

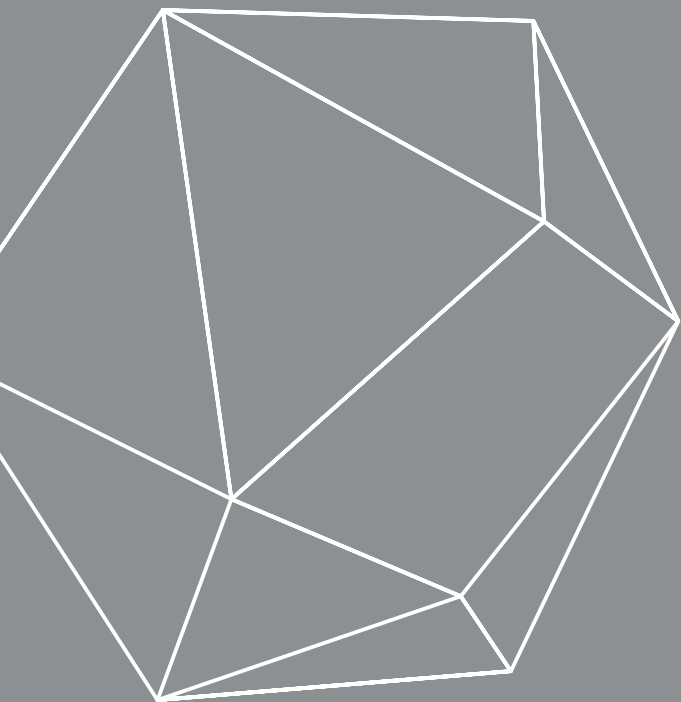
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PART 3: 1979-2001

DOING THE JOB



NW BOLIDEN



BOLIDEN 1924-2024

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Boliden 100 years, Part 3

Produced by Boliden AB in collaboration with the Center for Business History

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A story with many faces

When times get tough, the tough get going. The postwar years' optimism and successes came to be replaced by significantly tougher times, and not just for Boliden. Much later, this would lead to stronger industrial ties between Finland and Sweden. This did not happen without people taking sides.

In my homeland Finland, industrial production had grown continuously under a strategy that required concentrate from Finnish mines to be refined nationally. Smelters were of strategic national importance. Among other things, zinc production had begun in Kokkola at the end of the 1960s. However, the threat from the East grew in the wake of the Cold War, while inflation and international competition created many challenges. Urho Kekkonen introduced emergency laws and the Finnish mark was devalued several times. But the furnaces at the smelters continued to run hot, people worked hard and after

a proper dose of Finnish grit, things improved.

When the company embarked on new, more spectacular adventures there were still a great many who got on with the job in silence. Long-term value creation instead of sensational brainwaves. In my mind's eye, our story is all about these people. People who took responsibility all through the year, year in year out, and who never gave up. This has given our smelters their unique position in the communities where we operate. Occasional dark clouds have been met by an even stronger conviction that problems will all be solved. Ours is a story where countless faces have come together to successfully build a strong team.

We will also have good times and bad moving forward. We shall continue to confront them and carry on working. For no matter what kind of future we create for ourselves and the company, we will create it together.



Photo: Jeanette Hegglund

A handwritten signature in black ink, appearing to read 'D. Peltonen', with a long horizontal flourish extending to the right.

Daniel Peltonen
President Boliden Smelters

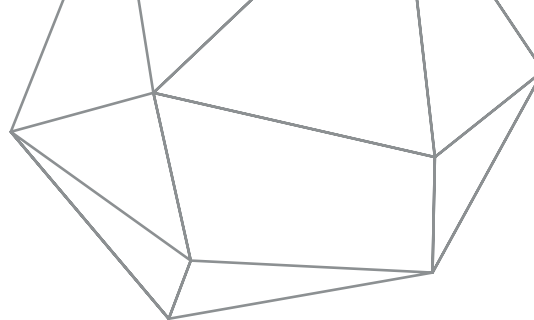
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It's about loyalty and responsibility. Taking care of one another. The understanding that nothing is impossible, and what doesn't kill you makes you stronger.

Ragnvald Jonsson,
former finance director
(Read more on page 50).



CONTENTS



1

1924–1945
The beginnings of
a mining company

In focus:
Boliden Area,
Garpenberg, Odla

*Topic: Technology
under constant
development*
A story about
technical advances,
big and small

2

1946–1978
New discoveries
and business from
residual products

In focus:
Aitik, Tara

*Topic: Health
and safety*
Safety consciousness
has taken over the
industry

In this issue

3

Historical background:
Changing times **6**

1979–2001
New markets and new ownership **8**

In focus:
Rönnskär **16**

Harjavalta **20**

Kokkola **24**

Topic: Doing the job
The personnel are key **28**

How it works:
Smelting **40**

More than just a metals **42**

Unknown Boliden:
The mine and the inland ice **44**

Orders from the top:
Do as little as possible **48**

Boliden people **50**

4

2002–2024
New Boliden

In focus:
Bergsöe, Kevitsa

*Topic: For
generations to come*
Constantly
striving for a better
environment



Photo: Vesa Saivo, Sanoma Oy



I got to know the employees and learned all of their names. After that, never a bad word was heard.

Read more about Pekka Tuokkola on page 54.



CHANGING TIMES

*Text: Dag Avango, history professor
at Luleå University of Technology*

From the second half of the 1970s and throughout the first half of the 80s, the mining industry in large parts of the Western world went through a difficult period. The Swedish mining industry was unable to compete on the world market because of high wages and high energy prices. To survive the crisis, the industry implemented ruthless structural rationalizations. The steel companies closed blast furnaces, and in the Bergslagen area they fell from 13 in 1975 to 2 in 1982. The mines that had supplied them with ore were closed. In 1975, there were 18 mines in operation in Bergslagen. Seven years later there were two iron ore mines left, Grängesberg and Dannemora, and the Falu copper mine. And after another 10 years, by 1992, they had all closed. With that, the mining industry was no more in its former Swedish heartland.

Naturally, Boliden had also been

Dannemora mine, 1991.

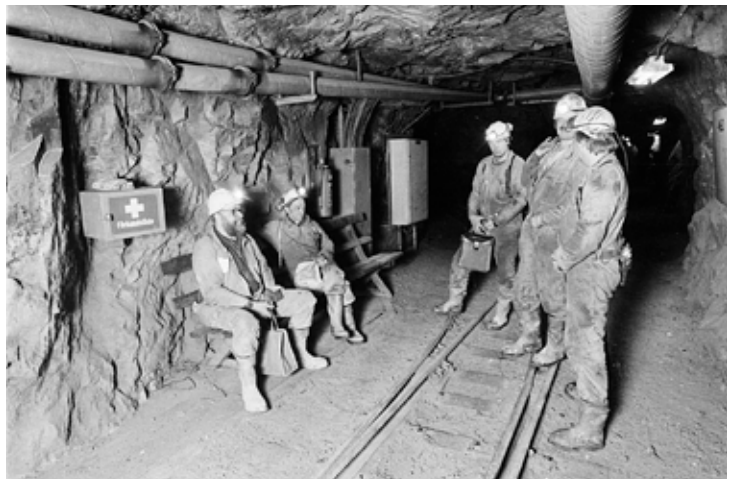


Photo: Tommy Arvidsson/Wikimedia Commons (SM/5438_29)

The demand for energy increased during this period. Hydropower was an important source.

affected by the severe energy price increases during the 1970s, as well as by the subsequent economic downturn for the entire industry. The consumption of energy had increased ever since the mining company began operations. Up until 1940, the increase had been at a constant pace, following which energy consumption increased quickly owing to rising production to satisfy demand. The 1950s involved a new rapid increase of the company's energy consumption, this time as a result of Boliden's transition to smelting ore in electric furnaces in its smelter on Rönnskär, and production increases to meet demand in the burgeoning postwar economy. Boliden satisfied its energy needs through hydropower; the company purchased electricity from Skellefteå Stads Kraftverk, which was building ever more hydroelectric plants in the Skellefte River. The demand for electricity also increased in households, but it was primarily Boliden's industrial mining complex that drove the increase. The company's electricity consumption rose until 1968–69, and Skellefteå Kraft built the Hydro stations at Granforsen and Båtforsen in 1962, and Rengård in 1970. Boliden also consumed fossil fuels in the context of its production in the mines. When energy prices rose during the 1970s, the company, just like other energy-intensive industries, needed to take measures.

State support

Research into the mining industry's strategies for addressing the crisis in the 1970s in Sweden and internationally,

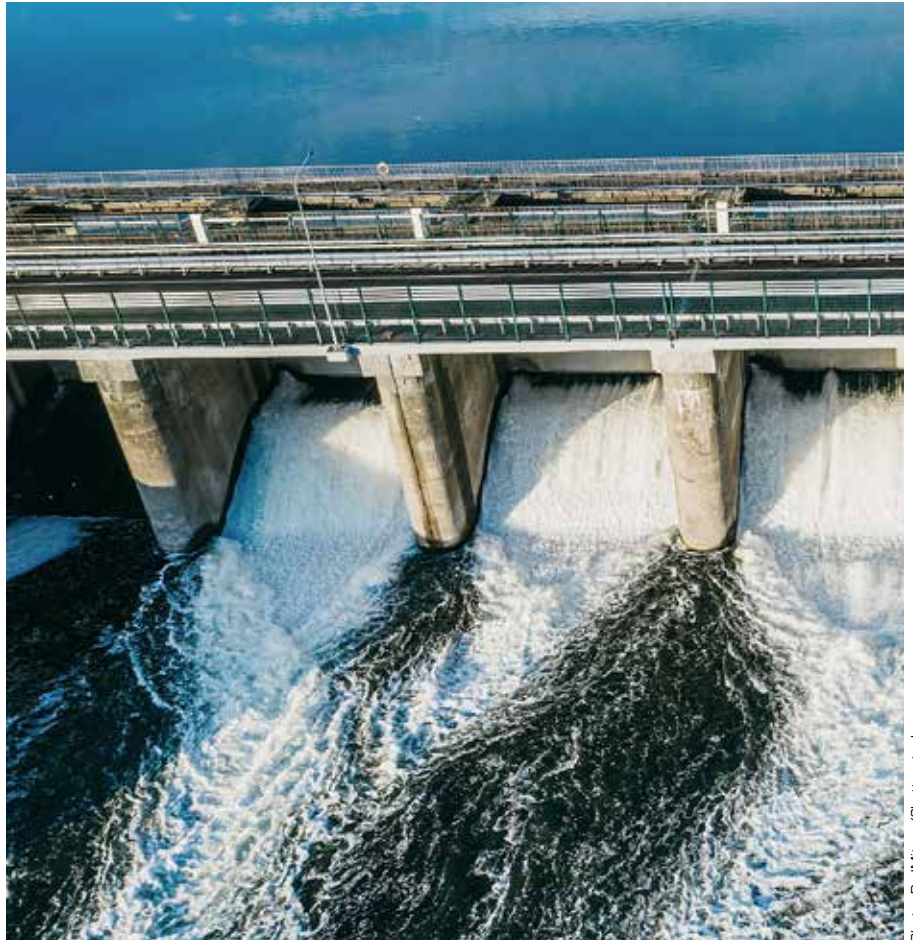


Photo: DeclMityay/Shutterstock

shows that companies did not respond solely with structural rationalizations and closures. An important measure was energy efficiency improvements, from mines with crushers and concentrators, to smelters and haulage. Something that distinguishes Sweden during the crisis, was the active part the state played in crisis management. During the 1970s, grants to specific industries in Sweden totaled around SEK 26 billion. Mining belonged to the industries that received major amounts, but among them were also companies in the same value chain, such as smelters.

The crisis hit every energy-intensive industry in the Western world, thus also in Norway and Finland. There were extensive closures that also affected large-scale, previously profitable mines in the

Scandinavian Arctic such as Hannukainen in northern Finland and Sydvaranger on the Norwegian Arctic Ocean coast. Lively mining communities turned into crisis-riven depopulation areas.

