sized tangential, wedge and trough sets of cross-beds. The Atarque Member is about 11 ft (3.4 m) thick and contains fossil-rich lenses of poorly sorted, dark yellow-brown-weathering sands that are friable to moderately indurated and calcite cemented. Shale galls are present in the fossil-rich lenses and, with wood fragments, abundant turtle bone fragments, some crocodile tooth and scute fragments, amid vertebrae and teeth indicate a nearshore environment with a nearby source of fresh water. Selachian teeth and probable coprolites are richly varied and abundant. The following genera have been recognized: *Hybodus, Lonchidion, Squalicorax, Squatina, Brachaelurus, Scapanorhynchus, Odontaspis, Cretoxyrhina, Cretolamna, Plicatolamna, Paranomotodon, Ischyrhiza, Ptychotrygon, Rhombodus,* as well as several as yet indeterminate genera. The dominant invertebrate genus is the oyster *Crassostrea* although at least two genera of gastropods are present.

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Geomagnetic Polarity Stratigraphy of Type Tesuque Formation, Santa Fe Group, in Espanola Valley, New Mexico

Sampling of the several type sections of the Tesuque Formation, lower Santa Fe Group, exposed near Espanola, New Mexico, has yielded a composite magnetic-polarity stratigraphy in which the 760-ft (230 m), fine-grained, tuffaceous middle (Skull Ridge) Member is characterized by a long, uninterrupted interval of reversed polarity; approximately 900 ft (275 m) of the coarser grained upper (Pojoaque) member is characterized by rocks predominantly of normal polarity. Laboratory results from AF demagnetization in fields up to 200 oe, and from the acquisition and removal of IRM (often of multiple specimens cut from single samples), indicate that the magnetic signals in these rocks, probably borne by detrital magnetite, are a record of the geomagnetic field at or near the time of deposition. The stratigraphic utility of the results is confirmed by replication in geographically separate, lithostratigraphically equivalent sections in different fault blocks. Within the context of the medial to late Miocene time span long acknowledged for this part of the Santa Fe Group, this composite polarity stratigraphy appears to correlate best with the standard Tertiary polarity time scale as follows: fossiliferous Nambe Member: early Epoch 16; Skull Ridge Member: late Epoch 16 and early Epoch 15; Pojoaque Member: mid-Epoch 15 and younger. These results indicate an age for at least the Pojoaque Member significantly younger (by about 3 to 4 m.y.) than fission-track ages recently reported for ash beds in the type Pojoaque section.

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Effect of Oil Prices and "Windfall Profit" Taxes on Life or Death of an Oil Field—a Case History

The dramatic effect of price increases and subsequent taxing of profits is obvious for small oil operators who are attempting to produce marginal oil and gas properties. The Red Mountain oil field and associated leases in the San Juan basin of New Mexico are a prime example of the recent "yo-yo effect" of oil and gas pricing and subsequent taxing.

An analysis of the profitability of these operations, and its subsequent effect on oil field employment and purchases of equipment, are a clear, if small, example of the impact recent government policies have had throughout the oil industry.

Increases in the price of oil and gas made operations temporarily economic, and inspired additional drilling. This activity actually resulted in discoveries of new oil and gas sands and increased oil and gas reserves. However, the effect of a positive price has been partly or totally cancelled by taxing through the "windfall profit" tax. "Windfall profit" taxes have had a negative effect by shutting down additional exploration, cancelling planned waterflood projects, and generally hindering profitable operations.

This microstudy can be multiplied by hundreds and perhaps thousands of similar examples throughout the United States, with the effect of shutting in millions of barrels of oil, which would otherwise have been discovered and recovered. This is a prime example of illogical and arbitrary taxing procedures and policies.

The ramifications are felt not only by the oil and gas operators but also by suppliers, oil field workers, and their families. The economics of the area, and thus the state and the nation as a whole are adversely affected.

