Environmental Protection Operations Directorate
Pacific and Yukon Region
201 - 401 Burrard Street
Vancouver, BC
V6C 3S5

July 16, 2020

ECPT: 20-BC-003
CEAR: 80702

Fraser Ross
Project Manager
Impact Assessment Agency of Canada
210A – 757 West Hastings Street
Vancouver, BC V6C 3M2

Dear Mr. Ross:

Re: Castle Project – Designation Request Federal Authority Advice Record

Environment and Climate Change Canada (ECCC) received a request from the Impact Assessment Agency of Canada (the Agency) on May 27th to provide input on the designation request for the Castle Project. The Agency provided a Federal Authority Advice Record (FAAR) form to use.

Attached is ECCC's response the request, as well as relevant guidance documents. It is ECCC's view that the Project has a high potential to cause adverse direct or incidental effects as described in section 2 of the Impact Assessment Act, as well as other effects within ECCC's mandate.

ECCC's response to the FAAR is founded upon departmental mandate and is related to: migratory birds and their habitat, species at risk, water quality, air quality, GHGs, and environmental emergencies. Applicable laws, legislation and best management practices related to this Project under ECCC's authority include, but are not limited to:

- Canadian Environmental Protection Act, 1999;
- Migratory Birds Convention Act, 1994;
- *Fisheries Act; and*
- Species at Risk Act.

If you have any questions or concerns regarding the advice provided in the attached, please do not hesitate to contact Chelsey Cameron at 604-666-5566 or Chelsey.Cameron@canada.ca, or Christie Spry at 604-666-7829 or Christie.Spry@canada.ca.

Sincerely,

<Original signed by>

Chelsey Cameron
Senior Environmental Assessment Coordinator
Environment and Climate Change Canada / Government of Canada

<Original signed by>

Christie Spry
Senior Environmental Assessment Coordinator
Environment and Climate Change Canada / Government of Canada

Attach. (1): Environment and Climate Change Canada FAAR Response
Attach. (2): *Proposed Regulatory Framework for Coal Mining* – January 2017
Attach. (3): *Proposed Approach for Coal Mining Effluent Regulations* – November 2017
Attach. (4): *Signal Check - Proposed Coal Mining Effluent Regulations* - Fall 2018
Attach. (5): Update – *Proposed Coal Mining Effluent Regulations* – February 2020
Attach. (6): Update – *Proposed Environmental Effects Monitoring (EEM) for the Coal Mining Effluent Regulations* – February 2020

ENCLOSURE:
Federal Authority Advice Record: Designation Request under the Impact Assessment Act
Response due by June 16, 2020
Castle Project- Teck Coal Limited

Department/Agency	Environment and Climate Change Canada (ECCC)
Lead Contact	Chelsey Cameron, Senior Environmental Assessment Project Manager
Full Address	201-401 Burrard Street Vancouver, BC V6C 3S4
Email	Chelsey.cameron@canada.ca
Telephone	(604) 666-5566
Alternate Departmental Contact	Christie Spry, Senior Environmental Assessment Project Manager Christie.spry@canada.ca (604) 666-7829

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1. **Has your department or agency considered whether it has an interest in the Project; exercised a power or performed a duty or function under any Act of Parliament in relation to the Project; or taken any course of action (including provision of financial assistance) that would allow the Project to proceed in whole or in part?**

   Specify as appropriate.

   ECCC has not exercised a power or performed a duty or function under any Act of Parliament in relation to the Castle Project (the Project), nor has ECCC taken any course of action that would allow the Project to proceed in whole or in part. However, ECCC has an interest in the Project for the following reasons:

   - The potential for the project to result in adverse impacts within federal jurisdiction (see Question 6 for more information) and to generate public concerns related to those impacts;
   - ECCC enforcement is currently conducting an investigation into alleged violations of s. 36(3), the pollution prevention provisions of the *Fisheries Act*, by Teck Coal Limited at their Greenhills and Fording River Operations (noting that the Project is a proposed expansion of the Fording River Operations, see Question 5 for more information);
   - ECCC is currently developing Coal Mining Effluent Regulations (CMER) under the *Fisheries Act* that would apply to coal mining in Canada, including this proposed project (see Question 2 for more information);
   - ECCC is currently engaged in the federal environmental assessment (EA) review process for other coal mines in the Elk Valley, BC, including the Michel Coal Project and the Crown Mountain Coking Coal Project;

- Transboundary water quality concerns in Lake Koocanusa, USA, expressed by United States (US) Tribal governments, US states, and the US Environmental Protection Agency (EPA);

- Teck Coal Limited's challenges in implementing water treatment facilities in a timely manner to address cumulative effects in the region;

- Carrying out the Project has the potential to impact Aboriginal and Treaty rights of the Ktunaxa Nation; and (see Question 8 for more information);

- The potential for the Project to generate greenhouse gas (GHG) emissions. If designated, the Project would be subject to Canada's draft strategic assessment of climate change (SACC).

More detail outlining the interests above has been provided in ECCC's response to Question 9 (unless specified otherwise).

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2. Is it probable that your department or agency may be required to exercise a power or perform a duty or function related to the Project to enable it to proceed?

If yes, specify that power, duty or function and its legislative source.

Subsection 36(3) of the *Fisheries Act* prohibits any person from depositing or permitting the deposit of a deleterious substance of any type in water frequented by fish, unless authorized by a regulation. The deposit of a deleterious substance to water frequented by fish constitutes a violation of the *Fisheries Act* except where federal regulations under subsection 36(5) of the Act, or other Governor in Council regulations, authorize the deposit of the deleterious substance to levels set out in the regulations.

ECCC is currently developing CMER under the *Fisheries Act* that would apply to coal mining in Canada, including this proposed project. ECCC is targeting early 2021 to pre-publish the proposed CMER in *Canada Gazette*, Part I, which would be followed by a 60-day comment period. Final regulations are targeted for publication in *Canada Gazette*, Part II in early 2022. Proponents are encouraged to consider the consultation documents prepared by ECCC (attached) when designing new coal mines.

Due to the Project's proximity to the US-Canada border, the following s may also apply:

- *International River Improvements Act*: A license under the *International River Improvements Act* (IRIA) is required from ECCC to construct, operate or maintain an international river improvement, such as a dam or water diversion;

- *Boundary Waters Treaty* (Article IV)*: The Boundary Waters Treaty* regulates water quantity and water quality of boundary waters between the United States and Canada. The Project is located upstream from US waters in proximity to the US border. ECCC has an obligation under the *Boundary Waters Treaty* (Article IV) to ensure that transboundary waters are not polluted.

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3. If your department or agency will exercise a power or perform a duty or function under any Act of Parliament in relation to the Project, will it involve public and Indigenous consultation?

Specify as appropriate.

ECCC is targeting early 2021 to pre-publish the proposed CMER in *Canada Gazette*, Part I, which would be followed by a 60-day comment period. The development of these regulations have included pre-consultations with various Indigenous groups including the Ktunaxa Nation.

The publication in *Canada Gazette* Part I will start the formal consultation for the regulations, which would include the general public, Indigenous groups (including the Ktunaxa Nation), environmental non-governmental organizations, and industry (including Teck Coal Limited).

If the Project requires a licence under section 4 of the IRIA, consultation with Indigenous groups may also be required.

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4. Is your department or agency in possession of specialist or expert information or knowledge that may be relevant to any potential adverse effects within federal jurisdiction caused by the Project or adverse direct or incidental effects stemming from the Project?

Specify as appropriate.

ECCC has specialist or expert information in the areas listed below, notably with regard to establishing an adequate baseline, assessing potential effects to biophysical valued components within federal jurisdiction, effectiveness of mitigation measures, methods for monitoring and follow up, as well as information regarding federal policies, standards, and regulations that may be relevant to the assessment.

Air Quality: ambient air quality; sources of emissions; emissions estimation and measurement; dispersion modelling; and follow-up monitoring.

Greenhouse gas emissions and climate change: estimations of GHG emissions (net and upstream); GHG mitigation measures and determination of Best Available Technologies/Best Environmental practices (BAT/BEP); climate change science to inform evaluation of potential changes to the environment and project resilience to effects of climate change; climate change policies; and national GHG projections.

Water quality and quantity: surface water quality; contamination sources for surface and groundwater, including effluent; water quality predictions and modelling; management of contaminated soils or sediments; hydrology; geochemistry; water treatment options specific to nitrate and selenium, including new technologies such as saturated rock fill; follow-up and monitoring.

Wildlife, species at risk, and habitat: migratory birds, their nests, eggs, and habitat; species at risk, their habitat and critical habitat including recovery strategies and management plans; ecological function of wetlands; and ecotoxicology.

Environmental emergencies: emergency management planning and guidance; atmospheric transport and dispersion modelling of contaminants in air; fate and behaviour; and hydrologic trajectory modelling of contaminants in water.

Climate and Meteorology: long-term climate patterns and norms.

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5. Has your department or agency had previous contact or involvement with the proponent or other parties in relation to the Project?

Provide an overview of the information or advice exchanged.

ECCC attended a technical advisor webinar for the Project, led by the British Columbia Environmental Assessment Office (BC EAO) on June 4, 2020. At the meeting, Teck Coal Limited provided an overview of the Project and the BC EAO provided an overview of their EA process. ECCC did not ask questions or provide advice, but attended in an information gathering capacity.

ECCC has provided Letters of Comment for other Teck Coal Limited coal projects in the Elk Valley during EA reviews, such as Coal Mountain Phase 2 Project (federal and provincial EA), Fording River Swift Project (provincial only EA), and Line Creek Operations Phase II Project (provincial only EA). ECCC is also currently involved in the EAs for several proposed coal mining projects in the Elk Valley Region, including the Michel Coal Project, Bingay Main Coal Project, and Crown Mountain Coking Coal Project, none of which are owned by Teck Coal Limited. All are undergoing coordinated federal and provincial EAs.

ECCC enforcement is currently conducting an investigation into alleged violations of s. 36(3) pollution prevention provisions of the *Fisheries Act* by Teck Coal Limited at their Greenhills and Fording River Operations (noting that the Project is a proposed expansion of the Fording River Operations). In late 2018, the Public Prosecution Service of Canada issued a notice to Teck Coal Limited regarding an alleged violation of the pollution prevention provisions of the *Fisheries Act* in connection with the release of selenium and calcite by coal mines in the Elk Valley. As stated in their Annual Information Form (Teck Coal Limited 2020), Teck Coal Limited is currently not in compliance with certain water quality parameters set out in the Elk Valley Water Quality Plan and expressed concerns about being able to operate their Elk Valley coal mines in compliance with the *Fisheries Act*.

In the context of broader pre-consultations on the proposed CMER held in the winter and spring of 2020, ECCC responded to questions from Teck Coal Limited and the Ktunaxa Nation on how this Project may be regulated.

Officials from the US Department of State and the US EPA have raised concerns related to the potential transboundary impacts of the Project with Departmental Officials during Canada-US working group calls on transboundary mining issues.

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6. From the perspective of the mandate and area(s) of expertise of your department or agency, does the Project have the potential to cause adverse effects within federal jurisdiction or adverse direct or incidental effects as described in section 2 of the Impact Assessment Act? Could any of those effects be managed through legislative or regulatory mechanisms administered by your department or agency? If a licence, permit, authorization or approval may be issued, could it include conditions in relation to those effects?

Specify as appropriate.

Yes, the Project has the potential to cause adverse direct or incidental effects, as described in section 2 of the Impact Assessment Act (IAA), that are within ECCC's mandate. For example:

- Section 2(a)(i) and 2(a)(ii) – potential effects to fish and fish habitat, and aquatic species listed under the *Species at Risk Act* (SARA).
    - Project-related changes in water quality (e.g., increases in selenium, nitrate, sulphate and cadmium concentrations and calcite deposits) may adversely affect fish and aquatic species listed under SARA, including Westslope cutthroat trout (aquatic species of special concern listed in Schedule 1 of SARA).
    - The proposed CMER aims to reduce the threats to fish and fish habitat by setting national baseline effluent quality standards for selenium, nitrate and suspended solids. The regulation will also include environmental effects monitoring requirements as a performance measurement tool to assess the effectiveness of the regulation over time.

- Section 2(a)(iii) - potential effects to migratory birds.
    - Project activities may lead to destruction, disturbance and fragmentation of habitat (e.g., foraging, nesting), habitat avoidance, sensory disturbance, and the inadvertent

disturbance and destruction of individuals, nests and eggs of migratory birds protected under the *Migratory Birds Convention Act, 1994.*
    - Project activities may lead to changes in water quality (e.g. increase in selenium concentrations) may adversely impact migratory birds such as spotted sandpipers and American dippers. Elevated selenium concentrations in the diet of water birds can lead to embryotoxicity and reproductive deformities.

- Section 2(b)(ii)/(iii) – a change to the environment that would occur outside of BC or Canada.
    - Project activities may result in the potential for transboundary water quality effects in Lake Koocanusa, and the Kootenai Watershed in the US
    - Project activities may result in the potential for air quality effects outside of BC based on proximity to the BC-Alberta border (<10 km).

- Section 2(c)(ii) - with respect to Indigenous peoples in Canada, a change to the environment* that may result in a change to the current use of lands and resources for traditional purposes; and, Section 2(d) - a change in the health of Indigenous peoples of Canada.
    - Project-related changes to air quality (e.g., potential exceedances of the Canadian Ambient Air Quality Standards) may adversely affect the health of Indigenous peoples in the region.
    - Aerial deposition of contaminants may adversely affect the quality of traditional foods, including plants, berries, and wild game.
    - Project-related changes to surface water and groundwater quality may adversely affect the health of Indigenous peoples in the region.
    - Changes to water quality may adversely affect the health and quality of fish traditionally harvested by Indigenous peoples.

  * ECCC can provide expertise regarding the change to the environment, such as changes to water quality or air quality, but would rely on Health Canada to determine potential impact to Indigenous peoples.

Other potential environmental effects (that relate to ECCC's mandate) include:

- The Project may affect species at risk and their habitat during construction, operations, and closure activities. These activities can result in habitat loss, alteration, and fragmentation, direct and indirect mortality, sensory disturbance and functional habitat loss, and introduction of invasive species. The Proponent has identified federally listed species within the Project area including: grizzly bear (special concern), American badger (endangered), olive-sided flycatcher (threatened), barn swallow (threatened), bank swallow (threatened), western toad (special concern), and whitebark pine (endangered).

- The Project may affect wetlands through construction of terrestrial components as well as changes to water quality. Effects on wetlands may include wetland loss, reduction, alteration, and change in wetland function. The Proponent has identified wetlands along the Fording River and Kilmarnock Creek. The Project has the potential to adversely affect these wetland communities and ecological functions, thereby also affecting the availability and/or quality of wetland habitat for migratory birds and other wildlife.

- Environmental Emergencies: The Project, as proposed, includes fine tailings storage and a wastewater treatment facility, as well as explosives storage and delivery systems, waste rock storage areas, and mining equipment including drills, shovels, and haul trucks. As such, there is potential for adverse environmental effects from accidents and malfunctions including slope failure in the pits or waste rock storage areas, containment failure at tailings storage facilities, failure of the water treatment system, equipment and rail accidents, and spills of hazardous materials such as diesel fuel, or other explosive materials such as ammonium nitrate/fuel oil mixture.

- GHG emissions and climate change: The construction, operation, and decommissioning of the Project may result in GHG emissions. Furthermore, the Project has the potential to be affected by future climate change, possibly resulting in impacts to the environment.
    - In the Initial Project Description, Teck Coal Limited anticipates the change to emissions and GHGs to be minor compared to existing activities (either a very small increase or a very small decrease), but ECCC has not verified this conclusion. Should the Project be designated, the draft SACC provides interim guidance related to climate change throughout the impact assessment process. The draft SACC outlines information that the Proponent should provide, including but not limited to GHG emissions, GHG mitigation measures, and climate change resilience.
    - Federal regulatory mechanisms to manage potential environmental effects related to GHG emissions include the proposed Clean Fuel Standard Regulations, which would reduce the lifecycle carbon intensity of fuels used in mobile and stationary equipment and could incent the use of electric or zero emissions technologies in lieu of those equipment.

- Cumulative effects: Given the high density of existing and proposed coal mining operations in the Elk Valley, the Project has the potential to contribute to cumulative effects in the region (including water quality, air quality, and impacts to wildlife and their habitat). The impact assessment (if the project is designated) would consider both direct project effects and cumulative effects.

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7. Does your department or agency have a program or additional authority that may be relevant and could be considered as a potential solution to concerns expressed about the Project? In particular, the following issues have been raised by the requestor:

- **The importance of effectively evaluating cumulative effects of current and future coal mining in the Elk Valley on the Kootenai Watershed;**
- **elevated concentrations of selenium and nitrate pollution in the Kootenai River watershed due to effluent from BC mines;**
- **transboundary effects in the U.S. and traditional tribal territory on water quality, fish, wildlife, and traditional cultural uses;**
- **mortality of the Westslope cutthroat trout in the Upper Fording River;**
- **ineffective efforts by BC, Montana, and Teck to improve water quality; and**
- **lack of sufficient measures and proven technology to mitigate mining contamination.**

If yes, please specify the program or authority.

Please refer to ECCC's response to Question 2 in regards to the proposed CMER under the *Fisheries Act*.

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8. Does your department or agency have information about the interests of Indigenous groups in the vicinity of the Project; the exercise of their rights protected by section 35 of the *Constitution Act, 1982*; and/or any consultation and accommodation undertaken, underway, or anticipated to address adverse impacts to the section 35 rights of the Indigenous groups?

If yes, please specify.

In 2017, the Ktunaxa Nation wrote to the Minister of Foreign Affairs urging the Canadian and US governments to address the impacts of mines in the Elk River Valley on water quality.

The Ktunaxa Nation is currently negotiating a Recognition Agreement with Canada and BC. The Parties were previously engaged in treaty negotiations under the British Columbia treaty process for many years and have now agreed to explore a stepping stone approach to concluding a treaty, of which legal recognition is a first step. Crown Indigenous Relations and Northern Affairs

(CIRNA) is leading the process for Canada, and ECCC is participating as an implicated department. This agreement will provide for the legal recognition of the Ktunaxa Nation as a distinct legal entity, and as the holder of the collective Section 35 rights and title of the Ktunaxa people, within their traditional territory. The agreement is currently being ratified by all parties. Once ratified, the agreement will create a transitional government arrangement and provide Ktunaxa Government the ability to enter into contracts and agreements, acquire and hold property, and do other things ancillary to the exercise of its rights, powers and privileges. A concluded treaty may supersede all, or parts of this Agreement. ECCC will continue to support the BC treaty process with the Ktunaxa Nation, where the community has interests and rights related to environmental protection, migratory birds, and species at risk.

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9. Taking into account your mandate, does your department or agency have a view as to whether the Project should be designated under the *Impact Assessment Act*?

If yes, please specify.

ECCC has reviewed the project information available to date, including the current activity in the region (cumulative effects), the potential environmental effects (see Question 6), and the concerns raised by indigenous communities and transboundary partners. It is ECCC's view that the Project has a high potential to cause adverse direct or incidental effects as described in section 2 of the IAA, as well as other effects within ECCC's mandate.

Rationale:

- **Project scale:** The Project is a proposed expansion of Teck Coal Limited's existing Fording River Operations (the largest coal mine in Canada). The expansion itself would have a production capacity of approximately 27,400 tonnes per day and a disturbance footprint of approximately 4,100 ha (2,550 ha of newly disturbed land plus 1,550 ha of land within the Fording River Operations disturbance permit area for waste rock storage). The scale of the Project is 2 to 10 times greater in terms of production capacity and disturbance footprint than the three other proposed coal mines in the Elk Valley (Michel Coal, Crown Mountain and Bingay Main Coal) that are currently undergoing coordinated federal and provincial EAs. The Elk Valley currently has four of the largest operating coal mines in Canada, and the Project (by itself) would also be one of Canada's largest. The scope and scale of the impact assessment review should be commensurate with the Project's potential for adverse effects.

- **Recent fish declines in the Upper Fording River:** According to Teck Coal Limited fish survey monitoring data, the adult Westslope cutthroat trout population downstream of their mining activities in the Upper Fording River have declined 93% from 2017 to 2019, and juveniles have declined 74% over the same time period (Teck Coal Limited, 2019). Teck Coal Limited states that they are currently investigating the cause of the observed declines, including whether water quality played a role. Westslope cutthroat trout is listed as a species of special concern under SARA, and the population in the Upper Fording River is considered to be a unique and genetically distinct population (Josephine Falls acts as a fish barrier that isolates them from other trout in the Fording and Elk Rivers). A thorough review of potential project-related impacts to water quality and fish from the Project is recommended in this case, because the Project is an expansion of Teck Coal Limited's Fording River Operations (i.e., one of the mines in the Upper Fording River that is currently impacting water quality and fish in the Upper Fording River).

- **Cumulative effects on water quality:** Historical and existing coal mining operations in the Elk Valley have led to elevated concentrations of contaminants (including selenium, nitrate, sulphate and cadmium) and degraded water quality in the Elk River and its tributaries, resulting in high magnitude, long-term effects to aquatic life and aquatic-feeding wildlife throughout the Elk Valley watershed. For example, in addition to the recent fish declines observed in the Upper Fording River, similar declines have also been noted further down in the watershed, in

Graves Creek and Harmer Creek (Teck Coal Limited, 2019). The Project may further contribute to adverse impacts to water quality and aquatic life in the region, including the ongoing decline of the Westslope cutthroat trout in the Elk Valley.

- **Water treatment technologies:** The Project has the potential to result in adverse impacts to water quality, and there is established uncertainty regarding the type, effectiveness, capacity and timescales of water treatment to effectively mitigate these impacts. Since 2014, the BC government and Teck Coal Limited have committed to implementing water treatment facilities in the Elk Valley to decrease and stabilize concentrations of contaminants in the water; however, technical and logistical challenges have delayed the implementation. Despite a 2014 commitment to install two water treatment plants by the end of 2019, with an additional facility online by the end of 2021, Teck Coal Limited has only built and commissioned one water treatment plant to date (the West Line Creek water treatment facility). The facility has experienced challenges achieving its design criteria, including operating below its planned water treatment capacity and incomplete water treatment that resulted in the release of selenium and other contaminants of concern at concentrations that killed fish in Line Creek. Teck Coal Limited pled guilty to breaching Section 36(3) of the *Fisheries Act* as a result of the fish kill, and paid a fine of $1.425 million (the largest ever single incident fine in BC in relation to *Fisheries Act* pollution charges) (The Free Press, 2014). Following these challenges with water treatment, Teck Coal Limited released their 2019 Implementation Plan (an update to the 2014 Elk Valley Water Quality Plan) with new, delayed timelines for establishing additional water treatment facilities. Teck Coal Limited has also been exploring alternative water treatment technologies for selenium and nitrate removal, and have a pilot saturated rockfill at their Elkview Operations. While some initial results are promising, saturated rockfill is an emerging technology that has not been adequately tested or validated through rigorous scientific research or peer review, and evidence of its effectiveness as a treatment measure over long-term timescales is lacking.

- **Transboundary effects:** The Project may contribute to the degradation of water quality in Lake Koocanusa and the Kootenai River in the US, and concerns have been voiced by US government departments and Tribal Nations:

    - In 2018, the US Geological Survey (USGS) undertook a preliminary assessment of selenium and other contaminants downstream of the Libby Dam in Montana, which creates Lake Koocanusa. The results of the study, released in September 2019, concluded that levels of selenium that exceed the US EPA criteria were present in fish eggs and fish tissue downstream of Lake Koocanusa. The study also concluded that, by comparing samples from the Kootenay River and its tributaries, the source of selenium was the Elk River in BC and not a tributary river south of the border.

    - The US EPA expressed their concern, in a letter dated February 4, 2020 to the BC Minister of the Environment, George Heyman, stating that the US EPA finds it unacceptable that the BC Government has accepted a water treatment plan that allows for seasonal exceedances of water quality objectives by the mines. In addition, the letter addresses the effects observed in the Kootenai River watershed downstream of the Libby Dam, and requests an independent review of water treatment technologies to facilitate US stakeholder confidence in the new approaches suggested for treating mine effluent.

    - The Tribal Councils of the Confederated Salish and Kootenai Tribes and the Kootenai Tribe of Idaho submitted a designation request letter for the Project to Minister Wilkinson which outlines their concerns, including:

        - Recent data from 2019, as part of Teck Coal Limited's annual monitoring, documenting declines and population collapse of Westslope cutthroat trout in the Upper Fording River.

- Lack of demonstrated, successful technology to mitigate contamination from mining activities and reduce risks to water quality and aquatic life.
- Recent data from 2019 collected by the US EPA, US Geological Survey, and the Kootenai Tribe of Idaho documenting elevated concentrations of selenium and nitrates, originating from Teck Coal Limited's Elk Valley mines, in the Kootenai River of Montana and Idaho, that exceed US EPA thresholds for Kootenai River fish.
- Importance of accurately and robustly evaluating cumulative environmental impacts, at the appropriate geographic scale, from mining in the Elk Valley to the transboundary Kootenai watershed, including Teck Coal Limited mine expansions, and three proposed mines in pre-environmental assessment phase, not owned by Teck Coal Limited, seeking permits in the watershed.

- **Canada's commitment to climate change:** The draft strategic assessment of climate change provides guidance on how federal impact assessments would consider a project's greenhouse gas emissions and its resilience to climate change impacts. Additionally, in Fall 2019, the Government of Canada announced further commitments to develop a plan to set Canada on a path to achieve net-zero emissions by 2050.

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10. If your department has guidance material that would be helpful to the proponent or the Agency, please include these as attachments or hyperlinks in your response.

ECCC has attached the following guidance materials that may be helpful to the Proponent and/or the Agency:

- *Proposed Regulatory Framework for Coal Mining* – January 2017
- *Proposed Approach for Coal Mining Effluent Regulations* – November 2017
- *Signal Check - Proposed Coal Mining Effluent Regulations* - Fall 2018
- Update – *Proposed Coal Mining Effluent Regulations* – February 2020
- Update – *Proposed Environmental Effects Monitoring (EEM) for the Coal Mining Effluent Regulations* – February 2020

In addition, the draft Strategic Assessment of Climate Change (SACC) can found at: www.strategicassessmentclimatechange.ca

Saul Schneider
Name of departmental / agency responder

Regional Director,
Environmental Protection Operations
Directorate – Pacific and Yukon Region
Title of responder

July 16, 2020
Date

References

The Free Press. 2017. *Teck Coal pleads guilty to 2014 environmental charge: Mining company fined $1.4M for toxic effluent released in Line Creek*. Available at: Https://Www.thefreepress.ca/News/Teck-Coal-Pleads-Guilty-to-2014-Fish-Kill/.

