

International Conference on the Management of Naturally Occurring Radioactive Materials (NORM) in Industry

VIRTUAL EVENT

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Use of ^{226}Ra and ^{228}Ra radiometry in the investigation of NORM formation processes in shale gas

The exploration of shale gas requires the technique of fracking (hydraulic fracturing), that is, injection of high pressure fluid to release hydrocarbons from the geological formations. Fracking can mobilize naturally occurring radioactive materials - NORM –that are present in shale. As a result, radium salts will form incrustations on the inside walls of production wells and surface equipment (pumps, separators, effluent storage or retention tanks). The present work aims to develop a methodology to investigate the processes of NORM formation in shale gas exploration by means of ^{226}Ra and ^{228}Ra radiometry. The study area is located in Morada Nova de Minas (southeastern Brazil), in the São Francisco Geological Basin. Deep investigations (up to 2,000 m) identified intervals containing dark organic-rich (up to 3.5% total organic carbon) and radioactive shales. These shales are the gas source rocks of interest for this research. They occur mainly in the basal portion of the Sete Lagoas formation in the Bambuí group (600 my). The methodology in the research consists in the analysis of the boreholes gamma logs and identification of the intervals containing the shales of interest. Samples of these shales are collected from drill-cores, and after comminuted (2-3 μm size) in porcelain mills. To obtain an understanding of the sources of Ra, sequential extractions will be performed targeting shale-specific constituents or phases, e.g. calcite, organic matter and clay minerals, each of which may contain U, Th and their progenies, including ^{226}Ra and ^{228}Ra . Operationally these phases can be dissolved by acetic acid, hydrogen peroxide and hydrofluoric acid, respectively. In addition to U and Th, it is intended to measure the most abundant elements, especially Ca and Ba, in all fractions. Ra isotopes will be measured by gamma spectrometry in shale extract fractions. This research is part of the GASBRAS project - “Support for the Non-Conventional Gas R&D Network in Brazil”- that has governmental resources from the National Fund for Scientific and Technological Development (FNDCT). The results of this research may contribute to the management of NORM wastes/residues from the shale gas industry in Brazil, and thus assist in preventing environmental contamination.

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