

**Bibliography of uranium- and  
copper-bearing breccia pipes on or near  
the Colorado Plateau of Arizona**

by

R.A. Trapp

Arizona Geological Survey  
**Open-File Report 97-13**

July 1997

**Arizona Geological Survey**  
416 W. Congress, Suite #100, Tucson, Arizona 85701

Includes 11 pages text

This report is preliminary and has not been edited  
or reviewed for conformity with Arizona Geological Survey standards



## **Bibliography of uranium- and copper-bearing breccia pipes on or near the Colorado Plateau of Arizona**

This report is a comprehensive listing of citations pertaining to the geology of uranium- and copper-bearing breccia pipes on or near the Colorado Plateau of Arizona. It consists of 205 citations and is derived from AZGEOBIB, a computerized annotated bibliographic database of more than 12,000 citations on the geology of Arizona.

AZGEOBIB has been under development for several years at the Arizona Geological Survey. It can be searched by location keywords or subject keywords or both. There are 555 location keywords and approximately 300 subject keywords plus over 2500 stratigraphic names that can be used in searching by subject. Contact the Arizona Geological Survey for more information concerning bibliographic searches.

A recent publication, AZGS OFR 96-6, **Physiographic area index for AZGEOBIB, v. 2.1 (including AZGS OFR 96-1 and OFR 95-2)** is designed to be used as a system to find geologic references for all locations in Arizona. AZGS OFR 96-6 consists of three parts. The first is a **physiographic area index** of the 555 location keywords used in AZGEOBIB. The second part is **AZGEOBIB, v. 2.1: A list of references on the geology of Arizona** (available separately as AZGS OFR 96-1), which is a listing of more than 12,000 citations pertaining to the geology of Arizona. The third part consists of copies of **AZGS OFR 95-2a and OFR 95-2b** which are maps showing the outlines of the 555 physiographic areas referenced in this report. OFR 95-2a has a comprehensive base map, while OFR 95-2b has a base map which shows township and range information only. Contact the Arizona Geological Survey for ordering information.

- Adamek, Paul, Behr, H.J., and von Pechmann, Edmund, 1992, Gold-bearing collapse-breccia pipe, Copper Mountain, northwestern Arizona, in Dickinson, K.A., ed., Short papers of the U.S. Geological Survey Uranium Workshop, 1990: U.S. Geological Survey Circular 1069, p. 51-53.
- Ashwill, W.R., 1957, The Orphan uranium mine, Grand Canyon, Arizona: U.S. Atomic Energy Commission Report RME-2082, 19 p.
- Baillieul, T.A., and Zollinger, R.C., 1980, National uranium resource evaluation, Grand Canyon quadrangle, Arizona: U.S. Department of Energy Open-File Report PGI-20, 43 p.
- Baillieul, T.A., and Zollinger, R.C., 1982, National Uranium Resource Evaluation, Grand Canyon quadrangle, Arizona: U.S. Department of Energy Report PGJ/F-020(82), 36 p., 6 microfiche, 18 sheets.
- Barrington, J., 1960, Piercement features near Cameron, Arizona. Part I. A breccia pipe at Black Peak. Part 2. Collapse features and silica plugs. Part 3. Alteration of Tuba dike: New York, Columbia University, Ph.D. dissertation.
- Barrington, J., and Kerr, P.F., 1961, Breccia pipe near Cameron, Arizona: Geological Society of America Bulletin, v. 72, no. 11, p. 1661-1674.
- Barrington, J., and Kerr, P.F., 1963, Collapse features and silica plugs near Cameron, Arizona: Geological Society of America Bulletin, v. 74, no. 10, p. 1237-1258.
- Been, J.M., and Szarzi, S.L., 1989, Helium and radon soil-gas surveys of collapse features on the Hualapai Indian Reservation: U.S. Geological Survey Open-File Report 89-0486, 29 p.
- Beikman, H.M., Peterson, Jocelyn A., Huber, D.F., and Butler, W.C., 1986, Metallic mineral and mineral-fuel resource potential map of Arizona showing major mineral deposits: U.S. Geological Survey Mineral Investigations Resource Map MR-94, scale 1:1,000,000.
- Billingsley, G.H., 1986, Relations of the Surprise Canyon and Watahomigi Formations to breccia pipes in the Grand Canyon, Arizona [*abs.*]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 342.
- Billingsley, G.H., 1993, Geologic map of Wolf Hole Mountain and vicinity, Mohave County, northwestern Arizona [*Wolf Hole Mtn. East, Wolf Hole Mtn. West, Lizard Point, and Purgatory Canyon 7.5 min*]: U.S. Geological Survey Miscellaneous Investigations Series Map I-2296, 1 sheet, scale 1:31,680.
- Billingsley, G.H., 1993, Geologic map of the Russell Spring quadrangle, northern Mohave County, Arizona: U.S. Geological Survey Open-File Report 93-0717, 17 p., 1 sheet, scale 1:24,000.
- Billingsley, G.H., 1994, Geologic map of Sullivan Draw and vicinity, Mohave County, northwestern Arizona [*St. George Canyon, Mustang Knoll, Sullivan Draw North, and Sullivan Draw South 7.5 min*]: U.S. Geological Survey Miscellaneous Investigations Series Map I-2396, 1 sheet, scale 1:31,680.
- Billingsley, G.H., Antweiler, J.C., Beard, L.S., Luchitta, I., and Lane, M.E., 1986, Mineral resource potential map of the Pigeon Canyon, Nevershine Mesa, and Snap Point Wilderness Study Areas, Mohave County, Arizona: U.S. Geological Survey Miscellaneous Field Studies Map MF-1860-A, 10 p., scale 1:50,000.
- Billingsley, G.H., Antweiler, J.C., and Ellis, C.E., 1983, Mineral resource potential map of the Kanab Creek Roadless Area, Coconino and Mohave Counties, Arizona: U.S. Geological Survey Miscellaneous Field Studies Map MF-1627-A, 10 p., 1 sheet, scale 1:48,000.
- Billingsley, G.H., and Ellis, C.E., 1984, Kanab Creek Roadless Area, Arizona, with contributions by Jack Antweiler, in Marsh, S.P., and others, eds., Wilderness mineral potential - Assessment of mineral resource potential in U.S. Forest Service lands studied 1964-84, v. 1: U.S. Geological Survey Professional Paper 1300, p. 77-78.
- Billingsley, G.H., Wenrich, K.J., and Huntoon, P.W., 1986, Breccia pipe and geologic map of the southeastern Hualapai Indian Reservation and vicinity, Arizona: U.S. Geological Survey Open-File Report 86-0458-B, 28 p., 2 sheets, scale 1:48,000.
- Billingsley, G.H., Wenrich, K.J., Huntoon, P.W., and Young, R.A., 1990, Breccia pipe and geologic map of the southwestern Hualapai Indian Reservation and vicinity, Arizona: U.S. Geological Survey Open-File Report 86-0458-D, 33 p., 2 sheets, scale 1:48,000.
- Bliss, J.D., 1993, Mineral resource assessment of undiscovered mineral deposits for selected mineral deposit types in the Kaibab National Forest, Arizona, with a section on Mineral resource assessment of solution-collapse breccia pipe uranium deposits, by J.D. Bliss and C.T. Pierson: U.S. Geological Survey Open-File Report 93-0329, 61 p.
- Bowles, C.G., 1965, Uranium-bearing pipe formed by solution and collapse of limestone, in Geological Survey research, 1965: U.S. Geological Survey Professional Paper 525-A, p. A12.