Teck Coal Limited. 2019. *Elk Valley Fish and Fish Habitat Committee Meeting*. October 31, 2019. Available at: https://www.scribd.com/document/456418138/Elk-Valley-Fish-and-Fish-Habitat-Committee-Meeting-Slide-Deck-October-31-2019.

Teck Coal Limited. 2020. *Annual Information Form*. Available at www.teck.com/media/2020-AIF.pdf

Proposed Regulatory Framework for Coal Mining

Consultation Document

January 2017

Proposed Regulatory Framework for Coal Mining

1. Introduction

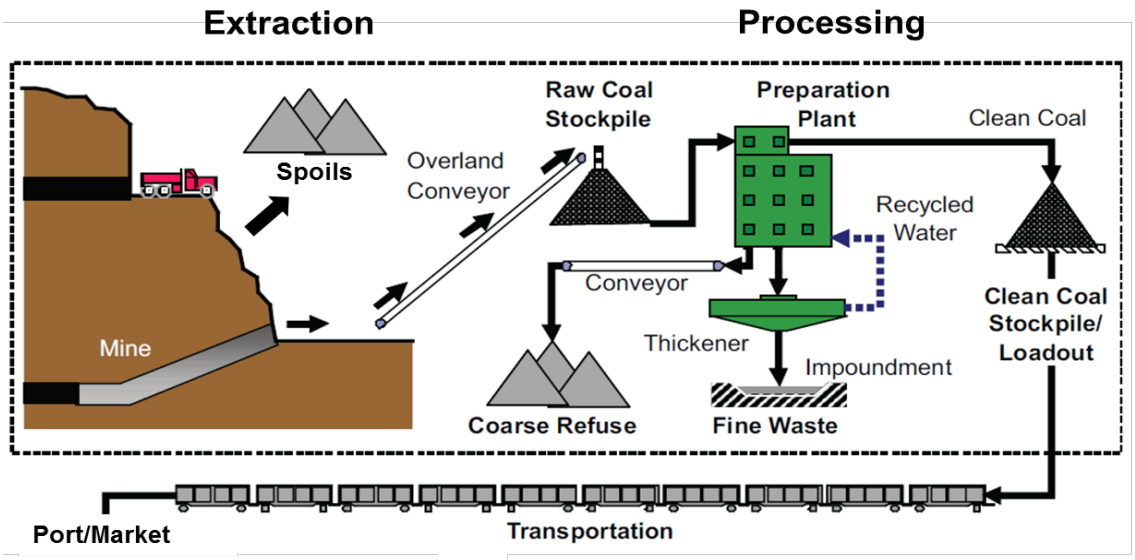
Environment and Climate Change Canada (ECCC) has prepared this consultation document to inform interested parties and solicit feedback on the key elements of the proposed framework for a new regulation for the coal mining sector. Interested parties may comment in writing by mail or e-mail (see Section 5 for details)**.**

2. Context

2.1. Background

Canada is a mid-size producer of coal, ranking 12th among global coal producing countries. In 2015, Canadian mines produced 62 million tonnes of coal. Canadian coal mines produce metallurgical coal (used in steelmaking), as well as thermal coal (used to generate power). There are two types of mining methods used in Canada: underground and surface mining. The majority of coal mines are surface mines, which include strip mines and mountain mines.

Coal mining involves extraction and processing operations. Extracted coal is sent to preparation plants for processing, while mine wastes generated from extraction are placed in spoils. Effluent is generated from both extraction (e.g. due to precipitation and runoff) and processing operations (e.g. tailings impoundments). Most effluent treatment at coal mining operations in Canada is done by conventional means, i.e., diversion, settling, and sedimentation, and the treated effluent is then discharged into the receiving environment. Effluent from coal processing operations can also be recycled. A general overview of coal mining operations[1] is presented in Figure 1.



[1] Figure 1. Overview of coal mining operations (adapted from Virginia Center for Coal and Energy Research; Virginia Polytechnic Institute and State University, 2009).

Local and regional water quality may be affected by mining activity at coal mines. After being removed to access the coal, waste rock and overburden can be placed in spoil piles or pits. The material stored in spoil piles is exposed to the natural elements. Such exposure can lead to the leaching of contaminants into surface waters through runoff from rain or snow, or through groundwater. Coal mining can also generate air emissions, including fine particulate matter, from the extraction (e.g., drilling, blasting, hauling, collection, transportation and fugitive releases) and processing (e.g., crushing, pulverizing, drying) operations.

2.2. Issue

Coal mining operations can generate mine waste including effluent, tailings (coal rejects) and solid wastes (e.g., waste rock, overburden and fine particulates). The environmental effects of coal mining have been well documented in scientific literature. Effects can be categorized on the basis of the media impacted (i.e., surface water, groundwater, soils, sediments, airsheds), biological systems impacted (i.e., human health and ecological), and geographic scale (i.e., on site, adjacent to site, downstream surface waters, groundwaters and airsheds). The impact of these releases on the environment varies according to the mining method used as well as the local geology, climate, and rainfall. This document focusses on coal mine releases to water and their potential negative effects on fish and aquatic life.

2.2.1. Substances of Concern

Selenium, nitrate and total suspended solids are typically the substances of concern related to coal mining effluent, although there may be others that are associated with localized geology.

2.2.1.1. Selenium

Selenium has been identified as an issue for coal mining operations in certain regions in Canada, namely north and southeastern B.C. and western Alberta. Selenium is known to be a bioaccumulative element, and its effect on aquatic organisms can be related to their internal body concentrations. The most severe effect resulting from long-term exposure to elevated concentrations of selenium in the food web is reproductive failure in egg-laying vertebrates (fish, waterbirds and amphibians).[2] In fish, excess selenium may accumulate in fish eggs and affect developing embryos and larvae, while adults appear to be less affected. Field studies conducted in Canada and other regions of North America have demonstrated the hazards and reproductive effects of selenium on birds and fish when present at sufficiently high concentrations in the food web, as well as its potential impacts on fish populations and biodiversity, all of which affect the integrity of various ecosystems. Effects to aquatic life from selenium are best predicted from concentrations in fish tissues, especially fish eggs and ovaries.

The draft screening assessment report published in July 2015 by Environment and Climate Change Canada (ECCC) and Health Canada in *Canada Gazette*, Part I proposed to conclude that selenium and its compounds meet the criteria under paragraph 64(a) and 64(c) of the *Canadian Environmental Protection Act, 1999* (CEPA 1999) as they are entering or may enter the environment in a quantity or a concentration or under conditions that have or may have an

[2] Environment Canada. (2015). *Draft Screening Assessment: Selenium and its compounds.* Environment Canada and Health Canada. http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=301B5115-1

immediate or long-term harmful effect on the environment or its biological diversity, and constitute or may constitute a danger in Canada to human life or health. The report also concluded that selenium and its compounds meet the criteria for persistence and bioaccumulation, as defined in the *Persistence and Bioaccumulation Regulations* made under CEPA 1999. The coal mining sector was identified as posing a risk to the aquatic environment due to releases of selenium. The publication of the final Screening Assessment Report is expected in 2017.

2.2.1.2. Nitrate

Nitrate in coal mine effluents is typically associated with the use of explosives in blasting operations. Coal mining may require blasting to remove rock or overburden, resulting in the release of some nitrate from ammonium nitrate blasting powder. While much coal mining is done by equipment which can rip the softer rock matrix without the need for blasting, certain types of coal mining operations, such as mountainous coal mining operations, require a significant amount of blasting. As a result, nitrate is likely entering the environment from coal mining activities.

2.2.1.3. Total Suspended Solids

Total suspended solids (TSS) are solid materials, both mineral and organic, that have been moved from their place of origin by air, water, ice, or gravity. TSS from coal mining are generated following the removal of vegetation, blasting of overburden and the use of heavy equipment, all of which create erosion and introduce sediment into streams. Sediment loads are particularly high in coal mining operations located in mountainous and hilly terrains due to increased erosion rates. Suspended solids reduce light penetration in water and alter a waterway's temperature. Fish production and spawning grounds are often affected by high TSS loadings due to smothering. Furthermore, TSS may act as a carrier for other pollutants such as heavy metals, although TSS from coal mining more commonly consists of sand, silt and clay.

2.2.2. Legacy Mining and Waste Management

Coal mining has occurred in certain areas (e.g., the Elk River valley of British Columbia) for over 100 years. In the Elk River valley, underground mining began in the late nineteenth century. However, since the late 1960’s, coal mining has been by surface mining methods from five mountain mines in the valley. Operating coal mines are also located in other areas of British Columbia as well as Alberta, Saskatchewan and Nova Scotia, some of which are located in historical mining areas.

Mountain mining involves removing large quantities of geological material (overburden and waste rock) in order to reach coal seams which may be much deeper under the surface than at strip mines. Mine waste from mountainous areas is often placed in valleys due to spatial constraints. Generally, mountain mines occupy large footprints, with mine waste piles often reaching hundreds of metres in height and many square kilometres around the base.

Mine waste (e.g., waste rock) can pose significant challenges depending upon its composition and reactivity with the surrounding environment. In some mining areas, particularly in western Canada, selenium tends to be found in similar geological environments as coal. Waste rock that

was previously thought to be inert has been placed in large piles that are exposed to the elements. Water from seasonal or intermittent streams, pre-existing streams/rivers, precipitation and runoff can infiltrate these waste rock piles and can carry selenium and other contaminants into local water bodies if it is not controlled and/or treated. Recent studies have found that the generation of waste rock associated with mining increases selenium releases.

The effective management of mine effluent (including seepage and run-off) as well as other mine waste represents a key aspect of the management of coal mining facilities. The large quantity of annual precipitation and snowmelt in some areas of Canada poses a challenge for the effective environmental management of many Canadian coal mines. These challenges require a thorough understanding of the hydrological regime, topography and watershed boundaries within the mine area. Collecting effluent that leaches from mine waste may be technologically challenging in regions where, in particular, mountain mining occurs, due to the historical deposition of mine waste in and near water bodies.

More recent coal mine developments generally go through or have gone through much more rigorous environmental assessments prior to start-up than mines that commenced operations long ago. Based on more recent scientific understanding of the issues that can arise from coal mining, newer mines tend to be designed in such a way as to reduce or mitigate the extent of environmental impacts that can occur. By comparison, those mines that commenced operations long ago did not have the benefit of our current knowledge and were not necessarily designed to minimize or mitigate environmental impacts. Some of these mines are still currently operational and now must consider the environmental impacts of historic mining practices.

Cumulative environmental impacts of legacy issues can increase over time if not managed properly. Several current operations in Canada have been showing negative impacts. This has been the case for selenium and nitrate in the Elk River valley and elsewhere across other provinces where coal mining occurs. TSS have also been shown to be released at high concentrations from coal mines across the country. Other parameters such as arsenic and sulphate have shown negative impacts in localized areas such as Long Lake near the Quinsam Mine on Vancouver Island, however these parameters are not generally at concentrations of concern from effluents at most coal mines.[3]

Geochemical studies of waste rock piles in the Elk River valley indicate that they will continue to release selenium for a very long period of time. Waste rock placed decades ago continues to release selenium at a steady rate today, and is expected to continue doing so far into the future.[4] Historical mining practices are also contributing to environmental impacts in areas outside the Elk River valley.

2.3. Existing Environmental Management in Canada

The management of coal mining and, in particular, coal mining effluent has been a topic of discussion in many fora for a number of years involving all jurisdictions in Canada. Interested parties have consistently indicated the need for regulatory clarity and for all levels of government to work cooperatively.

[3] Stantec. (2011). *Study on Canadian Coal Mining Effluents: Final Report.* Stantec Consulting Limited.
[4] Teck. (2014). *Elk Valley Water Quality Plan.* Teck (Teck Coal Limited).

2.3.1. Provincial Requirements

Provincial regulatory requirements include effluent quality standards that are established through provincial permitting processes. Many provinces have established processes whereby the standards for effluent quality are established on a site-specific/case-by-case basis. The number of contaminants of concern to provincial regulators for coal mining operations has been increasing in recent years – most existing effluent discharge permits include limits for TSS, pH, floating solids, visible foam, oil or other substances, and general toxicity as represented by acute lethality testing using rainbow trout[3] and *Daphnia magna*. Measures targeted at specific contaminants such as selenium include effluent and receiving environment-based compliance limits as well as site-specific Selenium Management Plans.

In British Columbia, Ministerial Order No. M113 (Order) was issued in April 2013, requiring Teck Coal Limited to prepare an Area Based Management Plan for the Elk River valley to remediate water quality effects of coal mining operations and to guide future development. The goal of the Elk Valley Water Quality Plan is to stabilize and reverse the increasing trend of selenium, nitrate and other substances to ensure the ongoing health of the watershed, while at the same time allowing for continued sustainable mining in the region. The plan was approved by the British Columbia provincial Minister on November 18, 2014, and a provincial permit was subsequently issued. The permit incorporated the short, medium and long-term targets for selenium (and other contaminants) outlined in the plan.

Provincial governments in Alberta and British Columbia have also required some mines to submit and implement Selenium Management Plans as a condition of issued permits. These plans can include identification of best management practices or technologies that will achieve a reduction of selenium releases to the environment within a given timeframe (usually over several years), as well as requirements to submit periodic progress reports. Selenium Management Plans have been required for the following mines: Cardinal River Operations (Luscar and Cheviot mines) and Grande Cache mine in Alberta; and Willow Creek, Trend (including the Roman expansion), Brule and Wolverine (Perry Creek) mines in British Columbia.

2.3.2. Federal Requirements

Effluent from coal mining in Canada must comply with all applicable federal legislation including the *Canadian Environmental Protection Act, 1999* (CEPA 1999) and the *Fisheries Act,* as well as applicable provincial permits and licenses. The Minister of the Environment and Climate Change is responsible for the administration and enforcement of the pollution prevention provisions of the *Fisheries Act.* Subsection 36(3) of the *Fisheries Act* prohibits anyone from depositing or permitting the deposit of a deleterious substance of any type in water frequented by fish, or in any place under any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the deleterious substance, may enter any such water. The *Fisheries Act* allows for the establishment of federal regulations that would authorize the discharge of deleterious substances under conditions set out in the regulations.

3. Proposed Regulatory Framework for Coal Mining

3.1. Objective

The objective of the regulations under consideration would be to reduce the threats to fish, fish habitat and human health from fish consumption by decreasing the level of harmful substances discharged to surface water from coal mine effluent.

3.2. Elements of the Proposed Regulations

Most of the provisions of the regulations for coal mining would be modelled after the *Metal Mining Effluent Regulations* under the *Fisheries Act*. Other provisions are being considered in acknowledgement of the unique challenges associated with existing mines and the effluent (e.g. runoff) from mine waste rock and overburden.

3.2.1. Application

The regulations would apply to all coal mines in Canada discharging effluent which enters, or depositing other mine waste into, water bodies frequented by fish.

Focus question:

Do you agree with the proposed application of the regulations? If not, please explain what other types of activities should be covered by the proposed regulation.

3.2.2. Deleterious substances and effluent discharge limits

Mines would collect and monitor all effluent originating from mines to be discharged through defined Final Discharge Points (FDP). Effluent limits for total selenium, total nitrate and TSS are being considered. For selenium, compliance may be tied to concentrations of selenium in fish tissues and receiving waters. For TSS, a flexibility mechanism that accounts for exceptional precipitation or high flow events may be established for some mines. Additional deleterious substances may be considered for the establishment of effluent compliance limits. The pH of effluent would be within a specified range. Effluent would be required to be non-acutely lethal to fish (e.g., rainbow trout) and invertebrates (e.g., *Daphnia magna*).

Focus question:

Do you agree with the proposal to regulate selenium, nitrate and TSS with national minimum baseline standards? Please provide information that would be helpful in establishing such limits.

3.2.3. Mine waste management

3.2.3.1. New mines and expansion projects

A requirement to segregate mine wastes containing elevated levels of selenium would be established for new mines and expansion projects. Placing mine wastes such as waste rock and overburden in contained areas designed to prevent weathering and mobilization of deleterious substances will reduce selenium releases.

Focus question:

Do you agree with the proposal for new mines and expansion projects? If not, please explain the challenges associated with this proposal and propose alternative approaches.

3.2.3.2. Existing mountain mines with legacy issues

3.2.3.2.1. Receiver-Based Compliance Limits

It is recognized that for some existing mines it may not be feasible to collect all effluent and release it through defined FDPs due to historical mine design and practices. In these cases, requirements for water quality in the receiving environment would be considered.

3.2.3.2.2. Long-Term Selenium Reductions

ECCC is proposing to incorporate a long-term approach to managing selenium releases associated with mines having legacy issues, as described in Section 2. Release reductions required specifically for selenium would be tied to the concentration of selenium in fish tissue in the exposure area. Mines with elevated releases of selenium to the environment would be required to measure selenium concentrations in fish tissue. If the concentration of selenium in fish tissue is above a set trigger, releases of selenium from the mine would need to be reduced. Interim compliance targets may be used to facilitate progressive selenium reductions towards a final, long-term, compliance limit.

Focus question:

Given the long-term challenges associated with legacy issues, do you agree with the proposal for long-term reductions?

- If so, how far into the future do you feel is appropriate to allow mines with legacy issues to come into compliance with a final compliance limit?
- If not, please explain why and propose alternative approaches.

3.2.4. Mine Waste Disposal Areas (i.e., Tailings Impoundment Areas)

Disposal of mine wastes into water bodies frequented by fish would be allowed under certain conditions, but only if it is shown to be the best option for disposal, taking into account environmental, technical, socio-economic and economic factors. Mine wastes include tailings (coal rejects), waste rock, overburden, and refuse. Proponents seeking to dispose of mine wastes into natural water bodies frequented by fish would be required to conduct an assessment of alternatives that conforms to section 2 of the *Guidelines for the Assessment of Alternatives for Mine Waste Disposal*[5], as amended from time to time by ECCC. A fish habitat compensation plan would also be required.

3.2.5. Environmental Effects Monitoring (EEM)

Effluent and water quality monitoring studies, as well as biological monitoring studies would be required. These would include:

[5] Environment Canada. (2011). *Guidelines for the Assessment of Alternatives for Mine Waste Disposal.* Mining and Processing Division. http://ec.gc.ca/Publications/default.asp?lang=En&xml=5ECBCE8B-7E50-49E3-B7AD-8C21A575E873

- effluent characterization;
- sub-lethal toxicity testing of effluent;
- water quality characterization of reference and exposure areas .
- site characterization;
- fish population studies;
- fish tissue studies; and
- benthic invertebrate community studies.

Other studies may be considered.

3.2.6. Reporting requirements

Reporting requirements and the frequency of reporting to ECCC would be established for:

- regulated parameters (i.e., deleterious substances, acute lethality results, pH, etc.);
- substances monitored under the EEM requirements; and
- biological monitoring studies conducted under the EEM requirements.

3.2.7. Closure

Requirements would be established for mines intending to cease commercial operation, and would include conducting final biological monitoring studies for EEM.

4. Next Steps

The key targets for regulatory development are outlined below:

March 31, 2017	Interested parties are welcome to provide feedback on the *Proposed Regulatory Framework for Coal Mining* to ECCC by March 31, 2017 (refer to the additional information below about providing feedback).
2018	Proposed coal mining effluent regulations under the *Fisheries Act* published in *Canada Gazette* Part I for a 60-day comment period.
2019	Final coal mining effluent regulations under the *Fisheries Act* published in *Canada Gazette* Part II.

5. Providing Feedback

We would like to invite all interested parties to provide comments and feedback on the proposed coal mining regulations framework as discussed in this document. Please send your feedback in writing to:

James Arnott
Mining and Processing Division
Environment and Climate Change Canada
Place Vincent Massey
351 Blvd St-Joseph, 18th Floor
Gatineau, Quebec K1A 0H3
E-mail: james.arnott@canada.ca

Proposed Approach for Coal Mining Effluent Regulations

Consultation Document

November 2017

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Proposed Approach for Coal Mining Effluent Regulations

Introduction

Environment and Climate Change Canada (ECCC) has prepared this consultation document to inform interested parties and solicit feedback on the key elements of proposed coal mining effluent regulations under the *Fisheries Act*. An approach for all coal mines is presented in Parts 1-3 of this document; Part 4 proposes an alternate approach for existing mountain coal mines. Interested parties may comment in writing by mail or e-mail (see Part 5 of this document for details)**.**

Background

In January 2017, ECCC shared a consultation document, *Proposed Regulatory Framework for Coal Mining* (the *Framework*), with industry, environmental non-governmental organizations (ENGOs), Indigenous Peoples, provincial governments, and other interested parties. The *Framework* broadly outlined how ECCC plans to regulate coal mining effluent. The objective was to seek feedback from interested parties on the contents of the *Framework*.

Additionally, in February and March 2017, ECCC held a series of consultation sessions in four locations across the country. The objectives of these sessions were to provide participants with contextual information and answer questions about the proposed *Framework*. ECCC also met with a number of Indigenous organizations and their representatives in June 2017.

Comments received at the various consultation sessions and through written submissions, covered a broad range of issues and perspectives and are summarized in ECCC's *National Consultation Report, February to April 2017*. A key theme of the comments was for ECCC to provide a more detailed proposal for consultation prior to publishing the proposed regulations in *Canada Gazette*, Part I (CGI) in 2018. In response, ECCC has developed this more detailed proposal and is seeking feedback from interested parties.

This document is intended to provide an overview of the anticipated content of the proposed regulations. A number of focus questions and information requests have been included throughout the document. ECCC welcomes responses to these questions and other feedback from all interested parties. ECCC will consider all responses received during the consultation period prior to drafting and publishing the proposed regulations in CGI.

The proposed regulations are intended to be published in CGI in fall 2018. This provides another opportunity to provide comments on the proposed regulations. Final regulations would then be developed for publication in the *Canada Gazette*, Part II (CGII) in 2019.

Objective

The objective of the regulations under consideration would be to reduce the threats to fish, fish habitat and human health from fish consumption by decreasing the level of harmful substances discharged to surface water from coal mine effluent.

Part 1. Proposed Approach for All Mines

1.1 Application

The proposed regulations would apply to all coal mines in Canada. A coal mine would become subject to the regulations if it meets the following criterion:

- *Effluent Discharge*: The regulations would apply to any coal mine once it discharges 50 m^3 of effluent in a day from its operations area and deposits effluent in a fish frequented water body, or that may enter a fish frequented water body. This would include mines where the effluent is discharged to land, but enters a water body after being discharged.

It is proposed that the regulations apply to mines and mines under development. The regulations would not apply to mines currently under care and maintenance, unless they resume commercial operation after the regulations come into force. Exploration projects are intended to be excluded from the scope of the proposed regulations until they begin mine development. Closed and abandoned mines would also be excluded from the scope of the proposed regulations unless they resume commercial operation. For strip (or prairie) mines, it is intended that reclaimed areas be excluded from the regulations (see part 3.4.2 of this document for details).

Coal mines in Canada that ECCC has identified as being currently in commercial operation are shown in Annex A.

1.2 Key Definitions

- *Coal Mine*: a coal mine includes all activities related to the extraction, processing and storage of coal that occur at a facility designed or used to produce coal. Extraction would include both surface and underground extraction methods. Processing would include screening, crushing, grinding, washing and other processing of coal that occurs at a coal mining facility (i.e., coal preparation facilities). All of these activities are proposed to be captured by the regulations since they are capable of generating effluent. The definition of a coal mine is proposed to include its operations area.

- *Effluent*: includes liquid discharge from a coal preparation facility, liquid discharge from a mine waste disposal area; water that is pumped from or flows out of any underground works, or open pits; water from a polishing pond, treatment pond, settling pond or water treatment plant or from any mine water treatment facility other than liquid discharge from a sewage treatment facility; liquid discharge from a coal-fired power plant that is combined with any of the above liquid discharge originating from a coal mine; and any seepage or surface runoff that flows through or out of a mine's operations area.

- *Operations Area*: includes an area within which the activities related to the extraction, processing and storage of coal occur or have occurred. This area should include all infrastructure designed or used to extract or process coal, including supporting infrastructure, mine waste management infrastructure (including the mine waste itself),

coal preparation and storage facilities, and cleared or disturbed areas that are adjacent to these areas.

1.3 New Mines and Expansions

It is proposed that the regulations distinguish between existing mines, new mines and expansion projects. Elements of the regulations would contain distinct provisions for existing and new mines, as well as expansions. Together, the provisions for new mines and expansions would support continuous improvement in the management of mine waste while recognizing capital turnover rates and the costs that existing mines could incur to meet new requirements.

- *Existing mines* would refer to mines that are in commercial operation at the time of publication of the final regulations, or that enter commercial operation within 3 years of publication.

- *Expansions* of existing mines would refer to new coal preparation or storage facilities, new open pits or underground mines, new mine waste disposal areas including mine waste piles, or new treatment ponds or facilities. ”New” is intended to refer to infrastructure constructed 3 years or more after publication of the final regulations. Where a new Final Discharge Point (FDP) is constructed at an expansion project, the FDP would be subject to effluent limits for new mines.

- *New mines* would refer to mines that enter commercial operation 3 years or more after publication of the final regulations, including mines that resume commercial operation at least 3 years after publication of the final regulations.

Focus question:

Do you support ECCC’s proposed definition of expansion? If not, please provide information that would be helpful in establishing an alternative definition.

1.4 Deleterious Substances and Effluent Discharge Limits

ECCC is proposing to establish national baseline effluent standards for deleterious substances. It is proposed to regulate total selenium, total nitrate and total suspended solids (TSS). Details about considerations in proposing effluent limits can be found in Annexes B and C.

1.4.1 Key Definitions

- *Final Discharge Point (FDP)*: would refer to an identifiable discharge point of a mine beyond which the operator of the mine no longer exercises control over the quality of the effluent.

- *Grab sample*: would refer to the quantity of undiluted effluent collected at a given point in time.

- *Monthly mean concentration*: would refer to the average value of the concentrations measured in all samples collected from each FDP during each month there was a discharge.

