



This case was written by Kent Keeler, William Crothers, and Professor Deborah McPhee, Brock University. It is based on materials publicly available and is intended as a basis for classroom discussion, not to illustrate either effective or ineffective handling of a management situation.

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It was just before 2:00 p.m. on August 5, 2010. Marcelo Kemeny had just returned to his desk at the head office of the San Esteban Mining Company (SEMC), located in Santiago, Chile. The afternoon would likely be spent reviewing the previous month's production reports from his company's only operating facility, the San Jose copper mine, 800 kilometres away in Northern Chile (see Figure 1).

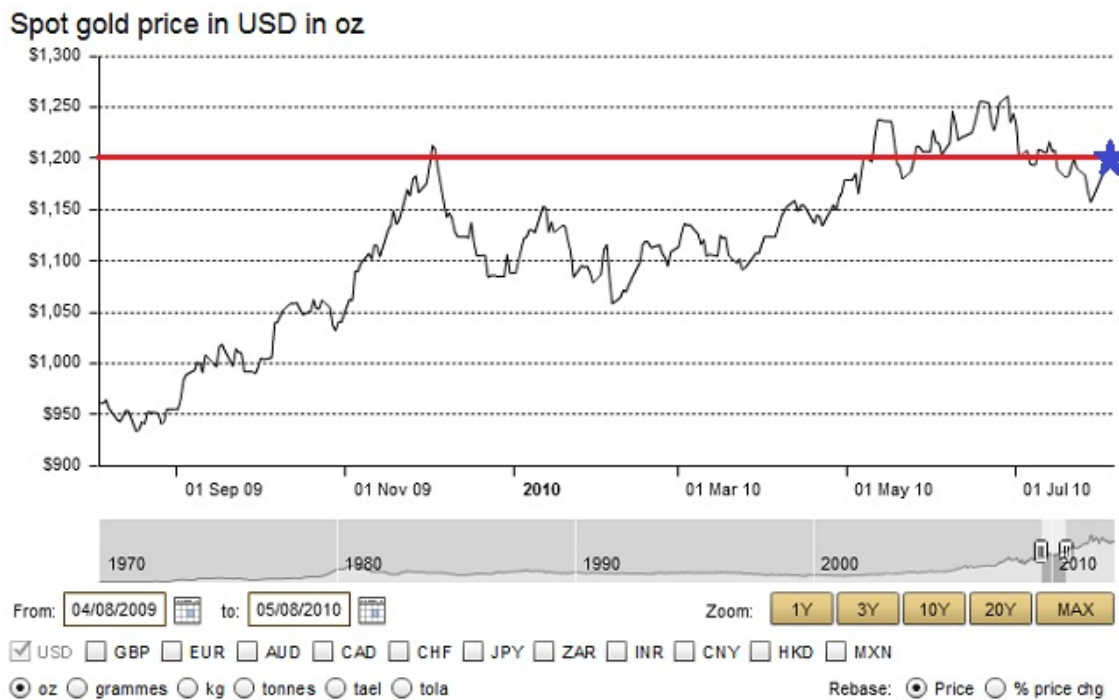


Source: Google Maps

Kemeny's day had started out like many others in the past few weeks. He had spent the morning attending meetings at the San Esteban office, as well as checking on the daily gold and copper prices. This morning's market update e-mail indicated that gold and copper prices were continuing their satisfying upward trend, recovering from one of their periodic downturns. Gold was expected to exceed US\$1,200 per ounce (see Figure 2) and copper was above US\$3.25 per pound (see Figure 3).

These prices offered further support for the decision that had been made a week earlier to reopen the San Jose Mine. It had been closed in accordance with a government order, pending safety upgrades. A government official had lifted the forced closure order eight days earlier, on July 28, 2010, even though some of the required safety improvements had not yet been implemented. The reopening of this mine and the resulting revenues were crucial to sustaining SEMC's business, and it was especially important not to have to sit on the sidelines as mineral prices increased.

**Figure 2: Historical Gold Prices**



Source: [http://www.gold.org/investment/statistics/gold\\_price\\_chart/](http://www.gold.org/investment/statistics/gold_price_chart/)

**Figure 3: Historical Copper Prices**



Source: <http://www.infomine.com/ChartsAndData/ChartBuilder.aspx?z=f&gf=110563.USD.1b&dr=5y&cd=1>

## COMPANY BACKGROUND

The San Esteban Mining Company had been started in 1957 by Jorge Kemeny, Marcelo's father, initially mining iron. Jorge purchased the San Jose property and diversified into copper. Eventually taking over the company from his father, Marcelo and Alexander Bohn together held a majority position in the company and have managed SEMC ever since, including their San Jose underground mining operation.

