

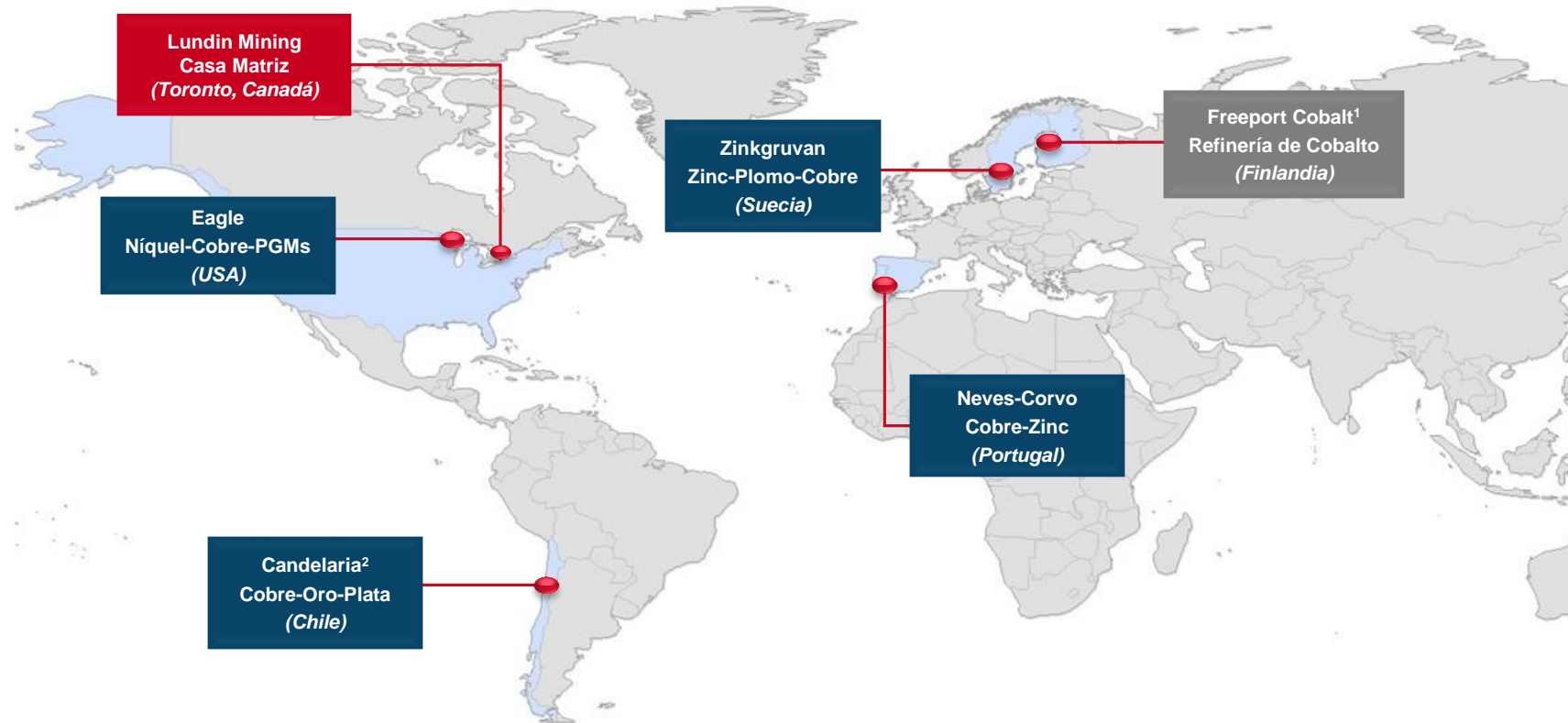
Minera Candelaria Tailings Storage Facilities Transition Experience April 2019

Candelaria, Atacama Region, Chile

AGENDA

- Lundin Mining, Candelaria District
- TSF Candelaria description and capacity
- TSF distribution System - Water recovery – Monitoring
- Natural events
- TSF Los Diques – construction/transition
- TSF Summary/Inspections and review
- Conclusions/Learnings

Lundin Mining – Diversified Global Portfolio



1. Lundin Mining holds an indirect 24% equity stake in the Freeport Cobalt Oy business which includes a cobalt refinery located in Kokkola, Finland.
2. Lundin Mining holds an 80% interest in Candelaria.

Candelaria District

The district is formed by **Candelaria Open Pit**, **Candelaria Norte**, **Santos** and **Alcaparrosa** ore deposits.



The ore extracted from these deposits is processed in the **Candelaria** and **Pedro Aguirre Cerda (PAC)** concentrator Plants.



The copper concentrate produced is shipped at the **Punta Padrones Mechanized Clean Port** in Caldera.



The **Desalination Plant** provides **100%** of water process demand. Is located In the same industrial complex as the Port.



Candelaria 2030: Operacional continuity

STATUS: EIA approved (July 2015)