- Bowles, C.G., 1977, Economic implications of a new hypothesis of origin of uranium- and copper-bearing breccia pipes, Grand Canyon, Arizona, in Campbell, J.A., ed., Short papers of the U.S. Geological Survey Uranium-Thorium symposium, Golden Colo., April 27-28, 1977: U.S. Geological Survey Circular 753, p. 25-27.
- Bowles, C.G., and Reimer, G.M., 1986, A soil-gas helium survey of the Hualapai Indian Reservation, northwest Arizona: U.S. Geological Survey Open-File Report 86-0036, 53 p., scale 1:50,000.
- Bowles, C.G., Reimer, G.M., Been, J.M., and Murrey, D.G., 1986, Soil-gas helium distribution at the Shadow Mountain collapse, Cameron uranium district, Arizona, in Peterman, Z.E., and Schnabel, D.C., eds., Shorter contributions to isotope research: U.S. Geological Survey Bulletin 1622, p. 201-212.
- Brown, N.A., Mead, R.H., and McMurray, J.M., 1992, Relationship between collapse history and ore distribution in the Sage Breccia Pipe, northwestern Arizona, in Dickinson, K.A., ed., Short papers of the U.S. Geological Survey Uranium Workshop, 1990: U.S. Geological Survey Circular 1069, p. 54-56.
- Casebolt, L.L., Faurote, J.M., and Pillmore, D.M., 1986, Underground geologic evaluation; Hack Canyon breccia pipe uranium orebody, Mohave County, Arizona [*abs.*]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 345.
- Chenoweth, W.L., 1958, Exit road log; Grand Canyon rim drives and Orphan mine, in Anderson, R.Y., and Harshbarger, J.W., eds., Guidebook of the Black Mesa Basin, northeastern Arizona: New Mexico Geological Society 9th Field Conference Guidebook, p. 54-56.
- Chenoweth, W.L., 1960, The Riverview Mine, Coconino County, Arizona: U.S. Atomic Energy Commission Report TM-173, 5 p.
- Chenoweth, W.L., 1986, The Orphan Lode mine, Grand Canyon, Arizona; a case history of a mineralized collapse-breccia pipe: U.S. Geological Survey Open-File Report 86-0510, 126 p.
- Chenoweth, W.L., 1986, Developments in uranium in 1985: American Association of Petroleum Geologists Bulletin, v. 70, no. 19, p. 1632-1637.
- Chenoweth, W.L., 1986, The Orphan Lode; a case history of a uranium mine in a breccia pipe, Grand Canyon, Arizona [*abs.*]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 346.
- Chenoweth, W.L., 1988, The production history and geology of the Hacks, Ridenour, Riverview, and Chapel breccia pipes, northwestern Arizona: U.S. Geological Survey Open-File Report 88-0648, 60 p.
- Chenoweth, W.L., 1993, Geology and production history of the uranium ore deposits in the Cameron area, Coconino County, Arizona: Arizona Geological Survey Contributed Report CR-93-B, 30 p., 1 sheet, scale 1:62,500.
- Chenoweth, W.L., and Blakemore, P.P., 1961, The Riverview mine, Coconino County, Arizona: Plateau, v. 33, no. 4, p. 112-114.
- Chester, J.W., and Cutter, R.C., 1951, Investigation of the Hacks Canyon Mine, Mohave County, Arizona: U.S. Atomic Energy Commission Report TM-31, 2 p., 2 sheets, scales 1:44,000 and 1:425,000.
- Dodge, M., and McKlveen, J.W., 1970, Hogan's Orphan mine, in True West: Stillwater, Okla., Western Publishing, December, p. 6-10, 40-42.
- Duncan, J.T., 1990, Energy resources map of Arizona, in Duncan, J.T., and Mancini, F.P., Energy resources of Arizona: Arizona Geological Survey Map M-28, 1 sheet, scale 1:1,000,000 [available only with Duncan, J.T., and Mancini, F.P. (1991), Arizona Geological Survey Down-to-Earth Series DTE-1].
- Duncan, J.T., and Mancini, F.P., 1991, Energy resources of Arizona: Arizona Geological Survey Down-to-Earth Series DTE-1, 17 p. 1 sheet, scale 1:1,000,000.
- Finch, W.I., 1992, Grade and tonnage model of solution-collapse breccia pipe uranium deposits, in Bliss, J.D., ed., Developments in mineral deposit modeling: U.S. Geological Survey Bulletin 2004, p. 36-38.
- Finch, W.I., 1992, Descriptive model of solution-collapse breccia pipe uranium deposits, in Bliss, J.D., ed., Developments in mineral deposit modeling: U.S. Geological Survey Bulletin 2004, p. 33-35.
- Finch, W.I., Pierson, C.T., McCammon, R.B., Otton, J.K., Sutphin, H.B., and Wenrich, K.J., 1990, New developments in uranium endowment assessment in the United States, in Carter, L.M.H., ed., USGS research on energy resources--1990 program and abstracts - Sixth McKelvey Forum on mineral and energy resources: U.S. Geological Survey Circular 1060, p. 29-30.
- Finch, W.I., Pierson, C.T., McCammon, R.B., Otton, J.K., Sutphin, H.B., and Wenrich, K.J., 1992, New assessments of uranium endowment for two regions in the United States, in Dickinson, K.A., ed., Short papers of the U.S. Geological Survey Uranium Workshop, 1990: U.S. Geological Survey Circular 1069, p. 7-11.

