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

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Environment and Climate Change Canada
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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

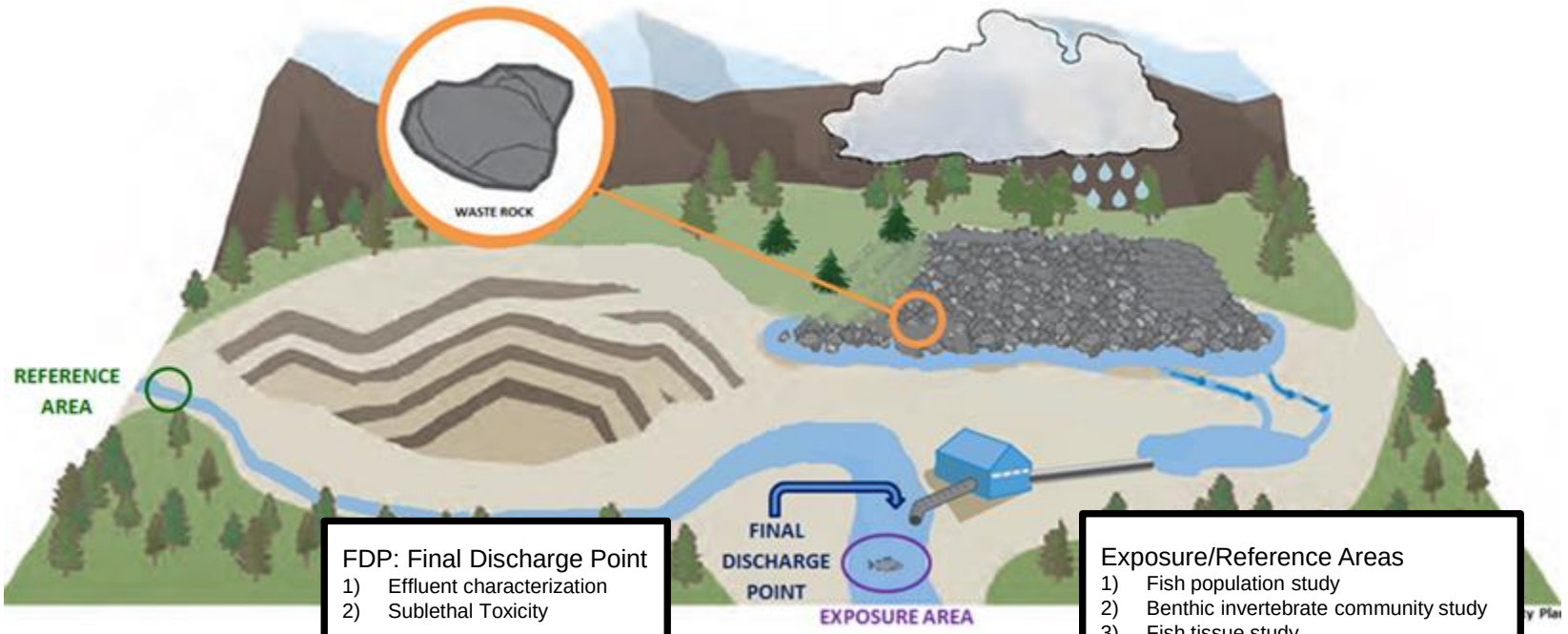
WHAT IS EEM?

- 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

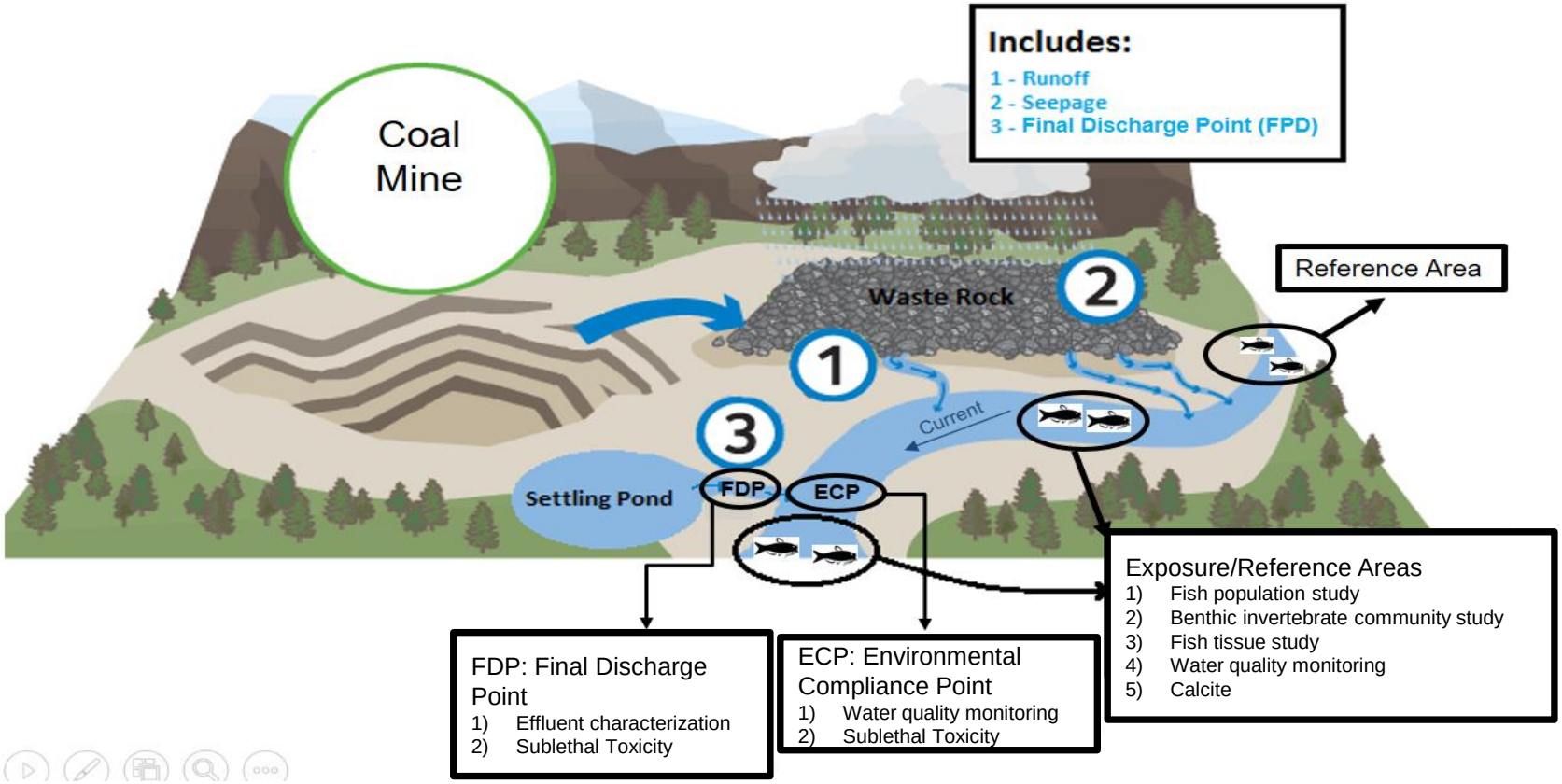


FDP: Final Discharge Point
1) Effluent characterization
2) Sublethal Toxicity

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