

Circum Minerals' Danakil project

World-class potash operation in the making

Sitting on the world's largest, undeveloped potash deposit, privately-owned junior company **Circum Minerals** is working through the last stage necessary – fund raising – to move its 100% owned Ethiopia-based Danakil project into construction. And while the plan to build the operation will occur in four phases, the final operation will be a significantly sized operation – substantially larger than any of its African-focused potash peers, writes **LAURA CORNISH**.

IN SHORT

A world-class potash project looks set to move into construction in 2019.

Situated in Ethiopia's Afar region, Circum Minerals has been quietly advancing its project. With a mining licence in hand (awarded in April 2017), it has spent the last year optimising its definitive feasibility study which has seen it increase its potash production targets.

The original plan entailed producing 2 Mtpa of MOP (muriate of potash, KCl) and 750 000 tpa of SOP (sulphate of potash, K₂SO₄), explains COO Duncan Bowker. On the back of its optimised study, completed by African engineering expert SENET, the company is now looking to produce an additional 750 000 tpa, delivering 3.5 Mtpa potash in total.

These production volumes are significant and Circum Minerals is considering a phased approach to the project's construction in order to de-risk implementation and reduce capital requirements.

"Our focus at present is to secure the necessary funding to move into construction, with the objective to raise the capital through a combination of debt and equity.

"With the money secured we will start construction in 2019 – which entails a two-year build period followed by a two-year ramp up to full production. According to this schedule, we will produce our first SOP towards the end of 2021," Bowker outlines. The remaining phases will subsequently be constructed and funded out of cash flow.

A magnificent potash ore body

Not only does the Danakil ore body reside within one of the largest undeveloped potash deposits in the world, it also supports production of both MOP and SOP – giving Circum Minerals the flexibility to adapt its product generation according to market conditions. For now, the SOP market is highly lucrative and is the focus.

With a known resource of 4.9 Bnt, it makes sense to develop a larger-scale operation – "which is in essence a bulk commodity that requires heavy-duty logistics with significant economies of scale." Bowker however does mention in passing

↑ **Circum Minerals** has spent the last year optimising its definitive feasibility study

4.9 Bnt

DANAKIL'S PROVEN
RESOURCE SIZE

→ Tadjourah Port

↓ Harvesting
a salt crop

that a 2D seismic survey has revealed that the potash layers continue over the licence area, "giving us a total resource exploration target of 12 – 14 Bnt."

Unlike most potash juniors in Africa, Circum Minerals will develop Danakil as a solution mining operation. This entails drilling production wells, pumping water down the holes, dissolving the potash layers and pumping the resulting brine into lined evaporation ponds on surface. Solar evaporation of the water leaves behind a crystal salt crop which will then be harvested and sent to a process plant. The plant will utilise standard potash processing design including crushing, screening, selective dissolution and flotation in order to produce a high purity SOP final product.

For the first 20 years of Circum's operating lifespan, mining depth will average no more than 200 m below surface. To maintain full production during Phase 1, the company will operate about 60 production wells. On the plus side, the MOP layers lie above the SOP layers, which means each production well can be used to produce both products. "We have proved in trial mining that we can selectively mine both layers from a single well," Bowker confirms.

Circum has completed 12 months of test mining and has proved the selective solution mining method and processing route, with 600 tonnes of raw salt harvested and refined into SOP and MOP product. Product quality has been excellent and Organic certification has been received.

Mined out production wells will be backfilled with

the remaining disposal brines and tailings, meaning the site will house virtually no surface waste, reducing environmental impact and rehabilitation requirements.

Looking forward, Bowker says Circum Minerals will develop the project using an EPCM contractor who will hand the project over to an owner's team to operate the mine. The process of selecting the contractor is underway, being conducted in parallel with the fund raising process.

What about infrastructure?

Supporting infrastructure (transport, power and water) is critical to any bulk commodity project and this is of equal importance and necessity for Danakil.

The required water resources have been delineated and Bowker assures that the project already has sufficient water for 25 years, which it will access from high yielding underground aquifers. These aquifers have been extensively tested and found to be highly saline and not suitable for drinking or agriculture, hence ideal to exploit for process water.