Main

FEATURES

MINE

Expansion of the pit to exploit new mineral reserves

WASTE FACILITIES

Increase in the storage volume of waste

TSF Los Diques

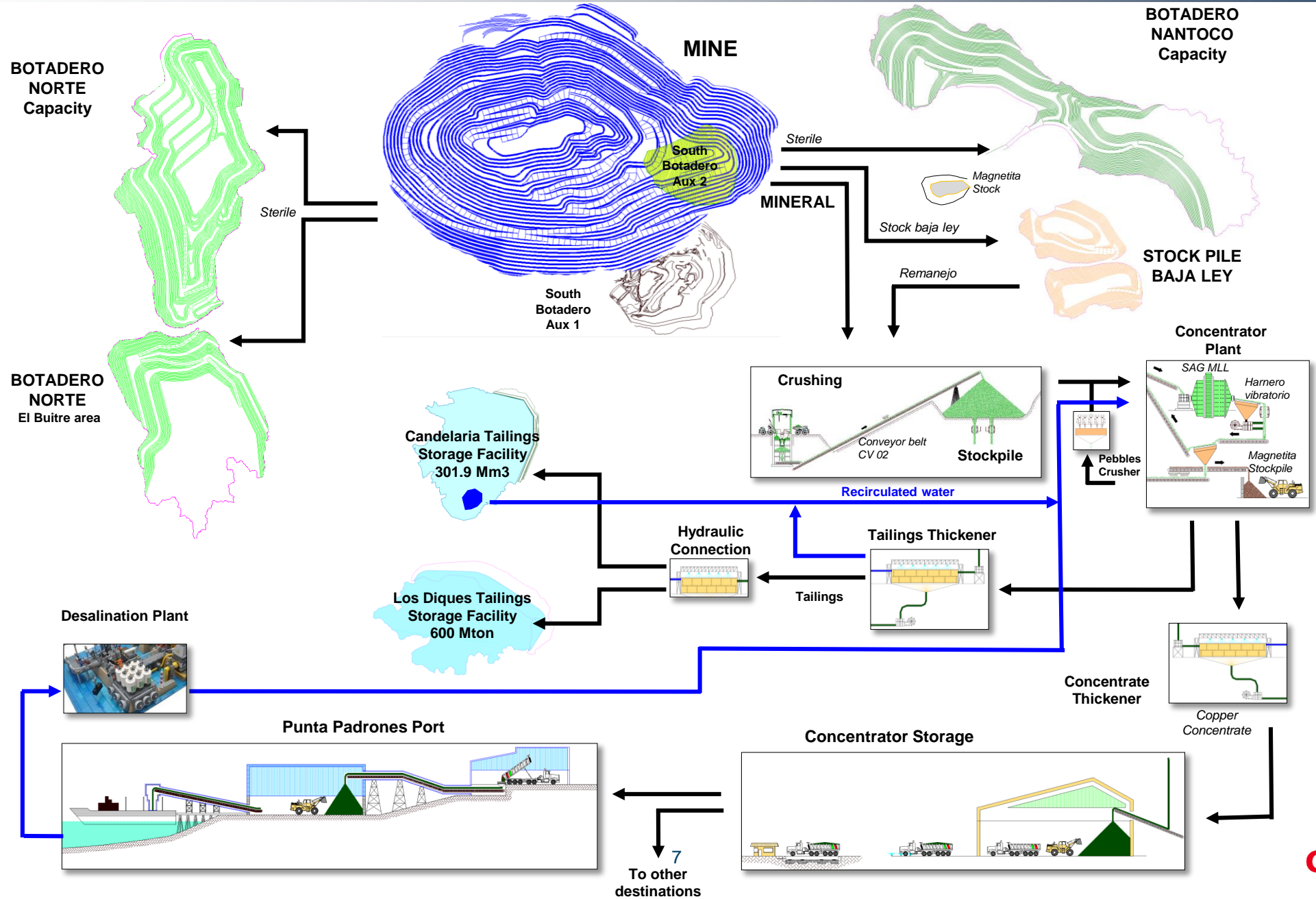
Construction of a new tailing facility

MINE LIFE

Extension of the mine life operation from 2018 to 2030



Flowsheet



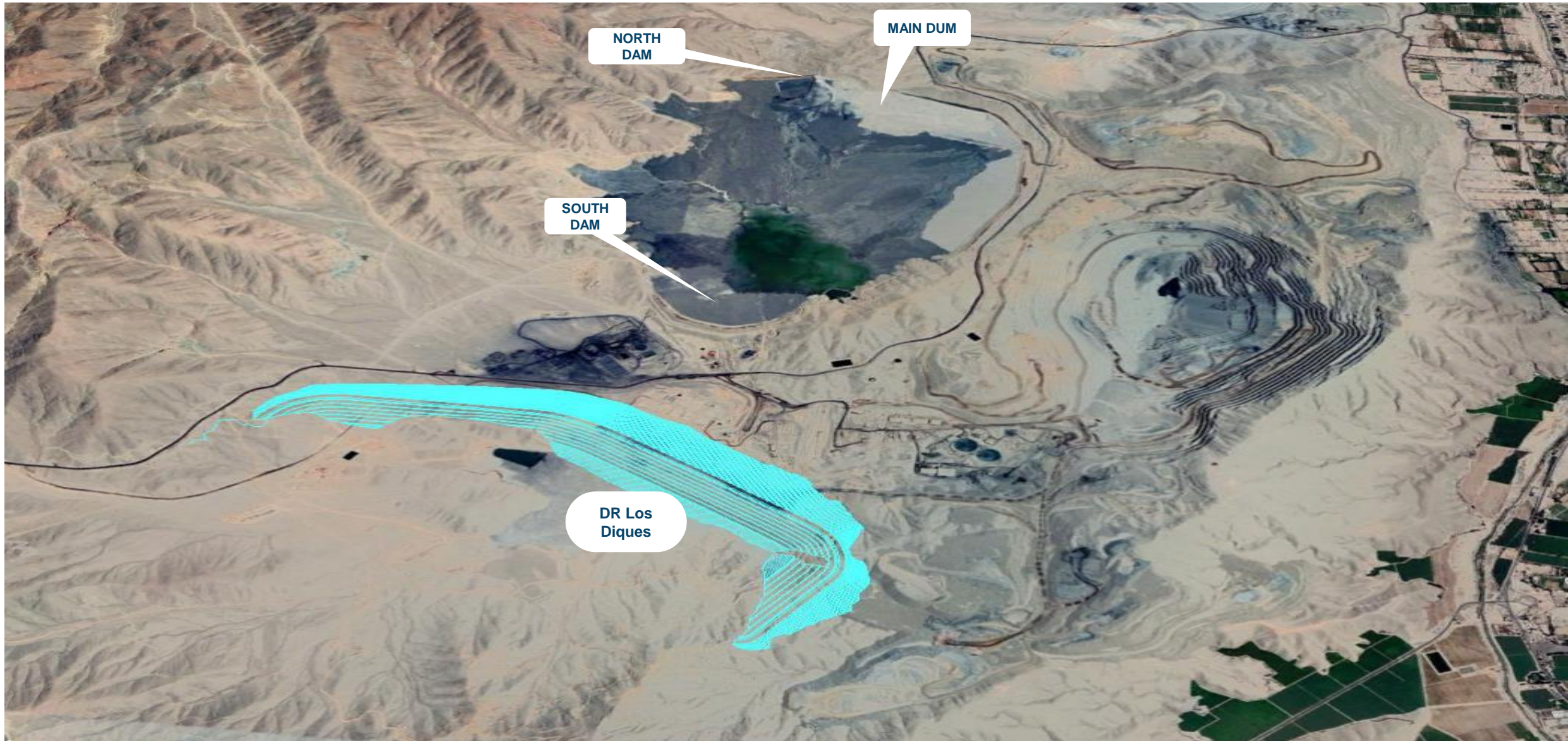
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TSF Candelaria



