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GENERALIZED GEOLOGY OF GUAM, MARIANA ISLANDS

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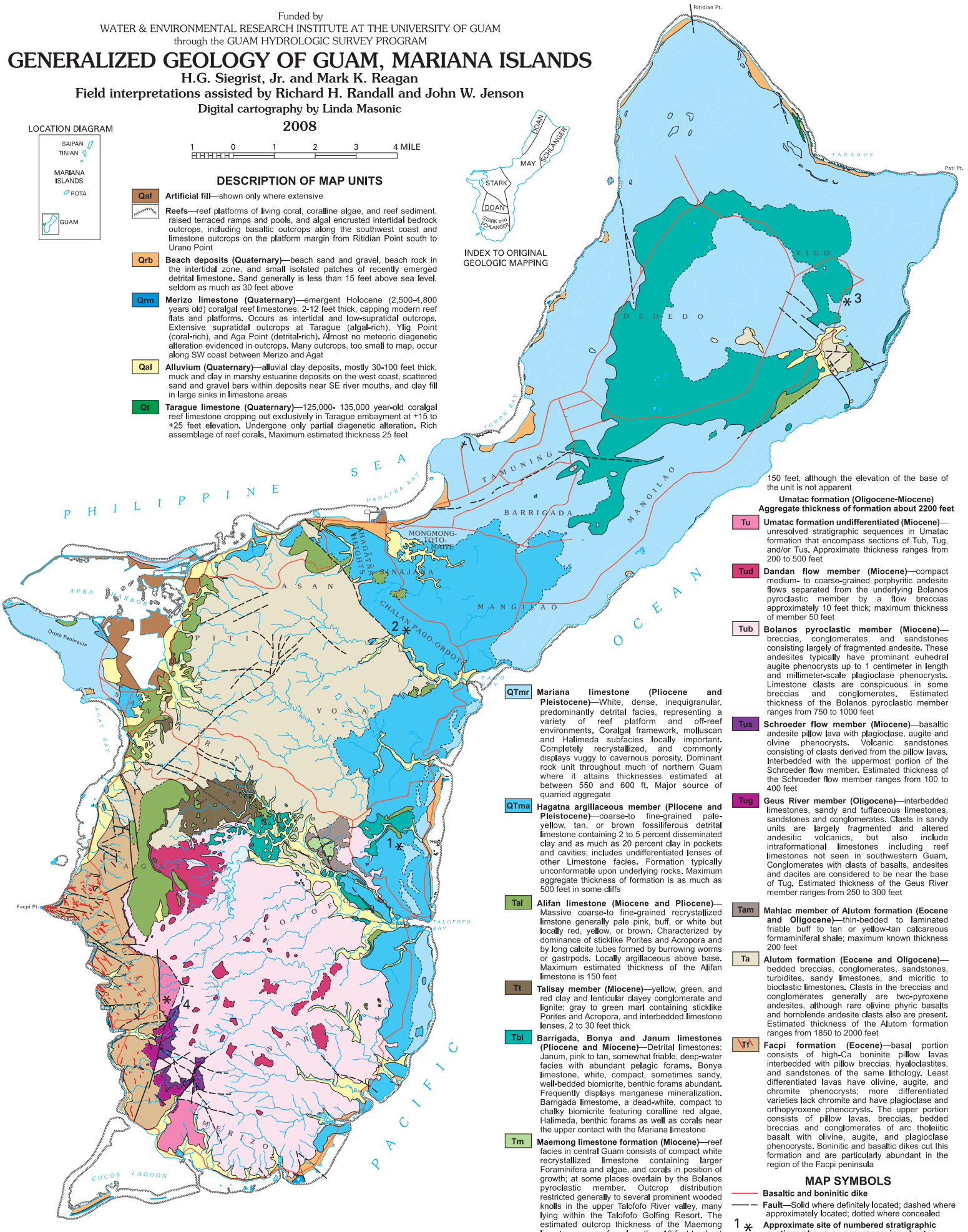
LOCATION DIAGRAM



DESCRIPTION OF MAP UNITS

- Qaf** Artificial fill—shown only where extensive
- Reefs**—reef platforms of living coral, coralline algae, and reef sediment, raised terraced ramps and pools, and algal encrusted intertidal bedrock outcrops, including basaltic outcrops along the southwest coast and limestone outcrops on the platform margin from Ritidian Point south to Urano Point
- Qrb** Beach deposits (Quaternary)—beach sand and gravel, beach rock in the intertidal zone, and small isolated patches of recently emerged detrital limestone. Sand generally is less than 15 feet above sea level, seldom as much as 30 feet above
- Qrm** Merizo limestone (Quaternary)—emergent Holocene (2,500-4,800 years old) coralg reef limestones, 2-12 feet thick, capping modern reef flats and platforms. Occurs as intertidal and low-supratidal outcrops. Extensive supratidal outcrops at Tarague (algal-rich), Ylig Point (coral-rich), and Aga Point (detrital-rich). Almost no meteoric diagenetic alteration evidenced in outcrops. Many outcrops, too small to map, occur along SW coast between Merizo and Agat
- Qal** Alluvium (Quaternary)—alluvial clay deposits, mostly 30-100 feet thick, muck and clay in marshy estuarine deposits on the west coast, scattered sand and gravel bars within deposits near SE river mouths, and clay fill in large sinks in limestone areas
- Qt** Tarague limestone (Quaternary)—125,000- 135,000 year-old coralg reef limestone cropping out exclusively in Tarague embayment at +15 to +25 feet elevation. Undergone only partial diagenetic alteration. Rich assemblage of reef corals. Maximum estimated thickness 25 feet

