Iron-ore Tailings dams' disasters – A review

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The demand for iron-ore is ever increasing with the industry directly employing 60,500 people in a range of highly skilled roles in Australia. In the year 2019, the global iron -ore production was 2.85 billion tonnes. It is estimated that for each tonne of beneficiated iron ore 400 kg of tailings is produced. The current and most applied method of iron-ore tailings (IOTs) disposal is using subaqueous disposal of tailings in a dam. The footprint generated by a tailings dam is massive and requires constant monitoring due to the possibility of a breakage making the operation and maintenance of tailings dam extremely expensive.

A review was carried out to evaluate the known causes of tailings dam disasters, their impact to the environment and day-to-day human life and application of IOTs. The presence of excess water was a major contributing factor in the severity of the events. With increase in water content the pressure on the dam walls and the liquefaction potential of the tailings increase reducing the overall strength of the dam making the dams more vulnerable to failure. Aquatic and human life is often adversely affected and cause fatality in the event of a dam failure as we saw in the year 2019.

IOTs are fine, dense and stable crystalline material mainly composed of iron oxides, alumina and silica. Potential applications of IOTs are in paints, aggregates in construction materials and bricks. Inorganic paints do not bleach, are heat and light resistant and are much cheaper than organic paints making IOTs a major choice for use in paints. IOTs have also exhibited good mechanical strength over conventional aggregates when used with concrete and as bricks for construction. The reuse of IOTs reducing waste and generating further revenue can carve a path towards a sustainable future for the industry.