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Metals Watch (11/23/16): Gold $1,213.25 • Silver $17.05 • Copper $2.63 • Lead $1.09 • Zinc $1.30 • Platinum $908.00 • Palladium $747.00 • Molybdenum $6.92

Tailings Stewardship: Adding Value To Due Diligence

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Acquiring new properties to increase production is a strategy for growing your mining business and, not unlike buying a used car, caveat emptor (let the buyer beware). It is leadership's responsibility to protect assets, reduce liabilities and mitigate or eliminate operating risks through preacquisition due diligence. Knowing what stands in the way of sustaining or expanding existing production of a new asset must be determined to realize full value of an acquisition. Every year somewhere in our mining world there is the potential for a tailings storage facility (TSF) failure. Recent tailings dam failures in British Columbia and Brazil have resulted in catastrophic impacts to the environment, mining company balance sheets, income statements, and market capitalization, as well as civil and criminal penalties both direct and punitive, against responsible parties. Existing tailings storage facilities are critical to mine production sustainability and, tailings stewardship is a role that has taken on new meaning and depth of scope in the pre-acquisition due diligence process.

The Mt. Polly tailings dam breach in British Columbia, Canada in August 2014, followed by the Fundao tailings dam failure in Minas Gerais, Brazil in November 2015 brought heightened awareness of the inherent risks associated with less than adequate tailings management practices. Inherent risks are well documented and include negative environmental and social impacts to society, and severe economic consequences to the mine owners. The Mt. Polly and Fundao tailings incidents caused untold negative environmental impacts, 19 fatalities (Fundao) and total economic consequences to the mine owners exceeding billions (with a B) of dollars, and counting.

Regulators have responded by enacting more stringent TSF permitting and operating regulatory requirements. British Columbia's (BC) Department of Energy and Mines (DEM) announced changes to the Province's Mining Code requiring mining companies applying for environmental operating permits to provide significantly more information and analysis. Other changes include creating independent tailing review boards, to help assure mines are designed and/or being operated in compliance with updated regulations, and posting all inspection documents and board activity overviews online.

Following suit, in June of this year the Brazilian Government submitted to the National Congress a Bill of Law setting forth a new legal framework for the mining sector. The proposed "New" Mining Code intends to dissolve the National Department of Mining Policy (the Departamento Nacional de Política Minerária) and create the National Mining Agency (the Agência Nacional de Mineração), endowed with the authority to regulate and supervise the mining sector.

These regulatory modifications are intended to enforce upon mining companies, practices to improve the safety and security of their mining operations, with a laserlike focus on tailings operations and management practices (TMP), during active operations and closure. Mining companies have re-sponded by initiating activities to comply with the new regulations in BC. The Brazilian mining sector will take time to catch up with BC, however reputable Canadian mining companies operating in Brazil have begun applying these Canadian "Standards" in Brazil, as well as their operating mines throughout Latin America and the rest of the world.

In time, the implementations of these compliance activities should enhance TSF safety worldwide, and provide a higher confidence level with respect to TSF management and operations to mining companies seeking properties to acquire. Which brings us to the main point of this article; Mine property due diligence, and identifying risk associated with historical TSF management practices before an acquisition.

As the name implies, "tailings" represent the "tail-end" of the mining industry. Thus, historically once the tailings left the process plant they were not only forgotten, but ignored.

Considered nothing more than a non-revenue generating financial burden to the mine, often viewed as a low-priority item during annual budgeting, and one of the first to be cut. An industry colleague describes it as, "the mines toilet bowl, something relied upon every day, and forgotten about…until it backs up!"

This is not to say that TMP have not improved over the past several decades following multiple tailings incidents, upset-conditions and failures; through an increased use of best available technologies (BAT), and best management practices (BMP) to reduce and/or avoid potential risks. In fact, since the Mt. Polly and Fundao tailings dam failures many mining companies, ("Majors" for the most part) have improved or enhanced their environmental management practices (EMP), or implemented formal tailings stewardship strategies (TSS) to improve TMP. Improved TMP have made their TSF's safer and improved stakeholder, and investor confidence.

Growth in the mining industry is however largely driven through property acquisitions. In fact, the Canadian Junior miners' business model is primarily to discover and do early-stage development of exploration targets with the sole intent of selling the properties to a Major or Mid-tier mining company. Early-stage development can include building a mine that includes a TSF. All acquisitions in the mining industry should require an appropriate level of due diligence prior to closing.