During the second half of the 1980s, the mining industry in Sweden stabilized for a few years but it continued to struggle during the 90s with declining profitability. While mines that had operated since medieval times in Bergslagen closed for good, the industry survived in the North along with occasional mines in the country's southern regions. Even at the end of the 1990s, hopes for the mining industry's future in Sweden were not high. The big turning point would come in the beginning of the millennium, once again driven by changes on the international markets.

1979–2001

NEW MARKETS AND NEW OWNERSHIP

Toward the end of the 1970s, Boliden began working according to a new strategy: the operation would go international. The company would hold onto its existing business areas, but build up operations in other countries.

Text: Karin Jansson Myhr



At the end of the 1970s and the beginning of the 80s, Boliden also made acquisitions on its home turf. The first was the Danish company Paul Bergsøe & Son in Landskrona, which recycles lead acid batteries.

The new strategy meant the operation would not only be developed in e.g. future raw materials supply, but also in the sale of products and technology on the international market. However, the main objective was to secure the Boliden Group's development in Sweden.

At the beginning of the 1980s, a number of company acquisitions were made and there were set-ups in e.g. North America, France and the Philippines. Also, mining rights were acquired in e.g.

Hans Bengtsson and Kjell Malmgren
visiting the Saudi East Mine, 1985.





At the end of the 1970s and beginning of the 80s, Boliden also carried out a number of strategic acquisitions on its home turf, in the field of metal recycling.

Pinas Altos in New Mexico, USA. In addition to this, the subsidiary Boliden Intertrade enjoyed successes in international trade. In 1981, Boliden Contech was formed and intensive efforts were begun to market Boliden's technology internationally.

In 1983, with a view to further broaden and strengthen the marketing of the Group's technology and consultancy services, Boliden acquired parts of the Gränges Group's mineral exploration company and consultancy, Gränges International Mining. Through this acquisition, Boliden gained mining rights in both Sweden and Saudi Arabia. In its internationalization efforts, Boliden also established its own exploration offices in countries such as the USA, Canada, Saudi Arabia and Spain.

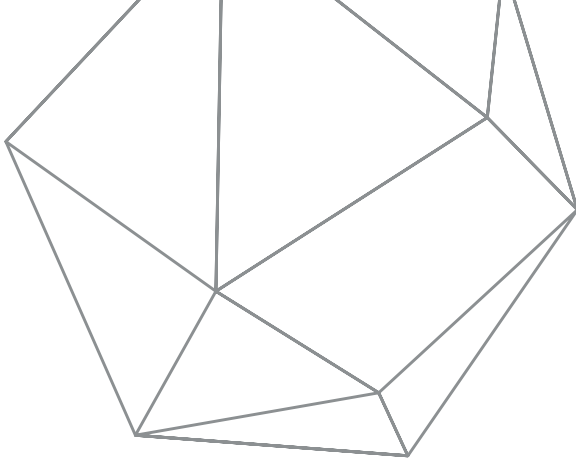
Investments on its home turf

In 1980, the Dammsjö deposit was discovered in Garpenberg, perhaps Europe's biggest silver deposit. Because silver prices fell during the 1980s, it was never put into operation. But later, at a depth of 1,000 meters, higher grade ore was found, and this is mined still today. The exploration office was closed in 1986, and exploration in Bergslagen ceased. A little less than 10 years later it opened again, but for economic reasons, no major initiatives were taken. However, exploration continued on a smaller scale, and around the turn of the millennium deposits were found in Gransjön, Kapersbo, Lappberget and Kvarnberget. Lappberget is, together with Aitik outside Gällivare,



The area around the Jabal Sayid copper mine in Saudi Arabia

In the beginning of the 1980s, mining rights were acquired in e.g. Pinas Altos in New Mexico, USA.



the biggest ore deposit discovered by Boliden. The discovery in Lappberget probably saved the future of Garpenberg.

At the end of the 1970s and beginning of the 80s, Boliden also carried out a number of strategic acquisitions on its home turf, in the field of metal recycling. The first was the Danish company Paul Bergsøe & Son which also had a big operation in Landskrona, which was followed by Arv. Andersson in Skellefteå.

Trelleborg – a long-term owner?

In the middle of April 1986, the major

Swedish industrial group Trelleborg AB became the new principal owner of Boliden. In January 1987, Trelleborg had acquired sufficiently many shares for Boliden to become a subsidiary of Trelleborg. One year later, Trelleborg became sole owner of Boliden, and the Boliden share was delisted from the stock exchange.

Trelleborg's CEO Rune Andersson justified the purchase as follows, according to the Swedish daily Svenska Dagbladet on April 17, 1986: *"We have an expanding, profitable business, but it's*



New deposits in Garpenberg extended the mine's lifetime.

“

Now it seemed as though the company had gotten a stable, long-term owner, which was essential for implementing the necessary action plan.

a narrow business. For a long while, the Board and company management have discussed getting into a new business. But it had to be one that is not only linked to what we do ourselves, but also involved mature products.”

Over the years, Boliden had experience many changes of ownership. Among others, Beijerinvest, Volvo and a consortium comprising Asea, Atlas Copco, Gränges, Investor and Providentia had been owners. Then came a string of investment companies. Now it seemed as though the company had gotten a stable, long-term owner, which was crucial for implementing the necessary action plan. According to the same article in

the Svenska Dagbladet, Boliden’s CEO John Dahlfors could barely conceal his joy during the press conference when the deal was presented. At last the company would enjoy stable ownership, and perhaps the new ownership structure would lead to more jobs in Boliden. However, John Dahlfors did not remain long in his position as CEO. He was soon replaced by Trelleborg’s own Kjell Nilsson.

Once Trelleborg had become principal owner of Boliden, the international company acquisitions continued. Boliden acquired companies in many of the subsidiaries and business areas which now forms part of the Group, such as Boliden Mineral and the Chemicals business

In its internationalization investment, Boliden had established exploration offices in e.g. Spain, whether they also began mining ore in Los Frailes, west of Seville.



The 1998 dam accident in Los Frailes, Spain, affected nearby areas. The area was decontaminated by Boliden's subsidiary Boliden Apirsa S.L. in collaboration with both the central and local governments.



area. And through the purchase of the American company Allis Chalmers, which manufactured crusher, screening and processing equipment for the mining industry, they added another business area, and around 4,300 employees.

Boliden becomes Canadian

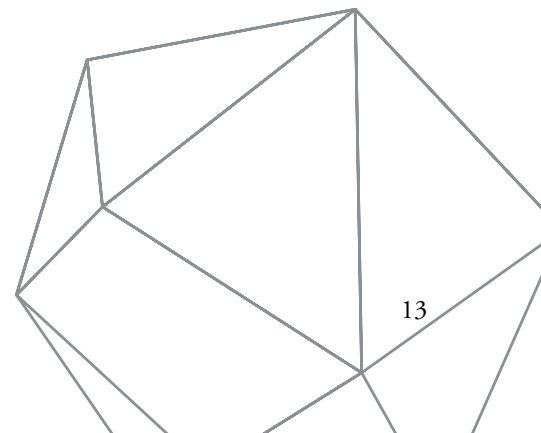
However, Boliden was making major losses, and that required radical measures. Kjell Nilsson now initiated an 'ordeal by fire' with major job cuts to get Boliden on an even keel. It wasn't particularly popular, but probably essential. He left his CEO position in 1988 in conjunction with Boliden's disappearance from the Stockholm stock exchange when it became a business area in the Trelleborg Group.

Trelleborg proved not to be quite the long-term owner Boliden had hoped for. In 1996, Trelleborg decided to dispose

of the majority of its holding in Boliden. The following year, Boliden Limited, which the company was now called, was listed on the stock exchanges of Toronto and Montreal in Canada. This also meant that Boliden's head office was moved to Toronto. The move was made in the hopes that Boliden would become an international mining player.

For Trelleborg, the Canadian deal was a success. In conjunction with the stock exchange listing, it sold 55 percent of its Boliden shares, scooping up almost SEK 5 billion. But after the listing, the Boliden share began to fall drastically.

Shortly after, it acquired the Canadian company Westmin Resources. Among other things, the company owned zinc ore on Vancouver Island (Myra Falls) and a copper deposit in Chile. However, the acquisition proved to be a bad deal. Firstly, the acquisition had been made





Bank of America Merrill Lynch

Romeo
Juliet
March 15-20



◀ In 1997, the head office was moved to Toronto and the company was listed on the stock exchanges in Toronto and Montreal.



with SEK 5.8 billion in cash, not its own shares, which meant Boliden was burdened with major loans. Secondly, the company's mines were not especially profitable.

Boliden is rescued

At the turn of the millennium the situation was dire, and Boliden was threatened with bankruptcy. The company then had liabilities totaling SEK 8 billion. Not only had the move to Canada been a failure, Boliden also suffered a major accident when a dam burst at the Los Frailes mine in Spain in 1998. Low metal prices and a general mistrust of the entire mining industry did not improve things. Bankruptcy would have had devastating consequences, especially for commerce in Norrbotten and Västerbotten Counties.

In 2001, a very special, and successful, rescue operation was initiated. Under the leadership of financier Carl Bennet,

Anders Sundström (the then director of Sparbanken in Piteå), the construction company Peab's CEO Mats Paulsson, Skellefteå town council commissioner Lorentz Andersson and union representatives for Boliden, they succeeded in putting together SEK 2.6 billion. Even the banks stepped up, they really had no choice. In December that same year, Boliden was once again under Swedish ownership. For the people who took part in the rescue operation, it turned out to be a good deal.

When Boliden was once again Swedish, a comprehensive reconstruction of the company was begun with the aim of improving the company's financial position and its operational flexibility. Businesses were disposed of or closed, costs were cut and among other things, the number of employees at the head office were halved. The measures paid off.

Included in the acquisition of Westmin Resources was the Myra Falls Zink ore mine on Vancouver Island.



At the turn of the millennium the situation was dire, and Boliden was threatened with bankruptcy.

In focus: Rönnskär

In Skelleftehamn, 15 kilometers outside of Skellefteå, is one of the world's most efficient copper smelters. The plant receives copper and lead concentrates from Boliden's own mines and from external suppliers. Thanks to the further development of Kaldor technology, the smelter is today also a world leader in electronics recycling.

