To: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
Subject: Fwd: Elk Valley Water Quality Bullets

AJ Downie
Director, SE Coal Mining Team

Sent from my iPhone

From: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
Sent: Monday, April 25, 2022 10:38:38 AM
To: Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>
Cc: Caunce, Cassandra ENV:EX <Cassandra.Caunce@gov.bc.ca>; Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>
Subject: Elk Valley Water Quality Bullets

Hi Chris,

As mentioned, here are the two most recent INs on Water Quality. Also attached is the ENV Estimates Note.

The 3 documents contain a lot of the same information – our Estimates Note is likely the most succinct but it also includes a broader range of topics including FRX, KNC governance, etc; the March 10 bullets are pretty focussed on the water treatment, and the March 29 bullets include lots of the same water treatment info, but also some info on the state of the valley, and compliance.

AJ

A.J. Downie
Director, Southeast Coal
Environmental Protection Division
Ministry of Environment and Climate Change Strategy
phone: (778) 671-0133
email: AJ.Downie@gov.bc.ca

Waste Discharge Authorizations Website

Ministry of
Environment and Climate
Change Strategy

MEETING NOTE

MEETING DATE: Thursday March 10, 2022, 11:15am PST

PREPARED FOR: Honourable George Heyman, Minister of Environment and Climate Change Strategy

TOPIC: Water quality in the Elk Valley and an update on water quality mitigation progress

ATTENDEES:
George Heyman, BC Minister of Environment and Climate Change Strategy
Kevin Jardine, Deputy Minister of Environment and Climate Change Strategy
Marcia Smith, Senior VP, Sustainability and External Affairs, Teck
Marcella Munro, Head of Government & Regulatory Affairs, Teck
Jeff Hanman, VP, Sustainable Development, Teck
Scott Maloney, VP, Environment, Teck
Sheila Risbud, Director, FRX Project, Teck

KEY MESSAGES:

- **We acknowledge the extensive efforts to date by Teck to develop and implement new treatment facilities and other water quality mitigations in the Elk Valley. The treatment facilities are showing effective removal of selenium and nitrate, and we look forward to seeing further improvements as the additional facilities come online in the coming months.**
- **We understand that Teck is nearing completion of its next update to the Area Based Management Plan (ABMP) Implementation Plan, which we understand will propose continued substantial investments in new treatment facilities. We appreciate Teck's efforts to attain full compliance as soon as possible; however, we are concerned about predicted non-compliances at some locations for a few more years, and Teck is strongly encouraged to do everything possible to mitigate these.**
- **The ministry intends to amend the ABMP to reassess the Koocanusa reservoir selenium target, incorporate new knowledge, and improve processes for addressing impacts and managing water quality in the Elk Valley. Teck will be invited to participate in this process and I understand engagement with Teck staff has already commenced.**

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- **We encourage Teck to continue focussing on building a strong and trusting relationship with the KNC, to support timely application reviews and effective outcomes from strategic projects including the ABMP amendment.**

KEY FACTS:

- In 2014 ENV approved an Area Based Management Plan (ABMP) for the Elk Valley to stabilize and improve water quality in the mainstem Elk and Fording Rivers. The Plan includes water quality targets for selenium (Se), nitrate (NO_3), sulphate (SO_4) and cadmium (Cd), as well as a schedule of mitigation activities that have become regulatory requirements in Teck's effluent discharge permit.
- In recognition of: a) the historical mining context, b) site-specific data; and c) the still-emerging science on how to best manage coal mining contaminants, the ABMP manages the environment on a watershed-wide scale and accepts a higher level of risk than is typically accepted downstream of other mines or industrial discharges. On its own, the ABMP is currently not managing on a tributary-by-tributary level where some localized impacts of mining activities to fish and benthic invertebrates have been observed.
- At present, Teck is operating two active water treatment facilities [Fording River Operations (FRO) –South, and West Line Creek at Line Creek Operations (LCO)] and one saturated rock fill (SRF) at Elkview Operations (EVO). The facilities remove Se and NO_3 and in January 2022, they treated 26,653 m^3/day of water (see Appendix 1).
- The FRO-South facility is still being brought online and treatment capacity will increase in the coming months. Teck is also in the pre-commissioning stage of a second SRF at FRO-North. By the end of 2023, Teck is expected to be treating 77,500 m^3/day, with stabilization and reduction of Se and NO_3 trends also expected (see Appendix 2 for treatment to 2023).
- SRF is a new technology that has been developed by Teck in the Elk Valley. The technology has been carefully reviewed and authorized by the *Environmental Management Act* (EMA) and *Mines Act* permits for use at EVO and FRO. Teck has submitted a Technology Readiness Assessment for SRF technology to document all of the research and development work that has been done, to confirm general applicability of this technology for planning purposes, and to support continued use of SRF technology in the Elk Valley.
- Implementation of the FRO-South treatment facility has been behind schedule, due to a combination of factors including a need to adjust the technology based on upsets and learnings from the first active water treatment facility at LCO, construction challenges, and COVID-19. Other treatment facilities have made progress in accordance with the current permit requirements.
- At present, Teck is updating their ABMP Implementation Plan and schedule for treatment and will be proposing additional SRFs and treatment capacity up to 193,500 m^3/day by the end of 2042 (see Appendix 3). Teck has indicated their intent to be in full compliance as soon as possible, as well as to maintain compliance with the current Se target of 2 ug/L in the Koocanusa reservoir.

