

FACTS

Boliden Aitik is Sweden's biggest copper mine and lies just to the south of Gällivare in northern Sweden.

The deposit consists of chalcopyrite and pyrite yielding copper, gold and silver.

The mineralisation was discovered in the beginning of the 1930s.

The equipment and technology required to make Aitik economically profitable was not available until the 1960s. The mine opened in 1968 with an annual production level of 2 million tonnes of ore.

In 2014, the annual production level will be 36 million tonnes of ore.

Vast quantities of waste rock must be mined in order to access the ore. Since 1968, over 480 million tonnes of waste rock have been removed. A large amount of the waste rock becomes a commercial product and is used to reinforce roads and as ballast material in cement.

Aitik has about 600 employees and is the largest private employer in Gällivare municipality.

Boliden is a metals company with focus on sustainable development. Our core expertise is in exploration, mining and recycling.

Boliden's main metals are zinc and copper. Other important metals produced include lead, gold and silver.

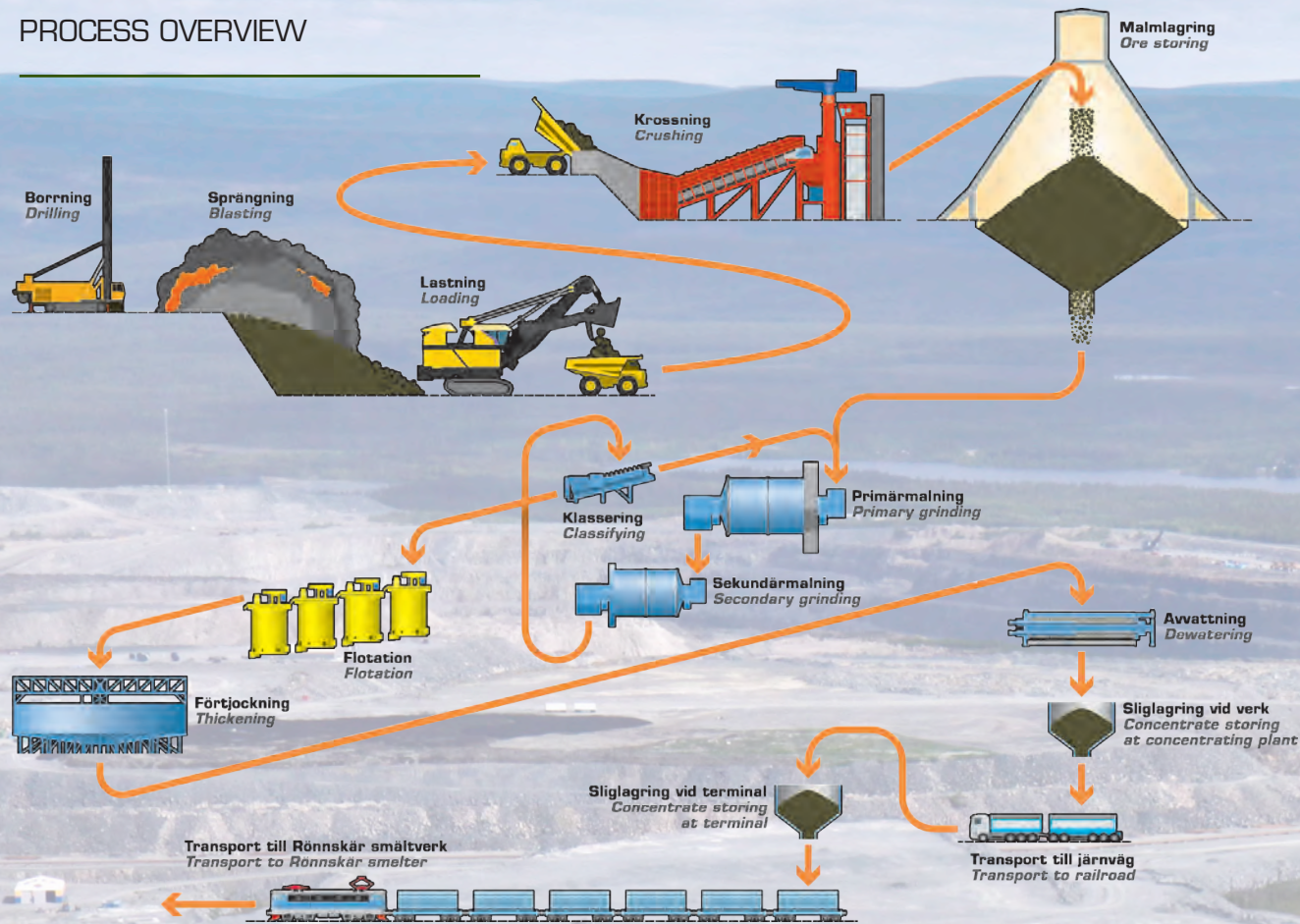
Boliden's operations are conducted in Sweden, Finland, Norway and Ireland, and the company also has marketing offices in Germany and the UK.