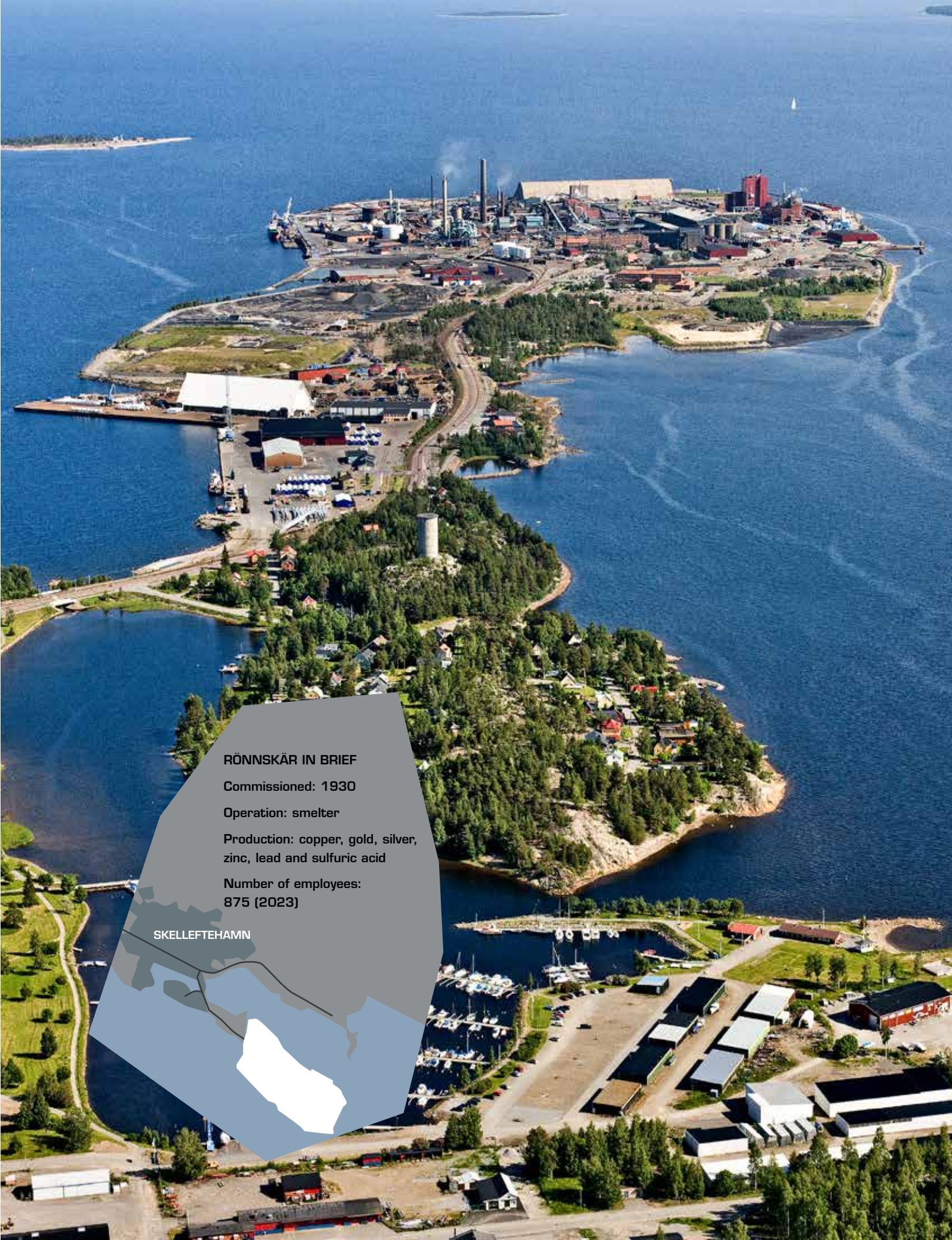
Text: Sara Johansson

Rönnskär is Boliden's biggest production unit and one of the biggest private employers in the Västerbotten region. The location of the smelter is no coincidence. The proximity to labor and efficient haulage were crucial when the newly discovered Boliden ore would be processed. The ore's complicated composition included, among other things, large quantities of arsenic. Back then, at the end of the 1920s, there were only two smelters in the world – in the USA and Germany – that could process such ore. And only in small batches.

And so as early as 1927, Boliden decided to build its own smelter. At first, the idea was to locate the plant close to the mine, but for several reasons they had second thoughts. The Boliden mine was located in a poorly accessible area and lacked both its own processing plants and an acceptable transport system. On the coast, near Skelleftehamn, conditions were much better. There was already access to a functioning port, a railroad, electricity and it was also close to the labor they needed. And so the smelter came to be located on the two islands, Hamnskär and Rönnskär. The islands were filled in, joined and united with the mainland. And so Rönnskär was born.

HRH Prince Gustaf Adolf visited Rönnskär in 1928 when construction of the tall smokestack began.





RÖNNSKÄR IN BRIEF

Commissioned: 1930

Operation: smelter

**Production: copper, gold, silver,
zinc, lead and sulfuric acid**

**Number of employees:
875 (2023)**

SKELLEFTEHAMN

Europe's tallest smokestack

In 1928, construction began on the actual installation. The area saw the construction of what was to be Europe's tallest smokestack, no less than 145 meters. The idea was quite simply for the smoke to blow as far away from the Swedish coast as possible. Operations could begin in January 1930. Initially, production consisted mainly of unrefined copper known as blister, that was cast as ingots. The first ingots blister cups were produced during the Midsummer weekend in 1930.

Since the beginning, Rönnskär has also produced pure gold and silver. A precious metal plant was put into operation as early as 1933. The gold is produced in the form of granules or bars, and the silver as granules. The precious metals are used, among other things, in the electronics industry and for investment purposes.

During the 1940s, the lead operation also began, and in 1952, a sulfuric acid plant was built. In the middle of the 1960s, zinc recycling picked up speed. In

1976, Rönnskär commissioned the world's first lead kaldo plant. The plant was built to make use of residual products from the copper plant. Four years later, the recovery of metals from electronics scrap began. Over the years, the Kaldo process has shown great flexibility and has been used to smelt a great many different materials. It also has major environmental benefits.

Sweden's dirtiest industry cleaned up

During the 1970s, Rönnskär was referred to as 'Sweden's dirtiest industry'. Arsenic was flushed into the sea and the discharges from Rönnskär could be detected in the Southern Baltic. A treatment plant was built in the middle of the decade, and since then environmental work has progressed steadily. In the 1990s, arsenic discharges had been reduced by 99 percent.

Recycling has also been an important part of the business for a long while. Copper scrap recycling began back in the 1960s. The work was refined, and in 2012 it led to the commissioning of the

e-kaldo plant. The operation also takes care of steel dust from recycling companies, foundries and others. In 2018, construction began on a leaching plant with technology developed to extract as much metal as possible from in-house residual materials. This will reduce the amount of waste deposited in the underground repository by 80 percent. But the things that still have to be stored will be located deep in the bedrock. In 2022, a new underground repository went into operation. Nowhere else in the world is such a deep repository located so close to a smelter.

Today, as the first company in the world, Boliden offers two separate copper products produced with a dramatically lower carbon footprint than the global average. One product, Low-Carbon Copper, is produced from concentrate from Boliden's own copper mines. The other product, Recycled Copper, has the same emission levels as Low-Carbon Copper, and is produced from secondary raw materials such as electronic scrap.



Trusted partners

Project Rönnskär +200 was carried out in 1998–2000. The initiative involved increasing production capacity by no less than 70 percent to succeed in producing 200,000 metric tons of copper per year. This was done through comprehensive modernization, the introduction of new smelting technology and the construction of a sulfuric acid plant and a new converter hall. All while the old plant was in operation. They built the new plant on top of the old one. At the same time, the electrolysis hall was also extended. The success of the project can be seen as a show of strength that highlighted collaboration and everyone’s good efforts.

Part of Rönnskär’s successes lies in its collaboration with others. Several important partnerships over the years were crucial, especially during the crisis in 2001 when the local electricity generator Skellefteå Kraft provided concrete help by deferring invoices or commuting them into shares. But there were also other

long-term partners such as scrap dealers like Siegfried Jacob and Arv. Andersson was significant over the years.

The fire

On June 13, 2023, Sweden’s biggest industrial fire ever broke out at the electrolysis plant on Rönnskär. Precisely what caused the fire has not yet been determined, but the result was devastating. The firemen succeeded in preventing it from spreading to other operations, but the electrolysis plant was destroyed. Immediately after the fire, a cleanup operation began as did a project aimed at building an entirely new electrolysis plant. As a result of the fire, Rönnskär was forced to recast its business model and selling copper anodes instead of cathodes. The organization was adapted to meet the new conditions, where gold production also fell. But the common goal for the employees was clear; a new, modern electrolysis plant would be built as soon as possible.



The success of the project can be seen as a show of strength that highlighted collaboration and everyone’s good efforts.

◀◀◀ Earlier, there was also a concentrator on Rönnskär. It was closed in 1954.

◀◀ Gold casting, 1936.

▶ Work in the copper electrolysis plant.

▼ The e-kaldo plant opened in 2012.



Photo: Johan Lidman



HARJAVALTA

NUMMI

KREETALA

HARJAVALTA IN BRIEF

**Commissioned: 1944 (1936
in Imatra)**

Acquired by Boliden: 2004

Operation: smelter

**Production: Copper, nickel, gold,
silver and sulfuric acid**

Number of employees: 559 (2023)

In focus: Harjavalta

Boliden Harjavalta, in Satakunta County, produces nickel as well as copper and precious metals. The nickel is produced in a single step thanks to modern technology. However, the smelter's long and dramatic history is as much about fisticuffs as it is about major technical advances.

Text: Sara Johansson

Harjavalta is located in southwest Finland, not far from the port on the Baltic Sea. The main products from the smelter are nickel, copper, gold and silver and the by-product sulfuric acid. The Port of Pori, where Boliden Harjavalta has its copper refinery, is 30 kilometers away. Today, Boliden Harjavalta is one of the world's most efficient copper and nickel smelters, and is unique in that it's the only nickel smelter in western Europe. It also has among the lowest sulfur dioxide emissions per metric ton of nickel produced compared to other nickel smelting plants around the world.

While Boliden's mine in Kevitsa supplies the smelter with concentrate, it also purchases raw materials from external mines. Recycled metal is also used in the processes.

A historical move

The smelter was founded in 1936 by the Finnish company Outokumpu, but was

then located in Imatra in South Karelia, close to the Russian border. On July 1, 1944, the head of Finland's war economy issued orders to move the smelter west, away from the ongoing war. The work with dismantling and moving was begun immediately. Because of the prevailing circumstances, they could not count on getting any new construction material or new equipment. Thus they had to take everything with them. It was all loaded onto railroad wagons and in September,



► The converter hall in Harjavalta, 1945.

the last wagons rolled toward the smelter's new address – Harjavalta. However, because the railroad did not go all the way to the new industrial area, they were quickly forced to build one. They solved the problem by 'borrowing' a rarely used railroad spur and moving it to the area. Thus in three days, the problem was solved. But next they had to erect the smelter.

The move and the reconstruction were made possible thanks to the efforts of almost 1,000 people. At first, it seemed almost impossible to get hold of the necessary labor as so many men were at the front. But the work progressed and on Christmas Day 1944, power was connected to the first smelter furnace. Read more about this unconventional move and Harjavalta's development in a separate article.

The birthplace of flash smelting

Not only did Outokumpu choose to move the smelter, it also took the opportunity to increase its capacity. However, electricity prices had risen sharply during the war so they were forced to find new

ways to keep the business going. The metallurgists came up with a method that used the natural heat generated in the reaction between iron and copper sulfide. Flash smelting was born.

The technique was gradually improved and refined. In the 1950s, when they began marketing the new method on the world market, they also began to investigate whether the method would also work for producing another metal – nickel. It did. Today, flash smelting is the cornerstone for energy efficiency at the smelter, and the method is now used in the production of almost half of the entire world's copper.

In the beginning of the 1970s, the industry began to rely more on gas, which also changed the process in the smelters. Many people from various parts of Finland and the rest of the world flocked to Harjavalta as the plant was at the forefront of progress.

Major investments and new strategies

In the middle of the 1990s, the smelting process was changed again and much was automated. Major necessary investments



The metallurgists came up with a method that used the natural heat generated in the reaction between iron and copper sulfide. Flash smelting was born.



The test furnace where flash smelting experiments were conducted in 1947.

were made in both nickel and copper production.

Boliden took over Harjavalta as part of the big deal with Outokumpu in 2004. It was a financial boost for the smelter as large investments were also made, especially in copper production. But it involved great cultural change after so many years of domestic ownership. With Outokumpu as the owner, the smelter had lived through times of great difficulty and great success. But now that there was a new owner, and Swedish to boot, it was viewed with some skepticism. It took a little time, but once people understood that the new management was prepared to invest in the business and was pulling in the same direction, things improved.

In 2015, they began purchasing nickel concentrate themselves. While this involved an entirely new strategy that was certainly more complicated – they now both bought and sold nickel – it was also more profitable.

No I in teamwork

Regardless of the owner, the smelter had always enjoyed good collaboration with others in the industry. In addition to the mines that supplied raw material, they had long enjoyed productive collaborations with e.g. the smelters in Kokkola and Rönnskär.

And collaboration is unmistakably present on their home turf. At Boliden Harjavalta, no individual would ever put himself before the team. There’s no I in teamwork. Everyone is seen as a cog in a bigger machine, and many families have worked there for generations. Every employee leaves his mark on the company, and everyone has their own journey to make, whether it began under Outokumpu’s or Boliden’s management.