TSF Candelaria and TSF Los Diques



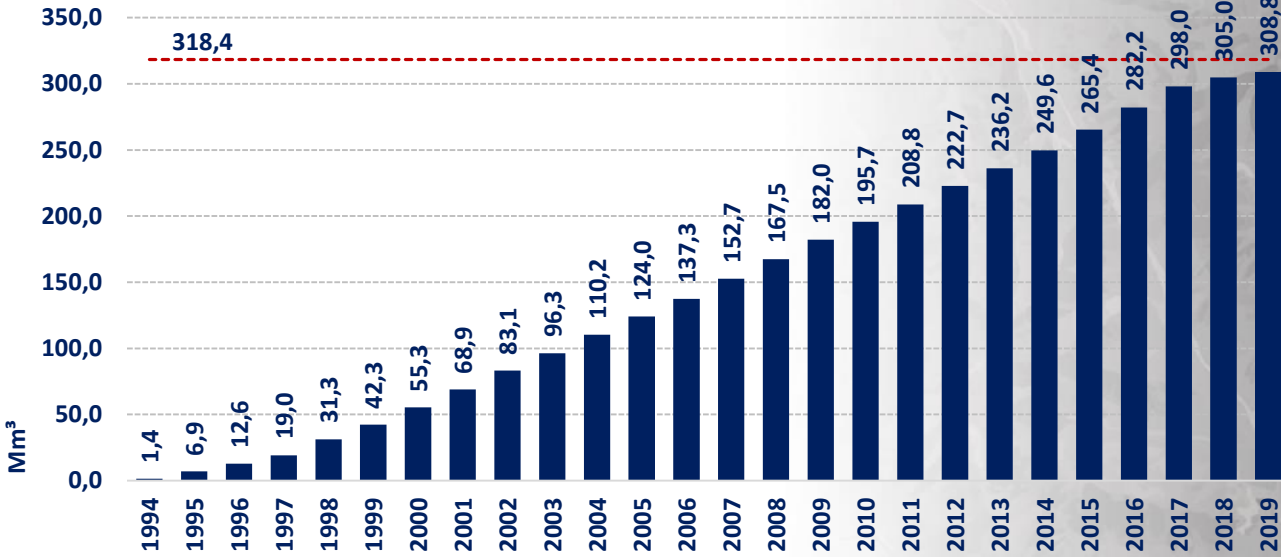
TSF Candelaria – main information

- ✓ Actual deposit in operation from 1994
- ✓ Volume authorized : 318.4 Mm³
- ✓ Volume accumulated: 309.0 Mm³
- ✓ Total tonnage accumulated: 541 Mt
- ✓ Actual deposit level: 795.9 masl
- ✓ Crest Elevation : 800.0 masl
- ✓ Authorized level: 798.5 masl
- ✓ Freeboard : 1.5 m

