

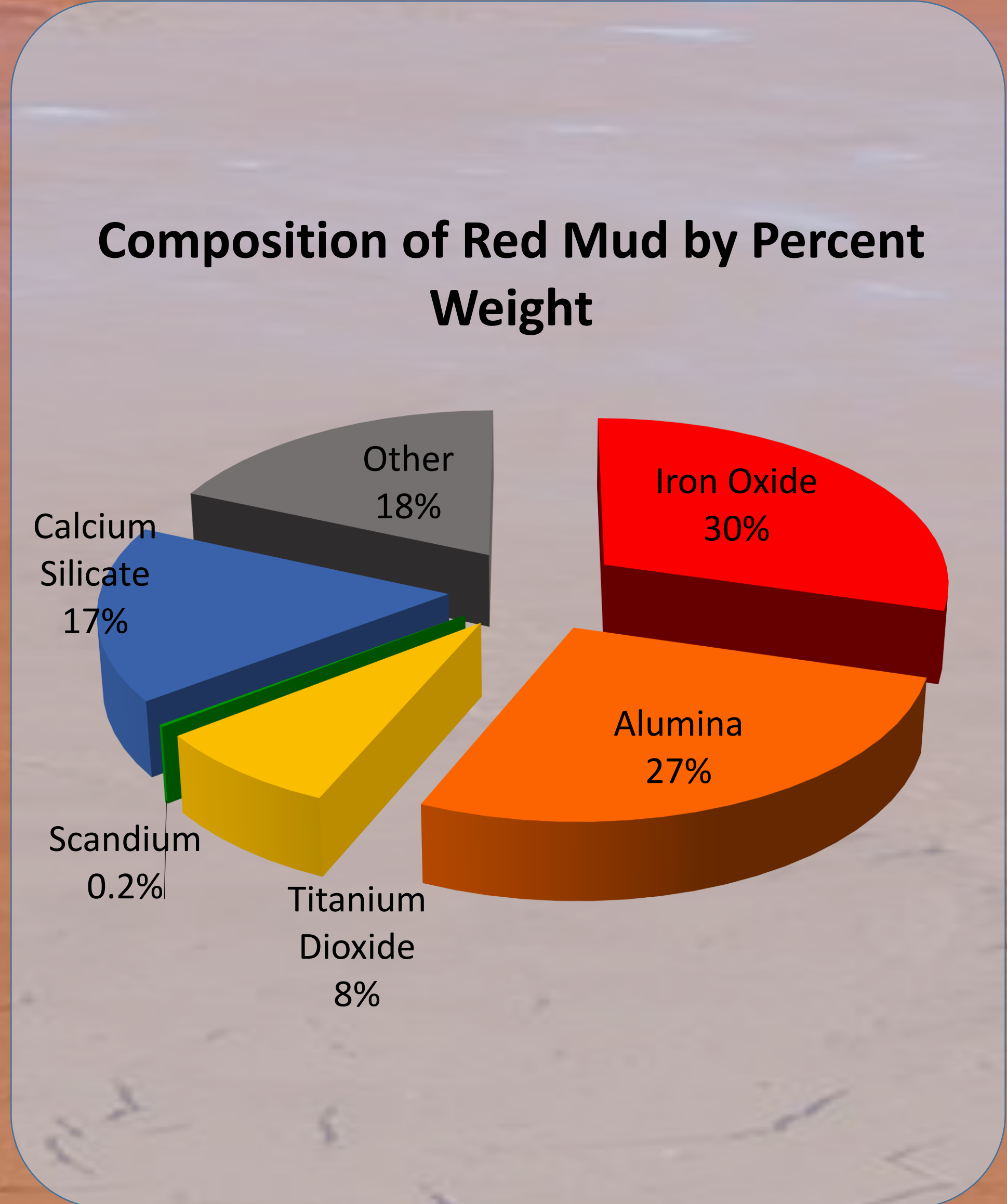
