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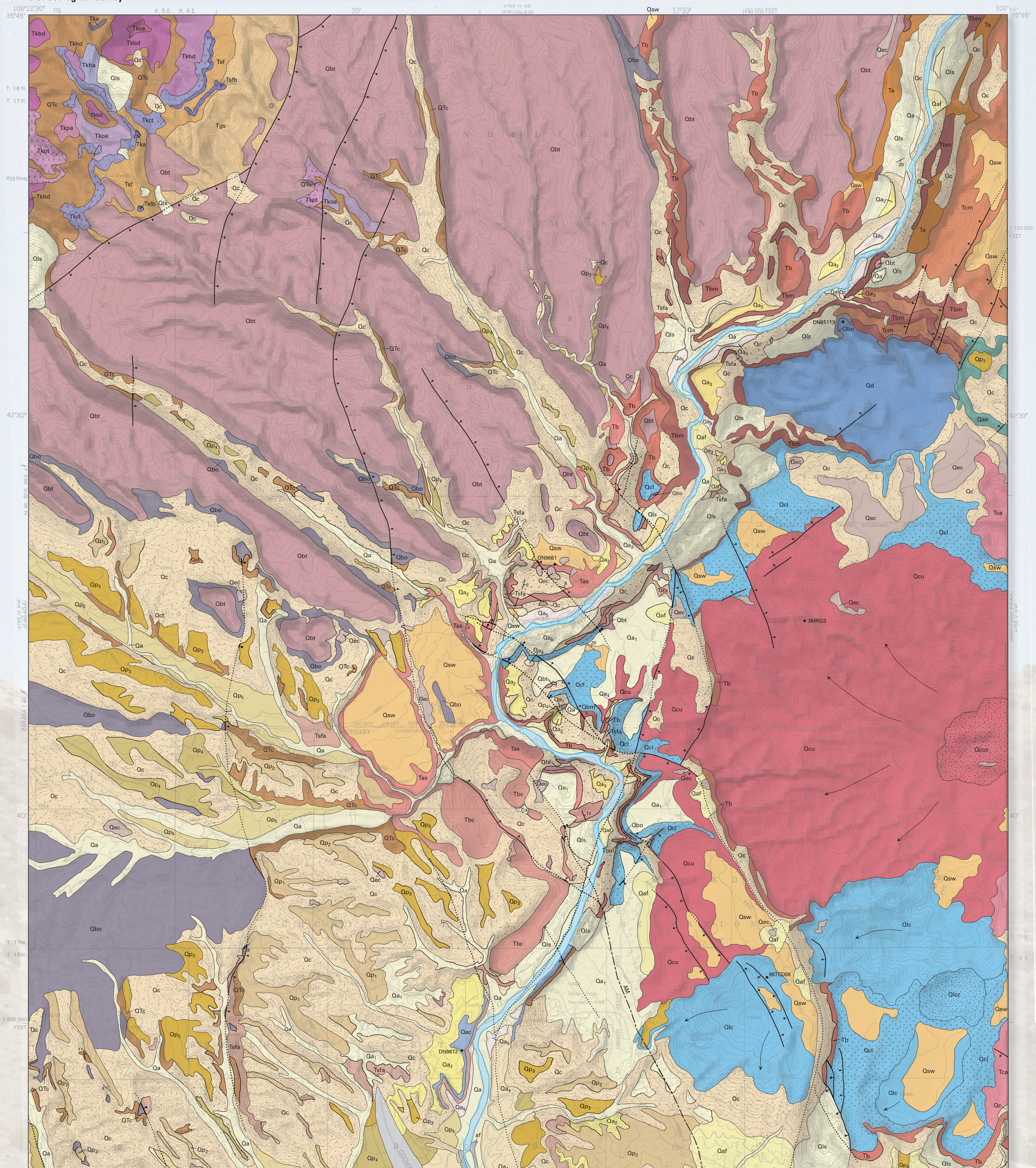
