

## Garpenberg, mining treatment plant, Sweden

### The client

*Boliden is a metals company with a commitment to sustainable development. Their roots are Nordic, but the business is global. The company's core competence is within the fields of exploration, mining, smelting and metals recycling. Boliden has a total of approximately 4,800 employees and a turnover of SEK 34 billion. Its shares are listed on NASDAQ OMX Stockholm, segment Large Cap. ([www.boliden.com](http://www.boliden.com))*



### Key information

- > Plant capacity: 2880 m<sup>3</sup>/day or max 250 m<sup>3</sup>/h
- > Start-up year: December 2013
- > Zinc, silver, gold, copper and lead mine
- > Drainage water

[www.anoxkaldnes.com](http://www.anoxkaldnes.com)  
[www.vaing.se](http://www.vaing.se)  
[www.vwsmining.com](http://www.vwsmining.com)

### The needs

Boliden AB, a Swedish mining company, carried out a major expansion of the Garpenberg mine (Sweden) in January 2011. The ore production was to be increased from 1.4 million tonnes to 2.5 million tonnes per year. The expansion was carried out between 2011 and 2014, expecting to reach full production capacity by the end of 2015.

To be able to handle the new stringent outlet requirements, and the increased water production, an efficient nitrogen removal process had to be installed.

### Veolia's solution

Veolia secured the contract and installed the AnoxKaldnes™ MBBR process for biological nitrogen removal, directly on the mine drainage water. This is a compact, cost effective and very efficient biological process. After the MBBR the water is mixed with a side water stream and released into the recipient.



## Technical data

### Design load:

Dimensioning Flow:	120 m <sup>3</sup> /h
Maximum Flow:	250 m <sup>3</sup> /h
SS:	100 mg/l
TN:	117 kg/d
Temperature:	10- 20°C

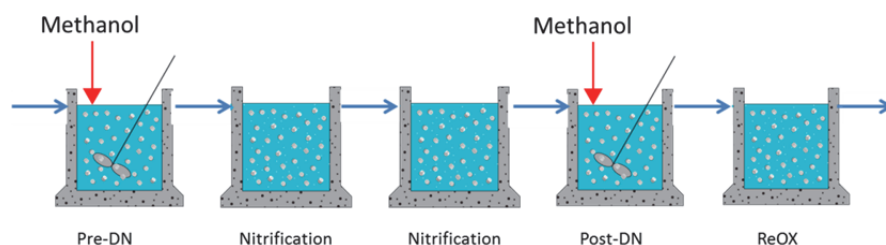
### Effluent requirements

Total soluble Nitrogen: <2 mg/l  
on monthly average.



## The process

The very strict effluent requirement of 2 mg/l soluble TN required a flexible and stable process. With a very small footprint, the plant is constructed and designed for pre-denitrification, 2-stage nitrification and post-denitrification, plus a reoxidation stage for reduction of excess carbon. The external carbon source used for the denitrification stages is methanol.



## Results

The plant has shown excellent performance, removing up to 98% of the incoming nitrogen. The total soluble nitrogen level in the effluent is now stable at 1.5-1.6 mg/l, on average (graph below), which is about 95% reduction, and safely below the effluent requirement.