The San Jose Mine was located in the Atacama Region of Chile, a desert area in the northern part of the country. Mining originally began at this site over 100 years ago in 1889. The San Jose Mine produces copper and some gold, with revenues of approximately US\$20 million per year. In 2010, the underground workings at the mine extended approximately 800 metres below the surface. The only access in and out of the mine was a ramp – a sloped access road – that spiralled down into the working areas where rock containing the copper and gold was drilled and blasted. This extracted rock (called ore) was transported out of the mine by truck via the access road.

This road was also used to move all workers and necessary materials into and out of the mine each day. Some underground mines like this would also utilize a large vertical shaft that allows access for materiel and workers by means of large elevators, referred to in the industry as “cages”, but the old mine workings at San Jose did not have this alternative route. Like other underground mines, the San

Jose Mine had vertical ventilation shafts to provide fresh air to the underground operations.

The mine employed over 150 miners, who were paid many times the Chilean minimum wage. An average miner's annual pay with bonuses was upwards of \$25,000. With salaries like these, San Esteban never faced serious problems finding employees.

## **THE CHILEAN COPPER MINING INDUSTRY**

Copper mining has been a key component of the Chilean economy, helping to make it much stronger than that of other South American countries. Chile was the world's top copper producer, and recent high copper prices had been good for mining companies like San Esteban and for Chile's economy in general. The mining industry as a whole represents a large sector of the Chilean economy, generating about 15 per cent of the country's GDP.

In 2010, the mining industry in Chile was made up of a wide range of players. There were large mining companies, both domestically and internationally owned, including the state-owned Codelco. Codelco was the world's largest copper-producing company and operated a number of large mines. One of Codelco's significant mines in the same region as San Jose was La Escondida, the world's largest open-pit copper mine. La Escondida's annual output of over 1.2 million tons of copper represented more than 20 per cent of Chile's overall production. The operations of these large companies typically used modern techniques and equipment and had the resources to meet all of the requirements set out in the government's stringent mining laws, including the safety regulations.

Smaller operations were mainly the privately owned mines operated by companies like San Esteban. The San Jose Mine would be considered medium-sized, with an annual copper output of approximately 1,200 tonnes. While San Esteban did not have access to the same vast resources as the larger, more financially stable companies, they had worked towards making improvements in terms of regulatory compliance. Smaller privately owned companies and the *pirquineros*, or artisanal miners, had an even more difficult time meeting all of the safety requirements expected by the government. There were over 40,000 *pirquineros* in Chile, who worked under little to no regulatory scrutiny. The miners at this end of the industry worked on their own, or in small groups and were not known to have been concerned with the regulatory requirements set out by the government. They typically produced very small amounts of minerals, which they would simply sell directly to a buyer or into a larger pool with other *pirquineros*.

A common experience for all of the mining companies, large to small, was that they had operated in virtual absence of regular oversight by the government regulator, the National Geology and Mining Service, known by its acronym SERNAGEOMIN. This body was responsible for ensuring the protection of the workers employed in the thousands of mines in the country. Mine owners knew that the likelihood of an inspection from one of the few government workers had always been low. For this reason, it was easier to make business decisions based

on internal factors – the risk of regulatory penalty was not significant as long as things operated smoothly and they didn't attract the attention of the regulator. Mine owners had to balance the risks of a mine with the costs of operation, which included all of the expenditures that would be required for SEMC to comply with government regulatory requirements. They might feel great pressure to take advantage of boom times in the industry to bring in the profits that would pay for safety and other improvements.

## **MINE SAFETY IN CHILE**

Despite the adoption of strict laws and the modernization of the industry, mining in Chile continued to be a dangerous occupation. The Chilean mining industry as a whole had improved its health and safety record, but miners were still killed each year on the job. The mine sites that were operated by large companies had definitely raised their standards in terms of safer operating conditions. It was well known, however, that at the small and medium-sized mines like San Jose, accidents happened more frequently, resulting in injuries and sometimes deaths.

Even with what was seen as strong national mine safety legislation, between 2000 and 2010 there had been an average of 34 mining related deaths per year. Most Chileans were familiar with such terrible stories as the disaster in 1945 when 355 miners were killed due to an underground fire at the El Teniente copper mine. More recently there had been an incident at a nearby site where two trucks collided inside the mine and caught fire. The underground location of the accident led to 70 miners being trapped; fortunately all but two of them had been able to tunnel out and survived. The San Jose Mine had never endured the kind of large-scale event that had been experienced in other mines in Chile, but there had been a number of smaller accidents at the mine.

In terms of enforcement, it was common knowledge that there were only 16 safety auditors for all of Chile's 4,500 mines, and only three inspectors working the Atacama Region where the San Jose mine was located. With 884 mines in this region alone, the safety inspectors simply did not have enough time to effectively enforce the government's mine safety regulations.

