

Kemano T2 Project

Project update – Winter 2021-2022



The tunnel boring machine broke through!

It gives me great pleasure to share this project update with you. We received queries from the community about the project and feel that there is an interest in learning more about the work being done in Kemano.

This project update will inform you about the progress of the project, but also about our health and safety measures, environment initiatives, and various tunneling related topics.

Let me start by heartily thanking those who are supporting the construction of this second tunnel: our First Nations partners, the government of British Columbia, community members, employees and contractors.

What an amazing opportunity to start this edition with a major and historical milestone: the breakthrough of the tunnel boring machine into the stub tunnel. The first blast for the T2 adit, the entrance to the mountain to bore the second tunnel, was in September 1989. The TBM started mining the second tunnel in the early 90s. This project is 30 years in the making!

The TBM broke through, but there is still a lot of work to be done before we can fill the tunnel with water, so we are getting ready for winter. We finalized our winterization procedures on the project site. There is so much snow in Kemano during winter that we use GPS coordinates to track the material that gets hidden under the snow. We also

installed identifying markers to make sure we do not damage our material during snow removal operations. Avalanche control team members have already repaired and maintained the gazex canons and ensured everything is in place for our passive and active avalanche control methods.

We welcome your feedback, so please contact us if you have anything to share or if you have questions about the project.

Stay safe and enjoy your reading!

Alex Jones
Project Manager
Kemano T2 Project



A safe breakthrough

The tunnel boring machine (TBM) of the Kemano T2 Project has broken through to complete its journey. The TBM cut 7.6 kilometres through the rock in the mountains over 30 months, completing the route for a 16-kilometre tunnel that was started in the early 1990s.

Safety is the top priority on the Kemano T2 project. The team took several steps to ensure the breakthrough was safe and successful. Three additional gyro surveys were performed by the team leading up to the event to meticulously align the TBM with the stub tunnel it had to break into. Once the stub tunnel had been safely dewatered, the team drilled a smaller probe hole from the machine into the intake to confirm the alignment. Only then the approval to mine through was given and the TBM moved slowly towards its target.



Watch the full story
of the breakthrough here

Boring a tunnel with a TBM... how does it work?

The tunnel boring machine does more than just bore a hole through the mountains. The TBM is a 190-metre-long structure that transports waste rock away, installs the permanent concrete tunnel lining and grouts it in place, drills drain holes into the rock to relieve water pressure on the tunnel and provides a safe work environment for the tunnelling crews.

The T2 tunnel has been excavated by a TBM with a diameter of more than 6.5 metres. The big piece at the front is called the cutterhead, and the individual cutters on it are called, well, the cutters! The cutterhead houses 31 single cutters and four double cutters. As the cutterhead rotates, the cutters roll along the rock and cut it.

“When you look at the cutterhead, the cutters appear randomly scattered. But when the cutterhead turns a full circle, each cutter cuts a circle in the rock that is 10 cm from the next one,” explains Riley McMillan, Kemano T2 Project Lead Tunnel Engineer.

The cutters wear out so they were checked twice per day. Up to 10 cutters may need to be changed in a single day.

Worn out cutters were disassembled, refurbished and re-built on site for re-use.

How many cutters did we have? We had one full set (39 cutters) in the cutterhead; we kept at least one full set re-built and ready to go; one full set in the warehouse just in case, and then we always had a couple extra that are being taken apart and repaired. All together, we kept a little more than 100 cutters in circulation!



“When we change cutters all the work happens from inside the cutterhead and we only move the cutterhead about 10 centimetres from the rock using a short telescoping articulation joint in the shield. When we inspected and repaired the cutterhead last year, we slid the entire TBM backwards 1 metre to make space for people to work in the front of the cutterhead and we took the opportunity to take some photos.”

All cutters are removed from the cutterhead on this photo. The Tunnelling Association of Canada awarded the Canadian Photo of the Year Award – 2021 to Riley for this photo.

The Kemano T2 Project: What's next?

The tunnel boring machine (TBM) finished tunnelling in October. We now need some time to remove the TBM from the tunnel and put what we call the Horetzky plug, a giant wall that will block the passage where we entered to bore the tunnel. If all goes well, we will fill the tunnel with water in the second half of 2022.

We speak a lot about the tunnel that was bored and the impressive tunnel, but we also have a whole team dedicated to refurbishing a part of the tunnel that was bored in the 1990s. The work comprises thorough cleaning of the rock, rock bolting, and **shotcrete** spraying, among others.



What is shotcrete?

Shotcrete is a construction technique which consists in spraying concrete. It can be sprayed onto any type or shape of surface and it reinforces the excavation, in this case the tunnel. Shotcrete requires less preparation (no structure in which we pour concrete required) and is used in the tunnel to stabilize the tunnel walls.

Why do we need a second tunnel?

