The Badak field, with reserves of 7 Tcf of gas and 160 million bbl of oil and condensate in place, now has daily production of 600 MMscf of gas, 15,000 bbl of condensate, and 10,000 bbl of oil.

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Legal Implications of Consulting Relationship—Professional Liability of Consulting Geologist in Urban-Environmental Context

Providing information upon which others rely involves the consulting geologist being potentially liable to several kinds of claimants under varying standards depending on the legal characterization of the behavior of the geologist.

The broadest liability arises when the geologist participates directly in a scheme that is subsequently determined to have involved misrepresentations of material facts upon which others relied to their detriment.

The geologist in public practice is required to exercise professionally competent judgment for the benefit of those contracting for the geologic services. This raises the problems of the precise standard to which geologists are going to be held, which requires defining the legal nature of the science of geology.

Under particular circumstances a geologist may have a positive duty to disclose knowledge of potential geologic hazards in a project to the public authorities despite the existence of a confidential or contractual relationship with the project's sponsor. A failure to act can result in liability.

A geologist's participation in political action as a citizen, individually or allied with others in somewhat formal groups, may lead to liability for misstatements or improperly prepared public criticism that delays or damages a project. Although a geologist enjoys the same freedom of speech and action as other citizens, there are limits to constitutional liberties beyond which private liability is possible.

The consultant needs to consider the legal implications of the contractual relationship and the opinion given, including conflicts of interest, confidentiality, proprietary rights to data, and qualification of opinions.

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Origin of Hills Beach–Fletcher Neck Tombolo System, Biddeford, Maine

In Cumberland County, on the southeast coast of Maine, two spits connect the mainland to two rock islands. A narrow channel separates the two headlands, kept open by strong currents generated as the bay enclosed by the double tombolo is flooded and drained by 2.5-m tides.

A shallow-marine (Presumpscot Formation) clay was deposited during postglacial time. Following this, crustal rebound in early Holocene time raised the area 65 m above sea level. With later (~5,000 years B.P.) subsidence and continued eustatic sea-level rise, the two spits prograded over the marine clay, forming tombolos to the offshore islands. With further rise of sea level, the two tombolos began migrating toward each other at a rate of at least 500 m in the past 1,000 to 2,000 years, leaving relict marsh exposed on the present beach face.

Subsurface studies of the resulting stratigraphy show five distinct environments: (1) nearshore, intertidal, washover and dune sands of the barriers; (2) tidal-pool muds, deposited in the relative quiet of the bay, currently being transgressed by the barriers; (3) a flood-tidal delta of organic-rich sands and muds; (4) tidal-channel sands; and (5) back-barrier marsh.

With the high energy conditions generated by northeast and southeast storms, and continuing stability of relative sea level, the spits will continue their migration until the bay is completely infilled, resulting in a highly complex stratigraphy created by the "merging" of two tombolos.

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Seaward Primary Dip of Fall-in Beds, Lower Seven Rivers Formation (Permian), Guadalupe Mountains, New Mexico

Fall-in beds are shelf carbonate rocks which exist adjacent to the Capitan Limestone in a belt about 1 km wide, and which have basinward dips of 5 to 15°. Sedimentologic and structural-geopetal data gathered in field studies of the lower Seven Rivers Formation in North McKittrick Canyon show that tectonic tilting and/or compactional subsidence can account for only part of the basinward dip of fall-in beds, the remainder being primary depositional dip.

The dominant lithologies of fall-in beds are stromatolitic algal oncolite rudites and sand-sized, mixed skeletal-peloid grainstones. Rocks are tightly cemented with marine phreatic isopachous fibrous magnesium calcite. Fall-in beds lack features of the adjacent, shallower, but generally submerged shelf-crest facies such as fenestral fabric, pisolites, tepees, erosion surfaces, and shoaling cycles. An inferred energetic, subtidal marine depositional environment for fall-in beds is compatible with their significant basinward depositional dip.

Primary geopetal fabrics, although scarce in fall-in beds, have dips not exceeding a few degrees. The dip divergence between bedding planes and geopetal surfaces averages $8 \pm 2°$, a value which is inferred to be equal to the original depositional dip.

Proof of primary seaward dip in fall-in beds lends support to Dunham's marginal-mound hypothesis for the Capitan shelf. Also, primary dip in beds adjacent to the Capitan supports recent interpretations that the Capitan Limestone formed in a relatively deep (30 to 50 m), continually submerged shelf-edge position, and was not a true barrier reef.

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Geochemistry of Oils from Santa Cruz Basin, Bolivia—Case Study of Migration-Fractionation

Oils from the Santa Cruz basin, southeastern Bolivia, probably were derived from a common source. These oils, however, are in reservoirs of different ages (Ter-