

Tuesday, January 15, 2013

Hyatt North Houston (former Crowne Plaza Hotel - Greenspoint)
425 North Sam Houston Pkwy E

Social 11:15 AM, Luncheon 11:30 AM

Cost: \$31 pre-registered members; \$35 for non-members

To guarantee a seat, you must pre-register on the HGS website and pre-pay with a credit card.

Pre-registration without payment will not be accepted.

You may still walk up and pay at the door, if extra seats are available.

HGS Northsiders Luncheon Meeting

HGS Northsiders Luncheon Meeting

Fred Baldassare,

ECHELON Applied Geoscience Consulting, Murrysville, PA

Mark A. McCaffrey, PhD,

Weatherford Laboratories, Dallas, TX

John A. Harper, PhD,

Pennsylvania Geological Survey, Pittsburgh, PA

A Geochemical Context for Stray Gas Investigations in the Northern Appalachian Basin: Implications of Analyses of Natural Gases from Quaternary-through-Devonian-Age Strata in North-Central Pennsylvania

As the pace of drilling activity in the Marcellus Formation in the northern Appalachian Basin has increased, so has the number of alleged incidents of stray natural gas migration to two shallow aquifer systems. For this study, more than 1,900 gas and water samples were analyzed for molecular composition and stable isotope compositions of methane and ethane. The samples are from Quaternary to Middle Devonian-age strata in a five-county study area in northeastern Pennsylvania. Samples were collected from 181 gas wells during mudgas logging programs and from 67 private water supply wells during baseline groundwater-quality testing programs.

Evaluation of this database reveals that microbial, mixed microbial/thermogenic, and thermogenic gases occur in some shallow aquifer systems, and that the gas occurrences pre-date Marcellus Formation drilling activity. Isotope data reveal that thermogenic gases in the regional Quaternary/Upper Devonian shallow subsurface (average $\delta^{13}C_1 = -42.13$ ‰; average $\delta^{DC1} = -228.26$ ‰) typically are distinct from gases in Middle Devonian strata (average $\delta^{13}C_1 = -32.87$ ‰; average $\delta^{DC1} = -163.45$ ‰). Additionally, gas geochemistry at the site-specific level reveals a complex thermal and migration history with gas mixtures and partial isotope reversals ($\delta^{13}C_1 > \delta^{13}C_2$) in units above the Marcellus Formation.

Identification of a source for stray natural gas requires the synthesis of multiple data types at the site-specific level. Molecular and isotope geochemistry provides evidence of gas origin and

secondary processes that may have affected the gases during migration. Such data provide a focus for investigations where the potential source of the stray gas includes multiple formations. ■

Biographical Sketch

DR. MCCAFFREY received his B.A. (1985) from Harvard University, magna cum laude with highest honors, in geological sciences, and his Ph.D. (1990) in chemical oceanography (in the area of organic geochemistry) from the Massachusetts Institute of Technology / Woods Hole Oceanographic Institution Joint Program. Mark spent 10 years at Chevron and Arco

as a petroleum geochemist, then founded OilTracers LLC, a firm that specializes in applications of petroleum geochemistry.



Identification of a source for stray natural gas requires the synthesis of multiple data types at the site-specific level.

After 10 years, OilTracers was acquired by Weatherford Laboratories. Mark is a California Registered Geologist, License #5903; a Texas Professional Geoscientist, Geology, License #350; and an AAPG Certified Petroleum Geologist Certificate #5339. He has authored more than 30 articles on the application of geochemistry to petroleum exploration, reservoir management, oil biodegradation, and paleoenvironmental reconstruction. As an Expert Witness in gas fingerprinting, he has testified in Mississippi State Court, in Ohio

Federal Court, before the Oklahoma Corporation Commission, and before the Railroad Commission of Texas.