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CONTINUED RESPONSIBILITY



ENVIRONMENT, HEALTH
& SAFETY REPORT



BOLIDEN LIMITED and its subsidiaries (collectively, “Boliden”) are engaged in the mining, processing and sale of metal and mineral products, principally zinc and copper. Boliden has mining and processing operations in Canada, Chile, Saudi Arabia, Spain and Sweden and smelting and refining operations in Sweden and Norway. Boliden is also engaged in the fabrication and sale of copper tubing and brass products, with fabrication facilities in Belgium, the Netherlands, Sweden and the United Kingdom. Boliden Contech AB provides technology design, process engineering, procurement and project management services around the world.

(All dollar amounts in this report are in US dollars)

CONTINUAL IMPROVEMENT

Boliden is dedicated to the continual improvement of its environmental, health and safety management systems, programs and performance at all of its operations. The Company fosters openness and works proactively with employees, government and the public to develop environmental, health and safety priorities and programs.

CONTINUED RESPONSIBILITY...CONTINUAL IMPROVEMENT

Boliden has grown during the past year to become a truly global company. Our roots, however, are in Scandinavia where there is a heritage of environmental awareness. Strict environmental regulations for the mining industry came into effect in Sweden in 1969 – early by international standards. Boliden was at the forefront of the international mining industry, promptly developing environmental management systems in response to these regulations.

Improving as Science Advances

Metals are one of the earth's most sustainable materials. They can be reused almost indefinitely. It has been estimated that approximately *80% of the copper ever mined is still in use today*. As metal processing and refining techniques continue to advance, the potential for recycling and reuse of metals continues to grow.

Environmental responsibility, of course, goes far beyond recognizing the sustainability of metals. Boliden believes that setting and meeting high environmental standards are prerequisites for sustainable business. In this regard, we are committed to good stewardship in the protection of the environment and to the continuous improvement of our standards and processes of environmental management.

To accomplish its environmental objectives, Boliden works extensively with governments, universities and industry organizations. In cooperation with these organizations, we take an active role in research and development to advance environmentally sound technologies and procedures in key areas such as energy conservation, recycling, decommissioning, closure and reclamation.

Promoting Health and Safety

Boliden believes that it is essential to have a safe and healthy work environment at all of its operations. We believe that providing such an environment leads to a more motivated workforce and improved performance. We have established a work environment where safety is strongly promoted and employees have the information, training and skills to work safely. Our immediate goal is to minimize accidents. Our vision is zero accidents.

The mechanized movement of significant volumes of materials at our mining and smelting operations by its very nature poses a number of potential health and safety risks. In 1998, despite a 28% decrease in lost-time injury frequency at our Myra Falls operation, a 25-year mining veteran was killed by an isolated fall of consolidated backfill. This terrible event reinforces our commitment to minimize accidents.

First Environment, Health and Safety Report to Shareholders

Reporting our environmental, health and safety (EH&S) performance is not new. We report to a variety of regulatory authorities on a regular basis. We also have strong, ongoing relationships with numerous scientific, industry and stakeholder groups and with the communities in which we operate.

This is, however, Boliden's first formal EH&S report designed as a supplement to the Annual Report. There are several reasons for starting now – heightened environmental awareness within the industry, our acquisition of Westmin Resources Limited and the tailings dam failure at Boliden Apirsa SL's mine in Spain.

As mineral exploration and development have expanded around the globe in the 1990s, the need for an international standard for environmental management and protection has arisen.

In 1998, we began the process of integrating the policies and practices of Westmin and Boliden. As part of this process, a new environmental policy was recently approved by our board of directors. Similarly, a new set of health and safety principles was approved. In 1999, we will continue to improve, standardize and implement EH&S management systems throughout the organization.

A special section of this report is devoted to describing the Apirsa tailings dam failure in Spain. The tailings dam failure and resulting spill was a very disturbing event for Boliden. We take our environmental responsibilities seriously. Boliden responded swiftly and decisively to minimize the negative impact of the spill. Now that the cleanup is essentially complete, we are focused on rehabilitating the affected area. This work will continue in 1999. An independent study commissioned by Boliden investigated the cause of the accident. We believe that its findings clearly absolve Boliden of negligence or fault.

Continually Improved Reporting

In this EH&S report, we have tried to provide as much meaningful information as possible. Just as continual improvement is our goal for our environmental, health and safety programs, it is also our goal for our EH&S report.



A handwritten signature in cursive script, appearing to read 'F. Telmer'.

FREDERICK TELMER

Chairman of the Board of Directors



A handwritten signature in cursive script, appearing to read 'A. Bülow'.

ANDERS BÜLOW

President and Chief Executive Officer

RESPONSIBILITY

At Boliden, everyone shares responsibility for environmental, health and safety matters: the board of directors, management and employees. Goals are developed through cooperative efforts at all levels, and best practices are communicated throughout the organization. Senior management is responsible for developing programs and standards and promoting their implementation. All employees are responsible for following strict environmental, health and safety practices.

Environment

Environmental matters are reported to the board of directors by Lars-Åke Lindahl, Vice President of Environment Affairs.

Local environmental matters are the responsibility of the head of each operation and local staff with specific environmental responsibilities. Central staff supports each operation with specialist competence and by monitoring the status of environmental work.

Environmental audits are conducted on average every second year at each major facility. After each audit, action plans are drawn up and implemented to address any required improvements.

Our risk assessment programs focus on preventing accidents by identifying risks. In 1997-98, Boliden, together with independent consultants, carried out a risk assessment of our tailings dams and plants in Sweden and North America.

Boliden is adapting its environmental management system to ISO 14001 standards. ISO accreditation of our internal environmental auditors is underway and some operations are seeking ISO certification.

Health and Safety

Health and safety matters are reported to the board of directors by Nils Renström and Larry McNeely, Human Resources managers for Europe and the Americas, respectively.

Each operation has an occupational health and safety committee, comprised of employer and employee representatives, whose mandate is to improve health and safety in the workplace.

Safety audits are conducted on a regular basis. After each audit, action plans are drawn up and implemented to address any required improvements.

— HEALTH AND EDUCATION

In a mining and smelting area, there is obvious value in helping the local medical community become familiar with industry-specific health concerns, as well as the progress made in dealing with them. At Rönnskär, we bring medical students from the nearby community of Umeå to the shelter for education and promotion in occupational health and to conduct field research.

BOLIDEN ENVIRONMENTAL POLICY

Boliden believes that setting and meeting high environmental standards are prerequisites for carrying on business in a sustainable society. Boliden is committed to good stewardship in the protection of life, health and the environment.

Boliden will continue to take an active role in research and development to advance environmentally sound technologies and procedures in key areas such as energy conservation, recycling, decommissioning, closure and reclamation.

Boliden will comply with all applicable environmental legislation. Boliden will exercise good environmental management practices and diligently apply technically proven and economically feasible environmental protection measures at its operations even where environmental legislation is absent or evolving.

TO IMPLEMENT THIS POLICY, BOLIDEN IS COMMITTED TO:

- continuous improvement of its environmental management system, programs and performance, taking into account environmental legislation, technological and scientific developments, economic circumstances, environmental impacts of operations, community expectations and social concerns;
- implementing environmental management standards, including active self-monitoring and auditing programs to ensure compliance with Company environmental requirements and environmental legislation and to promote continual improvement;
- promoting the efficient use of energy, materials and other resources and the safe management of waste;
- promoting the reuse and recycling of products and by-products to maximize their utility to present and future generations;
- planning for the operation, closure and reclamation of each new project at the design stage;
- providing adequate resources to meet environmental control obligations for the operation, closure and reclamation of each operation;
- requiring that contractors comply with Company environmental requirements and environmental legislation;
- working cooperatively with suppliers, contractors and stakeholders to identify opportunities to improve environmental performance; and
- fostering openness and working proactively with employees, government and the public to develop environmental priorities and programs.

HEALTH AND SAFETY PRINCIPLES

BOLIDEN'S HEALTH AND SAFETY PRINCIPLES INCLUDE THE FOLLOWING:

Boliden recognizes the right of employees to have a safe work environment. Boliden believes that employees have the responsibility to perform their work in a safe manner.

All operations will comply with Boliden's health and safety standards and requirements and local occupational health and safety legislation. They will also adopt and implement preventative measures, including active self-monitoring and auditing programs, to ensure compliance with Boliden's standards and requirements and local legislation, and to promote continual improvement. If local legislation is absent or evolving, Boliden's health and safety standards and requirements will be followed.