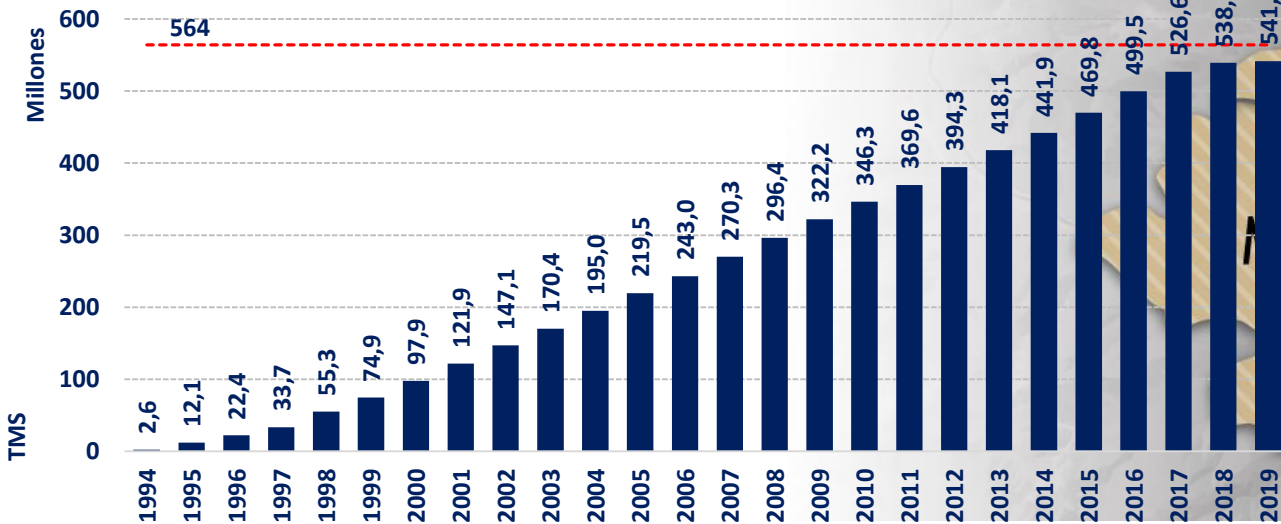


TSF Candelaria – accumulated tailing

Volume of accumulated tailings



Accumulated tonnage Tailings



AGENDA

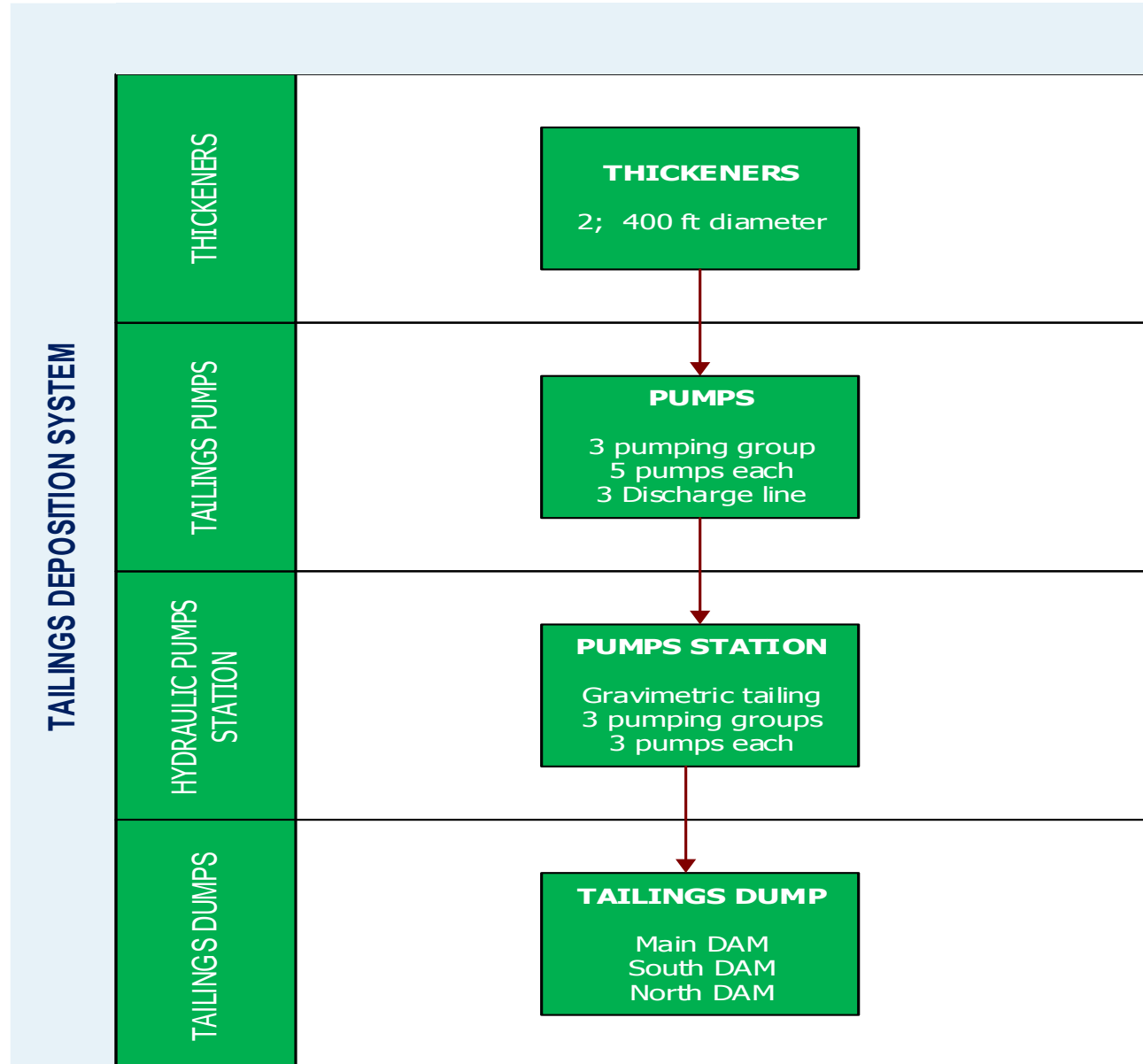
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TSF distribution System - Water recovery – Monitoring