All effluent originating from a mine would be required to be collected and discharged through defined FDPs. Effluent limits are proposed to apply at all FDPs at Canadian coal mines. Mines would be prohibited from combining water with effluent for the purpose of diluting effluent before it is deposited. ECCC would not impose any requirements on the number of FDPs at a mine. Therefore, a mine may have multiple FDPs.

1.4.2 Total Suspended Solids (TSS)

The following effluent limits are being considered for TSS. These limits would apply at all times:

		Existing Mines		***New Mines and Expansions***	
Deleterious Substance	**Unit**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**
TSS	mg/L	35	70	35	70

Testing for TSS in effluent would be required once per week during discharge at all FDPs. Additional detail on testing frequencies can be found in Annex D.

1.4.3 Nitrate

The following effluent limits are being considered for total nitrate. These limits would apply at all times:

		Existing Mines		***New Mines and Expansions***	
Deleterious Substance	**Unit**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**
Total Nitrate	mg-N/L	10	20	3	6

Testing for nitrate in effluent would be required once per week during discharge at all FDPs. The frequency of testing would be reduced to once per calendar quarter at FDPs where effluent concentrations are consistently less than 10% of the proposed monthly mean effluent limit. Additional detail on testing frequencies can be found in Annex D.

1.4.4 Selenium

1.4.4.1 Selenium in Fish Tissue Studies

Existing mines would be required, within 3 years of publication of the final regulations, to conduct a study of the selenium concentration in fish tissue from water frequented by fish that is exposed to effluent. New mines would be required, within 3 years of becoming subject to the regulations, to conduct a study of the selenium concentration in fish tissue from water frequented by fish that is exposed to effluent.

Measurements would be done on whole fish or muscle and, if possible, in female fish ovaries and eggs. Mines would report the concentration of selenium on a dry weight basis in µg/g, in addition to the % moisture content. A selenium in fish tissue study would be required to be conducted every 3 years. Provisions for mines to cease conducting selenium in fish tissue studies are being considered (see section 1.4.4.4.).

Additional requirements are being considered for selenium in fish tissue studies that could include specifications related to the number, size, gender or life stage of specimens to be studied, seasonality requirements for conducting studies, location of study within the area exposed to effluent, as well as other requirements.

Additional information on selenium in fish tissue can be found in Annex C.

1.4.4.2 Selenium Management at Existing Mines

For existing mines ECCC proposes a tiered approach to regulatory compliance that includes fish tissue.

1.4.4.2.1 Key Definitions

- *Baseline limit*: a national, baseline effluent limit that all existing mines must meet, at a minimum, at all FDPs at all times.

- *Triggered limit*: a technology-based effluent limit that must be met at all FDPs that exceed a fish tissue trigger.

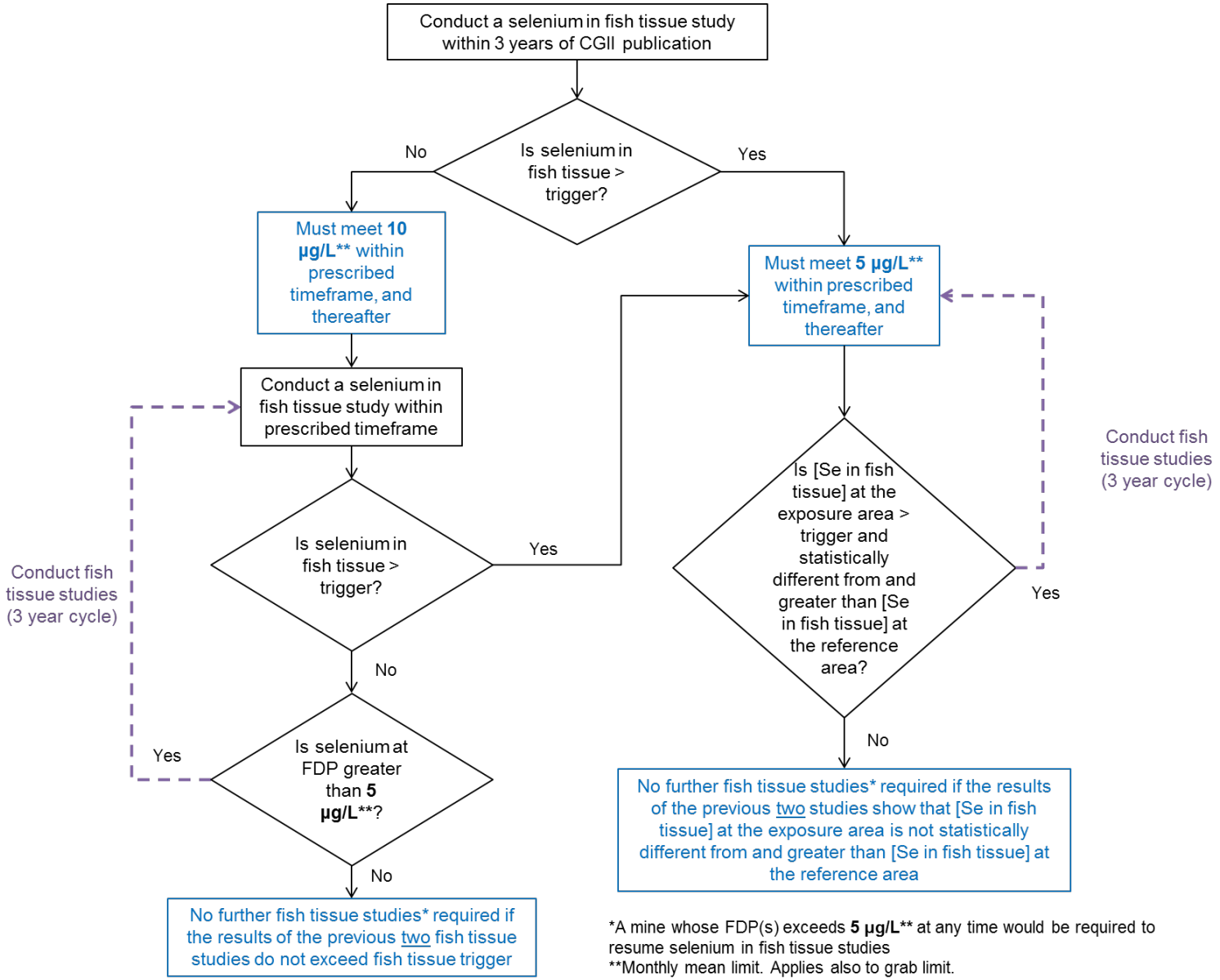
- *Fish tissue trigger*: a concentration of selenium in fish tissue, which, if exceeded, would trigger the requirement for FDPs to meet the triggered limit at all times.

It is proposed that compliance be tied to concentrations of selenium in fish tissues, according to the following approach:

- Selenium concentration would be measured in effluent at all FDPs.
- There would be two sets of effluent limits, a baseline limit and a triggered, technology-based limit.
- All mines must, at a minimum, meet the baseline limit at all FDPs.
- Mines must meet the triggered effluent limit at all FDPs where an exceedance of a selenium in fish tissue trigger occurs in an area exposed to effluent from those FDPs.

- Mines that do not report a selenium in fish tissue concentration within the 3 year timeframe would be required to meet the triggered limit at all FDPs.
- The requirement to meet an effluent limit for selenium would come into force 6 years following CGII publication.
- If, at a later date, a mine becomes required to meet the triggered limit, that mine would then have 3 years to comply with that limit.
- FDPs at a mine required to meet the triggered limit would continue to be subject to the triggered limit thereafter.

The proposed selenium management approach for existing mines is described in the following diagram:



*A mine whose FDP(s) exceeds **5 µg/L**** at any time would be required to resume selenium in fish tissue studies
**Monthly mean limit. Applies also to grab limit.

The following effluent limits and fish tissue triggers are being considered for selenium[1]:

Existing Mines	***Effluent***				***Fish Tissue***
	Baseline Limit		**Limit triggered by fish tissue study result**		
Deleterious Substance	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**	**Trigger for reductions from *Baseline Limit* to *Triggered Limit***
Unit	µg/L				µg/g dry weight
Total Selenium	10	20	5	10	2.9 (whole body and muscle); 11.8 (egg/ovary)

1.4.4.3 New Mines and Expansions

For new mines and expansions, a technology-based effluent limit for selenium is proposed. The following effluent limits are being considered for total selenium:

Selenium Effluent Limits: New Mines and Expansions			
Deleterious Substance	**Unit**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**
Total Selenium	µg/L	5	10

1.4.4.4 Testing Frequency for Selenium in Effluent and Fish Tissue

Testing for selenium in effluent for new and existing mines would be required once per week during discharge at all FDPs. The frequency of testing would be reduced to once per calendar quarter at FDPs where effluent concentrations of selenium are consistently less than 10% of the proposed monthly mean effluent limit. Additional detail on testing frequencies can be found in Annex D.

[1] It is proposed that the trigger for reduction in effluent concentration be based on a Predicted No-Effect Concentration (PNEC) for selenium in fish tissue. The PNEC was established by ECCC and Health Canada in the draft screening assessment report for selenium and its compounds, published in July 2015 in *Canada Gazette*, Part I. The PNEC may be subject to change with publication of the final screening assessment report for selenium and its compounds. It is proposed that the fish tissue trigger align with the PNEC in the final screening assessment report once it is published. In the absence of a PNEC for muscle tissue, the PNEC for whole body would be used

There are two scenarios under which a mine would no longer be required to conduct a selenium in fish tissue study:

1) If a mine meets the triggered limit at all FDPs and if the results of the 2 previous consecutive studies show that the concentration of selenium in fish tissue is less than the fish tissue trigger in an area exposed to effluent.

2) In the event of a fish tissue trigger exceedance, if a mine meets the triggered limit at all FDPs and if results of the previous two studies show that the concentration of selenium in fish tissue collected from a sample in the area exposed to effluent is not greater than and not statistically different from that of a sample collected in an area that is not exposed to effluent.

A mine that exceeds the proposed triggered effluent limit for selenium would be required to resume selenium in fish tissue studies.

Focus question:

Do you support ECCC's proposed effluent limits and triggers for total selenium, total nitrate and TSS? Is there any additional information that ECCC should consider for establishing limits for existing or new mines and expansions?

Do you support ECCC's proposal to require more stringent effluent limits for new mines and expansions of existing mines?

1.5 Non-Acute Lethality Requirements

Effluent would be required to be non-acutely lethal to fish and invertebrates. Acutely lethal would mean that undiluted effluent kills more than 50% of test organisms[2] subjected to it for a specified period of time, based on a grab sample. If a test results in an acute lethality failure, the owner or operator of a mine would be required to identify and report the cause of the failure and indicate the remedial measures planned or implemented in response to the failure. A mine would be non-compliant with the regulations if it failed an acute lethality test.

Acute lethality testing would be required once per month for both the fish and invertebrate species at all FDPs. The frequency of testing for each species would be reduced to once per calendar quarter at FDPs where effluents are non-acutely lethal for 12 consecutive months for that species. Similarly, failed tests for a given species would increase testing frequency by testing twice per month for that species. A FDP required to increase testing frequency could return to testing once per month once 3 consecutive tests are non-acutely lethal. Additional detail on testing frequencies can be found in Annex D.

1.5.1 Rainbow Trout

ECCC proposes that the requirement for effluent to be non-acutely lethal to fish be met by passing an acute lethality test of effluent to rainbow trout (Reference Method EPS 1/RM/13).

[2]Acute lethality tests are conducted on laboratory test organisms. Test organisms would not be taken from the vicinity of a mine to meet this requirement.

1.5.2 *Daphnia Magna*

ECCC proposes that the requirement for effluent to be non-acutely lethal to invertebrates be met by passing an acute lethality test of effluent to *Daphnia magna* (Reference Method EPS 1/RM/14).

1.5.3 Alternate Marine Species

The proposed regulations would also add alternative marine species to test for non-acute lethality in scenarios where saline effluent is being released into marine receiving environments.

- For rainbow trout, the alternate marine species would be the three-spined stickleback. The non-acute lethality tests would be used when the salinity value of effluent is greater than 10 parts per thousand. The test would be carried out according to method EPS 1/RM/10, 2nd Edition.

- For *Daphnia magna*, the alternate marine species would be *Acartia tonsa.* The non-acute lethality tests would be used when the salinity value of the effluent is greater than 4 parts per thousand; a test method is currently under development.

1.6 pH range

ECCC proposes a range of 6.0 – 9.5 for pH for Canadian coal mine effluents. This range of pH would be maintained at all times, based on a grab sample, and be measured at all FDPs. Testing for pH in effluent would be required once per week during discharge at all FDPs. Additional detail on testing frequencies can be found in Annex D.

1.7 Effluent Monitoring Conditions

1.7.1 Volume of Effluent

ECCC proposes that the owner or operator of a mine record a total monthly volume of effluent discharged from each FDP for each month where there is an effluent discharge. The total monthly volume of effluent could either be determined on the basis of the flow rates or by using a monitoring system that provides a continuous measure of the volume of effluent deposited.

1.7.2 Loading of Deleterious Substances

The proposed regulations would require the owner or operator of a mine to record the loading of total selenium, total nitrate, and TSS discharged through each FDP. This recording would be done on a monthly basis.

1.8 Mine Waste Disposal Areas

Mine waste includes tailings (coal rejects), waste rock and overburden. Disposal of mine waste into water bodies frequented by fish would be allowed under certain conditions. This would be similar to *the Metal Mining Effluent Regulations.* Proponents seeking to dispose of mine wastes into natural water bodies frequented by fish would be required to conduct an assessment of alternatives that conforms to section 2 of the *Guidelines for the Assessment of Alternatives for Mine Waste Disposal* (Environment Canada, 2011), as amended from time to time by ECCC. A fish habitat compensation plan would also be required.

1.9 Emergency Response Plan

An Emergency Response Plan (ERP) is a plan that describes the actions a mine would take in the event of an environmental emergency that causes the discharge of a deleterious substance. ECCC proposes that the owner or operator of a mine prepare an ERP that describes the measures to be taken to prevent, prepare for, respond to and recover from any situation or impending situation which the owner or operator of a mine is unable to control or manage, that results or may result in the deposit of a deleterious substance, as defined under the *Fisheries Act*. The requirements for the ERP would be intended to align with the *Environmental Emergency Regulations*, where practicable. The proposed requirements would require the owner or operator of a mine to:

- keep the ERP and any updates readily available at the mine site so they are accessible to the individuals responsible for carrying out the plan in case of an emergency;
- update and test the ERP on an annual basis; and
- prepare and keep a record summarizing the tests of the ERP and any subsequent amendments to the ERP.

Part 2. Environmental Effects Monitoring (EEM)

It is proposed that all coal mines would be required to conduct Environmental Effects Monitoring (EEM) as a condition governing the authority to deposit effluent to the receiving environment. EEM studies are designed to detect and measure changes in aquatic ecosystems receiving effluent. EEM is an iterative system of monitoring and interpretation phases that is used to assess the adequacy of the regulations, by evaluating the effects of effluents on fish, fish habitat and the use of fisheries resources by humans.

EEM studies would consist of:

- effluent and water quality monitoring studies consisting of
  - effluent characterization;
  - water quality monitoring;
  - sublethal toxicity testing of effluent; and

- biological monitoring studies in the aquatic receiving environment to determine if effluent is affecting fish, fish habitat, or the use of fisheries resources, and if impacts are occurring, the cause of those impacts and determining solutions for eliminating impacts. Coal mines would need to consider all relevant data, analysis, scientific information, as well as Indigenous Knowledge for the purpose of meeting the EEM requirements.

Additional detail on EEM studies is provided in Annex F.

2.1 Key Definitions

- *Exposure area*: means all fish habitat and waters frequented by fish that are exposed to effluent.
- *Reference area:* means water frequented by fish that is not exposed to effluent and that has fish habitat that, as far as practicable, is most similar to that of the exposure area.
- *Sampling area*: means the area within a reference or exposure area where representative samples are collected.

2.2 Effluent Characterization

Effluent characterization would be conducted by analyzing a sample of effluent at each FDP and recording the required parameters listed below. In addition to these parameters, coal mines would also be required to monitor calcite formation by calculating a calcium carbonate saturation index based on effluent characterization measurements. Effluent characterization would be required once per calendar quarter and not less than one month apart. Analytical requirements, including method detection limits, accuracy and precision would be defined in the regulations (see part 3.1.2).

Proposed effluent characterization parameters:

- Hardness
- Alkalinity
- Electrical Conductivity
- Temperature
- Aluminum

- Ammonia
- Arsenic
- Calcium
- Cadmium
- Carbon dioxide, dissolved
- Chromium
- Cobalt
- Copper
- Lead
- Iron
- Mercury
- Manganese
- Nickel
- Nitrite
- Phosphorus
- Sulphate
- Total Dissolved Solids
- Uranium
- Zinc

2.3 Water Quality Monitoring

Samples for water quality monitoring would be collected from the exposure area surrounding the point of entry of the effluent into water from each FDP and the related reference areas, as well as from the sampling areas selected for biological monitoring studies. Water quality monitoring would be conducted once per calendar quarter and during biological monitoring studies. The substances measured for effluent characterization (Part 2.1) would be measured and recorded in addition to the deleterious substances set out in Part 1.4. Dissolved oxygen concentrations would be recorded for all samples. In the case of effluent deposited into freshwater, the pH, hardness, electrical conductivity and alkalinity would be recorded. In the case of effluent deposited into estuarine waters, salinity would be measured in addition to the parameters recorded in freshwater. In the case of effluent deposited into marine waters, only the salinity would be recorded. Mines would also be required to monitor calcite formation by calculating a calcium carbonate saturation index based on water quality measurements.

2.4 Sublethal Toxicity Testing of Effluent

Sublethal toxicity (SLT) testing would be conducted on the effluent from a mine's FDP that has the most potential adverse environmental impact. This testing monitors effluent quality by measuring survival, growth and/or reproduction endpoints in marine or freshwater organisms in a controlled laboratory environment. In the case of effluent deposited into marine, estuarine and freshwater environments, SLT testing would be required on a fish species, an invertebrate species and an algal species, and an additional plant species test would be required for freshwater environments. Tests would be conducted according to the methods referred to in the regulations (for additional detail, see Annex F).

ECCC is proposing to require mines to conduct SLT testing using all required tests twice per calendar year for the first three years. Using the test results from the first three years, mines would then be required to determine the most responsive test. In all subsequent years, mines would be required to conduct the most responsive test four times a year.

2.5 Biological Monitoring Studies

The biological monitoring study component of EEM studies would be conducted every three to six years. The requirements for each study would be dependent on the results of previous studies. Conducting and reporting EEM biological studies would involve submitting a study design, which includes a site characterization (see Annex F for additional information), conducting biological monitoring, conducting data assessment, and submitting an interpretive report.

Biological monitoring studies would consist of:

- a fish population study to assess fish health,
- a benthic invertebrate community study to assess fish habitat, and
- a mercury fish tissue study to assess the usability of fisheries resources by humans,

The table below presents the three biological monitoring study types, as well as the criteria which would trigger the requirement to conduct each study.

Table 1. Biological monitoring study types and associated triggers.

Study Type	**Trigger**
Fish Population	Effluent concentration in the exposure area is greater than 1% beyond 250 m from FDP
Fish Habitat (Benthic Invertebrate Community)	Effluent concentration in the exposure area is greater than 1% beyond 100 m from FDP
Mercury in Fish Tissue	Effluent characterization reveals an annual mean concentration of total mercury that is greater or equal to 0.10 µg/L

Mines would also be required to report the presence of any fish or invertebrate lesions, tumours, parasites or other abnormalities.

Biological monitoring studies would require sampling of the fish population and the benthic invertebrate community in areas exposed to effluent and in reference areas to assess effluent effects on specific indicators. The fish population study indicators would include age, weight at age, relative gonad size, relative liver size, and weight at length (condition). The benthic invertebrate community indicators would include density, evenness index, taxa richness and the similarity index. If a comparison between reference and exposure areas for a given indicator reveals statistical differences equal to or greater than the predefined critical effect size[3], further studies would need to be conducted by performing additional monitoring to investigate potential causes of the effects and solutions to mitigate these effects; Environment Canada 2010, Environment Canada 2012.

[3]A critical effect size (CES) is a threshold that indicates that an effect may be of high risk.

2.6 Non-discharging Facilities

If a facility has not discharged effluent since the previous biological monitoring study was conducted (e.g., a period of 36 consecutive months without discharge) the mine would not be required to conduct: the subsequent biological monitoring studies, SLT, effluent characterization and water quality monitoring. However, the EEM requirements would resume when the facility continues effluent discharge.

Part 3. Testing, Reporting, Closure Requirements, Public Availability of Information and Coming Into Force

3.1 Testing

Testing and reporting would be required in effluent for deleterious substances (described in part 1.4), non-acute lethality (described in part 1.5), pH range (described in part 1.6) and other information concerning effluent to be measured. Testing and reporting would also be required under EEM (described in part 2). A summary of testing requirements is located in Annex D.

3.1.1 Extension of Time to Collect Samples

ECCC proposes that the testing frequencies for collecting samples of effluent be extended if unforeseen circumstances cause safety concerns or access problems for the collection of samples. This extension would be conditional on the owner or operator of a mine notifying ECCC of the circumstances and when they expect to collect samples, as well as samples being collected without delay when the circumstances permit.

3.1.2 Analytical Requirements

The regulations would establish analytical requirements for the testing of effluent at all FDPs, water quality in the reference and exposure areas, and fish tissue. These requirements would include Method Detection Limits for substances, as well as precision and accuracy requirements. Proposed analytical requirements are outlined in Annex G. Additional requirements may be established for conducting selenium in fish tissue studies.

The regulations would establish effluent limits based on grab samples and monthly mean concentrations, and non-acute lethality requirements based on grab samples.

Focus question:

Effluent limits have been proposed on a grab and monthly mean basis. Another sampling technique, not currently proposed, is a composite sample. A composite sample is a mixture of grab samples taken at different times or locations over a defined period of time. Samples are pooled together to provide one sample. Composite sampling may also be taken by collecting a sample continuously over a defined period of time.

Do you support ECCC's proposal to establish requirements for effluent limits based only on grab samples and monthly means? If not, please explain.

3.2 Reporting and Recordkeeping

Reporting requirements and a defined frequency of reporting to ECCC would be established for the provisions of the regulations, including:

- identifying information about the owner or operator of the mine, including the name and address of both the owner and operator, and the parent company of the mine. This information would be submitted when a mine becomes subject to the regulations, when ownership of a mine in transferred, or any time this information changes;

- information pertaining to each FDP, including a general description, plans and specifications and its location, how it is designed and maintained, and the name of the receiving body of water;
- results of testing (e.g., deleterious substances, acute lethality testing results, pH);
- monitoring equipment information, including a description of the equipment and the results of calibration tests of the equipment;
- EEM requirements (effluent characterization, sublethal toxicity, water quality monitoring and biological monitoring studies); and
- Emergency Response Plans.

Mines may be required to keep records of the information reported. Additional requirements for reporting and recordkeeping may also be established.

3.3 Public Availability of Information

Information related to deleterious substance concentrations in effluent, pH, acute lethality, selenium in fish tissue, volume of effluent at all FDPs, as well as EEM would be made publicly available and accessible.

3.4 Closure

3.4.1 Key Definitions

- *Reclaimed Area*: means the surface area of a strip mine which has been re-contoured and on which revegetation (specifically, seeding or planting) work has been completed, and the surface area is no longer required for commercial operation.

- *Strip Mine*: a mine that is worked from the earth's surface by the stripping of topsoil and overburden in long cuts or strips in areas with flat terrain.

3.4.2 Reclaimed Areas at Strip Mines

ECCC proposes that reclaimed areas of strip mines be eligible to be excluded from the regulations.

Areas of land at strip mines that have already been reclaimed and are no longer depositing effluent are intended to be excluded from the regulations. For areas that become reclaimed after publication of the regulations, in order to be excluded from the regulations, the mine would be required to:

- provide written notice of the intention for the reclaimed area to become excluded from the regulations, where the written notice includes identification of the reclaimed area within the operations area;
- provide written notice that revegetation of the reclaimed area has been completed; and
- cease depositing effluent from the reclaimed area for a continuous period of 3 years.

Additional requirements for reclaimed areas are being considered. Once a reclaimed area of a strip mine has completed all of the above requirements, the area would be excluded from the

regulations. Despite ECCC's proposal for reclaimed land, effluent management infrastructure at strip mines (e.g., effluent from end pit lakes) would not be eligible for exclusion from the regulations.

Focus Question:

Do you support ECCC's approach for reclaimed areas at strip mines?

To further develop this approach, ECCC is seeking information related to progressive reclamation practices at strip (prairie) mines. Specifically, ECCC would like to better understand:

- how pre- and post-reclamation areas are differentiated in provincial coal mining regulations or permits;
- provincial requirements that mines must meet in order to become officially recognized as having reclaimed (portions of) their operations areas;
- time between reclamation activities (re-contouring, revegetation) and official recognition that an area is reclaimed;
- provincial requirements imposed on effluent during and following the reclamation process, including requirements for biological monitoring studies;
- effluent management infrastructure in place following reclamation (e.g., end pit lakes).

3.5 Coming into Force

The proposed regulations are expected to be published in the *Canada Gazette*, Part I (CGI) in 2018. Publication of the final regulations in *Canada Gazette*, Part II (CGII) would likely occur 12 to 18 months following CGI.

Most provisions of the regulations would come into force 3 years following CGII publication to allow time for facilities to meet the requirements. These include the requirement to collect and discharge all effluent through one or more FDPs, effluent limits for nitrate and TSS, the requirement for effluent to be within a defined pH range, and the requirement for effluent to be non-acutely lethal.

For selenium, the requirement to meet an effluent limit would come into force 6 years following CGII publication. A selenium in fish tissue study would be required within 3 years following CGII publication.

EEM provisions would come into force six (6) months following CGII publication.

Part 4. Existing Mountain Mines with Non-Point Source Discharge

Due to historical mine design and operational practices, an alternative regulatory approach is proposed to manage non-point source effluent for some existing mountain mines. The approach would include establishing a limit for deleterious substances in the receiving environment to be achieved at a specified location away from the point of entry of the non-point effluent.

This approach would not apply to mines that meet the definition of new mines or mine expansions.

4.1 Key Definitions

- *Environmental Compliance Point (ECP)*: means at least one point within the exposure area downstream of effluent deposited by a mine that is reflective of the maximum effluent contribution to the exposure area.