Boliden has approximately 4,400 employees.



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PROCESS OVERVIEW



BOLIDEN

Welcome to Boliden Aitik

SAFETY

- Follow the instructions given by the guide appointed by Boliden.
- Never leave the group during a guided tour.
- Always wear the hard hat with the chin strap fastened, plus any other safety equipment that you have received.
- Watch out for traffic passing through the area. Mine-site vehicles always have right of way.
- Remember that mine trucks, wheel loaders and shovels have very poor vision of their immediate surroundings.
- Walk carefully in the mine and plants – floors may be uneven and slippery.
- No photographs may be taken within the area without the permission of your guide. Please ask!
- Please switch off your mobile phone or set it in silent mode.

BOLIDEN
Metals for modern life



AITIK OPEN PIT MINE

Aitik is a 3 km long and 450 m deep open pit copper mine located outside the town of Gällivare in northern Sweden. The ore contains low grades of copper, gold and silver. The current expansion of the mine will expand the mine lifespan to 2030 and double its annual ore production to 36 million tonnes.

1



LOADING AND TRANSPORTATION

The ore is loaded onto trucks by electric shovels. The shovel bucket scoop is 80 tonnes and the trucks have a payload capacity of 320 tonnes. Both machines are among the world's largest.

2



TRUCK WORKSHOP

Truck workshop for maintenance of the gigantic trucks. The workshop also has an advanced wash bay for mining machines.

3



CRUSHING STATIONS

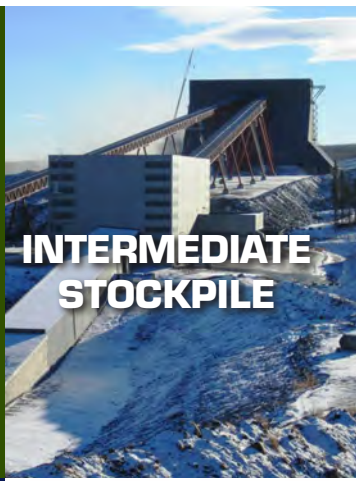
To reduce haul truck mileage there is one crusher at surface level and one inside the pit.

4



5

Intermediate ore storage facility for 30,000 tonnes. The ore is then transported from this storage up to the main ore storage next to the concentrator.



INTERMEDIATE STOCKPILE

6

The crushed ore is transported on the belt conveyor system. Total length: 7 km including 3.5 km underground.



BELT CONVEYOR

7

The main ore storage building, with a 200 000 t capacity extends from 30 m below ground level to 60 m above.



MAIN ORE STORAGE

8

The concentrator consist of two parallel grinding lines with a capacity of 2,200 tonnes/hour/line. Flotation technology is used to separate out the chalcopryite.



