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Controversial projects offer chemeng lessons

RepRisk report includes mining, process accidents

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A NEW report on the world's top ten most controversial projects in 2014 contains important lessons for the process industries, with some oft-repeated mistakes contributing to the worst offenders.

Business intelligence provider RepRisk daily screens information and data on projects such as mines, ports, factories and travel and leisure complexes to assess environmental, social and governance risks. It has risk profiles for 12,000 projects. [RepRisk's latest report](#) has assessed issues such as health and safety, employment conditions, pollution, violations of national legislation, human rights abuses and corruption.

Based on its analysis, RepRisk believes that the most controversial project is the Kunshan Zhongrong Metal Plating Factory in China, which supplies wheels to major car manufacturers including General Motors, Volkswagen and Mitsubishi. On 2 August 2014, an explosion killed 146 workers and injured many more. Investigators found that the blast had been caused by a build-up of aluminium metal dust. Two months before the explosion, there had been another dust-related fire at the site and the owner, Zhongrong Metals, was accused of repeatedly ignoring warnings about dust build-up, as well as about environmental and safety issues related to its emissions and waste water. At present, 15 Kunshan City officials and three company executives are facing prosecution.

Number two on RepRisk's list is the Cananea Mine in Mexico, owned by Grupo Mexico and operated by Buenavista del Cobre. On 6 August 2014, a defective pipe seal led to the release of 40,000 m³ of sulphuric acid into the Sonara and Bacanuchi Rivers. Up to 20,000 people were left without water, cattle died, crops were destroyed and wells and soil contaminated. Mexico's environment ministry called the incident "the worst environmental disaster in the country's mining history". A second spill later that month led to the state civil protection agency severing its ties with Buenavista del Cobre. Grupo Mexico has since been accused of not distributing a US\$148m compensation fund, blackmailing local officials into falsely claiming that the leak had been cleaned up, and lying about the size of the spill. The National Miners' Union has warned that one of the mine's tailings dams is in imminent danger of collapse, threatening villages housing 25,000 people.

The sixth most controversial project is Imperial Metals' Mount Polley copper and gold mine. On 4 August 2015, its tailings dam ruptured, allowing around 17m m³ of water and around 8m m³ of slurry to leak into Polley and Quesnel lakes and contaminating the wider Quesnel and Cariboo river systems. The tailings may contain dangerous levels of harmful substances such as mercury, arsenic and sulphur. There are concerns for the indigenous First Nation tribes who live in the area, as well as livestock, wild animals and aquatic life such as 1.5m sockeye salmon. It has been described as the worst environmental catastrophe in Canadian mining history and remedial work will take years.

Duke Energy's Dan River Steam Station in North Carolina, US, also made the list. On 2 February 2014, a stormwater pipe ruptured, spilling up to 82,000 t of coal ash into the Dan River. The riverbed was coated with toxic sludge for around 110 km downstream, with high levels of arsenic, chromium, and lead. It was claimed by a pressure group that the spill could have been avoided if Duke Energy had heeded advice to remove toxic ash heaps years earlier. Local residents have complained of illnesses and birth defects related to drinking water contaminated by the power plant. Duke Energy has now been ordered to remove or cap ash dumps by 2029 and close four power stations, including Dan River, by August 2019.

"Unfortunately none of these events can either be considered a black swan, or a previously unknown phenomenon. This means each of them was absolutely preventable, had the principles of good process safety engineering been applied. There are clear lessons for all of us working in engineering fields. The challenge we have is to understand the lessons, so we can apply them," says IChemE Safety Centre (ISC) director Trish Kerin. "It is easy to deflect a learning because it is not identical to your own facility. For example, the Kunshan Zhongrong Metal Plating Factory suffered a metal dust explosion, but there are many other types of dust that are also combustible. It is vital to understand how lessons from dust explosions can be applied, rather than discounting the incident because the dust you manage is not a metal dust."

Other projects to feature on the list include the Abbot Point port expansion in Queensland, Australia, which is criticised for plans to dump dredged debris near the Great Barrier Reef, and the 2022 FIFA World Cup. This four-yearly event, due to be held in Qatar in 2022, has attracted controversy right from the start with allegations of high-level bribery to secure the deal. Since then Qatar has faced intense criticism over the inhumane treatment of workers building the football stadia. There are allegations of forced labour and dangerous working conditions. Between January 2012 and April 2014, it is alleged that 430 Nepalese workers and 567 Indian workers died, a rate of one per day. The International Trade Union Confederation estimates that up to 4,000 labourers could die by the completion date.