- *Mountain Mine*: means a surface coal mine where the coal seam or seams, prior to extraction, runs through a mountain, ridge or hill.

- *Non-Point Source Effluent*: means effluent that cannot be collected and discharged through a FDP.

4.2 Application process

ECCC proposes that the authorization for non-point source effluent would apply to the owner or operator of a mine if certain criteria are met concerning the nature of the non-point source effluent.

An application to the Minister of the Environment would be required. The deadline for submitting an application for such an authorization would be 6 months following publication of the regulations in CGII. Following this 6-month period, no mine would be eligible to apply for this authorization. The application would include, at a minimum, the following information:

- A detailed description of the mine, including:
  - Size of the mine, in square kilometres;
  - Location of the current operations area of the mine;
  - Site plan, which identifies:
    - the name and location of all known FDPs at the mine;
    - the name and location of all water bodies within the operations area, including identification of which water bodies are fish frequented;
    - the location of all mine waste; and
    - the location of all monitoring (including environmental effects monitoring) and/or compliance sites other than FDPs, and identification of all parameters and media monitored at each site;

- Description of the local geography, including:
  - topography, e.g., the elevation range of the mine; and
  - climate and hydrology.

- Effluent management practices, including:
  - A description of the effluent treatment systems in place and planned, with information such as design rated and nominal treatment capacities;
  - Volume of effluent treated at each FDP;
  - Identification of all non-point sources of effluent;
  - Effluent plume delineation conducted according to ECCC's *Revised Technical Guidance on How to Conduct Effluent Plume Delineation Studies*[4] and outlining locations that are reflective of the maximum effluent contribution to the exposure area;
  - Volume of non-point source effluent;
  - Volume of clean water diverted around the mine; and
  - A description of effluent (including non-point source effluent) authorized to be deposited by a provincial jurisdiction.

- Historical and current mine waste management practices, including:
  - Proximity of mine waste to water bodies; and
  - Size of mine waste areas (volume and area).

- A proposal for locations of environmental compliance points (ECPs), taking into consideration the effluent plume delineation and locations that are reflective of the maximum effluent contribution to the exposure area. The proposal should include a detailed analysis of all locations considered, and rationale for the ECPs proposed.

Additional information may be required.

4.3 Authorization

ECCC would review all applications, and may, upon receipt of an application, take the following action:

- Authorize a mine to deposit non-point source effluent from a mine; however, this would not be an authorization to stop using current FDPs; or
- Reject an application to authorize a mine to deposit non-point source effluent, in which case a mine would be required to discharge effluent through FDPs.

The authorization would be based on an approach that considers the surface area of current waste rock piles, the quantity of effluent currently not collected, and the distance of the nearest waste rock piles to a fish-bearing water body. To determine whether or not to authorize the deposit of non-point source effluent, ECCC proposes to establish a system of points that takes into account the current conditions at a mine. The proposed system is illustrated below:

[4] National Environmental Effects Monitoring Office. National Water Research Institute. Environment Canada (March 2003). https://www.ec.gc.ca/esee-eem/E93AE5BC-89C6-4701-AED7-FEF2A4AC2D7A/Plume_Delineation_Report_e.pdf

CONDITION	CRITERIA	AUTHORIZATION POINTS
Surface area of current waste rock piles (km^2)	< 1 km^2	0
	1 - 5 km^2	5
	>5 to <10 km^2	10
	≥ 10 km^2	20
Quantity of effluent not collected (m^3/year)	< 10,000 m^3/year	0
	10,000 - 250,000 m^3/year	5
	>250,000 to <500,000 m^3/year	10
	≥ 500,000 m^3/year	20
Distance of waste rock piles to nearest fish-bearing waterbody (m)	≥ 33 m	0
	>10 to <33 m	5
	1 - 10 m	10
	< 1 m	20

A mine would receive an authorization with a total of 45 authorization points or more. Conditions that current FDPs continue to be used would be included. In addition, the authorization would establish the location of the ECP(s).

4.4 Regulatory Requirements

The authorization would impose conditions on mine owners or operators associated with the deposit of non-point source effluent. All provisions proposed in Parts 1-3[5] of this document would also apply to mines who receive an authorization to deposit non-point source effluent, unless otherwise stated in Part 4 of this document. In particular, for TSS, nitrate, selenium and pH, a receiver-based compliance approach is being considered. Additional conditions would also apply to mines authorized to deposit non-point source effluent, as described below.

4.5 Environmental Compliance Points

The discharge of effluent from non-point sources means that establishing conditions associated with FDPs may not capture all effluent discharged from a mine. Therefore, ECCC proposes to establish Environmental Compliance Points (ECPs), in the receiving environment downstream of the mine. The location of ECPs would be established in the authorization to deposit non-point

[5]Mountain mines would not be eligible for provisions related to progressive reclamation as they would not meet the definition of strip mine.

source effluent and would be based on the information provided in the application, including effluent plume delineation.

The intent of establishing ECPs would be to manage all effluent coming from a mine. Therefore, more than one ECP may be established at each mine, e.g., where a mine discharges into multiple receiving environments. Additionally, more than one ECP may be established in the same receiving environment.

It is acknowledged that as mining progresses over time the location of ECPs could be subject to change. A mine would be required to submit information to ECCC periodically to support the location of its ECP.

Focus questions:

To further develop this approach, ECCC is seeking additional information:

- How many environmental compliance points should be required at a mine authorized to discharge non-point source effluent?
- For current provincial compliance points in the receiving environment, if they exist, how was the location determined?

4.6 Management of Effluent and Deleterious Substances

Additional conditions would also apply only to mines with an authorization to deposit non-point source effluent, as described below.

4.6.1 TSS

ECCC is considering that all effluent discharged through FDPs be required to comply with the proposed TSS effluent limit at all FDPs, as described in part 1.4.2.

In addition, mines authorized to discharge non-point source effluent would be required to meet a TSS limit at all ECPs. TSS at the ECP would not exceed a 10% change above the TSS concentration in the reference area of a mine at any time.

The approach is represented by the following example:

- A mine has the authorization to deposit non-point source effluent, at the end of 2019, and its ECP has been determined
- A mine measures a grab sample in its Reference Area having a TSS concentration of 50 mg/L
- The grab compliance limit at the ECP would be 50 + (50 x 10%) = 55 mg/L.

It is proposed that all samples collected in the reference area and at the ECP be taken no more than 24 hours apart.

4.6.2 Selenium

For mines authorized to deposit non-point source effluent, ECCC is proposing to establish effluent limits for selenium at FDPs only if there is no non-point source effluent discharged to that water body (i.e., no downstream ECP).

ECCC is considering a receiver-based approach to compliance for selenium at each ECP, including a series of increasingly stringent compliance limits every 5 years with a goal of meeting a selenium concentration of 2 µg/L in the local receiving water by 2050. This approach takes into consideration the lag time between the installation of treatment and other mitigation measures (e.g. clean water diversion, reclamation) and reductions in selenium concentration in the receiving environment. The proposed approach is as follows:

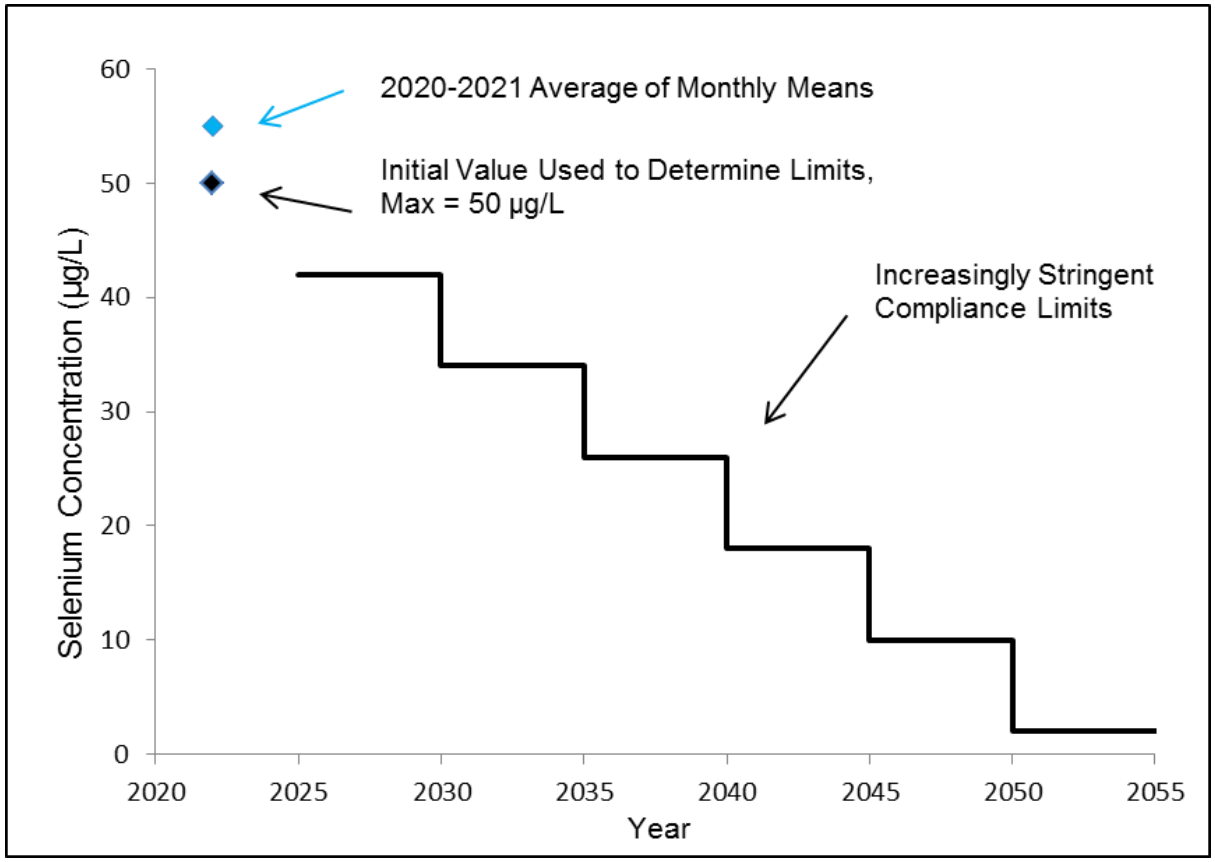
- Starting one year after publication of the regulations in CGII, the mine would determine its monthly mean concentration of selenium at each ECP for two years.
- The average of these monthly mean selenium concentrations would be considered as the mine's 'current performance' at that ECP.
- Within the next three years, a mine would be required to reduce the selenium concentrations by 8 µg/L from the current performance or from 50 µg/L (whichever is lower) at the ECP.
- A reduction in selenium concentration of 8 µg/L every 5 years, thereafter, would repeat for the next 25 years or until the monthly mean concentration at the ECP is less than or equal to 2 µg/L.
- The concentration of selenium would be required to be measured once per week at the ECP, with no opportunity for reducing frequency.
- Compliance would be based on a monthly mean limit and include a grab limit, which would be twice the monthly mean limit.

The approach is represented by the following example:

- The regulation is published in CGII in 2019
- A mine has the authorization to deposit non-point source effluent, at the end of 2019, and its ECP location has been determined
- From 2020 – 2021, the mine collects weekly selenium concentration data at its ECP
- Its current performance (average of all monthly mean selenium concentrations for two years) at its ECP is 55 µg/L
- Its current performance is > than 50 µg/L. Therefore, 50 µg/L is used as the starting point to determine the compliance limit at that ECP.
- The compliance limits would be as follows:

Timeframe	Determination of compliance limit		Compliance Limit (Monthly Mean)	Compliance Limit (Grab)
			µg/L	µg/L
2025 – 2029	8 µg/L reduction from initial concentration	= 50 µg/L - 8 µg/L	42	84
2030 – 2034	8 µg/L reduction from previous limit	= 42 µg/L - 8 µg/L	34	68
2035 - 2039	8 µg/L reduction from previous limit	= 34 µg/L - 8 µg/L	26	52
2040 – 2044	8 µg/L reduction from previous limit	= 26 µg/L - 8 µg/L	18	36
2045 - 2049	8 µg/L reduction from previous limit	= 18 µg/L - 8 µg/L	10	20
2050 onward	8 µg/L reduction from previous limit	= 10 µg/L - 8 µg/L	2	4

In this example, the following diagram represents the compliance limits:



4.6.3 Nitrate

For mines authorized to deposit non-point source effluent, ECCC is proposing to establish effluent limits for nitrate at FDPs only if there is no non-point source effluent discharged to that water body (i.e., no downstream ECP).

ECCC is considering a receiver-based approach to compliance for nitrate at each ECP, including a series of increasingly stringent compliance limits every 5 years with a goal of meeting 3 mg-N/L in the local receiving water. This approach takes into consideration the lag time between the installation of treatment and other mitigation measures and reductions in nitrate concentration in the receiving environment.

The proposed approach would follow the approach proposed for selenium, with an initial reduction of 2.2 mg-N/L from the current performance or from 16 mg-N/L (whichever is lower) at the ECP. The reduction would be followed by a 2.2 mg-N/L reduction every 5 years thereafter until 2050, or until the monthly mean concentration at the ECP is less than or equal to 3 mg-N/L. The timelines for establishing 'current performance' data, as well as timing of compliance limits, would align with those proposed for selenium.

4.6.4 pH

ECCC is considering that all effluent discharged through FDPs be required to comply with the proposed pH range at all FDPs, as described in part 1.6.

In addition, mines authorized to discharge non-point source effluent would be required to meet a pH range at all ECPs of between 6.5 and 9.0 at all times.

4.6.5 Non-Acute Lethality Requirements

ECCC proposes that all effluent discharged through FDPs be required to comply with the proposed non-acute lethality requirements at all FDPs, as described in part 1.5. In addition, all non-point source effluent would be required to be non-acutely lethal.

Focus question:

Do you support ECCC's proposed approach for mines authorized to discharge non-point source effluent?

4.7 Additional Conditions

All provisions described in this document as applying at FDPs, including proposed testing, reporting, analytical and administrative requirements would also apply at all ECPs. Analytical requirements (e.g., method detection limits) applying at the ECPs may be more stringent for mines authorized to discharge non-point source effluent than analytical requirements proposed for all mines.

ECPs would not be eligible for reduced frequency of testing for deleterious substances and pH. Testing for deleterious substances and pH would occur on a weekly basis. Monitoring the flow and calculation of loading of deleterious substances at each ECP would also be conducted on a

weekly basis. Mines would also be required to estimate the volume of non-point source effluent being deposited from the mine on a periodic basis. Additional detail on testing frequency requirements can be found in Annex E.

4.8 Environmental Effects Monitoring

All proposed EEM requirements in Part 2 of this document would also apply to existing mountain mines authorized to deposit non-point source effluent. However, the EEM approach would include additional requirements including increased frequency and additional sampling areas, as described below.

A table summarizing the required EEM studies for mines authorized to deposit non-point source effluent is provided in Annex F.

4.8.1 Key Definitions

- *Bank length:* means the length of the water body which receives effluent from the mine.

4.8.2 Environmental Monitoring Point

The discharge of effluent from non-point sources means that standard EEM methods for characterizing reference and exposure areas around a FDP may not capture all effluent discharged from a mine. Therefore, ECCC proposes to establish Environmental Monitoring Points (EMPs) in the receiving environment.

A first EMP would be located in the receiving water body where effluent (point source or non-point source) is initially detected. A second EMP would be required for mines that have a bank length that is equal to or greater than 20 km that receives effluent from the mine. This second EMP would be located between the first EMP and the ECP. The second EMP would be selected by the mine and would represent the area that is most adversely affected by the point-source and non-point source discharges.

4.8.3 Effluent Characterization and Water Quality Monitoring

As described in Part 2.2, water quality monitoring includes monitoring for all effluent characterization parameters, as well as monitoring of deleterious substances and pH. Coal mines authorized to deposit non-point source effluent would conduct effluent characterization and water quality monitoring as described in Parts 2.1 and 2.2.

In addition, these mines would also be required to sample water at all ECPs and EMPs, as well as the area surrounding the point of entry of effluent from the FDPs, and characterize them according to the effluent characterization parameters. Effluent characterization and water quality monitoring would be required monthly. Sampling at ECPs and EMPs would coincide with SLT and ECP monitoring for deleterious substances and pH. Water quality monitoring would also be required during biological monitoring studies.

4.8.4 Sublethal Toxicity Testing of Effluent

Sublethal toxicity (SLT) testing would be conducted as per Part 2.3. In addition, mines authorized to deposit non-point source effluent would also be required to conduct SLT at the most impacted ECP.

4.8.5 Biological Monitoring Studies

Mines authorized to deposit non-point source effluent would be required to conduct all biological monitoring study components (site characterization, fish population study, a mercury is fish tissue study and a benthic invertebrate community study) as outlined in Part 2.4. There would be no criteria that would trigger the requirement to conduct these studies. Mines would be required to conduct biological monitoring studies in reference and exposure areas, with sampling areas at ECPs and EMPs. Mines with a bank length equal to or greater than 20 km would be required to perform additional sampling at a second EMP located between their first EMP and the ECP.

4.9 Coming Into Force

The ability to apply for an authorization to deposit non-point source effluent would come into force at the time of CGII publication and would expire 6 months following CGII publication.

All provisions applying at each ECP, e.g., compliance limits, the requirement to be within a defined pH range; testing, reporting, analytical, and administrative requirements would come into force immediately upon being authorized to deposit non-point source effluent.

4.10 Summary

The following table compares the requirements proposed for mines who receive an authorization to deposit non-point source effluent and all other mines. Additionally, Annex H presents a conceptual location of FDPs, ECPs, reference areas and exposure areas.

Proposed Requirement	Mines Authorized to Discharge non-point source effluent	All other mines
Non-Acute Lethality	All Final Discharge points (FDPs) and All non-point source effluent	All FDPs
pH range	All FDPs and All Environmental Compliance Points (ECPs)	All FDPs
Monitor volume to within +/- 15%		
Limit for TSS		
Limit for nitrate	All ECPs	
Limit for selenium		
Study of selenium in fish tissue	Exposure Area	Exposure Area
Environmental Effects Monitoring (sublethal toxicity testing)	1 FDP, with potential for most adverse environmental impact and 1 ECP, with potential for most adverse environmental impact	1 FDP, with potential for most adverse environmental impact
Environmental Effects Monitoring (effluent characterization and water quality monitoring)	All FDPs All ECPs All EMPs Reference Area and Exposure Area	All FDPs Reference Area and Exposure Area
Environmental Effects Monitoring (biological monitoring studies):	Reference Areas and Exposure Areas (EMPs + ECPs)	Reference Area and Exposure Area
· Site characterization		
· Same core endpoints for fish and benthos		
· Two consecutive studies to confirm absence or presence of effects		
· Investigation of cause for confirmed effects		
· Investigation of solutions to mitigate effects		
· Final study upon notice that mine will be closing		
· Exemption from fish and benthos if effluent <1% at designated distance	None	Eligible for exemption
· Exemption from Mercury in Fish Tissue if concentration of total mercury is < 0.10 µg/L	None	Eligible for exemption

Part 5. Next Steps

The key targets for regulatory development are outlined below:

January 31, 2018	Interested parties are welcome to provide feedback on the *Proposed Approach for Coal Mining Effluent Regulations* to ECCC by January 31, 2018 (refer to the additional information below about providing feedback).
2018	Proposed coal mining effluent regulations under the *Fisheries Act* published in *Canada Gazette* Part I for a 60-day comment period.
2019	Final coal mining effluent regulations under the *Fisheries Act* published in *Canada Gazette* Part II.

Providing Feedback

We would like to invite all interested parties to provide comments and feedback on the proposed approach for coal mining effluent regulations as discussed in this document. Please send your feedback in writing to:

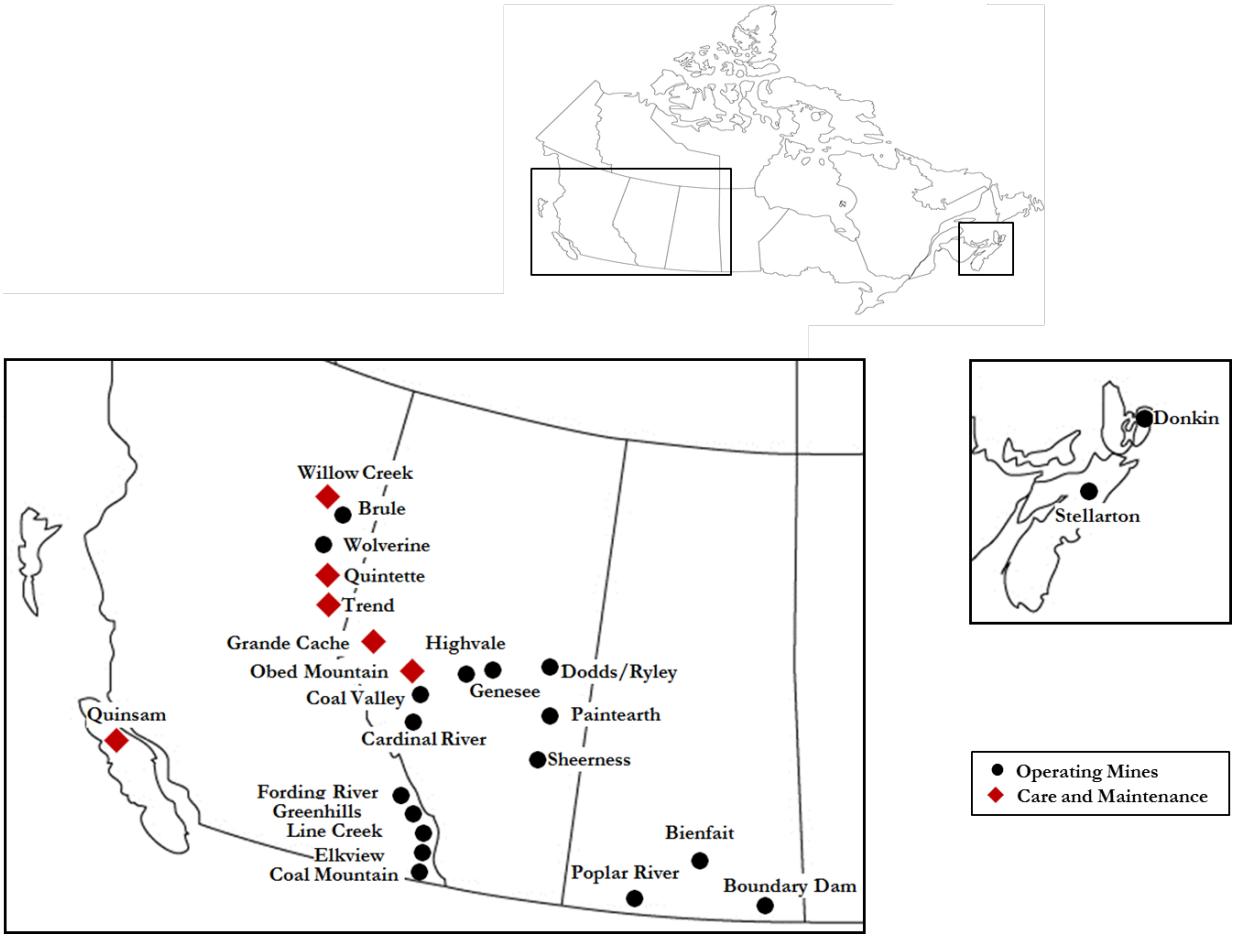
James Arnott

Mining and Processing Division
Environment and Climate Change Canada
Place Vincent Massey
351 Blvd St-Joseph, 18th Floor
Gatineau, Quebec K1A 0H3
E-mail: ec.ermc-cmrd.ec@canada.ca

ANNEXES

ANNEX A. Existing Coal Mines in Canada

There are 25 coal mines located in four provinces within Canada: British Columbia, Alberta, Saskatchewan and Nova Scotia. The following diagram shows the approximate locations of the coal mines in Canada, and provides an indication of their current operating status:



ANNEX B. Deleterious Substances and Effluent Limits

The impacts of selenium, nitrate and total suspended solids on the aquatic environment are described in the *Framework*. In proposing effluent limits, a number of key factors have been considered, including:

- Regulated substances and permitted effluent limits in other domestic and international coal producing jurisdictions;
- Performance of existing coal mines;
- Performance achieved by treatment technology that has been commercially proven at the industrial scale; and
- Potential aquatic effects of harmful substances.

ANNEX B1. Review of Effluent Limits in Other Jurisdictions

The purpose of this annex and the tables in Annexes B3-B5 is to provide interested parties with an overview of the key provisions in some of the existing environmental management instruments that apply to coal mines in other jurisdictions. These annexes are intended to be used as a quick reference and pertain only to limits for those deleterious substances proposed for federal regulation. The summaries provided herein are not meant to be exhaustive or comprehensive of the environmental management requirements in other jurisdictions.

Provincial Requirements

All provinces in which coal mines are located have established effluent limits, through regulations, guidelines, objectives and/or operating permits. Selenium, nitrate and TSS are the most common substances with effluent limits in provincial operating permits. For TSS, all but one coal mine have provincially permitted effluent discharge limits. For selenium and nitrate, provincially permitted effluent or receiving environment-based limits[6] are in place for almost half of existing mines. Several additional mines have been required to submit and implement Selenium Management Plans. The establishment of effluent limits in provincial operating permits provides an indication that these substances pose a risk to the aquatic environment.

Regulations, Guidelines and Objectives

Most provinces in which coal mines are located have regulations, guidelines or objectives for effluent quality in place for coal mining effluent. In BC, effluent quality objectives apply to mining and other industrial sectors. In Alberta, guidelines are specific to the coal mining sector. In Saskatchewan, regulations apply to the mineral industry.

Coal Mining Operating Permits

In Canada, provincial departments and agencies play an important role in the regulation of coal production in Canada. Coal mining operations are subject to provincial environmental assessments (EAs) prior to start-up, and they may also trigger federal EAs for such things as potential impact to fish habitat, impingement on or proximity to federal or First Nations lands, and involvement with cross-provincial or international transportation (e.g., ports).

Once operating, coal mines are subject to provincial regulatory requirements. These include standards for the effluent and receiving environment quality that are established through the provincial permitting process. Provinces also require that receiving waters downstream of the mine site meet the applicable ambient water quality guidelines. Many provinces have established processes whereby guidelines can be modified on a basin or site-specific basis into water quality objectives to address specific parameter issues such as relatively high background levels, or the need for lower targets to protect impaired systems or to address cumulative impact concerns. Objectives are specified in discharge permits, along with the associated monitoring requirements.