BOLIDEN BELIEVES THAT THE FOLLOWING ELEMENTS ARE REQUIRED FOR A SAFE AND PRODUCTIVE WORK ENVIRONMENT:

- employees should have the information, training and skills required to work safely;
- management and supervisors should have the information, training and skills required to promote strict health and safety practices;
- regular safety inspections, including hazard identification and risk assessments, should be conducted, substandard practices and conditions identified and remedial action taken;
- self-monitoring and auditing programs should be developed and implemented to ensure compliance with Boliden's health and safety standards and requirements and local occupational health and safety legislation. These should include safety meetings and safety reviews; and
- statistics of injuries and incidents and results of health surveys and monitoring programs should be regularly measured, evaluated and communicated.

Boliden recognizes that occupational health and safety matters are best handled through the participation of concerned employees, management and occupational health and safety specialists. Boliden believes, however, that the ultimate responsibility for ensuring that health and safety programs and standards are implemented and respected at all of its operations rests with management.



1998

**ENVIRONMENTAL,
HEALTH AND SAFETY
PERFORMANCE**

MINING

The overriding environmental concerns for mining operations are land use, water management and the potential release of metals to the environment. In 1998, all operations generally performed within applicable limits with the exception of the Los Frailes mine in Spain. Whenever limits were temporarily exceeded, relevant authorities were informed and appropriate action was taken to rectify the situation. In general, emissions to water from the Swedish mines increased in 1998. This was due to higher levels of precipitation which resulted in increased amounts of water at operations. Effluent concentrations remained at the same low levels as in previous years.

Managing Acid Rock Drainage

When exposed to air, sulphur-containing rocks have the potential to decompose into metal oxides and sulphuric acid. Water (e.g., rain or groundwater) may cause the metals and acid to be released into the environment. This is known as acid rock drainage (ARD).

During mining and after mines are closed, the priority is to control ARD. This is accomplished by early identification and management of ARD sources, such as waste rock and tailings dams, both during operations and after closure. By the end of 1998, decommissioning plans for most of Boliden's waste rock and tailings disposal sites were either approved or before authorities for review.

Site-by-Site Performance

GIBRALTAR

Gibraltar is an open pit copper mine and a mill and accompanying solvent extraction and electro-winning (SX-EW) facility located in central British Columbia. The facility was acquired by Boliden in the Westmin acquisition. Gibraltar stopped processing ore in December 1998 and Boliden is currently preparing the facility for permanent closure and reclamation. The cost of reclamation and post-closure water treatment is estimated at \$32.7 million.

Discharges

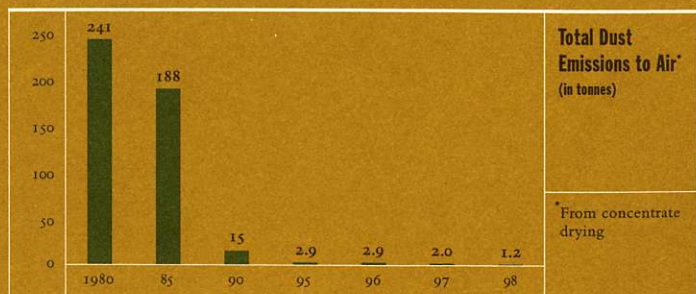
Gibraltar is a zero-discharge facility. All water on the property is contained and recycled. In 1998, the mine had one accidental discharge, a considerable improvement over the six discharges which occurred in 1997. The 1998 discharge was contained and caused no environmental damage.

MYRA FALLS

Myra Falls is an underground mine and a mill located on Vancouver Island, British Columbia within Strathcona Provincial Park. The facility was acquired in the Westmin acquisition. The mine temporarily suspended production in December 1998 because of unstable underground rock conditions, which posed a potential safety risk. An action plan was implemented to stabilize the underground workings, including stope and access route rehabilitation and development as well as maintenance work. Production is expected to resume by April 1, 1999.

CONTINUAL IMPROVEMENT:

Dust management programs have dramatically reduced emissions.



Discharges

The mine's effluents were in compliance for the year, except for periodic occasions when zinc levels were fractionally elevated. We are actively searching for the source of the elevated zinc seepage. Once the source has been found, we will take the steps necessary to prevent further seepage.

There were two accidental discharges and five incidents in 1998 in which pH levels were briefly outside permitted limits. This is down from five accidental discharges and 12 incidents in 1997. One accident involved spillage during a highway accident, the other occurred due to a power outage. There were no significant environmental impacts and no cleanup was required.

Tailings capacity

Boliden has developed plans to enhance the seismic stability of the Myra Falls tailings facility and to increase the elevation of the tailings embankment. If approved by the British Columbia governmental authorities, the project is expected to enable the tailings facility to meet the recommended operating (a one-in-475-year return period earthquake event) and closure design (a one-in-1,000-year return period maximum credible earthquake event) standards for seismic stability. It will also add three more years of capacity to the tailings facility. The estimated cost of the project is \$10 million. A program is in place to return future tailings to the underground workings from which they came. The program is expected to be implemented within the next two years.

Continuous reclamation

The contents of the old Lynx tailings facility, adjacent to the Myra Falls mine, have been removed and deposited in a new site constructed in the depleted Lynx open pit. As part of the decommissioning and reclamation of the old Lynx facility, three hectares were hydro-seeded, another five were treated with lime and fertilized, and 35 red alder trees were planted at test sites to gauge the best locations for their growth.

Soil sampling

Soil sampling took place at the Discovery Terminal to track hydrocarbon contamination which occurred before the property was acquired by Westmin.

LOMAS BAYAS

Lomas Bayas is an open pit copper mine and SX-EW facility located in the Atacama desert in northern Chile about 145 kilometres northeast of the major port of Antofagasta. The project was acquired in the Westmin acquisition. The Atacama desert is one of the driest regions on earth. For this reason, the principal environmental issues are water management and dust control.

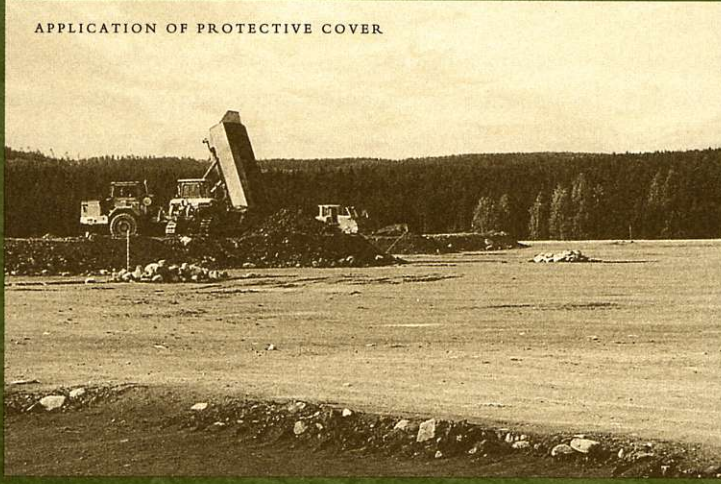
Water management

Water is pumped 135 kilometres to the site. Although Lomas Bayas only began commercial production on September 1, 1998, a recent environmental audit showed that we have already succeeded in maximizing our level of water recycling and conservation.

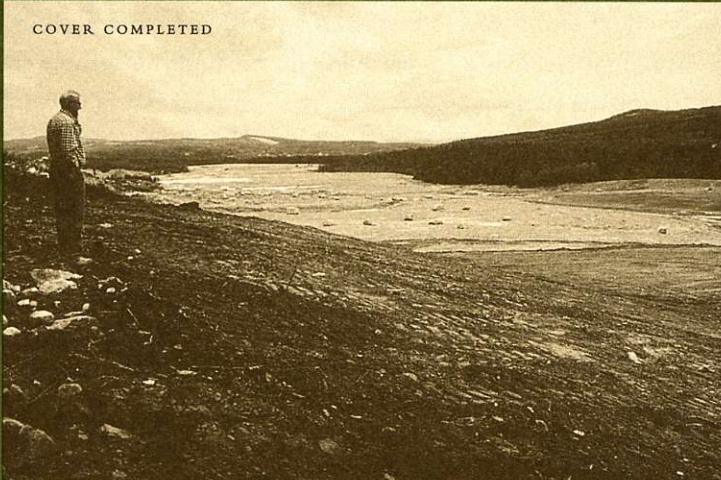
Dust control

Dust emission levels are well controlled. We regularly monitor ambient dust levels, assess the source, devise and implement control strategies.

