

June 7, 2019

Adam C.T. Matthews  
Co-Lead  
Investor Mining & Tailings Safety Initiative  
Tailings  
Director of Ethics & Engagement  
Church of England Pensions Board

John Howchin  
Co-Lead  
Investor Mining &  
Safety Initiative  
Secretary General  
Swedish Council on Ethics  
for the AP Public  
Pension Funds

Dear Sirs,

**Subject: Boliden's Tailings Management Approach and CEO certification**

We refer to your letter of April 26<sup>th</sup> 2019. In our reply, you will receive a description of Boliden's Dam Safety work, as well as our answers to your overview questions regarding this matter. Please find Boliden's tailings safety disclosure attached as a separate pdf file.

The information provided in these documents is true to the best of our knowledge, based on our governance, technical and review systems as per the date above written.

Yours sincerely



Mikael Staffas  
President and Chief Executive Officer  
Boliden AB

## ***Overview Boliden Dam Safety work***

### *Introduction*

Boliden operates both active and closed tailings management facilities (TMF), including tailings dams in three different countries: Sweden, Finland and Ireland. The different facilities use various construction techniques and the construction method has in some cases also changed during the time of operation. The tailings deposition methods/system also vary between different facilities.

Surface tailings dams represent one of Boliden's selected risk areas and dam safety is therefore a prioritized area. All facilities are classified according their potential failure consequences and have individual OMS manuals (operational, maintenance and surveillance manual) containing all relevant information for a safe operation.

### *Operation*

National laws, guidelines, site-specific permits, Boliden dam safety guidelines and Boliden common routines are all followed by the different facilities. Each site has a clearly defined dam safety organization and a dam safety responsible person accountable to ensure ownership and proper management of the facility.

The site-specific OMS manuals include information on roles and responsibilities, description of the facility and its key components, relevant permits and permit conditions, operating procedures, maintenance plan, monitoring/surveillance plan, procedures for documentation and reporting and an emergency and response plan.

Surveillance involves visual monitoring and inspection, instrument measurements, data collection and analysis and periodic inspections and reviews. Formal dam safety inspections are carried out according to legislation, guidelines and site-specific routines. Operational supervision and internal inspections are carried out quarterly, monthly, weekly and daily, sometimes as frequently as several times every day. All internal inspections are carried out by competent personnel and according to site specific routines. All inspections are documented and reported. Deviations and improvements concerning dam safety are both reported in Boliden deviation management system.

In Kevitsa, Aitik, Boliden Area, Garpenberg, Kylylahti, Harjavalta and Tara, Boliden manages active TMF's. In Stekenjokk, Boliden manages a closed facility. Many sites include multiple impoundments, which are often a mix of active and inactive.

### *Consequence classification*

All dams are classified based on consequences that may occur in the event of a potential dam failure. If a facility has more than one dam, each dam is evaluated and classified separately. The assessment of consequences is based on the failure scenario with the most severe consequences and will evaluate damage on all objects that will be negatively affected by a potential failure. The consequence classification is the basis for all activities on and related to the dams and dam safety, e.g. planning, instrumentation, inspections and reporting.

### *Risk management*

Risk management starts with a systematic identification, analysis and evaluation of potential failures/hazards and the likelihood of such failures. Based on this evaluation, actions are taken to minimize the risks. The main objective is to proactively prevent failures from happening.

To describe the total risk for a facility, all potential failure scenarios are identified and assessed. Based on these assessments, existing weaknesses and potential failure modes are identified and evaluated. The next steps are:

- Development of an action plan to mitigate identified weaknesses,
- Implement a program to monitor potential failure modes and
- Develop an Emergency Preparedness and Response Plan to minimize the negative consequences, should a failure still happen.

Risks related to dams may be divided in short and long-term risks. Short term is defined as “during operation” while long term is “after closure”. Any risk assessment will have to consider all relevant risks, i.e. short term and, as and when appropriate, long term risk.