▲ Boliden Harjavalta has a copper and nickel smelter as well as sulfuric acid plants in Harjavalta and copper electrolysis in Pori.

◀ Working with sulfuric acid in the lab.



Photo: Stefan Berg

◀ Today, the smelter is one of the world’s most efficient for copper and nickel.

In focus: Kokkola

The smelter in Kokkola in the west coast of Finland, has decades of zinc production experience. With its stable production, the operation has always appeared as a pioneer in the industry.

Text: Sara Johansson

In 1967, Finnish industrial giant Outokumpu decided to build a zinc plant in Kokkola, in central Österbotten. At that time, the company had several zinc mines in Finland, but as they did not have their own zinc plant, all of their milled concentrate was exported. Kokkola (Karleby in Swedish, it's a bilingual town) was already a nationally significant industrial town at the end of the 1960s as Outokumpu operated several production plants, a power station, a sulfur plant and a cobalt plant there. There was a good supply of labor and the town's location with excellent traffic connections and its proximity to the zinc mines was an additional plus.

Zinc production began in Karleby in 1969. But it was a tumultuous beginning. At the startup phase, it was noticed that the work needed to be halted, and a separate mercury removal process had to be built. It was a major challenge, but one they quickly overcame. During the first years, the plant's production capacity was around 70,000 metric tons.

Zinc production began in 1969.





KARLEBY

KOKKOLA IN BRIEF

Commissioned: 1969

Acquired by Boliden: 2004

Operation: smelter

Production: zinc and sulfuric acid

Average number of employees:
543 (2023)

Smart organizational changes

In the 1990s, Outokumpu restructured, which resulted in the separation of operations at Kokkola's plants, and the zinc plant formed a subsidiary within the group. This opened up new opportunities for developing production, and during a number of decades the installation constantly change through various expansion and development programs. In 1998, Kokkola's zinc smelter was the first smelter in the world to introduce the direct leaching method for concentrate. Today, this technology is also in use at other zinc smelters.

Outokumpu transferred the zinc plant to Boliden in 2004 in a major business deal. Six years later, Boliden also acquired the sulfuric acid plant located next to the zinc plant. Since 2014, the production process also recovers the

silver that is present in the concentrate.

The silver concentrate is then sent to another operator for processing into pure silver metal.

Silver extraction is a relatively new process, but when it comes to the circular economy, Boliden Kokkola has been a pioneer for decades. The heat generated in the production of zinc and sulfuric acid is actually recovered and used for district heating. This is of great local importance. For example, more than 40 percent of the district heating produced by the local energy company now comes from the waste heat generated by Boliden's processes.

Good reputation

The zinc smelter is very important for the local communities. A great many companies have grown up around the smelter,

leading to hundreds of new jobs. There are excellent conditions as regards power, water and other essentials. But perhaps most important of all was, indeed still is, the excellent relations that have always existed between the companies. Several of them were previously state owned, which certainly made collaboration easier, but the local populace has always been driven by this culture of collaboration.

The smelter has a reputation for being a good workplace where the employer takes care of its personnel. In 1977, Outokumpu closed the unprofitable sulfur plant and decided to offer employment to all of its 300 workers in other factories. Company management needed to find jobs for everyone, which they succeeded in doing. The same situation occurred again in the 1990s when the weaker economy affected the production of cobalt. It was



Photo: Päivi Kerttunen



important and is still vividly remembered by many. And in fact, the zinc plant has never needed to furlough anybody.

Training new employees has always been a fundamental success factor. This became particularly clear at Kokkola, where they had not recruited continuously during the 1980s, which later led to many employees retiring at the same time. They then invested in the creation of training programs for new recruits, which proved to be such a great success that the program has continued. And there were no major problems during the pandemic years. Kokkola never had to close production, but adapted its operations instead. Many white-collar workers worked from home, which until then had been seen as impossible. Several of these adaptive measures have remained in place.

A smelter for the future

Boliden Kokkola has an unusually stable history, and the operation is of great importance for the region. Today, it's a world-class zinc smelter producing products for modern society. The zinc it produces is used in e.g. vehicles, bridges and batteries. Now and in the future it involves being part of, and meeting the needs of, the green transition so that society can continue to develop without leaving major carbon footprints.

In 1998, Kokkola's zinc smelter was the first smelter in the world to introduce the direct leaching method for concentrate.

▲▲ With port access to the Baltic Sea, Kokkola is strategically located.

The heat generated in production is recovered and used for district heating.

▼ The zinc produced is used in e.g. vehicles and batteries.

▼▼ The smelter has a good reputation and finds it easy to attract personnel.



TOPIC: DOING THE JOB

THE PERSONNEL ARE KEY

The old team, we presume. Deadly serious, and with dirty faces. Was it because photography was a bit formal, or because they didn't think the job was much to laugh about? Hard to tell, but until recently, the mining industry was very much a man's world. However, the story of Boliden begins with the crucial efforts of a woman.

Text: Olle Lundqvist



The history of mining is full of disappointments and failed investments, and Boliden's history could have ended back in 1924, seven years before the company was officially formed in 1931. Its first predecessor Centralgruppens Emissionsbolag was namely a loss maker, and had in earnest begun to feel the effects of the general financial crisis. Loud voices talked about stopping ore exploration, as an efficient means to cut expenditures short-term. In the long term, more doubtful, because without ore, there are no mines. But in fact, at the start of 1924, the

A shiftwork team in Boliden's early days, 1926.



These days, women in production are nothing unusual, especially when it comes to truck drivers in Aitik.

board of Centralgruppen decided to significantly reduce exploration.

At this time, a few lumps of arsenopyrite ended up with Thelma Berggren. She was a chemist at Centralgruppen's laboratory in Ulfvsunda outside Stockholm, and the sample she began to analyze came from a rocky outcrop near Holmtjärn, a little forest lake 45 kilometers northwest of what would later become the town of Boliden. Here, a group of prospectors at found a depression containing 'flour'. It contained small pieces of arsenopyrite bearing copper. But not just copper. Because when Thelma Berggren analyzed the sample, she also found gold in astonishing quantities. The gold content in the two small lumps was equivalent to almost 1.2 kilos per metric ton of ore! However, the content of the ore in its entirety was not as high. Its upper part contained an average of 100 grams of gold per ton, increasing to 550 grams per ton at depth. They also found proof of a possible 850 grams of silver per ton.

Never has the expression "good things come in small packages" been more apt. The Holmtjärn ore was actually unusually small. Eight square meters at the surface, tapering off at its maximum depth of 26 meters below ground. But that was enough. The mine that opened that same year was the break Centralgruppen's Emissionsbolag had been crying out for. The mine quickly produced sufficient revenues for exploration to continue, and at the end of that year on December 10, the major Fågelmýran deposit was discovered. Without it, it's unlikely that Boliden Gruv AB would ever have



▲▲ Chemist Thelma Berggren analyzed the first samples and discovered the high gold content.

▲ Passenger hoist in the Kristineberg mine, 1955. 13 years later a woman was given dispensation to operate hoists.

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Traditionally, women featured largely in the lab, or indeed predominated.

existed. And Thelma Berggren was the first person ever to see these riches.

Hoist operator with special dispensation

It was no coincidence that Thelma worked in the laboratory. Traditionally, women featured largely in the lab, or indeed predominated. In the mines, things moved more sluggishly, and it took much longer before women were allowed access. The reason is unclear, but until 1978 women were forbidden from working underground. In Kristineberg, the boundary was at the edge of the mine when Elvi Strand began working there as a hoist operator in 1968. It was a borderline case – the hoist went into the mine – but Elvi was granted dispensation, and tests showed her to have a talent for a

job that wasn't all that easy. Because the mine hoist, unlike elevators in residential buildings, had no fixed stops, the hoist operator had to brake precisely so that the hoist floor stopped flush with the ledge in the rock where the miners were to board or alight.

Inga Wahlberg was another pioneer. In 1970, she had reached the age of 40, her children were grown up, her husband had sold his haulage company and owed a lot of back taxes. Inga Wahlberg felt it was time she started earning money, both for herself and to pay off the back taxes. She enquired at Boliden and there was a job available at the Långsele mine. A hoist controller was required at the outlet to operate the barrels that traveled up and down the shaft carrying men and material, as well as the mine hoists that eventu-



Hoist operation was a task that attracted both men and women. Here we see Dagmar Krokstrand back in 1964.

▲ Helka Puhakka at the laboratory in Harjavalta, 1972.

▲▲ Siv Karlsson at the concentrator lab in Kristineberg, 1955.

▼ On the way up, or down? Seen here among others Severin Lundmark, Filip Westerlund, Arne Ahlström and Gideon Björk.

ally replaced the barrels. It was a matter of both monitoring and regulating the speed. If the barrels were heavily laden or filled with sensitive items, they had to be moved incredibly slowly and carefully. Hoist operator was a sought-after position for an injured miner or anyone who for some other reason was unable to continue in his previous job. In Inga Wahlberg's case there were no such inabilities, and maybe some man or other felt passed over, as a certain irritation was expressed that a woman had been let into what was by custom a man's mining world.

"These days, the women would speak up. Something we unfortunately hadn't learned back then," she says.

In 1978, the prohibition against women working underground was abolished. First in the field was Ing-Marie Lundmark, who began as a miner in LKAB's mine in Kiruna, but this did not mean the floodgates suddenly opened. A decade later, only three women had worked underground in Boliden's mines. One reason, in addition to convention, may have been the physically heavy nature of the work, as handheld drills were still in use.

Still in the minority

But gradually, there began to be a lot less space in the women's locker room. Today, the women in Boliden's mines are not only miners. Women also work as e.g.



electricians, and these inroads are perceived in general as beneficial, not least for the atmosphere in the workplace. It has contributed to a workplace climate where people respect and are considerate of each other, something men and women alike have gained from.

And our hundred-year-old Boliden has plenty of women in middle management and even higher. The general managers of both Rönnskär and Odda are women, and a woman was also head of the Group's smelters. For a while, four of the seven executives in the management group at Rönnskär were women. But there's still a long way to go before 50-50. Admittedly, just over half of the truck drivers in Aitik

are women, but across all of Boliden's workplaces and employees, the proportion is around 20 percent. As before, the laboratories are female strongholds, while male predominance in the other operations is almost total. In Boliden Harjavalta's laboratory, the majority of the staff are women. Also, women work in various white-collar roles and supervisory positions. The number of women in production roles is relatively small.

Anita Engman was hired to drive trucks in Aitik in 2006. When she heard Boliden would be training truck drivers, she applied and was one of four trainees hired. And who stayed. Boliden has good experiences of women drivers, who have

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In 1978, the prohibition against women working underground was abolished.

Maj-Britt Larsson was one of the women pioneers in Aitik. Seen here getting into her truck, 1975.





Members of a Boliden shift team lined up for a photograph, 1926.



proved to drive more safely and cause less damage to trucks than many of their male colleagues. Anita's training course took five weeks and was organized by the company, something that has always been a tradition at Boliden. The first training course arranged for prospective miners was also five weeks long, and was known as drill school as it mainly dealt with drilling and handheld machines.

A mixture of theory and practice

During Boliden's first 100 years, courses that mix theory with practice, tailored to suit Boliden's special requirements, have been held in all of the Group's units. An early example was Rönnskär's industrial school whose first group passed out in 1947, after four years of studies and

practical work. This "smelters university" lived on until 1965, when the last class graduated and was, assert some, almost too good. For many, the industrial school became a springboard to higher studies, and fewer employees than calculated stayed at Rönnskär.

There is a present-day equivalent in Lycksele, where Lycksele Learning Center has run a one-year adult course for miners in collaboration with Boliden since 2011. The catchment area is, with occasional exceptions, Västerbotten. The idea is that people with local connections are more inclined to stay in the region, which is in the company's interest. Boliden also provides expertise in rock drilling, rock blasting, mining, maintenance and hydraulics, which are

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The idea is that people with local connections are more inclined to stay in the region, which is in the company's interest.



