Petrology, Stratigraphy, and Depositional History of the Upper Triassic–Lower Jurassic Eagle Mills Formation, Choctaw County, Alabama

Donald E. Burch, Jr.,[1] and **A. E. Weidie**[2]
[1]Consultant, 935 Gravier St., New Orleans, LA 70112
[2]Department of Geology and Geophysics, University of New Orleans, New Orleans, LA 70148

Extended Abstract

In southwestern Choctaw County, Alabama, the Eagle Mills Formation consists of alluvial-fan red beds deposited in a Mesozoic graben. The Exxon No. 1 Smith Lumber Co. well penetrated the upper 2,210 ft of the Eagle Mills, and it is divided into eight lithostratigraphic units designated A through H from bottom to top.

Unit A consists of numerous upward-fining and -coarsening sequences of sandstones, conglomeratic sandstones, and conglomerates of variable thickness separated by red mudstones. They were deposited on the distal fan by ephemeral streams and sheetfloods and are composed of low-grade metamorphic rock fragments probably derived from the Talladega slate belt.

Unit B consists of red mudstone with interbedded upward-fining and -coarsening sandstones and conglomerates with abundant calcite concretions and paleocaliche. Thin-section analyses of three sandstones of Unit B show that two are phyllarenites and one is a subphyllarenite. They vary from very fine to coarse-grained and are moderately sorted and submature, with angular to subangular framework grains. Quartz (subequal monocrystalline and polycrystalline) is the dominant framework grain with lesser amounts of schist and phyllite. In the two shallower sandstones, quartz content decreases as chert and dolomite marble rock fragments increase. Scanning electron microscope examination of one sandstone shows the presence of large well-developed pores lined with illite and authigenic quartz. Examination of drill cuttings from other Unit B sandstones, however, shows them to be poorly sorted, highly indurated, and apparently of low porosity. Unit B was deposited on the distal fan by sheetfloods and ephemeral streams. Faulting and igneous activity related to rifting occurred during the latter stage of deposition of Unit B.

Units C through G are dominantly conglomerates; Units C, D, and F contain abundant igneous rock fragments. Unit C contains plutonic (syenite) and volcanic (rhyolite and dacite) rock fragments, and the igneous clasts of Units D and F are volcanic. Rare poorly defined graded beds occur in Unit D cores. Units C and D exhibit a general upward coarsening of sediments, indicating progradation of the fan. Unit E coarsens upward to a sedimentary (chert and limestone) and metamorphic (dolomite marble and lesser amounts of phyllite and schist) rock-fragment-bearing cobbly pebble conglomerate. Unit F is a mixed volcanic and sedimentary-rock-fragment-bearing conglomerate. Unit G is a massive sedimentary and metamorphic rock-fragment-bearing cobbly pebble conglomerate. Cores taken from the upper half of this unit show this portion to be a poorly sorted clast- to matrix-supported conglomerate. Although Unit G is in general massive, rare poorly defined graded beds and rare thin-bedded sandstones are also present. Units D through G were deposited in the mid-fan subenvironment.

In Unit H, high log porosities and well-rounded sand grains in drill cuttings indicate the presence of eolian deposits. Log responses and the presence of anhydrite in cuttings show that the Eagle Mills is overlain by the Werner Formation.

The provenance for Eagle Mills sediments was the southern Appalachian system, with sedimentary rock fragments being derived from folded Paleozoic rocks, whereas metamorphic rock fragments came primarily from metasedimentary rocks of the Talladega slate belt. Igneous rock fragments were derived from rocks emplaced in the upper-fan area as a result of igneous activity associated with rifting.

