

# THE MINING RECORD

126 YEARS OF  
MINERAL COVERAGE

INTERNATIONAL MINING NEWS™

www.miningrecord.com

Vol. 126, No. 6

June 2015

Denver, Colorado, USA

Metals Watch (05/26/2015): Gold \$1,215.90 • Silver \$17.41 • Copper \$2.84 • Lead \$.89 • Zinc \$1.01 • Platinum \$1,165.00 • Palladium \$788.00 • Molybdenum \$7.85

## Tailings Stewardship - "Genuine" Corporate Responsibility

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**ABSTRACT:** Tailings Stewardship has come to the forefront of the mining industry's attention following the Mt. Polley tailings dam breach in British Columbia, Canada. Recognizing the negative impacts a tailings dam failure has on a mining company's corporate social responsibility and market capitalization, combined with regulatory changes in Canada, Goldcorp Inc. (Goldcorp) has implemented additional tailings storage facility safety assurances. Tailings Stewardship is a management strategy that ensures best practices are implemented to properly design, construct, operate, maintain, monitor, and ultimately close tailings storage facilities. This article describes a stalwart Tailings Stewardship Strategy developed by Goldcorp and their Tailings Stewardship Team.

### 1. INTRODUCTION

Social and environmental consciousness, and investor confidence in today's society are as much a part of a mining company's corporate due diligence as the definition of its ore bodies. National Instrument 43-101 (Canada), the Joint Ore Reserves Committee (Australia), and the Reporting of Mineral Resources and Mineral Reserves (South Africa) exist to ensure that complete, accurately factual, and objective data and information relating to mineral properties is published and publicly reported to their respective stock exchanges. Accordingly, mining companies are required to disclose information that will positively or negatively impact the company's forecasted resources, production, and financial condition.

Historically, tailings management has been perceived as a component of the minerals processing circuit that does not contribute to a mining company's bottom line. As this paper will show, tailings management is as critical to a mine's operational revenue stream, investor confidence, and profit as any other component of the operation. In fact, implementing diligent tailings risk management techniques has become essential to prevent incurring potential social, environmental, and economic liabilities.

Stewardship is the careful and responsible management of something entrusted to one's care. Tailings Stewardship is an added

level of objective and independent guardianship to ensure Best Management Practices are incorporated throughout a tailings storage facility's life-cycle. This added level of assurance provides increased confidence to all of the mine's stakeholders, including: the mining company and its board of directors; mine operators and employees; Engineer of Record; surrounding communities who rely on the mine for both direct and indirect jobs; regulatory agencies; and the mining investment community.

### 2. TAILINGS DAM FAILURE(S) STAKEHOLDER IMPACTS

It is not this paper's intent to report or explain in detail the social, environmental, or economic impacts imparted on society by a tailings dam failure, or upset condition, which are well authored elsewhere (Vick, 1999; Davies, 2002; Azam & Li, 2010, Chambers & Higman, 2011, and others). Social and economic consequences are briefly discussed in the following sections to provide the reader a fundamental understanding of the risk magnitude posed to mining companies and their stakeholders.

#### 2.1 CORPORATE SOCIAL RESPONSIBILITY

In today's socially connected world, a tailings dam "incident", or even the perception of an upset condition or failure can, and will, negatively compromise a company's social license, which is its ability to operate with the permission of, and in cooperation with, its stakeholders at all levels. Consequential damages to a company's reputational capital can have negative implications when it comes time to permit future projects. Qualitative implications can be seriously damaging over the long-term, even if the effects cannot be immediately quantified. A comprehensive Tailings Stewardship Strategy protects human health and the environment, and demonstrates a corporate commitment to social responsibility; that in and of itself, provides long-term rewards.

#### 2.2 INVESTOR CONFIDENCE

The true cost of a tailings dam failure, or upset condition, is difficult to quantify due to long-term post-failure implications. Substantive tailings dam upset conditions or failures will undoubtedly suspend tailings operations, causing mine production to cease (unless the mine has another tailings storage alternative available to them, which typically is not the case). Suspending mine production interrupts the mine's revenue stream and cash flow; while ongoing sustaining costs continue during mine shutdown. Other direct costs including dam repairs or replacement, and environmental cleanup

or restoration, can also be incurred. Potential indirect costs include paying fines, litigating and/or settling class-action lawsuit(s), or in some instances, defending criminal charges.

Direct and indirect costs associated with a tailings dam failure can total tens of millions of dollars. Without question though, the single most significant economic impact to a mining company is lost market capitalization due to shareholder stock selloffs. Mining is highly dependent on capital investment. Most mining companies rely heavily on securities markets to raise the hundreds of millions of dollars necessary to develop capital projects; principally because it provides a good financial return on environmentally responsible investments. As such, investor confidence, whether institutional or individual, is critical to a mining company's long-term success and growth.