- Finch, W.I., Sutphin, H.B., Pierson, C.T., McCammon, R.B., and Wenrich, K.J., 1990, The 1987 estimate of undiscovered uranium endowment in the solution-collapse breccia pipes in the Grand Canyon region of northern Arizona and adjacent Utah: U.S. Geological Survey Circular 1051, 19 p.
- Fischer, R.P., 1968, The uranium and vanadium deposits of the Colorado Plateau region, in Ridge, J.D., ed., Ore deposits of the United States, 1933-67 (Graton-Sales Volume), v. 1: American Institute of Mining, Metallurgical, and Petroleum Engineers, p. 735-746.
- Flanigan, V.J., and Long, C.L., 1985, Geophysical exploration for breccia pipes on the Colorado Plateau of northern Arizona [abs.], in Krafft, K., ed., USGS research on mineral resources--1985, program and abstracts; V.E. McKelvey forum on mineral and energy resources: U.S. Geological Survey Circular 949, p. 11-12.
- Flanigan, V.J., Mohr, P., Tippens, C., and Snetterfit, M., 1986, Electrical character of collapse breccia pipes on the Coconino Plateau, northern Arizona: U.S. Geological Survey Open-File Report 86-0521, 50 p.
- Flanigan, V.J., Senterfit, R.M., Mohr, P., and Wenrich, K.J., 1987, The geophysical character of solution-collapse breccia pipes on the Coconino Plateau of northern Arizona [abs.], in Sachs, J.S., ed., USGS research on mineral resources--1987, program and abstracts; third annual V.E. McKelvey forum on mineral and energy resources: U.S. Geological Survey Circular 995, p. 21.
- Flanigan, V.J., Tippens, C.L., Senterfit, M.R., and Mohr, P.J., 1986, Geophysical exploration criteria for collapse breccia pipes, northern Arizona [abs.]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 355.
- Flanigan, V.J., Webring, M.W., and Mohr, P., 1986, Preliminary geology interpretation of the high resolution aeromagnetic map of part of the Coconino Plateau, Hualapai Indian Reservation, Arizona: U.S. Geological Survey Open-File Report 87-0053, 8 p., 2 plates, scale 1:48,000.
- Gabelman, J.W., 1957, The origin of collapsed-plug pipes: Mines Magazine (Colorado School of Mines Alumni Association), v. 47, no. 9, p. 67-72, 79-80.
- Gabelman, J.W., 1977, Migration of uranium and thorium - exploration significance: American Association of Petroleum Geologists, Studies in Geology no. 3, 168 p.
- Gabelman, J.W., and Boyer, W.H., 1958, Relation of Uranium deposits to feeder structures, associated alteration and mineral zones, in Survey of Raw Material Resources: United Nations International Conference on the Peaceful Uses of Atomic Energy, 2nd, Geneva, Switz., 1958, Proceedings, v. 2, p. 338-350.
- Garrels, R.M., and Larsen, E.S., 3d, eds., 1959, Geochemistry and mineralogy of the Colorado Plateau uranium ores: U.S. Geological Survey Professional Paper 320, 236 p.
- Gornitz, V.M., 1969, Mineralization, alteration and mechanism of emplacement, Orphan ore deposit, Grand Canyon, Arizona: New York, Columbia University, Ph.D. dissertation, 196 p. [Abstract in Dissertation Abstracts International, v. 30, p. 1753-B.].
- Gornitz, V.M., 1986, Uranium mineralization at the Orphan mine breccia pipe, Grand Canyon, Arizona [abs.]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 357.
- Gornitz, V.M., and Kerr, P.F., 1970, Uranium mineralization and alteration, Orphan mine, Grand Canyon, Arizona: Economic Geology, v. 65, no. 7, p. 751-768.
- Gornitz, V.M., Wenrich, K.J., Sutphin, H.B., and Vidale-Buden, R., 1988, Origin of the Orphan mine breccia pipe uranium deposit, Grand Canyon, Arizona, in Vassiliou, A.H., and others, eds., Process mineralogy VII--Applications to mineral beneficiation technology and mineral exploration, with special emphasis on disseminated carbonaceous gold ores, Proceedings of a symposium held during the Metallurgical Society Annual Meeting, Denver, Colo., 1987: Warrendale, Pa., Metallurgical Society, p. 281-301.
- Granger, H.C., and Raup, R.B., 1962, Reconnaissance study of uranium deposits in Arizona: U.S. Geological Survey Bulletin 1147-A, 54 p.
- Greeley, M.N., 1978, Proven copper reserves in Arizona, Table XXII, in The primary copper industry of Arizona in 1975 and 1976: Arizona Department of Mineral Resources Special Report no. 2, SR-2, p. 83-87.
- Greeley, M.N., 1978, The primary copper industry of Arizona in 1975-1976: Arizona Department of Mineral Resources Special Report no. 2, SR-2, 87 p, 1 sheet.
- Green, M.W., Byers, V.P., Condon, S.M., Huffman, A.C., Jr., Kirk, A.R., Lupe, R.D., Pierson, C.T., Robertson, J.F., Sikkink, P.G.L., Spirakis, C.S., Thaden, R.E., Wenrich-Verbeek, K.J., and Zech, R.S., 1982, National Uranium Resource Evaluation, Gallup quadrangle, Arizona and New Mexico: U.S. Department of Energy Open-File Report PGJ/F-013(82), 73 p., 8 microfiche, 15 sheets.

