

San Antonio Relay Ramp: Area of Stratal Continuity Between Large-Displacement Barrier Faults of the Edwards Aquifer and Balcones Fault Zone, Central Texas

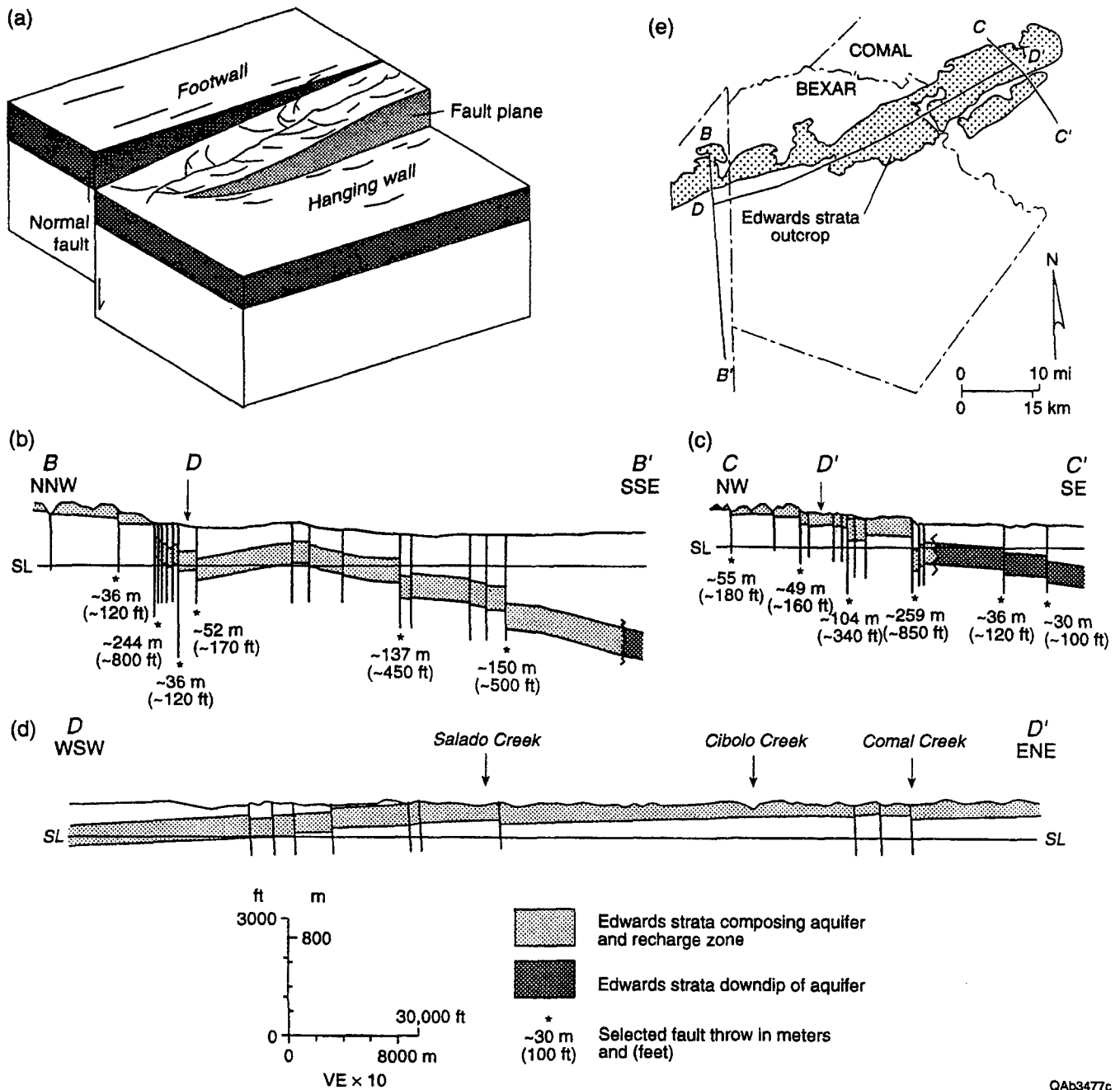
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Gentle southwest-dipping monocline, formed between the tips of two en echelon master faults having maximum throws of >240 m (Fig. 1a). Structural analysis of this relay ramp is important to studies of Edwards aquifer recharge and ground-water flow because the ramp is an area of relatively good stratal continuity linking the outcrop belt recharge zone and unconfined aquifer with the downdip confined aquifer. Part of the relay ramp lies within the aquifer recharge zone and is crossed by several southeast-draining creeks, including Salado, Cibolo, and Comal Creeks, that supply water to the ramp recharge area. This feature is an analog for similar structures within the aquifer and for potential targets for hydrocarbons in other Gulf Coast areas.

Defining the ramp is an ~13-km-wide right step of the Edwards Group outcrop belt and the en echelon master faults

that bound the ramp. The master faults strike N55-75°E, and maximum displacement exceeds the ~165-m thickness of the Edwards Group strata (Fig. 1b and c). The faults therefore probably serve as barriers to Edwards ground-water flow. Within the ramp, tilted strata gently dip southwestward at ~5 m/km, and the strata are cut by smaller faults that have displacements between 150 m and <1 m (Fig. 1d). The total structural relief along the ramp's southwest-trending axis is <240 m. The ramp's internal framework is defined by three fault blocks that are ~4 to ~6 km wide and are bound by northeast-striking faults having maximum throws between 30 and 150 m. Within the fault blocks, local areas of high fracture permeability may exist where smaller faults and joints are well connected.



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Figure 1. (a) Schematic block diagram of relay ramp. Folded aquifer strata in ramp are highly fractured locally and serve as a highly transmissive pathway where offset on major faults has otherwise reduced aquifer continuity. (b) and (c) Structural cross sections of Edwards strata cut by master faults of the San Antonio relay ramp. (d) Structural cross section along axis of relay ramp. (e) Location of cross sections.