To compound this problem, we pay over $40 per barrel for imports to make up for the oil we have in these areas but do not recover. This $40 per barrel would have been paid to Americans, in America, and would have bought American products and paid American labor. This in turn would have increased the American labor force and the American inventory, and would have used American goods to find and increase American reserves.

Instead this money is diverted to foreign lands where it buys foreign goods and services. When, and if, it is reinvested in America it may be used to buy political influence, or buy control of American lands and industry. This microexample shows the economic insanity of such a program.

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Geochronologic Studies near WIPP Site, Southeastern New Mexico: Summary and Interpretation

The WIPP site is currently being investigated for pilot storage of defense-generated radioactive waste. A critical facet of the overall study is the question as to whether the rocks have remained closed systems with respect to their bulk chemistry and isotopic composition since formation in the Late Permian as opposed to later episodic or continuous recrystallization. Early attempts at K-Ar dating of sylvites mixed with other salts yielded inconclusive results, primarily because sylvite is not well suited for K-Ar study owing to loss of radiogenic ^{40}Ar. Rb-Sr study of sylvites yields a 214 ± 15-m.y.B.P. isochron indicating closed system conditions to Rb and Sr since latest Permian or earliest Triassic. Pre-200-m.y.B.P. K-Ar dates have also been determined for pure langbeinites and polyhalites. When mixed with sylvite, age lowering results. The Rb-Sr systematics of aeolian clay minerals known to have interacted with the evaporite brine yield a poorly defined isochron of 390 ± 75 m.y.B.P., but the apparent date indicates that the clay mineral-brine interactions were not so severe as completely to rehomogenize Sr isotopes despite the clay-mineral alteration. A 34 ± 1.5-m.y.B.P. lamprophyre dike intrudes the evaporite sequence 16 km north of the WIPP site. Contact effects, including recrystallization of polyhalite, are restricted to within 10 m of the dike. Finally, polyhalite inclusions in one rubble chimney yield a pre-200-m.y.B.P. age indicating no major recrystallization effects due to this disturbance of the evaporite sequence. Collectively, the geochronologic studies argue for

pre-200-m.y.B.P. formation of the evaporite minerals and stability of the rocks since that time.

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Tertiary Mineralization in Part of Grants Mineral Belt, New Mexico

Mineralization in the Grants mineral belt, except for minor occurrences of secondary minerals, is commonly attributed to several distinct periods: (a) early epigenetic (Late Jurassic), (b) early redistributed (middle Cretaceous), or (c) late redistributed (Laramide). Previous geochronologic studies have supported the geologic data favoring these periods of mineralization. More recent geologic studies indicate post-Laramide mineralization, although the source for the uranium may well have been from an older, destroyed deposit as opposed to an entirely new supply of uraniferous solutions. Work on clay minerals formed penecontemporaneously with uranium mineralization at the Silver Spur Mine (host rocks, Dakota) and the Doris Mine (host rocks, Morrison) yield Rb-Sr isochron ages of 41 ± 9 m.y.B.P. with initial Sr(87/86) = 0.715 ± 0.001 and 44 ± 7 m.y.B.P. with initial Sr(87/86) = 0.724 ± 0.001. These clay minerals formed in the presence of fairly radiogenic ^{87}Sr as Sr(87/86) from pre-ore, host-rock calcites yields 0.709 ± 0.001; thus simple, in-situ rehomogenization of Sr isotopes did not occur. Further, at least two other suspected occurrences of Tertiary mineralization in the Churchrock district do not yield isochrons at all, but the preceding Rb-Sr data plot references 135, 120, and 90 m.y.B.P. isochrons with initial Sr(87/86) = 0.710. These data suggest incomplete rehomogenization of Sr isotopes during the Tertiary. At present the data suggest, but do not prove, a period of Tertiary mineralization in the Grants mineral belt at about 35 to 50 m.y.B.P.