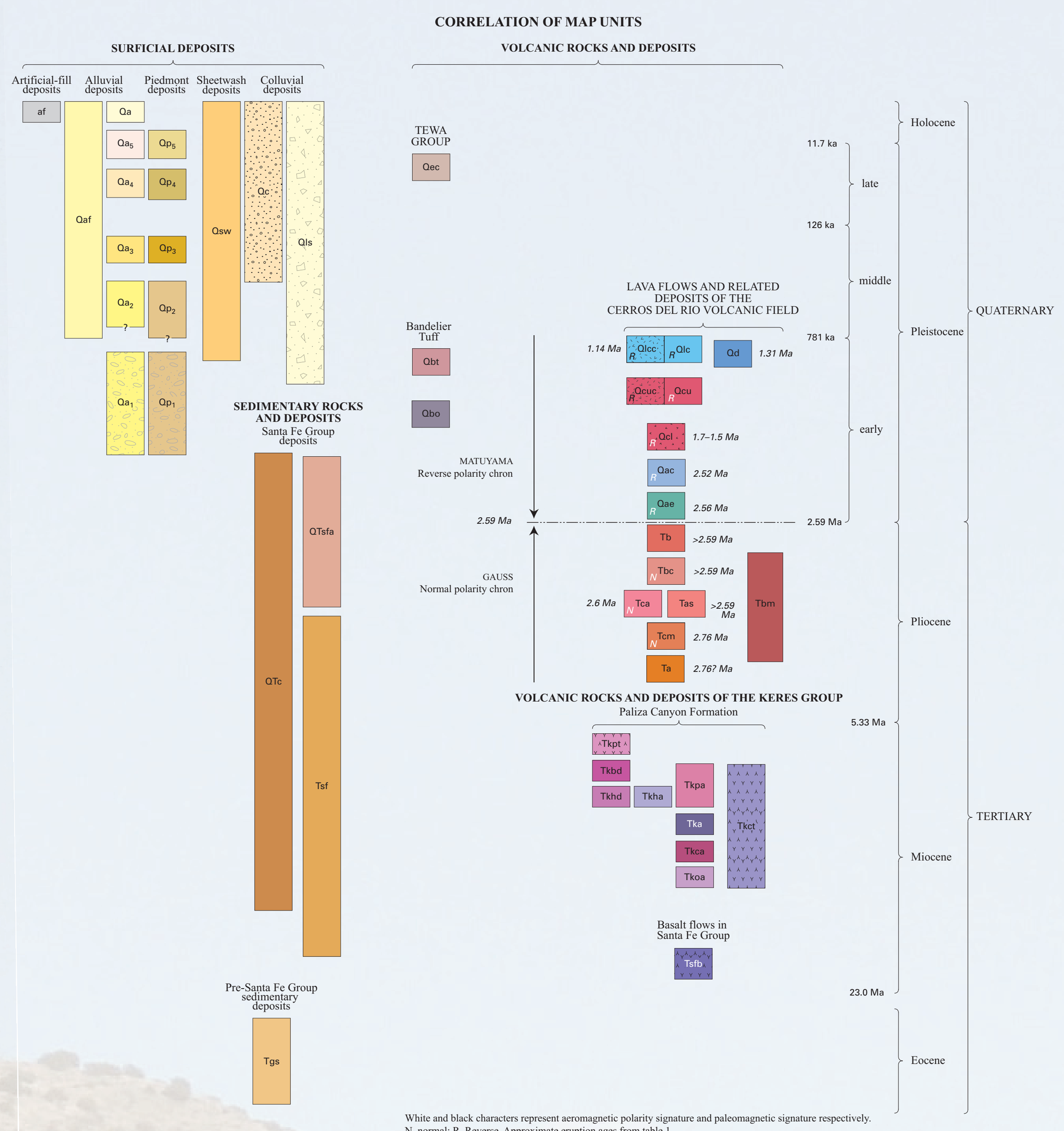
Scientific Investigations Map 3194



