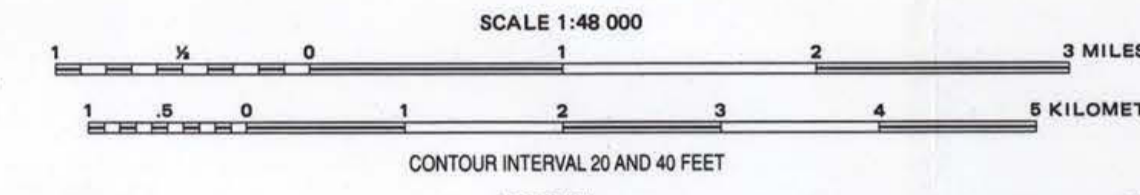


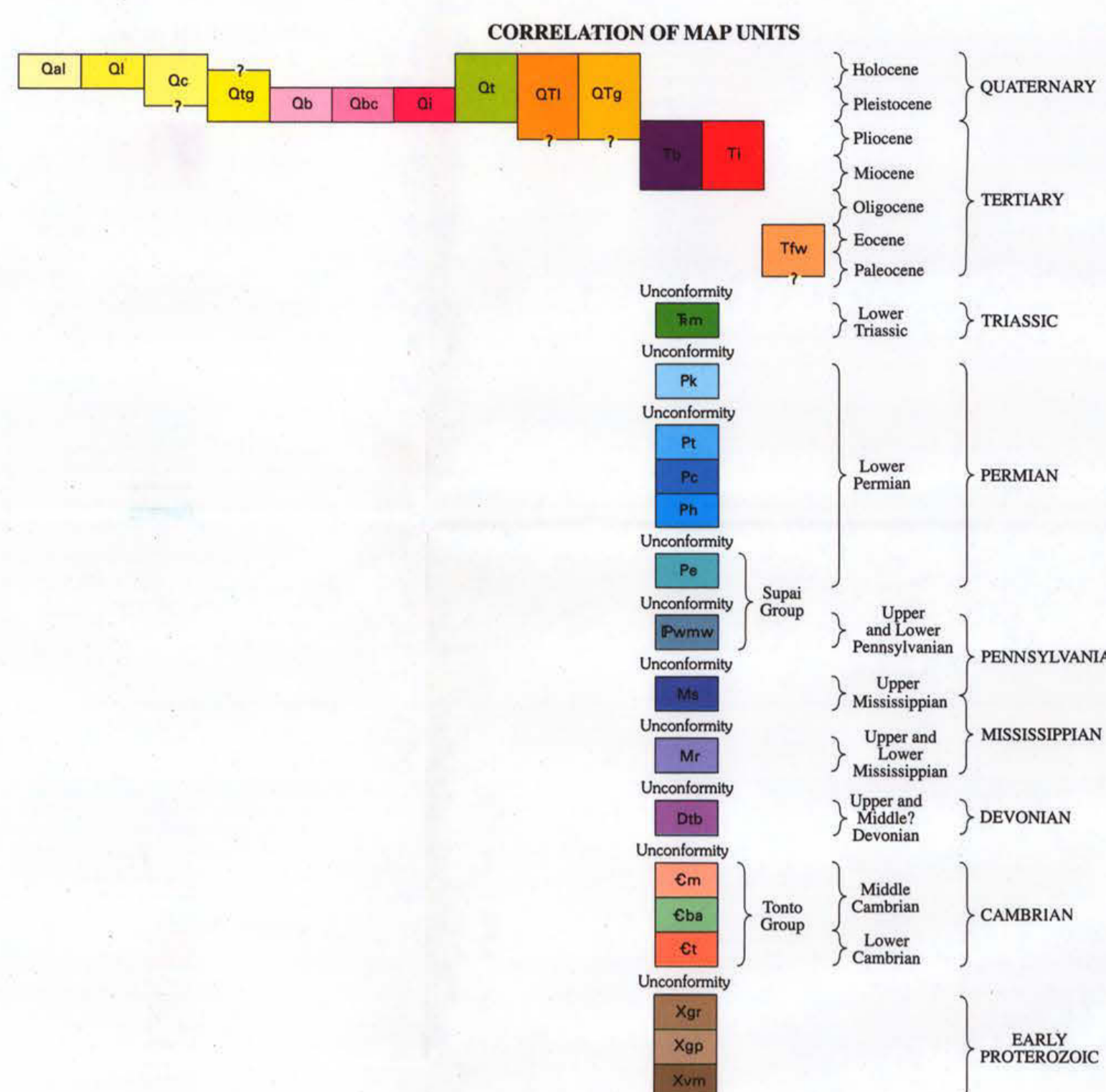
# MAP A. BRECCIA-PIPE AND GEOLOGIC MAP OF THE HUAPAI AND GEOLOGIC MAP OF THE NORTHEASTERN PART OF THE HUAPAI INDIAN RESERVATION AND VICINITY, ARIZONA

