

Simulation of Sparging in Connection with Leakage of Sequestered Carbon Dioxide,
E. Gessner and G. Ahmadi, Clarkson University, Department of Mechanical and
Aeronautical Engineering, Potsdam, NY 13699, Eric.A.Gessner@gmail.com; G. Brohmal
and D. Smith, Department of Energy, National Energy Technology Laboratory,
Morgantown, WV 26501

Sequestration of carbon dioxide is used to minimize exhaust of a known greenhouse gas to the atmosphere. One problem that can occur is the leakage of sequestered carbon dioxide. Leakage due to previous wells or permeable soil poses a real threat to the time and energy spent on sequestration. In order to determine if there is leakage in nature, tools for discovering emitting carbon dioxide are necessary. These tools are being developed in a controlled study in conjunction with sparging of carbon dioxide. Sparging is the insertion of a gas below the water table where the natural buoyancy is the driving force. Most often, sparging is a method often used to mitigate volatile chemical or petroleum based spills. This procedure alleviates the hydrocarbon concentration with enhanced aerobic biodegradation. Conventionally, air is pumped into a contaminated zone where the permeable soil allows passage to the chemicals. This study, however, has been performed by sparging the “toxic” carbon dioxide into a clean subsurface. There has been strong correlation between experimental sparging of carbon dioxide and numerical predictions using FLUENT™. In addition, predictions about the quantity of carbon dioxide that can leak from abandoned wells has been studied. It has been shown that a rate of over 2,600 m³/year of carbon dioxide can easily be emitted from a single 5-inch diameter pipe given typical reservoir conditions. This poses a serious threat considering there are millions of test wells across the country.