CORRELATION OF MAP UNITS



INTRODUCTION

The Cochiti Dam quadrangle is located in the southern part of the Española Basin (fig. 1) and contains sedimentary and volcanic deposits that record alluvial, colluvial, tectonic and volcanic processes over the past seventeen million years. The geology was mapped from 1997 to 1999 and modified from 2004 through 2008. The primary mapping responsibilities were as follows: Dethier mapped the surficial deposits, basin-fill sedimentary deposits, Miocene to Quaternary volcanic deposits of the Jemez volcanic field, and a preliminary version of fault distribution. Thompson and Hudson mapped the Pliocene and Quaternary volcanic deposits of the Cerros del Rio volcanic field. Thompson, Minor, and Hudson mapped surface exposures of faults and Hudson conducted paleomagnetic studies for stratigraphic correlations. Thompson prepared the digital compilation of the geologic map.

The mapped distribution of units is based primarily on interpretation of 1:16,000-scale, color aerial photographs taken in 1992, and 1:40,000-scale, black-and-white, aerial photographs taken in 1996 (U.S. Geological Survey National Aerial Photography Program (NAPP) available at *http://eros.usgs.gov/#/Guides/napp*). Most of the contacts on the map were transferred from the aerial photographs using a photogrammetric stereoplotter and subsequently field checked for accuracy and revised based on field determination of allostratigraphic and lithostratigraphic units. Determination of lithostratigraphic units in volcanic deposits was aided by geochemical data, $^{40}Ar/^{39}Ar$ geochronology, aeromagnetic and paleomagnetic data (Grauch and Bankey, 2003; Grauch and others, 2006; Thompson and others, 2006). Supplemental revision of mapped contacts was based on interpretation of U.S. Geological Survey (USGS) 1-meter orthoimagery. This version of the Cochiti Dam quadrangle geologic map uses the USGS 1:24,000-scale Cochiti Dam, New Mexico quadrangle as the topographic base overlain on a screened shaded relief base generated from 10-m digital elevation model (DEM) data from the USGS National Elevation Dataset (NED, *http://ned.usgs.gov/*); sun illumination is from the northwest at 45° above the horizon.

For continuity, geologic units are delineated in areas now inundated by Cochiti Lake and in areas where natural topography was altered by excavation of material used in the construction of Cochiti Dam. Contacts in these areas are drawn using topography mapped in 1953, guided by aerial-photographic interpretation and mapping in adjacent areas. Northwest of the Pajarito fault zone in the northwest part of the map area, contacts and map unit descriptions were derived largely from Goff and others (1990). Major tributary canyons to the Rio Grande are labeled in figure 2 and a simplified fault diagram is shown as figure 3.

ACKNOWLEDGMENTS

The authors thank Margaret E. Berry and Florian Maldonado of the U.S. Geological Survey for their thorough reviews that greatly improved the report. V.J.S. Grauch prepared, and assisted with interpretation of, aeromagnetic data used to constrain lithostratigraphic units in the volcanic rocks. We gratefully acknowledge Daniel P. Miggins of the U.S. Geological Survey and William McIntosh of New Mexico Institute of Mining and Technology for previously unreported $^{40}Ar/^{39}Ar$ age determinations of volcanic rocks referenced in this report.