Electronic trading has created a highly volatile investment environment allowing investors to react, or in some instances overreact, nearly instantaneously to favorable or unfavorable news about a mining company. Combined with a 24-hour sensational internet news cycle, even the perception of a tailings dam upset condition or "failure" can cause severe stock selloffs within the same trading day the news is reported. This was never more apparent than on 5 August 2014, the first trading day following the Mt. Polley tailings dam breach when the mining company's stock (approximately 75 million shares) price fell from \$16.56 to \$9.70 per share; a market capitalization decline of more than \$500 million dollars (41%) in one trading day (Figure 1).

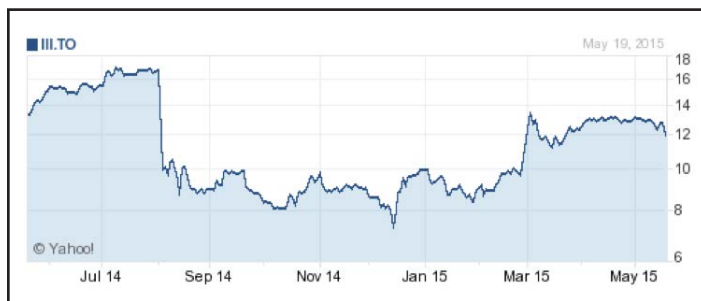


Figure 1. Stock Price Before and After the Mt. Polley Tailings Dam Breach.

Mt. Polley's owner is not the only mining company to experience a significant market capitalization decline following a tailings dam failure. In 1995 and 1998, the Omai (Guyana) and Los Frailes (Spain) tailings dam failures caused the owners' market capital to decrease by \$188 and \$68 million dollars, respectively.

### 3. MT. POLLY AFTERMATH

Following the Mt. Polley dam breach, the British Columbia government ordered an independent engineering investigation into the incident, and a third-party review of all 2014 dam safety inspections for every permitted tailings storage facility in the province. Based on recommendations made in the Mount Polley Independent Expert Engineering Investigation and Review Report, the Environmental Assessment Office, in collaboration with the Ministry of Energy and Mines and the Ministry of Environment, enacted new regulations to ensure the safety of tailings management facilities. This reaction is not dissimilar to actions taken in Spain and Guyana in the 1990's.

New Canadian regulations only apply to mines in Canada; however, conscientious Canadian mining companies typically apply Canada's regulatory standards or guidelines (at a minimum) to all of their operations worldwide. Goldcorp initially conceived their corporate Tailings Stewardship Strategy more than a year before the Mt. Polley incident. Goldcorp's corporate Tailings Stewardship Strategy initiative was developed to ensure best practices are implemented to properly design, construct, operate, maintain, monitor, and ultimately close tailings storage facilities in a safe, socially, and environmentally conscious manner. Rather than simply complying with regulatory statutes, Goldcorp's proactive management team launched the Tailings Stewardship Strategy in 2015.

### 4. GOLDCORP'S TAILINGS STEWARDSHIP STRATEGY

Tailings Stewardship begins with a corporate pledge to a zero tailings dam failure philosophy. Goldcorp's Tailings Stewardship Strategy adds an additional level of objective and independent guardianship to ensure best practices are incorporated throughout the tailings storage facility life-cycle. The Tailings Steward provides comprehensive technical expertise in all facets of the tailings facility life-cycle to facilitate a ubiquitous understanding amongst mine management, the Engineer of Record, the on-site tailings facility operations team, regulatory agencies, and external stakeholders to ensure best management practices are consistent companywide.

Specifically, Goldcorp's Tailings Stewardship Strategy is designed to:

1. Identify potential design or operational issues or concerns;
2. Manage liabilities (reduce risk);
3. Identify opportunities to improve operational efficiencies, and reduce costs;
4. Provide input into design, construction, and operations throughout the life of the facility (including closure and post-closure);
5. Provide operators contemporary, "state of the practice" training.
6. Improve data management;
7. Provide a standardized review process; and
8. Prepare for upset conditions (emergency preparedness).

Benefits derived for all stakeholders include:

1. Value engineering;
2. Reduced operational risks and liabilities;
3. Reduced post-closure risks and liabilities;
4. Improved site and community safety;
5. Improved operating practices; and
6. A single, current, "critical information" repository, readily accessible to the company's crisis-management team.

Goldcorp hand-selected a number of consulting engineering companies and requested they submit qualifications to serve as Tailings Steward(s) for all of their active and inactive mining operations around the world. After a rigorous review process, Goldcorp selected Tierra Group International, Ltd. (Tierra Group) and MWH Global (MWH) to implement their Tailings Stewardship Strategy beginning in 2015, with their eight active mines located in Latin America and Canada. Tierra Group was chosen as the Tailings Steward for Goldcorp's Latin American properties and MWH for Goldcorp's Canadian sites.

