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**Search for Surface Leakage from a Large-Scale CO2 Injection Project: Rangely, Colorado**

The success of CO2 sequestration by deep injection is dependent on the seals and aquitards being able to confine the large amount of overpresured fluid. The Rangely, Colorado field has been undergoing large-scale CO2 injection since 1986 for EOR. This report is on measurements of diffuse leakage of gas at the surface. A protocol for the detection of a deep source of gas in the presence of a large amount of surface biological production of gas require an understanding of the shallow noise being generated.

Measurements of CO2, CH4 and light paraffins in soil gas, and as fluxes into the atmosphere were made in the winter of 2000-01 and summer of 2001, and will continue in the winter of 2001-02. The measurements were made by field infrared spectroscopy and laboratory gas chromatography. The summer fluxes of CO2 from the soil average 4gCO2m\(^-2\)day\(^-1\) and Ch4 fluxes averaged 0.4mgm\(^-2\)day\(^-1\), respectively. Some evidence of a small scale deep source was indicated by stable isotopes, and supported by the presence of light paraffins in soil gas, but absent in a background area of similar surface geology, soils, and climate. Detection of a low intensity deep diffuse signal requires special care in selection of the parameters to be measured.