Photo: Stefan Berg

New technology demands new skills. The control room at the concentrator in Garpenberg, 2014.



Timo Kumlander and Petri Viljanen in conversation at the copper refinery in Pori.

the main theory subjects, and which do not constitute more than 20 percent of the course. The remaining 80 percent is practical work in Kristineberg, Renström and Kankberg, where students join shift teams and get to experience work for real, and are also reviewed by managers. A degree of screening takes place, but 80 percent of the students (who are also guaranteed summer jobs after the course) make it through the eye of the needle.

“Since the beginning in 2011, 103 of our students have gotten jobs,” says Håkan Karlsson, himself a miner in Boliden, and also an instructor on the course.

And in Gällivare, there is also a similar setup with a Boliden Model at Lappland’s Gymnasium, from which the Aitik mine recruits many of its new employees.

Earlier, in the Garpenberg area, the Gruvorten Learning Center had

external financial support, but is now run entirely by Hedemora municipality. They currently have a high school course and an adult education course. High school students take the construction and infrastructure course with a focus on mining during the last two years, but because the adult education students study the same content but without the high school’s core subjects, their course takes 18 months. The high school students are guaranteed summer jobs with Boliden and can therefore often count on pro tem or permanent employment.

Internal training attractive

There are similar setups in the Norwegian and Finnish units. Harjavalta is located in a region where other major employers compete for young labor, but the smelter’s internal training still attracts between 150 and 250 applicants for every

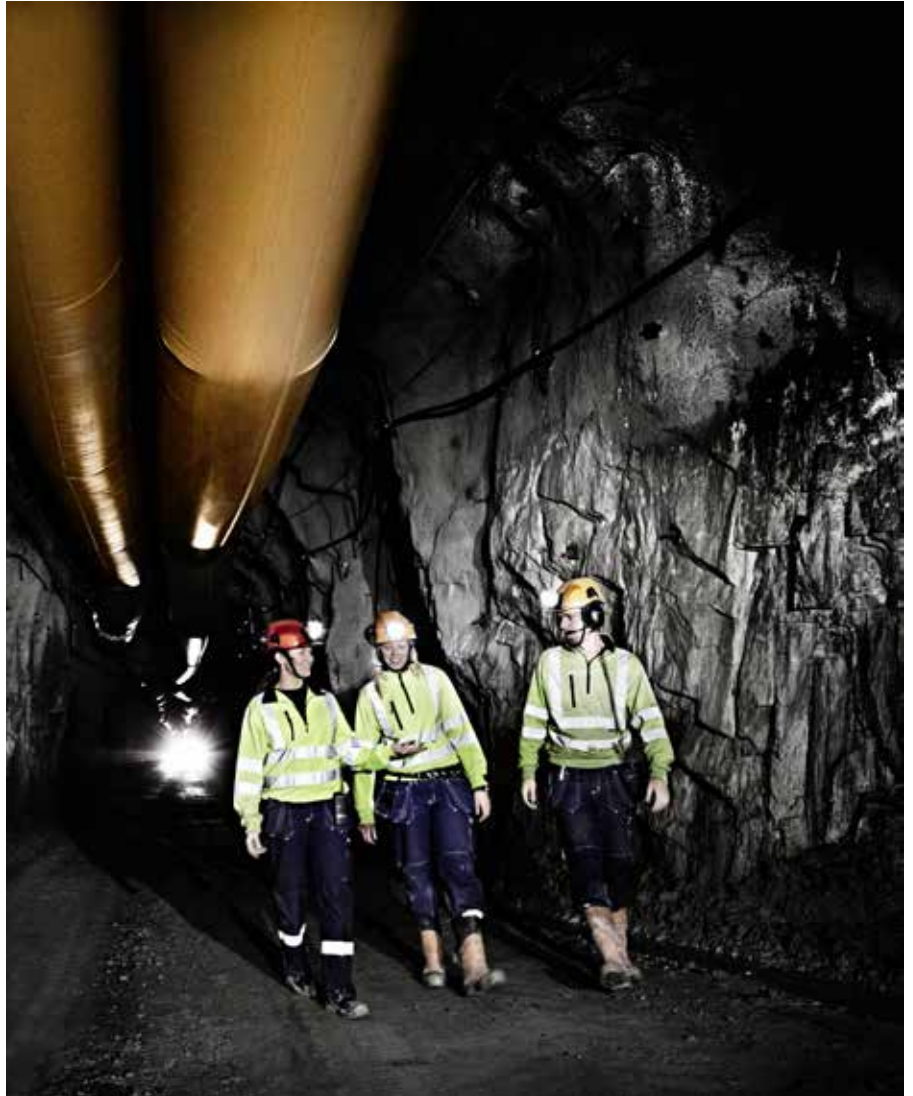
admission. Of these, around 10 percent make it through the eye of the needle and get to alternate four days' work in the smelter with one day's theory. Initially, pay is reduced, but on completion of training, which takes two years, it rises to the full amount. The students admitted are on average 23 years old and have a few years work experience, but despite good overall interest, women are severely underrepresented. In June 2023, three of the 30 apprentices were women.

Internal training is carried out as necessary. It has also taken place in Kokkola, especially during the 1990s when there was a great need for new recruits. There no longer is, and those we hire today come from courses outside the smelter.

In Kevitsa, the mine has a close collaboration with Lapland Education Centre, which holds a three year high school course with a focus on mining, and a training course for adults. The high school students are not allowed to work in the mine, as they are too young and also lack drivers' licenses, but they get to experience practical mining in a little training mine, and are also offered summer jobs after graduation. However, the adult students, whose training time varies between seven months and three years, alternate theory with real mine work. A majority of both student categories are usually hired by the mine. Also, Kevitsa's 570 employees have opportunities for further training at the Lapland Education Centre.

Successful apprenticeship system in Odda

Odda has an apprenticeship system that largely supplies young, 'tailor-made' labor to the zinc smelter. It concerns the two-stage training available throughout Norway and which is in line with current



In Garpenberg, Boliden collaborates with the Gruvorten Learning Center, which has both high school and adult education courses.

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Odda has an apprenticeship system that largely supplies young, ‘tailor-made’ labor to the zinc smelter.

thinking on how to combat youth unemployment. The apprenticeship starts with two years in vocational high school with courses in different fields. The students then apply for apprenticeships in an industry for a further two years. Initial pay is 45 percent of the starting salary, and the percentage increases gradually. Not everyone gets a permanent job directly after the apprenticeship. But in a Norway where very many young people, as in Sweden, are attracted to courses in e.g. IT and media, and where many industries are facing a generation shift and are in need of new personnel with the right skills, a notable number get permanent jobs right away. Those that don't, get to bide their time as pro tems.

Students from the Odda area often take the vocational school's process technology program as they have their

sights set on the zinc smelter, where this course is in most demand. But there are also apprentices who studied under the industrial program. Both programs are available at the high school in Odda, and most of the apprentices who end up at the zinc smelter also have their roots here. The gender distribution among the apprentices is around 50–50, which means the proportion of women is significantly higher than at the smelter in total.

In conjunction with the gigantic expansion of the smelter, apprentice training in Odda will be extended by a further six months when the students will primarily learn IT technology. This adaptation is aimed at meeting the requirements of today's times and a modern smelter.



Many prospective Aitik employees are trained at the special Boliden Model at the Lappland's High School in Gällivare.

Photo: Roger Isaksson

HOW IT WORKS

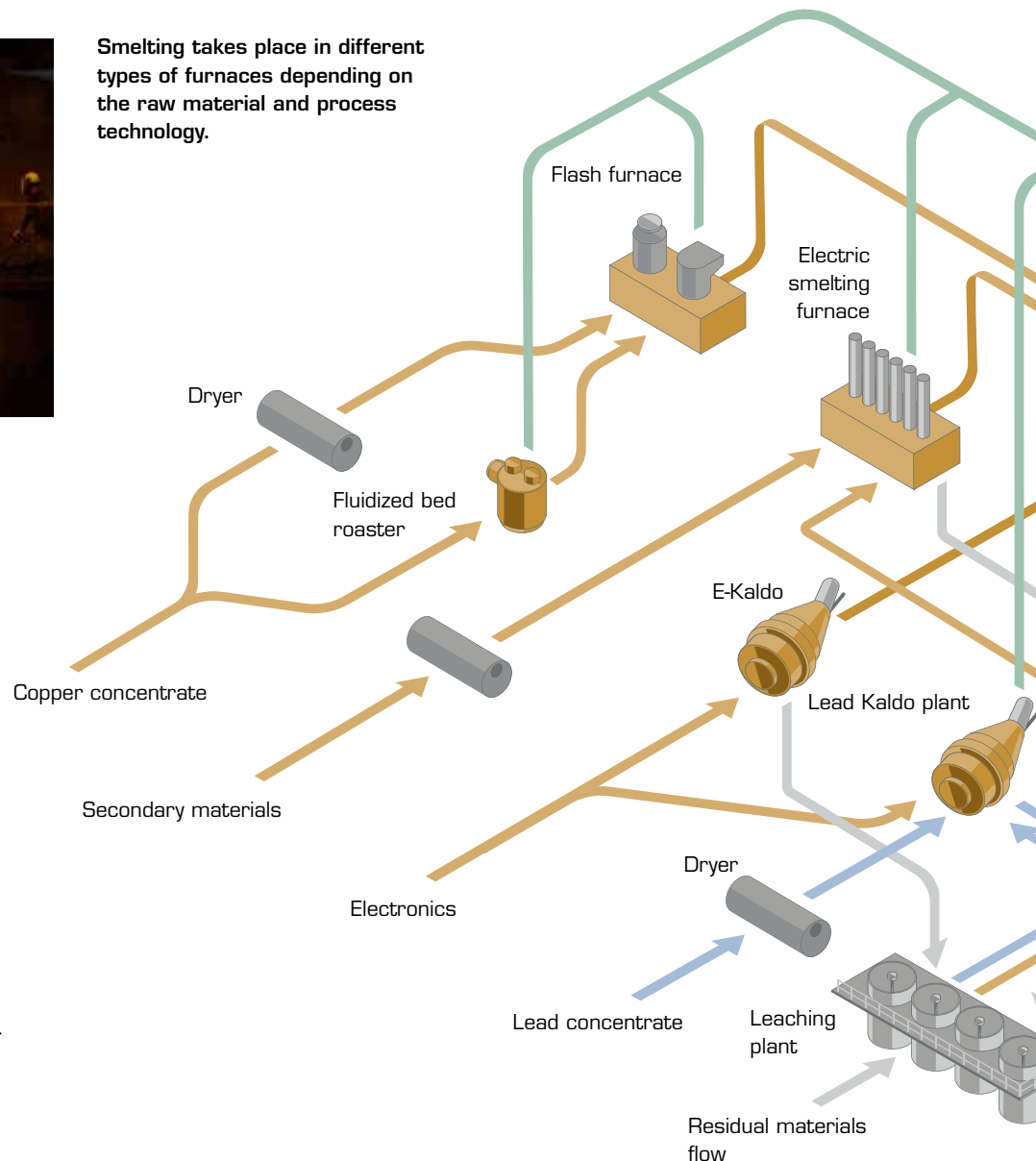
SMELTING

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Boliden extracts complex ores, i.e. ores that contain several different metals. The metals and other by-products are separated in a variety of different processes before being cast as pure metals.



Smelting takes place in different types of furnaces depending on the raw material and process technology.



Processing in various stages

Mine concentrates and secondary materials are refined at Boliden's smelters, producing pure metals. These metals are separated using reactions at high temperatures or with the aid of leaching.

E-kaldo

Crushed electronics are smelted in the E-kaldo plant to recover the metal content. The molten metal then continues to the normal copper process.