CONCENTRATOR

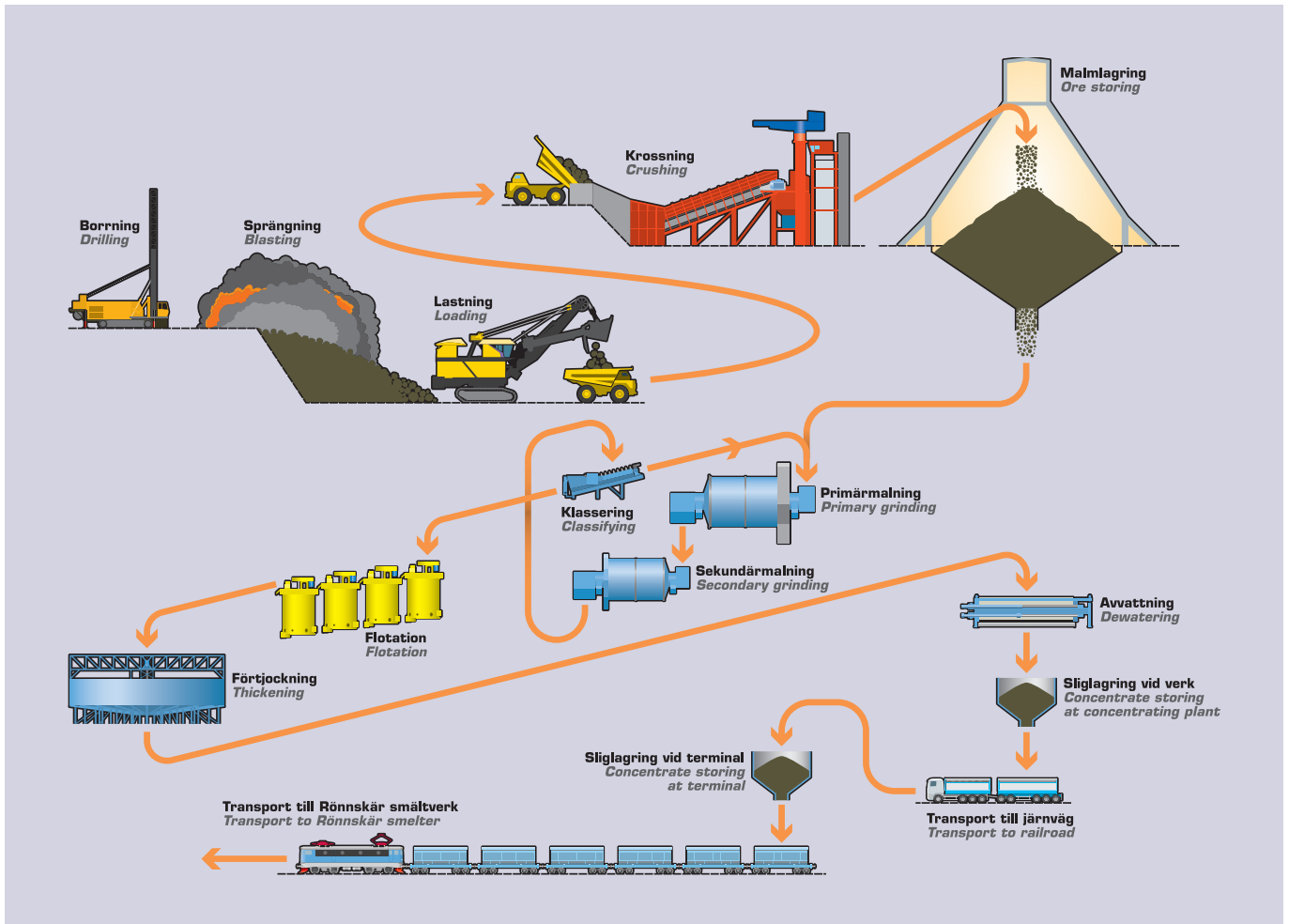
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Approximately 500 tonnes of copper concentrate is transported everyday by train to the Rönnskär copper smelter in Skellefteå.



CONCENTRATE TERMINAL

PROCESS – how it works



Every day, around the clock, a large quantity of rock is transported.

At Aitik mine near Gällivare ore is mined from an open pit mine. A prerequisite for open pit mining is that the ore body reaches the surface, and is not covered with thick earth or rock layer. The mining is done with so-called pallet mining. Earth and rock layers above the ore (waste rock) is taken away freeing the ore below in horizontal slices called pallets.