Risk analysis is not something that is done only once. Risk analysis should be done as part of design and planning, before changes (temporary or permanent) in design or operational practices, as part of maintenance and construction work and any other activity that might have a direct or indirect impact on dam safety. Making sure that lessons learnt from incidents at other facilities are shared within the dam safety network is also an important part of risk management.

### *Reporting and networking*

The status of the dams and dam safety are followed on a continuous or daily basis. The Dam Safety Supervisor issues monthly and annual summary reports to the Site manager and to the Boliden Mines Staff. These reports include a summary of monitoring data, performance trends and any deviations from normal or expected behaviour. Routines for what additional information to report to the Dam Safety Supervisor and further up the management structure are established and documented in the OMS manual. A review of tailings management and dam safety aspects is part of the agenda of the local site-management group meetings. This review includes a follow-up of inspections and of the progress of action plans.

Monthly and annual reports, including reported non-conformances, are compiled. Progress in dam safety related projects at all operations are also reported. The different sites within Boliden are all included in the Boliden dam safety network which has monthly meetings and a yearly dam safety network conference including site visits. Boliden is also members of the Swedish mining association's dam safety network and several other networks, for example SwedCOLD that is part of ICOLD and SVC (Swedish Hydropower Centre).

#### *Boliden's way of work*

In 2017 Boliden started to implement the use of independent tailings reviews similar to the routines that are used in Canada. Since March 2019 three of the TMF's have been reviewed. The plan is to continue to review two more facilities during 2019. The remaining five TMF's will be reviewed in the coming three years.

The audits carried out have not identified any immediate, significant risks to the integrity of the facilities or to the short-term business plans as a result of tailings management and operations. Furthermore, it confirms Boliden has progressed significantly towards meeting the increasingly high international standards for tailings management facilities.

A guideline for Boliden dam safety work has been established. The purpose of this guideline is to clarify and align Boliden dam safety work within all units and to maintain the same standard on the dam safety work for all facilities across the three countries. The guideline has been adopted by Boliden management team and the work on implementation is on-going.

A list of consequence classified tailings management facilities that Boliden manages, including more detailed information about the different facilities can be found in the attached table. The information in the table is as requested by the investor mining and tailings initiative.

#### ***Our answers to your overview question regarding dam safety:***

##### **a) Provide an overview of your tailings management system, and how you manage risk**

#### **Boliden Dam Safety Management System in summary**

Having a safety management system in place is established good practice and, for high consequence dams, a requirement under EU-legislation as well as under most national legislation on dams. It is Boliden's opinion that a system according to this will meet these legal requirements.

The Dam Safety Management System is an integrated part of the Operational Management System within Boliden.

The Boliden Dam Safety Management System includes procedures and routines at Boliden. The core of the system are the principles and routines established and followed at the individual sites.

At the mine site, the local Dam Safety Management System shall be specified in an **Operation, Maintenance and Surveillance Manual (OMS-manual)**. It must be in place upon commissioning and maintained thereafter until closure, providing a clear, documented framework for the daily operation as well as for the management of non-routine situations. The level of detail of an OMS manual must reflect site requirements.

Key features of the Boliden Dam Safety Management System are:

- Boliden Environmental Policy
- Boliden's Dam Safety Commitments
- A Dam Safety organisation with defined roles and responsibilities
- A system for classification and risk management of dams
- Basic criteria for design, construction, operation and closure of dams
- Procedures for monitoring, follow-up, reporting and Management Review
- Emergency Preparedness Planning
- Documentation

### **Policies and commitments**

Boliden has, as a member of Svemin, the Swedish Association of Mines, Metal and Mineral producers, participated in the development of the Svemin Dam Safety Policy, which reads:

*Dam safety at member companies focuses **primarily on safety and the protection of health and environment** but also considers other aspects. In addition to legal requirements, regulations and applicable sector specific guidelines, member companies are committed to adhere to the following principles:*

