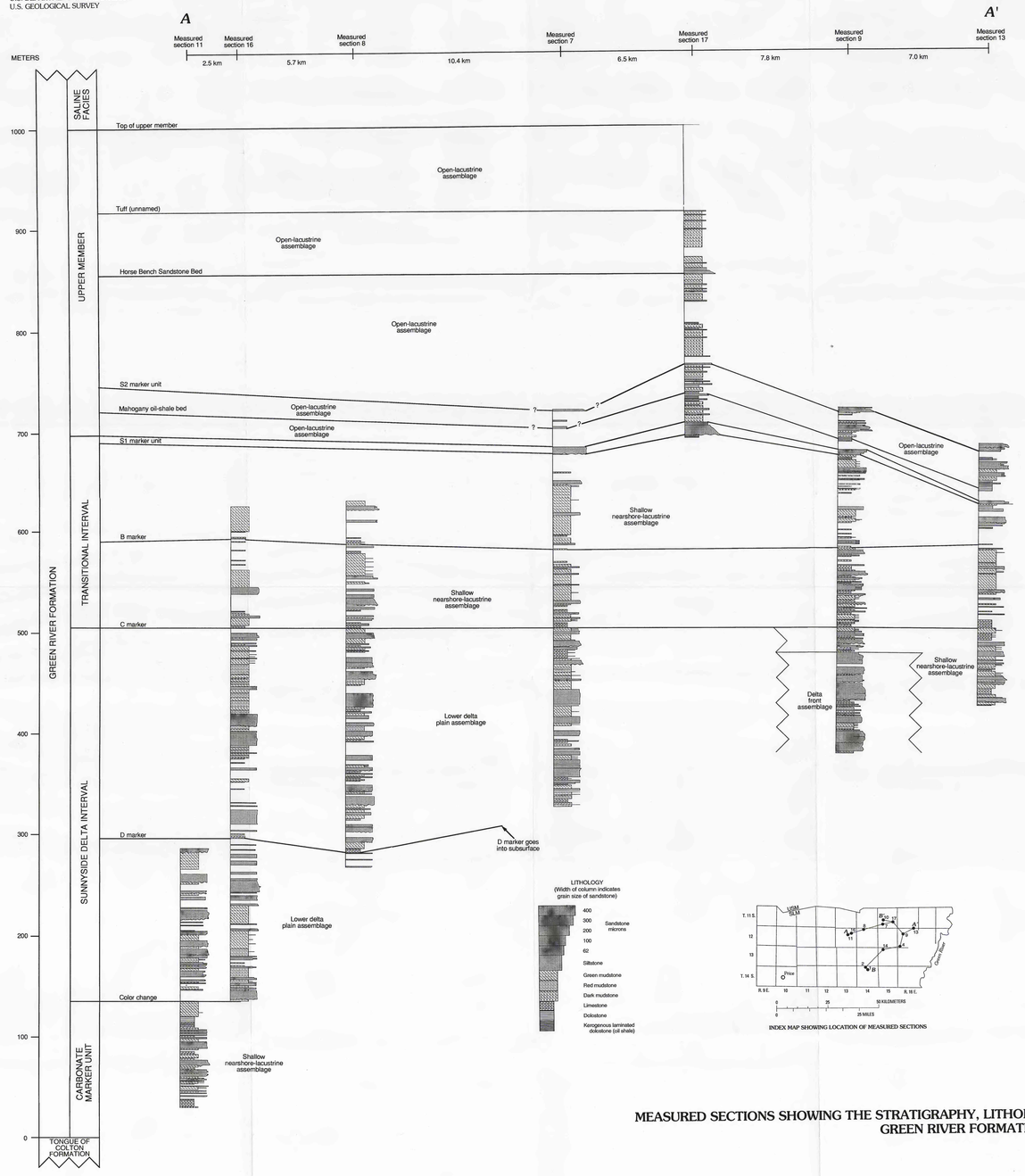

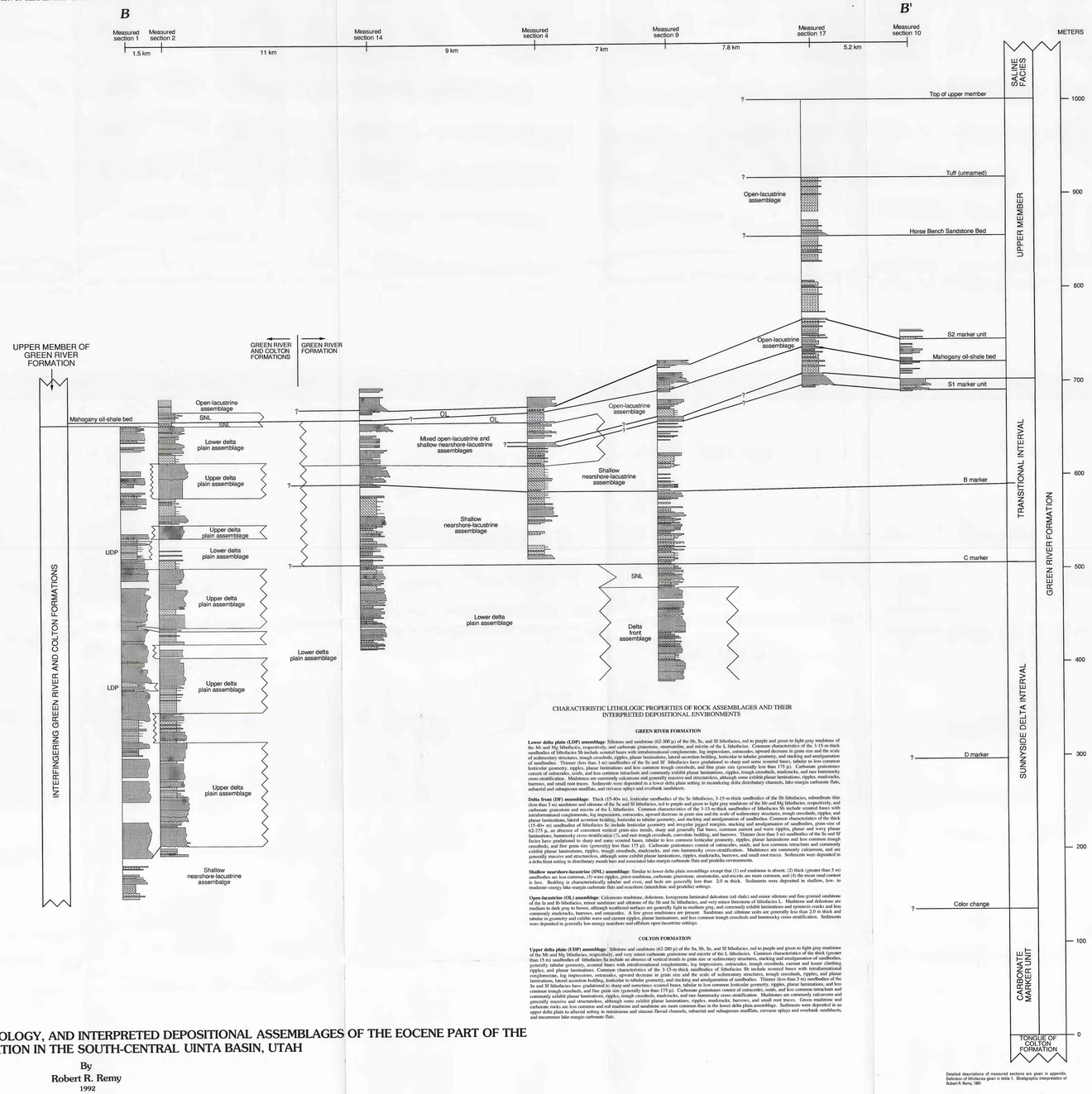

CHARACTERISTIC LITHOLOGIC PROPERTIES OF ROCK ASSEMBLAGES AND THEIR INTERPRETED DEPOSITIONAL ENVIRONMENTS

GREEN RIVER FORMATION

Lower delta plain (LDP) assemblage: Siltstone and sandstone (62-300 μ) of the Sh, Se, and Sf lithofacies, red to purple and green to light-gray mudstone of the Mr and Mg lithofacies, respectively, and carbonate grainstone, stromatolite, and micrite of the L lithofacies. Common characteristics of the 3-15 m-thick sandbodies of lithofacies Sh include scoured bases with intraformational conglomerate, log impressions, ostracodes, upward decrease in grain size and the scale of sedimentary structures, trough crossbeds, ripples, planar laminations, lateral accretion bedding, lenticular to tabular geometry, and stacking and amalgamation of sandbodies. Thinner (less than 3 m) sandbodies of the Se and Sf lithofacies have gradational bases, tabular to lens common lenticular geometry, ripples, planar laminations and less common trough crossbeds, and fine grain size (generally less than 175 μ). Carbonate grainstones commonly exhibit planar laminations, ripples, trough crossbeds, and rare hummocky cross-stratification. Mudstones are commonly calcareous and generally massive and structureless, although some exhibit planar laminations, ripples, mudcracks, burrows, and small root traces. Sediments were deposited in a lower delta plain setting in meandering delta distributary channels, lake-margin carbonate flats, subaerial and subaqueous mudflats, and crevasse splays and overbank sandsheets.

