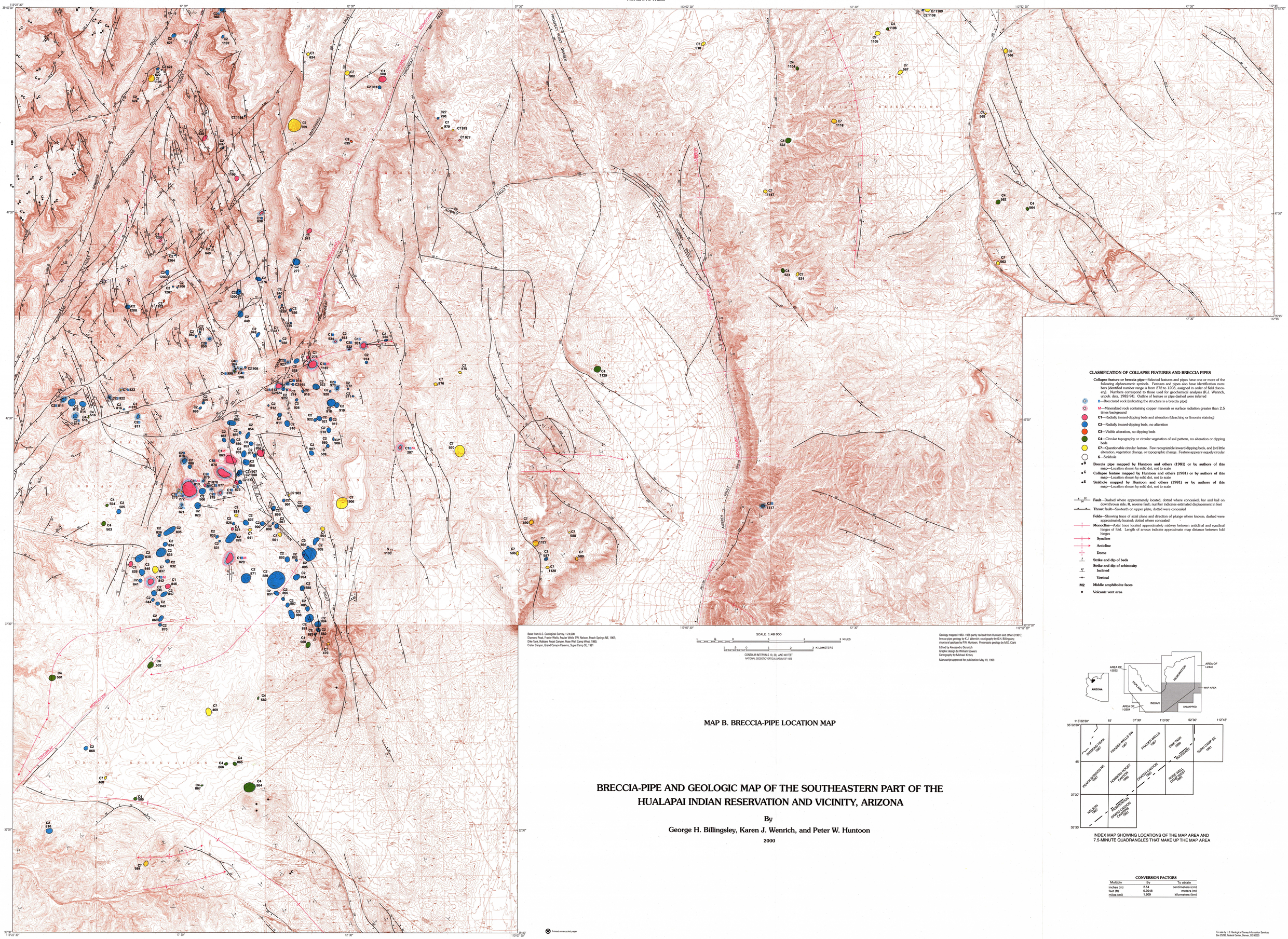
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
U.S. BUREAU OF INDIAN AFFAIRS AND THE
HUALAPAI TRIBE

GEOLOGIC INVESTIGATIONS SERIES
I-2643 (SHEET 2 OF 2)
Pamphlet accompanies map



Base from U.S. Geological Survey, 1:24,000
Diamond Peak, Frazier Wells, Frazier Wells SW, Nelson, Peach Springs NE, 1967;
Dike Tank, Robbers Roost Canyon, Rose Well Camp West, 1980;
Crater Canyon, Grand Canyon Caverns, Supai Camp SE, 1981

Geology mapped 1983–1986 partly revised from Huntoon and others (1981);
breccia-pipe geology by K.J. Wenrich; stratigraphy by G.H. Billingsley;
structural geology by P.W. Huntoon; Proterozoic geology by M.D. Clark

Edited by Alessandro Donatich
Graphic design by William Sowers
Cartography by Michael Kirtley

Manuscript approved for publication May 19, 1998

CLASSIFICATION OF COLLAPSE FEATURES AND BRECCIA PIPES

Collapse feature or breccia pipe—Selected features and pipes have one or more of the following alphanumeric symbols. Features and pipes also have identification numbers (identified number range is from 272 to 1208, assigned in order of field discovery). Numbers correspond to those used for geochemical analyses (K.J. Wenrich, unpub. data, 1982-94). Outline of feature or pipe dashed were inferred

- **B**—Brecciated rock (indicating the structure is a breccia pipe)
- **M**—Mineralized rock containing copper minerals or surface radiation greater than 2.5 times background
- **C1**—Radially inward-dipping beds and alteration (bleaching or limonite staining)
- **C2**—Radially inward-dipping beds, no alteration
- **C3**—Visible alteration, no dipping beds
- **C4**—Circular topography or circular vegetation of soil pattern, no alteration or dipping beds
- **C7**—Questionable circular feature. Few recognizable inward-dipping beds, and (or) little alteration, vegetation change, or topographic change. Feature appears vaguely circular
- **S**—Sinkhole

Breccia pipe mapped by Huntoon and others (1981) or by authors of this map—Location shown by solid dot, not to scale

Collapse feature mapped by Huntoon and others (1981) or by authors of this map—Location shown by solid dot, not to scale

Sinkhole mapped by Huntoon and others (1981) or by authors of this map—Location shown by solid dot, not to scale

Fault—Dashed where approximately located; dotted where concealed; bar and ball on downthrown side; R, reverse fault; number indicates estimated displacement in feet

Thrust fault—Sawteeth on upper plate; dotted were concealed

Folds—Showing trace of axial plane and direction of plunge where known; dashed were approximately located; dotted where concealed

Monocline—Axial trace located approximately midway between anticlinal and synclinal hinges of fold. Length of arrows indicate approximate map distance between fold hinges

Syncline

Anticline

Dome

Strike and dip of beds

Strike and dip of schistosity

Inclined

Vertical

M2 **Middle amphibolite faces**

Volcanic vent area

INDEX MAP SHOWING LOCATIONS OF THE MAP AREA AND 7.5-MINUTE QUADRANGLES THAT MAKE UP THE MAP AREA

MAP B. BRECCIA-PIPE LOCATION MAP

BRECCIA-PIPE AND GEOLOGIC MAP OF THE SOUTHEASTERN PART OF THE HUALAPAI INDIAN RESERVATION AND VICINITY, ARIZONA

By
George H. Billingsley, Karen J. Wenrich, and Peter W. Huntoon

2000

CONVERSION FACTORS

Multiply	By	To obtain
inches (in)	2.54	centimeters (cm)
feet (ft)	0.3048	meters (m)
miles (mi)	1.609	kilometers (km)

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