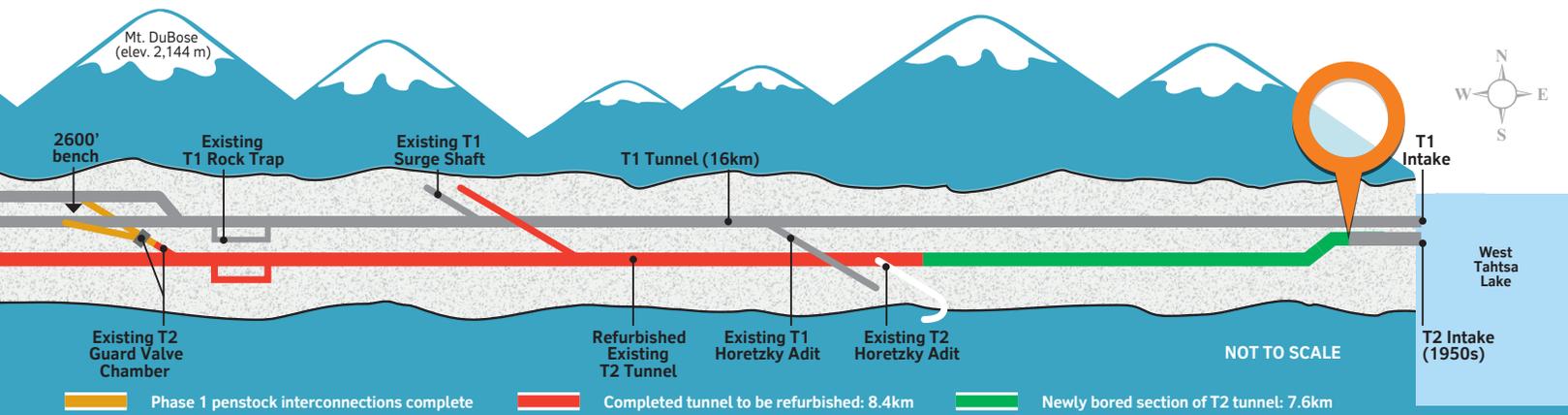
Unlike other parts of Kemano's infrastructure that can be turned off, shut down, and repaired as necessary, the original tunnel cannot be turned off without shutting down the Kemano Powerhouse and the aluminium production in Kitimat.

In 2010 and 2011, detailed engineering studies, which included underwater submarine inspections, were made in the original tunnel. Although no signs of deterioration were detected, there was maintenance work that needed to be made.

The Kemano T2 Project will ensure the long-term, sustainable operation of Rio Tinto's aluminium business in B.C. The second tunnel will allow Rio Tinto to conduct repairs and maintenance on the existing tunnel without shutting down Kemano and Kitimat operations.



Updated project timeline with breakthrough



You ask, we answer!

Q. Why use a TBM instead of drilling and blasting?

Rio Tinto assessed various excavation methods for the Kemano T2 tunnel, including drilling and blasting. The criteria used to select an excavation method were varied and included, amongst others, geotechnical conditions, safety, tunnel maintenance and equipment requirements. The TBM selected for the project offered the lowest risk for safety as well as the shortest construction duration with faster excavation. The concrete tunnel lining associated with the TBM chosen also provided better quality with the lowest risk to operations.

Q. I heard there are many bears in Kemano. How do you protect the workers?

Before arriving to Kemano, new workers to the Kemano T2 Project site are provided an introductory information package that includes awareness of bear activity. Part of their mandatory project induction training is dedicated to the wildlife in Kemano. They learn about good and improper behaviors when encountering bears, and how to use bear spray, if needed. Workers are highly discouraged to leave the camp, however if they do, they must be accompanied, bring bear spray and have access to a vehicle. Bear sightings are communicated on the project radio channels and in project site bulletins that request workers maintain awareness and keep a safe distance.

Q. How many people do you need to make the TBM work?

t'l'ughus was operated by a team of 12 people working underground to drive through the mountain.

Send us yours!



Hi! My name is Sophie. I am the communities and Social Performance Advisor for the Kemano T2 Project and I want to hear from you.

Part of my role is to be the connection between the project and the community. This project update aims at giving you interesting and informative insights on what is happening on the project, underground and on the ground. I would love to hear from you so please do not hesitate to contact me if you have any questions on the project or feedback about this project update.

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About the Kemano T2 Project

The BC Work's smelter in Kitimat is powered by the Kemano Powerhouse, which receives water from the Nechako Reservoir via a single tunnel that is over 60 years old. The Completion of a second tunnel will ensure the long-term reliability of the power supply that energizes Rio Tinto's BC Works smelter in Kitimat. The smelter produces aluminium with one of the lowest carbon footprints in the world.

Rio Tinto will continue to operate the existing tunnel and monitor its condition until the T2 Project is completed, and on an ongoing basis.

Rio Tinto and all the contractors working on the Kemano T2 Project are working to maximize the involvement of local businesses and First Nations in the project.