Umvoto Africa was contracted by Circum Minerals in 2013 to present to undertake the water

resource assessment for the Danakil project. This involved groundwater assessment and development including desktop studies, remote sensing analysis, numerical modelling, weather station installation and hydroclimatological monitoring. Umvoto designed and managed the drilling and testing of wide diameter, high yielding abstraction boreholes and numerous monitoring boreholes into the primary alluvial aquifers.

An aquifer stress test was undertaken to aid in regional and local characterisation of the hydro-geological system, during which over 600 000 m³ of groundwater was abstracted within a month. Improved understanding of the structural setting and associated hydrothermal flows within an active rift zone was achieved through geological field mapping and isotope analyses of groundwater

↓ The evaporation pond on site used during trial mining phases



GOVERNMENT PARTNERSHIP

"The Ethiopian and Djibouti governments have been and remain extremely supportive of our project - their investment in road and port infrastructure is evidence of this. As we move our project forward we will look to build further on the close relationship we have established."

Circum Minerals will look to employ locally during both the construction and operating phases of the mine. Phase 1 operations alone will need about 1 100 people so local employment opportunities within Ethiopia to support the project are significant.

K-UTEK
SALT TECHNOLOGIES

COMPETENCE IN SALT TECHNOLOGIES SINCE 1951



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Core Business:

- geology and geophysics for exploration and evaluation of salt deposits
- mining technologies and process engineering to produce NaCl, Na₂SO₄, KCl, K₂SO₄, H₃BO₃, Li₂CO₃ etc.
- chemical and mineralogical investigations for all types of salt
- waste management and backfilling technologies

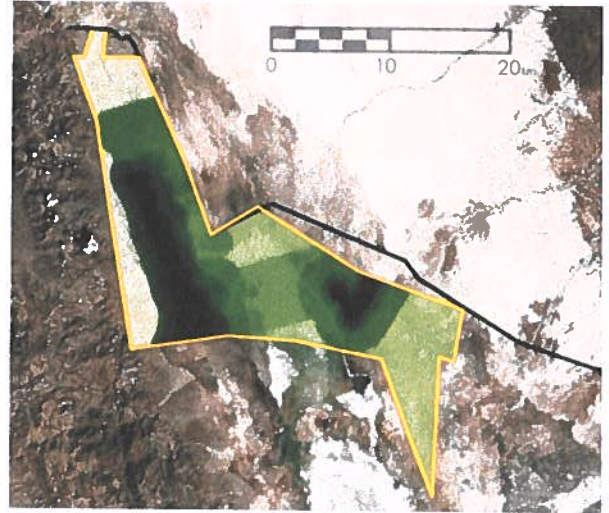
Services:

- scoping and feasibility studies
- mine and process design
- basic and detail engineering
- assistance and consultancy in procurement of equipment as well as during construction phase and commissioning

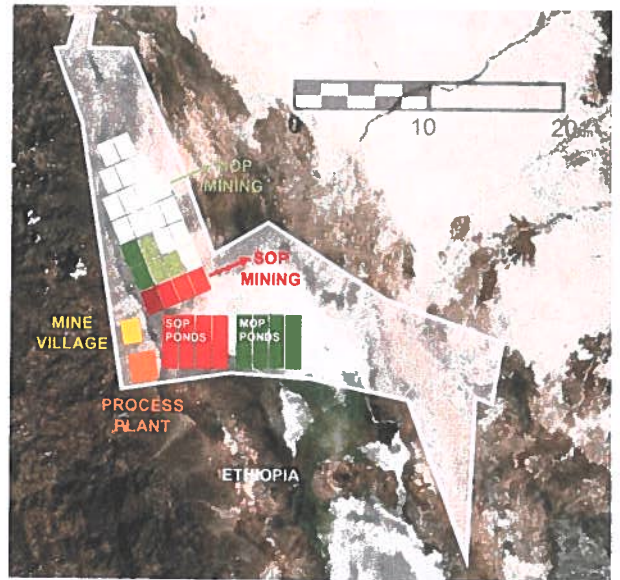
engineering, consulting and monitoring for mining, processing and backfilling