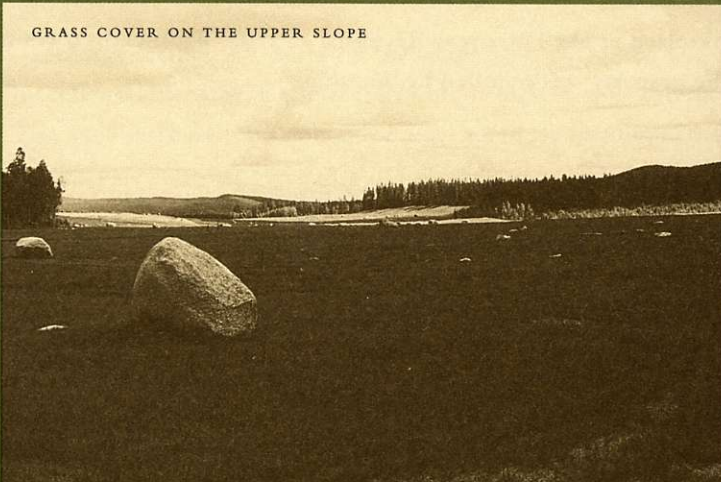
APPLICATION OF PROTECTIVE COVER



COVER COMPLETED



GRASS COVER ON THE UPPER SLOPE



RECLAMATION AT SAXBERGET

The Saxberget tailings ponds lie in part on a permeable glacial formation. This posed special challenges for the safe long-term disposal of tailings when the mine was closed in 1988. In cooperation with the Swedish Environmental Protection Agency, Boliden conducted detailed technical experiments and investigations. Ultimately, we developed a new method of sealing the ponds — a sealing layer using compacted glacial till with high clay content. Oxygen transport to the tailings has been virtually eliminated.

SCPM

Saudi Company for Precious Metals (SCPM) was formed in 1989 to mine and process gold ore from the Sukhaybarat deposit 330 kilometres east of Medina in Saudi Arabia. SCPM uses both carbon-in-leach and heap leach technology to recover gold. Boliden owns 50% of SCPM and the Saudi government owns the balance.

External consultant Knight Piesold was engaged to make recommendations for further work on cleaning up leakage from an old tailings facility. A groundwater protection system consisting of a network of back-pumping wells has been in use since 1997 to mitigate any effects from this leakage. The groundwater protection system and cleanup activities will continue in 1999.

BAO

Boliden Area Operations (BAO) are composed of five underground mines and one open pit mine with a central mill located in northern Sweden. The mines are Kristineberg, Petiknäs, Renström, Långdal, Åkulla and Åkerberg. The mill is located in the village of Boliden and the tailings pond at nearby Gillervattnet.

Overall 1998 environmental performance was good, with emissions almost entirely below limits.

Waste

The mill at Kristineberg mine was shut down in 1991. Before demolition in 1998, the area was screened for waste. All remaining oil, PCB-containing oils, mercury and other hazardous waste chemicals were collected and disposed of in a safe and proper manner.

Discharges

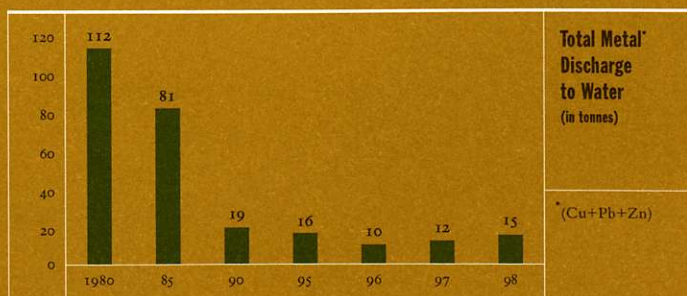
The levels of pH and suspended solids in the outlet water from the Kristineberg and Gillervattnet tailings facilities were occasionally above permitted limits. This was due to reclamation work, and in the latter case, unusually heavy precipitation.

A new water treatment plant was built at Kristineberg during the year to treat mine drainage. Early start-up problems were solved and findings from early 1999 show very good results with low metal discharges.

A new sedimentation pond was built at the Åkerberg mine to ensure compliance with standards for outlet water.

CONTINUAL IMPROVEMENT:

Through careful management and use of state-of-the-art technology, discharge to water has been drastically reduced.



Rehabilitation

Boliden's decommissioned Kristineberg tailings facility was chosen as the field site for research by Mitigation of Environmental Impacts of Mining Waste (MiMi), a Swedish government funded program which focuses on mitigating ARD. Field work began in 1998. The research team has installed instrumentation to measure the performance of the decommissioned facility.

Noise

Noise at the Petiknäs mine was a concern for local residents. In 1998, to alleviate their concern, we built a barrier that reduced noise levels by half.

GARPENBERG

Garpenberg comprises two underground mines and a mill located in central Sweden about 200 kilometres from Stockholm.

Discharges

Discharges were below limits, except for occasional elevated levels of nitrate in the mine water at the Garpenberg Norra mine. We believe that these nitrate levels are related to the blasting techniques and explosives used at the mine. In 1999, Boliden and the University of Luleå (the Swedish centre for educating mining engineers) will conduct a study to investigate the cause of the elevated nitrate levels and develop remedies.

Dust

To control emissions of dust under dry and windy conditions, we built a warehouse at Gävle harbour in which to store our concentrates before shipment.

LAISVALL

Laisvall is an underground lead mine and a mill located in northern Sweden. The facility lies partially under a lake.

Water management

Given the mine's location relative to the lake, water management is the main issue. Water flowing into the mine is controlled by large pump stations. One-third of the water can be pumped back into the lake without treatment, one-third is treated before being returned to the lake and one-third is used in the mill. Strict quality controls are applicable to the water returned to the lake. The water treatment facility includes large, underground water treatment plants to comply with applicable regulatory requirements.

Discharges

Discharges were below limits but slightly higher than in preceding years. High levels of precipitation during the year increased the level of discharges.

Rehabilitation

In 1997, a comprehensive decommissioning plan was approved by the Swedish governmental authorities. The cost of completing the plan is estimated at \$2 million.

AITIK

Aitik is an open pit copper mine and a mill located north of the Arctic Circle in northern Sweden. The mine is Europe's largest open pit copper mine.

Dust

In 1996, in response to occasional incidents of wind-borne dust from the tailings facility, we installed a water sprinkling system to reduce dust from the tailings facility. We continue to monitor the facility and will make further improvements if necessary.

Waste rock

In 1998, we implemented a new strategy for waste rock management to separate the sulphide-containing rock from the sulphide-free rock. This will make sulphide-free rock available for use in future construction works and also reduce closure costs.

Discharges

Aitik uses 100% recycled water in its processing operations. Precipitation adds water to the system, however, and this water must be discharged. The discharged water has a very low copper content and does not require treatment. Discharges were low but higher than in preceding years. High levels of precipitation during the year increased the level of discharges.

Rehabilitation

During 1997 and 1998, waste rock dumps covering an area of 14 hectares were covered and hydro-seeded.

Closed Mines

After operations end, we continue active monitoring and maintenance of closed mines and tailings facilities to minimize the risk of future environmental problems. There were no environmental issues at any of Boliden's closed mines during 1998. Boliden's major closed mines include Premier Gold in British Columbia and Stekenjokk, Enåsen, Saxberget and Vassbo in Sweden.

**CONTINUAL IMPROVEMENT: THE CHAR RETURN TO STEKENJOKK**

In 1991, after careful investigation, Boliden decided to close the tailings pond at Stekenjokk via flooding. We have monitored the pond continuously for seven years and found that almost no metals have been released. In fact, the success of the reclamation was confirmed in 1997, when we discovered a healthy stock of Arctic char in the pond. Char are freshwater fish which depend on clean water to survive.

SMELTERS

The main environmental issues for smelters are emissions control, waste management, recycling and energy consumption. Overall, emissions were in compliance with regulations and comparatively lower than other smelters worldwide. Waste management, recycling and energy consumption levels were as good as or better than comparable smelters.

Minimizing Impact, Maximizing Recycling

The smelting process has the potential to release sulphur dioxide and metals into the air. It also uses energy and produces wastes such as slag from the furnace, dust from air-cleaning equipment and solids from water treatment. We regularly monitor for air, water and noise emissions and waste production. Findings are regularly reported to authorities.

Smelting also offers positive environmental opportunities, such as recycling. Boliden is at the forefront of metals recycling. Some noteworthy examples:

- we work closely with government and industry groups to increase the recycling of non-ferrous metals and to organize an infrastructure for collecting recyclable scrap.
- as a member of the Swedish Recycling Industries Association, we are developing technical processes to recycle non-traditional wastes such as computer scrap.
- Boliden has its own scrap dealer, AB Arv. Andersson, a company which actively acquires scrap which we then recycle.

Site-by-Site Performance

RÖNNSKÄR

The Rönnskär metallurgical complex located in northern Sweden comprises a copper, lead and precious metals smelter and refinery with its own port facilities. In 1998, the facility received a permit to expand the capacity of the copper smelter from 140,000 tonnes to 240,000 tonnes of copper cathode per year. The permit conditions are stringent, requiring the smelter to keep emissions at current levels, while nearly doubling production.