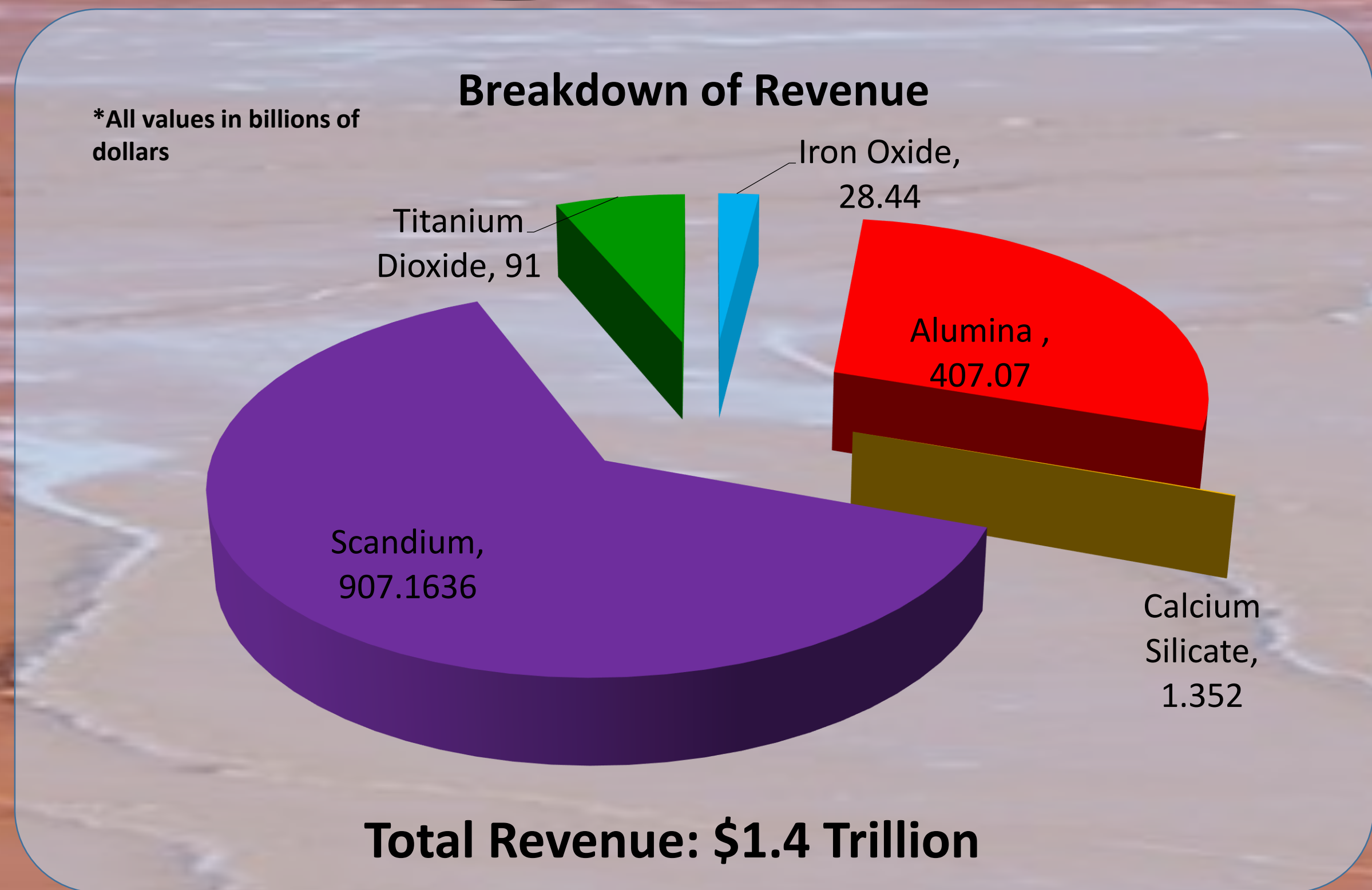
