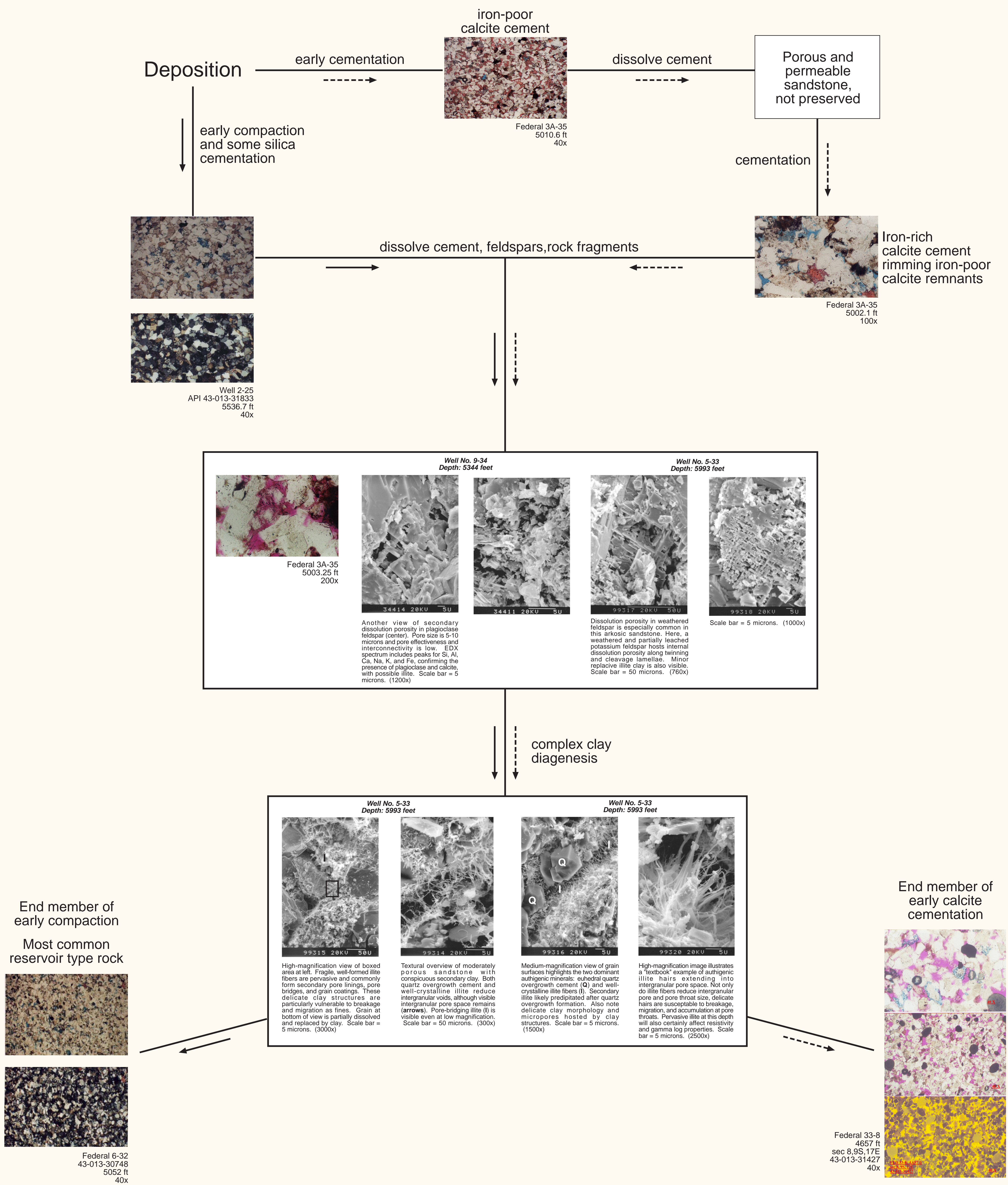


SANDSTONE DIAGENESIS



SUMMARY

The Green River Formation sandstone reservoirs from the shallow producing fairway in the southern portion of the Uinta Basin were principally deposited in a series of anastomosing distributary channels derived from highlands further to the south. Most likely, this source terrain consisted of the Precambrian basement complex and overlying sedimentary rocks of the ancestral Uncompaghre Complex of western Colorado. These Green River sand packages, regardless of detailed origin, can be recognized using a series of correlative carbonate markers that normally reflect deeper lacustrine environments. Because the anastomosing channels can either be sedimentologically active or inactive at any single moment of geologic time, exact correlation of individual sands within a single package is commonly difficult among various wellbores, currently at standard 40-acre spacing. As a consequence, waterflooding efforts in the region will result in mixed successes and failures. Other reservoirs reflect (1) more alluvial environments, especially associated with the coarser grained Wasatch Tongue in the deeper portions of the Green River Formation, (2) isolated sand bars located in shallow offshore settings associated with carbonate clastic shoals or algal buildups, (3) lacustrine "turbidites?" consisting of very thick (up to 250 feet) deposits of clayey very fine sandstones and siltstones, seriously disrupted by soft sediment deformation, and (4) very shallow sheet sandstones located in proximity to mud flat and coal prone environments.

Reservoir quality is extremely variable in spite of the near-consistent presence of very fine- to fine-grained feldspathic litharenites or lithic arkoses. The best permeability (20-100 md) normally results when early carbonate cementation prevents serious grain compaction, and this calcite subsequently becomes leached perhaps by organic acids. When this early calcite authigenesis does not occur, compaction and silica cementation proceed virtually unabated such that permeabilities of pay zones descend to the approximate 0.1 md level. In both groups of sandstones, dissolution of feldspars and/or rock fragments serves to improve reservoir quality, while ferroan carbonate cementation and/or complex clay authigenesis significantly reduce permeability further. Occasionally, medium-grained reservoirs are found, particularly in the basal portions of the formation (formerly referred to the "black shale" facies). These sands usually contain limited permeability due to compaction and silica cementation, but severe dissolution of various framework grains occasionally produces better reservoirs in the single millidarcy range. Because anastomosing distributary channels are isolated from one another in an aerial sense, diagenetic histories also vary among apparently correlative deposits.