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- Se and NO_3 levels are now beginning to stabilize and reduce in some areas immediately downstream of operating treatment facilities. However, at times Teck continues to be out of compliance at certain locations, including in the Fording River and Line Creek. They are developing strategies to address these areas. The updated Implementation Plan that Teck is finalizing predicts full compliance with Se and NO_3 limits at all compliance points by 2028.
- Monitoring and assessment programs have revealed that aquatic ecosystems in most of the mainstems are functioning, but chronic toxicity impacts are present at some locations in the Elk Valley, in part because the full mitigation plans have not yet been implemented and in part because a higher level of risk to the environment was accepted when the original ABMP was approved. As water quality in the Elk Valley improves, we expect chronic impacts that we are currently observing will also improve.
- ENV staff are currently working on a draft Ministerial Order to amend the ABMP, including updating the Koocanusa reservoir Se target to reflect the new learnings from the water quality objective (WQO) development process, and developing a new process to consider emerging contaminants and better support adaptive management and continuous improvement.
- BC's draft WQO for the Koocanusa reservoir, which was co-developed by ENV and KNC, is expected to be released for public comment and then finalized at the start of the ABMP Amendment process. The WQO has been developed in accordance with ministry policy and procedures and, as an ENV policy, will inform the ABMP target reassessment. Along with the new WQO, the reassessment will also consider additional monitoring data and impact and risk assessment results, which were not available during the WQO development process, plus other relevant information such as feasibility/achievability and socio-economic factors that are not typically considered during WQO development.

Appendices:

- Appendix 1: January 2022 Treatment Data: Facility Performance Reporting for Selenium and Nitrate Provided By Teck
- Appendix 2: Treatment Facilities to 2023
- Appendix 3: Proposed Selenium and Nitrate Treatment Facilities Based on Teck's Draft 2022 Update to the Implementation Plan

s.13

Assistant Deputy Minister:
Laurel Nash
Environmental Protection Division
250-508-1670

Alternate contact for content:
Tessa Graham
Regional Operations Branch
250-812-3531

Prepared by:
A.J. Downie, Director
SE Coal Team
250-802-7149

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Appendices

Appendix 1: January 2022 Treatment Data: Facility Performance Reporting for Selenium and Nitrate Provided By Teck

WLC AWTF, EVO SRF and FRO-S AWTF Performance Summary

Note these calculations use the most recent data available and as such the data may not have undergone final QA/QC. Results may change as data undergoes final QA/QC.

	WLC AWTF	EVO SRF	FRO-S AWTF
Throughput**	7253 m^3/day	16529 m^3/day	2871 m^3/day
Influent nitrate**	17.2 mg/L	20.9 mg/L	34.9 mg/L
Effluent nitrate**	0.22 mg/L	0.88 mg/L	1.56 mg/L
Daily average nitrate load removal**	122 kg/day	286 kg/day	95.0 kg/d
Influent selenium**	228 µg/L	171 µg/L	534 µg/L
Effluent selenium**	12.9 µg/L	8.48 µg/L	24.6 µg/L
Daily average selenium load removal**	1.55 kg/day	2.71 kg/day	1.45 kg/day
Effluent non-selenate*	0.834 µg/L	1.14 µg/L	0.18 µg/L