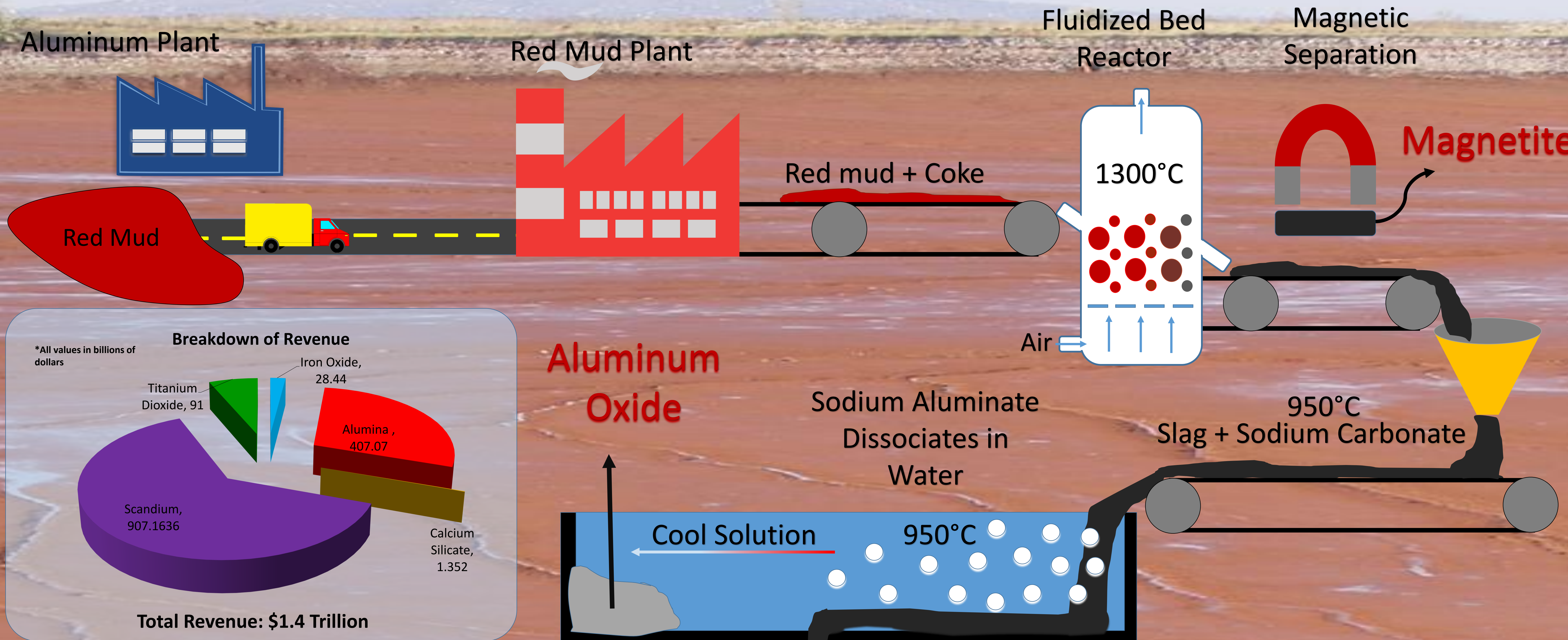
Red Mud Recovery

