lithofacies within the Wilkins Peak Member.

The innermost of the cyclic lithofacies, which includes bedded evaporites, occupies the depositional center of the ancient lake basin and consists of repetitious ascending sequences of (1) dark-brown oil shale, (2) white to brown trona and halite, and (3) gray or green dolomitic mudstone. A second lithofacies that encircles the first, but does not contain bedded evaporites, shows in vertical section cyclic sequences of (1) gray siltstone, (2) dark-brown oil shale, (3) tan or light-brown oil shale, and (4) gray or green dolomitic mudstone. The oil shale and siltstone in these cycles were deposited as lake-bottom muds and along ephemeral shorelines during periods of lake expansion and water-freshening; the trona and halite and gray and green mudstone were deposited in salt pans and on mud flats during periods of lake contraction and water-salting. A third lithofacies is present at the outermost margins of the lake basin, but the cyclic sequences there, consisting mostly of gray and green mudstone and some thin interbedded tan and brown oil shale, are largely obscured by irregularly interbedded tan algal limestone, oolites, and thin beds of dolomite and sandstone. Floodplain deposits of interbedded red and gray sandstone and mudstone are present nearly everywhere between the outer edges of the lake basin and surrounding mountains.

The number of major contractions of Lake Gosiute during deposition of the Wilkins Peak Member can be determined by counting the number of oil shale beds involved in cyclic sequences near the depocenter of the basin. Seventy-three oil shale beds, and hence 73 saline cycles, were counted in a hole cored in the Blacks Fork area by the U.S. Energy Research and Development Administration. Histograms of oil shale beds in drill holes and outcrops in other parts of the basin support 70 to 75 as the probable total number of saline cycles.

The time intervals of the saline cycles can be roughly estimated by using potassium-argon dating methods for biotites in tuff, and by counting oil-shale varves. From these data, the shortest cycle in which salines were deposited is believed to have lasted less than 1,500 years and the longest cycle more than 100,000 years.

RUSHING, ROY J., Converse Consultants, Anaheim, CA, and M. S. WOYSKI, California State Univ., Fullerton, CA

Geology and Mineralogy of Vogel Specialty Sand Deposit, Barstow, San Bernardino County, California

The Vogel specialty sand deposit contains on the order of 16 million tons of potentially economic dune sand. The immediate source is the fluvial deposits of the Mojave River adjacent to the site on the west. These fluvial sands are derived primarily from the Mesozoic granitic bedrock units of the San Bernardino Mountains near Silver Lake and the Jurassic to Triassic metavolcanic bedrock units of the Silver and Sidewinder Mountain areas.

The sands contain principally feldspar (oligoclase, 40%; K-spar, 17%), and quartz (35%), with minor amounts of hydrobiotite (5%) and hornblende, tourmaline, etc (2%). The sand is very well sorted with most grains about 0.3 mm in diameter and angular to subangular.

The deposit has many similarities to the once extensive specialty sand deposits mined along the California coast prior to the restrictive coastal zone ordinances of the 1960s and 1970s.

SCHNEIDER, WILLIAM A., Colorado School Mines, Golden, CO

Land Seismic Source Study

During the summer of 1980, faculty and students from the Colorado School of Mines Geophysics Department conducted an extensive series of seismic measurements in eastern Colorado, with the objective of characterizing and comparing land seismic sources under a variety of controlled conditions. This work was sponsored by 29 companies and one U.S. government agency, and results are reported in full in a series of Master of Science theses completed during the fall term, 1981, at Colorado School of Mines.

The test site for the measurement program was located near Brush, Colorado, on gently rolling range land. The site was selected on the basis of easy access, geology suitable for the program objectives (thick Pierre Shale section near the surface and good reflectors at depth), nearby petroleum production and well-log information, and a landowner willing to establish a permanent test site.

The seismic sources used in this study included: (1) vertical and horizontal vibrators, (2) land airgun, (3) weight drop, (4) conventional explosives in shot holes, (5) surface explosives, (6) suspended charges in air (Poulter method), (7) Marthor (registered trademark of IFP), and (8) Betsy (registered trademark of Mapco).

The measurement program consisted of three phases: (1) three-component downhole measurements from 400 to 1,000 ft (120 to 300 m) in 100-ft (30 m) intervals for each source type over a range of horizontal offsets from 50 to 1,000 ft (15 to 300 m); (2) three-component noise spread on the surface for each source covering an offset range of 120 to 8,730 ft (37 to 2,660 m); and (3) a conventional CDP line for each source covering 3 mi (4.8 km) of subsurface with a maximum of 24-fold coverage over the center 1 mi (1.6 km).

The primary test objectives consisted of: (1) quantitative comparison of source waveforms, amplitude and phase spectra, source repeatability, source directivity, and intensity levels from downhole measurements, (2) comparison of surface-wave noise-generation characteristics between different sources from noise spread data, and (3) quantitative comparison of reflection signal characteristics (e.g., bandwidth, S/N ratio, etc) from the CDP shooting.

SHLEMON, ROY J., Box 3066, Newport Beach, CA

Buried Pleistocene Gold-Bearing Channels, Central Great Valley, California

Ancient gold-bearing channels have long been exploited in the Sierra Nevada foothills and in the eastern Great Valley of California. Many channels have been hydraulically mined, whereas others have been dredged. Yet there remains an extensive buried channel system, particularly associated with ancient courses of the lower American and Mokelumne Rivers. The channels are identified in water-well logs, in bridge borings, and locally in quarry exposures. Near the foothills, many channels are expressed geomorphologically by fluvial-filled terraces, many of which have been dredged, and some are even now exploited for gold and aggregate.

At least five now-buried channels were cut and filled by the lower American River. These channels emerge from the foothills near Folsom and are traced in the subsurface to depths of 115 ft (35 m) below present sea level. Some channels are over 25 mi (40 km) long, and 20 to 33 ft (6 to 10 m) thick. The channels are named Older Fair Oaks (oldest), Younger Fair Oaks, Older Riverbank, Younger Riverbank, and Modesto, respectively, after the formations in which they occur.

Five buried channels underlying the lower Mokelumne River are best defined between Clements on the east and Lodi on the