

**CORRELATION OF NORTHERN MAP UNITS**

Quaternary	Qa, Qc, Qd, Qe, Qf, Qg, Qh, Qi, Qj, Qk, Ql, Qm, Qn, Qo, Qp, Qq, Qr, Qs, Qt, Qu, Qv, Qw, Qx, Qy, Qz	Holocene and Pleistocene
Tertiary	Ta, Tb, Tc, Td, Te, Tf, Tg, Th, Ti, Tj, Tk, Tl, Tm, Tn, To, Tp, Tq, Tr, Ts, Tt, Tu, Tv, Tw, Tx, Ty, Tz	Miocene and Oligocene
Tertiary and Cretaceous	Tr, Tc, Tm, Tn, To, Tp, Tq, Tr, Ts, Tt, Tu, Tv, Tw, Tx, Ty, Tz	Eocene to Lower Cretaceous

**DESCRIPTION OF NORTHERN MAP UNITS**

- Qa** ARTIFICIAL FILL (HOLOCENE)—Sand, limestone, and volcanic rock transported to fill valleys, swamps, and part of Bahía de San Juan. Shown only in area near San Juan.
- Qb** ALLUVIUM (HOLOCENE)—Undifferentiated alluvium and terrace deposits.
- Qc** SAND, CLAY, GRAVEL, AND COBBLE DEPOSITED IN STREAM VALLEYS.
- Qd** UNDIFFERENTIATED ALLUVIUM AND TERRACE DEPOSITS.
- Qe** LANDSLIDE DEPOSITS (HOLOCENE)—Masses of soft, calcareous clay, and limestone rubble.
- Qf** BEACH DEPOSITS (HOLOCENE)—Sand composed of rounded grains of quartz, volcanic rock, and shell. Includes deposits of beach rock, small coastal dune deposits, and longitudinal sand dunes of beach sand.
- Qg** BEACH DEPOSITS (HOLOCENE)—Sandy muds and clayey sand. Some areas underlain by peat.
- Qh** EOLIANITE (PLEISTOCENE)—Fragile to consolidated, highly crossbedded calcareous eolian sandstone composed of fine to coarse grains of shell fragments and quartz. Some of the deposits are partly silicified.
- Qi** SILICA SAND DEPOSITS (PLEISTOCENE)—Very pure fine to very fine quartz sand derived from the more sandy eolian deposits by leaching and winnowing by wind. The thicker deposits serve as a raw material in making glass.
- Qj** TERRACE DEPOSITS (PLEISTOCENE)—Clay, sand, and gravel deposits deposited on former flood plains of rivers. Includes some alluvial fan deposits.
- Qk** UNDIFFERENTIATED SURFICIAL DEPOSITS (QUATERNARY AND TERTIARY)—Clay, sandy clay, and sand deposits shown on more detailed geologic maps as beach deposits, marine terrace deposits, and other miscellaneous Quaternary deposits.
- Ql** CAMUY DEPOSIT (MIOCENE)—Chalk and limestone, commonly somewhat sandy and ferruginous. Calcareous sandstone small quantities of dolomite. In upper part, lenses of very pale orange sand-lime limestone.
- Ta** AYMAMÓN LIMESTONE (MIOCENE)—White to very pale orange, locally pale yellow and grayish pink, very pure fossiliferous limestone, massive to thick bedded, generally indurated by secondary cementation into a finely crystalline, rather dense limestone. Upper part of unit in northwestern area of the island is very pale orange to light yellow chalk interbedded with more typical indurated limestone. Contains dolomite at many places near the coast.
- Tb** AGUADA LIMESTONE (MIOCENE)—Thick layers of very pale orange to pink hard calcareous alternating with cherty and tabular limestone. Commonly thin bedded and crossbedded at top. Lower part commonly less indurated than upper part.
- Tc** CIBAO FORMATION (MIOCENE AND OLILOCENE)—Typical beds of calcareous clay, earthy limestone, and sand, very pale orange to pale yellow-orange and containing pebbles and cobbles of older volcanic rocks. Angular to subangular fine to coarse quartz sand in a calcareous silty clay matrix, near Vega Alta contains sand and gravel clay pebbles covered into fossiliferous sand.
- Td** Quebrada Acaes Limestone Member—May finely crystalline to dense, very pale orange to pale grayish-orange limestone that locally contains scattered grains of quartz sand and abundant fossiliferous.
- Te** Alternate San Juan Limestone—Subrounded to subangular, crossbedded pebbles to fine to coarse sand consisting of quartz grains and volcanic rock debris.
- Tf** Rio Indio Limestone Member—Compact, but cherty, fragmental limestone, mostly pale yellow-orange, weakly bedded to massive, and locally slightly gypsiferous.
- Tg** Manabaco Limestone Member—Fine to medium grained calcarenite, commonly reworked into a hard, dense limestone. At base, unit is friable clayey, coarse calcarenite composed largely of nodules in some places, base is commonly marked by thick bed of large oyster shells.
- Th** Guayama Member—Fossiliferous calcareous clay and large oyster shells, lenses of sand and gravel.
- Ti** MUCARABONES SAND (MIOCENE AND OLILOCENE)—Grayish-orange to yellowish-brown, highly crossbedded medium to coarse calcareous sand. In vicinity of Bayamón, unit consists of grayish-orange to yellow crossbedded fine to medium sand containing lenses of fossiliferous earthy limestone and very pale orange to grayish-brown sandy clay, west of Bayamón contains lenses of gravel.
- Tj** LARES LIMESTONE (OLIOLOCENE)—Hard finely crystalline very pure fossiliferous limestone in beds 10-30 cm thick, color ranges from nearly white to very pale orange. In western part of outcrop area, unit contains lenses of sand and calcareous clay; in western eastern part, unit contains entirely of calcareous clay.
- Tk** SAN SEBASTIAN FORMATION (OLIOLOCENE)—Ruddy brown and gray sandy calcarenite, locally containing pebbles and cobbles of older volcanic rocks; locally contains beds of fossiliferous earthy limestone.
- Tl** UNDIFFERENTIATED LOWER TERTIARY AND CRETACEOUS FORMATIONS—Limestone, calcarenite sandstone and siltstone, full basaltic, lava, gneiss, and quartz diorite.