A Zero Waste Solution

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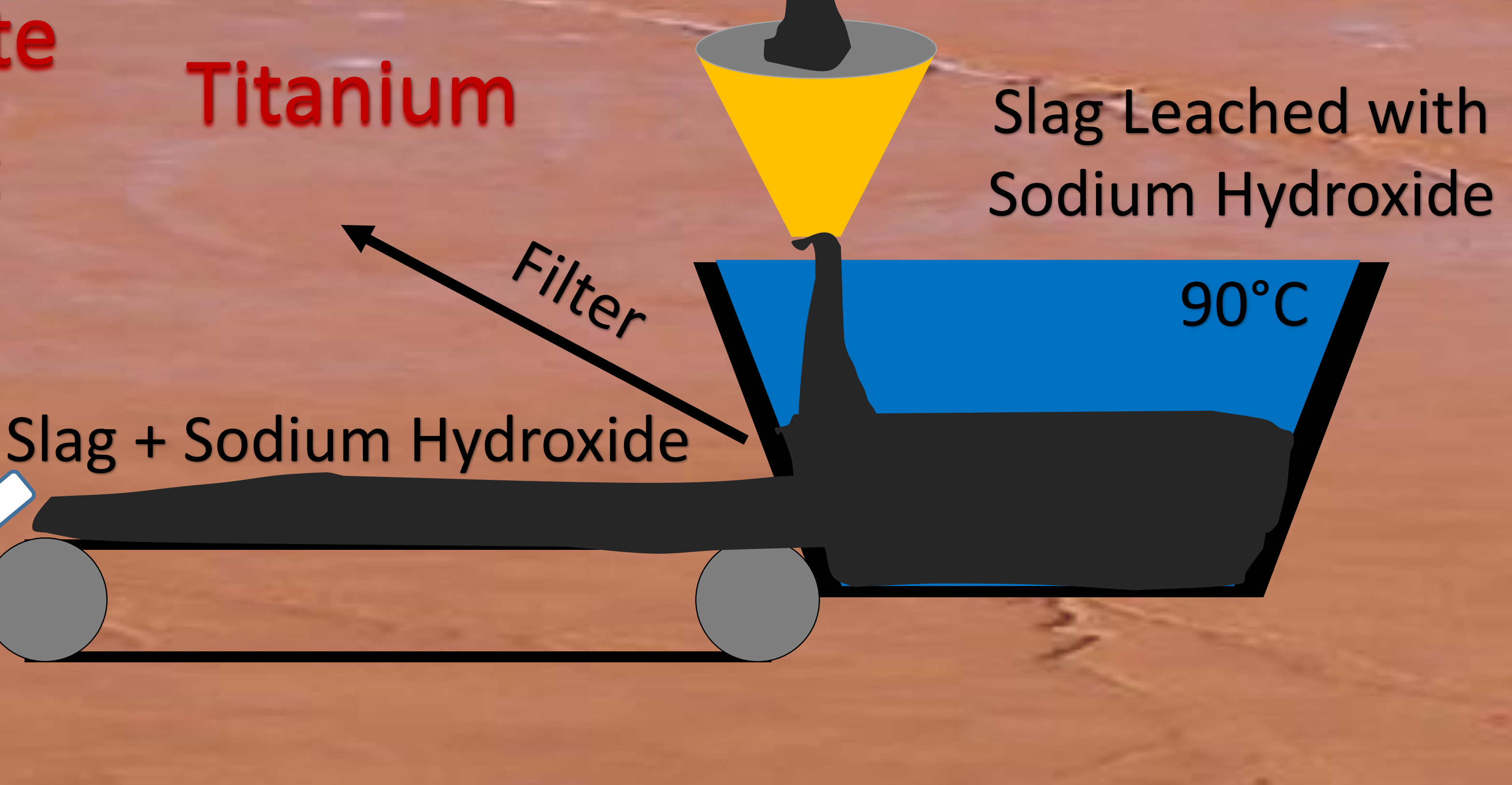
Abstract

The aluminum industry is booming but with its mass production comes large amounts of waste known as red mud. This hazardous waste is not only an economical loss, but has serious environmental impacts such as leeching into the water table. Many attempts have been made to utilize it from forming bricks or mixing it in with cement but these solutions fall short. The struggle to dispose of this waste product may be at an end as we turn to the potential of red mud as a source for commercial materials. Red mud is composed of fair amounts of iron oxide, additional alumina, titanium dioxide, calcium silicate, and trace amounts of rare earth elements. The objective of this project is to establish a system that efficiently extracts these materials individually and sells them to their respective industries. After careful analysis of the processes required for extraction and the profit made from these metals, it has become evident that red mud should no longer be considered a mere waste product.



Conclusion/Recommendation

- Iron Extraction** by Fluidized bed reaction with metallurgical coke
- Aluminum Extraction** by solid Na_2CO_3 reacting with the Al_2O_3 at 950°C , yielding a water soluble NaAlO_2 . Once cooled with water to 25°C , up to 95% of the Al_2O_3 can be extracted in pure form and sold for profit.
- Titanium Extraction** by sulfuric acid leaching
- Rare Earths Extraction** by autoclaving at 300°C in presence of 300-500 g of NaOH.
- Calcium Silicate** can be used for construction materials
 - Bricks
 - Insulation
 - Portland Cement



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