

**CODELCO CHALLENGE – EL TENIENTE DIVISION**

**Ore pass unblocking in underground mining**

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**CHALLENGE CONTEXT**

The mining method currently used by Codelco's El Teniente Division for the extraction of the ore body (Panel Caving), facilitates the filtration of surface water that accumulates in subway productive sectors. These tend to flow towards the extraction points increasing the percentage of humidity of the mineral in a range of 5% to 10%.

The mentioned condition generates an adverse impact on the transfer systems, since the fine material tends to compact, consolidate and even cement on the walls of the ore pass and hoppers, resulting in the phenomenon known as "blockage".

The ore pass have a free diameter of 3 meters and up to 30 meters in length, including a vertical section of 25 meters and a subvertical section of 5 meters with an inclination of 40°. The ore pass are internally reinforced with a layer of concrete followed by steel.

Each transfer system could have a maximum flow rate of 4,000 tpd, and the maximum size of a rock could be 1 meter long (reference information).

The ore pass has access both from the upper part, at the production level, and from the lower part, at the transport level, through the unloading bin, a mechanical structure for loading and unloading trucks.

In the north mine there are more than 40 ore pass systems, but the ones with relevant blockage are in the order of 10%.

**WHEN THE PROBLEM OCCURS**

Permanently, due to the increase in the percentage of humidity of the mineral.

**CONSEQUENCES**

Lower rate of ore pass unloading to the haul truck due to reduced section in the ore pass, leading to non-compliance (or non-adherence) to the production plan.

Operational stoppage of the pit for ore pass blockage, in one or more shifts, leading to non-compliance with the production plan.

Possible exposure to people due to ore pass unblocking tasks.

**HOW THE PROBLEM IS CURRENTLY BEING SOLVED**

Through mechanized tools.

**PROVEN TECHNOLOGIES**

Mechanized tools, explosives, water.

**EXCLUDED SOLUTIONS**

- Consultancy, advice and engineering studies.
- Solutions that do not prevent the formation of blockages and/or do not unblock the already affected ore pass.

**OBJECTIVES AND SCOPE**

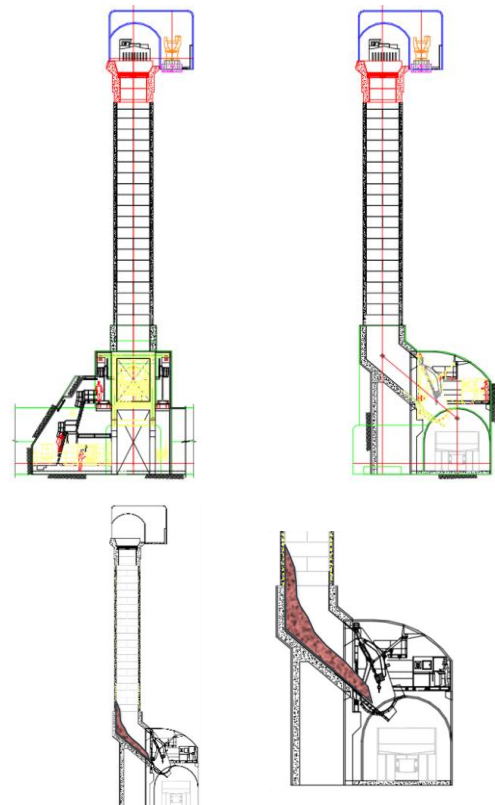
Preventing the formation of blockages and/or unblock of underground mining ore pass and hoppers at Codelco's El Teniente Division, which transport primary ore.

The problem is generated due to the filtration of surface water that accumulates in productive sectors, increasing the percentage of humidity in the ore in a range of 5% to 10%.

**SOLUTIONS REQUIREMENTS**

1. The solution must prevent the formation of blockages and/or unblock of already affected ore pass.
2. Solution should mitigate or eliminate the exposure of people to risks.

**Reference map of the ore pass systems**



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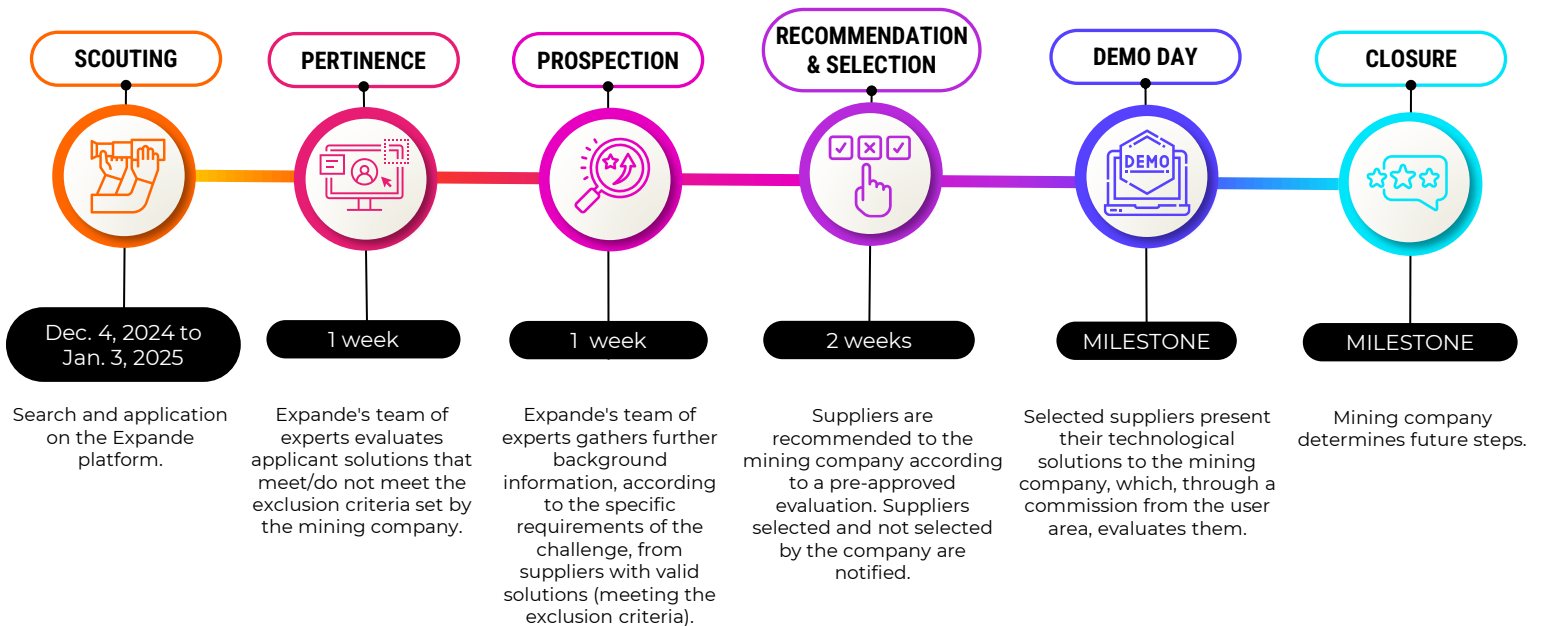
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## STAGE TIMELINE



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The personal data provided when registering in the database, such as the information related to the technological solutions to be applied in the open innovation processes carried out by Expande, are completely confidential, as well as the information provided in the contact forms to receive information on the following stages of these processes.