Drilling

Holes for blasting are drilled with electric drills from Bucyrus and Atlas Copco.
Hole depth: 16-17 m
Hole diameter: 311 mm
Drill pattern: 7x9 m
 Between 200-300 holes are drilled for each round of blasting. A normal blast round produces around 700 000 tonnes of rock for extraction. Aitik's record blast round was in December 2010 and produced around 3,7 Mtonnes of blasted material.



Blasting

Boosters are loaded into the holes followed by emulsion explosives.
Explosives: Emulsion explosives (Kemitti-610) from Forcitra, about 1 tonne of explosive is used in each hole.

Loading and transport

With the help of shovels from Bucyrus, P&H, Komatsu and wheel loaders from Caterpillar, the blasted rock is loaded on to trucks for further transportation. The largest trucks, CAT 795E, holds about 313 tonnes. A bucket can hold 45 m³ rock (Komatsu 26 m³). The ore is transported to the crusher and the waste rock to a waste rock dumpsite. The machines are equipped with the positioning system Minestar.



PROCESS – how it works



of flotation cells with a total volume of 5 340 cubic meters. Remaining material are pumped to the tailing pond for disposal.



Crushing

We have three crushers, two in the open pit and one at surface level. The crushers in the open pit are located at 165 and 285 meters below ground level. Each crusher has a capacity of up to 8 000 tonnes/hour. Each day, around 100 000 tonnes of ore are crushed. The crushed ore is transported by conveyor belts through an intermediate stockpile and then to the ore storage located by the concentrator.

The conveyor

There are seven conveyors with a total length of 7 km for the transportation of ore from the crusher to the ore storage. 3,5 km of the route is in a tunnel.

The conveyors have a capacity of up to 8 000 tonnes/hour and can go up to 4,8 meters/second.

Ore storage

An ore storage area with a capacity of 200 000 tonnes, equivalent to two days operation, is located beside the concentrator.

The building is 90 meters high and 60 meters is above ground level.

Concentrator

When the ore enters the mill, water is added and then grinded into the two mills. The grinding technique is called autogenous, ie the ore grinds itself without the addition of

external material. There are two grinding lines, each line consisting of a primary and a secondary mill.

Each grinding line has a capacity of 2 200 tons of ore/hour, a total of 36 million tons/year. Primary mills are 12 meter in diameter and 14 meter long. The electric motor driving the mills is of 22,5 MW (30 570 hp).

Screw classifiers in the grinding circuit ensure that the milling is sufficient.

Finished ore slurry then flows to a common mixer, reagents are then added to allow the flotation of the mineral chalcopyrite.

The flotation circuit consists

Dewatering

The concentrate are dewatered with a thickener and then through a press filter. The finished product is known as copper concentrate and contains of 28% copper, 8 g/t gold and 250 g/t silver.

Concentrate transport

Copper concentrate is now ready for transport by truck to the rail terminal in the south-west corner of the industrial area.

It is then loaded on rail wagons and transported to the smelter in Rönnskär, Skellefteå.

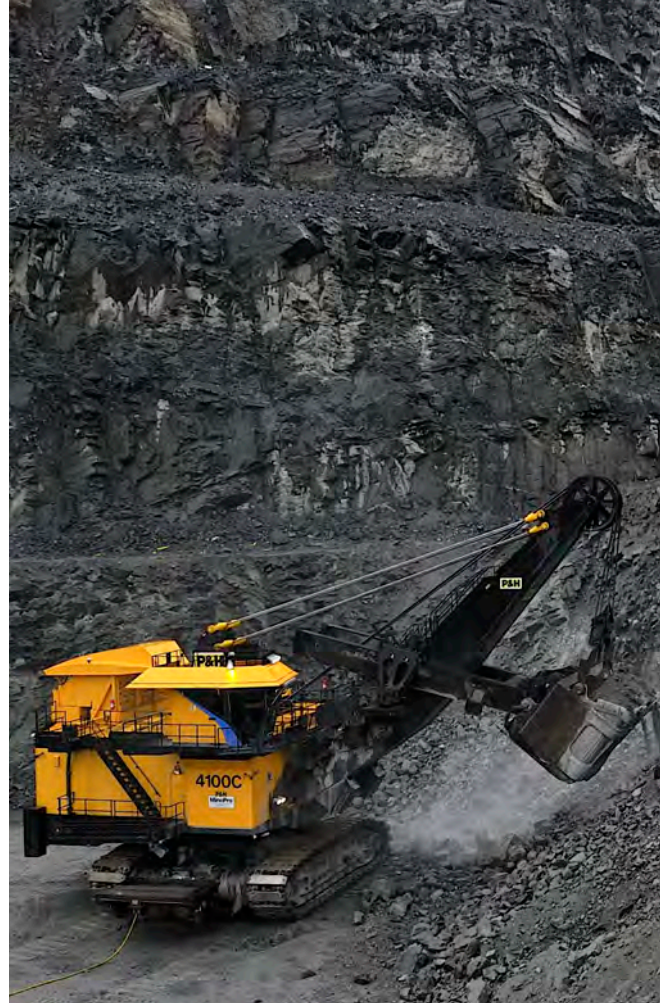
The annual production of copper concentrate is about 350 000 tons.

