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Hydrogeologic Risks in the Ground-Water Supply of Harris County, Texas: Radioactive Constituents, Natural Gas, and Growth Faults

We have been involved in a number of environmental projects in Harris County where ground water was found to contain radioactive constituents and natural gas, all related in one way or another to the presence of growth faults in the immediate area. Radioactive constituents, including radon-222 and radium-226, taken from selected areas of northwest and south-central Harris County in the early 1980s, exhibited unusually high concentrations. Uranium was reported to be present across Harris County during the United States Department of Energy's Natural Uranium Resource Evaluation (NURE) program in the 1970s and 1980s. We will place these occurrences in a geological context of the associated growth faults in the area. The likely source of these radioactive gases in groundwater from the Evangeline Aquifer or below will be postulated.

We have also conducted investigations on selected high-production municipal utility district (MUD) water wells. Two such MUD wells were investigated by downhole closed circuit television (CCTV) and by sampling the produced ground water and headspace of the particular well for natural gas, including methane, ethane, ethylene, propane, propylene, iso-butane, n-Butane, iso-pentane, n-pentane, and hexanes. The results of this sampling will be considered with some discussion regarding the actions taken. Further investigations revealed that another MUD well in the FM-1960 area also contains anomalous natural gas in the produced ground water. Steps were subsequently taken by the particular MUD to remove these contaminants from the produced groundwater by adding degassing systems at the wellhead. The source of the natural gas produced in ground water from the Evangeline Aquifer or deeper will be discussed. The application of carbon-13 and deuterium in methane to determine the likely source of methane also will be discussed based on samples from a rural water well and a nearby natural gas well located in East Texas.

The distribution of growth faults in Harris County will be discussed in the context of the occurrences of radon-222 and radium-226, uranium, and natural gas; occurrences will also be compared in the context of local infrastructure such as the location of pipelines, permitted and unpermitted landfills, old dumps, and some shallow features revealed by ground-penetrating radar experiments in the moist soils of Harris County, Texas. —

Biographical Sketches

MR. CAMPBELL earned a Bachelor's Degree in geology and hydrogeology from The Ohio State University in 1966 and a Master's Degree from Rice University in geology and geophysics in 1976 as a Mills Bennett Fellow. He has worked in the United States and overseas in Australia, Southeast Asia, and Africa for American companies on natural resource exploration, mining and associated environmental projects.



In the United States, he has also been involved in a variety of mining and associated environmental projects. Before entering private practice, he served DuPont Environmental as Regional Technical Manager and Chief Hydrogeologist.

Over the past 40 years, Mr. Campbell also produced a number of EPA-sponsored guidance documents and associated reports involving ground-water resource development and associated contamination assessment and abatement. He has written three technical books, many papers and reports, and has served on a number of editorial boards of the major technical journals in his field. He is a Fellow in the Geological Society of America, a Fellow in the Society of Economic Geologists, a CPG in AIPG, and is a member of other societies, many for more than 40 years. This

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includes HGS, which published a book on the *Geology and Environmental Considerations of Alternate Energy Resources* in 1977 under his leadership (see: <http://i2massociates.com/geology-and-environmental-considerations-alternate-energy-resources>). He is a licensed professional geologist and hydrogeologist in Texas, Washington, Wyoming, Mississippi, and Alaska, and serves as Chairman of the Uranium (and Nuclear Minerals) Committee of the Energy Minerals Division of the AAPG. Mr. Campbell and the members of the EMD Uranium Committee and 12M Associates, LLC contributed the final chapter of the text of the EMD-AAPG Memoir 101, which was just released in April (see: Press Release [\(here\)](#)). He also has served the legal community as an expert witness and consulting expert on more than 40 cases.

MR. WISE has more than 30 years of professional experience in geological and environmental remediation. He also has substantial experience in ground-water assessment and remediation projects

in Texas and the eastern United States. He also has substantial experience in exploration and production of uranium in Texas. Mr. Wise is a graduate of Boston University, with a Bachelor's degree in geology, and obtained a Master's degree in geology from the University of Texas at El Paso. He is a Licensed Professional Geologist in Texas and Alabama, and is a Certified Professional Geologist from the AIPG. As a long-time member of the HGS, Mr. Wise is Co-Chairman of the Government Affairs Committee and publishes "Governmental Update" in the HGS *Bulletin* every month. In addition, he publishes the semi-weekly blog "The Wise Report" on the HGS and AIPG-TX.com websites. He was a founding member of the Energy Minerals Division of AAPG in 1977 and is a member of the EMD Uranium Committee.

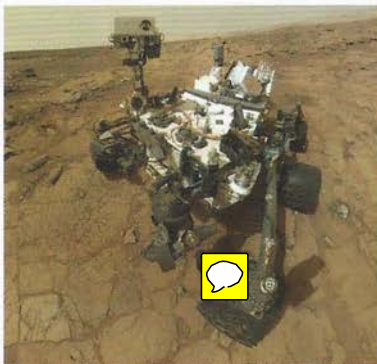


Hot Potato? History of the National Uranium Resource Evaluation Reconnaissance Program | **Hydrogeochemical and Stream Sediment**

The National Uranium Resource Evaluation (NURE) program was initiated by the Atomic Energy Commission (AEC) in 1973 with a primary goal to identify uranium resources in the United States. When the AEC was abolished by an act of Congress in 1974, the NURE program was transferred to the newly created Energy Research and Development Administration (ERDA). In 1977, Congress terminated ERDA; at that time all its functions, which included the NURE program, were transferred to the new Cabinet-level Department of Energy (DOE).

The Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) program, initiated in 1975, was one of nine components of NURE. Planned systematic sampling for uranium over the entire United States began in 1976 under the responsibility of four DOE national laboratories. In 1977, the NURE program changed from a study area basis such as State, County, or geomorphic provinces to a 1° x 2° quadrangle basis. Out of a total of 625 quadrangles that cover the entire lower 48 States and Alaska, only 307 quadrangles were completely sampled and another 86 quadrangles were partially sampled.

The NURE program effectively ended about 1983-84 when funding disappeared. At this time, the HSSR data consisted of 894 separate data files stored with 47 different formats! The University of Oklahoma's Information Systems Programs of the Energy Resources Institute (ISP) converted only 817 of the 894 original files before their funding ended. The sample archive was transferred from Oak Ridge Gaseous Diffusion Plant (ORGDGP) to the U.S. Geological Survey (USGS) in 1985. —



HGS GUEST NIGHT — SATURDAY, JUNE 8, 2013

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