Discharges

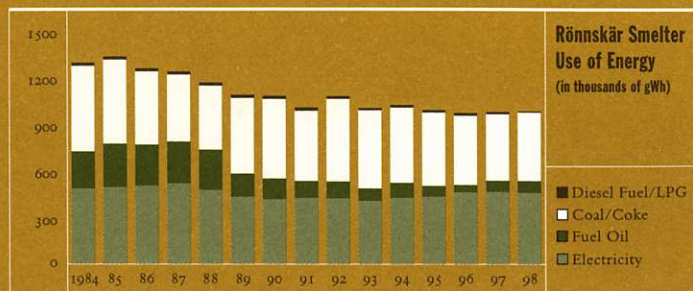
In 1998, there was a minor leak from some old drainage pipes. Limits were not exceeded, but increased mercury was found in the sewage system, and increased zinc and cadmium in the cooling water drainage system. In 1996, we began an ongoing program to refit the entire drainage system over a three-year period. When the refit is complete, critical pipes will be housed above ground, thus more accessible for observation and maintenance.

Emissions

Rönnskär achieved an outstanding 98.5% containment of sulphur dioxide in 1998. This performance compares favourably with smelters around the world. Sulphur dioxide concentrations are monitored in the areas surrounding the operations in cooperation with the local municipality of Skellefteå.

CONTINUAL IMPROVEMENT:

At smelters, conserving energy is a priority. We are concentrating our efforts on reducing consumption and selling our excess heat to municipalities for energy generation, in turn, lowering their fossil fuel consumption.



In 1997, Rönnskär invested in a new filter system to reduce dust. The system exceeded all expectations during 1998, allowing us to increase recycling in our Kaldo furnace and decrease mercury emissions by 90%.

In 1998, we began a study into the formation of dioxins at the slag fuming plant to determine whether levels can be reduced.

Waste

Our objective is to divert as much waste from landfill as possible. We continually pursue new avenues for reuse, recycling, recovery and other means of decreasing wastes. Some examples are:

- through granulation, slag, the residue from copper smelting, becomes iron sand. This slag has been used locally for decades in drainage materials around houses and in roads. In 1998, with the Swedish Geotechnical Institute, we carried out further testing of this slag to improve documentation relating to its possible environmental impact. The tests confirmed that leaching rates are at levels comparable to natural materials.
- in 1998, 60,000 tonnes of slag resulting from the smelting of Laisvall lead concentrates were transported to Laisvall and deposited underground for safe and approved storage. This means of disposal "closes the loop," returning the residue to the point of origin.
- up until 1998, the dust collected from air-cleaning filters went to landfill. This year, however, we were granted a permit to export the dust to England where a special furnace is able to further recover remnant amounts of lead and zinc, leaving a relatively clean waste product.

NORZINK

Norzink is a zinc smelter and refinery located in Odda, a town in southwestern Norway. The facility is a 50-50 joint venture between Boliden and Rio Tinto Plc. The facility produces refined zinc and aluminum fluoride powder.

Waste

Zinc smelters are faced with the potentially challenging environmental task of disposing of their iron oxide or jarosite wastes. Norzink is able to dispose of its jarosite wastes safely by depositing them in caves which it excavates in nearby mountains. Norzink has also been able to successfully reclaim nearby wetlands that were once used as jarosite waste disposal sites. In 1998, Norzink began work on mountain cavern number 10. The cavern has a volume of 140,00 cubic metres and is due for completion in May 1999 at an estimated cost of \$4 million.

Norzink's gypsum waste from the production of aluminum fluoride has traditionally, and with the permission of Norwegian governmental authorities, been deposited in the nearby fjord. In 1998, Norzink invested in new equipment that allows it to transform the waste into saleable anhydrite, thus significantly reducing waste output. Sales are scheduled to begin in 1999.

Discharges

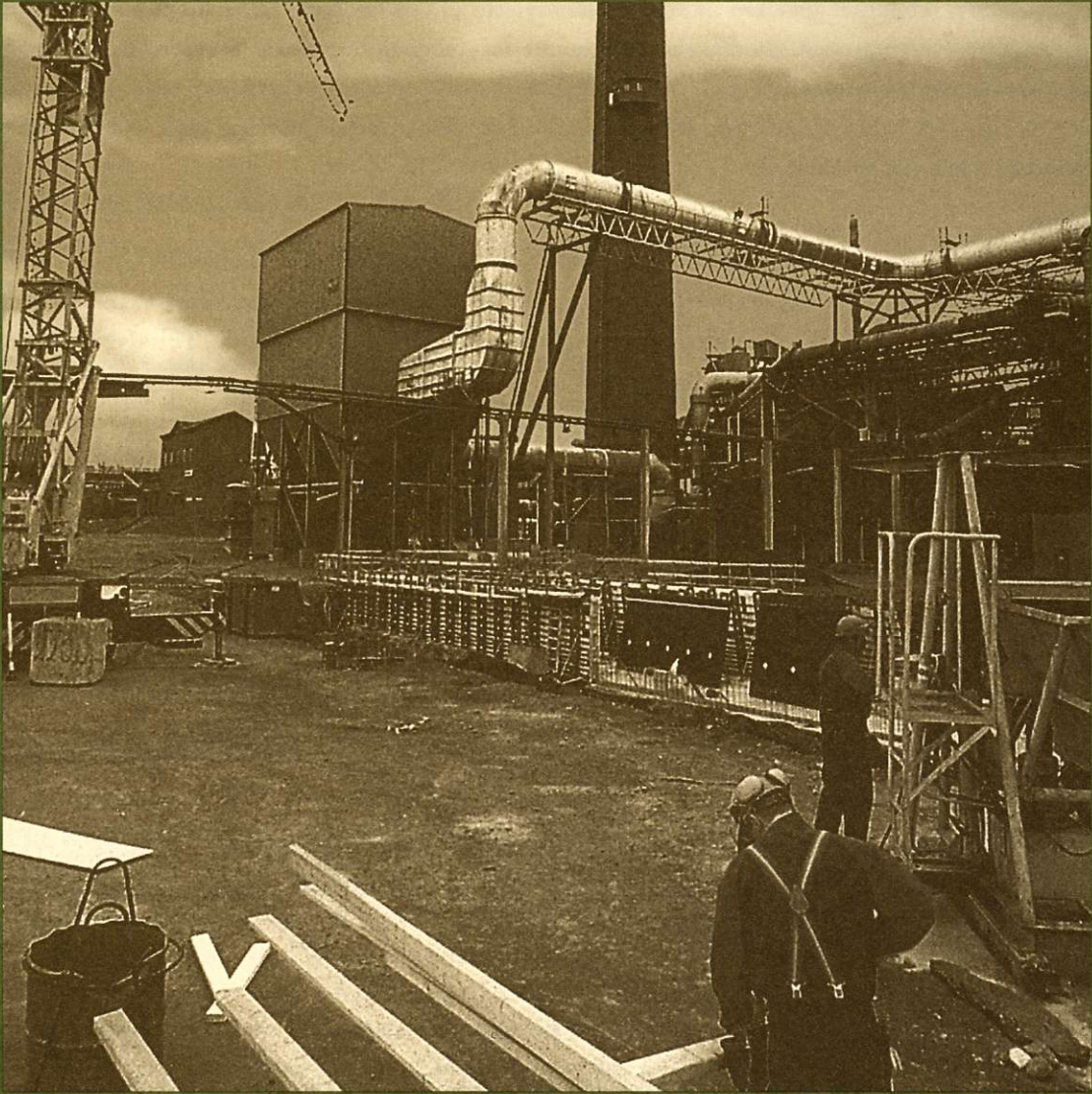
An action plan carried out in 1998 resulted in a reduction in the number of accidental discharges from 16 in 1997 to one in 1998.

Emissions

Norzink was in compliance with emission limits during 1998 except for elevated sulphur dioxide emissions during the second half of the year and a limited period of increased dust emissions.

The increased dust emissions were caused by a punctured bag in the bag-house filter at the zinc powder plant. The puncture was identified and the bag replaced. Annual levels of dust and metal emissions were, however, negatively impacted by the incident.

The elevated sulphur dioxide emissions were first observed in June 1998. Since that time,



Rönnskär's expansion will double production while emissions stay at current levels.

Norzink has investigated several different possible causes and taken remedial measures to reduce the emissions to normal operating levels, but without success. Further investigations are being carried out. The Norwegian environmental authorities have been informed of the situation.

BERGSÖE

Bergsöe is a secondary lead smelter located in southern Sweden. The smelter processes all the spent lead-acid batteries collected in Sweden and most of the spent lead-acid batteries collected in the other Scandinavian countries. Most of the lead recovered by Bergsöe is sold to battery manufacturers as lead alloy for use in new lead-acid batteries.