Teck

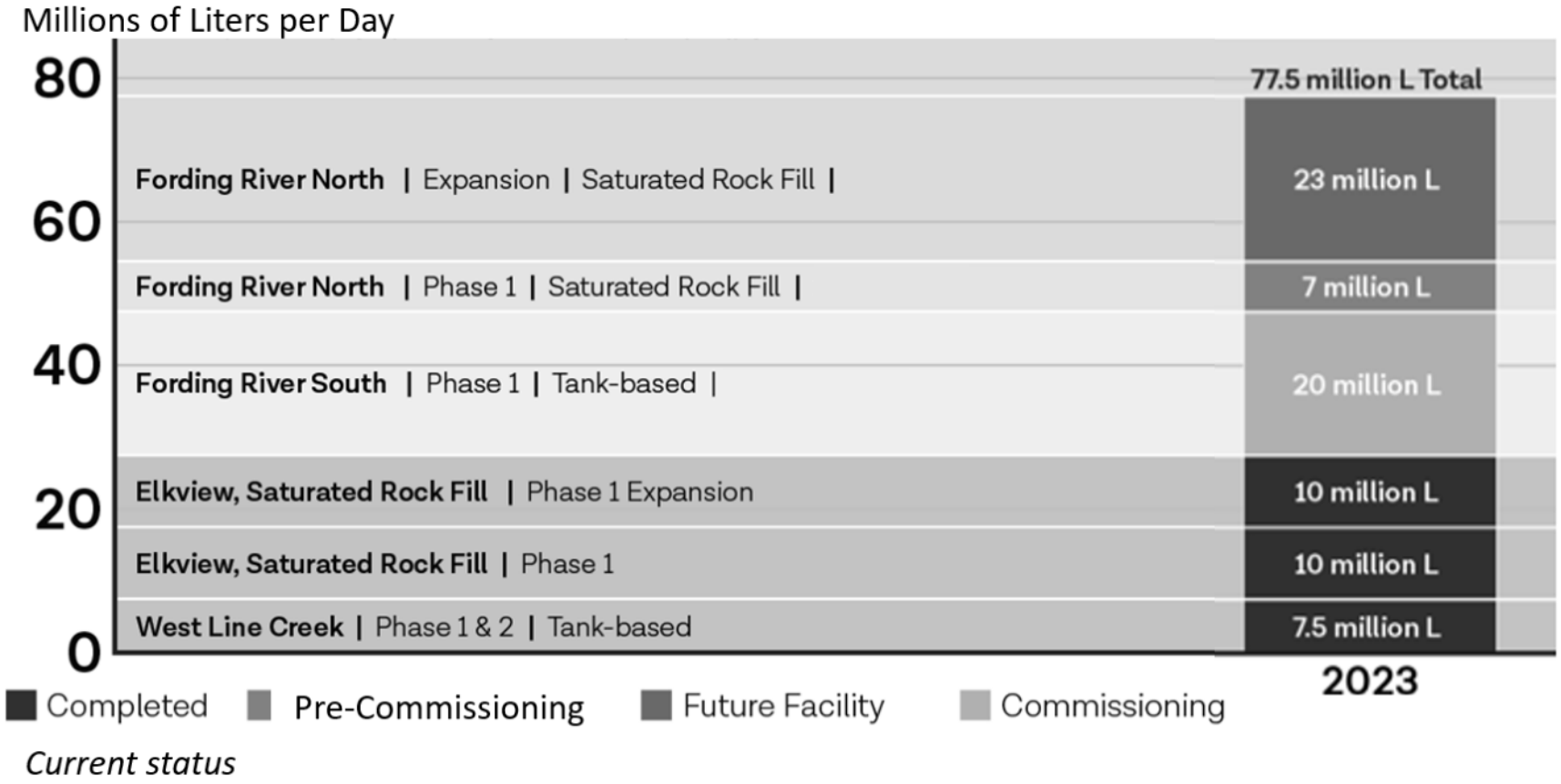
*Since last update **January

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Ministry of
Environment and Climate
Change Strategy

Appendix 2: Treatment Facilities to 2023



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Appendix 3: Proposed Selenium and Nitrate Treatment Facilities Based on Teck's Draft 2022 Update to the Implementation Plan

