30+ years of Operation Experience in a Large Membrane Gas Separation Plant for CO2 Removal from Natural Gas in CO2 EOR facility.

Atsushi Morisato, Ed Mahley, Rick Peters

Cameron, A Schlumberger Company, 2504 Verne Roberts Circle, Suite 102, Antioch, CA 94509

Abstract

Since the inception of the world first CO2 membrane gas separation plant in natural gas application on CO2 enhanced oil recovery (EOR) facility in 1983, membrane gas separation technology has been accepted widely as one of the reliable separation technology option in large natural gas applications. Nowadays, a typical CO2 membrane separation plant in CO2 EOR facility handles around 1 billion SCFD of inlet gas with CO2% ranging 25-90% to outlet CO2% of as low as 3%.

New technologies usually do not simply emerge from the laboratory acceptable for commercial consumption. A transition is required from prototype to marketable product. The task of applying membrane gas separation technology to the oil field can also require a multi-faceted transition. Not only is a commercial device specification required, but also an acceptable method of applying the device is essential.

With the application for unloading existing CO2 removal facilities at the SACROC CO2 EOR plant in West Texas, operation of a demonstration test skid utilizing commercial size membrane devices was necessary. This test skid was designed for an inlet flow of 4 MMSCFD. The heat exchange, dehydration, process flow and membrane modules were to be configured the same as for the full-size facilities. All instrumentation is electronic and normal operator functions are accomplished from the control room with all process valve sequencing accomplished by a programmable controller.

Although membranes are not the answer to all CO2 removal problems, but with the advances in membrane capabilities, such as increased device capacity, reliable operating history, and improved component separation, the membrane CO2 separation have come to be a field proven technology option.