



Mapped Sedimentary Facies on the Lucama and Kenly East 7.5-minute Quadrangles, Johnston, Wilson, and Wayne Counties, North Carolina

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INTRODUCTION
The sedimentary cover of the Lucama and Kenly East 1:24,000-scale quadrangles, located in the Raleigh 1:100,000-scale sheet, was mapped as part of the STATEMAP Geologic Mapping Program in 1995-1997. These quadrangles are in the Upper Coastal Plain of eastern North Carolina in parts of Johnston, Wilson, and Wayne Counties. Elevations range from about 95 feet on the eastern side of the quadrangles in the stream drainages to about 300 feet in the northwestern map area on the Sims Pluton. The Kenly Escarpment crosses the area at an elevation of about 170 feet in a northeast-southwest orientation and represents a former shoreline location. The database collected for the mapping effort consists of 25 continuous cores, 58 power-auger drill holes, and 289 outcrops and field observations. Drill hole data reveals a relatively thin sedimentary package, ranging up to about 50 feet thick, which rests on an irregular basement surface. This surface restricted the sediment distribution between pre-existing highs. Basement rocks include, but are not limited to, metabasaltic, metavolcanic, and at least two separate granitoid plutons, the Sims Pluton in the northwestern map area, and the Centerville Creek Pluton in the east-central portion of the map area. The metavolcanic Kenly Ridge along the western edge of the Lucama and Kenly East Quadrangles restricted the western limit of some of the earlier marine to marginal marine lithofacies. As sea level continued to rise, eventually this ridge feature was flooded. The oldest sedimentary unit identified in the mapped area consists of loose coarse-grained sands, and is tentatively correlated with the Upper Pliocene Black Creek Formation. This unit occurs in the subsurface only in core KE-C-02A. The Upper Pliocene Yorktown Formation in the mapped area is more widespread below about 150 feet, and consists of the Ruhamere and the Morgans Beach Members. The Ruhamere Member consists of finely coarse-grained sands, while the overlying Morgans Beach Member is a distinctive laminated to massive silty clay. The post-Yorktown units comprise a very complex set of lithofacies that filled pre-existing paleo-drainages as sea level continued to rise. Continued sea level rise flooded drainage incisions during a maximum sea-level event and sediments were deposited over the entire mapped area. Later, as sea level began to fall, some pre-existing lithofacies were eroded out of the old paleo-drainages and new sedimentary packages were deposited in these drainages. Various lithofacies representing tidal flats, tidal channels, overwash deposits, fluvial channels, beach/shoreline complexes, barrier, and back barrier deposits, have been identified in the drill samples and in some outcrops.

DESCRIPTION OF MAP UNITS

Qal - Quaternary Alluvium: Sand, gravel, clay and silt, white, gray, and black, unconsolidated, associated with present stream channels and floodplains.

CB 7 - Possible Carolina Bay Sediments: - Comprise very coarse-grained sands overlying white to tan silty siltstone. Unusual lithology compared to other local and regional drilling results, and the drill site resides close to a Carolina Bay depression. KE-C-08 was drilled just east of NC 581 above this feature, however, there may be road fill associated with this area.

Tpgrv - Grand Flashes: Coarse, rounded to subrounded, white quartz, and fine to medium grained, granular to boulder gravel. Occurs in distinct patches at the surface. Typically indicates crystalline basement rocks in shallow subsurface. Predominantly moderate red (R4), light orange (O4), and light gray (N4). Unit occurs throughout the mapped area.

Tpcfs - Coarse Felspathic Sand: Silty and clayey, typically moderate reddish brown to R4 (R4), pale yellowish orange to O4 (O4), light gray (N4), predominantly coarse-grained; poorly to moderately sorted; trace to common white lithofacies; trace mica; trace to common fine quartz; and fine to medium grained, granular to boulder gravel. Occurs in distinct patches at the surface. Typically indicates crystalline basement rocks in shallow subsurface. Predominantly moderate red (R4), light orange (O4), and light gray (N4). Unit occurs throughout the mapped area.

Tpfs - Cross-bedded Sand: Sand, slightly silty; pale pink SRP (S2) to moderate pink (P4), pale yellowish orange to O4 (O4), pale yellowish gray to G4 (G4), fine to coarse-grained sand and sandy gravel; poorly to very well sorted, subangular to subrounded, trace of heavy mineral in discrete laminae; trace to minor white lithofacies; trace mica. Low angle cross-bedding is common. Contains thin beds of massive sand silt. Tpcfs generally unconformably overlies Tps, and is in turn unconformably overlain by Tps.

Tpms - Massive Sand: Sand, slightly clayey; moderate yellowish orange to O4 (O4), pale yellowish orange to O4 (O4), moderate orange to P4 (P4), medium to coarse-grained (predominantly coarse); quartz grains subangular to subrounded, locally heavily cross-bedded; moderately well to well sorted; locally fine upward; contains rare to trace very fine grained heavy minerals; trace to moderate white kaolin (K1) clasts; trace of white lithofacies are near the base of the unit, unconformably overlies Tps, and is in turn unconformably overlain by Tps.