Emissions

In 1998, under certain weather conditions, yellow stains occasionally appeared on boats moored in the nearby harbour. A third-party consultant's investigation of Bergsöe's emissions, completed in the third quarter, concluded that it was not possible to state the origin of the stains. Despite that finding, Boliden made technical changes to the smelter's flue-gas system in September, to minimize any possibility that Boliden could be contributing to the stains.

ARV. ANDERSSON

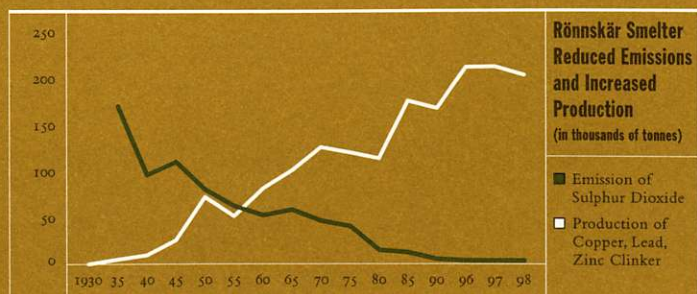
AB Arv. Andersson (AA) comprises nine scrapyards, most of them in the north of Sweden. In late 1998, AA applied for ISO 14001 accreditation and was certified early in 1999.

Discharges

In 1998, the municipality of Umeå found high levels of PCB residues in mud from the surface runoff of an AA company. The residues were likely from transformers brought to the scrapyard in the 1960s and 1970s before Boliden's ownership. AA retained a consultant to sample and analyze the soil and install groundwater pipes. The surface runoff system was rinsed. The mud and water that was collected was incinerated. Subsequent analysis showed only occasional elevated concentrations of PCBs. Further sampling and analysis by the municipality show that there are PCB residues in areas outside the AA scrapyard. These results indicate that the residues come not only from the scrapyard but also from neighbouring industries. Investigations and cleanup will continue in 1999.

CONTINUAL IMPROVEMENT:

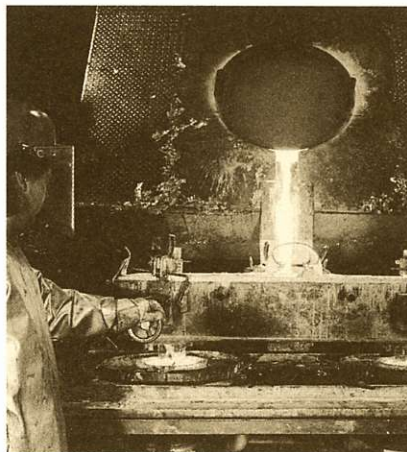
Through technological advances, Boliden has steadily decreased emissions at Rönnskär while at the same time increasing production.



FABRICATION

Boliden's fabrication business produces copper tubing and brass products for sale throughout Europe. The brass division has three plants – in Sweden, the Netherlands and the United Kingdom, and the copper division has two plants – in Belgium and Sweden.

The key environmental issues at these plants are discharges of metals and hydrocarbons into water and possible soil contamination. Discharges are monitored and reported to authorities regularly. Environmental reviews were conducted at all units in 1998 and no major issues were reported. The plants are preparing to apply for a certification according to ISO 14001 of their environmental management systems.



TECHNOLOGY SALES

Contech, Boliden's engineering and construction company, sells and licenses technology developed by Boliden. It also provides design and process engineering services and procurement and project management services to mining and mineral processing companies around the world.

This year, Contech helped develop a newly emerging technology for removing mercury from sulphuric acid. The process enables the production of mercury-free fertilizer from commercial acid.

1999 ENVIRONMENTAL PRIORITIES

Two events occurred in 1998 which will have a significant impact on our environmental work:

- the failure of the tailings dam in Spain on April 25; and
- the acquisition of Westmin Resources Limited in early February.

Despite the accident in Spain, Boliden takes pride in its environmental track record. Over the last three decades, metals emissions and other discharges to air and water have gone down dramatically – in the order of 90% to 99% throughout its various operations.

Today, the environmental performance of Boliden's mines and smelters is among the best in the world. Most of the operations use state-of-the-art technology and emissions and discharges are so low that further reductions would only be possible after major technological advances.

This is not to say that there is no potential for improvement. Even though emissions during normal operation are very low, and even though the accident in Spain is an extraordinary event, less significant incidents can also result in unacceptable emission or discharge levels.

Going forward, the main focus in our environmental work will be risk management, waste treatment, efficient use of energy and the decommissioning of industrial areas and mine sites.

With the Westmin acquisition, we are completing our review of policies and routines, and are applying our efforts to the integration and coordination of the environmental management systems and cultures of the two organizations. This work is well underway.

1999 TARGETS

Boliden's targets for 1999 include documenting and implementing the ongoing integration of the Boliden and Westmin Environmental Management Systems (EMS). This includes among other things:

- a revised environmental policy (see page 5);
- standards for internal and external environmental reporting;
- developing key indicators for environmental performance;
- minimum requirements for the execution of, and follow-up on, environmental audits including the establishment of an internal audit network;

CONTINUAL IMPROVEMENT: THREE INNOVATIONS COMBINED

Traditionally, when a mine is decommissioned, tailings are safely covered using only one technique. Kristineberg is unique in that three different techniques are being combined to best meet site-specific conditions. The more elevated parts of the tailings were covered with compacted clay and a protective layer of till. Where the groundwater table is closer to the surface, a layer of unclassified till will be used to cover the tailings, thus raising the groundwater table. The downstream tailings will be covered with water in a man-made lake.

- minimum requirements regarding development and implementation of contingency and emergency response plans;
- minimum requirements regarding environmental training;
- completing the ongoing tailings dam safety review at all facilities and developing operation, supervision and maintenance manuals for all tailings dams;
- carrying out environmental audits, followed by action plans, to meet identified concerns, in accordance with our plan for biannual audits on all major operations;
- keeping emissions to air and water at 1998 levels or lower by optimizing existing equipment and preventing incidents leading to accidental discharges;
- establishing one- and five-year environmental targets for all operations including emissions to air and water, energy consumption, fresh water consumption and waste management; and
- continuing to actively participate within the scientific community in researching tailings dam safety, acid rock drainage and decommissioning issues.

HEALTH AND SAFETY

Boliden has established what it believes is a safe and healthy work environment. Our vision is to create a safe workplace with zero accidents.

Integration and Continual Improvement

Following the Westmin acquisition in 1998, Boliden began the task of integrating Boliden's and Westmin's policies, procedures and best practices in the area of health and safety. In 1998, we revised our Health and Safety Principles (see page 6) to provide consistent guidelines throughout the organization. Implementing these principles will be a priority in 1999.

Integration and improvement are ongoing processes. Some of the most critical activities in 1998 include:

- occupational health and safety committees at each site;
- regular safety meetings at each site;
- occupational health and safety training;
- workplace inspections to identify problems and implement remedies;
- accident investigations to determine causes and prevent recurrence;
- emergency preparedness procedures;
- workplace monitoring to evaluate and control health hazards; and
- control programs to ensure employees have the information needed for the safe use, storage and handling of hazardous materials in the workplace.

1998 Significant Events and Programs

Overall, accidents declined in 1998. Highlights include:

- Laisvall recorded an historic safety performance, with only three minor accidents for the year; and
- lost time injury frequency at Myra Falls decreased by 28%.

In late 1997 and early 1998, an independent consultant reviewed safety standards and regulations at nearly all Boliden smelters and mines internationally and found them to be generally acceptable. Based on these findings, the priority for 1998 was not to make new regulations, but rather to raise the profile and enforcement of existing ones, as well as to raise individual employee awareness and involvement.

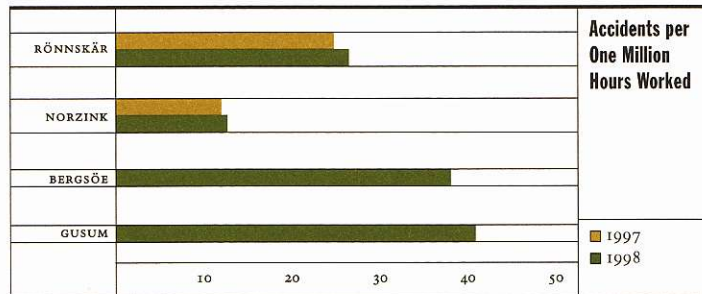
Early in 1997, the Swedish mines launched a special project entitled "Improved Working Environment" designed to raise the profile of safety issues, increase knowledge about safe practices and encourage employees to make workplace safety a high priority. Action plans arising from the project were implemented in 1998.