MACHINE DATA – some of the largest machines in Aitik



Drill ATLAS COPCO PITVIPER 351

- Length - 16,4 meters, Width - 8,1 meters, Height - 31,4 meters, Weight - 181,4 tons.
- Voltage - 6 000 volts.
- Capacity - 20-40 meters/hour.



Shovel P&H 4100C

- Length - 13,8 meters, Width - 11,8 meters, Height - 12,2 meters (19,2 m), Weight - 1 300 tons.
- Voltage - 6 600 volts.
- Motors - Five total, 900 kW each.
- Capacity - 6 000 tons/hour.
- Bucket size - 45 m³.



MACHINE DATA – some of the largest machines in Aitik



Wheelloader CATERPILLAR 994F

- Length - 17 meters, Width - 5,5 meters, Height - 7,5 meters, Weight - 210 tons.
- Engine - 1 800 hp.
- Bucket size - 18 m³.



Truck workshop with associated wash bay and tire workshop.



Truck CATERPILLAR 795F

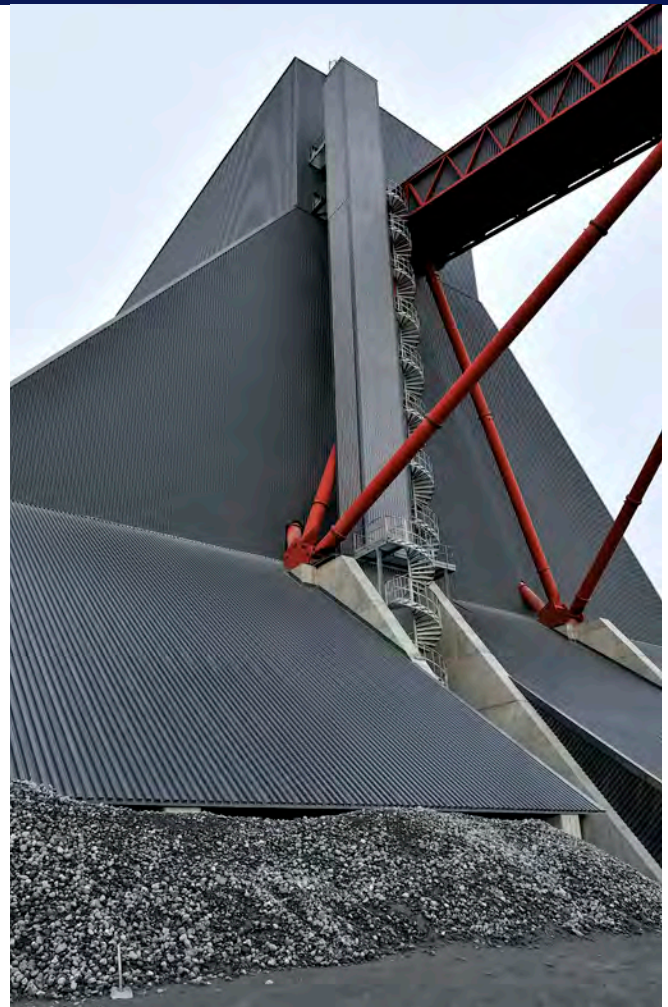
- Length - 15 meters, Width - 9 meters, Height - 8 meters, Weight - 250 tons.
- Load capacity - 313 tons.
- Engine - 3 400 hp, Oilpan - 310 litres, Fuel tank - 7 192 litres.
- Fuel consumption with a load on flat ground: 70 litres/hour.
- Fuel consumption with a load uphill: 400 litres/hour.
- Tire dimensions 56/80R63, Tire diameter 4,1 meters, Air pressure 6,7 kp.