International Standards

[6] Includes compliance point limits, order station requirements and site-performance or reach-specific objectives

A key element of ECCC's approach to proposing effluent limits was to examine effluent limits that are currently in place in some major coal producing countries in the world, including the U.S., India, Germany, South Africa and Australia, all of which are among the top 10 global producers for coal and have readily available national baseline effluent standards. Regulatory approaches in non-major coal producing jurisdictions have also been reviewed. These jurisdictions include Spain, Portugal and Chile. The purpose of this analysis has been to help identify effluent discharge levels of proposed deleterious substances that are regulated in these jurisdictions.

United States

In the U.S., coal mining is regulated by a number of federal regulatory programs and associated state programs. The United States Environmental Protection Agency (USEPA) regulates water quality in the U.S. through the *Clean Water Act,* which provides a set of criteria for ambient water quality. The USEPA also establishes effluent standards for individual industries which are based on available technology, although the proponent may use whatever technology they wish in order to achieve these standards. Three levels of criteria are used: Best Practicable Control Technology Currently Available, Best Conventional Pollutant Control Technology and Best Available Technology Economically Achievable. New mining projects are held to Best Available Technologies standards or better. The provisions in Title 40: Protection of Environment Part 434, are applicable to discharges from the coal mining sector.

In additional to the national standards established in Title 40, the USEPA also uses the National Pollutant Discharge Elimination System (NPDES) which is a permitting approach that uses water quality-based limits as well as technology-based end of pipe limits. States may then adopt recommended NPDES limits in permits or legislation.

The activity surrounding the design, testing and data collection of effluent pollution control technologies is widespread and significant in the U.S. For this reason, ECCC focused its review on regulated and permitted effluent limits in major coal producing states. According to the U.S. Energy Information Administration (EIA), the top coal producing states in 2015 were Wyoming, West Virginia, Kentucky, Illinois, Pennsylvania and Montana (USEIA, 2016).

According to the EIA, in 2015 there were over 1,100 coal mines in the US. ECCC's review of NPDES permits targeted operating mines in the top coal producing states. Further, ECCC targeted mines with the largest production, and included a mix of surface and underground mines in various topographical regions. ECCC's review was limited to permits that were accessible and readily available.

Additional parameters of potential concern are proposed to be included in the Environmental Effects Monitoring (EEM) provisions (see Part 2). By monitoring these parameters, ECCC would be able to gather information which could help to determine if effluent limits for these parameters would be required in the future.

Given ECCC's regulatory objective, the *Canadian Water Quality Guidelines for the Protection of Aquatic Life* provide a useful reference point. These guidelines are available on the Canadian Environmental Quality Guidelines page of the Canadian Council of Ministers of the Environment website. Guidelines exist for selenium, nitrate and TSS.

ECCC has obtained effluent concentration data for 21 coal mines across Canada, and has compared effluent concentrations of proposed deleterious substances to their respective guidelines. Generally speaking, effluent concentrations for selenium and nitrate for the sector substantially exceed their respective guidelines. These exceedances provide an indication that the release of these substances in coal mining effluent poses a risk to the aquatic environment.

ANNEX B2. Performance of Coal Mines in Canada

Coal Mining Effluent Data Analysis

ECCC has analyzed effluent data from the coal mining sector in Canada. Data were obtained from publicly available provincial databases, and through information requests with provincial governments and owners or operators of mines. The current analysis focused on the 4 most recent years for which ECCC received data, that is, 2012-2015. The quality of data (i.e., number of samples taken, number of years of data, substances monitored) varied depending on the mine.

The effluent data are presented in the chart below. Each point on the chart represents an annual average effluent concentration for a given FDP. FDPs with multiple years of data would be depicted as multiple data points on the chart. The bars on the chart represent the range of effluent concentrations at a FDP for a given year. The bars are intended to show the variability of the data.

The following Annexes provide a summary of coal mining effluent and receiving environment limits in other jurisdictions for selenium, nitrate and TSS; and show effluent concentration data analyzed by ECCC.

ANNEX B3. Total Suspended Solids

Where the following tables do not contain a numerical value, no limit has been identified.

Summary of Effluent Limits for TSS in Regulations, Guidelines and Objectives in Canadian Jurisdictions

Province	TSS Monthly Mean	TSS Grab	Reference
Unit	mg/L	mg/L	
Alberta	50	350	(AER, 2014)
BC	-	25-75	(BCMOE, 1979)

Summary of International Effluent Limits for TSS in Codes and Regulations

Jurisdiction	TSS Monthly Mean	TSS Grab or Daily Max	Reference
Unit	mg/L	mg/L	
United States[1]	35	70	(US, 2002)
India[2]	-	100	(India, 2000); (India, 1993)
South Africa	-	90	(SA, 1984)
Germany	-	80	(Germany, 2004)
Spain	-	150	(Spain, 1986)
Portugal	60	-	(Portugal, 1998)
Chile[1]	-	80-300	(Chile, 2010)

[1]Daily Maximum

[2]Limit for TSS for irrigation is 200 mg/L

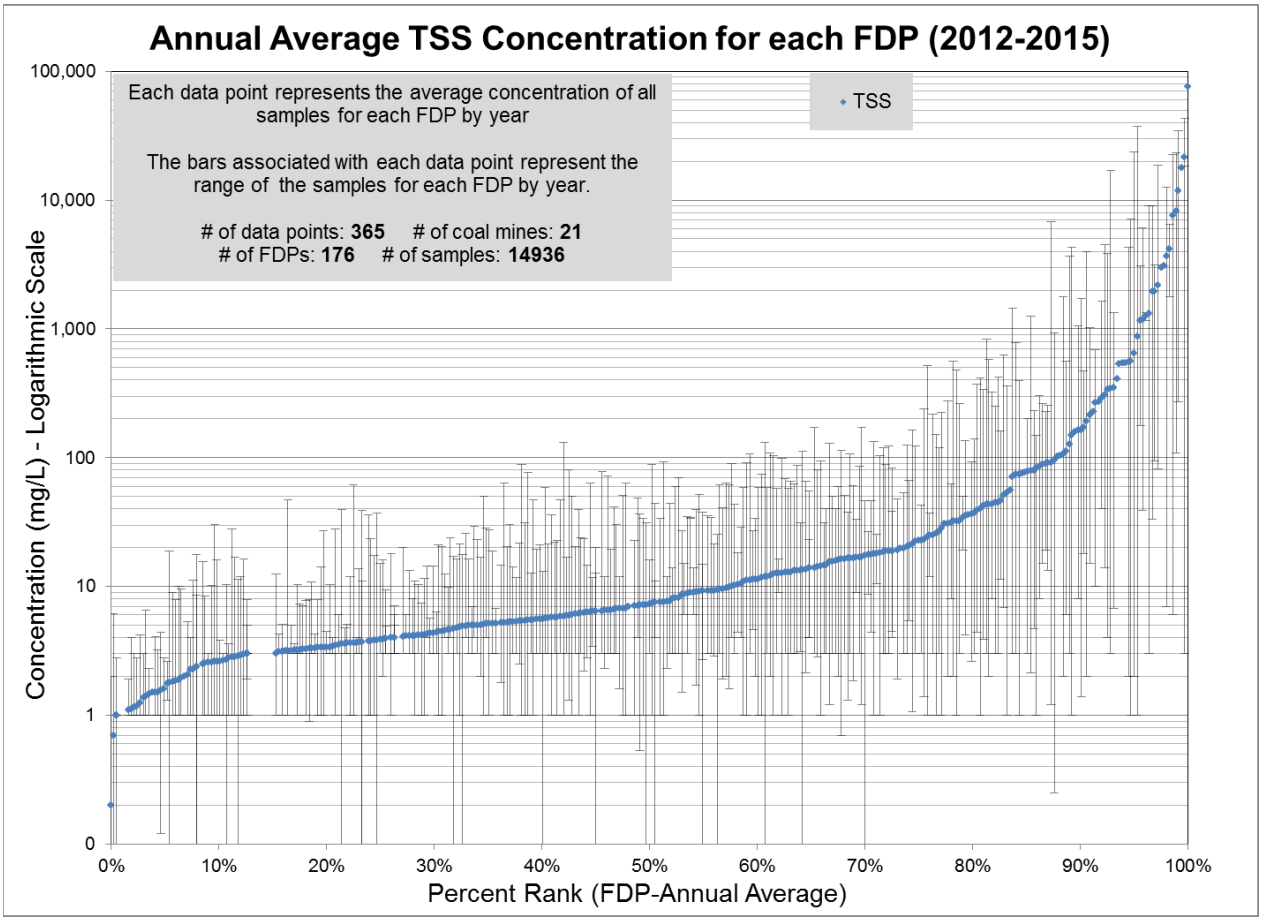
Summary of Effluent Limits for TSS in Provincial Mine Operating Permits

Permits Review - Effluent	TSS	
Number of Permits Reviewed	29	
Number of Permits with Limit	28	
Effluent Limits for Provincial Coal Mine Operating Permits	Monthly Mean	Daily Maximum or Grab
Unit	mg/L	
Lowest Limit	25	10
Median Limit	50	50
Maximum Limit	50	350

Summary of US Effluent Limits for TSS in Mine Operating Permits

US Permits - Effluent	TSS	
Number of Permits Reviewed	29	
Number of Permits with Limit	29	
Effluent Limits for US Coal Mine Operating Permits	**Monthly Mean**	**Daily Maximum or Grab**
Unit	**mg/L**	
Lowest Limit	35	70
Median Limit	35	70
Maximum Limit	100	300

Performance of Canadian Coal Mining Effluent - TSS



ANNEX B4. Total Nitrate

Where the following tables do not contain a numerical value, no limit has been identified.

Summary of Effluent Limits for Nitrate in Regulations, Guidelines and Objectives in Canadian Jurisdictions

Province	Nitrate Monthly Mean	Nitrate Grab	Reference
Unit	mg-N/L	mg-N/L	
Alberta	Implement Best Management Practices		(AER, 2014)
BC	-	10-25[1]	(BCMOE, 1979)

[1]Nitrate/Nitrite

Summary of International Effluent Limits for Nitrate in Codes and Regulations

Jurisdiction	Nitrate Monthly Mean	Nitrate Grab	Reference
Unit	mg-N/L	mg-N/L	
India[1]	-	10	(India, 2000); (India, 1993)
Australia (Queensland)[2]	-	1.1	(ECCC, 2017)
Spain	-	12	(Spain, 1986)
Portugal	11.3	-	(Portugal, 1998)

[1]Limit for nitrate based on general standards for all industrial sectors.

[2]Effluent trigger level to investigate impacts

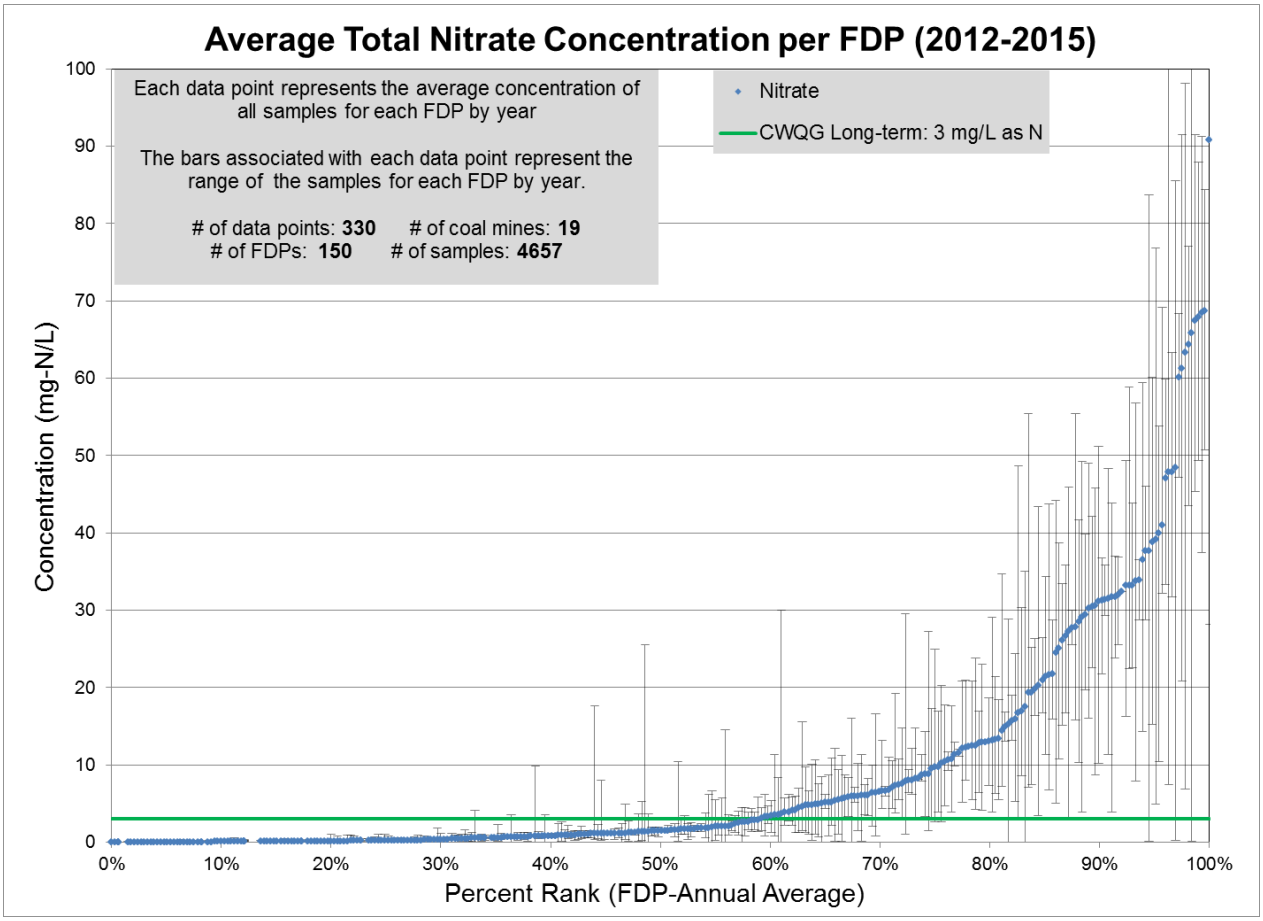
Summary of Effluent Limits for Nitrate in Provincial Mine Operating Permits

Permits Review - Effluent	Nitrate	
Number of Permits Reviewed	29	
Number of Permits with Limit	3	
Number of Mines Represented by Permits with Limit (some permits cover multiple mines)	6	
Effluent Limits for Provincial Coal Mine Operating Permits	**Monthly Mean**	**Daily Maximum or Grab**
Unit	**mg-N/L**	
Lowest Limit	10	3
Median Limit	15	3
Maximum Limit	20	141

Summary of US Effluent Limits for Nitrate in Mine Operating Permits

No US permit reviewed has limits for nitrate.

Performance of Canadian Coal Mining Effluent - Nitrate



CWQG means Canadian Water Quality Guideline for the Protection of Aquatic Life

ANNEX B5. Total Selenium

Where the following tables do not contain a numerical value, no limit has been identified.

Summary of Effluent Limits for Selenium in Regulations, Guidelines and Objectives in Canadian Jurisdictions

Province	Selenium Monthly Mean	Selenium Grab	Reference
Unit	µg/L	µg/L	
BC	-	50-500[1]	(BCMOE, 1979)

[1]Dissolved

Summary of International Limits for Selenium in Codes and Regulations

Jurisdiction	Selenium Monthly Mean	Selenium Grab	Reference
Unit	µg/L	µg/L	
India[1]	-	50	(India, 2000); (India, 1993)
South Africa	-	50	(SA, 1984)
Australia (Queensland)[2]	-	10	(ECCC, 2017)
Spain[3]	-	30	(Spain, 1986)
Chile[4]	-	10	(Chile, 2010)

[1]Limit selenium based on general standards for all industrial sectors.

[2]Effluent trigger level to investigate impacts

[3]Dissolved

[4]Maximum daily concentration

Summary of Effluent Limits for Selenium in Provincial Mine Operating Permits

Permits Review - Effluent	Selenium	
Number of Permits Reviewed	29	
Number of Permits with Limit	3	
Number of Mines Represented by Permits with Limit (some permits cover multiple mines)	6	
Effluent Limits for Provincial Coal Mine Operating Permits	**Monthly Mean**	**Daily Maximum or Grab**
Unit	**mg-N/L**	
Lowest Limit	10	*16*
Median Limit	20	168
Maximum Limit	70	320
Permits with no limit, but with Selenium Management Plan	4	

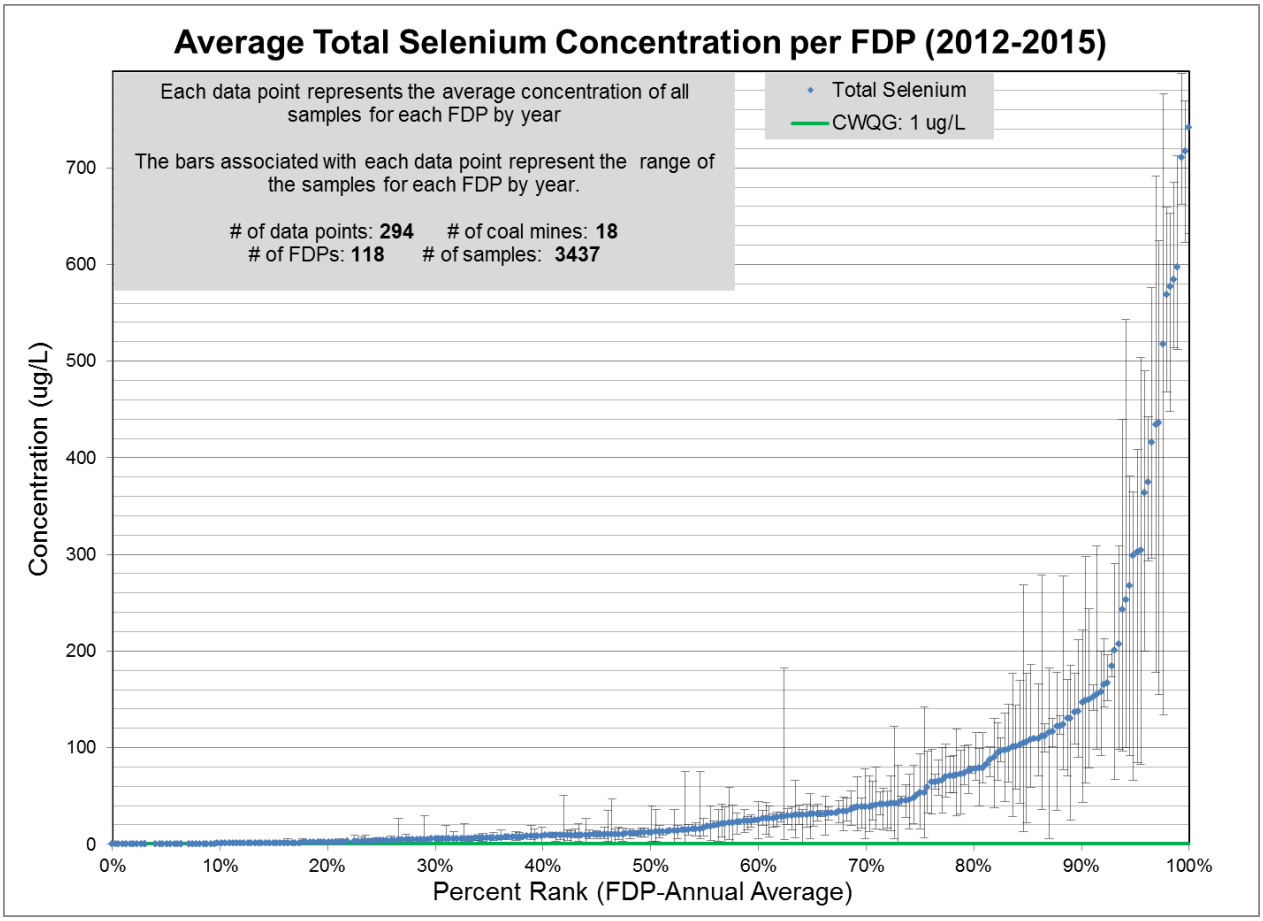
Italicized means dissolved

Summary of US Effluent Limits for Selenium in Mine Operating Permits

US Permits - Effluent	Selenium	
Number of Permits Reviewed	29	
Number of Permits with Limit	13	
Effluent Limits for US Coal Mine Operating Permits	**Monthly Mean**	**Daily Maximum or Grab**
Unit	**µg/L**	
Lowest Limit	1.6	*0.25*
Median Limit	5	20
Maximum Limit	46	79

Italicized means dissolved

Performance of Canadian Coal Mining Effluent - Selenium



CWQG means Canadian Water Quality Guideline for the Protection of Aquatic Life

ANNEX B6. Management of Deleterious Substances

Best Management Practices

Best management practices may be used in order to reduce or limit or eliminate the contact of clean water with mining waste and activities. Best management practice may include the diversion of clean waters, progressive reclamation, use of covers and geomembranes, and refined mining practices.

As an example, the primary method to reduce the concentration of nitrates and ammonia in effluent is to practice best management practices for explosive use. Lower quantities of explosives and proper detonation will reduce the residual amount that may end up in water and snow melt.

Geomembranes

Geomembranes may be used to cover waste piles in order to prevent all or part of the water and snow melt from becoming contaminated in the first place. This reduces the level of active treatment needed for contaminated water.

Total Suspended Solids Treatment Technology

The most commonly used effluent treatment system at coal operations to treat for TSS is a pond-based system (i.e., sedimentation pond). In pond-based systems, the water is collected from the mining site into a pond where the water is allowed to accumulate and stay in order for the suspended solids to settle. Most, if not all, coal mines in Canada already employ some form of this treatment. Reagents such as coagulants and flocculants can be added at various stages to aid in the settling and removal of solids. Membrane filtration is another method that may be used to remove suspended solids.

Selenium Treatment Technology

There are currently three main categories of active treatment technologies available for the treatment of selenium, these include: bioreactors, ion exchange systems and filtration membranes.

Bioreactors

Bioreactors use microorganisms to alter the waste stream to remove contaminants, in this case selenium. There are various configurations and designs available for bioreactors (ponds, tanks, trenches). The designs that have demonstrated the ability to successfully treat selenium to low concentrations generally consists of tank vessel designs. Bioreactors are currently used in treatment operations for many mining sectors and subsectors in North America, including coal mining. There is one bioreactor currently operational at a coal mine in British Columbia.

Ion Exchange Systems

Ion exchange is a treatment option that can be used to treat selenium. Common substances used for the exchange and precipitation of selenium include iron and sulphur as they have similar chemical properties to selenium and a higher electronegativity.

Filtration Membranes

Membranes are typically applied in the treatment of selenium in conjunction with other treatment methods. The ion exchange treatment is an excellent example of this, where the precipitate (waste) can be collected through membrane filtration.

Nitrate Treatment Technology

In effluent, the technologies available to treat nitrates are the same technologies available to treat selenium. These include bioreactors/biological treatments and ion exchange, and in other industries, reverse osmosis has also been used.

ANNEX C. Selenium in Fish Tissue

Selenium can be found in many chemical forms within the aquatic environment. The various chemical forms of selenium depend on the environmental characteristics of the receiving media and exhibit different properties with regard to sorption, bioavailability, mobility and toxicity (Environment Canada, 2015).

The form of selenium that aquatic organisms are exposed to is important, because bioavailability varies between selenium species as well as the receiving environment (lentic or lotic). Despite this, there is a general agreement that freshwater fish appear more sensitive to selenium than any other taxa of aquatic organisms. The concentration of selenium in fish tissue is an indicator of selenium bioavailability, and also represents accumulation from all possible exposure pathways and selenium species.

As described in the draft screening assessment report for selenium and its compounds, published by ECCC and Health Canada in July 2015 in *Canada Gazette*, Part I (Environment Canada, 2015), a significant correlation of selenium concentration measured in fish ovaries and eggs with effects endpoints make them accurate predictors of selenium toxicity to fish. The Predicted No-Effect Concentrations (PNEC) for selenium in fish eggs and ovaries was derived using a chronic toxicity assessment that is based on a range of reproductive impairment endpoints for various freshwater fish species. The PNEC is based on the 5^{th} percentile hazardous concentration (HC_5), which is understood to be protective of most freshwater fish species.

The PNEC may be subject to change with publication of the final screening assessment report for selenium and its compounds. It is proposed that the fish tissue trigger align with the PNEC in the final screening assessment report, which is anticipated to be published in the coming months.