Employees at Lomas Bayas received a variety of safety training and orientation courses in preparation for start-up. All mine equipment operators were trained and certified to operate equipment. All employees attended a three-day seminar on communication and team work. Relevant for health and safety was the seminar's emphasis on building a culture of personal responsibility.

Despite the significant decrease in accidents at Myra Falls since the Westmin acquisition, a fatal accident occurred in October due to an isolated fall of consolidated backfill. Boliden's response was to thoroughly investigate and take the remedial steps needed to prevent a recurrence of such a tragedy. The accident at Myra Falls was investigated by Boliden, the British Columbia Ministry of Mines and third parties. Recommendations included improving mine operating procedures related to mucking, drilling and ground control.

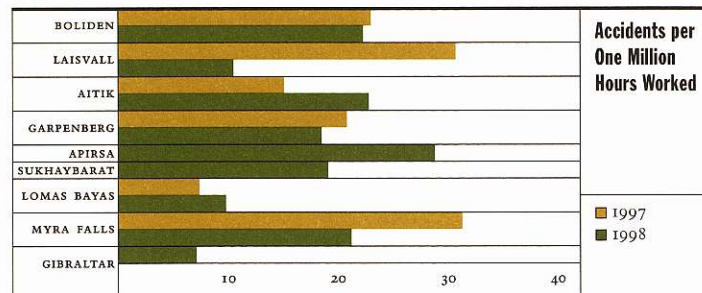
As part of the Rönnskär expansion project, Boliden will provide special safety training for the approximately 2,000 contract workers and 850 employees involved in the two-year project.

ACCIDENT STATISTICS OF THE BOLIDEN SMELTERS



ACCIDENT FREQUENCY OF GUSUM AND BERGSÖE FOR 1997 NOT AVAILABLE.

ACCIDENT STATISTICS OF THE BOLIDEN MINES



ACCIDENT FREQUENCY OF APIRSA, SUKHAYBARAT AND GIBRALTAR FOR 1997 NOT AVAILABLE.

Health Issues in Sweden

Since the middle of the century, Boliden has researched and monitored real and potential health risks and has taken a number of proactive steps to eliminate or manage them. Exposures to chemical agents such as silica and lead and to physical agents such as noise have been greatly reduced by monitoring and management programs.

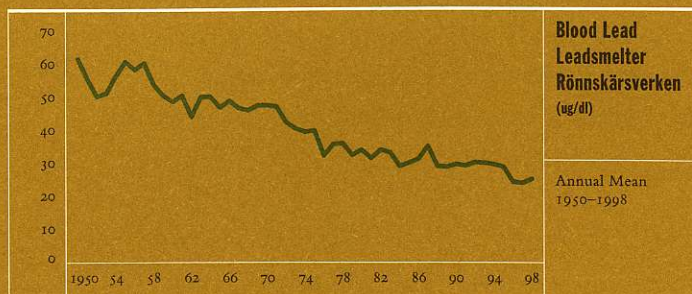
A key initiative, the exposure monitoring system launched in 1982, allows us to calculate our miners' annual exposure to a variety of chemical and physical agents.

One current concern in mines is exposure to diesel exhaust, the health effects of which are not entirely known. In accordance with present scientific knowledge, we have directed our efforts to ventilation, improved fuel quality and cleaner diesel engines.

In copper and lead smelters, exposure to metals and process gases are health concerns. Employees in smelters are routinely tested every three years for lung function, hearing, vision and lead exposure. Boliden has monitored lead levels in blood since the late 1940s. Today, lead in blood is at historically low and safe levels.

CONTINUAL IMPROVEMENT:

Blood lead levels have been greatly reduced by monitoring and management programs and no longer pose a health threat.



Blood Lead Leadsmelter Rönnskärsverken (ug/dl)

Annual Mean 1950-1998



SPECIAL REPORT:

TAILINGS DAM FAILURE, SPAIN

TAILINGS DAM FAILURE, SPAIN

In 1998, the tailings dam owned by Boliden Apirsa, SL (Apirsa) in southern Spain failed causing a release of tailings and tailings water. This section of our EH&S Report is devoted to detailing the accident, its causes, the cleanup and the current status of the area affected by the accident and the future of the mine.

Independent investigations indicate that Boliden was neither negligent nor at fault. Nevertheless, as owner of the operation, we accepted responsibility for the cleanup and immediately took aggressive action.

The Accident

On April 25, an approximately 600-metre section of the tailings dam was laterally displaced, sliding, essentially intact, for a distance of about 60 metres. This movement caused an opening in the tailings dam and the release of an estimated 5.5 million cubic metres of tailings water and about 1.3 million cubic metres of tailings materials. Approximately 2,600 hectares of land were covered with tailings materials along a 40-kilometre stretch of river channels. A combination of the rapid rise and fall of the water level in the river channels together with the muddy discharge resulted in most of the aquatic life either being stranded on dry ground or being suffocated in the tailings water.

The tailings filled a number of irrigation wells and covered some ground crops. While the fruit on trees was already ripe, and therefore unaffected, fear of contamination made the crop unmarketable. Although there was limited property damage to private homes, there were no personal injuries and no livestock was harmed.

Spanish environmental authorities took prompt action to divert the flow away from the Doñana National Park, which was not affected.

Immediate Actions

The tailings dam failure was discovered by an electrician at the mine in the early morning. The general manager of Apirsa and Boliden management in Sweden and Canada were contacted immediately, as were the Spanish authorities. Before noon, experts from Sweden were en route to the mine site. Apirsa worked swiftly and closed the failed area within a day. Production at the mine was immediately suspended.

Within three days of the spill, Apirsa developed a plan for cleaning up the discharged tailings. This initiative formed the basis for intensive, constructive talks between Apirsa and the Spanish governmental authorities and led to a division of responsibilities between them. Apirsa assumed responsibility for cleaning up the northern sector below the tailings dam (an area of approximately 800 hectares containing about 80% of the discharged tailings) and the Spanish governmental authorities assumed responsibility for cleaning up the southern sector below the tailings dam (an area of approximately 1,800 hectares containing the remaining discharged tailings).

To safeguard the quality of the work, Apirsa developed a comprehensive plan for the recovery of the area. The plan included investigating the impact on ground and surface water, the ecosystem and soils. From an engineering perspective, it included removing tailings, cleaning wells, controlling erosion and revegetation. Apirsa received a permit to proceed as planned on May 2, 1998.

In early May, Apirsa offered to purchase the current year's harvest from the local farmers at a cost of approximately \$6.5 million. This was done to help the farmers and assist local governmental authorities in calming fears that crops from the area might turn up in the marketplace. The payment was made to alleviate an immediate hardship, and does not imply that Boliden is liable for the damage.

Cleanup

PHASE ONE—1998

The immediate damage had been done. Apirsa's priority was to avoid secondary damage in the medium or long term. The spill had happened just as the rainy season was ending. It was urgent to complete the cleanup before the next rainy season began, and thus prevent the rains from causing the metals in any remaining tailings to leach into the environment.

Eight hundred men driving nearly 500 trucks worked 12 to 16 hours a day to remove the tailings. With the permission of the Spanish governmental authorities, Apirsa built a private road to keep trucks off public thoroughfares. The waste was deposited for safe, approved storage in the depleted Aznalcóllar open pit adjacent to the Los Frailes mine.

Throughout the process, Apirsa, supported by independent international experts, rigorously tested and monitored the quality of ground and surface water, and measured residual concentrations of metals on the cleaned-up lands.

CLEANUP COMPLETED

By late 1998, more than 99% of the tailings in Apirsa's northern sector had been removed and safely deposited in the depleted Aznalcóllar open pit.

Site-specific criteria for metals in soil were established by Spanish environmental authorities providing guidance for further remedial actions. Lead, zinc and copper in soil and sediments meet the criteria: lead is below 500 mg/kg, zinc is below 1,200 mg/kg and copper is below 500 mg/kg.

Arsenic concentrations meet the criteria on at least 60% of the affected lands (on 73% of agricultural land). The remaining affected lands, mostly abandoned gravel pits, may require additional remedial action in the future. This could involve chemical stabilization of arsenic and metals, possibly combined with the application of clean soil.

Water quality in the river improved rapidly. Fish have returned to the river, and aquatic life is recovering.

PHASE TWO—1999

With phase one of the cleanup completed, the rehabilitation phase has begun and will continue through 1999. Investigations to form the basis for resuming the agricultural use of the land began in 1998 with greenhouse tests using soil from various areas. Field tests began in 1999. Boliden is working on this project with scientists from the University of Córdoba and the internationally known Swiss consultancy, Batelle.



Once rehabilitated, the land is expected to be safe for agriculture. The Spanish governmental authorities have, however, stated their preference to turn the area into a Green Corridor linking Doñana National Park with Sierra de Aracena y Picos de Aroche National Parks.