Delta front (DF) assemblage: Thick (15-40+ m), lenticular sandbodies of the Se lithofacies, 3-15 m-thick sandbodies of the Sh lithofacies, subordinate thin (less than 3 m) sandstone and siltstone of the Se and Sf lithofacies, red to purple and green to light gray mudstone of the Mr and Mg lithofacies, respectively, and carbonate grainstone and micrite of the L lithofacies. Common characteristics of the 3-15 m-thick sandbodies of lithofacies Sh include scoured bases with intraformational conglomerate, log impressions, ostracodes, upward decrease in grain size and the scale of sedimentary structures, trough crossbeds, ripples, and planar laminations, lateral accretion bedding, lens to tabular geometry, and stacking and amalgamation of sandbodies. Thinner (less than 3 m) sandbodies of the Se and Sf lithofacies have gradational bases, lenticular geometry and irregular jagged margins, stacking and amalgamation of sandbodies, grain-size (15-48+ m) sandbodies of lithofacies Se have bimodal grain-size trends, sharp and generally flat bases, common current and wave ripples, planar and wavy planar laminations, hummocky cross-stratification (?), and rare trough crossbeds, convolute bedding, and burrows. Thinner (less than 3 m) sandbodies of the Se and Sf facies have gradational to sharp and some scoured bases, tabular to lens common lenticular geometry, ripples, planar laminations and less common trough crossbeds, and fine grain size (generally less than 175 μ). Carbonate grainstones consist of ostracodes, oolds, and less common intraclasts and commonly exhibit planar laminations, ripples, trough crossbeds, mudcracks, and rare hummocky cross-stratification. Mudstones are commonly calcareous, and are generally massive and structureless, although some exhibit planar laminations, ripples, mudcracks, burrows, and small root traces. Sediments were deposited in a delta front setting in distributary mouth bars and associated lake-margin carbonate flats and prodelta environments.

Shallow nearshore-lacustrine (SNL) assemblage: Similar to lower delta plain assemblage except that (1) red mudstone is absent, (2) thick (greater than 5 m) sandbodies are less common, (3) wave ripples, green mudstone, carbonate grainstone, stromatolite, and micrite are more common, and (4) the mean sand content is less. Bedding is characteristically tabular and even, and beds are generally less than 2.0 m thick. Sediments were deposited in shallow, low- to moderate-energy lake-margin carbonate flats and nearshore (interdeltaic and prodelta) settings.

Open-lacustrine (OL) assemblage: Calcareous mudstone, dolostone, kerogenous laminated dolostone (oil shale) and minor siltstone and fine-grained sandstone of the Ia and Ib lithofacies, minor sandstone and siltstone of the Sh and Se lithofacies, and very minor limestone of lithofacies L. Mudstone and dolostone are medium to dark gray to brown, although weathered surfaces are generally light to medium gray, and commonly exhibit laminations and synaresis cracks and less commonly mudcracks, burrows, and ostracodes. A few green mudstones are present. Sandstone and siltstone units are generally less than 2.0 m thick and tabular in geometry and exhibit wave and current ripples, planar laminations, and less common trough crossbeds and hummocky cross-stratification. Sediments were deposited in generally low energy nearshore and offshore open-lacustrine settings.

COLTON FORMATION

Upper delta plain (UDP) assemblage: Siltstone and sandstone (62-280 μ) of the Sa, Sh, Se, and Sf lithofacies, red to purple and green to light-gray mudstone of the Mr and Mg lithofacies, respectively, and very minor carbonate grainstone and micrite of the L lithofacies. Common characteristics of the thick (greater than 15 m) sandbodies of lithofacies Sa include an absence of vertical trends in grain size or sedimentary structures, trough crossbeds, current and lesser climbing generally tabular geometry, scoured bases with intraformational conglomerate, log impressions, ostracodes, trough crossbeds, current and lesser climbing ripples, and planar laminations. Common characteristics of the 3-15 m-thick sandbodies of lithofacies Sh include scoured bases with intraformational conglomerate, log impressions, ostracodes, upward decrease in grain size and the scale of sedimentary structures, trough crossbeds, ripples, and planar laminations, lateral accretion bedding, lenticular to tabular geometry, and stacking and amalgamation of sandbodies. Thinner (less than 3 m) sandbodies of the Se and Sf lithofacies have gradational to sharp and sometimes scoured bases, tabular to lens common lenticular geometry, ripples, planar laminations, and less common trough crossbeds, and fine grain size (generally less than 175 μ). Carbonate grainstones consist of ostracodes, oolds, and less common intraclasts and commonly exhibit planar laminations, ripples, trough crossbeds, mudcracks, and rare hummocky cross-stratification. Mudstones are commonly calcareous and generally massive and structureless, although some exhibit planar laminations, ripples, mudcracks, burrows, and small root traces. Green mudstone and carbonate rocks are less common and red mudstone and sandstone are more common than in the lower delta plain assemblage. Sediments were deposited in an upper delta plain to alluvial setting in nonmarsous and sinuous fluvial channels, subaerial and subaqueous mudflats, crevasse splays and overbank sandsheets, and uncommon lake-margin carbonate flats.

MEASURED SECTIONS SHOWING THE STRATIGRAPHY, LITHOLOGY, AND INTERPRETED DEPOSITIONAL ASSEMBLAGES OF THE EOCENE PART OF THE GREEN RIVER FORMATION IN THE SOUTH-CENTRAL UINTA BASIN, UTAH

By
Robert R. Remy
1992

Detailed descriptions of measured sections are given in appendix.
Definition of lithofacies given in table 1. Stratigraphic interpretation of Robert R. Remy, 1991