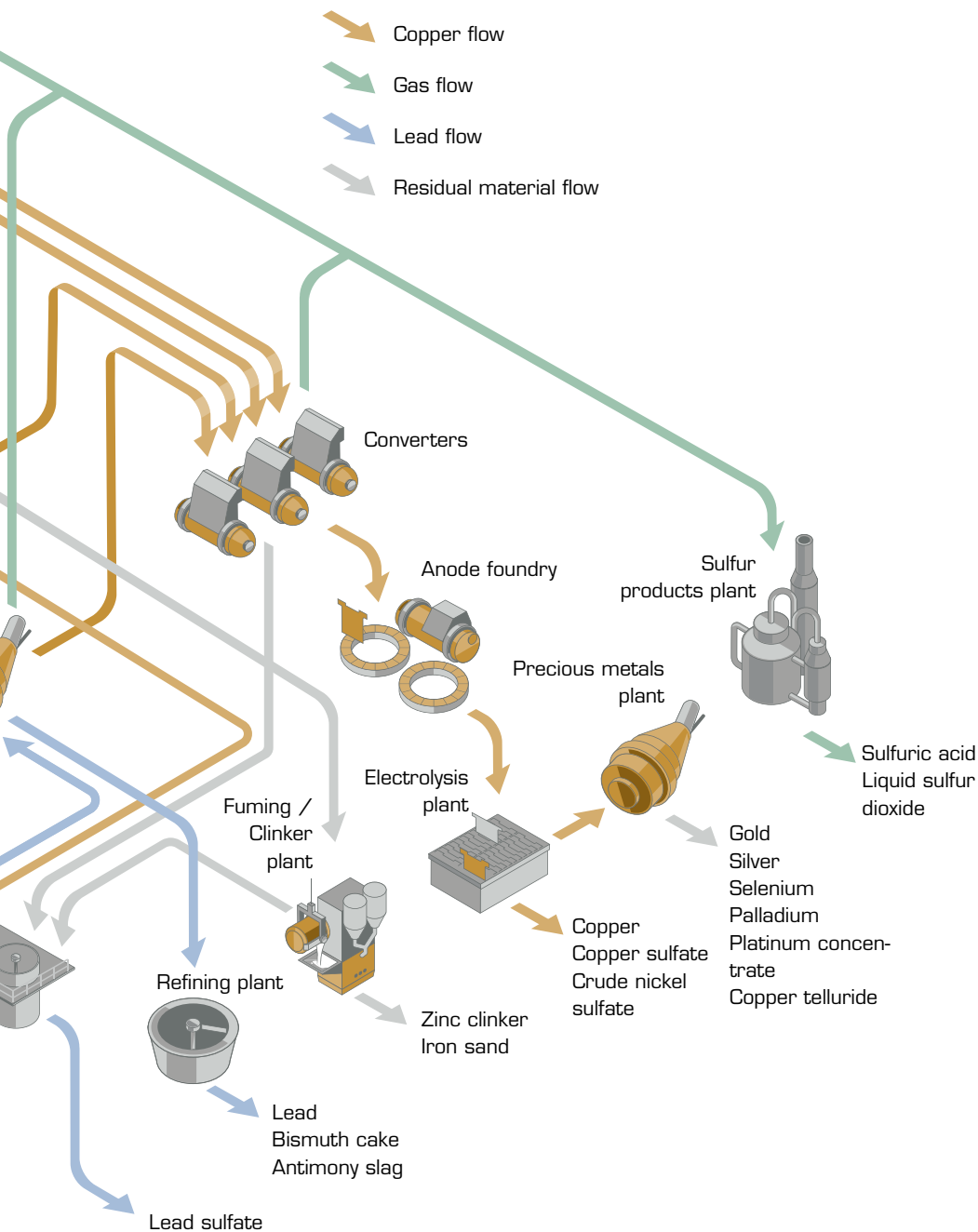
Leaching

The goods are leached in the zinc smelter using sulfuric acid to precipitate and filter out any iron. The result is a zinc sulfate solution containing small amounts of impurities. The leaching process enables a reduction in the amount of waste and an increase in the amount of metal extracted. This applies especially to copper, lead, zinc, gold and silver.



Photo: Stefan Berg

Metal concentrates are processed into pure metals in the smelters, but even the metals in electronics and batteries can be harvested. Seen here, Balwant Singh and Carl Abrahamsson at Bergsöe with lead ingots made from recycled material.



Casting

The end products from the smelters are zinc ingots, copper cathodes, lead ingots, gold and silver granules and other products such as sulfuric acid, zinc clinker, sulfur dioxide and palladium concentrate.

Electrolysis

In the copper smelter, the anodes are placed in tanks with steel cathode plates. In the subsequent electrolytic refining process, copper migrates from anodes to cathodes, which ultimately have a copper content of 99.9975 percent or higher. The cathodes are separated from the steel plates and washed. They are then ready for delivery.

MORE THAN JUST METALS

Thanks to advanced technology for making use of as much as possible in the smelting process, many other products in addition to pure metals are produced today. The operation helps to reduce waste in metal production, and the by-products also fulfill important functions in society.



Sulfuric acid is made at the smelter in Harjavalta, among others.

The most important by-product is **sulfuric acid**, a highly corrosive, colorless viscous liquid. It's one of the most used chemicals in the production of e.g. paper pulp and artificial fertilizer. Boliden has an annual production capacity of 1.7 million metric tons of sulfuric acid at the smelters in Rönnskär, Harjavalta, Kokkola and Odla.

But Boliden also produces many other by-products:

Copper sulfate – blue crystals sold as reagents to the mining industry.

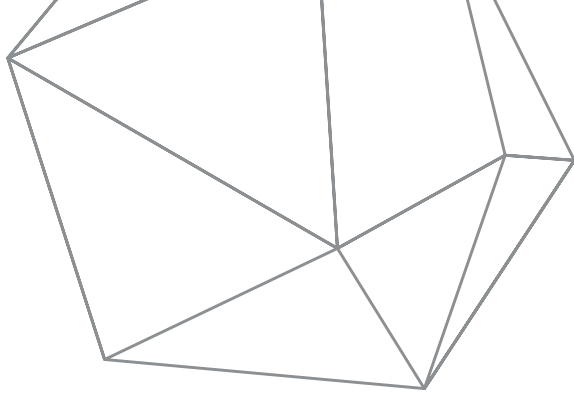
Coppola telluride – Black powder used as an alloying substance in the steel industry and rubber production. It can also be sold on for processing into pure tellurium.

Selenium – black powder used in pharmaceuticals, for soil improvement, paint manufacturing, staining and destaining glass and in the steel industry.

Zinc clinker – yellowish powder, which is a slag product from copper production. Metallic zinc can be extracted from the powder.

Nickel in matte – an intermediate product based on nickel concentrates that are sold on for processing into pure metal.

Iron sand – Black, coarse powder with insulation and drainage properties making it very suitable as a filler in road and building construction.



◀◀ Copper sulfate.



◀ Platinum and palladium are used in e.g. the jewelry industry.

Photo: George Tolkahev



Photo: Marc Oliver_Artworks



◀◀ Selenium is used in the field of medicine, among others.

◀ Iron sand is used in infrastructure construction.



Crude nickel sulfate.

PGM Concentrate – Platinum Group Metals is a generic term for the six elements Palladium (Pd), platinum (Pt), Rhodium (Rh), Iridium (Ir), Ruthenium (Ru) and Osmium (Os). Used largely in catalytic converters in the automotive industry. Platinum and palladium are also used in the jewelry and electronics industries.

Crude nickel sulfate – a greenish yellow powder that is an important by-product of copper production. Used for e.g. nickel plating.

**UNKNOWN
BOLIDEN**

The little mining community
seen from above.



The mine and the inland ice

In November, concentrate shipments ceased, as that was when the sea froze, with the ice remaining until midsummer. So it took hard work to ship out what had been produced during the long winter and also make sure everything that was required was shipped to this desolate place.

Text: Olle Lundqvist

Black Angel Mine sounds like it's in Canada or the USA. It's neither. Nor is it a mine in Saudi Arabia, Spain, Burkina Faso, Chile, Portugal or Mexico. That's a lot to choose from, as during the last 30 years of the 20th century, Boliden was involved in mines and mining projects all over the world. But the question is whether anything was quite as special as Den Sorte Engel. That's its real name, as the mine was located on Greenland, the former Danish colony.

But English goes down better in the mining world. And so it became Black Angel Mine, and it's not just the name that's exciting. Greenland, the world's biggest island and also the world's most sparsely populated country with more than three quarters covered by the world's only inland ice sheet outside Antarctica. That did not stop it from being inhabited for at least 4,500 years by Arctic people. Vikings arrived on the island in the 10th century, and Inuits

in the 13th century, but it was not until the 18th century that Denmark (which, like Norway laid claim to the island for several hundred years) established a sovereignty that has led to ever greater home rule over the past 50 years.

Exploration project

The Black Angel Mine is located in Maarmorilik on Greenland's west coast. This has its advantages, one of them being that the polar bears stay on the east side.

Boliden purchased the mine in 1986 from the Canadian company Cominco relatively cheaply, as in recent years the mine had not done so well. And actually, it wasn't really the mine but the prospecting rights that Boliden was out to get. Company management would have been satisfied if it only made a slight profit. But it turned out better than that.

The mining department manager was Lars Norling, a mining engineer with a



Company management would have been satisfied if it only made a slight profit. But it turned out better than that.

BOLIDEN 100 YEARS PART 3

sound Boliden background in Adak field, Rudtjebäcken, Näsliden, Kristineberg and Garpenberg. His official employer was Greenex, the company that previously ran Black Angel Mine and which was included in Boliden's (actually the newly formed company Boliden Grönland) purchase of the mine and continued to run the mine, the concentrator and the electrical power plant.

The Black Angel Mine, whose main products were zinc and lead and a small quantity of silver, had 220 employees, mostly Danes (the working language was also Danish), the others being Swedes and Greenlanders. Everyone worked a

lot, and 120 people worked in the mine, where the basic working week was 60 hours. Above ground, it was no less than 72 hours. In a six-day week. The seventh day was officially free, but anyone who wanted to also had the right to work, which very many did, in order to enjoy as much consecutive leave as possible back in the homeland. It was also good for the company; it really needed all available labor, and what's more, the knowledge that they would have to work the following day restrained any tendency to celebrate Saturday evenings, which could otherwise get pretty boisterous.

Because of the permafrost, buildings have to be built on piles, and the water pipes are suspended in the air, well insulated.



The Black Angel Mine is located in Maarmorilik, on Greenland's west coast.

In November, the concentrate shipments stopped as the sea would be frozen. The ice would remain until midsummer.



► The concentrate was shipped to Rotterdam and then on into Europe.

►► The mine was only a few hundred meters from the harbor.



Planning intensive

One of the Maarmorilik area's benefits was the mine's location just a few hundred meters from the port, from where the concentrate was shipped to Rotterdam and on to various European smelters. But an eight-month ice season demanded extraordinary planning, and special solutions were also needed in other respects.

Because of the permafrost, buildings have to be built on piles, and the water pipes are suspended above ground, well insulated.

The Black Angel Mine, which was reminiscent of Laisvall with pillars and huge 'halls', was much more than just a

ticket to exploration. A lot more ore was mined than was originally planned. In July 1986, the ore resource totaled 1.2 million metric tons, but by the same time four years later, 3 million tons had been mined. As the global market price for zinc rose, so did the production of concentrate, costs fell and the mine became very profitable.

In fact, in comparison with most of the other 25 or so foreign mines and mining projects that Boliden had begun or purchased since the 1970s, an unholy mixture of flips and flops, Black Angel sticks out as a true success. But after three years the mine was considered exhausted, and in 1990 mining ceased, and

this also took place under the conditions geography demanded. Because closure, including the clean-up, took one year, most of the work had to be done in the summer and it required a great deal of planning.

