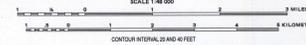


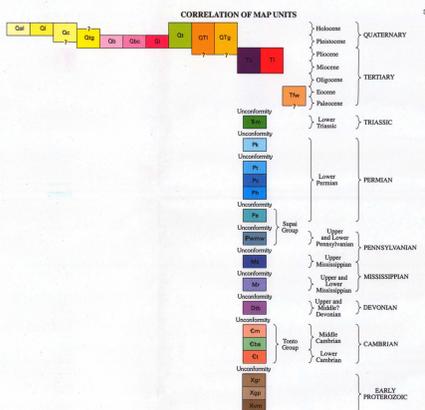
MAP A. BRECCIA-PIPE AND GEOLOGIC MAP OF THE HUAPAI AND GEOLOGIC MAP OF THE NORTHEASTERN PART OF THE HUAPAI INDIAN RESERVATION AND VICINITY, ARIZONA

By
K.J. Wenrich, G.H. Billingsley, and P.W. Huntoon
1997

Base Map, U.S. Geological Survey
1:250,000 General Topographic Map Series
Four Volume Series, Volume Three 25, Arizona Tract 20, Williams Fork
Watershed (Part 2), Williams Fork, 250,000 Scale, 1987
1:250,000 National Cartographic Database, 1987



Revised by P.W. Huntoon, geologist, U.S. Geological Survey
Geology by K.J. Wenrich, geologist, U.S. Geological Survey
Cartography by S. J. Smith and S. J. Smith
Map design approved by production July 26, 1997



- #### LIST OF MAP UNITS
- (See accompanying text for expanded descriptions of map units)
- Qal Alluvial deposits (Holocene)
 - Ql Landfills (Holocene and Pleistocene)
 - Qc Colluvium (Holocene and Pleistocene)
 - Qta Terrace deposits (Holocene and Pleistocene)
 - Qb Basal flow (Pleistocene)
 - Qbc Basaltic cinder deposits (Pleistocene)
 - Qd Intrusive volcanic rocks (Pleistocene)
 - Qtr Travertine deposits (Holocene and Pleistocene)
 - Qti Landfills (Holocene to Pliocene)
 - Qtm Younger gravel, unindurated (Holocene to Pliocene)
 - Qts Basalt (Pliocene)
 - Qti Intrusive volcanic rocks (Pliocene and Miocene)
 - Qts Fracture Wall Gravel of Koons (1964) (Eocene and Paleocene)

- #### SEDIMENTARY ROCKS
- Pa Monks Formation (Lower Triassic)
 - Pa Kabab Formation (Lower Permian)
 - Pa Tropicup Formation (Lower Permian)
 - Pa Cocconino Sandstone (Lower Permian)
 - Pa Hermit Shale (Lower Permian)
 - Pa Esplanade Sandstone (Lower Permian)
 - Pa Lower part of Sagu Group (Upper, Middle, and Lower Pennsylvanian)
 - Pa Superior Canyon Formation (Upper Mississippian)
 - Pa Redwall Limestone (Upper and Lower Mississippian)
 - Pa Temple Butte Formation (Upper and Middle Devonian)
 - Pa Shaw Limestone (Middle Cambrian)
 - Pa Bright Angel Shale (Middle Cambrian)
 - Pa Tapeats Sandstone (Middle and Lower Cambrian)

- #### METAMORPHIC ROCKS
- Pa Neofoliated granitic gneiss (Early Proterozoic)
 - Pa Layered mafic complex (Early Proterozoic)
 - Pa Paragunit (Early Proterozoic)

- #### CLASSIFICATION OF COLLAPSE FEATURES AND BRECCIA PIPES
- (Also refer to map 8, where characteristics of each feature and pipe are color coded.)
- C2 Collapse feature or breccia pipe—Selected features and pipes have one or more of the following characteristics: (1) circular or sub-circular plan view; (2) also have identification numbers (identification number range is from 500 to 1,200, assigned in order of field discovery); (3) outline of feature or pipe dashed where inferred; (4) breccia pipe (indicating the presence of breccia pipe); (5) mineralized rock containing copper minerals or surface radiation greater than 2.5 times background; (6) radially inward-dipping beds and alteration (bleaching or limonite staining); (7) basaltic inward-dipping beds, no alteration; (8) basaltic inward-dipping beds, no alteration; (9) visible alteration, no dipping beds; (10) circular topography or circular vegetation or soil pattern, no alteration or dipping beds; (11) questionable circular features—Few recognizable inward-dipping beds, but only little vegetation, vegetation change, or topographic change. Features appear roughly circular.
 - S—Subside
 - B—Breccia pipe mapped by Huntoon and Billingsley (1981), Billingsley and Huntoon (1983), or by authors of this map—Location shown by solid circles, see text.
 - C—Collapse features mapped by Huntoon and Billingsley (1981), Billingsley and Huntoon (1983), or by authors of this map—Location shown by solid circles, see text.

CONVERSION FACTORS

Quantity	To obtain
feet (ft)	centimeters (cm)
feet (ft)	meters (m)
miles (mi)	kilometers (km)

