SHOEMAKER, WILLIAM A., Idaho State Univ., Pocatello, ID

Geology of Raymond Canyon, Sublette Range, Western Wyoming

Raymond Canyon is located on the west side of the Sublette Range, Lincoln County, Wyoming. The study area is just east of the Idaho border and 10 mi (16 km) southeast of Geneva, Idaho. It contains an ideal view of a thrust fault (Tunp thrust), excellent exposures of vertical strata, small-scale folding, and minor strike-slip faulting formed during development of the Idaho-Wyoming thrust belt.

Formations exposed range in age from Late Pennsylvanian to Tertiary (Pliocene) and include: the lower part of the Wells Formation (Pennsylvanian, total thickness 720 ft or 219 m); the upper part of the Wells Formation and the Phosphoria Formation (both Permian, 153-210 ft or 47-64 m); the Dinwoody Formation (185 ft or 56 m); Woodside Shale (540 ft or 165 m); Thaynes Limestone (2,345 ft or 715 m); and Ankareh Formation (930 ft or 283 m), all of Triassic age; the Nugget Sandstone (1,610 ft or 491 m), Twin Creek Limestone, Preuss Sandstone, and Stump Formation, all of Jurassic age; and the Salt Lake Formation and the Sublette conglomerate, both Pliocene postorogenic continental deposits. Generally these formations are thinner than in nearby areas to the west and northwest.

Raymond Canyon lies on the upper plate of the Tunp thrust and the lower plate of the Crawford thrust of the Idaho-Wyoming thrust belt. Thus, it lies near the middle of the imbricate stack of shallowly dipping thrust faults that formed in the late Mesozoic.

Study of the stratigraphy, structure, petrography, and inferred depositional environments exposed in Raymond Canyon may be helpful to those engaged in energy development in the Idaho-Wyoming thrust belt.

SINGDAHLSEN, D. SCOTT, Montana State Univ., Bozeman, MT

Structural Geology of Swift Reservoir Culmination, Sawtooth Range, Montana

Northwest-trending, thrusted and folded rocks of Paleozoic and Mesozoic age comprise the Sawtooth Range of northwestern Montana. The Sawtooth Range is a part of the northern disturbed belt and is characterized by thin-skinned deformation. Stratigraphy plays an important role in the location and character of the various thrust sheets. Major decollement surfaces include the Upper Cambrian, the top of the Devonian, and several horizons within the Mississippian.

In the Swift Reservoir area, a broad culmination exposes Cambrian through Cretaceous strata in a series of imbricately stacked, west-dipping thrust sheets. The structural configuration of the culmination appears to be a compound duplex zone with structures north and south of Swift Reservoir dipping away from the culmination. Mapping of the culmination reveals vertical stacking of thrust sheets, and a lateral ramp that forms the southern boundary of the duplex. A structural high in the basement may have resulted in ramping of the thrust sheets and formation of the culmination.

Deformation within the thrust sheets is controlled by structural position and by ductility contrasts between the stratigraphic units. Deformation varies widely, ranging from tight overturned folds in the Cambrian units to broad open folds and fractures within the Mississippian. Because of the variation in lithology and ductility, the most intense deformation is observed within the Cambrian units. This deformation is characterized by overturning of folds in the direction of thrust transport, and the development of small-scale kink folds, cleavage, pencil structures, and boudinage.

SMITH, DERALD G., Univ. Calgary, Calgary, Alberta, Canada

Anastomosed River Deposits, Sedimentation Rates, Basin Subsidence, and Locations in Proximal Molasse Basins

Recent research on large sized modern anastomosing river systems (upper Columbia River, British Columbia, Canada, and Magdalena River, Colombia, South America) has recognized six depositional environments: channel, levee, crevasse-splay, lacustrine, marsh, and peat bog or swamp. Average sedimentation rates in both river systems are 5 mm/yr and 3.8 mm/yr, respectively, Such rapid sedimentation rates (vertical accretion) are keeping pace with equivalent rates of basin subsidence. High rates of sedimentation and basin subsidence are most likely to be found at proximal locations in molasse basins during major orogenic pulses. Such conditions were present during the Columbian and Laramide orogenies during the early Cretaceous and Tertiary in the foreland adjacent to the Rocky Mountain system. Thus, channel and crevasse-splay shale-encased sandstone reservoirs and coal, common in anastomosed fluvial rock sequences in proximal molasse settings, should be encountered in parts of the Western Interior sedimentary basin. Such deposits probably have been interpreted as deltaic or alluvial plain and should be reexamined to better predict sandstone trends for hydrocarbon exploration.

SOBEL, LLOYD S., Pennzoil Co., Denver, CO

Submarine-Fan Complex in Late Precambrian Yellowjacket Formation, Central Idaho

A thick sequence of Late Precambrian metasedimentary strata exposed in central Idaho represents part of a submarine-fan complex deposited in the Yellowjacket basin where important strata-bound cobalt deposits have been found. Three distinct sedimentary lithofacies are recognized within the Yellowjacket Formation on the basis of bedding style and sedimentary structures. These facies represent the laterally extensive and progradational sequence of basin-plain, outer-fan, and mid-fan environments.

The basal member of the sequence is a graded argillite, deposited in a basin plain as hemipelagic mud, and as very thin, graded couplets of silt and clay. This facies was succeeded by a ripped quartzite, deposited as thin layers of sand and silt in the outer-fan environment. As the top of the sequence is a laminated quartzite, deposited as beds of fine sand in a mid-fan environment by nonchannelized turbidity flows and possibly reworked by bottom currents. The vertical sequence of facies is gradational and indicates a progressive shift toward higher energy conditions with time.

A comprehensive basin analysis is not possible because adequate paleodepth and paleocurrent indicators are lacking. However, several important features of the Yellowjacket basin can be determined. Turbidite deposition was continuous and began in deep quiet water and was accompanied by the slumping and sliding of waterlogged sediment. Continued progradation had a subsiding effect on the basin. The basin was part of a passive craton margin, receiving sediment from a mountainous area in gneissic or crystalline terrane located to the east or northeast.

SONNENBERG, S. A., Bass Enterprises Prod. Co., Denver, CO, and L. B. CONYERS, Devon Energy, Denver, CO

Tectonic and Sedimentation Model for D Sandstone Deposition, Zenith Field Area, Denver Basin, Colorado

Cretaceous sandstones are oil and gas productive throughout a large area in the Denver basin. The Zenith field is a recently developed area that contains significant reserves in the D sandstone. Minor production also comes from the J sandstone.

Detailed mapping of the D sandstone suggests that productive sandstones are of channel origin within a valley-fill complex. Trapping of petroleum appears to be mainly stratigraphic with structure playing a minor role.

The stratigraphy of seven Cretaceous stratigraphic intervals was analyzed to determine if paleostructure may have influenced D depositional patterns. Thickness variations within stratigraphic intervals are caused by unconformities, convergence, and normal faulting. Thickness variations caused by unconformities and convergence may be related to paleostructure; variations caused by normal faulting are postdepositional and related to Laramide structure. Analyses of seven stratigraphic intervals clearly show that paleostructure influenced D sandstone depositional patterns. A new model proposed for D sandstone deposition incorporates paleotopography and sea level changes. During or immediately after the deposition of the Huntsman Shale and a thin regressive D sandstone deposit, a structural low area formed. The low area was probably created by basement fault-block movement. Concurrent with the tectonics, a drop in sea level occurs which drains a portion of the D depositional basin. A drainage system develops and follows the low area and incises through the regressive D deposit and into the Huntsman Shale. A sea level rise occurs and thick D channel sandstones are then deposited within the