For Lars Norling, the head of the mining department, four years felt quite enough:

"Actually, it was good that it closed when it did. If you stay longer, it can happen that you move there mentally as well. I've seen people who've worked abroad a little too long, they put down roots and then have a real bad time when they have to move back home again."

Orders from the top: Do as little as possible

Odda can still seem hard to reach today. The journey, involving tunnels and ferries, is awkward and difficult. Even so, the town and its smelter have both attracted foreign interest throughout history. Its great trial was the German occupation during World War II.

Text: Olle Lundqvist

The zinc smelter's management recruited as many people as possible during the war years.

Norway is not Sweden. And more importantly, Norway was not Sweden. While Sweden kept out of World War II, Norway was occupied by Germany, and this meant entirely different conditions for each country's smelters. Rönnskär, as the guarantor for Sweden's metal needs was given high priority by the government, but Norzink, which owned the smelter in Odda, was placed under German control

and had its hands tied. But there was also passive resistance.

Following an initial decade of technical and other early problems, Norzink had managed to get production going during the 1930s and keep its head above water financially. The German occupation utterly changed the smelter's situation. Deliveries of Spanish ore concentrate from Asturienne ceased, and the raw materials from other countries were also choked off. Norzink now had to make do with the limited quantities of ore from the Norwegian mines Sulitelma, Mofjellet, Björkåsen, Vigsnes, Killingdal and others, could conjure up. While these were not enough to maintain the production volumes they had achieved in 1939, they did ensure a certain level of operation. And more importantly, jobs.

Unemployed Norwegians were forced to work for the German army, which everyone wanted to avoid. Thus Norzink's management endeavored to keep as many people as possible in work, despite there being a lack of actual assignments.





Improved relations

The Germans, acting almost like commissar controllers, were fortunately not quite as inspired by their jobs as many of their countrymen, were persuaded that maintaining production required the labor force to remain intact, regardless of the amount of zinc produced. In English this would be called working-to-rule, but it was carried out with the approval of the smelter's management, or rather on its initiative. Half speed? No, not even that. Before the war, the electrolysis hall had produced 10 or 12 vats of zinc per day, but now it was suddenly down to four, and not just because of the lack of raw materials. While zinc production was just one third, and some years one fifth, of what it had been in 1939, the labor force during the war increased from 450 to 775 people!

Even though the low work ethic was desirable, the war also meant an improvement in relations between management and workers. From having been a source of true contention, they were suddenly almost friction free. Now that they had a common enemy, the old internal differences appeared far less important. The atmosphere at Norzink changed

entirely. During the war years, measures were taken to reduce accident risks in the workplace, and pensions, supported by the company, were introduced in 1944 for salaried personnel.

High price, deep wounds

Some of Norzink's personnel joined the Norwegian resistance movement, and that had its price. Many were arrested and placed in prison camps, and for others it was worse. Ørnulf Slottelid and Olav Prestegård were executed by the Germans and Norzink was infiltrated by Nazis. One employee proved to be both an informer and employed under a false name. The man was kidnapped and sent to a prison camp in England.

After five years, the poor raw materials supply, slow pace of work and the whole wartime situation had left deep wounds. Even though it had not suffered from any wartime action, both the smelter and its finances were in very poor condition in 1945. At war's end, Norzink was at rock bottom and faced a huge challenge. How they overcame it is an entirely different story, one about technological advances, bold ideas and big investments. And definitely not about twiddling thumbs at work.

Zinc slabs ready for shipment.

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Some of Norzink's personnel joined the Norwegian resistance movement, and that had its price.

The finance director who refused to file for bankruptcy

Text: Olle Lundqvist

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If you always have to play to the stock market, everything becomes short-term, which is devastating.

Could there be a more anxiety-inducing industry than mining, when it comes to finances? On the other hand, is there anything more exciting? Because when things go well, they can go very well indeed. Ragnvald Jonsson knows most things about these two aspects.

After leaving business college and being demobbed from national service, Ragnvald Jonsson, raised in Mellansel outside Örnsköldsvik, became an internal auditor with Philipssons Automobil in Sundsvall. In 1971 he successfully applied for a position as an accountant at the Rönnskär smelter. Things must have gone well, because in 1982 he was asked to move to the head office in Stockholm as chief accountant.

“Of course, I was flattered. So Margareta and I sold our newly built house on Öhn in Ursviken (Skellefteå) and moved with our three children to a house in Åkersberga north of Stockholm.”

But things did not start well. For example, clothing was a bit of a culture shock. It turned out that suits and ties were de rigueur at the Stockholm office at Stureplan. Not the polo neck that Ragnvald was used to at Rönnskär. But the culture clash was about more than just office attire.

“I didn’t feel at home at all. I sat on the bus into town hoping that it would be a bit late before we arrived downtown at Kungsträdgården.

An incredibly valuable lesson, he emphasizes. But nine months were enough. Ragnvald enquired about work at the Rönnskär smelter, prepared to accept

whatever job he was offered. It turned out to be a financial position in the tax and accounting department.

Tough years

A few years after his return, Trelleborg took over as owner, and in 1997 Boliden became Canadian. Trelleborg sold 55 percent of its shares in Boliden, which was floated on the Toronto Stock Exchange. One week after its listing, the Boliden share began dropping like a stone and it had fallen by 97 percent to just SEK 2.0 when it reached bottom. It was the run up to the crisis that would culminate a few years later. At that time, Ragnvald Jonsson had been appointed finance director.

“Initially, we felt honored that our company had gained a place in the big wide mining world and I was impressed by how many well-known names sat on the board. But they soon proved to lack both knowledge and commitment, and many on the board had other loyalties,” he tells us.

The end of the 1990s was tough. The Bre-X scandal, when two geologists added gold to ore samples to increase the price of their company’s shares, caused investors to lose confidence in the entire mining industry. IT companies were suddenly much more rewarding. And then metal prices began to fall.

Refused to file for bankruptcy

One December evening in the year 2000, Ragnvald and his wife Margareta were out on the town. They had been married 25 years and planned to celebrate with a good dinner and a movie, but just a few

hours earlier, Boliden’s chief legal officer asked Ragnvald to draw up paperwork in preparation for the company’s reorganization / bankruptcy.

“I refused, but I was not mentally present during the dinner or the movie.

All I could think of was how to save Boliden.”

Under the leadership of financier Carl Bennet, Anders Sundström (the former Minister for Employment who was then director of Sparbanken in Piteå), the construction company Peab’s CEO Mats Paulsson, Skellefteå town council commissioner Lorentz Andersson and union representatives for Boliden, put together SEK 2.6 billion. Bennet himself invested SEK 140 million, new shareholders contributed SEK 800 million as did old shareholders, and the banks were persuaded to convert loans into shares in the amount of SEK 860 million. In December 2002, Boliden was once again Swedish owned. Boliden Ltd became Boliden AB, and a number things began

heading in the right direction. In a successful deal with Outokumpu, Boliden acquired three smelters and a mine. The company found new ores in Garpenberg, and metal prices rose so sharply that they justified huge investments in both Aitik and Garpenberg.

“What doesn’t kill you makes you stronger”

In 2009, when Ragnvald Jonsson retired at the age of 62 after 38 years with Boliden, he left a company in good shape despite the prevailing financial crisis, but knowing that mining always has its ups and downs.

There will always be crises, and the trick is to prevent them. When you don’t need them, the banks stand in line, but in bad times they get nervous and don’t want to know. If you always have to play to the stock market, everything becomes short-term, which is devastating.

Ragnvald Jonsson’s work had always been about numbers, but behind the

numbers are people. He talks warmly about the Boliden Spirit, something that maybe hasn’t taken root in all of Boliden’s foreign investments, but which informs all of the company’s operations in Sweden:

“It’s about loyalty and responsibility. About taking care of one another. Understanding that nothing is impossible, and what doesn’t kill you makes you stronger.

Ragnvald Jonsson in red surrounded by five other previous Boliden employees: Bo Johan Nilsson, Mati Sallert, Lars Viklund, Wiking Andersson and Lennart Marklund.



First underground

Text: Sara Johansson

Short and petite, kind and pleasant mannered. And also afraid of the dark. Doesn't sound exactly like your typical miner. But that's how her grandchildren describe Evy Mårtensson, the first woman to begin working underground in Garpenberg. And she did so with honor.

Sisters Pernilla and Jessica Johansson are Evy Mårtensson's grandchildren. And they work in Garpenberg, just like grandma. Jessica has enjoyed a long career in the company and is today a safety coordinator. Like her sister, Pernilla began working there in her teens as a

cleaner, and after a longer sojourn she has returned to Garpenberg and a position as project manager. But neither of them thinks their grandmother's career in the mine influenced their choice of job:

"No, I don't think it influenced me. I started work to earn money when I was young. And now that I've returned, it's because of an interesting job that turned up," says Pernilla Johansson.

"Although all but one of grandma's five children have worked in the mine.

Evy Mårtensson in the hoist on the way down into the mine.



Almost everyone in our family and our relatives worked here at some time,” says Jessica.

Moved south

And they would not even have been there had Evy and granddad Tore Mårtensson not actually moved south from Saxnäs in Lapland in 1966 when Tore got a job in Garpenberg. One year later Evy also had a job in the mine. Back then, she worked as a hoist operator above ground and continued doing so until 1980. Evy, who was born in 1928, had previously worked in retail and cleaning, was attracted to the work due to the high wages and the opportunity for a good pension. When she later suffered a shoulder injury through her work as a hoist operator, she switched jobs and became a haulage worker underground. Thus she also became the first woman to gain access to this previously men-only territory.

“We’re not sure if she was relocated or if she applied for the position herself. When she began she was the only woman, but more started a little later,” says Jessica.

Evy looks tough and confident when we see pictures of her at work. And it was work she really enjoyed. Especially because of her fellow workmates in the southern mine, who were very caring according to Jessica.

“She was afraid of the dark, so it was tough in the beginning. But she got help from the guys, who fixed lighting and

rebuilt things to make work easier for her. She was only 150 cm tall.” And nor was the work environment like it is today, it was often cold and wet.

Evy also adapted to the miners’ customs and traditions. For example, staying at home with a sick child was out of the question. The five siblings had to stay at home from school and look after each other when necessary.

Nothing could be left undone

Evy Mårtensson may well have been a mining industry pioneer, but for Jessica and Pernilla she was most of all a beloved grandmother.

“She was kind, pleasant and loved children. She worked hard and scrimped and saved. She hated to leave anything undone,” says Pernilla.

“And she loved baking, dancing and traveling to her cottage in her home village Dajkanvik,” adds Jessica.

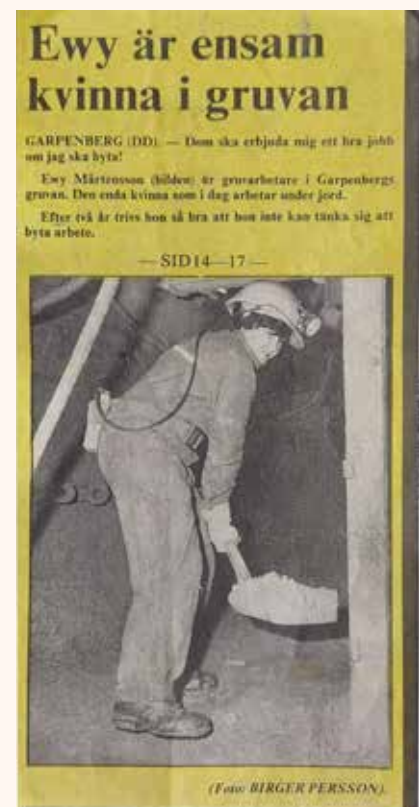
By all accounts, Evy Mårtensson thought hers was a good choice of jobs. When she turned 60, she retired, exactly as planned, with a mine pension and a great testimonial. Tragically, her husband Tore died following a snowmobile accident in 1997, and Evy passed away in December 2022, just before her 95th birthday.

“The pandemic years were tough for her; she aged faster. But she was pretty alert right up to the end. She stayed active through dancing, qigong and travel,” says Jessica.