Selenium criteria for the protection of aquatic life (fish and water)

Jurisdiction	Selenium Guidelines					
	Fish (egg/ovary)	Fish (muscle)	Fish (whole body)	Water (lentic)	Water (lotic)	Reference
Unit	µg/g dry weight			µg/L		
Canada (PNEC for fish, Canadian Council of Ministers of the Environment Water Quality Guideline for the Protection of Aquatic Life for water)	11.8	N/A	2.9	1	1	(Environment Canada, 2015)
United States Environmental Protection Agency	15.1	11.3 (skinless, boneless filet)	8.5	1.5 (30 day)	3.1 (30 day)	(USEPA, 2016)
British Columbia	11	N/A	4	2	2	(BCMOE, 2014)
Kentucky (proposed)	19.3	N/A	8.6	5	5	(Payne, 2013)
West Virginia	15.8	N/A	N/A	5	5	(WVDEP, 2017)

N/A means not available

ANNEX D. Proposed Testing Frequency for All Mines

PROPOSED PROVISION	REGULAR FREQUENCY	REDUCED FREQUENCY	INCREASED FREQUENCY	NOTES
Selenium, nitrate testing	**Weekly** [≥ 24 hours apart]	**Quarterly** [≥ 1 month apart] • If monthly mean concentration at FDP <10% of monthly mean limit for 12 consecutive months		Notify Minister of Environment in writing, ≥30 days in advance of reduction
TSS testing	**Weekly**			
pH and temperature testing	**Weekly** [≥ 24 hours apart] Record pH at the time of collection	**Quarterly** [Temperature only - according to non-acute lethality testing frequency]		pH and temperature must be measured from the same sample as collected for selenium and nitrate measurement and non-acute lethality testing measurement
Acute Lethality testing	**Monthly** [≥15 days apart]	**Quarterly** [≥45 days apart] • Not acutely lethal for 12 consecutive months • Notify the Minister of the Environment in writing ≥ 30 days prior • Select sampling date ≥ 30 days prior	**Twice a month**, no less than 7 days apart, • If effluent determined acutely lethal • Also conduct effluent characterization on aliquot of each sample. • Resume testing at regular frequency after 3 consecutive tests are passed.	Collect sufficient volume for effluent characterization Record temperature and pH at time of the sample's collection
Volume measurement	**Monthly**			Record in m^3
Effluent Characterization	**Quarterly** [≥1 month apart]			Aliquot of effluent selenium, nitrate testing Mercury can be discontinued if [Hg] <0.1 µg/L in 12 consecutive samples
Sublethal Toxicity testing	**2x per year** for three years	**Quarterly** using the most responsive test after 3rd year		Aliquots from FDP with potentially the most adverse impact
Water Quality testing	**Quarterly** [≥1 month apart]			While mine is depositing effluent, on samples of water from exposure area at each FDP (point of entry) & reference area(s) associated Same time as biological monitoring

ANNEX E: Testing Frequency for Mines Authorized to Discharge Non-Point Source Effluent

This Annex relates to mines authorized to discharge non-point source effluent and the testing frequency requirements for all Environmental Compliance Points (ECP), as well as Environmental Effects Monitoring requirements

PROPOSED PROVISION	REGULAR FREQUENCY	REDUCED FREQUENCY	NOTES
Selenium, nitrate, TSS testing	**Weekly** [≥ 24 hours apart]		For TSS, must test reference area and Environmental Compliance Point (ECP) no less than 24 hours apart
pH and temperature testing	**Weekly** [≥ 24 hours apart] Record pH at the time of collection		pH and temperature must be measured from the same sample as collected for selenium, nitrate and TSS measurement and non-acute lethality testing measurement
Volume measurement	**Weekly** [≥ 24 hours apart]		Record in m^3
Effluent Characterization	**Monthly** [≥15 days apart]		Aliquot of effluent selenium, nitrate and TSS testing; All FDPs; All ECPs
Sublethal Toxicity testing	**2x per year** for three years	**Quarterly** using most responsive test after 3rd year	Aliquots from FDP and ECP with potentially the most adverse impact
Water Quality testing	**Monthly** [≥15 days apart]		On samples of water from exposure area at each FDP (point of entry), ECPs, EMPs & reference area(s) associated Same time as biological monitoring

ANNEX F. Environmental Effects Monitoring Studies

LIST OF ACRONYMS

BIC: benthic invertebrate community
CES: critical effect size
EC_{25}: 25% effect concentration
ECP: environmental compliance point
EEM: environmental effects monitoring
EMP: environmental monitoring point
FDP: final discharge point
IC_{25}: 25% inhibition concentration
IOC: investigation of cause
IOS: investigation of solutions
MMER: *Metal Mining Effluent Regulations*
SD: standard deviation
SLT: sublethal toxicity test

Effluent Characterization and Water Quality Monitoring

Data generated from effluent characterization and water quality monitoring would be used to:

- provide the necessary supporting data to understand acute lethality testing results;
- provide the necessary supporting data to understand sublethal toxicity testing results;
- provide the necessary supporting data to interpret the results of biological monitoring studies;
- help identify the causes of effects identified during biological monitoring studies; and
- provide important information to ECCC about the occurrence of potential contaminants of concern in effluent from mine sites across Canada.

The proposed effluent characterization and water quality parameters are included in table F1.

Table F1. Analytical parameters measured for effluent characterization and water quality monitoring

Effluent Characterization parameters	Water Quality parameters (EEM and Deleterious Substances)
Electrical conductivity	Electrical conductivity
Temperature	Temperature
Aluminum	Aluminum
Ammonia	Ammonia
Arsenic	Arsenic
Calcium	Calcium
Cadmium	Cadmium
Carbon dioxide, dissolved	Carbon dioxide, dissolved
Chromium	Chromium
Cobalt	Cobalt
Copper	Copper
Lead	Lead
Iron	Iron
Mercury*	Mercury
Manganese	Manganese
Nickel	Nickel
Nitrite	Nitrite
Phosphorus	Phosphorus
Sulphate	Sulphate
Total Dissolved Solids	Total Dissolved Solids
Uranium	Uranium
Zinc	Zinc
Hardness	Hardness (freshwater, estuarine)
Alkalinity	Alkalinity (freshwater, estuarine)
	Total selenium
	pH (freshwater, estuarine)
	Total nitrate
	Total suspended solids
	Salinity (estuarine, marine)

*The recording of the concentration of total mercury in effluent may be discontinued if that concentration is less than 0.10 μg/L in 12 consecutive samples and if the mine collects all effluent and discharges through final discharge points.

Sublethal toxicity

Sublethal toxicity (SLT) testing would be conducted according to the methods referred to in the regulations. The proposed sublethal toxicity test methods would be the same as in the *Metal Mining Effluent Regulations (MMER)* and are outlined in Table F2.

ECCC is proposing to require mines to conduct all SLT tests twice per calendar year for the first three years. Using the test results from the first three years, mines would then be required to determine the most responsive test[7]. In all subsequent years, mines would be required to conduct the most responsive test four times a year.

[7] The most responsive test would be selected by identifying the lowest geometric mean IC_{25} or EC_{25}.

Table F2: Proposed required sublethal toxicity tests and methodologies

Test description	Receiving Environment	Test species
Fish early life stage development	Marine	Inland Silverside (*Menidia beryllina*)[a] or Topsmelt (*Atherinops affinis*) [a]
	Freshwater	Fathead Minnow (*Pimephales promelas*)[1bc] or Rainbow Trout (*Oncorhynchus mykiss*) [bc]
Invertebrate reproduction	Marine	Echinoids (sea urchins or sand dollars)[d]
	Freshwater	Water Flea (*Ceriodaphnia dubia*)[e]
Plant and algae toxicity	Marine - algae	Barrel Weed (*Champia parvula*)[f]
	Freshwater - algae	Green Algae (*Pseudokirchneriella subcapitata*)[gh]
	Freshwater - plant	Lesser Duckweed or Common Duckweed (*Lemna minor*)[i]

1. Rainbow Trout are used where Fathead Minnows are not an indigenous species

a. Reference Method EPA/821/R-02/014. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. U.S. EPA

b. Report EPS 1/RM/22. Biological Test Method: Test of Larval Growth and Survival Using Fathead Minnows. ECCC

c. Reference Method EPS1/RM/28. Biological Test Method: Toxicity Tests Using Early Life Stages of Salmonid Fish (Rainbow Trout). ECCC

d. Report EPS 1/RM/27. Biological Test method: Fertilization Assay using Echinoids (Sea Urchins and Sand Dollars). ECCC

e. Report EPS 1/RM/21. Biological Test method: Test of Reproduction and Survival Using the Cladoceran *Ceriodaphnia dubia*. ECCC

f. Reference Method EPA/600/R-95-136. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms. U.S. EPA

g. Report EPS 1/RM/25. Biological Test Method : Growth Inhibition Test using a Freshwater Alga ECCC

h. Methode de référence http://www.ceaeq.gouv.qc.ca/methodes/pdf/MA500Psub10.pdf. Détermination de la toxicité : inhibition de la croissance chez l'algue *Pseudokirchneriella subcapitata*. MDDELCC[2]

i. Reference Method EPS 1/RM/37. Biological Test Method: Test for Measuring the Inhibition of Growth Using the Freshwater Macrophyte, *Lemna minor*. ECCC

Biological monitoring

Mines would need to consider all relevant data, analysis, scientific information, and Indigenous Knowledge for the purpose of meeting the biological monitoring study requirements.

Site characterization

Site characterization information would be submitted as part of the EEM study design. The requirements for site characterization would be based on the proposed MDMER. For the first EEM study design, site characterization information would be included in detail. For subsequent EEM studies the site characterization information would be submitted in summary format, with new information updated in detail. In most cases, mines would have most site characterization information available from previous assessments and historical studies. Site characterization information would be used to identify suitable sampling areas that have similar habitats in the exposure and reference

areas, and to obtain information on other discharges and confounding factors that may affect the interpretation of data obtained from those areas. The proposed requirements for site characterization would be:

- a description of the manner in which the effluent mixes within each exposure area; where applicable estimate concentration of effluent in water at 100m and 250m from every point at which effluent enters the area from a discharge point;
- a description of the reference and exposure areas where the biological monitoring studies would be conducted, if required, that includes information on the geological, hydrological, oceanographical, limnological, chemical and biological features;
- the type of production processes and environmental protection practices used by the mine;
- a description of any anthropogenic, natural or other factors that are not related to the effluent but that may reasonably be expected to affect the results of any biological monitoring study, if required;
- information on the spatial distribution of calcification in the exposure area and how that impacts the study design; and,
- any additional information that would enable a determination as to whether studies would be conducted in accordance with generally accepted standards of good scientific practice;
- if studies are not required, a confirmation that triggers are not met.

Biological monitoring (fish, fish habitat, fish tissue)

Coal mines would be required to conduct biological monitoring under certain conditions and, if required, sampling would be conducted at no less than one reference and one exposure area or along a gradient with decreasing effluent concentrations.

Data collected on specific-effect endpoints (listed in table F3 and table F4) would be assessed to determine if statistical differences are present in order to establish if there are any effects on the indicators. An “effect” on the fish population or benthic invertebrate community would be defined as a statistical difference between data collected in exposure and reference areas, or in sampling areas within an exposure area, where there are gradually decreasing effluent concentrations at increasing distances from the effluent discharge. An effect on fish tissue from mercury would be defined as a concentration of mercury that exceeds 0.5 µg/g wet weight in fish tissue taken from an exposure area and is statistically significant from and higher than the total mercury concentration in fish tissue that is taken from a reference area.

In addition to the fish indicators, mines would be required to identify the presence of any lesions, tumors, parasites or other abnormalities present. Sediment would be sampled and the total organic carbon content, particle size distribution would be determined and reported during the benthic invertebrate study.

Table F3. Effect indicators and endpoints for fish population study

Effect Indicators	Effect Endpoints
Growth (energy use)	Size-at-age (body weight relative to age)
Reproduction (energy use)	Relative gonad size (gonad weight to body weight)
Condition (energy storage)	Condition (body weight to length) Relative liver size (liver weight to body weight)
Survival	Age

Table F4. Effect indicators and endpoints for benthic invertebrate community study

Effect Indicators	Effect Endpoints
Total benthic invertebrate density	Number of animals per unit area
Evenness index	Simpson's evenness
Taxa richness	Number of taxa
Similarity index	Bray-Curtis index

To focus biological monitoring investigation efforts where large effects are observed, Critical Effect Sizes (CES) (table F5), defined as thresholds above which effects may be indicative of a potential higher risk to the environment, have been developed for some fish population and benthic invertebrate indicators. These CES thresholds would be used to determine when mines are required to further investigate the cause and identify potential solutions for confirmed effects[9] and when mines could decrease monitoring effort.

Table F5. Proposed paths forward within the EEM program for benthic invertebrate community and fish population studies based on results of studies and assigned CES's.

Phase 1 results	Phase 2 results	Subsequent phase
No effect	No effect	Reduced biological field monitoring frequency (72 months)
Effect below CES	No effect	
No effect	Effect below CES	
Effect below CES	Effect below CES	
No effect	Effect above or equal to CES	Standard biological field monitoring (36 months) or Investigation of Cause (IOC) followed by Investigation of Solutions (IOS):
Effect below CES	Effect above or equal to CES	Investigation of Cause (IOC) (36 months); concurrently or followed by Investigation of Solutions (IOS)
Effect above or equal to CES	Effect below CES	
Effect above or equal to CES	Effect above or equal to CES	

[9] An effect is qualified as confirmed when there is a statistically significant difference in two consecutive studies for a given indicator, and this significant difference must be in the same direction for both studies.

After a facility completes IOS the facility would return to standard biological monitoring and submits an interpretive report in 36 months.

The biological monitoring study requirements would be decoupled. For example, if a facility confirms no effects in their benthic study but has an effect equal or greater than CES for in their fish study the next interpretive report containing the benthic component would be due in 72 months and an interpretive report containing the fish component would be due in 36 months.

Table F6. Critical effect sizes for metal mining environmental effects monitoring program.

Fish Effect Endpoints	CES[1]	Benthic Effect Endpoints	CES[1]
Weight-at-age	± 25%	Density	± 2SD
Relative fish gonad size	± 25%	Simpson's Evenness	± 2SD
Relative liver size	± 25%	Taxa Richness	± 2SD
Condition	± 10%		
Age	± 25%		

[1] Differences in fish population effect endpoints are expressed as percentage (%) of reference mean, while differences in benthic effect endpoints are expressed as multiples of within-reference-area standard deviations (SDs).

Environmental Effects Monitoring for Existing Mountain Mines with Non-Point Source Discharge

The EEM approach for mines who receive authorization to deposit non-point source effluent would include additional conditions including increased frequency and additional sampling areas. These conditions are summarized in Table F7.

Table F7. Sampling location (excluding FDPs) for coal mines authorized to discharge non-point source effluent.

Location		Effluent Characterization and Water Quality Monitoring	Sublethal Toxicity	Benthic Invertebrate Community		Fish Population		Mercury in Fish Tissue
				<20 km bank length	≥20 km bank length	<20 km bank length	≥20 km bank length	
Exposure area	First EMP	✓	-	-	✓	-	✓	✓
	Second EMP	✓	-	-	✓	-	✓	✓
	ECP	✓	✓	✓	✓	✓	✓	✓
Reference Area		✓	-	✓	✓	✓	✓	✓

Note: for FDP related monitoring see paragraphs on effluent characterization, water quality monitoring and sublethal toxicity testing.

ANNEX G. Proposed Analytical Requirements

Analytical requirements, including Method Detection Limits (MDL), precision and accuracy requirements are proposed to be included in the regulations. The Method Detection Limit (MDL) is the minimum quantity of an analyte (e.g., effluent) that should be observed to justify the claim to have detected the analyte with a specified risk (normally 5% or 1%) of making a false detection. Precision and accuracy can be defined as follows:

- *Precision*: Relative standard deviation at concentrations 10 times above the MDL.
- *Accuracy*: Analyte recovery at concentrations above 10 times the MDL.

For all mines, at a minimum, the following analytical requirements are proposed for selenium, nitrate, TSS and pH:

Analytical Requirements - Effluent and Water Quality			
Substance/pH	**Precision**	**Accuracy**	**MDL**
Nitrate	10%	100 ± 10%	0.3 mg/L, expressed as nitrogen (N)
pH	0.1	0.1	Not Applicable
Selenium	10%	100 ± 10%	0.0005 mg/L
TSS	15%	100 ± 15%	2.000 mg/L

Analytical Requirements - Fish Tissue			
Substance	**Precision**	**Accuracy**	**MDL**
Selenium	10%	100 ± 10%	0.5 µg/g, dry weight

In addition, ECCC will be establishing analytical requirements for all parameters proposed to be monitored.

ANNEX H. Conceptual Diagrams of Coal Mines

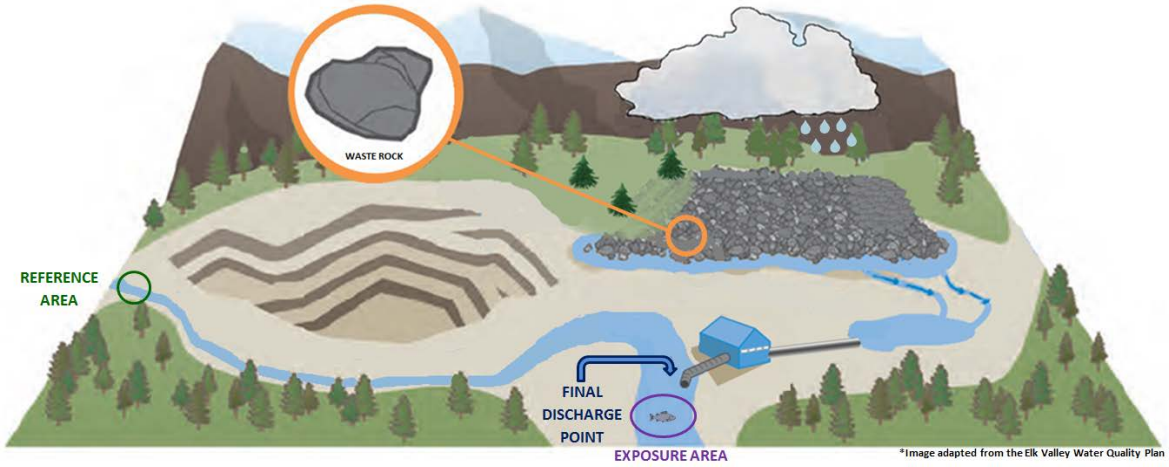


Figure H1. All coal mines.

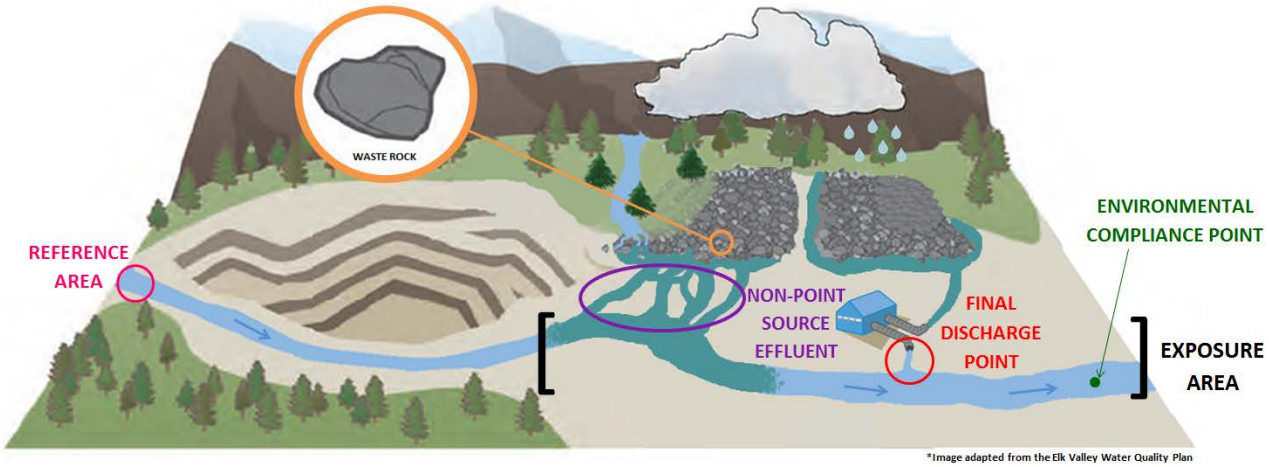


Figure H2. Existing mountain mines authorized to discharge non-point source effluent.

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Signal Check: Proposed *Coal Mining Effluent Regulations*

Fall 2018

Overview

- Context
- Key Issues:
  1. Expansions
  2. Total Suspended Solids
  3. Selenium
  4. Nitrate
  5. Reclamation / Closure
  6. Existing Mountain Mines
- Next Steps

Context

- The *Proposed Approach for Coal Mining Effluent Regulations* consultation document was shared with interested parties in November 2017

- Approximately 30 written submissions have been received to date from industry, ENGOs, provinces, other government departments and Indigenous organizations and their representatives

- Purpose of the presentation is to outline the current thinking on key issues and discuss next steps

Regulatory Overview

- A two-pronged approach is being considered:
  1. A general approach that requires collection of all effluent and release through Final Discharge Points (FDPs)

  2. An alternative approach for existing mountain mines that would be challenged to collect all effluent
     - Allows for release of non-point source (diffuse) effluent
     - Mines must apply for, and be issued, an authorization to deposit under this approach
     - Authorization would establish compliance points in the receiving environment
       - Long-term compliance approach for selenium and nitrate, with increasingly stringent limits over time
     - EEM as per the general approach, with potential additional EEM requirements

General Approach

Expansions

What we proposed (November 2017):

- Expansions of an existing mine would refer to new coal preparation or storage facilities, new open pits or underground mines, new mine waste disposal areas including mine waste piles, or new treatment ponds or facilities
- Expansions trigger new mine compliance limits

Expansions

Summary of what we heard:

- The concept introduces the potential for inequities within the coal mining sector, potentially penalizing mines due to spatial constraints and the requirement to construct new infrastructure;
- Mine planning and design takes place for the entire mine, even though not all infrastructure is built up-front;
- There may be an incentive for mines to continue to operate existing Final Discharge Points (FDP) to avoid meeting more stringent limits;
- There are opportunities for alignment between provincial and federal definitions of expansion

Expansions

What we are thinking:

- Expansions would not trigger *new* mine compliance limits

Total Suspended Solids (TSS)

What we proposed (November 2017):

		Existing Mines		*New Mines and Expansions*	
Deleterious Substance	**Unit**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**
Suspended Solids	mg/L	35	70	35	70

Total Suspended Solids

Summary of what we heard:

- Most provincial permits allow for higher TSS during exceptional flow or precipitation events
- Effluent limits proposed for TSS could:
  - require mines to use chemicals to meet discharge limits
  - cause habitat fragmentation, sediment and nutrient sinks, and sediment disposal issues if mines were to expand existing infrastructure to meet proposed limits

Total Suspended Solids

What we are thinking:

- The limits would remain as proposed in November 2017
- During an exceptional precipitation event, it is proposed that the FDPs are exempt from meeting limits during the event and for up to 48 hours following the end of the event.
  - Mines would be required to submit information to the Department indicating what defines a 1-in-10 year precipitation event at their mine site and during an event, that the event is/has occurred
  - This approach would apply to both existing and new mines

Selenium

What we proposed (November 2017):

- All mines would be required to perform selenium in fish tissue studies
- For existing mines, mines must meet a baseline limit

Existing Mines	***Effluent***				***Fish Tissue***
	Baseline Limit		**Stringent Limit triggered by fish tissue study result**		
Deleterious Substance	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**	**Trigger for reductions from *Baseline Limit* to *Stringent Limit***
Unit	µg/L				µg/g dry weight
Total Selenium	10	20	5	10	6.7 (whole body and muscle); 14.7 (egg/ovary)

- For new mines and expansions, a maximum monthly mean of 5 µg/L; maximum grab of 10 µg/L

Selenium

Summary of what we heard:

- Could create undue stress to vulnerable fish populations
- Limited value when selenium concentrations at FDPs are low
- A reduction in total selenium concentration may not necessarily translate into reduced selenium bioaccumulation
- Site-specificity should be considered
- Could be challenging to achieve using the current best available technology, particularly in areas with large volumes of effluent to be treated

Selenium

What we are thinking:

- The following effluent limits would apply:

		Existing Mines		*New Mines*	
Deleterious Substance	**Unit**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**
Total Selenium	µg/L	10	20	5	10

- Selenium in fish tissue studies would be conducted through Environmental Effects Monitoring – no longer a compliance mechanism

Nitrate

What we proposed (November 2017):

		Existing Mines		*New Mines and Expansions*	
Deleterious Substance	**Unit**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**
Total Nitrate	mg-N/L	10	20	3	6

Nitrate

Summary of what we heard:

- The proposed limits for existing mines are higher than limits in other jurisdictions.
- The proposed limits for new mines are extremely low, given that the Canadian Water Quality Guideline for the Protection of Aquatic Life is 3 mg-N/L for long-term exposure.
- The nutrient impacts of nitrate must be considered in relation to other nutrients that cause eutrophication.
- Mines that do not use blasting should not be required to monitor for nitrate.

Nitrate

What we are thinking:

		Existing Mines		*New Mines*	
Deleterious Substance	**Unit**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**	**Maximum Authorized Monthly Mean Concentration**	**Maximum Authorized Concentration in a Grab Sample**
Total Nitrate	mg-N/L	10	20	5	10

Reclamation and Closure

What we proposed (November 2017):

- Reclaimed areas of strip mines be eligible to be excluded from the regulations
- For areas that become reclaimed after publication, in order to become excluded from the regulations, a mine would be required to:
  - provide written notice of the intention for the reclaimed area to become excluded from the regulations while identifying the reclaimed area
  - provide written notice that revegetation of the reclaimed area has been completed, and
  - cease depositing effluent for a continuous period of 3 years
- Once the reclaimed area becomes excluded from the regulations, it would lose its authorization to deposit effluent
- Effluent management infrastructure (e.g., sedimentation ponds, end pit lakes) not eligible for exclusion from the regulations

Reclamation and Closure

Summary of what we heard:

- Effluent management infrastructure (e.g., end pit lakes, sedimentation ponds) may remain at a mine site even after an area has been reclaimed.
- Mines that do not meet the current definition of strip mines also undergo progressive reclamation.
- Some reclaimed areas, as opposed to being revegetated, are leased or sold for subsequent land use, e.g., agriculture, industrial uses.