Tpms - Laminated Silt and Sand: Silty, slightly sandy clay; sands are generally pale yellowish orange to O4 (O4), light red (R4), and most orange to O4 (O4) fine grained to very fine grained, and well to very well sorted; silt and silty clay are predominantly light gray (N4) and moderate orange to P4 (P4). Facies consists of predominantly continuous parallel laminae of alternating fine sand and silty clay; minor wavy and lenticular bedding trace of small horizontal burrows; trace to minor mica, rare disseminated heavy minerals. Contains distinct beds of fine-grained silty sand; moderately to well sorted. Occurs at elevations below 170 feet, reference mean sea level.

Tpms - Laminated Silt and Sand: The laminated silt and sand facies is interpreted as a tidal flat complex. The clayey tidal flats were crossed by tidal channels where sand was deposited. East of the major flat was a sub-tidal front where mixed clay and sand accumulated. The lack of vertical burrows suggests rapid sedimentation. Unit may correlate with the Ruhamere Member of the Upper Pliocene Bacons Castle Formation of Virginia.

Tpms - Heavy Mineral bearing Sand: Slightly clayey and silty sand; moderate reddish brown to R4 (R4), dark yellowish orange to O4 (O4), pale yellowish orange to O4 (O4), yellowish gray to G4 (G4) and very pale orange to O4 (O4). Fine to medium grained; silty, poorly to moderately sorted at base, well-sorted in upper portion; quartz grains are subangular to subrounded; trace to minor amounts of heavy minerals, chiefly ilmenite, rutile, zircon, titanite, and zirconium. Facies consists of predominantly continuous parallel laminae of alternating fine sand and silty clay. Sedimentary structures include parallel laminae defined by silty or heavy mineral, subvertical clay-lined (Ophiophora-like) burrows, and low angle planar cross bedding. A basal quartz pebble lag is common. Occurs at elevations above 170 feet, reference mean sea level.

Tps - Yorktown Formation, Upper Pliocene: Sand and clay, medium bluish gray to dark bluish gray (S4) to dark bluish gray (S4) when freshly exposed, oxidizes quickly to greenish gray (G4) to dark greenish gray (G4) (G4). Extreme upper portion also further oxidized to dark yellowish orange to O4 (O4). Two lithofacies are present: (1) upper silty clay, sandy, thinly laminated, diff. contains very fine grained well-sorted quartz sand; (2) lower sand, fine to medium grained, silty, poorly to moderately well sorted, subangular to subrounded; locally laminated; also locally heavily oxidized. A thin basal gravel of rounded quartz and rounded phosphate pebbles is locally present. Both lithofacies are locally fossiliferous, the brachiopod, *Mulinia congensis* is common in the eastern portion of the mapped area. Also present is the phosphatic brachiopod *Dalmanella* (*D. quana*). Both lithofacies contain glauconite, thin phosphate, chlorite, mica, trace of rutile and zircon. Molecular stratigraphic information indicates an upper Pliocene age (general communication, Black West, 1986, 1988). Unconformably overlies crystalline basement rock over most of the mapped area and rarely overlies Upper Cretaceous sandstone. Occurs predominantly at elevations below 150 feet mean sea level, but also occurs as an outlier above 170 feet (KE-C-14 - 15A; interpret top of Tps).

Tps - Black Creek Formation, Upper Cretaceous: Sand and gravel; pale yellowish orange to O4 (O4) and light gray (N4); sand is fine to coarse-grained; gravel is granule to small pebble-size clay rip up clasts; massive and laminated; locally burrowed; trace mica, trace glauconite, trace quartz, minor lignite. This unit was encountered in a single bore hole, KE-C-02A.

REFERENCES

Gay, N.K., 1980. Paleontology of the Yorktown Formation in Edgecombe County, North Carolina, unpublished Masters Thesis, East Carolina University, 278p.

Gay, N.K., and Nickerson, J.G., 2011. Geologic Map of the Lucama and Kenly East 7.5-minute Quadrangles, North Carolina, Poster Presentation, Southeastern Section Meeting of the Geological Society of America, Wilmington, North Carolina.

Hoffman, C.W., Nickerson, J.G., and Gay, N.K., 1997. Geologic Map of the Lucama Quadrangle, NC Geological Survey unpublished STATEMAP deliverable map, 1:24,000-scale.

Nickerson, J.G., and Gay, N.K., 1997. Geologic Map of the Kenly East Quadrangle, NC Geological Survey unpublished STATEMAP deliverable map, 1:24,000-scale.

Ward, L.W., and Blackwelder, E.V., 1989. Stratigraphic Revision of Upper Miocene and Lower Pliocene Beds of the Chesapeake Group, Middle Atlantic Coastal Plain, US Geological Survey Bulletin, 143-0, 89p.