Due diligence (DD) can be performed by a mining company, fund management companies, streaming companies, or other lending institution's. Some mining companies have their own in-house due diligence teams, others utilize consulting firms or a team of independent consultants with expertise in specific

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areas. Historically, and typically, the DD team's primary focus is mine economics, and consists of the following disciplines:

- Geologists - Reserves Estimating
- Metallurgist - Process
- Process Engineer - Process
- Mining Engineer - Mine Design/Planning/Equipment
- Geotechnical Engineer - Underground or Open-pit Stability
- Environmental/Permitting Specialist - Compliance
- Financial Advisor - Capital, and sustaining capital investments, Operating costs, Cash flow, and Return on Investment (ROI)

In advanced DD stages an investigative DD team may examine mine management, conflicts of interest, press and SEC filings, liens or licensing problems, judgments, and/or criminal or litigation matters.

Notably missing from the "typical-historical" DD team is a Tailings Steward; a company or individual with the requisite expertise to identify potential risks associated with the highest-liability piece of the mines infrastructure and operations; its tailings storage facility and tailings management practices.

For all but the largest mining companies in the world, a tailings dam failure is crippling, if not fatal. With total costs of a tailings dam failure escalating into the hundreds of millions, if not billions (as is the case with Fundao) of dollars; it makes sense to add Tailings Steward-ship to a mine DD team to specifically investigate potential tailings risks?

Tierra Group International, Ltd.'s (Tierra Group) Tailings Stewardship Team was recently asked to participate in a post-acquisition NI 43-101 Feasibil-ity Study update for a mine located in Latin America. During the DD effort, the new owner's DD team had developed an understanding from the previous owner that the existing TSF had sufficient capacity to store tailings for several years before additional sustaining capital investments would be required to increase tailings storage capacity (information asymmetry and caveat emptor). Based on results of the economic analysis performed during DD however, the new owner realized that an opportunity existed to greatly improve the ROI by increasing production, and that the ore reserves and process facilities would support it. The acquisition went through with the intent of immediately issuing a Press Release, followed by a 43-101 Technical Report 45 days thereafter.

The new owner hired Tierra Group immediately after the acquisition, to author the Tailings and Infrastructure chapter of the Technical Report. Tierra Group's tailings Qualified Person (QP) visited the site to inspect the TSF, and in so doing performed a Tailings Risk Assessment (TRA). Fortunately, the TRA did not identify a fatal flaw with the TSF. However, while reviewing the tailings design and operations reports Tierra Group also determined that the TSF filling curves, relied upon during DD, that suggested "several years" of available tailings storage capacity were outdated, and that in fact there only remained about one-year of tailings storage capacity, at the rate the previous owner was producing.

Furthermore, Tierra Group's investigations determined that there was insufficient geotechnical information obtained by the previous owner's design team to confidently characterize the foundation underlying the dam. This data deficiency lowered Tierra Group's overall confidence in the dam's integrity and warranted additional geotechnical drilling and testing and potential dam modifications to comply with the stringent regulations to which this mid-tier Canadian company strives to operate.

The new owner intended to immediately double the production rate, which would shorten the current TSF life expectancy to six-months! Thus, the new owner was suddenly faced with a significant and unexpected capital outlay to design and construct a tailings dam raise in a rush, and in the worst possible climatic seasonal conditions; all the while ramping up production amidst a new ownership transition.

Although this anecdote does not present a catastrophic circumstance; it does demonstrate how a Tailings Steward engaged during the DD process could have helped refine the balance sheet, provided a much more realistic understanding of the "tailings management situation", and smoothed the transition into new ownership. Certain progressive Major mining companies (or lending institutions) have already recognized this, and have addressed the issues that the "new" rules and regulations apply to during operations and closure, during pre-acquisition DD.

Performing due diligence is a lot like performing risk assessments, in that; you may know what you know, and you may know what you don't know, but when you don't know what you don't know, the unknowns can come back to bite you! Having a credible Tailings Steward engaged in the due diligence process can provide a level of assurance that at the least will provide a fuller understanding of the financial risks associated with tailings management, and at best avert an environmental, social and economic disaster.

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Tierra Group's Engineering Team has provided tailings stewardship services throughout Latin America since 1990.