

Carbon Sequestration by Carbonate Mineralization

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Introduction and Summary

This report summarizes a high level overview of Calera technology which will be instrumental in developing the detailed process engineering design. The Calera process focuses on the sequestration of carbon dioxide by carbonate mineralization. In particular, carbonate mineralization is carried out using materials to produce supplementary cementitious material (SCM) which can be used in cement.

In this report, the two scenarios of the Calera technology are investigated: Case A) All alkalinity is provided by natural materials, Case B) 20% of alkalinity is provided by the electrochemistry process. Initially, a deeper understanding of the chemistry is developed by identifying the total numbers of independent chemical equations to fully describe the process in the domain of given species and elements [1]. Subsequently, overall mass and energy balances are performed on the net stoichiometric equations. In addition, sensitivity analysis is carried out to identify feasible regimes of operation with respect to material concentrations and access, alkalinity contribution from Echem, % CO₂ capture, and % reaction conversion. At present, efforts are underway to use this information to determine the rate constants and laws, product properties and then focus on process design and process flow-sheet development. **The overall mass and energy balance looks promising for the base case parameters.**