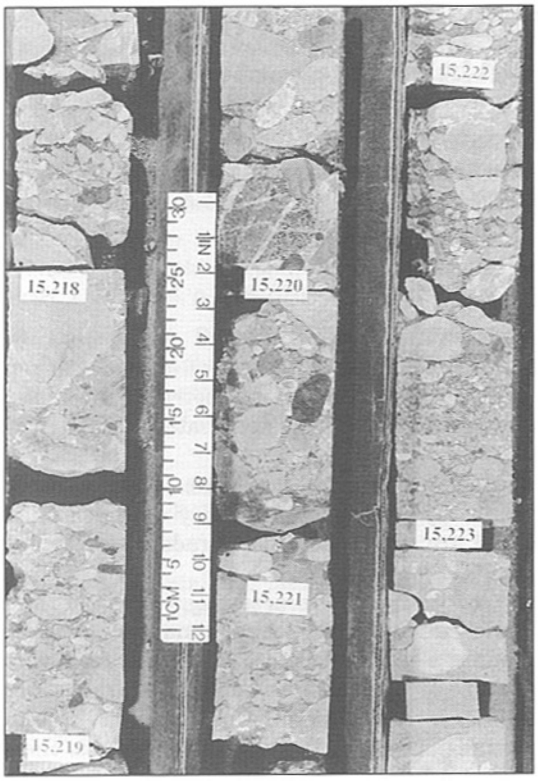

Figure 1. Unit G cobbly pebble conglomerate. Clasts are chert and dolomite marble.

Figure 2. Upward-fining conglomerate channel deposit. Light-colored clasts are quartzite; dark elongate clasts are hematite-stained phyllite and schist.

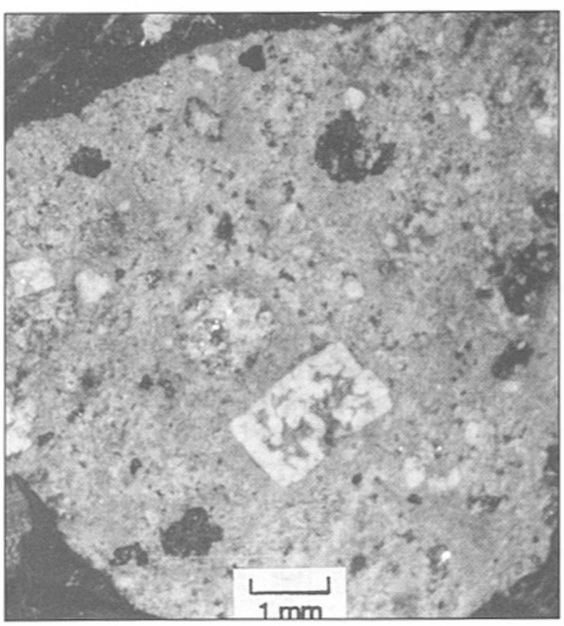

Figure 3. Unit D porphyritic rhyolite clast. White phenocryst is alkali feldspar altered to illite. Matrix is hematite-stained mud.

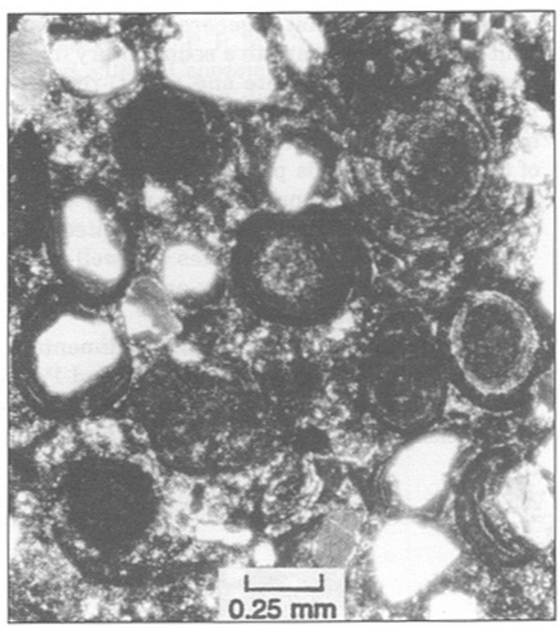

Figure 4. Thin-section photomicrograph of oolitic sandstone clast. Most ooid nuclei are quartz coated with hematite. Clast is from Silurian Clinton Group.