- Green, M.W., Byers, V.P., Condon, S.M., and others, 1982, National Uranium Resource Evaluation, Shiprock quadrangle, Arizona, New Mexico, Colorado, and Utah: U.S. Department of Energy Open-File Report PGJ/F-024(82), 70 p., 6 microfiche, 17 sheets.
- Hasbrouck, W.P., 1986, Results of shallow seismic studies across two collapse breccia pipe sites on the Hualapai Reservation, northern Arizona [*abs.*]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 360.
- Hasbrouck, W.P., 1986, Results of shallow seismic studies across two collapse breccia pipe sites on the Hualapai Reservation, northern Arizona [*abs.*]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 360.
- Heikes, V.C., 1907, Arizona, in Lindgren, W., and others, Gold and Silver, in Mineral Resources of the United States, calendar year 1906: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 147-177.
- Heikes, V.C., 1908, Arizona, in Gold, Silver, Copper, Lead, and Zinc in Western States (mine production), in Mineral Resources of the United States, calendar year 1907, Part I - Metallic Products: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 150-187.
- Heikes, V.C., 1909, Arizona, in Gold, Silver, Copper, Lead, and Zinc in the Western States (mine production), in Mineral Resources of the United States, calendar year 1908, Part I - Metallic Products: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 286-313.
- Heikes, V.C., 1910, Arizona, in Gold, Silver, Copper, Lead, and Zinc in the Western States (mine production), in Mineral Resources of the United States, calendar year 1909, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 232-259.
- Heikes, V.C., 1911, Arizona, in Gold, Silver, Copper, Lead, and Zinc in the Western States (mine production), in Mineral Resources of the United States, calendar year 1910, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 320-347.
- Heikes, V.C., 1912, Arizona, in Gold, Silver, Copper, Lead, and Zinc in the Western States (mine production), in Mineral Resources of the United States, calendar year 1911, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 420-462.
- Heikes, V.C., 1913, Arizona, in Precious and semiprecious metals in the Western States in 1912 (mine production), in Mineral Resources of the United States, calendar year 1912, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 536-568.
- Heikes, V.C., 1914, Gold, silver, copper, lead, and zinc in Arizona, in Mineral Resources of the United States, calendar year 1913, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 673-707.
- Heikes, V.C., 1916, Gold, silver, copper, lead, and zinc in Arizona, in Mineral Resources of the United States, 1914, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 427-475.
- Heikes, V.C., 1917, Gold, silver, copper, lead, and zinc in Arizona, in Mineral Resources of the United States, 1915, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 485-521.
- Heikes, V.C., 1919, Gold, silver, copper, lead, and zinc in Arizona (mines report), in Mineral Resources of the United States, 1916, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 283-319.
- Heikes, V.C., 1921, Gold, silver, copper, lead, and zinc in Arizona, in Mineral Resources of the United States, 1917, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 509-556.
- Heikes, V.C., 1921, Gold, silver, copper, lead, and zinc in Arizona, in Mineral Resources of the United States, 1918, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 329-368.
- Heikes, V.C., 1922, Gold, silver, copper, lead, and zinc in Arizona, in Mineral Resources of the United States, 1919, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 331-371.
- Heikes, V.C., 1922, Gold, silver, copper, lead, and zinc in Arizona, in Mineral Resources of the United States, 1920, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 339-364.
- Heikes, V.C., 1924, Gold, silver, copper, lead, and zinc in Arizona, in Mineral Resources of the United States, 1921, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 311-339.
- Heikes, V.C., 1925, Gold, silver, copper, lead, and zinc in Arizona, in Mineral Resources of the United States, 1922, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 489-518.
- Heikes, V.C., 1927, Gold, silver, copper, and lead in Arizona, in Mineral Resources of the United States, 1924, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 515-548.

- Heikes, V.C., 1927, Gold, silver, copper, lead, and zinc in Arizona, in Mineral Resources of the United States, 1923, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 515-548.
- Heikes, V.C., 1928, Gold, silver, copper, lead, and zinc in Arizona, in Mineral Resources of the United States, 1925, Part I - Metals: U.S. Geological Survey (Washington, D.C., Government Printing Office), p. 563-600.
- Hewett, D.F., Callaghan, E., Moore, B.N., Nolan, T.B., Rubey, W.W., and Schaller, W.T., 1936, Mineral resources of the region around Boulder Dam: U.S. Geological Survey Bulletin 871, 197 p., 3 sheets, scale 1:1,500,000.
- Hoffman, M.E., 1977, Origin and mineralization of breccia pipes, Grand Canyon district, Arizona: Laramie, University of Wyoming, M.S. thesis, 51 p.
- Hose, L.D., and Strong, T.R., 1981, The genetic relationship between breccia pipes and caves in non-karstic terranes in northern Arizona, in Beck, B.F., ed., Eighth International Congress of Speleology, Proceedings, v. 1: Americus, Ga., Georgia Southwestern College, Dept. of Geology, p. 136-138 [available from National Speleological Society].
- Huntoon, P.W., 1986, Ground water flow directions in Colorado Plateau breccia pipes [*abs.*]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 363.
- Huntoon, P.W., 1996, Large-basin ground water circulation and paleo-reconstruction of circulation leading to uranium mineralization in Grand Canyon breccia pipes, Arizona: Mountain Geologist, v. 33, no. 3, p. 71-84.
- Keith, Stanley B., Schnabel, L., DeWitt, E., Gest, D.E., and Wilt, J.C., 1983, Map, description and bibliography of the mineralized areas of the Basin and Range province in Arizona: U.S. Geological Survey Open-File Report 84-0086, 129 p., 1 sheet, scale 1:500,000.
- Kerr, P.F., 1958, Uranium emplacement in the Colorado Plateau: Geological Society of America Bulletin, v. 69, no. 10, p. 1075-1111.
- Kerr, P.F., and Barrington, J., 1963, Breccia pipe near Cameron, Arizona; reply: Geological Society of America Bulletin, v. 74, no. 2, p. 233-237.
- Kofford, M.E., 1956, The Orphan ore deposit: Golden Crown Mining Co., unpublished report [cited by Kofford (1969)].
- Kofford, M.E., 1969, The Orphan mine, in Baars, D.L., ed., Geology and natural history of the Grand Canyon region: Four Corners Geological Society 5th Field Conference Guidebook, p. 190-194.
- Krewedl, D.A., and Carisey, J.-C., 1986, Contributions to the geology of uranium mineralized breccia pipes in northern Arizona, in Beatty, B., and Wilkinson, P.A.K., eds., Frontiers in geology and ore deposits of Arizona and the Southwest: Arizona Geological Society Digest, v. 16, p. 179-186.
- Kwarteng, A.M.Y., 1988, Remote sensing applied to the exploration for uranium-mineralized breccia pipes in northwestern Arizona: El Paso, University of Texas, Ph.D. dissertation, 195 p.
- Kwarteng, A.M.Y., and Chavez, P.S., Jr., 1989, Digital image processing of airborne geophysical data for uranium-mineralized breccia pipes exploration in northwestern Arizona [*abs.*], in International Geological Congress, 28th, Washington, D.C., July 9-19, 1989, Abstracts, v. 2: International Geological Congress, p. 248.
- Kwarteng, A.M.Y., Chavez, P.S., Jr., and Wenrich, K.J., 1988, Application of Landsat Thematic Mapper digital data to the exploration for uranium mineralized breccia pipes in northwestern Arizona [*abs.*], in Thematic Conference, 6th, Houston, Tex., May 16-19, 1988, Summaries: Ann Arbor, Environmental Research Institute of Michigan, p. 37.
- Kwarteng, A.M.Y., Chavez, P.S., Jr., Wenrich, K.J., and Goodell, P.C., 1988, Application of Landsat Thematic Mapper digital data to the exploration for uranium mineralized breccia pipes in northwestern Arizona in Thematic Conference, 6th, Houston, Tex., May 16-19, 1988, Papers: Ann Arbor, Environmental Research Institute of Michigan, p. 239-248.
- Kwarteng, A.M.Y., Goodell, P.C., Pingitore, N.E., Jr., and Wenrich, K.J., 1989, Spectral discrimination of uranium-mineralized breccia pipes in northwestern Arizona [*abs.*]: American Association of Petroleum Geologists Bulletin, v. 73, no. 3, p. 376.
- Landais, P., 1986, Geochemical analyses of the organic matters associated with the breccia pipes in the Grand Canyon area [*abs.*]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 389.
- Landais, P., Brosse, E., Carisey, J.C., Meyer, A.J., and Pagel, M., 1985, Combined use of fluid inclusions, fission tracks, organic matter analyses and computer modelling for assessing the thermal history of Permian formations (Grand Canyon region, Arizona, U.S.A.) [*abs.*]: Chemical Geology, v. 70, p. 185.

