



EXPANDE – Open Innovation Program in Mining by Fundación Chile

Challenge BHP-17-2019
«Improving recovery from heap
leaching operations»

July, 2019

Challenge «Improving recovery from heap leaching operations»

This project is managed by the Supply Innovation area of BHP Billiton, associated with the Alta Ley Program, and supported by the Mining Open Innovation Program (EXPANDE) by Fundación Chile (FCh).

The common purpose is to promote innovation and make possible a better future for global mining, strengthening the mining ecosystem in Chile, together with constituting a collaborative model that enables the best solutions for the high complexity challenges of today and tomorrow's mining.

Challenge Description

- **Context**

In Minera Spence, mixed ores (mostly), oxides and sulphides are processed by heap leaching. This process have a drip and sprinkler irrigation system, and is it also aerated upstream flow. There is an agglomeration stage prior to leaching, where salt is added to the ore (*Full Salt* project) in order to increase recovery.

A high variability in the recovery of each heap leach pad is obtained. This occurs due to the characteristics of the ore, the precision of the irrigation systems and how the workers operate.

Currently, the irrigation cycles of each leach pad are three: first, 90 days are irrigated with raffinate solution, then 90 days with ILS and finished with raffinate solution again for 90 days. Finally they are drained for 40 days.

Challenge Description

- **Aim and scope**

Solutions are sought to increase and maintain the average recovery in each leach pad, decreasing the variability of the heap leaching process.

The target recovery percentage is 82%. The proposed solution must increase this objective.

The proposals submitted must not affect the *Full Salt* agglomeration process and must ensure safety when operating. Ideally, the maintainability and low investment of the proposal will be considered.

Challenge Description

▪ Current situation

Some situations that explain the variability in recovery are:

- Variability in the quality of agglomerates
- Solution accumulation in top lift
- Clogging of drippers and sprinklers
- *Solution channeling, both in the top lift and in the body of the heap (with the consequent lack of irrigation)*
- *Compaction of heap leach cover (with the consequent increase in groundwater level)*
- *Drainage clogging*
- *Deficient aeration distribution in the heap*
- *Unable to comply with leaching ratio because the pools are being repaired*

▪ Attempted technologies

- Industrial level (operative): flow and pressure sensors and online monitoring of the accumulation of solution in top lift during irrigation and aeration
- Pilot level (pilot scale tests): Moisture and groundwater level online sensors and agglomeration process monitoring

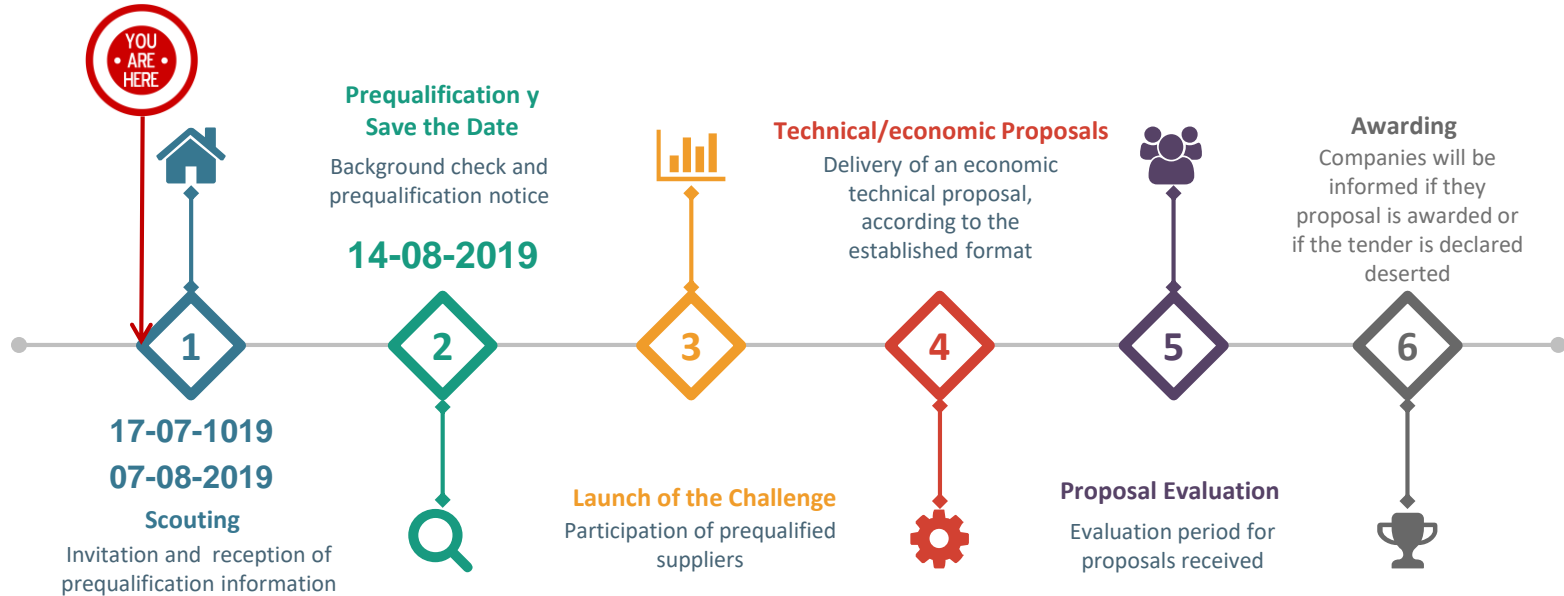
Prequalification documents

The following information is requested for this prequalification stage:

- National and international Companies/Suppliers
 - Relevant competences and experience of the supplier's team member for the Challenge.
 - Previous experience in similar solutions.
 - Description of the technological solution and degree of technological maturity (Solution under development, tested, implemented and/or in operation).
 - Success stories.
 - Ability to provide operational and maintenance services in the field.
- International Companies/Suppliers
 - Availability to operate in Chile or through technical/commercial representatives.

The format of the information delivered is free (pptx, pdf, image) and can be a brochure or presentation of the company's capabilities and technological solutions that apply to the proposed challenge.

Stages of development of the process



1. Scouting

- In case of interest, go to the link sent in the prequalification invitation email and upload the information required

2. Prequalification

- Expande will send an email notifying if your company pre-qualifies or not to participate in the challenge.
- In case of prequalification, you must enter to the Challenge page where you can download the technical documents and the BHP Pack Tender.
- In case of acceptance or refusal to continue participating, upload the respective letter to the Challenge page.
- In case of acceptance, confirm participation for the launch day in the form link indicated in the invitation letter.