

Tuesday, January 20, 2009

Black Lab Pub, Churchill Room • 4100 Montrose Blvd.

Social 5:30 p.m., Dinner 6:30 p.m.

Cost: \$25 Preregistered members; \$30 non-members & walk-ups

The HGS prefers that you make your reservations on-line through the HGS website at www.hgs.org. If you have no Internet access, you can e-mail reservations@hgs.org, or call the office at 713-463-9476 (include your name, e-mail address, meeting you are attending, phone number and membership ID#).

HGS Environmental & Engineering Dinner Meeting

Michael D. Campbell, P.G.
P.H.M.D. Campbell and
Associates, L.P.

Nuclear Power in Space Exploration and on Earth: An Overview

When Apollo 11 touched down at Tranquility Base on July 20, 1969, the goal of a lunar landing envisioned by President John F. Kennedy in 1961 was realized. The achievement of this goal depended on the development of technologies to turn this vision into reality. One technology that was critical to this achievement was the harnessing of nuclear power systems for spacecraft. Currently, nuclear power provides power for satellite systems and deep-space exploratory missions. In the future, nuclear power will provide propulsion for spacecraft and drive planet-based power systems.

The development of space-based nuclear power technology has run parallel to an evolving rationale regarding the need to explore our own solar system and beyond. Since the time of the "space race" with the Soviets, forward-looking analysis suggested that space exploration will one day exploit extraterrestrial natural resources. These natural resources could enable further exploration and provide new sources of materials that are subject to dwindling supplies and increasing prices on Earth. Mining for increasingly valuable commodities such as thorium and samarium is envisaged on the Moon and on selected asteroids as a demonstration of technology at scales never before imagined.

In addition, the discovery of helium-3 on the Moon may provide an abundant power source for lunar facilities or for Earth through the use of nuclear fusion technologies. However, that resource will remain on the shelf until the technological challenges of fusion power are overcome. Some day, helium-3 may even be stockpiled on the Moon until it is needed. Clearly, that nuclear power will provide the means necessary to realize the more ambitious goals of space development.

Technological advances in other areas will provide enhanced environmental safeguards in the use of nuclear power and innovative means to deliver space-derived materials to the Earth's surface such as a space elevator. These advances could include a

space 'gravity tractor' to nudge errant asteroids and other bodies out of orbits that would collide with the Earth. Nuclear systems will enable humankind to expand beyond the boundaries of Earth, provide new frontiers for exploration, protect the Earth, and renew critical natural resources. ■

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Biographical Sketch

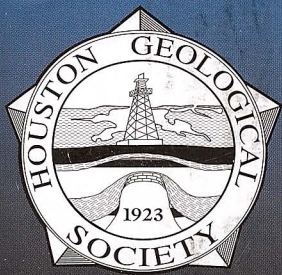
MICHAEL CAMPBELL holds a bachelor's degree in geology and hydrogeology from The Ohio State University (1966) and an MA in geology from Rice University (1976). He has worked for American companies overseas in Australia, Southeast Asia, and Africa on natural resource development and environmental projects. In the United

States, Mr. Campbell has been involved in a range of mining and associated environmental projects related to exploration for uranium and precious metals.

Over the past 40 years, he also authored a number of Environmental Protection Agency-sponsored guidance documents and associated reports involving groundwater resource development, contamination assessment and abatement, and uranium exploration and development. He has worked for several national consulting and engineering companies including Law Engineering, ENSR Consulting and Engineering, and DuPont Environmental.

Mr. Campbell has produced three technical books and many papers and reports in addition to serving on a number of editorial boards of major technical journals. He is a Fellow of the Geological Society of America, serves as Chairman of the Uranium Committee of the Energy Minerals Division of the American Association of Petroleum Geologists, and was appointed a member of the AAPG's Astrogeology Committee. He is also Chairman of a number of committees in other groups such as the AIPG in Texas and the AEG in Texas.





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