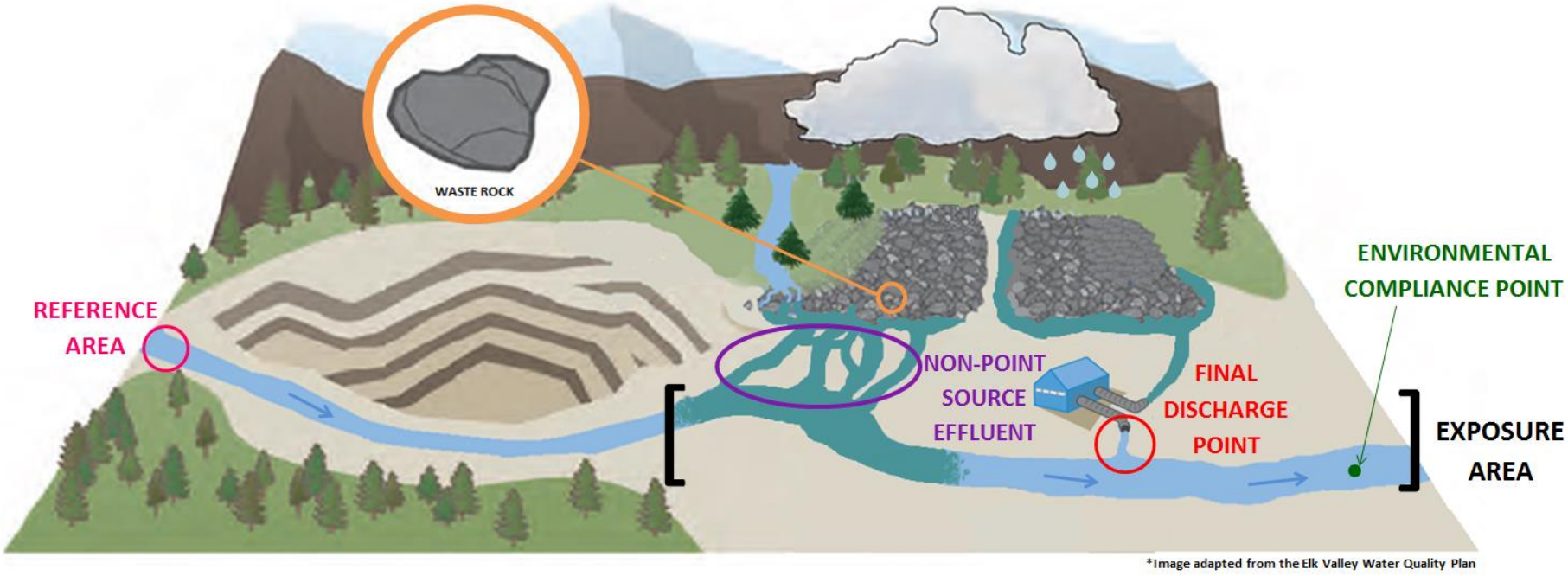
Reclamation and Closure

What we are thinking:

- Reclaimed Areas would not be covered by the regulations
- Provisions would apply to all mines under the general approach

Alternative Approach: Existing Mountain Mines with Non-Point Source Discharge

Alternative Approach for Existing Mountain Mines with Non-Point Source Discharge



Expansions

What we proposed (November 2017)

- Expansions of an existing mine would refer to new coal preparation or storage facilities, new open pits or underground mines, new mine waste disposal areas including mine waste piles, or new treatment ponds or facilities
- All effluent to be collected and discharged through defined FDPs
- Expansions subject to effluent limits for new mines

Expansions

Summary of what we heard

- Implementation of two separate regulatory regimes for the existing mine and for the expansion is not practical, particularly where treatment facilities have been designed to meet effluent limits at an established Environmental Compliance Point (ECP).
- Meeting separate limits could be challenging where characteristics from legacy mining remain influencers of effluent discharge for an expansion area.
- The definition of 'Expansion' should not include new mine waste disposal areas since new waste rock should not be placed into water bodies frequented by fish

Expansions

What we are thinking

- Maintain provisions for expansions at existing mountain mines authorized to discharge non-point source effluent.
- Narrow the definition of 'Expansion' to remove treatment facilities
- All effluent to be collected and discharged through defined FDPs

Total Suspended Solids

What we proposed (November 2017)

- Effluent discharged through FDPs must comply with the FDP limit proposed for all mines under the general approach
- In addition, a mine would be required to meet a TSS limit at all ECPs:
  - TSS at the ECP would not exceed a 10% change above the TSS concentration in the reference area of a mine at any time

Total Suspended Solids

Summary of what we heard:

- TSS limit should not be applied at ECPs
- TSS limits that include a percent increase above Reference Area may not be feasible; consideration should be given to a percent increase above baseline TSS concentrations instead
- The proposed ECP limit would require mines to visit the Reference Area on a weekly basis. This may prove challenging in remote areas or areas with limited year-round access.

Total Suspended Solids

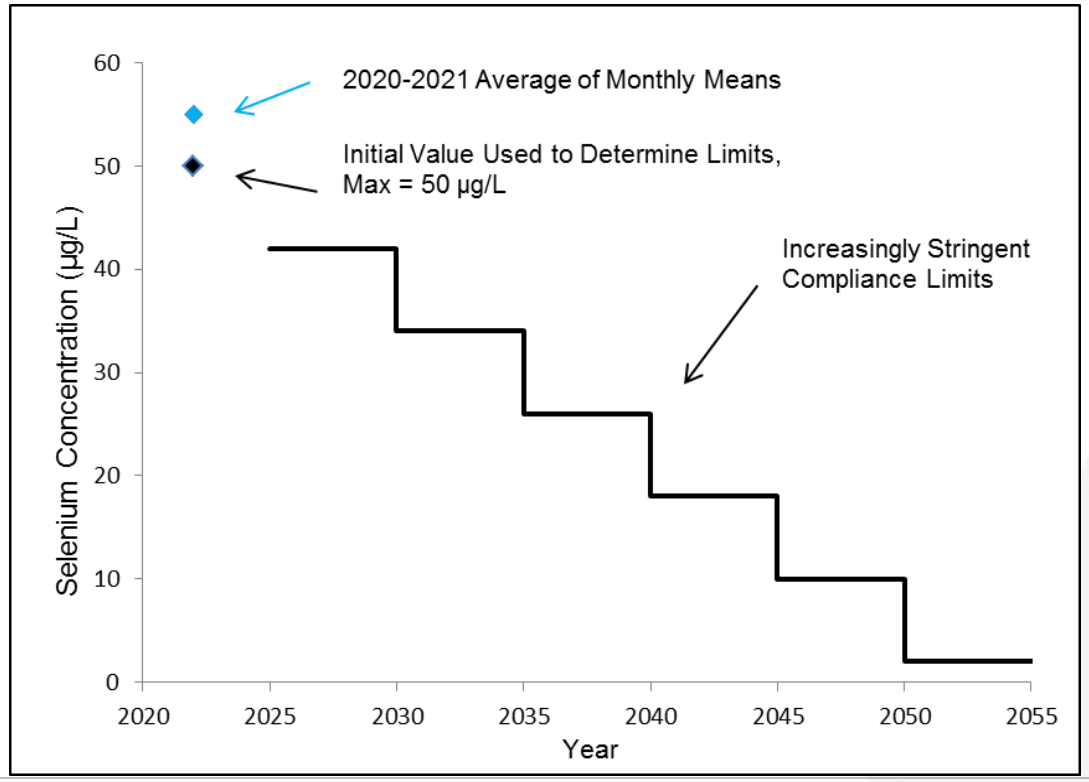
What we are thinking:

- TSS compliance only at FDPs
- A provision to exempt from TSS limits at FDPs for 48hr following a 1-in-10 year precipitation event

Selenium and Nitrate

What we proposed (November 2017)

- Selenium and nitrate reductions to a protective limit in the receiving environment by 2050, e.g., selenium:



Selenium and Nitrate

Summary of what we heard:

- The proposed approach for selenium does not reflect the state of current science:
  - Fish tissue concentrations are the most appropriate method to evaluate and monitor potential effects from selenium.
  - When a water concentration is needed, it should be back calculated from tissue effects concentrations to ensure that the water quality limit is protective of the species of a specific waterbody.
- It may be easier to achieve selenium and nitrate reductions when starting from high concentrations than to reduce when starting from low concentrations.
- An approach that reduces concentrations in main stem receiver does not protect water quality or other aquatic receptors in the tributaries.
- In some areas, there is a lag time of approximately 15 years from the time of deposition of waste rock into receiving waters and the reporting of releases

Selenium and Nitrate

What we are thinking (Selenium):

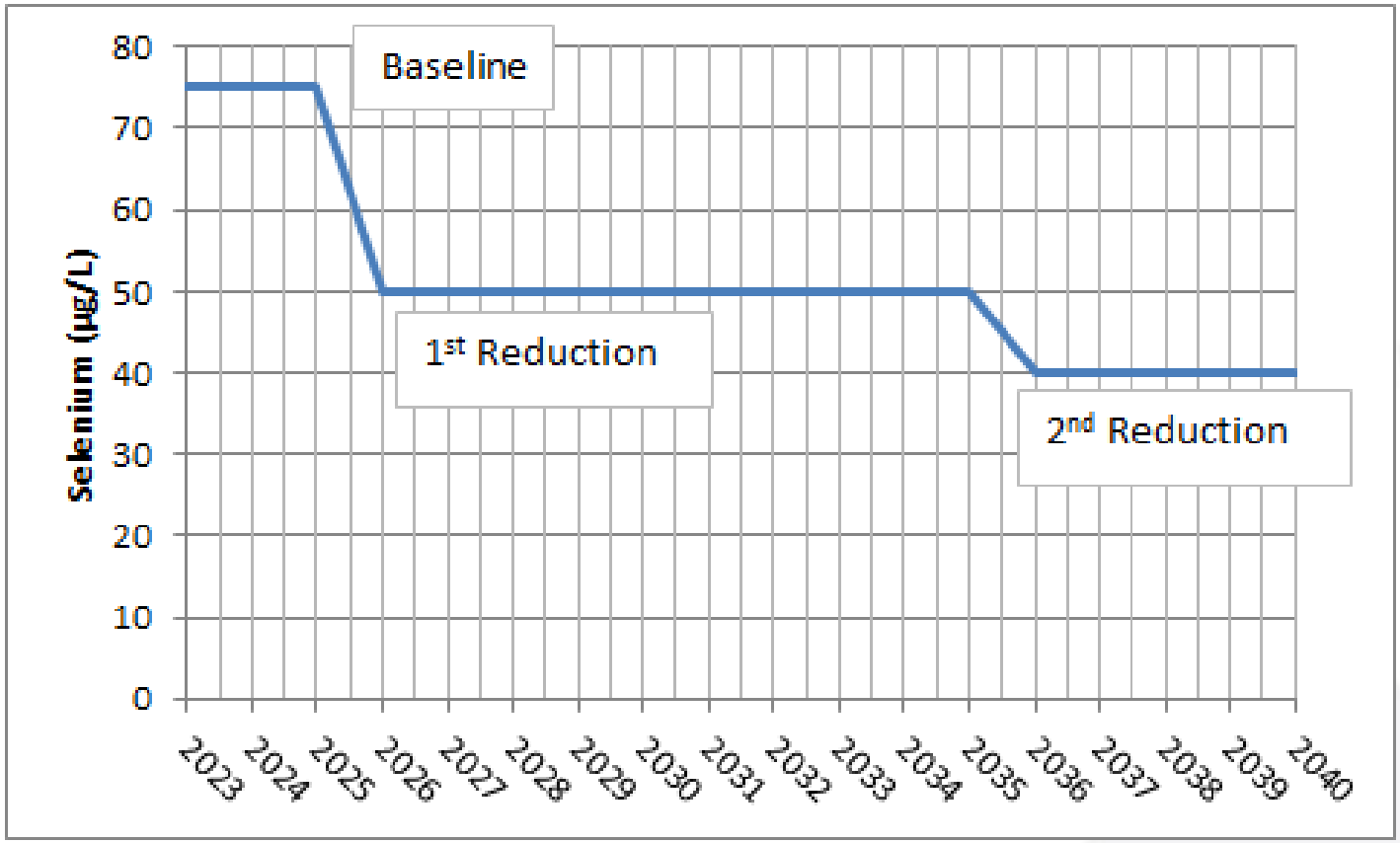
- A receiver-based compliance approach is being considered for selenium at each ECP
- This approach would include a series of increasingly stringent compliance limits every 10 years until 2036:

2021	CGII Publication
2022-2023	Gather baseline at ECP(s)
2024-2025	Maintain baseline at ECP(s)
2026-2035	lesser of: 50µg/L or 20% reduction off baseline
2036+	lesser of: 40µg/L or 20% reduction off limit established for 2026-2035

- Using adaptive management approach, review EEM results and advancements in mitigation measures to assess effectiveness and appropriateness of compliance limits for selenium

Selenium

What we are thinking (continued):



Next Steps

- Consider any feedback on the current thinking

- 2019/early 2020
  - Finalize regulatory package

- Spring/Fall 2020
  - Target to publish proposed regulations in *Canada Gazette*, Part I

- Spring/Fall 2021
  - Target to publish final *Coal Mining Effluent Regulations* in *Canada Gazette*, Part II

UPDATE – PROPOSED COAL MINING EFFLUENT REGULATIONS

Technical Information Sessions
February 2020

Environment and Climate Change Canada
Environnement et Changement climatique Canada
Canada

Overview

- Current Status
- Regulatory Overview
- Key Provisions for all Mines
- Key Provisions for Mines under the General Approach
- Key Provisions for Mines under the Alternative Approach
- Next Steps
- Open Discussion

A presentation on Environmental Effects Monitoring will follow.

Current Status

- Three rounds of engagement/consultations have occurred:
  - January 2017 – presented initial *Proposed Regulatory Framework for Coal Mining*
  - November 2017 – more detailed *Proposed Approach for Coal Mining Effluent Regulations* presented that considered comments received
  - Fall 2018 – presented update on current thinking on key issues:
    - Signal Check: Proposed Coal Mining Effluent Regulations
    - CMER EEM – Key areas considered for change from Nov. 2017 consultation document
- Written comments received have been considered in refining the proposed approach
- Purpose of this presentation is to provide information on the regulatory proposal and on the next steps

Regulatory Overview

- Two-pronged approach:
  1. **General approach** for mines with effluent discharged through Final Discharge Points (FDPs)
  2. **Alternative approach** only for existing mountain mines in the Elk Valley, British Columbia
     - Mines with effluent from FDPs and non-point sources (diffuse)

Change:

- Alternative approach would only apply to existing mountain mines in the Elk Valley, BC
- Objective for alternative approach was for it to apply where significant and long-standing practices has created legacy issues where it is not practical to collect all effluent, and where significant long-term impacts to the aquatic environment have occurred – these conditions only exist in the Elk Valley, BC
- Other existing mountain mines would be subject to the general approach

Key Provisions for All Mines

Application

- Regulations would apply to any coal mine that deposits effluent to water frequented by fish
- Would exclude:
  - Exploration projects
    - under 100,000 tonnes of coal production for testing purposes only
  - Mines that ceased coal production prior to January 1, 2012, unless they resume operations

Change:

- Removed the 50 m^3/day threshold – allows for any operating coal mines that deposits (discharges) effluent to be captured regardless of size
- Would include mines under care and maintenance since 2012 – these mines may re-open and discharge effluent

Authority to deposit deleterious substances

- Three substances would be prescribed as deleterious substances:
  - Selenium
  - Nitrate
  - Suspended Solids
- Effluent quality standards would apply to these substances
- Effluent must also be not acutely lethal

Mine Waste Disposal Areas

Change:

- Provisions will not be included for an authorization to deposit a deleterious substance into water frequented by fish for a coal mine waste disposal area (tailings impoundment area).

- Coal mines are not analogous to metal or diamond mines where water frequented by fish is used as a tailings impoundment area for the confined deposit of mine waste and tailings to prevent oxidization. ECCC is not aware of any coal mine that is planning the subaqueous storage of mine waste.

- Authorization will still be required from the Minister of Fisheries and Oceans Canada under Section 35 of the *Fisheries Act* for any coal mining related work, undertaking or activity that results in the harmful alteration, disruption or destruction of fish habitat.

Analytical Requirements

- Suspended solids, selenium and nitrate concentrations would need to be determined by a laboratory accredited
  - under the International Organization for Standardization standard ISO/IEC 17025, or
  - under the *Environment Quality Act*, CQLR, c. Q-2; and

Public Information and Review of Regulations

- Any information submitted under these regulations could be made public

Review of Regulations

ECCC intends to review the Regulations 10 years after promulgation. In reviewing the Regulations, ECCC will consider factors such as EEM results, effluent monitoring data and advancements in mitigation measures to assess the effectiveness and appropriateness of compliance limits, particularly selenium limits under the alternative approach.

Key Provisions under the General Approach

Application

- The General Approach would apply to coal mines other than existing mountain mines located in the Elk Valley, BC
- Excludes recognized reclaimed areas of coal mines

Effluent Quality Standards

- Starting 3 years after promulgation, deposits from final discharge points (FDP) would be authorized if effluent:
  - meets limits for selenium, nitrate and suspended solids;
  - is not acutely lethal; and
  - is within a pH range of 6-9.5
- Different limits for « new » mines and « existing » mines would apply
  - New mines include:
    - mines that first start operating 3 years after promulgation of the regulations, and
    - mines that ceased operating prior to January 1, 2012, and re-open after the three-year window
- Mines would be prohibited from diluting effluent prior to deposit through an FDP
  - can’t combine non-contact or diverted water with effluent resulting in diluting effluent prior to deposit through FDP

Effluent Quality Standards cont'd

- Limits and requirements with respect to pH and acute lethality would take effect 3 years after promulgation, when mines would gain the authority to deposit

Deleterious Substance	Unit	Existing Mines		New Mines	
		Maximum Monthly Mean Concentration	Maximum Grab Sample Concentration	Maximum Monthly Mean Concentration	Maximum Grab Sample Concentration
Suspended Solids	mg/L	≤ 35	≤ 70	≤ 35	≤ 70
Total Selenium	µg/L	≤ 10	≤ 20	≤ 5	≤ 10
Total Nitrate	mg/L, as nitrogen	≤ 10	≤ 20	≤ 5	≤ 10

Suspended Solids Exception

- Grab sample limits for SS would increase to 2000 mg/L during and within 24 hours after an exceptional precipitation event
- An exceptional precipitation event is:
  - For existing mines: a 1-in-10-year, 24-hour precipitation event
  - For new mines: a 1-in-25-year, 24-hour precipitation event
- To determine if an event is exceptional, the amount of rainfall would need to be measured using an on-site precipitation gauge and compared to ECCC's Intensity-Duration-Frequency (IDF) data from the closest station
  - ECCC publishes tables and graphs for short-duration rainfall IDF statistics across Canada: https://climate.weather.gc.ca/prods_servs/engineering_e.html

Changes:

- Limit of 2000 mg/L would apply during an exceptional event
- More stringent trigger (1-in-25 year) would apply for new mines
- Exception is limited to 24 hours after the event

Monitoring Requirements

- For the first three years, quarterly sampling and testing for selenium, nitrate and SS would be required – as part of effluent characterization for Environmental Effects Monitoring
- Frequencies would be as follows thereafter:

Parameter	Minimum Frequency
Selenium and Nitrate	Weekly - quarterly if 10% below limit for 12 consecutive months, additionally, in the case of nitrate, explosive cannot have been used in the preceding 12 months
SS	Weekly
pH	Weekly
Acute Lethality on Fish and Invertebrate Species*	Monthly - If failed, conduct effluent characterization and test twice a month until 3 consecutive passes - If passed for 12 consecutive months, reduced to quarterly
Flow rate	Weekly or continuously

*Effluent from mines would need to be non-acutely lethal to rainbow trout and *Daphnia magna.* For mines discharging saline effluent to marine environment, the use of Three-spined stickle back in place of rainbow trout and *Acartia tonsa* in place of *Daphnia magna*

Special Provisions for No-Production and Low Flow (<50 m^3/day) Mines

- If a mine ceases coal production or had an annual average daily volume of effluent less than 50 m^3 in the previous calendar year, minimum testing frequency would be reduced to quarterly for all parameters
- Quarterly mean limits for deleterious substances that are equal to the monthly mean limits would apply
- Increased frequency provisions would continue to apply in the case of acute lethality

Change:

- Intent is to reduce administrative burden in the case where effluent is expected to be relatively constant (mines on care and maintenance) and where mines have low flows (expected to be small mines).

Reporting Requirements

- Identifying information (within 60 days of promulgation) including:
  - Company and contact person information
  - Mine description including planned new areas, locations of fish-frequented waters, descriptions of treatment systems
  - Whether coal mine is producing coal or not
- Information with respect to FDPs (within 60 days of promulgation) including:
  - FDP name, description and location
  - Name and description of the receiving waterbody
  - Description of area of the mine that generates effluent deposited through the FDP
- Quarterly reports of all tests and monitoring conducted under the CMER in the preceding quarter
  - First quarterly report would need to be provided 45 days at the end of the first quarter after promulgation

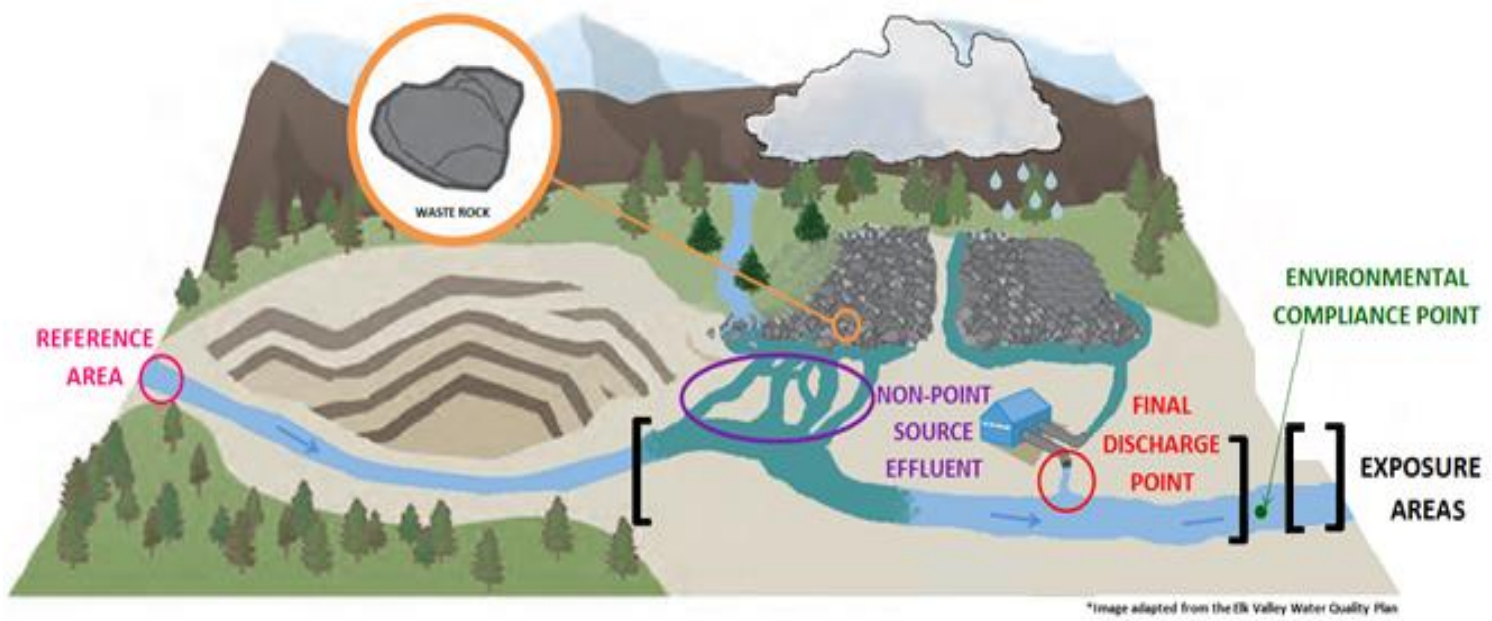
Recognized Reclaimed Areas

- The owner of a mine under the general approach could apply to have a mine or an area of a mine recognized as reclaimed by the Minister of the Environment
- Once the mine or area of the mine is recognized as reclaimed, it would lose its authority to deposit and would no longer be required to be monitored and reported on

Recognized Reclaimed Areas cont'd

- Criteria to be recognized as reclaimed would include:
  - Coal production and storage ceased at least 6 years prior to the application
  - Effluent from other parts of the mine does not contact the area
  - All provincial/territorial/federal requirements for establishing the area as reclaimed have been met
  - Reclamation activities to prevent the weathering and mobilization of deleterious substances within the area were completed at least 3 years prior to application
  - Effluent quality standards at FDPs within the area were met for 3 consecutive years prior to the application, where applicable
  - If applicable, has conducted an EEM biological monitoring study

Key Provisions under the Alternative Approach



Note that Environmental Effects Monitoring (EEM) would need to be conducted on two exposure areas, one upstream of each ECP and one downstream – to be discussed further in EEM presentation.

Alternative Approach: Overview

- Would apply to five existing mountain mines in the Elk Valley in southeastern BC
- Would require that effluent from existing areas currently discharged through FDPs:
  - Continue to be discharged through FDPs, i.e., keep collecting the effluent already collected
  - Monitor for selenium, nitrate, SS and flow
  - Meet SS limits, pH and acute lethality requirements (same as under general approach)
- Would set receiver-based limits for Nitrate, Selenium, and SS at Environmental Compliance Points (ECPs)
- Expansions would be required to collect effluent and deposit through an FDP. Limits for existing mines under the general approach would apply.
- Non-point source effluent would not be authorized to be deposited downstream of ECPs
- Authority to deposit would take effect 3 years after promulgation, at the same time as effluent quality standards at FDPs and ECPs

Change: Re-introduction of SS limits at ECPs relative to background point measurements.

Proposed Criteria for Locating Environmental Compliance Points

- The combination of all of a mine's ECPs would need to account for all effluent from a mine in each designated waterbody into which the mine discharges
  - Proposed designated waterbodies are the Fording River, the Elk River, Michel Creek and Harmer Creek
- An ECP would need to be within 200 m downstream from the mine's last effluent entry point into the designated waterbody (FPD or non-point source)
- ECP locations would need to allow for year-round sampling and flow measurement
- Mines depositing in the same area of a designated water body could establish joint ECPs with shared liability

Criteria adjusted to reflect the current proposal to limit the alternative approach to the Elk Valley.