- Landais, P., Meyer, A., Carisey, J.C., Krewedl, D.A., Brosse, E., and Forbes, P., 1989, Geothermal analyses of the breccia pipes (Arizona); organic matter, fluid inclusions, fission tracks and computerized modeling [abs.], in Muller-Kahle, E., chairperson, Uranium resources and Geology of North America; Technical Committee Meeting, Saskatoon, Saskatchewan, Canada, Sept. 1-3, 1987, Proceedings: International Atomic Energy Agency Report IAE-TECDOC-500, p. 239.
- Laughlin, W.D., 1983, The hydrogeologic controls on water quality, ground water circulation, and collapse breccia pipe formation in the western part of the Black Mesa hydrologic basin, Coconino County, Arizona: Laramie, University of Wyoming, M.S. thesis, 117 p.
- Leicht, W.C., 1973, Minerals of the Grandview mine: Mineralogical Record, v. 2, no. 5, p. 215-221.
- Lovejoy, E.M.P., 1954, Results of an aerial radiometric reconnaissance of the Ridenour mine district, Hualapai Indian Reservation, Coconino County, Arizona [supplement], in Miller, R., Copper-uranium deposit at the Ridenour Mine, Hualapai Indian Reservation, Coconino County, Arizona, Part 1: U.S. Atomic Energy Commission Report RME-2014, p. 19-23.
- Lucchitta, Ivo, Beard, L.S., Billingsley, G.H., Antweiler, J.C., Rieck, H.J., and Lane, M.E., 1983, Geology and mineral resource potential of the Pigeon Canyon (AZ-010-109), Nevershine Mesa (AZ-010-105A), and Snap Point (AZ-010-105B) Wilderness Study Areas, Mohave County, Arizona: U.S. Geological Survey Open-File Report 83-0888, 21 p., 1 sheet, scale 1:50,000.
- Ludwig, K.R., Rasmussen, J.D., and Simmons, K.R., 1986, Age of uranium ores in collapse-breccia pipes in the Grand Canyon area, northern Arizona [abs.]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 392.
- Ludwig, K.R., and Simmons, K.R., 1988, Progress in U/Pb isotope studies of collapse-breccia pipes in the Grand Canyon region, northern Arizona [abs.]: Geological Society of America Abstracts with Programs, v. 20, no. 7, p. A139.
- Ludwig, K.R., and Simmons, K.R., 1992, U-Pb dating of uranium deposits in collapse breccia pipes of the Grand Canyon region: Economic Geology, v. 87, no. 7, p. 1747-1765.
- Magleby, D.N., 1961, Orphan lode uranium mine, Grand Canyon, Arizona: U.S. Atomic Energy Commission Report TM-134, 17 p.
- Marks, R.L., 1961, Mining uranium on the rim of Grand Canyon: Explosives Engineer, v. 39, no. 6, p. 165-170.
- Mascarenas, J.F., Burmaster, B., Van Gosen, B.S., and Wenrich, K.J., 1986, The use of soil sampling for breccia pipe exploration [abs.]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 394.
- Mathews, G.W., 1978, Uranium occurrences of uncertain genesis, in Mickle, D.G., and Mathews, G.W., eds., Geologic characteristics of environments favorable for uranium deposits: U.S. Department of Energy Report GJBX-67(78), p. 221-250.
- Mathews, G.W., 1978, Classification of uranium deposits of uncertain genesis, in Mickle, D.G., ed., A preliminary classification of uranium deposits: U.S. Department of Energy Report GJBX-63(78), p. 53-71.
- Mathisen, I.W., Jr., 1987, Arizona Strip breccia pipe program; exploration, development, and production [abs.]: American Association of Petroleum Geologists Bulletin, v. 71, no. 5, p. 590.
- McBirney, A.R., 1963, Breccia pipe near Cameron, Arizona; discussion: Geological Society of America Bulletin, v. 74, no. 2, p. 227-232.
- McDonnell, J.R., Jr., 1984, Mineral investigation of the Hack Canyon Wilderness Study Area, Mohave County, Arizona: U.S. Bureau of Mines Mineral Land Assessment Open File Report MLA 37-84, 15 p.
- McKee, E.D., 1930, Copper deposits in the Grand Canyon: Grand Canyon Nature Notes, v. 4, p. 61.
- McKee, E.H., Gomez, P.M., and Hibbschman, M.H., 1977, Status of mineral resources information for the Hualapai Indian Reservation, Arizona: U.S. Geological Survey Administrative Report BIA-31, 38 p.
- Mickle, D.G., ed., 1978, A preliminary classification of uranium deposits: U.S. Department of Energy Report GJBX-63(78), 78 p.
- Mickle, D.G., and Mathews, G.W., eds., 1978, Geologic characteristics of environments favorable for uranium deposits: U.S. Department of Energy Report GJBX-67(78), 250 p.
- Miller, D.S., 1960, The isotopic geochemistry of uranium, lead, and sulfur in the Colorado Plateau uranium ores: New York, Columbia University, Ph.D. dissertation.
- Miller, D.S., and Kulp, J.L., 1958, Isotopic study of some Colorado Plateau ores: Economic Geology, v. 53, no. 8, p. 937-948.
- Miller, D.S., and Kulp, J.L., 1963, Isotopic evidence on the origin of the Colorado Plateau uranium ores: Geological Society of America Bulletin, v. 74, no. 5, p. 609-629.

