

SPHERES OF INFLUENCE

A QUARTERLY NEWSLETTER FOR DEG – 2014 ISSUE 1

President's Column

Douglas E. Wyatt Jr., Ph.D., P.G.



In reviewing the content of this issue and thinking about the overall environmental importance of water, the words of Neil Armstrong came to mind. "It suddenly struck me that that tiny pea, pretty and blue, was the Earth. I put up my thumb and shut one eye, and my thumb blotted out the planet Earth. I didn't feel like a giant. I felt very, very small." How many times have we heard the Earth referred to as the 'blue planet' because, as geoscientists we know, of the water on the surface and in the atmosphere? Thinking a bit more analytically, how many times have we realized that, at any given time, only about 2 percent is readily available for human consumption? Water is critical to life; energy is critical to life; water is critical to energy, energy is critical to clean available water. This is the logic statement that sustains all we know.

Our Division of Environmental Geosciences was formed because of this logic statement, often referred to as the "energy-water nexus." The future development and use of natural gas and oil is totally dependent on ensuring a future of abundant, readily available and clean water, on a global scale. Water is essential to all we do and who we are. Let's keep it at the top of our environmental list.

From the Editor-In-Chief's Desk

Kristin M. Carter, P.G.

The March 2014 issue of Environmental Geosciences focuses on sedimentology in action. Elliott et al. offer a great example of applied sedimentology relative to removal of Gold Ray Dam along the Rogue River in Jackson County, Oregon – fascinating photographs and application of SONAR! Skalak and Pizzuto use computer modeling to predict both past and future mercury concentrations in suspended sediments of Virginia's South River, using sediment sample and core data to calibrate their model. Our thanks go out to these authors who have provided very interesting reading this quarter!



AAPG

Division of Environmental Geoscientists

A Look-back Into the Archives: Sustainability of Energy and Water

Lee C. Gerhard, P. Patrick Leahy and Victor J. Yannacone. *Sustainability of Energy and Water Through the 21st Century: Proceedings of the Arbor Day Farm Conference, Oct. 8-11, 2000*. Lawrence, Kan.: Kansas Geological Survey, 2002. Print.

This publication is a compilation of keynote speeches and subsequent papers from the third AAPG DEG conference (2000) on resources and environment with a focus on energy and water sustainability. The articles provide an understanding of what we were focused on not long ago (2000-02) and establishes a foundation for how energy and water sustainability could now be impacted by the advancement of shale gas development and increased focus on fracing. On a broader theme, reviewing this material addresses the continued importance of passing along past learnings. Kris Carter and I discussed a one-time “digging into the archives” with this special publication, but perhaps we’ll start doing this more frequently.

Conference talks included:

- ✓ Energy as the basis for human society.
- ✓ The role of technology (Is it beneficial or detrimental?).
- ✓ Trends in global electric power.
- ✓ Alternative energy sources.
- ✓ What should we do on the moon, on Mars, and why?
- ✓ An overview of energy use in the United States.
- ✓ Sustainability of water resources.
- ✓ Review of some state specific models for water management.

Summary of Findings

- ▶ There are sufficient fossil-energy resources and other conventional fuels (including nuclear). Therefore, in the short term, energy is sustainable.
- ▶ There is concern that technological innovation will not keep pace with energy demand globally in the mid-term (50-100 years).
- ▶ There is general agreement with the prediction that natural gas demand will increase and that global production will significantly increase to help meet that demand.
- ▶ Resource conservation always will be required to meet basic energy needs of the expanding global population – though this always will be a particularly important issue with respect to water resource management in drought prone areas.
- ▶ Domestic and international energy policies are integral for the United States to meet domestic energy demand – one which aligns scientists and policy makers.
- ▶ We need to begin thinking “outside the box” when addressing long-term solutions to global energy demands, including lunar energy endeavors to mine Helium 3.
- ▶ Priorities and policies for water use need to be established to sustain freshwater supplies (minimum streamflows, federal regulations on swimmable waters, wetlands preservation laws and reclamation policies).
- ▶ Establishing a global sustainable-water policy is necessary, but will be quite difficult. Desalinization of ocean waters and pumping deep connate waters require extreme amounts of energy. The key is to value water appropriately (as a commodity rather than an entitlement) with a full cost approach.
- ▶ Plans for sustainable water policy need to be geographically based (with a watershed/recharge planning system) and not geopolitically based.

The concluding statement of the publication could still be applied today: “Earth scientists and life scientists must work together to bring about the necessary changes in public policy” to improve government understanding and develop necessary policies on the premise that sustainable energy is required for sustainable water on both national and global levels. With the advancement of horizontal drilling and fracing, the spotlight on water as a sustainable resource continues to grow. This spotlight brought a renewed charge for earth scientists with respect to water sustainability and energy, specific to natural gas development – to establish the facts, educate the public and become involved with government policy.