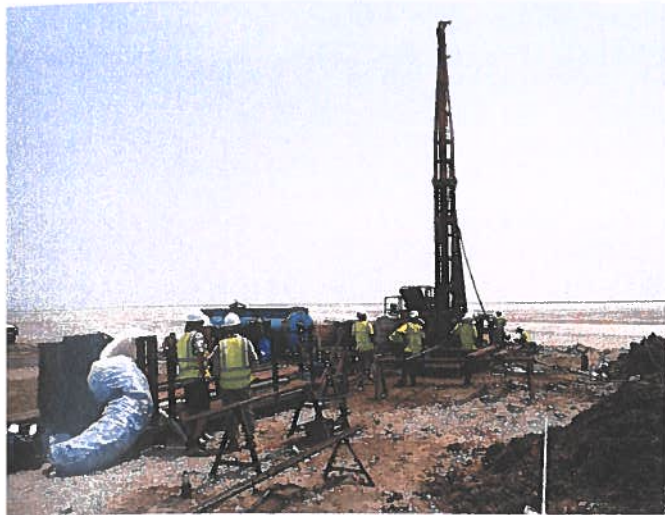
MINERAL RESOURCE – SOP AND MOP

	Tonnage (Mt)	KCI (%)	KCI (Mt)
Measured	1,229.9	18.8	231.7
Indicated	1,603.8	18.3	294.1
Measured & Indicated	2,833.7	18.6	525.8
Inferred	2,098.5	17.5	366.5
Total M&I	4,932.2	18.1	892.3

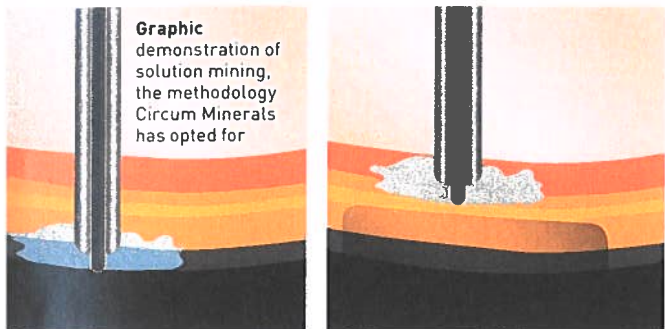


- Circum's License area is 365 km²
- Resource of 4.9Bt @18.1% KCI is among the largest in the world
- 2D Seismics over the entire lease suggests a total deposit of 12-14Bt





Graphic
demonstration of
solution mining,
the methodology
Circum Minerals
has opted for



samples. An integrated water resource development and management approach, centred around the monitor-model-manage philosophy, supported the development of a sustainable resource estimation for the solution mining operation from inception through the life of mine. This was achieved through optimisation of surface water flows, aquifer storage and yield modelling coupled with numerical groundwater and surface water flow modelling in FEFLOW and Arena software for discrete event simulation (DES).

Today Umvoto continues to offer support and maintenance to several weather stations in the region, across different concessions. This includes monitoring of evaporation rates for brine evaporation ponds, dust fallout analyses and compliance monitoring of long-term weather patterns feeding into climate change scenarios.

In terms of power supply, Circum Minerals will also have access to power thanks to a dedicated 180 kW power line that the government is currently building, specifically to support potash production from the Danakil basin. The line is scheduled to be completed in 2020. Circum Minerals will build a dedicated 10km, 100 MVA line from the government sub-station to site. Ethiopia is a regional power exporter with very attractively priced grid power.

In terms of logistics, Bowker reveals that the plan is to truck product 600 km to a dedicated potash export facility at Tadjourah Port in Djibouti where the local government has granted the company access to export. "There is also potential to export via closer Eritrean ports due to the rapidly improving relations between Eritrea and Ethiopia. This will give our project huge upside considering transport to port makes up a significant portion of operating costs.

The existing Massawa Port is 250 km from the project and the proposed dedicated potash facility at Anfile Bay only 100 km away. **MRA**