Summary of Treatment, Diversions and Conveyance for Selenium and Nitrate

Site	Treatment Vessel / Associated Diversions	Abbreviation on Graphs	Hydraulic Capacity (m^3/d)	Fully Effective Date	Sources Treated /Added
FRO	Kilmarnock Diversion		86,000	Dec 31, 2021	-
	FRO AWTF-S	FRO S	20,000	Sep 1, 2022	Swift/Cataract, Kilmarnock
	FRO-N 1 SRF Phase I	FRO N 1 SRF I	9,500	Dec 31, 2022	Eagle 4 Pit
	FRO-N 1 SRF Phase II	FRO N 1 SRF II	20,500	Dec 31, 2023	Clode, Liverpool, Swift Pit, Post Ponds
	FRO-N 1 SRF Phase III	FRO N 1 SRF III	10,000	Dec 31, 2025	Clode, Liverpool, Swift Pit, Post Ponds, Eagle Pond
	FRO-N 2 SRF	FRO N 2 SRF	20,000	Dec 31, 2026	FRO-N 1 SRF sources, Kilmarnock
	Eagle 6 South SRF	E6S SRF	6,500	Jun 30, 2033	Eagle 6 Pit North and South
LCO	WLC AWTF	WLC	7,500	Jan 1, 2020	West Line Creek, Line Creek
	WLC AWTF	WLC	-	June 30, 2023	MSAW
	NLC SRF Phase I	NLC SRF I	12,500	Dec 31, 2025	NLC, NLX, LCO Dry Creek
	NLC SRF Phase II	NLC SRF II	10,000	Dec 31, 2030	NLC, NLX, WLC groundwater
	NLC SRF Phase III	NLC SRF III	17,500	Dec 31, 2033	NLC, NLX, WLC groundwater, Line Creek, LCO Dry Creek
	Conveyance/Supplementation		Up to 30,000	Mar 29, 2023	-
	No Name, Horseshoe and Upper Line Creek Diversions		42,000	Dec 31, 2025	-
GHO	Cougar South Pit SRF	CSP SRF	5,000	Jun 30, 2042	Cougar South Pit, Leask, Wolfram, Thompson, Porter
	Greenhills Creek Treatment	GHC	7,500*	Dec 31, 2027	Greenhills Creek
EVO	EVO SRF Phase I		20,000	Sep 1, 2021	Erickson, Natal
	EVO SRF Phase II		4,000	Sep 30, 2023	EVO Dry
	EVO SRF Phase III		15,000	Dec 31, 2027	Erickson, Natal
	EVO SRF Phase IV		3,000	Dec 31, 2036	EVO Dry
	BRP SRF		5,000	Dec 31, 2042	Baldy Ridge Pit, Erickson, Natal

Teck

* For regional treatment to meet 107517 permit limits and SPOs, 3,000 m^3/day of treatment is required. 7,500 m^3/day is required based on the Federal Direction.

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Page 263 of 281

Withheld pursuant to/removed as

s.13

RE: Ktunaxa First Nation meetings: briefing materials and scheduling summary

From: Downie, AJ ENV:EX
To: Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>, Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>
Cc: von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>
Sent: July 19, 2022 4:22:25 PM PDT
Attachments: 4. CLIFF#_InfoBullets_SE Coal WQ and Compliance - 29March2022.docx

Hi Laurel and Chris,

I see that Katie has led the development of briefing materials for next week and I further understand the conversations are expected to be relatively high level. Please let me know if there's anything more detailed or specific you would like regarding water quality and related matters, for your back pocket. If you'd like something, I can probably pretty easily update one of the notes we had from last March, such as this one. If nothing further is needed, that's easy for me!

AJ

A.J. Downie
778-671-0133
AJ.Downie@gov.bc.ca

From: von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>
Sent: July 19, 2022 4:10 PM
To: Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>; Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>
Cc: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>; Hunt, Melanie EMLI:EX <Melanie.Hunt@gov.bc.ca>; Giles, Wayne IRR:EX <Wayne.Giles@gov.bc.ca>; Bodnar, Ashley IRR:EX <Ashley.Bodnar@gov.bc.ca>
Subject: Ktunaxa First Nation meetings: briefing materials and scheduling summary
Importance: High

Good afternoon,

Attached is the package for the briefing tomorrow and for the Ktunaxa meetings next week.

Note that materials are not yet CLIFF'ed and in the system.

Materials:

- DM BN – Ktunaxa Update 2022 07 19
- Community profiles – general information for each of the three communities we're meeting with
- BN info Goat River and map – (*specific to Yaqan nu?kiy and an issue that's likely to come up*)
- TO BE ADDED: ABMP memo to Ktunaxa (final version)

Scheduling/Details – see below

Thanks,

Katie.

s.16

Page 268 of 281

Withheld pursuant to/removed as

s.16

INFORMATION BULLETS

DATE: March 29, 2022

PREPARED FOR: Honourable George Heyman, Minister of Environment and Climate Change Strategy

ISSUE: Water Quality in the SE Coal Block: mitigation history, current state of the environment, and compliance & enforcement

SUMMARY AND KEY MESSAGES:

- The ABMP seems to be generally working:
  - The plan is driving significant investment in WQ mitigation measures, and provides a strategy for adaptively managing cumulative effects
  - Schedule delays for the FRO-S AWTF have been a challenge, resulting in significant continuing localized non-compliances for the past 3yrs; however, Teck expects to be back on schedule with treatment facility construction this year
  - Based on updated models and improved science, Teck is predicting full compliance with ABMP targets by 2028.
- Even with full compliance, the ABMP allows for localized effects in the short and medium term while working towards increased protection and reduced risk over time.
- ENV is in a process to co-develop an amendment to the ABMP with KNC, formally commencing in 2022.s.13

s.13

- Permitting teams will prioritize application reviews for mitigation projects or other applications that are necessary to support Teck in getting back into compliance.

