



October 2014

LOS ANGELES BASIN GEOLOGICAL SOCIETY MEETING ANNOUNCEMENT

October 23 (Thursday)

Dr. James (Jim) Boles

Professor Emeritus, UC Santa Barbara

Grant F. Miller
Advanced Earth Sciences, Inc

Thomas D. Wright
Orange County Waste & Recycling

Modern oil generation and pyrolysis at >800°C from spontaneous combustion in a landslide of Miocene shale, California

Abstract

A natural landslide in an organic-rich facies (2-6% TOC) of the Miocene Puente Shale occurred in Spring 2008. In early June 2009, smoke was observed emanating from the slide deposit. Gas analyses from other studies indicate the presence of C₂ through C₄ compounds, which demonstrate the combustion of hydrocarbons. Our investigation using field sampling and lab studies indicates that oxidation of iron sulfides has generated heat sufficient to crack hydrocarbons from the kerogen in the shale. Thick, tar-like coatings can be observed surrounding some of the heat vents. The generated hydrocarbons were then burned to produce local hot spots in the shale exceeding 800°C. The slide is adjacent to a landfill in Orange County California, but the landslide and combustion is unrelated to the landfill activities.

Analyses of the shale indicate sulfur content of 2.3 to 4 wt% and SEM confirms both cubic (pyrite) and orthorhombic (marcasite) forms of iron sulfides. Kerogen extracts indicate a Type II kerogen with relatively high sulfur (2 to 8.5 wt %) and nitrogen (about 2 wt %) content. Hydrous pyrolysis of the kerogen indicates hydrocarbon generation at relatively low temperature (peak generation of hydrocarbons at 380° C). All of these aspects of the shale, combined with the introduction of oxygen and moisture from the slide process, promoted the rapid build-up of heat and resulting combustion. By-products from pyrolysis of the organics at the heat vents includes sulphur dioxide vapor and deposition of cadmium sulfide, selenium compounds, ammonium sulfate, native sulfur, and gypsum. The hot landslide has been mediated as an

interim measure by covering the slide with about one half meter of a clay-bearing soil. This apparently has removed the available oxygen.

The slide is similar to other hot landslides in which heat is triggered from oxidation of iron sulfides, but this one is different in that the generation of hydrocarbons resulted in temperatures more than 500°C higher than in cases of kerogen-poor shales where no hydrocarbons were generated.

Speaker's Biography

Dr. James (Jim) Boles is Professor Emeritus at UCSB. He received his B.S. in Geology from Purdue University, his Masters from University of Wyoming, and his Ph. D from the University of Otago in New Zealand. He joined UCSB as a professor in 1975, and became Professor Emeritus in 2008. He also has 30 years industry experience, most of which has been in consulting for more than 30 oil and gas, environmental, and government entities. His expertise is based on sedimentary geology and petroleum geology; he focuses specifically on geochemistry of sedimentary materials and fluids, and geologic field analysis. In total, Dr. Boles has more than 100 referred publications in print.

Meeting Time, Place, Cost and Reservations

Time:

Thursday, October 23rd, 2014

Meeting Agenda

Lunch Served: 11:30 AM to 12:00PM
Announcements: 11:45 AM to 12:00 PM
Guest Speaker: 12:00 PM to 12:45 PM
Questions/Close: 12:45 PM to 1:00 PM

Place:

The Grand at Willow Street Conference Center located at 4101 East Willow Street, Long Beach, CA.

(562-426-0555). Take Lakewood Boulevard south from the San Diego Freeway (405), turn west onto

Willow Street and turn right onto Grand Avenue at the sign for the Center. Park free in the garage structure.

Cost:

Lunch and Speaker: \$25.00 with reservations
\$30.00 without reservations
Retired: \$20.00
Student: \$5.00

Meeting Reservations:

Make your reservations using our web site at www.labgs.org, or by calling Graham Wilson (562)-326-5278, or emailing gwilson@shpi.net.

PLEASE Make:☺ Reservations must be made by 10:00 AM Tuesday morning prior to Thursday's meeting to receive discount price noted above. As always walk-ins are welcome.

SAVE THE DATES & CALL FOR POSTER ABSTRACTS

Oil, Gas, and Groundwater in California: Wise Production and Protection of Our Valuable Natural Resources

February 18-19, 2015 – Long Beach, CA

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