## **SAFETY AT THE SAN JOSE MINE**

Safety seemed to have always been a major concern at the San Jose Mine. It had recently had been forced to shut down for the second time in the past few years because of an incident in which a miner had been injured. In that case the man had lost his legs, but there had been even more serious accidents over the years that had led to accusations and questions from workers, their families, and most importantly SERNAGEOMIN.

When SERNAGEOMIN had visited this mine site, they didn't always like what they found. The company had received 42 fines for safety violations in the past six years. Eight workers had been killed at the mine in the past twelve years, and others before that time. During a forced closure in 2007-2008, a number of safety

improvements had been mandated for the site. Although some of the necessary changes had been made and approval to re-open the mine, other items that SERNAGEOMIN demanded had not been totally completed, including emergency escape ladders in the ventilation shaft. Work had begun on these ladders, but it had not been completed prior to reopening of the mine. The incomplete status of the ladders was known to the owners.

The refuges, mandated as safe evacuation rooms within the mine, did not meet all of the regulatory requirements. If an accident prevented the miners egress from underground, typically in the event of a rock fall or fire that blocked a normal access route out of the mine, these refuges would be occupied as a place of last resort where they could survive while waiting for a rescue team to clear an escape route. The government had standards that were to be met to ensure these refuges would be built and maintained throughout the mine and would provide the necessities for a miner's survival if they had to be used. A refuge would be airtight and would contain food, water, fresh air, and medical supplies as well as a means of communication with people on the surface. Under normal operation, these safety features would not be required, so when the mine reopened, it could only be hoped that nothing unforeseen would happen and that there would be no problems until time and money were available to make the necessary improvements.

While SERNAGEOMIN had been critical of the mine's operation in the past, there was little chance of any unannounced follow-up visits by safety inspectors. Most owners would simply hope that a serious accident would not happen so that they would be unlikely to have to deal with the regulator. Although routine enforcement was relatively lax, when accidents happened in the past, the owners were held accountable. A few years back, Kemeny and Bohn had been charged with involuntary manslaughter following the death of Fernando Contreras, a truck driver who was killed in an accident in the mine. The two were forced to pay the Contreras family \$170,000 compensation in a reduced settlement. This settlement had only a minor impact on company finances, but standard practice was that the penalties would increase if accidents continued to occur and to result in workers being killed.

Government fines for infractions were 20-50 Monthly Tax Units (UTMs). A common standard for fines, taxes, and loans (though not a financial instrument), UTMs represent a set amount of Chilean Pesos adjusted for the Consumer Price Index. In August 2010, the set amount of Chilean Pesos per UTM was 37,213. Converted to US currency, 20 UTMs equalled \$1,453.63 per violation, given the exchange rate at the time. Fifty UTMs equalled approximately \$3,634.08 per violation. Fines may be doubled for repeat infractions. (The conversion calculation is shown in Appendix 1.)

## **ROCK BURST AT THE SAN JOSE MINE**

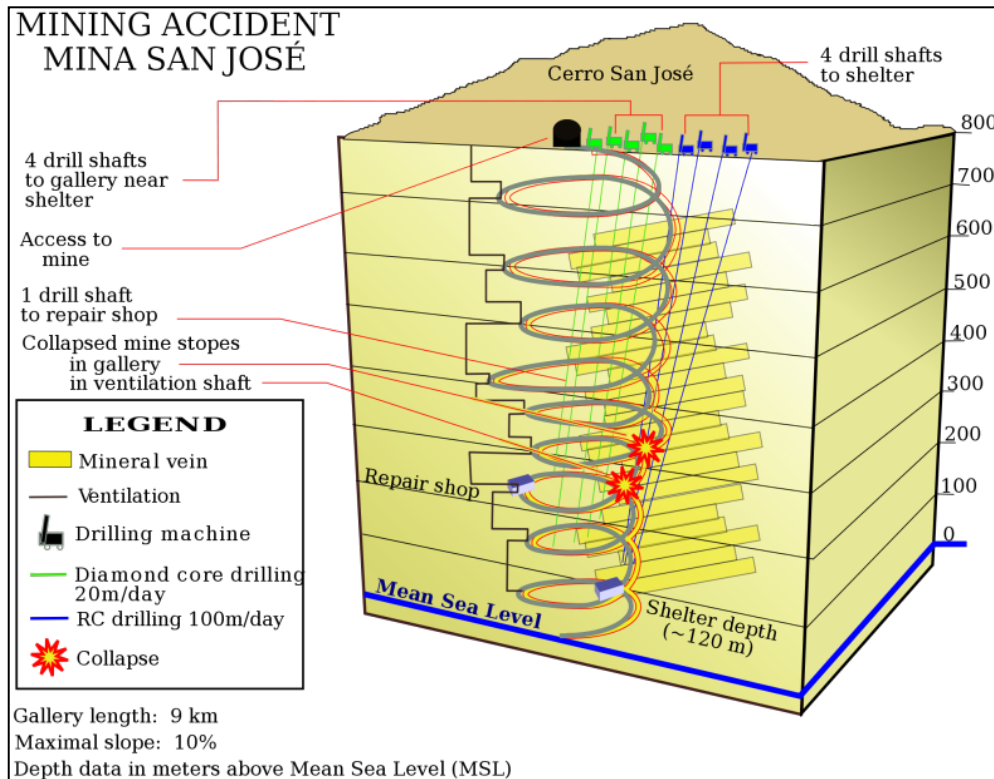
On his return from lunch, Kemeny received a call from San Jose Mine Manager Pedro Simunovic at the mine site. Panic sounded in Simunovic's voice as he described the tremendous explosion that he had just felt in the office at the mine. He knew from experience that what he felt must have been the surface vibration