- Miller, R.D., 1954, Copper-uranium deposit at the Ridenour mine, Hualapai Indian Reservation, Coconino County, Arizona, Part I, with a supplement on Results of an aerial radiometric examination of the Ridenour mine district, Hualapai Indian Reservation, Coconino County, Arizona, by E.M.P. Lovejoy: U.S. Atomic Energy Commission Report RME-2014, 23 p.
- Mining World, 1959, How Western Gold mines uranium in Grand Canyon: Mining World [San Francisco], v. 21, no. 1, p. 32-35.
- Moore, R.T., and Roseveare, G.H., 1969, Silver, in Mineral and water resources of Arizona: Arizona Bureau of Mines Bulletin 180, p. 251-270.
- Nations, J.D., 1978, The geology of Arizona, its energy resources and potential: Interstate Oil Compact Commission Committee Bulletin, v. 20, no. 2, p. 42-53.
- Nations, J.D., 1978, The geology of Arizona, its energy resources and potential: Arizona Bureau of Geology and Mineral Technology Open-File Report 78-03, 12 p.
- Nuclear Exchange Corporation (NUEXCO), 1978, Uranium occurrences in breccia pipes: Nuclear Exchange Corporation Report 123, p. 2.0-2.2.
- Nuclear Exchange Corporation (NUEXCO), 1982, The Arizona Strip: Nuclear Exchange Corporation Report 163, p. 14-16.
- Nuclear Exchange Corporation (NUEXCO), 1983, The Arizona Strip: Nuclear Exchange Corporation Report 176, p. 19-24.
- O'Neill, A.J., Nystrom, R.J., and Thiede, D.S., 1981, National Uranium Resource Evaluation, Williams quadrangle, Arizona: U.S. Department of Energy Report GJQ-009(81), 56 p., 3 microfiche, 19 sheets, scale 1:.
- Payne, A.L., 1959, Geology and uranium deposits of the Colorado Plateau: Stanford, Stanford University, Ph.D. dissertation, 245 p.
- Peirce, H.W., Keith, S.B., and Wilt, J.C., 1970, Coal, oil, natural gas, helium, and uranium in Arizona: Arizona Bureau of Mines Bulletin 182, 289 p., 19 sheets, scales 1:300,000, 1:500,000, 1:1,000,000, 1:2,500,000 [reprinted 1975].
- Rasmussen, J.D., Cunningham, C.G., and Gautier, A.M., 1986, Primary fluid inclusions in sphalerite from the Hack 1 and 2 mines, Mohave County, Arizona [*abs.*]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 404.
- Reid, A.R., and Rasmussen, J.D., 1990, The use of soil-gas CO<sub>2</sub> in the exploration for sulfide-bearing breccia pipes in northern Arizona: Journal of Geochemical Exploration, v. 38, nos. 1/2, p. 87-101.
- Reimer, G.M., 1985, Helium soil gas survey of a collapse feature on the Hualapai Indian Reservation, Arizona: U.S. Geological Survey Open-File Report 85-0394, 12 p.
- Reimer, G.M., and Been, J.M., 1986, Helium soil-gas surveys of collapse features on the Hualapai Indian Reservation, Arizona [*abs.*]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 404.
- Reimer, G.M., and Been, J.M., 1987, Helium soil gas surveys of several collapse features and breccia pipes on the Hualapai Indian Reservation, Arizona: U.S. Geological Survey Open-File Report 87-0014, 11 p.
- Rich, R.A., Holland, H.D., and Petersen, U., 1975, Vein-type uranium deposits - Prepared for the U.S. Energy Research and Development Administration, Grand Junction Office, under contract no. AT(05-1)-1640: U.S. Department of Energy Report GJO-1640, 383 p.
- Roller, J.A., 1987, Fracture history of the Redwall Limestone and lower Supai Group, western Hualapai Indian Reservation, northwestern Arizona: U.S. Geological Survey Open-File Report 87-0359, 33 p.
- Roller, J.A., 1989, Fracture history of the Redwall Limestone, lower Supai Group, and Tertiary units on the Hualapai Indian Reservation, northwestern Arizona: Additional data to Open-File Report 87-359: U.S. Geological Survey Open-File Report 89-0463, 42 p.
- Scarborough, R.B., 1980, Uranium in Arizona: Fieldnotes [Arizona Bureau of Geology and Mineral Technology], v. 10, no. 4, p. 1-5.
- Scarborough, R.B., 1981, Radioactive occurrences and uranium production in Arizona: U.S. Department of Energy Report GJBX-143(81), 297 p., 21 sheets, scales 1:24,000, 1:62,500, 1:125,000 and 1:250,000 [also released as Arizona Bureau of Geology and Mineral Technology Open-File Report 81-01].
- Scarborough, R.B., 1981, Radioactive occurrences and uranium production in Arizona - Final report: Arizona Bureau of Geology and Mineral Technology Open-File Report 81-01, 297 p., 21 sheets, scales 1:24,000, 1:62,500, 1:125,000 and 1:250,000 [also released as U.S. Department of Energy Report GJBX-143(81)].