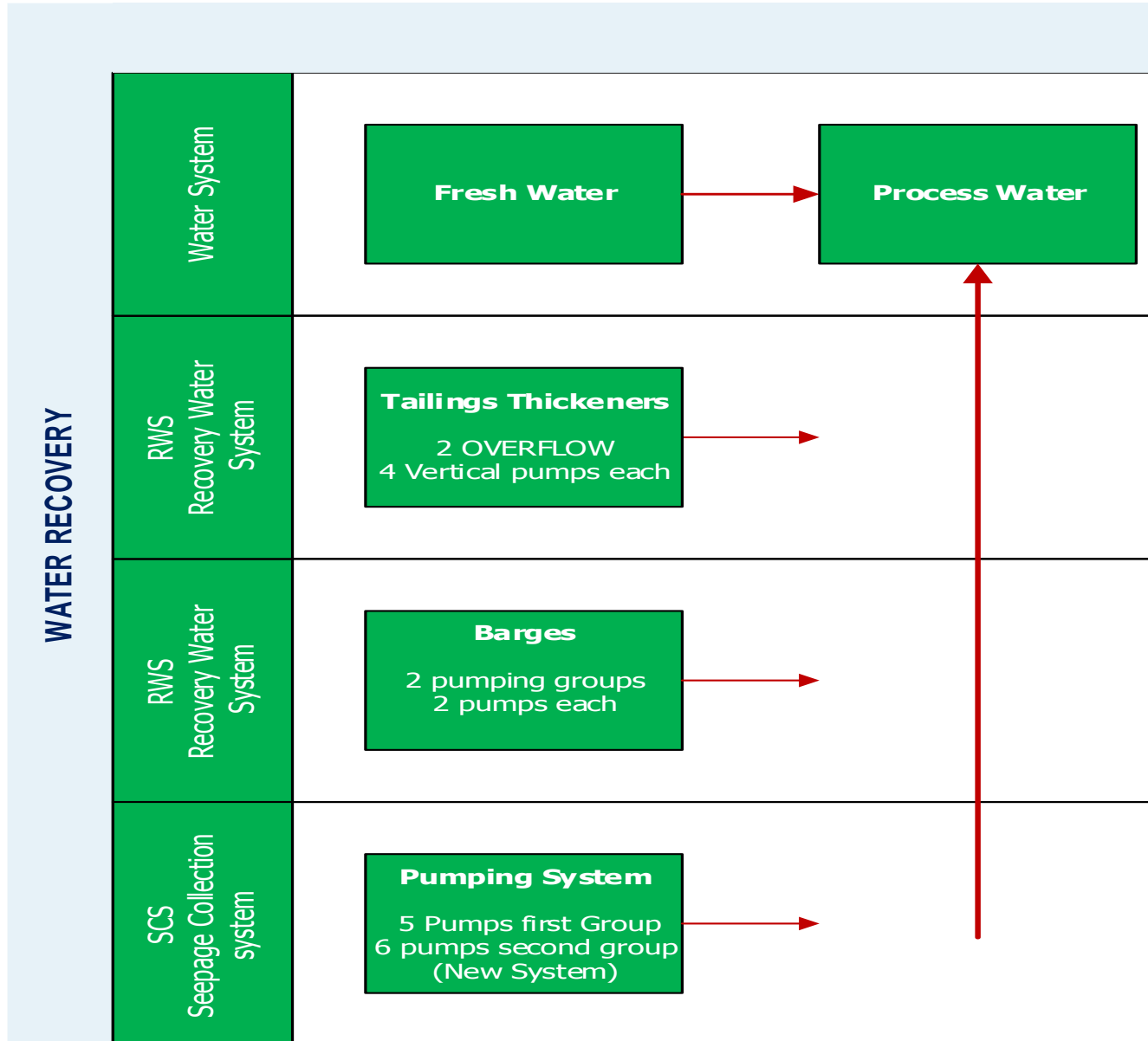


Evaluate and periodically execute new projects, in conjunction with Engineering and Management

Tailing Distribution system



Water recovery system



- Make up: 0.34 m³/ton
- Water recovery: 85%

Monitoring - PI System

The screenshot displays the PI Coresight monitoring interface. At the top, the title bar shows 'PI Coresight' on the left, 'New Display' and 'Carvajal Villalobos, Leonardo' on the right, and a help icon. Below the title bar, a search bar contains the text 'Relave'. A left-hand navigation pane lists 'All Displays', 'Favorites', 'My Displays', and 'Recent'. Below these are folder navigation options: 'Folder Home', 'Pantallas', 'Candelaria', 'Relave' (highlighted in blue), and 'New folder'. The main area is titled 'Pantallas\Candelaria\Relave (12)' and contains a grid of 12 monitoring displays, each with a thumbnail image, a title, a user path, and control icons (users, settings, star).

Display Title	User Path
TSF_Balsas y estanques	LUNDINMINING\piadmins
TSF_Bombeo y distribucion	LUNDINMINING\piadmins
TSF_Piscina de Drenaje	LUNDINMINING\piadmins
ENLACE_HIDRAULICO	LUNDINMINING\piadmins
ESP_RELAVES	LUNDINMINING\piadmins
TREN_BOMB_ABC	LUNDINMINING\piadmins
TREN_BOMB_C	LUNDINMINING\piadmins
FLOCULANTE 2450	LUNDINMINING\piadmins
TREN_BOMB_AB	LUNDINMINING\piadmins
TSF_Pozos	LUNDINMINING\piadmins
TSF_Piscina Emergencia	LUNDINMINING\piadmins
TSF_Distribucion estanques	LUNDINMINING\piadmins

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Natural events- Without impacts in tailing facilities