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150 feet, although the elevation of the base of the unit is not apparent

Umatac formation (Oligocene-Miocene)
 Aggregate thickness of formation about 2200 feet

- Tu** Umatac formation undifferentiated (Miocene)—unresolved stratigraphic sequences in Umatac formation that encompass sections of Tub, Tug, and/or Tus. Approximate thickness ranges from 200 to 500 feet
- Tud** Dandan flow member (Miocene)—compact medium- to coarse-grained porphyritic andesite flows separated from the underlying Bolanos pyroclastic member by a flow breccias approximately 10 feet thick; maximum thickness of member 50 feet
- Tub** Bolanos pyroclastic member (Miocene)—breccias, conglomerates, and sandstones consisting largely of fragmented andesite. These andesites typically have prominent euhedral augite phenocrysts up to 1 centimeter in length and millimeter-scale plagioclase phenocrysts. Limestone clasts are conspicuous in some breccias and conglomerates. Estimated thickness of the Bolanos pyroclastic member ranges from 750 to 1000 feet
- Tus** Schroeder flow member (Miocene)—basaltic andesite pillow lava with plagioclase, augite and olivine phenocrysts. Volcanic sandstones consisting of clasts derived from the pillow lavas. Interbedded with the uppermost portion of the Schroeder flow member. Estimated thickness of the Schroeder flow member ranges from 100 to 400 feet
- Tug** Geus River member (Oligocene)—interbedded limestones, sandy and tuffaceous limestones, sandstones and conglomerates. Clasts in sandy units are largely fragmented and altered andesitic volcanics, but also include intraformational limestones including reef limestones not seen in southwestern Guam. Conglomerates with clasts of basalts, andesites and dacites are considered to be near the base of Tug. Estimated thickness of the Geus River member ranges from 250 to 300 feet
- Tam** Mahiac member of Alutom formation (Eocene and Oligocene)—thin-bedded to laminated friable buff to tan or yellow-tan calcareous foraminiferal shale; maximum known thickness 200 feet
- Ta** Alutom formation (Eocene and Oligocene)—bedded breccias, conglomerates, sandstones, turbidites, sandy limestones, and micritic to bioclastic limestones. Clasts in the breccias and conglomerates generally are two-pyroxene andesites, although rare olivine phyruc basalts and hornblende andesite clasts also are present. Estimated thickness of the Alutom formation ranges from 1850 to 2000 feet
- Tf** Fapci formation (Eocene)—basal portion consists of high-Ca boninite pillow lavas interbedded with pillow breccias, hyaloclastites, and sandstones of the same lithology. Least differentiated lavas have olivine, augite, and chromite phenocrysts; more differentiated varieties lack chromite and have plagioclase and orthopyroxene phenocrysts. The upper portion consists of pillow lavas, breccias, bedded breccias and conglomerates of arc tholeiitic basalt with olivine, augite, and plagioclase phenocrysts. Boninitic and basaltic dikes cut this formation and are particularly abundant in the region of the Fapci peninsula

- QTmr** Mariana limestone (Pliocene and Pleistocene)—White, dense, inequigranular, predominantly detrital facies, representing a variety of reef platform and off-reef environments. Coralg framework, molluscan and Halimeda subfacies locally important. Completely recrystallized, and commonly displays vuggy to cavernous porosity. Dominant rock unit throughout much of northern Guam where it attains thicknesses estimated at between 550 and 600 ft. Major source of quarried aggregate
- QTma** Hagatna argillaceous member (Pliocene and Pleistocene)—coarse-to fine-grained pale-yellow, tan, or brown fossiliferous detrital limestone containing 2 to 5 percent disseminated clay and as much as 20 percent clay in pockets and cavities; includes undifferentiated lenses of other Limestone facies. Formation typically unconformable upon underlying rocks. Maximum aggregate thickness of formation is as much as 500 feet in some cliffs
- Tal** Alifan limestone (Miocene and Pliocene)—Massive coarse-to fine-grained recrystallized limestone generally pale pink, buff, or white but locally red, yellow, or brown. Characterized by dominance of sticklike Porites and Acropora and by long calcite tubes formed by burrowing worms or gastropods. Locally argillaceous above base. Maximum estimated thickness of the Alifan limestone is 150 feet
- Tl** Talisay member (Miocene)—yellow, green, and red clay and lenticular clayey conglomerate and lignite; gray to green marl containing sticklike Porites and Acropora, and interbedded limestone lenses, 2 to 30 feet thick
- Tbl** Barrigada, Bonya and Janum limestones (Pliocene and Miocene)—Detrital limestones: Janum, pink to tan, somewhat friable, deep-water facies with abundant pelagic forams. Bonya limestone, white, compact, sometimes sandy, well-bedded biomicrite, benthic forams abundant. Frequently displays manganese mineralization. Barrigada limestone, a dead-white, compact to chalky biomicrite featuring coralline red algae, Halimeda, benthic forams as well as corals near the upper contact with the Mariana limestone
- Tm** Maamong limestone formation (Miocene)—reef facies in central Guam consists of compact white recrystallized limestone containing larger Foraminifera and algae, and corals in position of growth; at some places overlain by the Bolanos pyroclastic member. Outcrop distribution restricted generally to several prominent wooded knolls in the upper Talofofo River valley, many lying within the Talofofo Golfing Resort. The estimated outcrop thickness of the Maamong limestone ranges from less than 10 feet to about

MAP SYMBOLS

- Basaltic and boninitic dike
- - -** Fault—Solid where definitely located; dashed where approximately located; dotted where concealed
- 1 *** Approximate site of numbered stratigraphic sections shown on accompanying sheet