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# Elk Valley Water Quality Plan

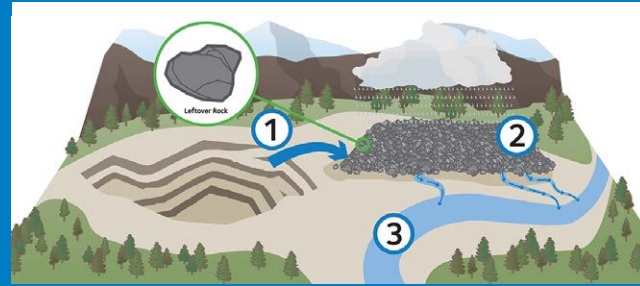
Summer 2017 Update

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**Teck**



# Water Quality and Mining



## The Challenge

- 1 The mining process generates large quantities of leftover rock that contains naturally-occurring substances such as selenium, an element that is essential for human and animal health in small amounts.
- 2 Water from both precipitation and runoff flows through these rock piles and carries selenium and other substances, such as nitrate, into the local watershed.
- 3 If present in high enough concentrations in the watershed, these substances can adversely affect aquatic health.

Our goal is to stabilize and reverse the increasing trend of selenium and other substances to ensure the ongoing health of the watershed, while at the same time allowing for continued sustainable mining in the region.

## Our Commitment to Water Quality

We recognize addressing the water quality effects of mining is a legacy issue connected to decades of mining. It is complex, and ready-made solutions do not exist; however, we are making progress.

Teck is fully committed to finding solutions and this work is at the global forefront of managing water quality in mining. Success requires a long-term approach, driven by continued innovation and collaboration.

## We Want to Hear From You

As we move forward with achieving the goals of the Elk Valley Water Quality Plan, we will continue to seek input and advice from experts, First Nations, residents and river users alike.

Phone toll-free to 1.855.806.6854 and leave a message. Send an email to [feedbackteckcoal@teck.com](mailto:feedbackteckcoal@teck.com). Fill out a feedback form here or at locations throughout the Elk Valley.

# The Elk Valley Water Quality Plan

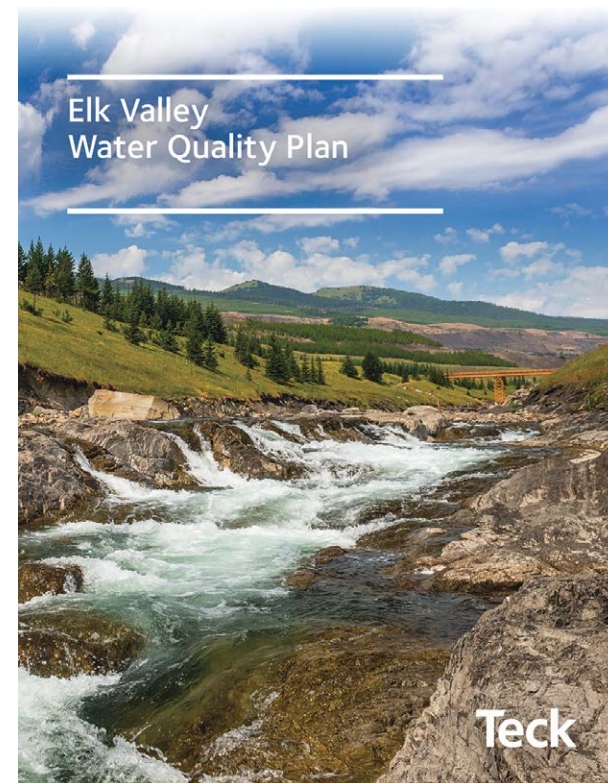
In 2014, B.C. Ministry of Environment approved an area based management plan — the Elk Valley Water Quality Plan (EVWQP)

The Plan was informed by scientific advice received from a Technical Advisory Committee chaired by B.C. Ministry of Environment with participation from government, First Nations, an independent scientist and community input received through three phases of public consultation in Elk Valley communities.

## Elk Valley Water Quality Plan Implementation

1. **Targets:** Set short, medium, long-term water quality targets that are protective of aquatic and human health
2. **Water Management:** Implement water treatment and mitigation actions to achieve targets
3. **Monitoring:** Define a monitoring program for water quality and aquatic health
4. **Research and Development:** Undertake an R&D program to advance ways to ensure water quality
5. **Adaptive Management:** Multi-decade plan, adapting implementation based on new information and learnings

An Environmental Monitoring Committee (EMC) was established to advise on the implementation of the plan. The EMC consists of experts from the Ministry of Environment, Ministry of Energy and Mines, the Interior Health Authority, the Ktunaxa Nation Council, an independent scientist and Teck. The EMC reviews and provides input and advice to all monitoring reports and study designs. The EMC publishes an annual public report at [www.teck.com/elkvalley](http://www.teck.com/elkvalley)



# Implementing Water Treatment



The West Line Creek Active Water Treatment Facility at Line Creek Operations.

## 1. West Line Creek Active Water Treatment Facility

- Commissioned in February 2016
- 7,500 m<sup>3</sup>/day water treatment capacity
- Meeting design targets for selenium and nitrate reduction:
  - Selenium concentrations are reduced by about 96% in treated water
  - Nitrate concentrations are reduced by over 99%
- A challenge related to selenium compounds in discharge water has been identified. An option to address this issue has been developed and is undergoing piloting through summer 2017.

