

**AAPG Annual Meeting
March 10-13, 2002
Houston, Texas**

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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 overpressured 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⁻²day⁻¹ and CH₄ fluxes averaged 0.4mgm⁻²day⁻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.