KEY FACTS:

<u>Water Quality: Mitigation History & Timeline</u>

- Decades of mining activity in the SE Coal Block of B.C. led to significant waste rock accumulation, alteration of land and watercourses, poorly understood environmental impacts and degrading water quality (WQ) trends.
- In 2014 the ENV Minister approved an Area Based Management Plan (ABMP), titled the Elk Valley Water Quality Plan, to stabilize and reduce mine-related contaminants in the watershed. The ABMP provides for regional management that allows localized environmental effects and supports trade-offs for efficient mitigation of watershed-scale impacts.

- The ABMP established short-, medium- and long-term WQ targets for Selenium (Se), Nitrate (NO_3), Sulphate (SO_4) and Cadmium (Cd) that range from B.C. water quality guideline levels which are fully protective) (at downstream sites), to site-specific targets levels that exceed thresholds where effects are expected (but are unlikely to be ecologically significant at the watershed/population level scale).
- After the ABMP was approved, ENV issued a valley-wide permit (the Valley Permit) to Teck under the *Environmental Management Act* to enforce commitments made in the ABMP.
- An implementation plan (i.e. treatment schedule) and the Regional Water Quality Model (RWQM) that support the ABMP must both be updated every three years.
- In 2015, the first Active Water Treatment Facility (AWTF) came online at West Line Creek (WLC), treating up to 7500m^3/d. Unexpectedly, the new technology resulted in toxicity impacts and Teck experienced reduced flows and downtime when the system had to be upgraded and adjusted.
- The challenges with the WLC AWTF, compounded with construction issues and COVID, caused delays in commissioning the second AWTF at Fording River Operations South (FRO-S), which commenced almost three years late in 2021. FRO-S AWTF is expected to be operating at full capacity by the end of 2022, treating 20 000m^3/d.
- In 2018, a full-scale pilot of Saturated Rock Fill (SRF) technology was permitted at Teck's Elkview Operations (EVO) to treat Se and NO_3. SRF technology is more robust, requires less complex infrastructure, and has lower capital and operating costs than AWTFs.
- In 2020, the EVO SRF pilot was expanded, and Teck began shifting their broad treatment approach to include SRFs. In early 2022, commissioning of a second SRF commenced at Fording River Operations North (FRO-N). Full operation at 30,000m^3/d is expected in 2023.
- Teck made significant updates to the RWQM in 2021, compared to the previous version from 2018. The model is likely the most complex and robust in BC. It provides updated projections of Se and NO_3 release and contaminant transport through groundwater. The model has been comprehensively reviewed.
- Teck is applying learnings from the RWQM to develop an implementation plan adjustment (IPA) which is expected to propose 18 facilities and/or expansions and to commit to treating 193,500 m^3/d by 2042 in order to achieve ABMP targets. See Figure 1.
- To date, Teck reports investments of over $1B implementing the ABMP, and by 2031 they will have invested close to $2B.
- The 2022 IPA is still predicting possible Se and NO_3 non-compliances at a few locations as late as 2028.
- For the first time, the 2022 IPA will also include Teck's plan to address sulphate though additional treatment modules at their existing and proposed treatment facilities.
- Teck has also developed antiscalant technology to prevent calcite deposition on streambeds, is currently operating five antiscalant plants over nine tributaries, and is developing pilot projects to remediate impacted streams.
- Teck continues to invest heavily in research and development (R&D) and is at the global forefront in developing source control and treatment to mitigate coal mining impacts.

<u>Water Quality: Current State of the Environment</u>

- Teck is required to monitor WQ at approximately 130 locations, and conducts numerous studies and assess mine-related impacts.

- Monitoring shows that aquatic ecosystems in mainstems are functioning, but chronic toxicity impacts are present in some areas. Many tributaries are heavily impacted both from infill and water quality.
- Monitoring and assessment programs have not detected aquatic ecosystem impacts in the Koocanusa reservoir, despite Se levels being above the proposed Water Quality Objective (WQO) most of the time and many fish tissue samples above the conservative threshold for potential aquatic life impacts. Further species sensitivity threshold studies are underway to better understand any risks posed by Se in the reservoir.
- The majority, but not all, fish tissue samples from Koocanusa are below the WQO threshold for safe fish consumption at Health Canada consumption levels and Ktunaxa preferred consumption levels.
- Studies continue to find other emerging issues in SE Coal, such as Nickel toxicity, that are being addressed using the structured Adaptive Management Program defined in the ABMP.
- Evaluation of Cause for the Upper Fording River Westslope Cutthroat population crash of 2019 (and Harmer Creek crash of 2020) does not point to WQ as a primary factor; however, WQ combines with other mining stressors and may create vulnerability in the population.