FACTS – modern and energy-efficient concentrator



Belt conveyor and Drive station 2030

- The new conveyor belt is 7 km long, of which 3,5 km is underground.
- The belt is 2 meters wide and weighs 150 kg/meter.
- To drive the belt there are two 2 800 kW (3 804 hp) motors and two 1 800 kW (2 446 hp) motors.
- The larger motor weighs over 9 tonnes, and the largest gearbox weighs about 15 tonnes.
- The belt travels 4,8 meters/second.
- The capacity of the belt is 8 000 tonnes/hour.
- Total weight (belt+ore) $883 + 1\,400 = 2\,283$ tonnes.



Main ore storage

- Capacity 200 000 tonnes (2 days production).
- Area 7 200 m² (one football field).
- Height 90 meters, which 60 meters above the surface.

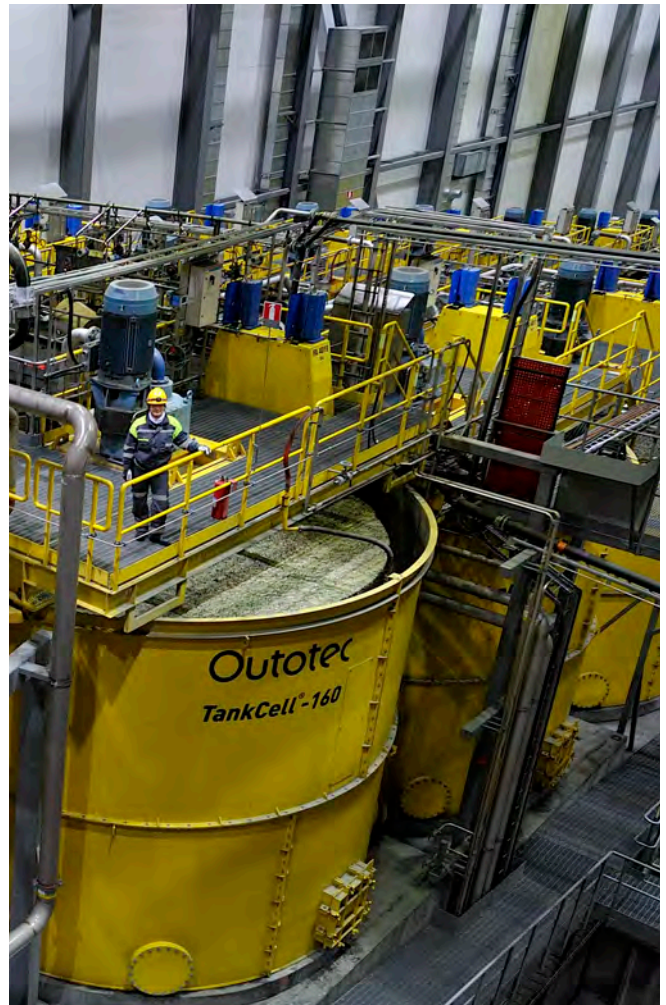


FACTS – modern and energy-efficient concentrator



Mills

- Two grinding lines, nominal supply 2 200 tonnes/hour.
- The primary mills are 12 meters in diameter and 14 meters long (the largest of their kind in the world).
- Gearless drive AG mill - 22,5 MW.
- Total power - 65 MW.



Flotation

- Chalcopryrite containing silver and gold sticks to air bubbles and float to the surface where they are separated.
- Flotation cells 26 á 160 m³, 14 á 50 m³, 12 á 40 m³. Total volume: 5 340 m³.