Boliden initially set aside a provision of \$34 million, net of insurance proceeds, towards cleanup, rehabilitation and business interruption costs. In the fourth quarter of 1998, Boliden added a provision of \$8.5 million for the greater than expected volumes of material cleaned up and for future rehabilitation costs. This brings the total provision to \$42.5 million.

Cleanup Quality Verification

An international panel, including representatives from Spain, was commissioned to review the environmental impact of the accident and the reclamation planning. The Panel was chaired by Dr. Grant Feasby, a mine waste specialist from Canada, and included experts in areas such as soil science, hydrogeology and geochemistry.

In their report, the Panel stated that "a very complex job has been successfully done (by both the governments and Boliden Apirsa) in recovering the... spilled tailings." Boliden's cleanup effort was described as "innovative and resourceful."

The report continued, "there is no doubt that the land and ecological resources were severely affected at the time of the spill. However, the Panel believes that it remains reasonable to expect that the land can be restored to its former use. If it is decided that a Green Corridor is to be established, the ecological resource and diversity should be improved from that before the spill event. This would be a positive legacy of the event."

DAM STABILITY INSPECTION HISTORY

The Apirsa tailings pond was designed and built in 1977-78. Boliden bought Apirsa in 1987.

The tailings dam was regularly inspected. In 1996, a full-scale stability study of the dam was conducted by independent experts, Geocisa of Spain and the Spanish governmental authorities. No signs of instability were detected. At the recommendation of the study, Boliden installed extensive new instrumentation to enhance monitoring.

Since the 1996 study, regular third-party inspections have been carried out, the most recent on April 14, 1998, two weeks before the accident. Again, no signs of instability were detected.

The tailings pond was designed to contain 32.6 million cubic metres of tailings. At the time of the failure, it contained about 15 million cubic metres, less than half its design capacity.

CONTINUAL IMPROVEMENT: DESERT INTO FOREST

The Lomas Bayas mine lies in one of the most arid places on earth. In 1996, as part of its Environment Impact Assessment commitment, we commissioned a pilot study on establishing a self-sustaining forest of algarrobo trees. A hardy desert species, algarrobos have an exceptional capability for sourcing water. By the end of 1999, the planting will cover 40 hectares and provide a greenbelt around the Río Loa near the Town of Calama. The budget for the project is \$400,000 a year.

Third-Party Investigation into Causes

EPTISA Servicios de Ingeniería S.A., an independent engineering firm specializing in dam design, mine engineering and environmental studies, was commissioned to investigate the tailings dam failure.

According to EPTISA, the cause of the failure was an earth slide 15 to 20 metres below the surface along a bedding plane within the Margas Azulas (Blue Clay) Formation underlying the dam. In more technical terms, the accident resulted from a fault in this Formation, as a result of surplus pressure in the interstitial water of the clays and pressures due to the weight of the dam and the tailings deposited. Furthermore, according to EPTISA, neither the 1977 dam construction project nor the 1996 dam stability study provided an adequate prediction of the behaviour of the subsoil. In other words, despite our best efforts at securing independent assessments, those assessments failed to accurately measure and predict the characteristics of the Formation which ultimately led to the tailings dam failure.

Apirsa commissioned independent experts Principia EQE to study EPTISA's report and the 1977 and 1996 projects to determine whether the projects contained technical errors or omissions. The Principia EQE study was directed by Professor Joaquin Martí, specialist in geotechnical engineering and professor of the Superior School of Mines at the Politechnical University of Madrid.

Reporting in February 1999, Principia EQE pointed to three deficiencies in the design and construction of the tailings dam by Dragados y Construcciones and its associated engineering firms, Itecsa and Geocisa, as the principal cause of the dam failure. The first deficiency resulted from excessive optimism in the values used to calculate the pressure distribution on the Formation. The second deficiency occurred as laboratory tests indicating the need to use more conservative friction angles in calculating the weight that the Formation could support were ignored. Finally, the brittle nature of the Formation was not sufficiently recognized.

Principia EQE concluded that if a realistic evaluation of the overall characteristics of the Formation had been used during the 1977 and 1996 studies, then a more conservative judgment of the impact of these characteristics on the strength and stability of the dam would have been recognized and the accident could have been avoided.

The study further underscores the fact that Boliden was neither negligent nor at fault. The 1977 and 1996 studies contained no information whatsoever which predicted a failure or could have been acted upon to prevent one from happening.

Closing the Old Pond, Restarting the Mine

Apirsa is in the process of decommissioning the old tailings pond. This involves three steps: securing the dam from future spills, covering the tailings with waste rock to prevent erosion from rainfall and sealing the area with clay and topsoil for final closure.

Apirsa has applied for a permit to restart the mine. At the time this report was written, receipt of the permit was pending a decision by the Spanish governmental authorities on the feasibility of using the depleted Aznalcóllar open pit for future tailings disposal.

ONGOING PROGRAMS

Research and Development

Working together with universities and governmental authorities, Boliden has been actively involved in closure and reclamation research since the early 1980s. In fact, we have not only discovered breakthrough technologies, but we have used them to carry out full-scale mine closures.

We are also involved in reclamation research through our participation in the Mitigation of Environmental Impacts of Mining Waste Program (MiMi). MiMi was developed cooperatively by industry (Boliden and LKAB, a major Swedish iron ore mining firm), the Swedish Environmental Protection Agency and several universities. It is funded by MISTRA (the Swedish Foundation for Strategic Environmental Research).

In 1998, through the Metal Information Task Force (see below), Boliden was involved in a plan for inter-sectoral research on the safe use of metals, and applied to MISTRA for funding to further develop the suggested program. The funding was granted.

Boliden is currently co-funding research by the International Lead and Zinc Research Organization and the International Copper Association into better understanding the environmental and health effects of lead, zinc and copper.

We have commissioned a pilot study in Chile on establishing a self-sustaining forest of algarrobo trees in the arid Atacama desert.

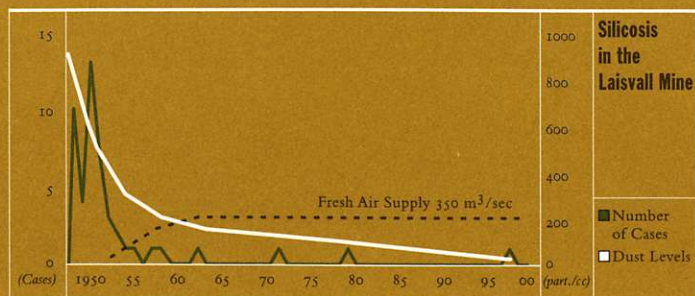
Boliden co-supervises and sponsors five to 10 PhD and MSc theses annually on mining-related environmental research such as pit lake chemistry and biology, nitrogen reduction in mine water, tailings pond decommissioning, ARD and baseline studies.

Communication, Education and Outreach

In 1997, Boliden was the driving force in starting the Swedish metal industry initiative, Metal Information Task Force (MITF), which focuses on metals and the environment. MITF issues publications on metals, their uses and processes, that help avoid potential negative impacts. It also forms two-way information exchanges with stakeholders, and is becoming active in metals research and development.

CONTINUAL IMPROVEMENT:

Silicosis is no longer a health threat. Over the years, exposures to silica have been greatly reduced by monitoring and management programs.



Boliden actively participates in industry organizations including the International Council on Metals and the Environment (ICME), Responsible Care (an international program of the chemicals industry), the British Non-Ferrous Metals Environment Group, the Health and Safety Industries Advisory Group, Euromines/Eurometaux, International Copper Association (ICA) and International Lead and Zinc Research Organization (ILZRO).

Boliden has good, ongoing relationships with the governmental authorities and residents in the communities in which we operate. We meet with local groups and invite people to open information meetings. We also publish environmental reports on various activities.

Boliden has an ongoing educational exchange with the medical school at the University of Umeå near our Rönnskär smelter.

In 1998, Boliden was invited to make formal presentations about the Apirsa tailings dam failure, impact, cleanup and investigation at numerous international conferences. Our participation and openness were well received.

Waste Separation

All of Boliden's operations separate wastes, including spent tires, construction waste and metal scrap. Wastes are recycled wherever the local infrastructure exists.

Energy Conservation

Energy conservation has been a focus at all of Boliden's operations for some time, and we continue to increase our efforts. The main users of energy are smelters, where we are concentrating our efforts on:

- reducing consumption; and
- using excess heat for energy generation – hot water is a by-product of smelting. We sell heat to municipalities, in turn, lowering their fossil fuel consumption.