EARTHQUAKES



2002

5,8°



2006

6,3°



2013

6,8°

RAINFALL EVENTS



1997

157,5 mm



2015

65,3 mm



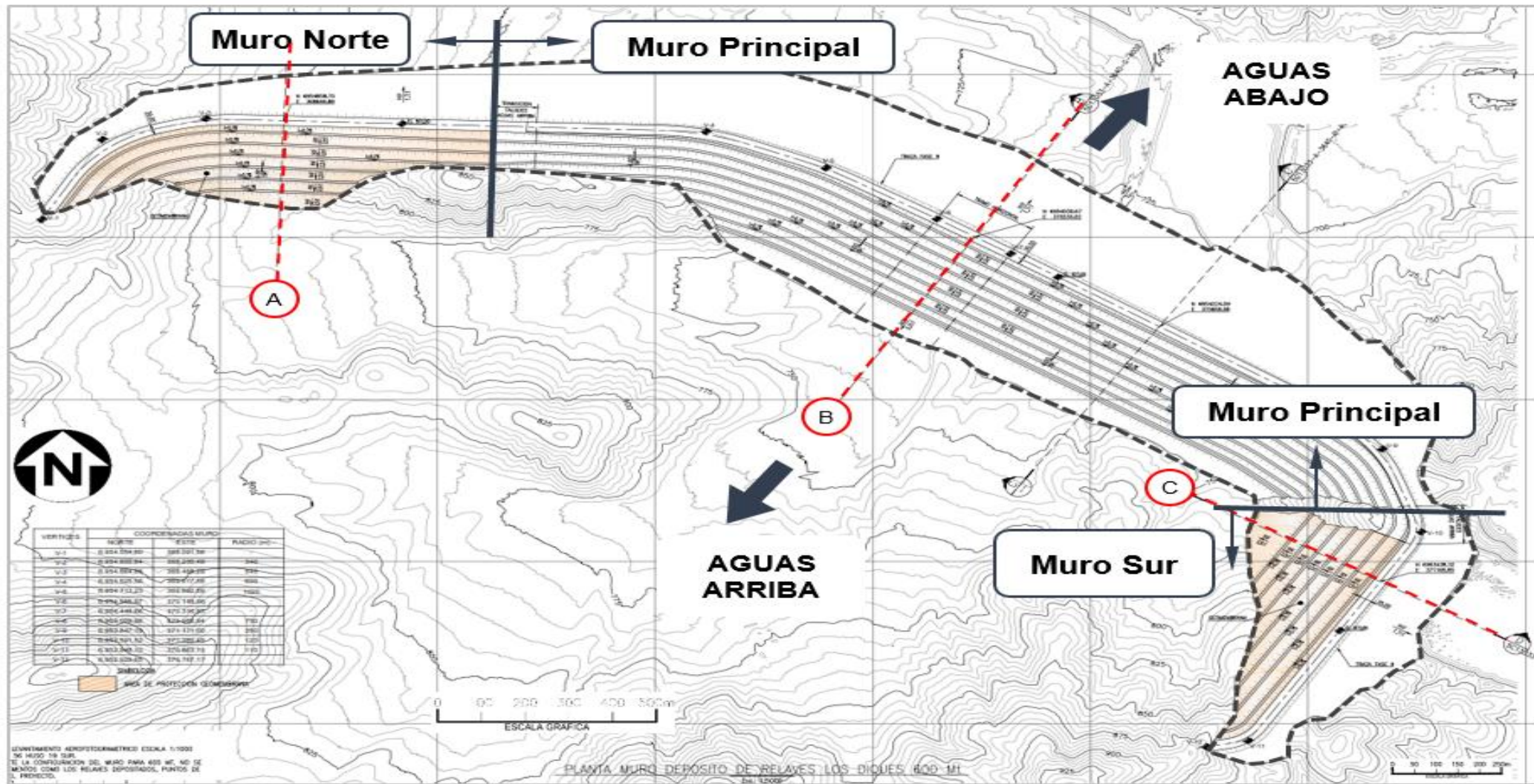
2017

45,5 mm

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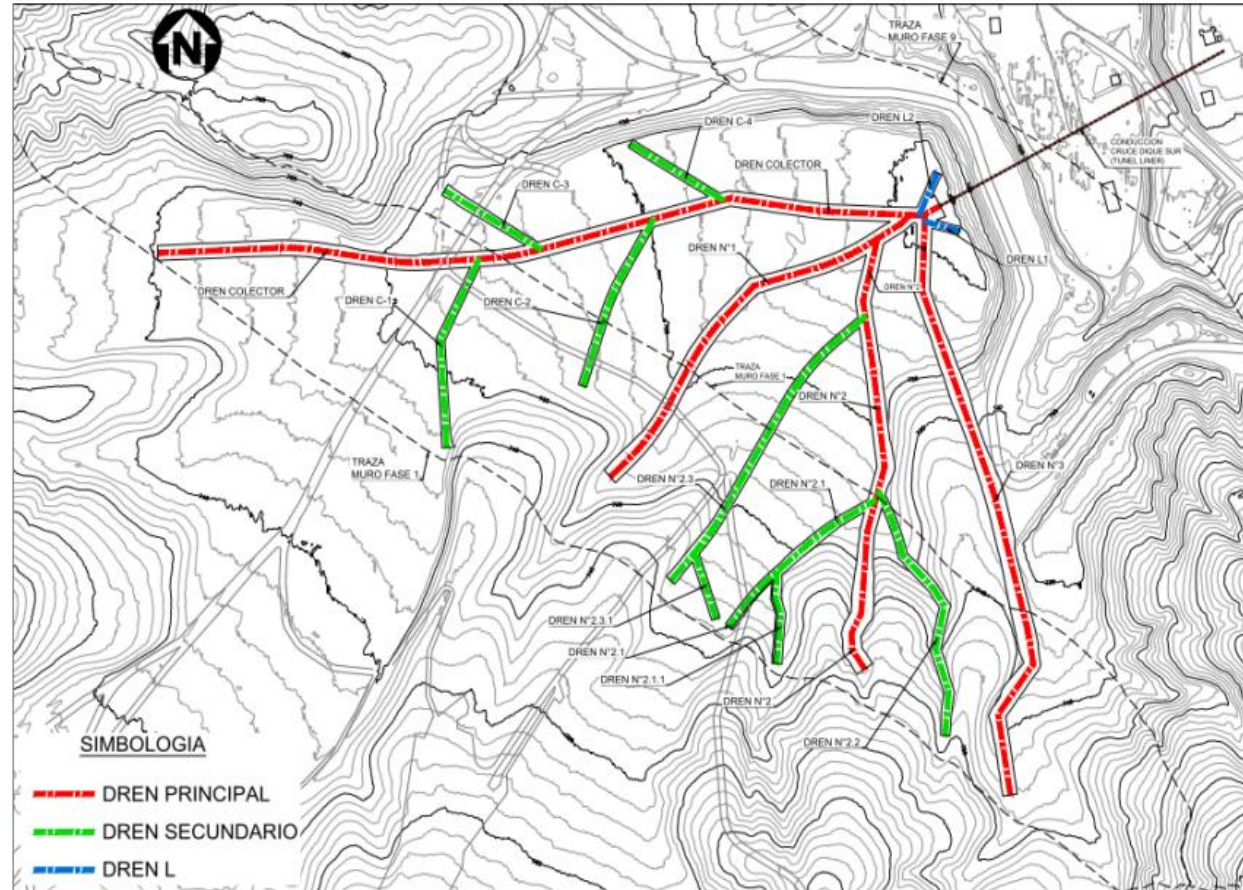
TSF Los Diques