from a rock burst occurring within the mine hundreds of metres below ground. Figure 4 shows the layout of the mine, with its spiral ramp from the surface, the ventilation shafts, and the location of the rock bursts.

A rock burst is an explosive breaking of a stressed mass of rock that produces a swift release of energy similar to seismic activity. During the call, a supervisor came into Simunovic's office with an update: one crew had left the mine just before the explosion occurred, but another crew of 33 miners was still underground and unaccounted for. Initial reports were that the miners were likely trapped because the fall of rock had prevented site emergency response crews from getting down the access road to determine what happened in the mine.

Figure 4 Cross-section of the San Jose Mine.



Source: 2010 Copiapo mining accident. (2010.)

Shortly after he received the phone call from the mine manager, Kemeny was on his way to the mine site. The incident would have to be reported to the government authorities, and they would be very concerned. Due to the large number of missing miners, this accident would attract the attention of local and possibly international media. Even though the San Jose mine may have been no more dangerous for workers than neighbouring mines, it was clear that depending on the fate of these missing miners, this event would be perceived as much worse than the accidents Chilean miners were used to seeing on a regular basis.

How Kemeny dealt with this accident could determine the lives of his workers, the financial solvency of the company, and ultimately his own legal liability. This was the precise scenario an owner would hope would not happen when deciding to reopen a mine without completing all of the safety improvements that SERNAGEOMIN had demanded. If the blockage was deep in the mine, the unfinished emergency ventilation escape ladders would be useless. And even if the miners were alive, the refuge would be inadequately stocked to sustain 33 people for a long period.

The best outcome for the San Jose Mine would be a quick ending like the story of the 68 miners who had been able to tunnel out after a fall of ground. There was reason to be optimistic that the trapped men would have made it to one of the refuges near the area they would have been working in, approximately 700 feet underground. While these refuges didn't meet all of the government requirements, they would still be a safe place for the miners to wait until they could be rescued. Still, one had to hope that the rescue would be swift, because there wouldn't be enough supplies for that many men to last down there for a lengthy period.

## **TOUGH DECISIONS**

Kemeny had to act fast to mobilize a response and then address the questions that would come from the media, the government, and the public as soon as word got out. When should he report the accident? What could he do to mitigate the blast before the regulators or the public found out? Word travels fast in the nearby mining communities, and people would be talking about this mine site already. It would not be possible to keep 33 missing miners a secret for long.

Kemeny had many other tough decisions to make. If necessary, the complicated search and rescue of the 33 men trapped in the mine would likely be very expensive, possibly much more than San Esteban could afford. Even without the rescue, the company would be under severe financial strain while the mine was shut down. If the government closed it for a long period, as they had done in the past, there would be no income for the company. The additional financial strain of funding a difficult recovery, paying wages and government fines, and hopefully reopening the mine could be more than San Esteban would be able to bear.

The owners and management team could also face serious potential legal consequences: the government and others would definitely consider taking civil and criminal action. If the previously ordered safety requirements that had not been completed had contributed to the cause of the accident or made the rescue of the miners more difficult, the government would almost certainly pursue charges against the company. Along with the lives of 33 miners, could the company survive the fallout?

## APPENDIX 1

Calculation of Fines for Infractions:

20-50 UTM (monthly tax units) per violation

August 2010 UTM = 37,213 (CLP)

August 2010 US\$1 = 512 (CLP)

20 UTM fine =  $20 \times 37,213 \text{ CLP} / 512 \text{ (CLP:USD conversion rate)} = \text{US\$}1453.63$   
per violation

50 UTM fine =  $50 \times 37,213 \text{ CLP} / 512 \text{ (CLP:USD conversion rate)} = \text{US\$}3634.08$   
per violation