<u>Water Quality: Compliance and Enforcement</u>

- ENV takes a risked-based approach to compliance and enforcement activities for Teck as guided by ministry policies and procedures. In addition to those policies and procedures a 4 Year Compliance Plan has been developed with input from the Ktunaxa Nation Council (KNC). The compliance plan covers all 26 of Teck's EMA authorizations:
    - The Valley Permit has quarterly inspections on WQ results and an annual comprehensive review
    - Eight effluent permits for specific mining operations are inspected annually
    - Eighteen other authorizations for discharges to air, refuse, and explosives are inspected at least once every four years
- KNC is provided with quarterly compliance updates and all inspection records. Recently, the Administrative Monetary Penalty (AP) process began providing KNC an opportunity to provide input to the statutory decision maker to consider, prior to a final determination on the AP.
- In 2020 most WQ data at compliance points was in compliance, except at two sites: Line Creek had only 25% compliance for monthly NO_3 and 98% for Se; and Upper Fording River had 83% compliance for NO_3 and 42% compliance for Se (related primarily to delays in FRO-S AWTF).
- There have been approximately 170 comprehensive permit inspections in the SE Coal area since 2015, including a total of 34 inspections on the Valley Permit which resulted in two Notices of Compliance, five Advisories, 12 Warnings, 13 AP referrals and two Investigations.
- Enforcement responses are escalating as non-compliances continue. There has been approximately $475K in APs assessed to Teck, s.15
s.15
- Teck has implemented a "Task Force" to develop and implement an action plan to address outstanding and recurring non-compliances.
- WQ is starting to stabilize at some target locations and is expected to improve by the end of 2022 with new treatment facilities coming online.

Assistant Deputy Minister:	Alternate contact for content:	Prepared by:
Laurel Nash, ADM *EPD* *250-508-1670*		*A.J. Downie, SE Coal Director* *Regional Operations Branch, EPD* *250-802-7149*

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Withheld pursuant to/removed as

s.21

RE: Ktunaxa First Nation meetings: briefing materials and scheduling summary

From:	Downie, AJ ENV:EX
To:	Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>, Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>
Cc:	von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>, Mattu, Jamin ENV:EX <Jamin.Mattu@gov.bc.ca>, Miller, Lana L ENV:EX <Lana.Miller@gov.bc.ca>, Hill, Douglas J ENV:EX <Doug.Hill@gov.bc.ca>
Sent:	July 21, 2022 12:42:26 PM PDT
Attachments:	image001.png, 2022-07-20 IN SE Coal WQ and Compliance.docx

Hello Laurel

As requested, here is an updated version of the IN as background material for you and Kevin next week.

Notable updates include adjusted language around ABMP in the summary, acknowledgement that there are few issues at EVO SRF right now related to selenium speciation and nickel, new bullets around the recently submitted human health risk assessment, and updated compliance metrics.

Please let me know if you have any questions or would like more information about anything.

AJ

A.J. Downie
778-671-0133
AJ.Downie@gov.bc.ca

From: Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>
Sent: July 19, 2022 9:26 PM
To: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>; Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>
Cc: von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>; Mattu, Jamin ENV:EX <Jamin.Mattu@gov.bc.ca>
Subject: RE: Ktunaxa First Nation meetings: briefing materials and scheduling summary

Thanks for this AJ. A really good suggestion to add an updated version of this AJ.
Much appreciated

Laurel Nash *(she/her)*
Assistant Deputy Minister

Environmental Protection Division
Ministry of Environment &
Climate Change Strategy
☎ (250) 953-4004 or (250) 508-1670
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I acknowledge with respect the Lək̓ʷəŋən peoples on whose traditional territory I live and work and the Songhees, Esquimalt and W̱SÁNEĆ peoples whose historical relationships with the land continues to this day.

From: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>
Sent: July 19, 2022 4:22 PM
To: Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>; Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>
Cc: von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>
Subject: RE: Ktunaxa First Nation meetings: briefing materials and scheduling summary

Hi Laurel and Chris,

I see that Katie has led the development of briefing materials for next week and I further understand the conversations are expected to be relatively high level. Please let me know if there's anything more detailed or specific you would like regarding water quality and related matters, for your back pocket. If you'd like something, I can probably pretty easily update one of the notes we had from last March, such as this one. If nothing further is needed, that's easy for me!