TSF Los Diques – Relevant aspects of the design

- Retaining wall constructed by high strength casting, composed of fresh rock.
- Growth method type downstream.
- Construction of the wall using compacted layers of controlled thickness.
- Developments for the control of infiltrations: curtain wall and curtain of injections.
- Geotechnical instrumentation to monitor the behavior of the retaining wall.
- Strong basal drainage system.
- Quality control and monitoring for the generation of acid drainage

TSF Los Diques – Drainage system



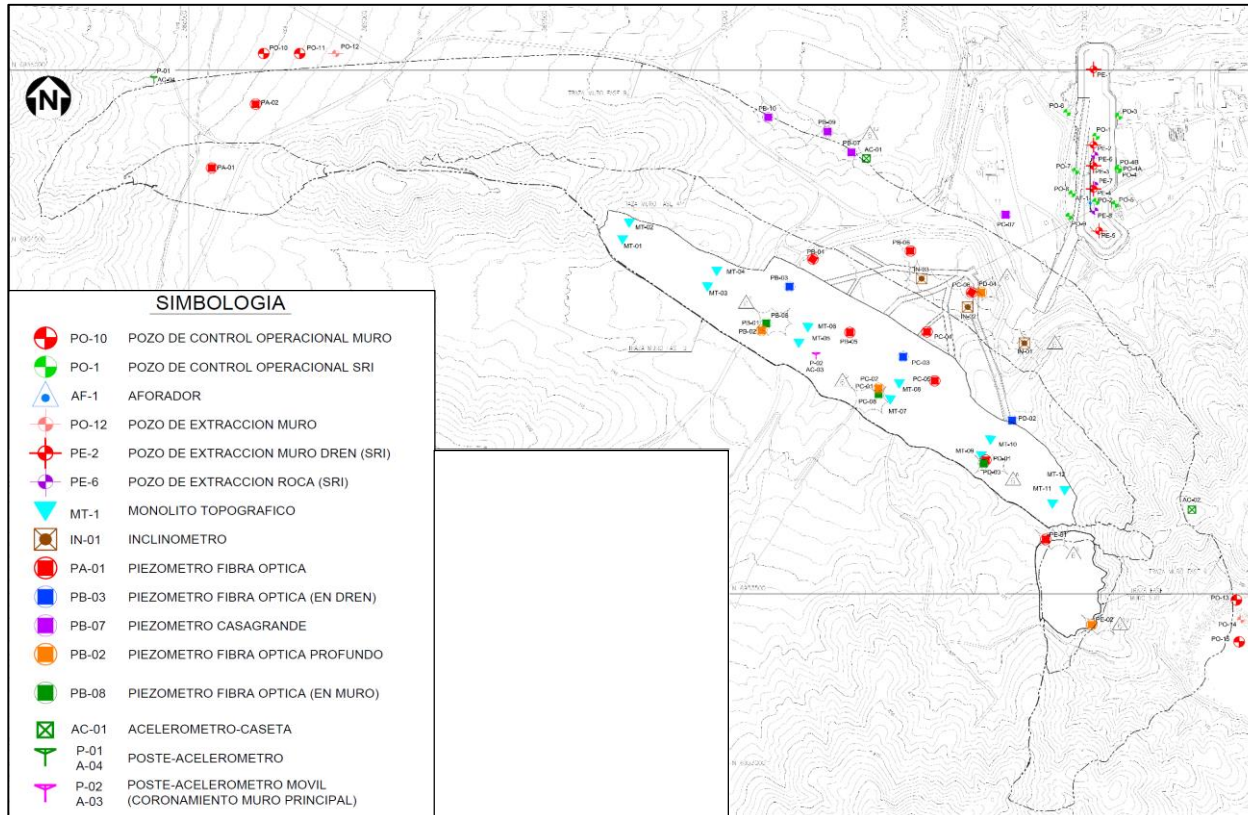
Main wall section

TSF Los Diques – Main dam



TSF Los Diques: Geotechnical Instrumentation

Allows for timely evaluation of the variables which control the behavior of the wall



- **Fiber optic and Casagrande-type piezometers:** monitor the phreatic level within the wall
- **Accelerometers:** determine the response of the wall against seismic events
- **Inclinometers and topographic monoliths:** allow the monitoring of displacement patterns of the wall
- **Aforador:** allows for the evaluation of quantity and characteristics of drainage flow

