THE NORPHLET FORMATION OF PANHANDLE FLORIDA

Greg W. Scott

ABSTRACT

The Norphlet Formation (Jurassic) of Mississippi, Alabama, and panhandle Florida can be a very lucrative but elusive oil and gas exploration target. Recent studies have thoroughly examined the formation in Mississippi and Alabama. However, in Florida the Norphlet has suffered from an overall lack of scrutiny.

Panhandle Florida is located within the subsurface Conecuh Embayment, which, in-turn is situated within the Alabama Interior Salt Basin. The Conecuh Embayment is formed between the pre-Jurassic Conecuh Arch to the north and the Pensacola Arch to the southeast.

The Norphlet Formation of panhandle Florida is primarily a sandstone that underlies the Smackover Formation and overlies the Louann and Werner Formations. Three lithofacies of Norphlet strata have been identified in panhandle Florida: an updip conglomerate, red beds, and an upper quartzose sandstone (Denkman Member).

The Denkman Member consists of an upper gray and a lower brown to reddish-brown quartzose sandstone. Generally, these sandstones are fine-to-medium grained and well sorted, with rounded to subrounded grains. Average grain size for the Denkman Member is 2.24 \( \phi \) (9.21 mm). The upper Denkman is massively bedded or can show faint horizontal or wavy laminations. The lower Denkman exhibits either coarse-grained horizontal laminations or low to high-angle cross stratification. Average petrologic composition of the member is 62% quartz, 26% feldspar, and 13% rock fragments, making it a lithic arkose.

Identified red bed lithofacies are fine- to coarse-grained, moderately sorted sandstones, with subrounded to rounded grains. Average grain size for the red bed lithofacies is 1.69 \( \phi \) (0.31 mm). The most distinctive feature of the lithofacies is its closely spaced horizontal to slightly included (1° to 5°) laminae. These laminae are composed of alternating fine-to-medium and coarse grained sizes. Average petrologic composition of the facies is 35% quartz, 16% feldspar, and 49% rock fragments, making it a feldspathic litharenite.

The conglomeratic lithofacies is a multi-layered section of gray conglomerates and red coarse-grained sandstones. The sandstones are moderately sorted with subangular to subrounded grain shapes. The conglomeratic material is poorly sorted, with angular to rounded grains. Large matrix supported rock fragments within the conglomerate consist of green, white, and gray pebble- to cobble-sized grains, some up to -6 \( \phi \) (75 mm). These rock fragments appear to be plutonic and metamorphic in origin.

Quartz and feldspar cementation are dominant forms of diagenesis affecting panhandle Florida Norphlet lithologies. Additional cements present in decreasing order of abundance are phyllosilicates, calcite, dolomite, anhydrite, and hematite. Compaction and dissolution are the other major processes affecting Norphlet sediments in panhandle Florida.

The association of adjacent Louann salt, playa lake deposits, eolian sands, and red beds all support an interpretation of arid environments of deposition for panhandle Florida Norphlet sediments. Conglomerate deposition probably commenced with an uplift in the Appalachian highlands supplying coarse-grained sediments to the Louann salt plain below. Conglomeratic sediments are presently encountered adjacent to the Conecuh, Wiggins, and Pensacola Arches. Downdip, the conglomeratic deposits are reduced in grain size and lithic content, grading into red bed sandstones. The quartz-rich Denkman Member probably accumulated as desert plain sediments in dune, interdune, wadi, and playa lake environments. The principal source of sand for the desert plain was both the conglomeratic and red bed lithofacies. Massively bedded sands of the upper Denkman have been interpreted as Denkman Member Deposits reworked by a transgressing Smackover sea.

Principal source areas for Norphlet sediments in panhandle Florida were the basement rock of the Concecuh Arch (Talledga Slate Belt) to the north and the Pensacola Arch (Piedmont Belt) to the south and east. Additionally, contributions from the Eagle Mills, Werner, and Louann Formations probably were significant.

\(^1\)Geraghty & Miller, Inc., 2900 West Fork Drive, Baton Rouge, LA 70827