-Danielle Deemer

The Good, The Bad and The Ugly

Last issue's The Good, The Bad and The Ugly focused on harnessing the benefits of geothermal energy as an alternative energy source. This issue takes an even closer look at other forms of alternative energy, specifically harnessing earth's water to produce electricity around the world.

<http://www.boem.gov/Renewable-Energy-Program/Renewable-Energy-Guide/Ocean-Wave-Energy.aspx>

The Bureau of Ocean Energy Management (BOEM) has put together a comprehensive website that "promotes energy independence, environmental protection and economic development through responsible, science-based management of offshore conventional and renewable energy resources." Not only does the BOEM study and participate in offshore renewable energy development, but is responsible for all Outer Continental Shelf leasing for oil, gas and other marine minerals.

<http://www.pelamiswave.com/history>

Pelamis Wave Power, "the world's most advanced wave power developer" has developed a wave energy machine to convert electricity captured from offshore wave power to an onshore grid network. Stationed in Scotland, the company has developed a series of "wave farms" for onshore electricity generation. Since wave energy is abundant, reliable and renewable, this form of alternative energy is gaining increasing interest around the world.

http://www.nrdc.org/energy/renewables/map_hydro.asp#map

The National Resources Defense Council, a huge advocate for environmental protection, has produced an interactive map showing wind, solar, advanced biofuel, biodigester, geothermal and low-impact hydroelectric facilities across the United States. The map shows both existing and planned facilities and allows users to search by zip code. Clicking on each facility will reveal its location, the fuel source (when applicable), and the current capacity.

<http://www.mapcorp.com/our-work/deep-sea-energy/>

Geothermal (hydrothermal) energy plants have proven that a vast amount of energy can be generated by the heat of the Earth. This has led some companies to explore the possibility of exploiting deep-sea hydrothermal vents in a similar fashion. In 2013, the Maritime Applied Physics Corporation (MAPC) was to "deploy a solid-state, modular and scalable 'hydrothermoelectric'" generator to extract power from a hydrothermal vent on the ocean floor..." While the execution and success of this project has not been confirmed, it raises the question of whether deep-sea vents can be used as yet another alternative energy source.

<http://www.tidalenergyLtd.com/>

Much like wave energy, tidal energy is being researched as a reliable and renewable source of energy. Tidal Energy Ltd (TEL) has proposed a "full-scale tidal stream generating device" that will be installed and tested in southwest Wales in 2014. Tidal stream devices extract energy from the kinetic movement of water as the tide ebbs and floods – much as wind turbines capture energy from the movement of air.

Beauty in Geology

With the current shortage of road salt in the northeast due to the snowstorms, please enjoy these photographs.



Folding and faulting within varved layers of calcite and gypsum, Castile Formation, Delaware basin, West Texas



Salt precipitating out of sediment, Upheaval Dome, Canyonlands National Park, Moab, Utah

Call for Participants! Don't Forget to Enroll in a DEG Short Course at AAPG ACE!

Sign up for one of these exciting short courses:

Forensic Geochemistry and Source Attribution

Saturday, 5 April, 8 a.m. – 12 p.m.

The definition of forensic geochemistry in this half-day course is the identification and differentiation of compounds and mixtures of compounds, which have different sources. When investigating complex mixtures of compounds such as petroleum, often molecular composition may differ in sufficient detail to differentiate unique products. However, when dealing with the dissolved and/or volatile fractions we often need to identify different sources of chemical compounds with identical molecular compositions. The recent developments of Compound Specific Isotope Analysis (CSIA) have revealed that even different batches of manufactured products often have unique isotopic compositions. It is not usual that a manufacturer can be identified, but it is not uncommon that the presence of two unique sources can be confirmed. This workshop will examine the fundamentals of forensic isotopic analysis, applications to dissolved organics such as BTEX and chlorinated solvents; applications to vapor intrusion; and applications to differentiation of "stray gas" in the area of shale gas exploration and production.

RCRA Hazardous Waste Management for Oil and Gas Operations

Sunday, 6 April, 8 a.m. – 1 p.m.

Got hazardous waste? Most businesses in the oil and gas industry manage hazardous waste and their personnel that handle it are required to receive annual training. This course meets the requirement for hazardous waste training per 40 CFR 262.34(a) and 265.16, which require annual training for all personnel who handle hazardous waste. Attendees will learn how to increase compliance with hazardous waste management in accordance with U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) regulations. This course will focus on practical solutions for oil and gas operation's implementation of hazardous waste management regulations.

Topics will include:

- ✓ Identification and classification of waste.
- ✓ Waste container handling, management and storage requirements.
- ✓ Requirements for hazardous waste generators, with emphasis on the oil and gas sector-specific requirements.
- ✓ Manifests and record-keeping requirements.
- ✓ Pollution prevention ideas.

Learn from an expert on hazardous waste management — not only what is required, but how to save money while increasing compliance with federal, state and local regulations.

We welcome your articles, comments and feedback for this quarterly Newsletter publication.

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2nd Quarter submissions deadline is May 1, 2014
Submit to ddeemer@talismanusa.com*



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