Background Points

- A Background Point would need to be established for each ECP
- Location would need to:
  - be within 200 m upstream of where effluent from a mine associated with the ECP is deposited in the designated waterbody
  - allow for year-round sampling and flow measurement
- Would establish selenium, nitrate and SS concentration and pH measurements prior to a mine depositing effluent
- SS limits at ECPs would be determined relative to background point measurements

Application for ECPs and Background Points cont'd

- The owner of a mine would be required to submit to the Minister of the Environment proposed ECP and Background Point locations and supporting information within 4 months of the coming into force of the regulations
- If all criteria in the application are met, a notice of acceptance would be issued within 1 year of promulgation

Application for ECPs and Background Points

- Application for ECPs and background points would include:
  - Mine identifying information
  - Details of each proposed ECP including name, location, details of how the ECP meets the criteria, description of effluent sources, pathways and deposit locations, etc.
  - Details of each proposed background point including name, associated ECP, location, description, receiving waterbody, etc.
  - Information on all existing monitoring sites for which information is reported to the province
- Information must be prepared and signed by qualified professionals and certified by the owner or operator

Determining Baseline Performance at ECPs

- Baseline performance for selenium and nitrate concentrations would be determined during years 2 and 3 after promulgation
- Weekly concentration measurements would be gathered to determine monthly and 24-month means
- Limits for selenium and nitrate would be based on the 24-month mean performance during the baseline period

Phase-in of Standards at ECPs

- Beginning 3 years following promulgation, the following effluent quality standards would have to be met at each ECP

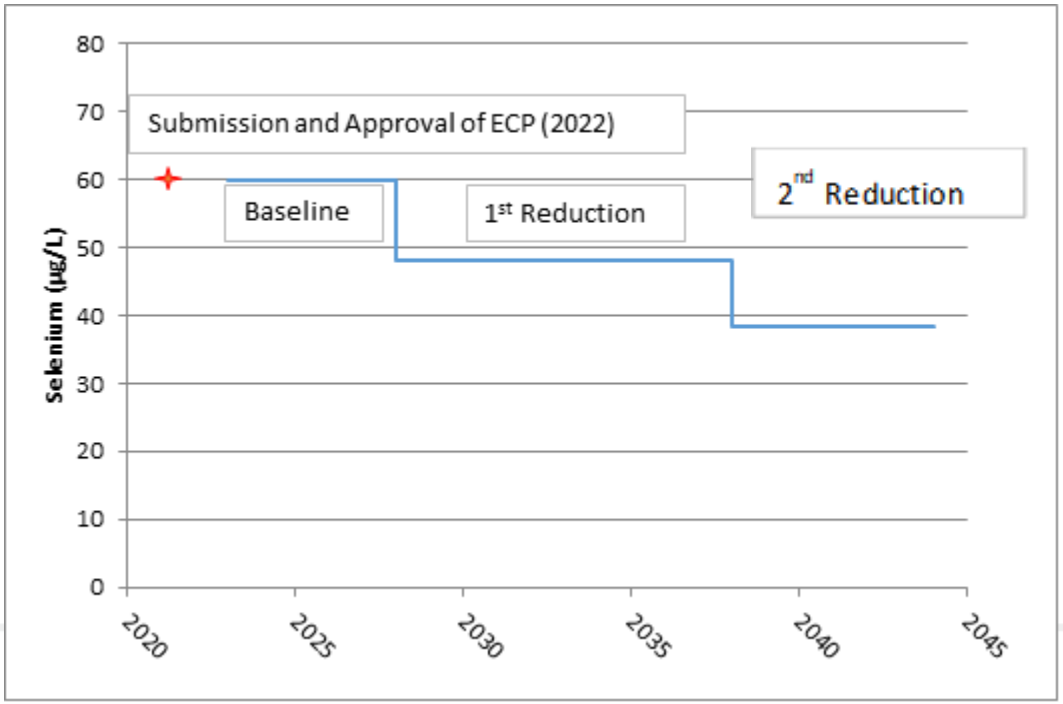
Deleterious Substance	Basis	Limit - Starting 3 years after promulgation	Limit - Starting 6 years after promulgation	Limit - Starting 16 years after promulgation
SS	Grab sample	≤25 % above background levels	≤10 % above background levels	≤10% above background levels
Selenium*	Monthly Average	Highest monthly mean measured during baseline	Lower of 50 µg/L or 20% reduction from baseline	Lower of 40 µg/L or 36% reduction from baseline
	Maximum (grab sample)	Twice the monthly mean	Twice the monthly average	Twice the monthly mean limit
Nitrate, measured as N*	Monthly Average	Highest monthly mean measured during baseline	Lower of 16 mg-N/L or 20% reduction from baseline	Lower of 12.8 mg/L or 36% reduction from baseline
	Maximum (grab sample)	Twice the monthly mean limit	Twice the monthly mean limit	Twice the monthly mean limit
pH	pH at each ECP must be equal to or greater than 6.5 but less than or equal to 9 at all times			

*Monthly mean for selenium and nitrate concentrations would not be required to go below 2 µg/L and 3 mg-N/L respectively.

Phase-in of Standards (cont'd)

Example of phase-in approach in the case where a mine is currently at 60 µg/L at its ECP, assuming CMER promulgation in 2021:

- 1st reduction / limit: 48.0 µg/L in 2027
- 2nd reduction / limit: 38.4 µg/L in 2037



ECP and Background Point Monitoring

- ECPs and background points would be defined as cross-sectional areas of a waterbody rather than a single point
  - When identifying ECPs and background points, coordinates would be provided for either side of the cross section and would need to be marked
- Samples would need to be taken within 25% of the centre of the width of the waterbody and within a metre of the cross-section
- Flow rates at ECPs and background points would need to be measured beginning one year after promulgation using one of two methods:
  - Measuring flow rate or volume of water passing through the cross-section using a flow measurement system
    - Equipment would need to be calibrated and maintained annually and be accurate to within 15%

  OR
  - Measuring the stage of the waterbody and applying a stage-flow relationship
    - Would need to be accurate to within 5mm and reference to at least 3 benchmarks
    - Equipment would need to be calibrated at least once per year
    - Stage-flow relation would need to be accurate to within 15%
    - Would need to be verified by taking manual flow rate measurements 3 times annually

- ECP no longer a single point – provides flexibility for seasonal changes
- Option for determining flow rate using a stage-flow relation added

ECP and Background Point Monitoring (cont'd)

- Weekly sampling and testing for selenium, nitrate, suspended solids and pH would be required at ECP and background points
  - There would be no reduced frequency provisions
- Background point samples would need to be collected within 4 hours of samples collected at the ECP
- Flow rate would need to be determined weekly at the time the sample is collected or continuously
- Acute lethality test would not be required at the ECP or background point
  - All effluent from the mines would be required to not be acutely lethal but monitoring for acute lethality would only be required at FDPs

Expansions

- The Minister of the Environment would need to be notified 60 days prior to commencing an expansion
  - Description of the expansion including a site plan would need to be provided
- Effluent from expansions would need to:
  - be collected and deposited through an FDP
  - meet standards and monitoring requirements for existing mines under the general approach
- An expansion could become a recognized reclaimed area if it meets the criteria

An **expansion** is intended as new areas of the coal mine associated with new coal processing facilities, new coal storage facilities, new areas used for surface or subsurface extraction, new waste storage facilities – not connected to such existing areas of the mine.

Example:

1) A new waste rock pile would be an expansion
2) Waste rock placed on an existing pile would not be an expansion

Reporting Requirements

- In addition to the reporting requirements under the general approach:
  - Identifying information would identify any planned expansions and the estimated timelines for those expansions
  - FDP information would specify whether an FDP is designed to deposit effluent from an Expansion or if it is located downstream of the last ECP
  - Monitoring reports would include concentration, pH and flow measurements from ECPs and background points

NEXT STEPS

Fall 2020

- Publish proposed regulations in *Canada Gazette*, Part I
- Formal 60-day comment period

Fall 2021

- Target to publish final *Coal Mining Effluent Regulations* in *Canada Gazette*, Part II

ANNEX 1 – EXAMPLE OF ECCC IDF DATA

SPARWOOD BC 1157630

Latitude: 49 45'N Longitude: 114 53'W Elevation/Altitude: 1137 m

Table 2a : Return Period Rainfall Amounts (mm)

Duration/Durée	2 yr/ans	5 yr/ans	**10** yr/ans	**25** yr/ans	50 yr/ans	100 yr/ans	#Years Années
5 min	3.0	4.5	5.6	6.9	7.9	8.8	35
10 min	4.0	6.2	7.7	9.5	10.8	12.2	35
15 min	4.8	7.3	8.9	10.9	12.5	14.0	35
30 min	6.3	9.1	10.9	13.3	15.0	16.8	35
1 h	8.2	11.1	13.0	15.3	17.1	18.9	36
2 h	10.7	13.4	15.1	17.4	19.1	20.7	35
6 h	17.1	22.2	25.5	29.8	32.9	36.0	33
12 h	23.0	33.5	40.5	49.3	55.8	62.3	33
24 h	28.6	40.6	**48.5**	**58.6**	66.0	73.4	35

UPDATE – PROPOSED ENVIRONMENTAL EFFECTS MONITORING (EEM) FOR THE COAL MINING EFFLUENT REGULATIONS

Information Session
February 2020

Environment and Climate Change Canada
Environnement et Changement climatique Canada
Canada

CONTEXT

- This presentation concerns the EEM proposal for the Coal Mining Effluent Regulations (CMER)

CURRENT STATUS

- Three rounds of engagement/consultations have occurred:
  - January 2017 – presented initial *Proposed Regulatory Framework for Coal Mining*
  - November 2017 – more detailed *Proposed Approach for Coal Mining Effluent Regulations* presented that considered comments received
  - Fall 2018 – presented update on current thinking on key issues:
    - Signal Check: Proposed Coal Mining Effluent Regulations
    - CMER EEM – Key areas considered for change from Nov. 2017 consultation document
- Written comments received have been considered in refining the proposed approach
- Purpose of this presentation is to provide information on the EEM proposal for CMER.

OVERVIEW

- What is EEM?
- How does EEM measure effects?
- Overview of CMER EEM proposal for:
  - Coal mines under the General Approach
  - Coal mines under the Alternative Approach

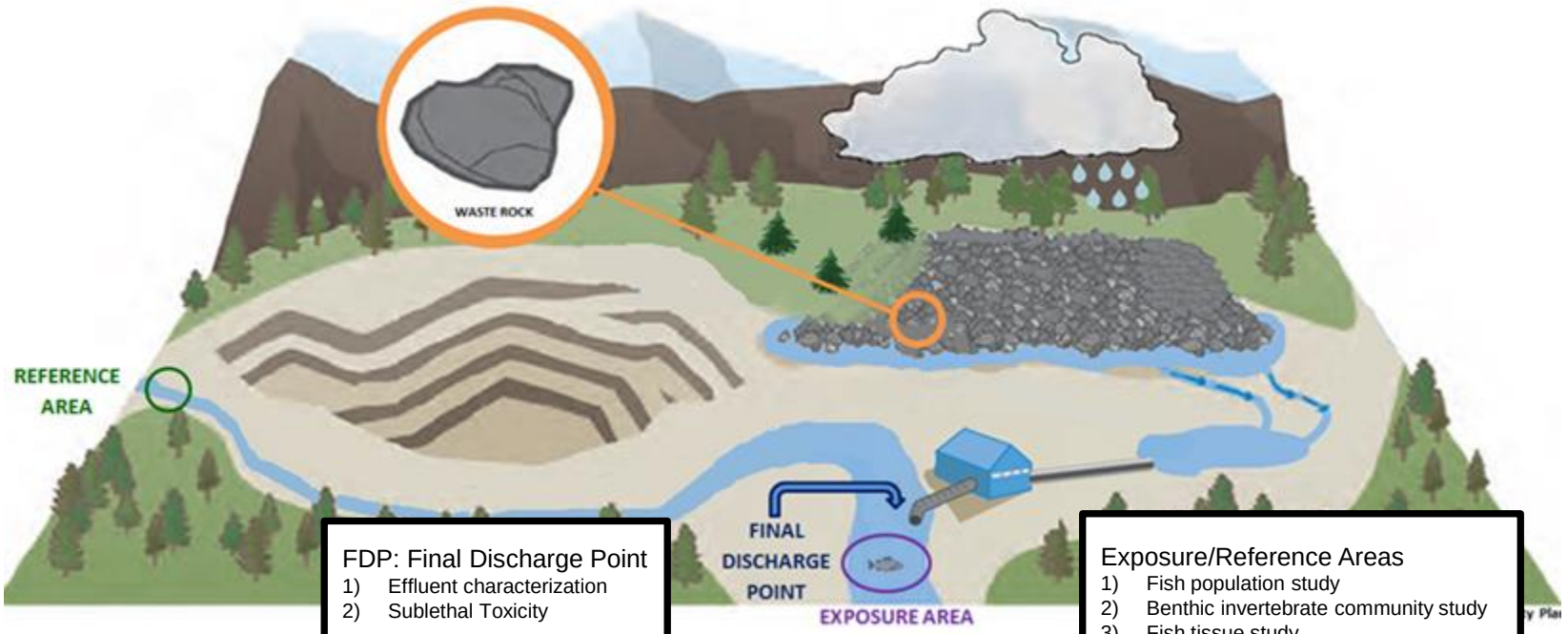
WHAT IS EEM?

- Environmental Effects Monitoring (EEM) is a regulatory requirement governing the authority to deposit effluent under *Fisheries Act* regulations.
- EEM measures, directly in the receiving environment, the effects of effluents on fish, fish habitat and human use of fisheries resources.
- The objectives of EEM are to:
  - Assess how well our control measures under the *Fisheries Act* protect fish, fish habitat (e.g. benthic invertebrates) and the use of fish by human.
  - Provide scientific evidence to inform policy and regulatory decisions.

HOW DOES EEM MEASURE EFFECTS?

- Compare measures taken in area exposed to effluent to those in similar area not exposed to effluent (reference)

GENERAL APPROACH

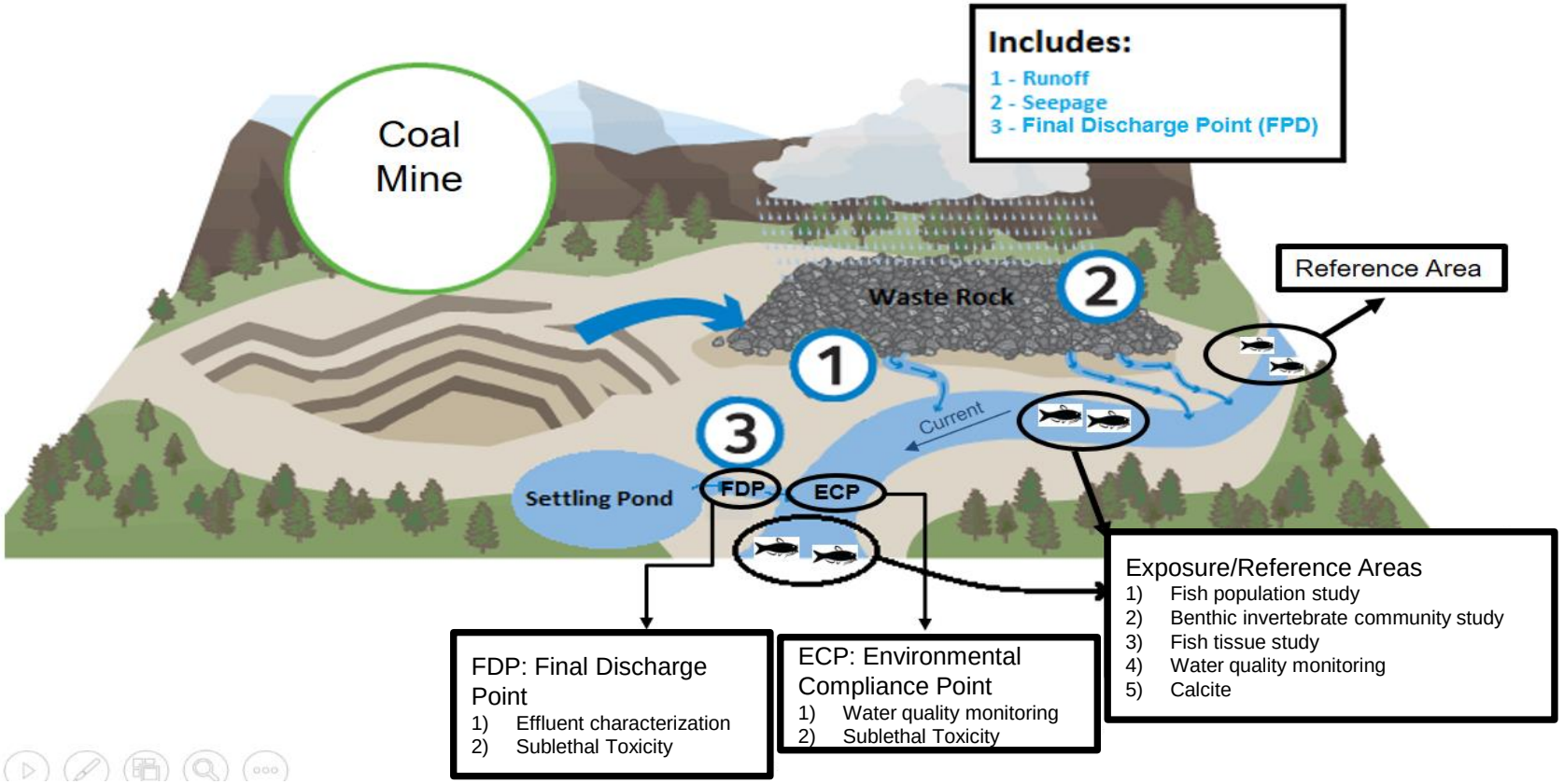


FDP: Final Discharge Point
1) Effluent characterization
2) Sublethal Toxicity

Exposure/Reference Areas
1) Fish population study
2) Benthic invertebrate community study
3) Fish tissue study
4) Water quality monitoring

ALTERNATIVE APPROACH

Existing Mountain Mines with Non-Point Source Discharge



EEM Overview

1. Effluent Characterization
2. Water Quality Monitoring
3. Sublethal Toxicity Testing
4. Fish Population Study
5. Benthic Invertebrate Community Study
6. Mercury in Fish Tissue Study
7. Selenium in Fish Tissue Study
8. Investigation of Cause and Solutions
9. Indigenous Knowledge
10. Calcite
11. EEM Study Following Reclamation
12. Reporting Requirements

1. Effluent Characterization

- Mines would be required to begin effluent characterization within the first calendar quarter they become subject to the CMER
- Collect samples of effluent from each final discharge point (FDP) once per calendar quarter

Major changes:

- Dissolved carbon dioxide concentration would no longer be required under effluent characterization
- Effluent characterization for mines under the Alternative approach would be required every calendar quarter instead of monthly

2. Water Quality Monitoring

- Mines would be required to begin water quality monitoring 12 months after becoming subject to the CMER
- Collect samples of water for mines under the General approach:
  - in each distinct effluent plume and related reference area 4 times per year
  - at benthic invertebrate community, fish population and fish tissue study sites, during biological monitoring studies (every 3 years)
- Collect samples of water for mines under the Alternative approach:
  - at the environmental compliance point (ECP), monthly
  - upstream and downstream of the ECP and related reference areas, monthly
  - at benthic invertebrate community, fish population and fish tissue study sites, during biological monitoring studies (every 3 years)

Major changes:

For mines under the General approach :

- Water quality monitoring would be based on distinct effluent plume, instead of FDP
- An effluent plume would be defined as a contiguous zone within the exposure area where effluent concentrations exceeds 1% - can result from the combination of effluent released from more than one FDP

For mines under the Alternative approach :

- The monitoring of water quality surrounding each FDP would be removed.
- The sites for water quality monitoring in the receiving environment would be established in relation to the ECP, and not by taking into account the bank length

3. Sublethal Toxicity Testing

- Mines would be required to begin sublethal toxicity (SLT) testing 12 months after becoming subject to the CMER
- SLT testing would be conducted:
  - using effluent from the FDP that has potentially the most adverse impact on the environment
  - In addition, for mines under the Alternative approach, using water collected at each ECP
- Tests twice per year
- After completing 6 testing periods: test four times per year using the most sensitive test method

Major change:

- SLT testing would be required at each ECP, not only the highest-risk ECP per mine

4. Fish Population Study

To assess effluent effects on fish reproduction, survival, condition and growth by comparing measures on exposed and reference fish.

- Within three and a half years of becoming subject to the CMER and once every three years thereafter, mines under the Alternative approach would be required to conduct a fish population study. For mines under the General approach it would be required if:
  - effluent concentration in the receiving environment is greater than 1 % at 250 m from any FDP.
- For mines under the Alternative approach, effects would have to be assessed separately upstream and downstream of the ECP
- Mine would be allowed to “skip” a study if:
  - the previous two studies indicate no effect on the fish population or effects below critical effect size (for endpoints with assigned CES), or;
  - the mine is required to conduct a study to determine the cause of a fish population effect and solutions to eliminate this effect

Major change:

- For mines under the Alternative approach, measures would be required upstream and downstream of the ECP and effects assessed separately

5. Benthic Invertebrate Community Study

To assess effluent effects on benthic invertebrate community (BIC) richness, evenness, density and community structure by comparing measures on BIC exposed to effluent and BIC from reference area.

- Within three and a half years of becoming subject to the CMER and once every three years thereafter, mines under the Alternative approach would be required to conduct a BIC study. For mines under the General approach it would be required if:
  - effluent concentration in the receiving environment is greater than 1 % at 100 m from any FDP.
- For mines under the Alternative approach, effects would have to be assessed separately upstream and downstream of the ECP
- Mines would be allowed to "skip" one study if:
  - the previous two studies indicate no effect on the BIC or effects below critical effect size (for endpoints with assigned CES), or;
  - the mine is required to conduct a study to determine the cause of a BIC effect and determine solutions to eliminate this effect

Major change:

- For mines under the Alternative approach, measures would be required upstream and downstream of the ECP and effects assessed separately

6. Mercury in Fish Tissue Study

- To assess if the level of mercury (Hg) in fish exposed to effluent is greater than that of reference fish and above fish consumption guidelines.
- Within three and a half years of becoming subject to the CMER and once every three years thereafter, mines under the Alternative approach would be required to conduct a Hg in fish tissue study. For mines under the General approach it would be required if:
  - effluent concentration of Hg is equal to or greater than 0.1 µg/L (annual average); or
  - Hg was analysed with an insufficient detection level
- For mines under the Alternative approach, effects would have to be assessed separately upstream and downstream of the ECP
- Mines would be allowed to "skip" one study if:
  - the results from the previous two studies indicate no effect from Hg in fish tissue; or
  - the mine is required to conduct a study to determine the cause of a Hg in fish tissue effect and solutions to eliminate this effect

Major change:

- In the case of a mine under the General approach exempted from monitoring Hg based on 12 consecutive measurements below 0.1 µg/L, the addition of a FDP or change to the location of an existing FDP would trigger back the mine into Hg monitoring.
- For mines under the Alternative approach, measures would be required upstream and downstream of the ECP and effects assessed separately

7. Selenium in Fish Tissue Study

To assess if the level of selenium (Se) in fish exposed to effluent is greater than that of reference fish and whether there are any exceedances of fish health or fish consumption guidelines in exposed fish.

- Within three and a half years of becoming subject to the CMER and once every three years thereafter, mines would be required to conduct a Se in fish tissue study.
- For mines under the Alternative approach, effects would have to be assessed separately upstream and downstream of the ECP
- Mines would be allowed to "skip" a study if:
  - The previous two studies indicate no effect on fish tissue from Se, and fish tissue Se concentrations do not exceed Se fish health and fish consumption guidelines, or;
  - the mine is required to conduct a study to determine the cause of a Se in fish tissue effect or exceedances, and determine solutions to eliminate this effect or exceedances

Major changes:

- Se in fish tissue studies would not trigger the requirement for more stringent effluent discharge limits but would be included as part of EEM
- Would include consideration of fish health and fish consumption guidelines
- Would also include the analysis of Se in benthic invertebrates and sediments

8. Investigation of cause and solutions

- After two studies confirming results, mines would be required to investigate the cause(s) (IOC) of and identify solutions (IOS) for:
  - Effects (equal to or above critical effect size for endpoints with assigned CES); and/or
  - Exceedances of Se fish health or fish consumption guidelines, measured in any of the two previous studies.
- IOS and IOC would occur sequentially over a three-year period
- At the conclusion of an IOC/IOS study, the mine would have to submit information on the cause(s) and solutions varying in environmental performance, along with economical and technical considerations.

Major change:

- The study to identify solutions (IOS) would be required within the same three-year period as the study for the investigation of cause(s) (IOC).

9. Indigenous Knowledge

- At least 12 months before the submission of their first study design, mines would be required to identify and invite Indigenous communities to share their Indigenous knowledge (IK) and consider it within EEM study designs.
  - Identification and invitation would be a one-time requirement
  - Consideration of IK would be a requirement for each study design
  - No deadline for the submission of the IK
- Mines would have to report in a separate document every three years:
  - How Indigenous communities were identified and invited to share their IK
  - The IK received
  - Whether and how it was taken into account in the EEM study design

Major change:

- The regulatory proposal would include requirements for mines to seek IK from Indigenous communities and consider it within EEM study designs.

10. Calcite

- Within a year and a half of becoming subject to the CMER and once every three years thereafter, mines would be required to visually assess and report the degree (percent surface area) and extent of calcite on the bottom substrate of the receiving environment
- Mines would also have to calculate a calcium carbonate saturation index every quarter based on parameters measured under effluent characterization and water quality monitoring

Major changes:

- The calcium carbonate saturation index would have to be calculated based on commonly measured parameters in effluent and water such as pH and dissolved alkalinity, instead of dissolved carbon dioxide
- The new requirement to visually assess the presence of calcite would supersede the calcium carbonate saturation index as a measure of calcification, which would be used to help understand how calcite formation is related to the mine's effluent and receiving environment water quality

11. EEM Study Following Reclamation

- These provisions would only apply to mines under the General Approach
- An EEM study following reclamation would be required as a condition for an area or a mine to be recognized as Reclaimed Mine or Reclaimed Area if:
  - The exposure area, where the fish or benthic invertebrates were collected in any previous EEM studies, are no longer exposed to the mine's effluent following reclamation; and
  - The most two recent studies conducted in that area indicated a similar effect (equal to or above critical effect size for endpoints with assigned CES) or an exceedance of selenium guidelines, measured in any of these two studies.
- Only the effects or exceedances that meet the condition above would be assessed as part of this study.

Major change:

- Modification to the final EEM study requirements for the new Reclaimed Mine or Reclaimed Area provisions

12. Reporting Requirements

- Effluent characterization, water quality monitoring and sublethal toxicity testing results would have to be reported to the Department annually
- Biological monitoring studies (e.g. fish population study) would have to be reported to the Department every three years, through a study design and interpretive report
    - The first study design would have to be submitted a maximum of 18 months after the mine become subject to the CMER
    - The first interpretive report would have to be submitted a maximum of 42 months after the mine become subject to the CMER
- Along with their study design, mines would be required to separately report information related to Indigenous Knowledge.
- An extension of up to 12 months to submit the first interpretive report may be granted to a mine if it allows to synchronize its sampling to fulfill provincial and EEM requirements

Major change:

- An extension to submit the first interpretive report would be included in the CMER to enable mines to synchronize sampling of fish or BIC for the purpose of fulfilling both provincial/territorial and EEM requirements