San Joaquin Geological Society

Date: **Tuesday, December 13, 2011**

Time: **6:00 PM Social Hour**
7:00 PM Dinner
8:00 PM Lecture

Place: **American Legion**
2020 H St. Bakersfield, CA 93301

PSAAPG Members & Mesozoic's
$25 w/reservation
$30 without reservation

Non PSAAPG Members
$30 w/reservation

Full-time Students with ID:
Free, Courtesy of Chevron & Occidental

SJGS WEBSITE

http://www.SanJoaquinGeologicalSociety.org/

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By: Friday December 9, 2011
Reply to this email
Or by phone 654-7005

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The Belridge Giant Oil Field

100 Years of History and a Look to a Bright Future

***Malcolm E. Allan** is a reservoir management geologist with Aera Energy LLC.*
He began his career working in Africa and the North Sea for Texaco before joining Occidental Petroleum to work in South America (Peru, Colombia), Middle East, and North Africa. After a few years with a small Canadian company in Egypt, Colombia, and Ecuador, he returned to California. Since then Malcolm has worked mainly on two of the giant oil fields in California: Belridge and Elk Hills. He is currently working for Aera Energy LLC on the diatomite reservoirs at the Belridge Field, doing reservoir characterization and field studies. He holds a B.Sc. degree in Geology and an M.Sc. in Petroleum Geology from Imperial College, University of London. He is a California state-registered geologist and a member of the AAPG, SPE, and SPWLA.

***Joseph J. Lalicata** is a geologist with Aera Energy LLC.*
He is involved in reservoir characterization studies, geocellular modeling, and reservoir development for the siliceous shale reservoirs at Belridge and Lost Hills fields, California. Prior to working at Aera, he worked on field studies of the turbidite reservoirs of the Wilmington Field (Los Angeles, California). He holds a B.S. in Geology from Binghamton University, New York and an M.S. in Geology from University of California, Santa Barbara. He is a member of the AAPG, SPE, and SPWLA.

April 2011 marked the 100th anniversary of the well that discovered the Belridge giant oil field in the San Joaquin Valley of California. During the 100 years the field has produced 1.6 billion of the approximately 6 billion barrels of the estimated original oil in place. The field covers an area roughly 22 miles long and 2.5 miles wide (35 by 4 km). It has three totally separate and distinctly different producing zones: Pleistocene shallow fluvio-deltaic sands producing heavy oil via steamflood; Miocene deepwater diatomite layers producing light oil via hydraulic fractures and with water injection for pressure maintenance; and Oligocene to lower Miocene marine sandstones producing gas and light oil via gas expansion. Each of the vertically stacked zones requires different work models and different completion strategies to sustain production.

Although down from its peak of 160,000 BOE per day in 1986, the field currently produces 80,500 BOE per day which makes it one of the largest onshore fields in the USA. Since discovery via a surface oil seep, over 25,000 wells have been drilled although only 6,000 producers and 2,400 injectors are still active. However, new insights to the reservoirs have resulted in about 600 new wells being drilled and completed in each of the past few years.

In the 1930s the field had the deepest well drilled in North America. In the 1990s the field had the closest well spacing of any field in the world: vertical and horizontal wells drilled as close as 30 ft (9 m) apart and completed with sand-propped hydraulic fracs. Continuing to successfully develop and produce the reservoirs requires applying conventional technologies and techniques in new and unconventional ways. Fit-for-purpose reservoir characterization studies in 2D and 3D, coupled with standardized workflows for modeling and documentation, build upon past fundamental knowledge using state-of-the-art software and databases to handle the immense quantity of data. At the start of the 21st century the field is gearing up for many more years of activity with expansion of steam drives in the oil sands and in the diatomite shales, installation of a large microseismic array, distributed temperature sensing to monitor water movement in water injection wells, and regular InSAR surveys to monitor ground movements. Exploration wells are also being drilled for seismic targets that are well below the current producing zones.