- Schafer, R.N., 1988, An example of a northern Arizona solution-collapse breccia pipe - Geology of the Pigeon Pipe [*abs.*]: Geological Society of America Abstracts with Programs, v. 20, no. 7, p. A139.
- Schmitt, L.J., 1988, A review of the association of petroliferous materials with uranium and other metal deposits in sedimentary rocks in the United States: U.S. Geological Survey Bulletin 1798, 18 p.
- Senterfit, R.M., Mohr, P., and Horton, R., 1985, Geophysical studies of breccia pipe locations on the Hualapai Indian Reservation, Arizona: U.S. Geological Survey Open-File Report 85-0400, 30 p.
- Shawe, D.R., Nash, J.T., and Chenoweth, W.L., 1991, Uranium and vanadium deposits, Chap. 7, in Economic Geology, U.S.: Geological Society of America, The Geology of North America, v. P-2, p. 103-124, 1 sheet, scale 1:10,000,000.
- Standish, R.P., and Schmelting, B.D., 1986, The use of transient electromagnetics in exploration for mineralized breccia pipes [*abs.*]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 415-416.
- Sutphin, H.B., 1986, Occurrence and structural control of collapse features on the southern Marble Plateau, Coconino County, Arizona: Flagstaff, Northern Arizona University, M.S. thesis, 139 p.
- Sutphin, H.B., and Wenrich, K.J., 1983, Structural control of breccia pipes on the southern Marble Plateau, Arizona: U.S. Geological Survey Open-File Report 83-0908, 6 p., 2 sheets, scale 1:50,000 [superseded by U.S. Geological Survey Miscellaneous Investigations Series Map I-1778, 1988].
- Sutphin, H.B., and Wenrich, K.J., 1986, Redwall Limestone joint control on Orphan-Mine type breccia pipes on the Marble Plateau, Arizona [*abs.*]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 416.
- Sutphin, H.B., and Wenrich, K.J., 1987, Caves in the Redwall Limestone, central Hualapai Reservation, Arizona [*abs.*]: Geological Society of America Abstracts with Programs, v. 19, no. 7, p. 860.
- Sutphin, H.B., and Wenrich, K.J., 1988, Maps showing structural control of breccia pipes on the southern Marble Plateau, north-central Arizona [*Cameron South, Coconino Point SE, Cameron North, Coconino Point, Shadow Mtn. Well, Blue Spring SE, Blue Spring, Desert View, Willow Springs, Pillow Mtn., Salt Trail Canyon, and Cape Solitude 7.5 min*]: U.S. Geological Survey Miscellaneous Investigations Series Map I-1778, 2 sheets, scales 1:50,000 and 1:250,000.
- Sutphin, H.B., and Wenrich, K.J., 1989, Map of locations of collapse-breccia pipes in the Grand Canyon region of Arizona: U.S. Geological Survey Open-File Report 89-0550, 1 sheet, scale 1:250,000.
- Sutphin, H.B., Wenrich, K.J., and Verbeek, E.R., 1983, Structural control of breccia pipes on the southern Marble Plateau, Arizona [*abs.*]: Geological Society of America Abstracts with Programs, v. 15, no. 5, p. 376.
- Tenney, J.B., 1929, Arizona copper prospects: Engineering and Mining Journal, v. 127, no. 19, p. 752-754.
- Theobald, T.K., Billone, M.A., Detra, P.S., and Vassalluzzo, C.A., eds., 1987, Summary of a workshop on the search for unconventional ore deposits in Arizona, January 12-13, 1987: U.S. Geological Survey Open-File Report 87-0498, 16 p.
- Theobald, T.K., Billone, M.A., Detra, P.S., and Vassalluzzo, C.A., eds., 1987, Summary of a workshop on the search for unconventional ore deposits in Arizona, January 12-13, 1987: Arizona Bureau of Geology and Mineral Technology Open-File Report 87-11, 16 p.
- Tillman, C.G., 1954, Defense Minerals Exploration Administration docket 3075 (copper-uranium), J. and M. Leasing Co., Cox and Ross claims, Mohave County, Arizona: 8 p.
- United States Atomic Energy Commission, 1959, Orphan Lode mine (Grand Canyon), in Guidebook to uranium deposits of western United States: U.S. Atomic Energy Commission Report RME-141, p. 3-44 to 3-47.
- United States Atomic Energy Commission, 1959, Guidebook to uranium deposits of western United States: U.S. Atomic Energy Commission Report RME-141, 359 p.
- United States Atomic Energy Commission, 1959, Mine operation data report, January 1, 1959: U.S. Atomic Energy Commission Report AEC-PED-1, 363 p.
- Van Gosen, B.S., and Wenrich, K.J., 1985, Mineralized breccia in the Blue Mountain pipe, northern Arizona - drilling results [*abs.*], in Irby, Grace, ed., Abstracts of the Symposium on Southwestern Geology and Paleontology, Flagstaff, Ariz., Sept. 7, 1985: Flagstaff, Museum of Northern Arizona, p. 10.
- Van Gosen, B.S., and Wenrich, K.J., 1989, Ground magnetometer surveys over known and suspected breccia pipes on the Coconino Plateau, northwestern Arizona, with computer graphics by W.L. Thoen, Chap. C, in Breccia pipes in northern Arizona: U.S. Geological Survey Bulletin 1683-C, p. C1-C31.
- Van Gosen, B.S., and Wenrich, K.J., 1991, Geochemistry of soil samples from 50 solution-collapse features on the Coconino Plateau, northern Arizona: U.S. Geological Survey Open-File Report 91-0594, 281 p., 3 diskettes [91-0594-A paper copy, 91-0594-B, -C, and -D geochemical data files on diskette].

- Van Gosen, B.S., Wenrich, K.J., Sutphin, H.B., Scott, J.H., and Balcer, R.A., 1989, Drilling of a U-mineralized breccia pipe near Blue Mountain, Hualapai Indian Reservation, northern Arizona: U.S. Geological Survey Open-File Report 89-100, 80 p.
- Verbeek, E.R., 1986, Fracture pattern of the southern Marble and eastern Coconino Plateaus, north-central Arizona [*abs.*]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 419-420.
- Verbeek, E.R., Grout, M.A., and Van Gosen, B.S., 1988, Structural evolution of a Grand Canyon breccia pipe: The Ridenour copper-vanadium-uranium mine, Hualapai Indian Reservation, Coconino County, Arizona: U.S. Geological Survey Open-File Report 88-0006, 75 p.
- Waesche, H.H., 1934, The Grand View copper prospect: Grand Canyon Nature Notes, v. 8, no. 12, p. 250-258.
- Waters, J.P., and Best, D.M., 1986, Determination of subsurface morphology of collapse features on the Kaibab Plateau, northern Arizona, using gravity surveys [*abs.*]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 420.
- Watkins, T.A., 1976, The geology of the Copper House, Copper Mountain, and Parashant breccia pipes, western Grand Canyon, Mohave County, Arizona: Golden, Colorado School of Mines, M.S. thesis, 91 p.
- Wenrich, K.J., 1984, Mineralization of breccia pipes in northern Arizona [*abs.*], in Bogdanov, N.A., ed., Special session of the International 'Lithosphere' Programme: International Geological Congress, 27th, 1984, v. 9, p. 380-381.
- Wenrich, K.J., 1985, Mineralization of breccia pipes in northern Arizona: Economic Geology, v. 80, no. 6, p. 1722-1735.
- Wenrich, K.J., 1986, Mineralized breccia pipes of NW Arizona--an overview [*abs.*]: Geological Society of America Abstracts with Programs, v. 18, no. 5, p. 421.
- Wenrich, K.J., 1986, Uranium mineralization of collapse breccia pipes in northern Arizona, western United States, in Fuchs, Helmut, ed., Vein type uranium deposits: International Atomic Energy Agency Technical Document IAEA-TECDOC-361, p. 395-414.
- Wenrich, K.J., 1986, Geochemical exploration for mineralized breccia pipes in northern Arizona, U.S.A.: Applied Geochemistry, v. 1, p. 469-485.
- Wenrich, K.J., 1986, Exploration techniques for locating uranium-mineralized breccia pipes in northern Arizona [*abs.*]: American Association of Petroleum Geologists Bulletin, v. 70, no. 5, p. 662.
- Wenrich, K.J., 1992, Breccia pipes in the Red Butte area of Kaibab National Forest, Arizona: U.S. Geological Survey Open-File Report 92-0219, 13 p.
- Wenrich, K.J., and Billingsley, G.H., 1986, Field trip log--Breccia pipes in northern Arizona, in Nations, J.D., Conway, C.M., and Swann, G.A., eds., Geology of central and northern Arizona, Geological Society of America, Rocky Mountain Section Meeting, Flagstaff, Ariz., 1986, Field Trip Guidebook: Flagstaff, Northern Arizona University, Geology Dept., p. 43-58 [now available from Arizona Geological Survey as publication NP-1].
- Wenrich, K.J., and Billingsley, G.H., 1986, Uranium-bearing solution-collapse breccia pipes in northern Arizona [*abs.*], in Carter, L.M.H., ed., USGS research on energy resources--1986, program and abstracts; V.E. McKelvey forum on mineral and energy resources: U.S. Geological Survey Circular 974, p. 72-73.
- Wenrich, K.J., Billingsley, G.H., and Huntton, P.W., 1986, Breccia pipe and geologic map of the northeastern Hualapai Indian Reservation and vicinity, Arizona: U.S. Geological Survey Open-File Report 86-0458A, 29 p., 2 sheets, scale 1:48,000.
- Wenrich, K.J., Billingsley, G.H., and Huntton, P.W., 1987, Breccia pipes and geologic map of the northwestern Hualapai Indian Reservation and vicinity, Arizona: U.S. Geological Survey Open-File Report 86-0458C, 32 p., 2 sheets, scale 1:48,000.
- Wenrich, K.J., Billingsley, G.H., and Van Gosen, B.S., 1986, The potential for breccia pipes in the National Tank area, Hualapai Indian Reservation, Arizona: U.S. Geological Survey Open-File Report 86-0592-A, 45 p.
- Wenrich, K.J., Billingsley, G.H., and Van Gosen, B.S., 1989, The potential of breccia pipes in the National Tank area, Hualapai Indian Reservation, Arizona, Chapter B, in Breccia Pipes in Arizona: U.S. Geological Survey Bulletin 1683-B, p. B1-B34.
- Wenrich, K.J., Billingsley, G.H., and Van Gosen, B.S., 1992, The potential of breccia pipes in the Mohawk Canyon area, Hualapai Indian Reservation, Arizona, Chapter D, in Breccia Pipes in Arizona: U.S. Geological Survey Bulletin 1683-D, p. D1-D39.
- Wenrich, K.J., Chenoweth, W.L., Finch, W.I., and Scarborough, R.B., 1989, Uranium in Arizona, in Jenney, J.P., and Reynolds, S.J., eds., Geologic evolution of Arizona: Arizona Geological Society Digest 17, p. 759-794.

