

Gas Monitoring and Soil Control at the Natural Gas Storage Site (Minerbio, Italy)

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Abstract : Gas migration through wellbore failure, in particular from abandoned wells, is repeatedly identified as the highest risk mechanism. The vadose zone was subject to monitoring system close to the wellbore in Minerbio, methane storage site. The new technology has been well-developed and used with the purpose to provide reliable estimates of leakage parameters. Of these techniques, soil flux sampling at the soil surface, via the accumulation chamber method and soil flux sampling at the depths of 100cm below the ground surface, have been an important technique for characterizing the gas concentrations at the gas storage site. We present results of soil Radon Bq/m³, CO₂%, CH₄% and O₂% concentration gases. Measurements have been taken for radon concentrations with an DurrIDGE RAD7 Company, Inc., USA, instrument. We used for air and soil quality an Biogas ETG instrument monitoring system, with NDIR CO₂, CH₄ gas sensor and electrochemical O₂ gas sensor. The measurements started in September-October 2015, where no outliers have been identified. The measurements have continued in March-April-July-August-September 2016, almost at the same time in the same place around the gas storage site, values measured 15 minutes for each sampling, to determine their concentration, their distribution and to understand the relationship among gases and atmospheric conditions. At a depth of 100 cm, the maximum soil radon gas concentrations were found to be 1770 ±±582 Bq/m³, the soil consists of 64.31% sand, 20.75% silt and 14.94% clay, and with 0.526 ppm of Uranium. The maximum concentration (September 2016), in soil at 100cm below the ground surface, with 83% sand, 8.96% silt and 7.89% clay, was about 0.06% CH₄, and in atmosphere 0.06% CH₄ at 40°C (T). In the other months the values have been on the range of 0.01% to 0.03% CH₄. Since we did not have outliers in the gas storage site, soil-gas samples for isotopic analysis have not been done.

Keywords : leakage gas monitoring, lithology, soil gas, methane

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