AJ

A.J. Downie
778-671-0133
AJ.Downie@gov.bc.ca

From: von Gaza, Katie IRR:EX <Katie.vonGaza@gov.bc.ca>
Sent: July 19, 2022 4:10 PM
To: Trumpy, Chris EMLI:EX <Chris.Trumpy@gov.bc.ca>; Nash, Laurel ENV:EX <Laurel.Nash@gov.bc.ca>
Cc: Downie, AJ ENV:EX <AJ.Downie@gov.bc.ca>; Hunt, Melanie EMLI:EX <Melanie.Hunt@gov.bc.ca>; Giles, Wayne IRR:EX <Wayne.Giles@gov.bc.ca>; Bodnar, Ashley IRR:EX <Ashley.Bodnar@gov.bc.ca>
Subject: Ktunaxa First Nation meetings: briefing materials and scheduling summary
Importance: High

Good afternoon,

Attached is the package for the briefing tomorrow and for the Ktunaxa meetings next week.

Note that materials are not yet CLIFF'ed and in the system.

Materials:

- DM BN – Ktunaxa Update 2022 07 19
- Community profiles – general information for each of the three communities we're meeting with
- BN info Goat River and map – (*specific to Yaqan nu?kiy and an issue that's likely to come up*)
- TO BE ADDED: ABMP memo to Ktunaxa (final version)

Scheduling/Details – see below

Thanks,

Katie.

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s.16

Ministry of Environment and Climate Change Strategy

CLIFF / eApprovals #: [XXXXX / XXXX]

File #: [leave blank if file number not used]

INFORMATION BULLETS

DATE: July 20, 2022

PREPARED FOR: Kevin Jardine, Deputy Minister of Environment and Climate Change Strategy
Laurel Nash, ADM, Environmental Protection Division

ISSUE: Water Quality (WQ) in the SE Coal Block: mitigation history, current state of the environment, and compliance & enforcement

SUMMARY AND KEY MESSAGES:

- The Area Based Management Plan (ABMP) seems to be generally working:
  - The plan is driving significant investment in WQ mitigation measures and provides a strategy for adaptively managing cumulative effects.
  - Schedule delays for the Active Water Treatment Facility (AWTF) at Fording River Mine have been a challenge, resulting in significant continuing localized non-compliances for the past 3yrs; however, the facility has now been commissioned and treatment capacity in the valley continues to increase as more facilities come online.
  - Based on updated models and improved science, Teck is predicting full compliance with current ABMP targets by 2028.
- Even with full compliance, the ABMP allows for localized effects in the short and medium term while working towards increased protection and reduced risk over time.
- ENV has been working on a proposal to update the ABMP.[s.13]

s.13

- Permitting teams will prioritize application reviews for mitigation projects or other applications that are necessary to support Teck in achieving compliance.

KEY FACTS:

<u>Water Quality: Mitigation History & Timeline</u>

- Decades of mining activity in the SE Coal Block of B.C. led to significant waste rock accumulation, alteration of land and watercourses, poorly understood environmental impacts and degrading water quality (WQ) trends.

- In 2014 the ENV Minister approved an Area Based Management Plan (ABMP), titled the Elk Valley Water Quality Plan, to stabilize and reduce mine-related contaminants in the watershed. The ABMP provides for regional management that allows localized environmental effects and supports trade-offs for efficient mitigation of watershed-scale impacts.
- The ABMP established short-, medium- and long-term WQ targets for Selenium (Se), Nitrate (NO_3), Sulphate (SO_4) and Cadmium (Cd) that range from B.C. water quality guideline levels which are fully protective (at downstream sites), to (upstream) site-specific targets at levels that exceed thresholds where effects are expected.
- ENV, Ktunaxa Nation Council (KNC) and Teck have been working in earnest to implement the ABMP since its approval.
- In 2015, the first Se (and NO_3) AWTF came online at West Line Creek (WLC), treating up to 7,500m^3/d. Unexpectedly, the new technology resulted in toxicity impacts and Teck experienced reduced flows and downtime when the system had to be upgraded and adjusted.
- The challenges with the WLC AWTF, compounded with construction issues and COVID, caused delays in commissioning the second AWTF at Fording River Operations South (FRO-S), which commenced almost three years late in 2021. FRO-S AWTF is now fully commissioned and is operating at full capacity, treating up to 20,000m^3/d.
- In 2020, Teck expanded a full-scale pilot of Saturated Rock Fill (SRF) technology at Elkview Operations (EVO) to achieve 20,000m^3/d capacity, and has continued to develop and refine this technology for widescale application throughout the Elk Valley. SRF technology is robust, requires less complex infrastructure, and has lower capital and operating costs than AWTFs.
- In early 2022, commissioning of a second SRF commenced at Fording River Operations North (FRO-N). Full operation at 30,000m3/d is expected in 2023.
- At present, the EVO SRF is operating at reduced capacity while Teck investigates the cause of unexpected elevated Se in benthic invertebrate tissue downstream of the outfall. Teck is also taking actions to reduce nickel discharge.
- Teck's Regional Water Quality Model (RWQM) is in place to support assessments, predictions, and mitigation planning. Teck is currently applying the RWQM to develop an ABMP implementation plan adjustment (IPA) which will be submitted imminently and is expected to propose 18 facilities and/or expansions and commit to treating 193,500 m^3/d by 2042 to achieve ABMP targets. See Figure 1.
- To date, Teck reports investments of over $1B implementing the ABMP, and by 2031 they will have invested close to $2B.
- The 2022 IPA is expected to predict possible Se and NO_3 non-compliances at a few locations as late as 2028.
- For the first time, the 2022 IPA will include Teck's plan to address sulphate though additional treatment modules at their existing and proposed treatment facilities.
- Teck has also developed antiscalant technology to prevent calcite deposition on streambeds, is currently operating five antiscalant plants over nine tributaries, and is developing pilot projects to remediate impacted streams.
- Teck continues to invest heavily in research and development (R&D) and is at the global forefront in developing source control and treatment to mitigate coal mining impacts.