- *dam safety requirements will be based on an assessment of consequences in case of a dam failure;*
- *dam stability and safety will constitute decisive criteria when deciding on the location of dams;*
- *dams will be designed, constructed, operated, maintained and closed in such a way that the probability for incidents, damage, or dam failure is kept as low as possible;*
- *consequences in case of a dam failure will be reduced as far as possible by proper planning and preventive measures;*
- *an assessment of the maximum life expectancy will be included as a crucial factor of dam design,*
- *dam safety will meet high international standards.*

*Member companies will follow procedures that ensure the quality and continuous improvement of dam safety measures.*

Boliden is committed to apply this dam safety policy to all its operations, independent of location.

### **Risk management**

Risk management starts with a systematic identification, analysis and evaluation of potential failures/hazards and the likelihood of such failures. Based on this evaluation actions are taken to minimize the risks. The main objective being to proactively prevent failures from happening. A general description of Boliden

Mines' risk management processes and procedures is included as part of the Operational Management System.

To describe the total risk for a facility, all potential failure scenarios should be identified and assessed. Based on these assessments, existing weaknesses and potential failure modes may be identified and evaluated. The next steps are:

- the development of an action plan to mitigate identified weaknesses,
- a program to monitor potential failure modes and
- an Emergency Preparedness and Response Plan to minimize the negative consequences, should a failure still happen.

Risks related to dams may be divided in short and long-term risks. Short term is defined as "during operation" while long term is "after closure". Any risk assessment will have to consider all relevant risks, i.e. short term and, as and when appropriate, long term risk.

Risk analysis is not something that is done once. On the contrary, risk analysis should be done as part of design and planning, before changes (temporary or permanent) in design or operational practices, as part of maintenance and construction work and any other activity that might have a direct or indirect impact on dam safety.

Making sure that lessons learnt from incidents at one facility are shared within the dam safety network is also an important part of risk management.

**b) Confirm whether your approach to tailings management has changed or will change in light of the recent tailings disasters at Brumadinho, Mariana, Mt Polley and others. Have you, for example, reviewed all tailings storage facilities with upstream dam construction, and taken steps necessary to protect local communities and the environment e.g. buttressing, evacuation?**

Boliden has a long tradition of proactive risk reduction and risk management for all of its tailings management facilities and tailings dams. Boliden experienced a large scale dam failure in 1998 at its then owned Aprisa mine. Since that incident, tailings management and dam safety have been a priority, and lessons learned from that incident form the back-bone of Boliden's current tailings management and dam safety. Through its membership in SveMin (the Swedish Mine Association), use of national and international experts, and memberships in international organizations such as ICOLD, Boliden continues to develop and improve on all aspects related to tailings management, dam construction and dam safety. Boliden uses these different networks to help inform, educate, and evaluate its own facilities in light of tailings dam incidents world-wide, thus ensuring that Boliden is always using best technical and management practices for tailings facilities and tailings dams.

Prior to the named incidents Boliden had already identified the need for buttressing of upstream dam construction and implement construction of buttressing where it was required. These construction programs are evaluated yearly and adjusted accordingly. As a direct result of the Mariana incident, Boliden implemented an Independent Review Process, similar to that used in Canada, for all of its tailings management facilities and dams, as well as a company-wide internal dam safety guideline. In addition, Boliden actively works with stakeholders to ensure their safety in the event of a dam failure or other

incident. These efforts include alarm systems, and instant messaging systems, as well as publicly available information for evacuation procedures in the event of a failure or incident.

Boliden is committed to constant improvement and uses all resources from all of its consultants, internal experts, international experts, and national and international organizations to ensure that we meet international standards and practices for tailings management facility design, construction, operation and dam safety. Boliden uses a company-wide deviation management and improvement reporting system as a method to share experiences, and knowledge gained from every site to enact proactive risk management measures.