As the only woman in the mine, Evy also caught the eye of the newspaper, Dala-Demokraten.

She was afraid of the dark, so it was tough in the beginning. But she got help from the guys, who fixed lighting and rebuilt things to make work easier for her.

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The CEO's golden rules

Graduate engineer, CEO and current Baron Pekka Tuukkola, 76, summarizes everything he learned during his long career.

Pekka Tuukkola comes from a farming family with six children. He grew up on a large cereal and livestock farm in Tavastkyro, that needed farmhands for its day-to-day chores.

His father died when Tuukkola was only 11, but he inherited his father's values and sense of equality.

"Losing my father was tough, and school was no longer my thing after that. But my mother Marjatta insisted that I go to high school. She said that no matter what I said or did, I had to graduate from high school."

So Tuukkola studied. He learned from the cradle that it's best if everyone has clear goals. He received the highest grades and advanced mathematics and was admitted to engineering college to

study metallurgy at the mining industry institute.

His career took Tuukkola, via Esbo and Karleby, to Harjavalta. In 1975, he began work as an operations engineer and R&D engineer at Outokumpu, which was a predecessor to Boliden.

Adventure in South Korea

Tuukkola spent the years 1979–1983 in South Korea setting up the pride of Harjavalta: flash smelting.

"It was an educational journey. I learned to speak English, enjoy the local cuisine and the love Buddhists feel for their neighbor, especially the respect for their elders.

The smelter was built in collaboration with Finns, Englishmen and Belgians. Tuukkola stayed behind to supervise the start-up at the plant.

When he returned to Finland, he worked as a manager for several projects including the extension of the slag

Text: Tanja Hovi

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I learned to speak English, enjoy the local cuisine and the love Buddhists feel for their neighbor, especially the respect for their elders.



Photo: Vesa Saivo, Sanoma Oy

Pekka Tuukkola is the ninth CEO for Boliden Harjavalta and its predecessor Outokumpu.

concentrator and the new laboratory building. Later, he was needed as an operations engineer and departmental head for the copper smelter and nickel smelter. He was also called to head up the copper electrolysis plant in Pori.

“I thought I would be in that position for five years, but it was only three. I had to clean things up in Pori and cut back on expenditures.”

Got to know the employees

A major expansion of Harjavalta began in the middle of the 1990s.

“We decided that everyone in the smelter would wear the same color helmets. I got to know the employees and learned all of their names. After that, never a bad word was heard.”

Before Tuokkola was chosen as CEO, he worked as head of production and was also responsible for purchasing and raw-materials marketing.

“It was a broad field. After that, I not only got to know people and the processes but also the raw materials and how we could make use of them. Everything that had to do with the way money comes and goes.”

At the turn of the millennium, the owner began to focus on steel production, and there was no longer any money for investments in Harjavalta.

“We were facing a major change. We kept production, but outsourced everything else like maintenance, haulage, building maintenance and security.”

On January 1, 2004, after the deal with Outokumpu, Swedish-owned Boliden made its entry into Finland.

Demand for non-ferrous metals began to rise. The mines and plants in Sweden,



Finland and Norway were making good profits and were collaborating well, but carefully monitoring each other’s KPIs.

“There was a clear improvement in productivity. We were able to invest in expanding copper electrolysis, in a convertible hall, in health and safety and environmental technology.”

Continued working as a consultant

Tuokkola retired in 2011. But he continued working as a senior advisor for six months and introduced his successor Jyrki Makkonen to his position as CEO. He had seen Makkonen work at the company back in his student days.

Baron Tuokkola keeps abreast of the times and is aware of the challenges the company currently faces such as the availability of labor.

“We also have to find jobs for our employees’ partners, so that entire families can put down roots in Satakunta.”

Tuokkola thinks the county needs stronger legs to stand on, and says he feels positive about establishing a university for the region. However, he’s not convinced about whether it will be

Pekka Tuokkola offered everyone cognac after the first strike-free year. “I still have the bottle,” says personnel manager Reijo Salminen (left).

Pori or Rauma that attracts people to the county.

“And there’s a difference between an advisor and a senior advisor; an advisor gives advice when he’s asked for it, and a senior advisor gives advice when he’s not asked for it,” says Tuokkola, providing an example of his technician’s humor.

Pekka Tuokkola’s golden rules:

1. Appreciate people and learn their names.
2. Make sure the common goal is clear to everyone.
3. A manager’s job is to make decisions even in difficult times.
4. Trust is the result of actions, not just words.
5. Always be curious about new things.

Proud fathers of Kevitsa

Text: Anna Sundquist

Peter Walker and Krister Söderholm transformed Kevitsa from an mineralization that no one was interested in to one of Finland's biggest mineral deposits ever.

British geologist and mining entrepreneur Peter Walker was the founder, CEO and group CEO of Scandinavian Minerals Ltd from its formation in 1996 until the company's acquisition by First Quantum Minerals Ltd in 2008. In 2011, he received the Fennoscandian Mining Award for his part in the development of the copper-nickel mine in Kevitsa in Finnish Lapland. Krister Söderholm was employed by Kevitsa Mining Oy between 2006 and 2010 as CEO and later country manager. Krister is known as The Father of Kevitsa because of the significant part he played in the early development of the Kevitsa project.



Photo: Arctic Minerals

Peter Walker

Used his own personal savings

At the end of the 1990s, Peter owned a small private company, Scandinavian Gold Prospecting Ab, and he was looking for new projects. He happened to get an invite to northern Finland to acquaint himself with a few small gold projects in an area known as Lemmenjoki. Because Peter was not really interested in projects of this type, his local host asked him if he had considered the Kevitsa area. They put through a quick call together to the Geological Research Center (GTK) in Rovaniemi and were informed that the previous owner, Outokumpu, had let Kevitsa go as they did not believe it was possible to process the ore there. Kevitsa was truly free to stake a claim on.

Peter applied for an exploration permit for Kevitsa in December 1999, and received the permit a few weeks later. He paid around EUR 10,000 for the geological database.

"This was actually money I took from our private savings without telling my wife... The money came from the sale of our house," he says.

He made a few inquiries and concluded that further metallurgical tests were necessary. This was because there was no known method of processing the minerals at Kevitsa. However, GTK had a suggestion as to how to solve the mineral processing problem by separating the copper and nickel concentrates. They conducted several unsuccessful tests until, just before the last attempt, they decided to try a new method that went against every instruction in the manual.



Photo: Arctic Minerals

Krister Söderholm

The test was an enormous success. Peter's company was registered in 2004, and after having solved the processing problem, they collected several million euros in two weeks.

Important partnership

Peter understood that he needed a local partner, and he found one in the experienced Finnish geologist and mine manager Krister Söderholm, who became the person whom would lead the project. Once Krister had joined the team, things really begin to get moving. Krister understood the importance of involving local stakeholders from the beginning of the mine project and of gaining the public sector's acceptance for the company's operation. He began very effective dialogs with the municipality, reindeer herders, government ministers and suppliers. The company enjoyed high credibility and was regarded as a Finnish project led



Commercial production in the mine began in 2012.

by Finns. The permitting process was uncomplicated, and they encountered no major obstacles along the way.

“We received very good support from Sodankylä municipality,” says Krister.

Peter Walker had always thought that Boliden would be the natural owner of Kevitsa. He had approached Boliden in 2005, but the company pondered a little too long. Instead, Peter signed a contract with First Quantum Minerals Ltd. Krister let the project group between 2006 and 2010. Commercial production began at the Kevitsa mine in 2012, which was then owned by First Quantum Minerals.

Peter and Krister both regard the Kevitsa project as the most important

experience of their careers. They took great risks, invested personal savings (eight years later, Peter’s wife forgave him when she found out that he’d use their savings), but they both believed in Kevitsa.

“This is the best thing we’ve ever done,” they say, with pride in their voice.

And today, Boliden Kevitsa can only agree with them. Without the perseverance of these two men, Kevitsa would still be a mineralization that was not worth closer inspection.

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It was actually money I took from our private savings without telling my wife...

43 years at Tara

Text: Sara Johansson

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Tara was different. Everyone was on a first-name basis, regardless of rank or position.



As Gertie Courtney looks back over her long working life, she can tell us about the changes big and small that have taken place. But it's the people she remembers best.

Gertie Courtney began working for Canadian Mine Services (CMS) back in March 1976. The company had been commissioned by Tara Mines Ltd to establish a mining operation and begin hiring staff. And that's precisely what Gertie would be helping with. Even though quite a lot of staff had come over from Canada, they took on the maintenance personnel they needed from the local community. They mostly employed young men, often with a background in agriculture or construction, who could learn to become miners. While many who came to the area lived in temporary housing, some took up residence in the local community, Navan. "This was a big change in such a small community," remembers Gertie.

"For a long while, the place resembled a construction site. But they were exciting times. And all the newcomers also changed our social life quite a lot. Many were young, so there was more than a little nightlife."

An atmosphere with a difference

In December that year, Gertie was hired by Tara Mines directly. She worked with payroll and the bonus system that was introduced. In 1983, she moved to HR, where she has worked ever since with every aspect of the HR field. She tells us about a workplace that was unlike any other in Ireland. Most office environments were very hierarchical and formal.

"Tara was different. Everyone was on a first-name basis, regardless of rank or position. And the dress code was relaxed.

It created an atmosphere that was pretty unusual back then," she says.

All the same, Gertie tells us about the macho culture that prevailed among the predominantly male workforce. Center-fold pinups were a far from uncommon sight. Women employees usually worked in the office or as lab technicians as they were forbidden by law from working underground. Outokumpu from Finland took over the mine in 1986. This was a time when Irish society was undergoing change on several levels. For example, priests had hitherto held church services in the mine, but now the church was losing followers. Equal opportunities issues were also raised at this time due to EU requirements.

Dependent on the mine

Being the only major employer during the 1980s and 90s, the mine was crucial for the city's entire economy. Thus many families were utterly dependent on the mine. This was also true of Gertie's family; three of her brothers also worked in the mine. In recent years, things have changed. Navan has developed and these days serves more as a suburb of Dublin, and many people now commute the 35 miles to and from the capital.

Boliden acquired the mine in 2004, and this involved a positive change in the workplace culture, which Gertie describes as more respectful, not least between male and female employees. And after 43 years at Tara, it's precisely her colleagues, the people, she misses most:

"Yes indeed, the best part was all the amazing people I got to work with over the years."

Gertie completed her final working day on May 7, 2019. Today, she enjoys life as a retiree in the countryside in Kitale, about two miles from her old workplace.

DID YOU KNOW THAT ...

Boliden's mines and smelters work closely with various schools to train future personnel. Some places, like Rönnskär, have established apprenticeship systems while others, like Kevitsa, take in trainees from the nearby mining school on an ongoing basis. In Gällivare, the high school has a Boliden Model where students undergo certain parts of the course on site in Aitik.



Photo: Daniel Holmgren



In 1949, Boliden's first CEO Oscar Falkman wrote a book about the company's history up until 1943, when he resigned. Because he based a great deal of the book on the minutes from board meetings, he was able to record the company's development in great detail. The foreword begins: "There cannot be many Swedish industrial companies that have had such unusual problems and outcomes as Bolidens Gruvaktiebolag." In other words, a history well worth recording. The book, whose Swedish title means 'Boliden's company history until 1943' comprises 274 typewritten pages and a map, and was only produced in 29 copies.

In Garpenberg, there are 70 different rescue chambers with enough air to keep 500 people alive for at least eight hours. Also underground are an ambulance, trailers with rescue equipment and two fire trucks with a total capacity of 400 liters of fire-extinguishing foam.



Photo: Anna Eklof



BOLIDEN 100 YEARS PART 3: 1979–2001

During the 1980s, Boliden began working according to a new strategy – the operation would go international. A new major owner also entered the scene, which came to have major consequences. This, our third centenary year magazine, focuses on people who do the work and how the company works to recruit the right personnel. We also show how a smelter functions.