**CORRELATION OF SOUTHERN MAP UNITS**

Quaternary	Qa, Qb, Qc, Qd, Qe, Qf, Qg, Qh, Qi, Qj, Qk, Ql, Qm, Qn, Qo, Qp, Qq, Qr, Qs, Qt, Qu, Qv, Qw, Qx, Qy, Qz	Holocene and Pleistocene
Tertiary	Ta, Tb, Tc, Td, Te, Tf, Tg, Th, Ti, Tj, Tk, Tl, Tm, Tn, To, Tp, Tq, Tr, Ts, Tt, Tu, Tv, Tw, Tx, Ty, Tz	Miocene
Tertiary and Cretaceous	Tr, Tc, Tm, Tn, To, Tp, Tq, Tr, Ts, Tt, Tu, Tv, Tw, Tx, Ty, Tz	Oligocene

**DESCRIPTION OF SOUTHERN MAP UNITS**

- Qa** ALLUVIAL DEPOSITS (HOLOCENE AND PLEISTOCENE)—Sand, gravel, and rubble, includes alluvial fan deposits and terrace deposits.
- Qb** SWAMP DEPOSITS (HOLOCENE AND PLEISTOCENE)—Sandy silt and clayey sand, mostly in areas of abundant mangrove.
- Qc** BEACH DEPOSITS (HOLOCENE AND PLEISTOCENE)—Sand, silt, and gravel, largely reworked from alluvial fan deposits.
- Qd** PONCE LIMESTONE (MIOCENE)—Very pale orange to grayish-orange limestone, generally consisting of abundant nodules of mollusks and corals, extremely highly cemented, sparsely fossiliferous limestone along coast west of Ponce, Verano.
- Qe** GUAYARBO FORMATION (MIOCENE)—Yellow earthy limestone, mostly weathered to compact silt containing nodules of mollusks, sand and gravel near Boqueron.
- Qf** JUANA DIAZ FORMATION (MIOCENE AND OLILOCENE)—Upper diorite member—Crossbedded sand, calcareous clay, and calcarenaceous clay, present only in quantities on west side of Ponce.
- Ta** Limestone member—Staffed cherty, clayey white to very pale orange limestone in area south and southwest of Ponce, unit consists of stratified very crystalline calcareous limestone near Guayama, consists of stratified coarse-grained calcarenite containing abundant fossils.
- Tb** Typical diorite beds—Mostly very pale orange to grayish-orange sandy silt, clay or mudstone, generally very fossiliferous. Sand, gravel, and cobbles of various kinds of volcanic rocks and also large coral heads are present locally near the base. Lenses of sand and gravel are present, but not common, at higher stratigraphic positions.
- Tc** UNDIFFERENTIATED LOWER TERTIARY AND CRETACEOUS FORMATIONS—Highly cemented limestone, calcarenite sandstone and siltstone, full basaltic, lava, gneiss, and quartz diorite.

A. GEOLOGIC MAP AND SECTION IN NORTHERN PUERTO RICO