By  
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1997

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1:250,000 National Cartographic Database, 1997



Revised topographic by C. H. Billingsley, geologic  
map by K. J. Wenrich, geologic map by P. W. Huntoon,  
and geologic map by G. H. Billingsley and P. W. Huntoon.  
Geographic names by G. H. Billingsley and P. W. Huntoon.  
Map prepared by production July 26, 1997



- ### LIST OF MAP UNITS
- (See accompanying text for the expanded descriptions of map units)
- Qal Alluvial deposits (Holocene)
  - Ql Landfills (Holocene and Pleistocene)
  - Qc Cultivum (Holocene and Pleistocene)
  - Qd Terrace deposits (Holocene and Pleistocene)
  - Qe Basal flow (Pleistocene)
  - Qf Basaltic tuff deposits (Pleistocene)
  - Qg Intrusive volcanic rocks (Pleistocene)
  - Qh Travertine deposits (Holocene and Pleistocene)
  - Qti Landfills (Holocene to Pliocene)
  - Qtr Younger gravel, unsorted (Holocene to Pliocene)
  - Qts Basalt (Pliocene)
  - Qv Intrusive volcanic rocks (Pliocene and Miocene)
  - Qw Fracture fill gravel of Koons (Pliocene and Pliocene)

- ### SEDIMENTARY ROCKS
- Pa Mazonian Formation (Lower Permian)
  - Pb Kanab Formation (Lower Permian)
  - Pc Tropic Formation (Lower Permian)
  - Pd Coconino Sandstone (Lower Permian)
  - Pe Hermit Shale (Lower Permian)
  - Pf Esplanade Sandstone (Lower Permian)
  - Pg Lower part of Supai Group (Upper, Middle, and Lower Pennsylvanian)
  - Ph Surprise Canyon Formation (Upper Mississippian)
  - Pi Redwall Limestone (Upper and Lower Mississippian)
  - Pj Temple Butte Formation (Upper and Middle Devonian)
  - Pk Mazon Limestone (Middle Cambrian)
  - Pl Bright Angel Shale (Middle Cambrian)
  - Pm Tapesandstone (Middle and Lower Cambrian)

- ### METAMORPHIC ROCKS
- Pa Neofoliated granitic gneiss (Early Proterozoic)
  - Pb Layered mafic complex (Early Proterozoic)
  - Pc Paragneiss (Early Proterozoic)
- Contact  
--- Fault—Dashed where approximately located; dotted where concealed; ball and bar on downthrown side; number indicates estimated displacement in feet; number in parentheses indicates approximate offset to foot of Conoco deposits. Predicts alluvium and colluvium where shown bounding these units.  
--- Fold—Showing trace of axial plane and, if known, direction of plunge; dashed where approximately located; dotted where concealed.  
--- Mesosite—Axial trace located approximately midway between antiform and synformal hinges of folds; dotted where concealed. Length of arrow indicates approximate map distance between fold hinges.  
--- Syncline  
--- Anticline  
--- Strike and dip of strata—Estimated and determined from aerial photographs  
--- Strike and dip of schistosity  
--- River antiform—Axial trace follows course of tributary canyon or Colorado River; parentheses bracket individual anticlines  
• Volcanic vent

- ### 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) Breccia fragments and pipes also have identification numbers (identification number range is from 500 to 1200, assigned in order of field discovery). Outline of feature or dashed where inferred.
  - B Brecciated rock (including the breccia in a breccia pipe)
  - M—Massifed rock containing copper minerals or surface radiation greater than 2.5 times background
  - CI—Radially inward-dipping beds and alteration (bleaching or limonite staining)
  - CS—Radially inward-dipping beds, no alteration
  - CS—Visible alteration, no dipping beds
  - C4—Circular topography or circular vegetation or soil pattern, no alteration or dipping beds
  - C7—Questionable circular feature—Few recognizable inward-dipping beds, and/or little or no 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 and circles  
• C—Collapse features mapped by Huntoon and Billingsley (1981), Billingsley and Huntoon (1983), or by authors of this map—Location shown by solid circles, circles, and circles