- Wenrich, K.J., and Huntoon, P.W., 1989, Breccia pipes and associated mineralization in the Grand Canyon region, northern Arizona, in Elston, D.P., Billingsley, G.H., and Young, R.A., eds., *Geology of Grand Canyon, northern Arizona (with Colorado River guides): American Geophysical Union, International Geological Congress, 28th, Field Trip Guidebook T115/315*, p. 212-218.
- Wenrich, K.J., and Palacas, J.G., 1992, Organic matter and uranium in solution-collapse breccia pipes of northern Arizona and San Rafael Swell, Utah, in Dickinson, K.A., ed., *Short papers of the U.S. Geological Survey Uranium Workshop, 1990: U.S. Geological Survey Circular 1069*, p. 36-50.
- Wenrich, K.J., and Pratt, L.M., 1985, Paragenesis and conditions of formation of ore minerals from metalliferous breccia pipes, n. Arizona [*abs.*]: *Geological Society of America Abstracts with Programs*, v. 17, no. 7, p. 747.
- Wenrich, K.J., Scott, J.H., Balcer, R.A., Van Gosen, B.S., Bedinger, G.M., Burmaster, B., Mascarenas, J.F., and Sutphin, H.B., 1985, Discovery of a mineralized breccia pipe in Mohawk Canyon, northern Arizona [*abs.*]: *American Association of Petroleum Geologists Bulletin*, v. 69, no. 5, p. 870.
- Wenrich, K.J., and Silberman, M.L., 1984, Potential precious and strategic metals as by-products of uranium mineralized breccia pipes in northern Arizona [*abs.*]: *American Association of Petroleum Geologists Bulletin*, v. 68, no. 7, p. 954.
- Wenrich, K.J., and Sutphin, H.B., 1983, Mineralization of breccia pipes in northern Arizona [*abs.*]: *Geological Society of America Abstracts with Programs*, v. 15, no. 5, p. 399.
- Wenrich, K.J., and Sutphin, H.B., 1987, Mineralized breccia pipes on the Hualapai Indian Reservation, northwestern Arizona [*abs.*]: *Geological Society of America Abstracts with Programs*, v. 19, no. 7, p. 886.
- Wenrich, K.J., and Sutphin, H.B., 1987, Unique minerals from Redwall Limestone caves, Arizona: Their association with mineralized breccia pipes [*abs.*]: *Geological Society of America Abstracts with Programs*, v. 19, no. 6, p. 463.
- Wenrich, K.J., and Sutphin, H.B., 1988, Recognition of breccia pipes in northern Arizona: *Fieldnotes [Arizona Bureau of Geology and Mineral Technology]*, v. 18, no. 1, p. 1-5, 11.
- Wenrich, K.J., and Sutphin, H.B., 1989, Lithotectonic setting necessary for formation of a uranium-rich, solution-collapse breccia-pipe province, Grand Canyon region, Arizona: *U.S. Geological Survey Open-File Report 89-0173*, 33 p.
- Wenrich, K.J., and Sutphin, H.B., 1989, Lithotectonic setting necessary for formation of a uranium rich, solution collapse breccia pipe province, Grand Canyon region, Arizona, in *Metallogenesis of uranium deposits - Proceedings of a Technical Committee Meeting on Metallogenesis of Uranium Deposits organized by the International Atomic Energy Agency and held in Vienna, 9-12 March 1987: Vienna, International Atomic Energy Agency*, p. 307-344.
- Wenrich, K.J., Sutphin, H.B., and Van Gosen, B.S., 1988, Distribution of Redwall Limestone-hosted breccia pipes across NW Arizona and the geochemistry and mineralogy of their orebodies [*abs.*]: *Geological Society of America Abstracts with Programs*, v. 20, no. 7, p. A139.
- Wenrich, K.J., Van Gosen, B.S., and Sutphin, H.B., 1990, Genesis and distribution of uraninite in solution-collapse breccia pipes, northwestern Arizona, in Carter, L.M.H., ed., *USGS research on energy resources--1990, program and abstracts, Sixth V.E. McKelvey Forum on mineral and energy resources: U.S. Geological Survey Circular 1060*, p. 86-91.
- Wenrich, K.J., Verbeek, E.R., Sutphin, H.B., Modreski, P.J., Van Gosen, B.S., and Detra, D.E., 1990, *Geology, geochemistry, and mineralogy of the Ridenour Mine breccia pipe, Arizona: U.S. Geological Survey Open-File Report 90-0504*, 66 p.
- Wenrich, K.J., Verbeek, E.R., Sutphin, H.B., and Van Gosen, B.S., 1987, The Ridenour mine, AZ--A solution-collapse uranium-mineralized breccia pipe [*abs.*], in *117th Annual Meeting [AIME, SME, TMS, Phoenix, Ariz.], January 25-28, 1988, [Program]: Society of Mining Engineers*, p. 28.
- Wheeler, R.L., 1986, Selecting reliable alignments of mapped points: Structural control of breccia pipes on the Marble Plateau, northern Arizona [*abs.*]: *Geological Society of America Abstracts with Programs*, v. 18, no. 5, p. 422.