#### 4.1 The Tailings Steward's Role

The Tailings Steward's primary role is to assess a tailings storage facility to determine if Best Available Technologies, combined with Best Management Practices, are being utilized to design, build, operate, and eventually close a tailings storage facility. This role requires that the Tailings Steward have not only a breadth of historical, hands-on technical expertise in all of these areas; but to also be keenly aware of the human element that has contributed to the current state of a tailings storage facility.

To this end, the Tailings Steward must serve as an independent facilitator and engage multiple stakeholders, including the tailings storage facility:

- Owner;
- Operator(s);
- Engineer of Record;
- Local community; and
- Regulatory agencies.

Each of these stakeholders play a vital role in implementing a successful Tailings Stewardship Strategy, and their input must be engaged.

Objective observation based on an empathetic appreciation for the people and the history of a tailings storage facility is paramount. All tailings storage facilities have a history based on decisions made during different times, and for different reasons. It is not constructive for the Tailings Steward to be critical of these decisions, or to take a "would've, could've, should've" attitude when developing an understanding of the current situation. It is therefore highly advantageous for the Tailings Steward to have had previous experience with an independent review of their own work by respected industry colleagues, prior to reviewing the work of others.

Engagement is key and begins with the Owner's internal Tailings Stewardship advocate. Goldcorp's Project Manager promoted the Tailings Stewardship Strategy internally to both Goldcorp management, individual site operations Teams (ultimately responsible for the tailings storage facility operations, maintenance, and safety), and the Engineer of Record to establish universal "buy-in" to the Tailings Stewardship process, before implementation. It is imperative that each stakeholder understands not only what the Tailings Steward is, but what they are not.

- What the Tailings Steward is:
  - A Teammate;
  - A valuable resource; with worldwide tailings experience to be shared; and
  - An advocate of good ideas for enhancing tailings storage facility safety; irrespective of whose idea it is.
- What the Tailings Steward is not:
  - An auditor; searching for mistakes, or looking to assign blame; nor
  - A competitor; looking to replace an Engineer of Record.

#### 4.2 Implementing the Tailings Stewardship Strategy

After establishing internal buy-in and selecting the Tailings Stewards, Goldcorp implemented the Tailings Stewardship Strategy in June 2015 at their eight active mining operations (four in Canada and four in Latin America), which included performing or preparing:

- Data and Information Review;
- Site Visits;
- Dam Safety Inspection(s);
- Operator and Engineer of Record Interviews;

- Tailings Storage Facility Operator(s) Training;
- Facilitated Risk Assessment for each site;
- 5-year Dam Safety Review Report;
- Tailings Storage Facility Safety Enhancing Recommendations; and
- A secure, readily accessible, "Critical Information" repository accessible by Goldcorp's "Crisis-Management" Team.

The first Tailings Stewardship site visit was performed in June 2015 at Goldcorp's Marlin Mine in Guatemala. Tierra Group is Marlin Mine's Tailings Steward and MWH is Marlin's Engineer of Record (one of Goldcorp's Tailings Steward selection criteria was that the Tailings Steward selected for a site could not be the Engineer of Record for the same site), which provided a unique opportunity for the Tailings Stewardship Team. The Marlin site visit allowed Goldcorp's two Tailings Stewards to coordinate during the first Tailings Stewardship Strategy site visit and develop continuity to the Strategy's process across all of Goldcorp's sites.

After initiating the Tailings Stewardship Strategy at Marlin, Goldcorp has since implemented the Tailings Stewardship Strategy at Musselwhite (Canada) and Peñasquito (Mexico). Goldcorp, Tierra Group, MWH, and each of the sites' operations Teams and Engineer of Record have worked together diligently to implement the Tailings Stewardship Strategy at all of Goldcorp's active mine sites, for the benefit of all stakeholders and the mining industry. Goldcorp will be implementing the Tailings Stewardship Strategy at their inactive sites in 2016.

## 5. SUMMARY

Implementing a corporate Tailings Stewardship Strategy is a proactive, forward looking, environmentally and socially responsible corporate management strategy to minimize risks and maximize returns on investments for all stakeholders. Properly implementing Best Management Practices using Best Available Technologies consistently across multiple operations in a variety of countries, climates, and cultures is challenging. However, the benefits of avoiding even one tailings dam upset condition, breach, or failure, to all stakeholders, and the mining industry as a whole, far outweigh the time, effort, and investment to adopt, implement, and execute a comprehensive Tailings Stewardship Strategy.

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