The Elk Hills field is one of the largest producing oil and gas properties in the Lower 48, the largest natural gas reserve in California, and the largest natural gas liquids producer in the state. The field produces only light oil and gas from a variety of lithologies in structurally and stratigraphically complex stacked reservoirs. Although production in this "mature" field has been steadily declining ever the past decade, production has been enhanced by the application of newer technologies and improved reservoir management.

The Federal Government will benefit from the fortuitous timing of the sale as potential high bidders in California are consolidating their own operations and aggressively acquiring independents. In addition, consolidated production operations that have a high net cash flow like Elk Hills are currently being valued at high prices.

Elk Hills field is located in the southwestern San Joaquin Valley, approximately 20 miles south of Bakersfield, California, and less than 15 miles from the surface trace of the San Andreas strike-slip fault system. The field was discovered in the early 1900s, at about the same time as nearby giant fields such as Buena Vista, Belridge, Midway-Sunset. In the 1980s the bulk of the field operations were converted into a Naval Petroleum Reserve by the Federal Government to ensure a steady supply of energy for the oil-fired boilers of the U.S. Navy. Since then the field has been jointly owned by the Federal Government (first the Navy, and now the Department of Energy), and Chevron USA. As a Naval Petroleum Reserve, the field has only really been produced during the two World Wars, and since the Arab oil embargo of the 1970s. The field operations have been managed by several operators, but current operations are run by Bechtel Petroleum Operations.

The field is centrally located in one of the richest oil and gas basins of the United States and produces from a variety of stacked Pliocene to Miocene reservoir rocks in four primary zones, all of which are productive in nearby fields. These reservoir rocks represent a variety of shallow to deep marine depositional systems impacted by the syndepositional growth of the nearby structural highs within either a marine or a non-marine setting. Reservoir rocks range from highly porous and permeable shallow marine and carbonate sandstones, to low porosity and permeability siliciclastic shales and tight sandstones.

Basement Structures

The area overlies the basement-level transition from coastal Petroleum series rocks, which behave plastically, to Sierra granitic batholithic rocks, which behave rigidly. This transition zone along the eastern edge of the San Joaquin Valley thrust belt results in a complicated and currently unresolved deep structural picture consisting of at least three structural separations separated by San Andreas-related strike-slip fault systems. The deeper structures merge into one large shallow subcrustal block broken by numerous small normal fault systems.

Seismic Data and Operations

Although the operational goals of the field have been related to development operations, many Vintage 2-D seismic lines, and one recent 3-D seismic survey are available. The poor quality of data for both
types of seismic data are a reflection of the thick air zones in the shallow section, the ongoing production operations, and the complex structural and stratigraphic framework in all but the shallowest producing horizons. This situation creates an opportunity for a technologically competent operator to better evaluate the shallow and deeper zones for production improvements and exploratory play definition.

Production Data
Elk Hills is a large and extensive operation. The 72 square mile unitized operation has approximately 1,200 active wells producing over 58,000 BOPD, 350 MMcf/d of natural gas, and 400 MGal/d of natural gas liquids.

Active production wells range from 1920s vintage vertical wells at a 10- to 20-acre spacing, to recent horizontal infill wells designed to produce from narrow “wedge” oil zones created in steeply dipping reservoirs between existing modern vertical wells at a 10-acre spacing. Wells range from about 3,000 to 11,000 ft in depth, and often contain multiple behind-pipe opportunities.

The reservoirs have been well managed through the interaction of the two owners and the lead operator, but recent production improvements can be related to implementation of newer technologies, increased use of modern reservoir management philosophy, and improved geological analyses and models. Most of the deeper reservoirs are pressure-maintained, either through gas injection or waterflooding projects. The operation has historically been well maintained even by California standards, with extensive amounts of investment made for field facilities and environmental compliance.

Reserve estimates from various sources are comparable in “Proved” categories, but vary in “Unproved” estimates. The complicated lithologies, stratigraphic variability, and microfaults create areas of unswept reserves in most of the reservoirs. Recently completed wells in marginal, mature production zones, have been enhanced significantly through the use of horizontal drilling and frac techniques.

Refineries and Processing Facilities
Each Elk Hills product has a unique niche in the competitive California energy market. Unlike nearby fields with predominantly thermally produced heavy oil, Elk Hills produces a high gravity crude sought by the independents as a diluent for pipeline transportation of their heavy crude to refineries in Los Angeles. The field also has the two largest gas processing facilities in California, and is the largest natural gas liquids producer in the state.

The field contains the largest pressure-maintained reservoirs in the state, with over 2 TCF having been reinjected for improved oil recovery and NGL stripping. Eventual gas cap blowdown will impact the California gas market. Excess electricity output from the modern cogeneration facility is ready for use in the soon to be deregulated California electric market. In addition, emission reduction credits and other value areas are also present.

Operational costs and revenues for Elk Hills field are significantly different from those typically associated with California operations. The preponderance of California long reserve life heavy oil production skews the financial analysis of “comparable” California operations. Elk Hills net cash flow, revenues per employee, and BOE produced per employee are among the highest in California. Production and financial simulation models generate a very positive range of values for the property. The true value will be dependent upon the new owner(s) strategic “fit”, evaluation of unproved reserves, anticipated operational cost savings, and long term price scenarios, especially for that of natural gas.

Biographic Section
Jonathan G. Kuespert is an oil and gas consultant in Los Angeles, CA. He received his B.S. in geology and B.A. in economics from Duke University in 1981, his M.S. in Petroleum Geology from Stanford University in 1984, and his M.B.A. from the University of California at Los Angeles in 1994. Upon graduation from Stanford he joined Chevron in San Francisco. Over the following nine years he worked as a development geologist, EOR geologist and explorationist in the Sacramento and San Joaquin basins of California, including two years at Elk Hills as the Stevens Zone geologist for Chevron. In 1995 he and Mr. Anand formed Inside Elk Hills LLC, a consulting company which included other independent consultants, to produce a multi-client technical field study for the then unannounced sale of the Federal portion of Elk Hills field. Since completion of the Elk Hills project, he and Mr. Anand, have formed EGOR, a technical and financial consulting firm for full service evaluation of energy, gas and oil resources on the West Coast.

The reservation code of this meeting is 5-0-4.