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Uranium in Permian Cutler Formation, Lisbon Valley, San Juan County, Utah

The Cutler Formation is composed predominantly of fluvial arkosic sandstones, siltstones, shales, and mudstones deposited by meandering streams that flowed across a flood plain and tidal flat. Sedimentary structures indicate two types of channel deposits: meandering and distributary. The area was occasionally transgressed by a shallow sea from the west, resulting in the deposition of several thin limestones and marine sandstones. The marine sandstones were deposited as longshore bars. Wind transported sand along the shoreline of the shallow sea, forming a coastal dune field. Marine and eolian sandstones are more common in the upper part of the Cutler Formation in the southern part of the area, whereas in the central and northern part the formation is predominantly fluvial. Cross-bed orientation indicates that streams flowed S67°W on the average, whereas longshore marine currents moved sediment S36°E and N24°W, and onshore wind transported sand S80°E.

The uranium in the Cutler Formation is found in the central and northern part of the area, in the upper part of the formation, in fluvial sandstone bodies that were deposited in a distributary environment. No uranium is known in the marine or eolian sandstones. Petrographically, the uranium-bearing sandstones are identical to other Cutler fluvial sandstones except that they contain less calcite cement and more clay and are slightly coarser grained. The diagenetic sequence indicates that uranium and vanadium were introduced late in the sequence, after oxidation had formed hematite and before the formation of calcite cement. Ore formation has modified the host sandstones very little.

The uranium and vanadium minerals are finely disseminated and thus difficult to identify but seem to include some uraninite, coffinite, uranophane, and carnotite. Much of the uranium is associated with iron oxide grain coatings and matrix. The uranium and vanadium are present together and independently. Both calcium and iron are depleted, and barium is concentrated in the ore zone. No significant organic carbon was found in the ore zones, and small amounts of selenium are concentrated at the base of the ore zones.

Formation of these orebodies has occurred without any obvious reductant. Perhaps sorption of uranyl by hematite was the concentration mechanism. The time of formation is not known; evidence is present for both a Permian age and a Triassic or younger age.

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Stratigraphy and Depositional History of Thousand Pockets Tongue of Page Sandstone and Crystal Creek Member of Carmel Formation (Middle Jurassic), Southwestern Utah

Between the East Kaibab monocline and Zion National Park in southwestern Utah, gray, cliff-forming, cross-bedded quartz sandstone of the Thousand Pockets Tongue of the Page Sandstone grades northwestward into red, slope-forming, flat-bedded quartz sandstone of the Crystal Creek Member of the Carmel Formation. On the basis of stratigraphic position, both members are considered Bathonian in age. Coastal deposits of the Thousand Pockets Tongue prograded northwestward and interfingered with contemporaneous submarine deposits of the Crystal Creek Member along a northeast-southwest trending shoreline of the Middle Jurassic seaway.

The Thousand Pockets Tongue is divided into three parts characterized by distinct sedimentary features and paleoenvironments. The gray lower part contains cross-bedded eolian sandstones (cross-bedded sandstone facies) which grade into evenly laminated and cross-bedded beach sandstones (Round Valley Draw facies). The red middle part is characterized by flat laminations, echinodern fragments, and a distribution which suggest a lagoon/tidal-flat environment. In the gray upper part, cross-bedded sandstones of eolian origin (Paria Canyon facies) grade into evenly laminated and cross-bedded beach sandstones (yellow sandstone ledge facies) and locally enclose red, flat-bedded units deposited in a washover channel-wind-tidal flat complex (red lenticular sandstone facies). The Crystal Creek Member is typified by evenly laminated, massive, and cross-bedded units and a lateral facies relation which suggest a lower beach and subtidal environment where storm and tidal currents dominated.

Cross-stratification measurements from eolian facies in lower and upper Thousand Pockets Tongue indicate north-northeasterly winds during Bathonian time. The marginal-marine and submarine interpretation of the red beds in the Thousand Pockets Tongue and Crystal Creek Member, respectively, lends support to a diagenetic origin for the red color of these beds.

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