CONTINUAL IMPROVEMENT: A MULTI-PURPOSE SOLUTION

At Garpenberg, Boliden is embarking on a unique project using the waste from a nearby pulp and paper plant to cover tailings. This waste is an excellent fertilizer and will help hasten revegetation as we plant trees and form wetlands to rehabilitate the land. This project is a cooperative effort between Boliden, the local community, the University of Dalarna, the Swedish Environmental Protection Agency, and the paper company STORA Fors AB.

LEGAL ACTIONS

In December 1998, the municipality of Umeå required AB Arv. Andersson (AA) to cover its costs for the monitoring and analysis of PCBs found near one of AA's plants (see page 17). AA will contest the action on the grounds that there are other possible sources of PCBs in the area.

In 1998, a court in Spain began investigating the tailings dam failure at the Los Frailes mine in southern Spain to determine whether or not any criminal or civil charges should be laid, and if so against which party or parties. The court's investigation is expected to conclude in 1999. (See page 23.)

APPENDIX

Mines and Concentrators

Business Unit	Product	Production	Operations	Location
Boliden Area	Zn,Cu,Pb,Au,Ag	1,639 Kt	Underground, open cut	Sweden
Garpenberg	Zn,Cu,Pb,Au,Ag	956 Kt	Underground	Sweden
Aitik	Cu,Au,Ag	17,931 Kt	Open cut	Sweden
Laisvall	Pb,Zn,Ag	1,955 Kt	Underground	Sweden
Apirsa	Zn,Pb,Cu,Ag	1,100 Kt*	Open cut	Spain
SCPM	Au	1,500 Kt	Open cut, CIL, heap leach	Saudi Arabia
Myra Falls	Cu,Zn	1,047 Kt	Underground	Canada
Gibraltar	Cu	12,394 Kt	Open cut	Canada
Lomas Bayas	Cu	2,648 Kt	Open cut, SX-EW, heap leach	Chile

Indicator	Business Unit	Units	1996	1997	1998
DISCHARGES TO WATER Surface water runoff	Boliden Area	Σ (Zn,Cu,Pb) Kg	5,020	7,317	7,811
	Garpenberg	Σ (Zn,Pb,Cu) Kg	448	676	675
	Aitik	Σ (Cu,Zn) Kg	8	14	71
	Laisvall	Σ (Zn,Pb,Cu) Kg	3,152	2,791	4,887
	Apirsa	Σ (Zn,Pb,Cu) Kg	NA	500	168*
	SCPM		NR	NR	NR
	Myra Falls	Σ (Zn,Cu) Kg	650	830	636
	Gibraltar		0	0	0
	Lomas Bayas		NR	NR	NR

EMISSIONS TO AIR Point sources	Boliden area	Σ (Zn,Cu,Pb) Kg	151	27	71
	Garpenberg	Σ (Zn,Pb) Kg	40	80	48
	Aitik	Σ (Cu) Kg	74	36	12
	Laisvall	Σ (Zn,Pb) Kg	730	180	32
	Apirsa		NA	NA	NA
	SCPM		NA	NA	NA
	Myra Falls		NA	NA	NA
	Gibraltar		NA	NA	NA
	Lomas Bayas		NR	NR	NA

FRESH WATER CONSUMPTION	Boliden area	m ³ /tonne of ore	3.29	3.10	2.96
	Garpenberg		1.20	1.39	1.59
	Aitik		None	None	None
	Laisvall		None	None	None
	Apirsa		NA	2.1	2.1*
	SCPM		NA	NA	0.22
	Myra Falls		NA	NA	NA
	Gibraltar		0.26	0.24	0.21
	Lomas Bayas		NR	NR	NA

ENERGY CONSUMPTION (including ore production, milling, concentrate drying, and heating)	Boliden area	kWh/tonne of ore	145.4	127.1	138.1
	Garpenberg		126.1	120.2	117.0
	Aitik		27.4	29.7	29.2
	Laisvall		53.6	50.1	45.8
	Apirsa		55.4	61.5	51.5*
	SCPM		NA	NA	21.8
	Myra Falls		NA	NA	78.4
	Gibraltar		NA	NA	NA
	Lomas Bayas		NR	NR	NA

* For the period January - April

Closed Mines and Concentrators

Site	Former Product	Decommissioned	Location
Enåsen	Au	1994, till cover	Sweden
Stekenjokk	Cu,Zn,Ag	1991, flooding	Sweden
Saxberget	Zn,Pb	1990-1995, clay/till cover	Sweden
Premier Gold	Au	Care and maintenance	Canada
Vassbo	Pb	1988-1989, revegetation	Sweden

Indicator	Site	Units	1996	1997	1998
DISCHARGES TO WATER	Enåsen	Σ (Zn,Cu,Pb) Kg	0	0	20
	Stekenjokk	Σ (Zn,Cu,Pb) Kg	54	117	77
	Saxberget	Σ (Zn,Cu,Pb) Kg	2,184	2,290	1,781
	Premier Gold	Σ (Zn,Cu) Kg	174	137	207
	Vassbo		NA	NA	NA

NA - not available
NR - not relevant

Smelters

<i>Business Unit</i>	<i>Product</i>	<i>Production</i>	<i>Operations</i>	<i>Location</i>
Arv. Andersson	Steel and Metal Scrap	87,222 t	Scrap metal supplier (7 sites)	Sweden
Bergsöe	Pb, Sn-alloys	48,093 t	Secondary lead smelter	Sweden
Norzink	Zn, Zn-alloys, AlF ₃ , H ₂ SO ₄	351,018 t	Smelter and refinery	Norway
Rönnskär	Cathode Cu, ZnO, H ₂ SO ₄ , Pb, Au, Ag, Se, NiSO ₄ , Pd-conc., and SO ₂	499,789 t	Smelter and refinery	Sweden

<i>Indicator</i>	<i>Business Unit</i>	<i>Units</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>
DISCHARGES TO WATER	Arv. Andersson		NA	NA	NA
	Bergsöe	Σ(Pb) Kg	3.8	1.9	2.8
	Norzink	Σ(Zn,Pb,Cd,Cu,) Kg	39,325	36,279	35,139
	Rönnskär	Σ(Zn,Pb,Cu,As,) Kg	5,200	4,250	7,770
EMISSIONS TO AIR, METALS	Arv. Andersson		NA	NA	NA
	Point sources				
	Bergsöe	Σ(Pb) Kg	78.9	50	62.8
	Norzink	Σ(Zn,Cd) Kg	21,200	23,200	33,200
Rönnskär	Σ(Zn,Pb,Cu,As) Kg	23,500	25,350	23,500	
EMISSIONS TO AIR, SO₂	Arv. Andersson	tonne	NA	NA	NA
	Point sources				
	Bergsöe		422	359	229
	Norzink (SO ₂ +SO ₃)		27.5	32	149
Rönnskär		3,253	3,290	3,100	
FRESH WATER CONSUMPTION	Arv. Andersson	m ³ /tonne of product	NA	NA	NA
	Bergsöe		2.40	1.56	1.78
	Norzink		27.4	26.6	27.1
	Rönnskär		2.88	2.83	2.90
ENERGY CONSUMPTION	Arv. Andersson	kWh/tonne of product	NA	NA	NA
	Bergsöe		2,213	2,195	1,967
	Norzink		1,779	1,740	1,741
	Rönnskär		1,923	1,915	1,953

Fabrication

<i>Business Unit</i>	<i>Product</i>	<i>Production</i>	<i>Operations</i>	<i>Location</i>
Gusum	Brass products and copper tubing	28,170 t	Fabricator	Sweden
LDM	Brass products	31,914 t	Fabricator	Netherlands
MKM	Brass products	32,959 t	Fabricator	United Kingdom
Cuivre & Zinc	Copper tubing	29,259 t	Copper tubing fabricator	Belgium

<i>Indicator</i>	<i>Business Unit</i>	<i>Units</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>
DISCHARGES TO WATER	Gusum	Σ(Zn,Cu,Pb) Kg	NA	115	162
	LDM		NA	NA	NA
	MKM		NA	NA	NA
	Cuivre & Zinc		NA	NA	NA
EMISSIONS TO AIR	Point sources				
	Gusum	Σ(Zn,Cu,Pb) Kg	NA	115	281
	LDM	Σ(Zn) Kg	NA	NA	2,970
	MKM		NA	NA	NA
FRESH WATER CONSUMPTION	Cuivre & Zinc		NA	NA	NA
	Gusum	m ³ /tonne of product	NA	NA	NA
	LDM		NA	NA	NA
	MKM		NA	NA	NA
ENERGY CONSUMPTION	Cuivre & Zinc		NA	NA	72.7
	Gusum	kWh/tonne of product	2,394	2,144	1,992
	LDM		NA	NA	NA
	MKM		NA	NA	NA
Cuivre & Zinc		NA	NA	1,518	

NA – not available
NR – not relevant

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