

<Executive Summary>

On January 25, 2019, the tailings dam of the Córrego do Feijão iron mine near Brumadinho, Brazil, failed, and released 1.2 million m³ of tailings, leaving at least 250 people dead and more than 21 people missing. In addition, water contamination caused by toxic substances contained in the tailings deprived local farmers of readily available irrigation water. The present study focuses on the Brumadinho dam disaster as an example of high-risk situation involved in mining, discusses causes and background of the failure, as well as relevant international trends, and clarifies the responsible entities.

The failed Córrego do Feijão Dam I (Brumadinho dam), built in 1978, is a so-called upstream-type dam by its design, and upstream dams in general are known to be prone to failure due to its structural weaknesses. Thus, whether the management had taken due safety measures is of critical importance.

The dam was acquired by Vale S.A., the world's largest iron ore miner, in 2001 and had not received new tailings since 2016, but Vale was in the process of retrieving unrecovered minerals from the old tailings in the dam. According to Vale, there were no apparent signs of distress prior to the failure, and the failure was caused by flow liquefaction within the dam materials due to prolonged retention of high water level, which was, according to Vale, a result of unusually high rainfall, exceeding the Vale's effort to lower the water level of the dam.

However, local community members do not see the dam failure as an "accident", but as a "crime" committed by Vale who was engaged in a high-risk operation without taking due safety measures. Considerable number of people even believe that Vale intentionally let the dam fail in order to facilitate the recovery of useful minerals from the tailings, and that the relief effort is delayed because Vale is taking time to recover useful minerals while removing debris.

Although the present study does not aim to investigate whether the claims of the people are true, evidence indicates that Vale did have knowledge of increased risk of collapse prior to the failure, and yet, the company neglected to take measures against potential collapse of the dam. An internal report of Vale, dated on Oct. 3, 2018, indicates that the risk of collapse for the Córrego do Feijão Dam I was twice the maximum level of risk tolerated under internal guidelines, and that a failure could potentially kill more than 100 people and cost the company \$1.5 billion. Nevertheless, the company neglected to take measures to reduce the risk of collapse. In addition, Vale is suspected to have pressured its auditors, Tuv Sud, a German auditing firm to guarantee the stability of the dam despite its alarming state. Internal e-mails as reported by BBC for example show auditors being concerned about the original assessment of the dam, but that the same auditors ended up assuring the dam's safety without any remedy. They simply changed their analysis models to come up with a calculation that deemed the dam safe. 9 other dams have been inspected by the same auditors and with the same 'adjusted' models.

Thus, the Brumadinho disaster is clearly a man-made disaster, and, while the responsibility associated with this deadly dam failure obviously falls upon Vale, their business partners who could have influenced Vale's management and governance should also bear part of the responsibility. This is particularly true for the case of Vale, because the company was also involved in the Mariana dam disaster that occurred in 2015 in the Samarco Mariana Mining Complex near Mariana, Brazil, and thoroughly investigating the case should have provided ample information about the shortcomings in Vale's management and governance, thus providing an opportunity to take corrective measures years before the Brumadinho disaster.

In the case of Japanese companies, Mitsui & Co. is particularly important when discussing the responsibility of the disaster. Although Mitsui & Co. only owns 5.59% of Vale's share, other large shareholders are in financial sector, and Mitsui & Co. is the largest shareholder directly

involved in Vale's undertaking, thus having large influences on Vale's management. In fact, the vice president of Mitsui & Co. (Brasil) S.A. has been a Vale's board member since October 2017, and Mitsui & Co. was "in the know" about the Vale's management and governance. In addition, although Mitsui & Co. was contractually bound and unable to sell all of its shares, it was still possible to immediately sell nearly 2% out of 5.59% the company held in Vale's share, and thus, Mitsui's inaction is taken as a result of an active decision made by the company with understanding of Vale's internal circumstances.

Regarding the relevance of the Brumadinho disaster to the Japanese financial sector, this case highlights shortfalls of banks' policy and monitoring in their financial services. Although the banks evaluated by the Fair Finance Guide (FFG) Japan score positively with respect to their policies and monitoring in the areas of human rights and environment, this is largely a result of being signatories of the Equator Principles. Because the Equator Principles are applicable only to project financing, banks may be involved with a problematic company such as Vale in the areas of corporate financing and securities underwriting, thus being indirectly involved in a project like the Córrego do Feijão Dam I even if they have no direct involvement through project financing. In this way, the current policies and monitoring of the banks are limited in their scope, and their FFG scores are not high for this reason. In fact, the following banks are financially connected to Vale and/or Mitsui & Co. in the areas other than project financing, and thus, banks' monitoring may have not sufficiently served its purpose.

Financial connection with Vale S.A.

MUFG Bank, Ltd.

\$216.44 million in securities underwriting

\$5 billion in corporate financing

Mizuho Bank, Ltd.

\$216.44 million in securities underwriting

\$5 billion in corporate financing

Sumitomo Mitsui Banking Corporation

\$216.44 million in securities underwriting

\$5 billion in corporate financing

Financial connection with Mitsui & Co.

MUFG Bank, Ltd.

¥414.089 billion in corporate financing

Mizuho Bank, Ltd.

¥204.020 billion in corporate financing

Sumitomo Mitsui Banking Corporation

holds 25.667 million shares

¥328.082 billion in corporate financing

Sumitomo Mitsui Trust Bank

¥198.726 billion in corporate financing

Financially supporting Vale S.A. and Mitsui & Co. closely involved with Vale will perpetuate the business practices that led to the Brumadinho dam disaster, a clearly man-made disaster that took many lives. Meanwhile, the world mineral demand is intensifying driven by a rapid growth in new technology such as electric vehicle as well as infrastructure development in the developing countries, and mining companies are now willing to take a greater risk faced with manifestation of resource depletion. Thus, mining projects that are currently under development are likely to involve much greater risk.

For example, the Llurimagua copper mine project in the northwestern part of Ecuador has attracted much attention and the pressure to develop the region is mounting despite local resistance partially driven by increasing copper demand in the world. However, located in a narrow, deep

valley surrounded by steep slopes, if developed, the Llurimagua mine would require an unrealistically tall tailings dam, and the maximum volume of tailings is expected to be 100 times greater than the volume of tailings held in the Córrego do Feijão Dam I. In addition, although there are distinct risks of flood and earthquake, a lack of information makes an accurate risk assessment impossible. Thus, the Llurimagua Project is being pushed without an adequate risk assessment, but with a potential to release 100 times greater volume of tailings than the Brumadinho dam disaster, if the dam fail: the risk is perceived to be so high that an expert commented that the project is "ridiculous beyond description".

Reassessment of risk is long overdue in the mining sector faced with high-risk new projects, like the Llurimagua Project, as well as the deteriorating conditions of existing mines developed with older technologies, and the banks should newly demand that "the best available technology" be employed.

Financial institutions supporting mining companies through large-scale investment/financing should utilize this financial leverage to pressure the companies so that prioritize inspection/maintenance/repair of tailings dams is prioritized, as well as to firmly demand them to ensure the safety through their engagement.

Finally, it should be noted that the urgency of the current situation is such that independent standards should be developed for the mining sector, which is, more than ever, deemed a high-risk sector.