Water Quality: Current State of the Environment

- Teck is required to monitor WQ at approximately 130 locations and conducts numerous studies to assess mine-related impacts. All this data is uploaded to a publicly accessible database quarterly.
- Monitoring shows that aquatic ecosystems in mainstems are functioning, but chronic toxicity impacts are present in some areas. Many tributaries are heavily impacted both from infill and water quality.
- Monitoring and assessment programs have not detected aquatic ecosystem impacts in the Koocanusa reservoir, despite Se levels being above the proposed Water Quality Objective (WQO) most of the time and many fish tissue samples above the conservative threshold for potential aquatic life impacts. Further species sensitivity threshold studies are underway to better understand any risks posed by Se in the reservoir.
- Studies continue to find other emerging issues, such as nickel toxicity and enhanced bioaccumulation of some forms of selenium, that are being addressed using the structured Adaptive Management Program defined in the ABMP.
- Evaluation of Cause for the Upper Fording River Westslope Cutthroat population crash of 2019 does not point to WQ as a primary factor; however, WQ combines with other mining stressors and may create vulnerability in the population.
- Teck's recently submitted comprehensive Human Health Risk Assessment concluded:
    - Selenium is the primary mine-related parameter of concern from a human health risk perspective in the Elk Valley. There is a risk to human health associated with Ktunaxa citizens eating fish at their preferred rate in all areas expect the Koocanusa Reservoir. More data is needed to understand local and fish species-specific risk patterns.
    - Other mine-related parameters pose little to no risk for most designated water uses, or human consumption via food or water.
    - Exposure to mercury from eating Koocanusa reservoir fish resulted in the highest human health risk assessed in the report. However, mercury is not mine-related and concentrations in fish are consistent with concentrations from other regional lakes.
    - Implementation of water treatment technologies will continue to reduce risks to human health associated with selenium and nitrate.

Water Quality: Compliance and Enforcement

- ENV takes a risked-based approach to compliance and enforcement activities for Teck as guided by ministry policies and procedures. In addition to those policies and procedures a 4 Year Compliance Plan has been developed with input from the Ktunaxa Nation Council (KNC). The compliance plan covers all 26 of Teck's EMA authorizations:
    - The Valley Permit has quarterly inspections on WQ results and an annual comprehensive review
    - Eight effluent permits for specific mining operations are inspected annually
    - Eighteen other authorizations for discharges to air, refuse, and explosives are inspected at least once every four years

- KNC is provided with quarterly compliance updates and all inspection records. They also have an opportunity to provide input to the statutory decision maker to consider when reviewing Administrative Penalties (AP), prior to a final determination on the AP.
- In 2021 most WQ data at compliance points was in compliance, except at three sites: Line Creek had only 25% compliance for monthly NO_3 (but 100% for Se); Upper Fording River had 33% compliance for NO_3 and 42% compliance for Se (both related primarily to delays in FRO-S AWTF); and the lower Fording River had 58% compliance for monthly NO_3 and 50% for Se.
- There have been approximately 175 comprehensive permit inspections in the SE Coal area since 2015, including a total of 33 inspections on the Valley Permit which resulted in two Notices of Compliance, five Advisories, 11 Warnings, 13 AP referrals and two Investigations.
- Enforcement responses are escalating as non-compliances continue. There has been approximately $675K in APs assessed to Teck,[s.15]
  s.15
- Teck has implemented a "Task Force" to develop and implement an action plan to address outstanding and recurring non-compliances.
- WQ is starting to stabilize at some target locations and is expected to improve by the end of 2022 with new treatment facilities coming online.

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Withheld pursuant to/removed as

s.21