## 2. Planned Fording River Operations Active Water Treatment Facility

- Planned for operation in 2019
- Estimated 20,000 m<sup>3</sup>/day capacity
- Tree harvesting and soil salvage of the project area is complete

## 3. Elkview Operations Active Water Treatment Facility

- Planned for operation in 2020
- Estimated 30,000 m<sup>3</sup>/day capacity

# Research and Development

Teck is undertaking an extensive, multi-year R&D Program, focused on:

- Improving mine designs to better control release of water quality constituents at source
- Identifying and piloting improved methods for treating mine-affected water
- Approximately 15 projects are underway now

## Pilot Study: Saturated Rock Fill Project

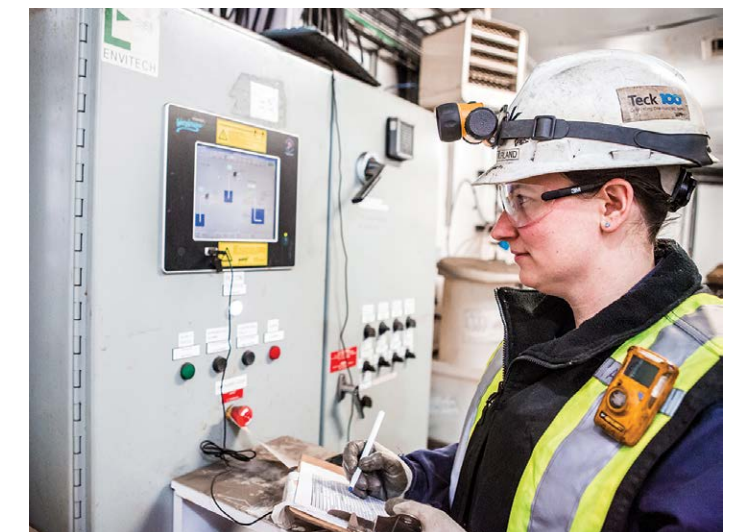
One major area of R&D work we are undertaking is a full-scale trial saturated rock fill at Elkview Operations to remove selenium within our existing operations.

This technology involves using naturally-occurring organic processes to treat mine-affected water. Saturated rock fills reduce nitrate and selenium through biologic reduction, similar to active water treatment.

So far, the pilot project has found that approximately 90% of selenium and nitrate is removed from the water through these natural processes.

There are many benefits to this approach including shorter schedule for design and construction and reduced complexity.

We continue to do more research to better understand this potential application, and how it can complement our water treatment approach.



Working at Fording River operations Active Water Treatment pilot project.



# Local and Regional Monitoring



Water quality testing at Thompson Creek.

We are conducting extensive monitoring to improve our understanding of water quality and aquatic health. Existing studies show that selenium concentrations and other mine indicators of water quality within the watershed are at levels that have not affected populations of fish and other sensitive aquatic animals.

## Water Quality Monitoring

- Teck is undertaking regular water quality monitoring (at least monthly) at more than 100 stations including main stem receiving environments; mine-influenced tributaries and reference areas.
- We also conduct quarterly regional groundwater monitoring at 37 wells and site-specific monitoring at more than 50 wells.

## Aquatic Health Monitoring

- We monitor aquatic health through our Regional Aquatic Effects Monitoring Program and our Local Aquatic Effects Monitoring Programs.

## Regional Aquatic Effects Monitoring Program

- The regional program is completed on a three-year cycle and monitoring includes water quality, sediment quality and calcite; periphyton (algae); benthic invertebrates (bugs) and fish. In some cases monitoring may also include birds and amphibians.

## Local Aquatic Effects Monitoring Programs

- To date, local programs have been established for Line Creek, Fording River and Greenhills mining operations.
- The goal is to assess site-specific issues on a more frequent and localized basis.

# Our Ongoing Commitment

## Tributary Evaluation Program

Teck has conducted a Tributary Evaluation Program to evaluate the ecological value of tributaries in the Elk and Fording rivers to help identify tributaries that play a significant role in supporting the health of the ecosystem as a whole.

This program is informing a Tributary Management Plan which is intended to incorporate protection and rehabilitation goals for tributaries that will support achieving the area-based objectives of the Elk Valley Water Quality Plan.

## Calcite Assessment

From 2013-2016, Teck assessed calcite on 370 km of the Elk and Fording rivers and their tributaries. The first calcite management program is planned to start on Greenhills Creek in 2017 and monitoring will continue throughout the watershed.

## Human Health Risk Assessment

Teck is conducting additional monitoring to support an ongoing Human Health Risk Assessment (HHRA). The HHRA objective is to examine the potential effects of mine-related constituents and other parameters of interest.



Fishing the Elk River.

## Fish and Fish Habitat Programs

A three year study was completed in 2015 on the Upper Fording River Westslope Cutthroat Trout population. It concluded that this genetically-pure population is viable and healthy but faces a number of potential challenges, including water quality; stream channel degradation; loss of tributary habitat and potential re-introduction of angling. The study recommended continued monitoring which will continue in 2017, 2019 and 2021.

In addition to our work in water quality, fish habitat rehabilitation projects are being implemented and planned in partnership with the Elk Valley Fish and Fish Habitat Committee which includes representatives from the Ktunaxa Nation Council, Fisheries and Oceans Canada and the Ministry of Forest Lands and Natural Resource Operations.

Approximately 33,000 m<sup>2</sup> of stream habitat was rehabilitated in 2016, including 133 large woody debris structures and 26 rock riffle structures.