TSF Los Diques – Operational chronology 2018

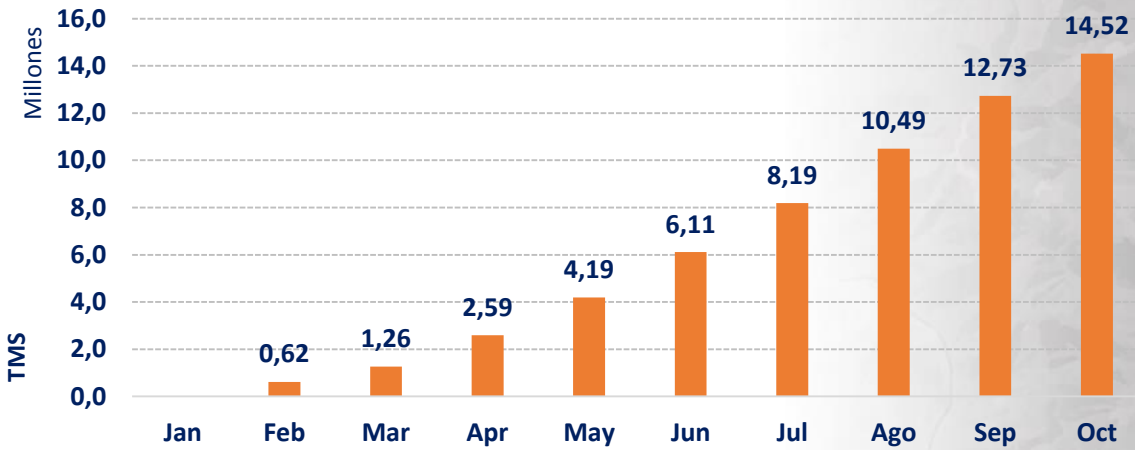


January	February	April	June	October
Tailing system Hydraulic test	Tailing delivery by Cajón Poniente (50 % of tailing)	Barges water recovery	100% tailing delivery to TSF Los Diques	Return to TSF Candelaria. Business decision



TSF Los Diques – accumulated tailing and water recovery 2018

Accumulated Tonnage Tailings



LOS DIQUES
NUEVO DEPÓSITO
DE RELAVES

**DEPÓSITO
DE RELAVES**

**DEPÓSITO
ESTÉRIL NORTE**

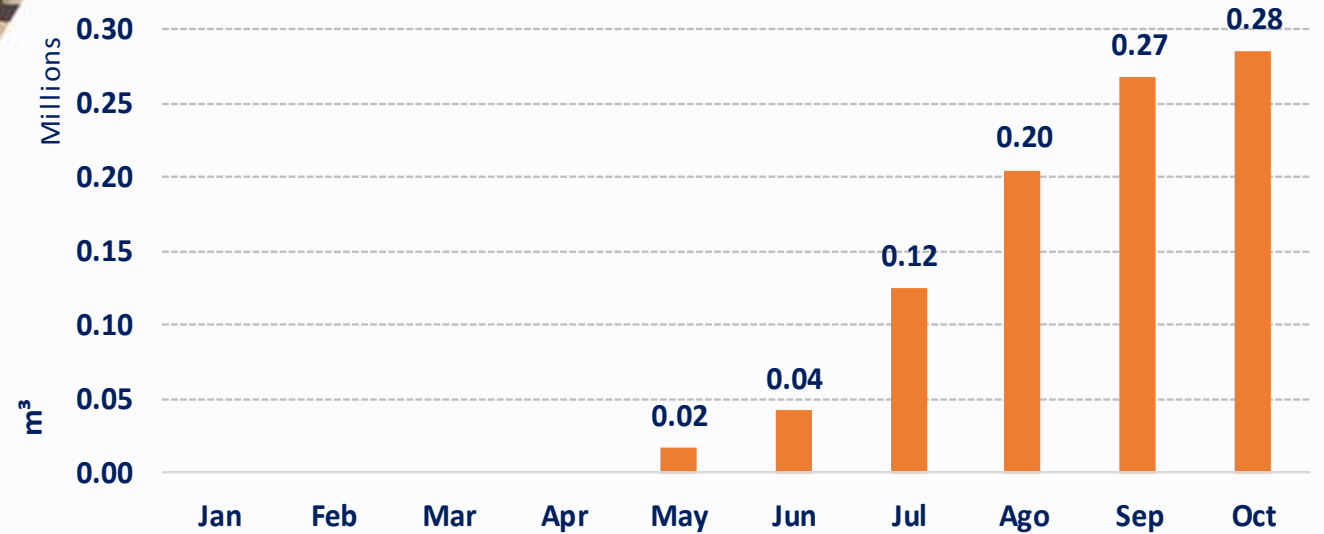
**RAJO
MINA**

**DEPÓSITO
ESTÉRIL NANTOCO**

Water recovery – Sequence



Volume water system Parshall



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Candelaria Tailings Facilities Summary

Active Facilities

Los Diques TSF

- Thickened technical disposal (55% solids) from Candelaria Plant
- Tailing stored 15 Mm³
- One main dam and another perimeter dam
- Dam design = downstream construction
- Nearby population = highway C-397 and Candelaria operations
- Emergency plan review annually
- Quality control and monitoring for the generation of acid drainage



Candelaria TSF

- Slurry tailings (35% solids) from PAC Plant and thickened tailing (55% solids) from Candelaria Plant
- Tailing storage 305 Mm³
- One main dam and three perimeter dams
- Max main dam height = 170 m
- Dam design = downstream construction
- Emergency plan review annually
- Quality control and monitoring for the generation of acid drainage



Candelaria Tailings Dam Inspections and Reviews

Description	Responsible	Independent	Frequency	Last	Next
Staff Inspection (Visual)	Site Personnel	No	Several times daily	Daily	Daily
Formal Staff Inspection	Site Personnel	No	Quarterly	Q4 2018	Q1 2019
Dam Safety Inspection (DSI)	External Consultant (Engineer of Record)	No	Annual	2018	July 2019
Corporate Tailings Stewardship Review	External Consultant (Third-party)	Yes	Annual	November 2018	November 2019
Government Agency Inspection	SERNAGEOMIN (Servicio Nacional de Geología y Minería)	Yes	Typically twice per year	2018	2019
Government Agency Inspection	DGA (Dirección General de Aguas)	Yes	-	2018	-

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Conclusions/Learnings



- ✓ Planning (Tailing deposit plan)
- ✓ Strong water balance
- ✓ Operational manual/Procedures
- ✓ Availability of water production (Desal Plant)
- ✓ Training
- ✓ External support
- ✓ Expedite water recovery
- ✓ Early involved of Candelaria team in design and construction stages

lundin mining

TSX: LUN Nasdaq Stockholm: LUMI