Exploration for Tertiary accumulations is carried out by: (1) mapping source rocks in basins with proper depth for maturity, (2) establishing presence of reservoir rocks, and (3) delineation of traps by photogeologic-geomorphic techniques, gravity surveys, and seismic shooting.

Numerous shows of oil and gas have been recorded in wells drilled in various basins, both in Paleozoic and Tertiary rocks. Other oil and gas indications include the Bruffey oil and gas seeps (Pine Valley, Nevada), the Wells oil seep (west of Wells, Nevada), an asphaltite dike in Mississippian sediments (Piñon Range, east of Pine Valley), the West Brigham City and Farmington gas areas (east of Great Salt Lake, Utah), and the Fallon gas area (Carson Sink, Nevada). Oil source units include Cretaceous to Tertiary lake deposits (Sheep Island gas area (Carson Sink, Nevada)), the Fall River formation of Cretaceous age. New Bielau field, Colorado County, Texas, is productive from an Eocene age, Wilcox formation point-bar sandstone. Although both reservoir sandstones were deposited in a similar "meander belt" facies, the expressed geometry of the trap as defined from the Seislog® traces is unique to each field.

In West Moorcroft field, at 4,800 ft (1,463 m) hydrocarbons are trapped by the arcuate shape of channel-filling shale that forms a seal for approximately 40 ft (12 m) of sandstone. Analysis of bandpass filtered sonic logs suggests that the frequency content of conventional seismic data is likely inadequate to uniquely separate porous sandstone from shale. Inversion of the seismic data facilitated identification of a higher velocity event, which although not discretely sandstone could be related to the productive unit. Updip, the channel-filling shale, the real trap, does form a mappable stratigraphic unit.

The producing point-bar sandstone at New Bielau is both deeper (8,700 ft; 2,652 m) and thicker (65 ft; 20 m) than at West Moorcroft. As predicted by bandpass filtered sonic logs, the sandstone is not uniquely resolved on inverted seismic data.

In this example, a high velocity marker beneath the productive interval clearly illustrates the concave morphology of the channel and serves to define the trap. Although poorly defined, the shale in the channel fill is recognizable.

In a comparative sense, the two fields illustrate the ability of inversion processing to identify very subtle stratigraphic units that can then be related to a reasonable geologic model. The expression of this stratigraphy on the conventional seismic section reminds us just how subtle those indicators really are.

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Controls of Zeolite Cementation in Upper Jurassic Sandstones, Lower Cook Inlet, Alaska

Field and petrographic studies indicate that the major factors controlling zeolite cementation in Upper Jurassic sandstones of Lower Cook Inlet were provenance, depositional environment, and igneous activity. The Jurassic strata record the unroofing of a Mesozoic volcanic-plutonic arc complex related to subduction and plate accretion beginning at least by Triassic time. Petrologic-stratigraphic trends show a striking increase in the ratio of quartz to volcanic rock fragments from Lower Jurassic to Upper Jurassic sedimentary rocks, re-