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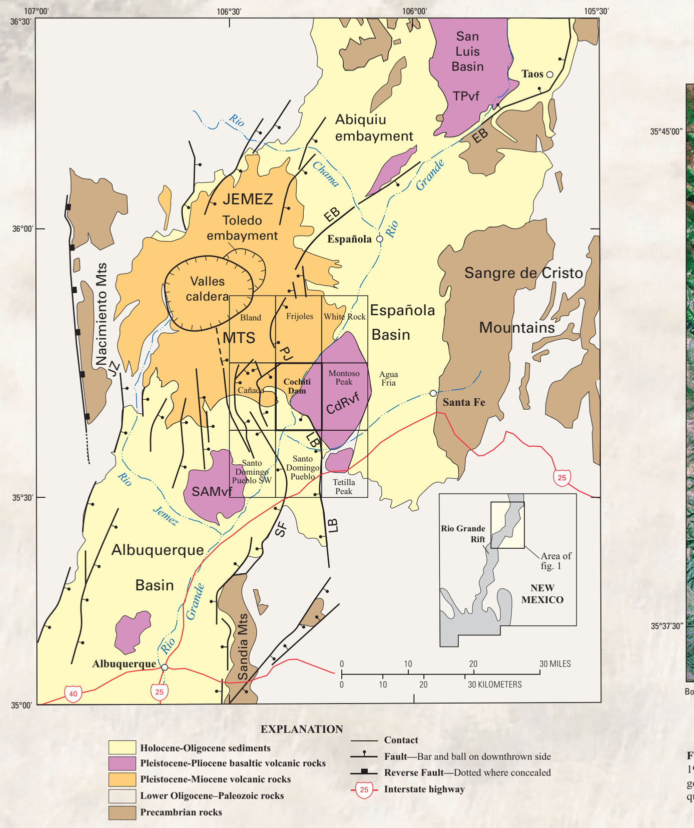
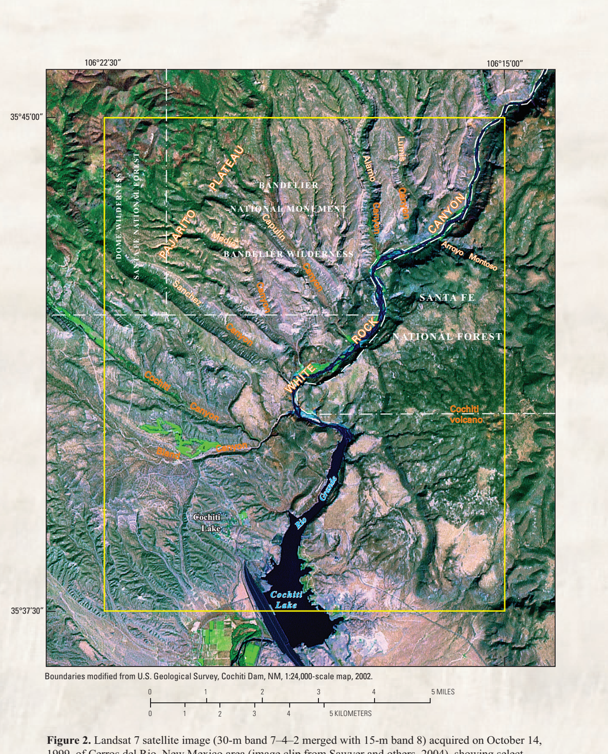
DESCRIPTION OF MAP UNITS

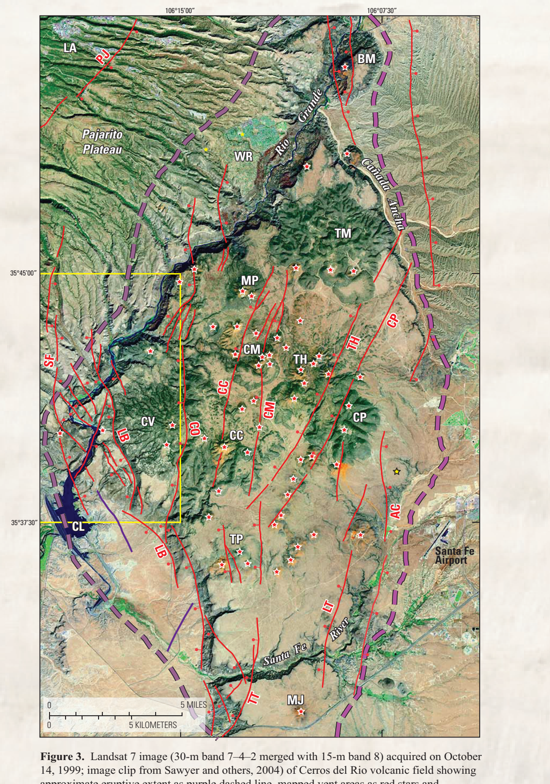
Otowi Member of Bandelier Tuff (early Pleistocene)—White to pink, nonwelded rhyolitic ash-flow tuff and a laminated to poorly sorted compound pumiceous fall unit as thick as 10 m, both containing abundant phenocrysts of chatoyant sanidine, quartz and sparse mafic phenocrysts. The Otowi Member consists of one to three thick ash-flow units comprising a compound-cooling unit as thick as 30 m. Lithic fragments generally are more abundant than in unit Qbt. Best

Paliza Canyon Formation

Peralta Tuff Member of Bearhead Rhyolite—White to tan, lithic-rich ash-fall tuff; pumice fragments contain phenocrysts of quartz, potassium feldspar, biotite+plagioclase; lithic fragments consist of volcanics from nearby sources. Tkpt fills in rugged volcanic topography on earlier Keres Group rocks; sources for all tuff units unknown; K-Ar age of lowermost tuff bed at Peralta Canyon type locality 6.81±0.15 Ma; maximum observed thickness about 170 m







Geologic Map of the Cochiti Dam Quadrangle, Sandoval County, New Mexico

By

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