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Arizona Geology

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INFORMATION AND SERVICE SINCE 1889

- *geologic information*
- *geologic library and databases*
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- *mineral resources*
- *well cuttings and core repository*
- *oil, gas, geothermal and helium (regulated by the Oil and Gas Conservation Commission)*

ARS 27-152

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Geologic Map of Sonora --Page 4

Carbon Dioxide and (or) Helium Discovery Near St. Johns?

Larry D. Fellows
Director and State Geologist

The August 26, 1994, *Farmington* (New Mexico) *Daily Times* reported that gas from Ridgeway Petroleum Company's Plateau Cattle Company No.1 (PCC No.1) well, 7 miles southeast of St.Johns in Apache County, Arizona, is 90 percent carbon dioxide, 6 percent nitrogen, and 0.52 percent helium. The well, completed August 12 at a depth of 2,431 feet, is in an area that was land during much of the Paleozoic era. Marine sedimentary strata ultimately overlapped the land area. Gas-bearing zones are in Supai Group (Permian) dolomite, which was deposited on Precambrian granite. Additional wells are being planned to determine the distribution and amount of carbon dioxide and helium present and whether they can be produced economically.

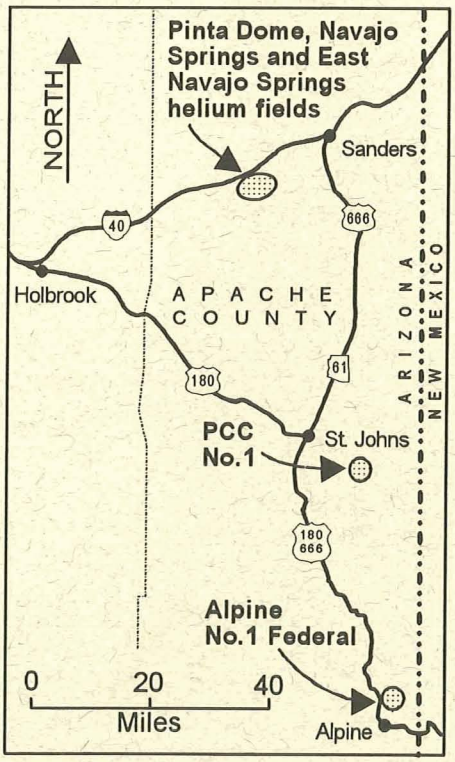
Ridgeway chose this area for drilling because of the oil show in the geothermal test in 1993 near Alpine, Arizona. Walter Ruck, Ridgeway's Chairman, said, "They didn't find any hot rocks, but they did find traces of oil. That's what caught our interest." The Alpine well was described in the Spring 1994 issue of *Arizona Geology* and Arizona Geological Survey (AZGS) Open-File Report 94-1.

From 1961 to 1976 helium was produced in Arizona from three fields 47 miles north of the PCC No.1. Gas percentages from those fields were: nitrogen, 90; helium, 8-10; and carbon dioxide, 1. About 785 million cubic feet of helium were produced.

Most natural gas contains small quantities of helium. The world's largest known helium reserves are in natural gas that contains less than 1 percent helium. Arizona's helium fields, although small, were some of the richest.

The AZGS recently completed **Open-File Report 94-20** (listed on page 2), a compilation of more than 350 reports and maps that cover all or parts of Apache County south of Interstate Highway 40.

For additional information, please contact Steven L. Rauzi, Oil and Gas Program Administrator.



Just Released

Bibliographies and Indexes

Index of published geologic maps of Arizona: 1982 to mid-1993: R.C. Harris, R.A. Trapp, T.G. McGarvin, and J.E. Spencer, compilers, 1994, Map 31 (Pub. number M 31), 45 p., 3 sheets, scale 1:1,000,000. $8.00

Bibliography of subsidence and earth fissures within Arizona: Robin Frisch-Gleason, Steven Slaff, and R.A. Trapp, 1994, Open-File Report 94-16 (Pub. number OFR 94-16), 19 p. $3.50

This bibliography supplements, but does not replace, OFR 90-7 by adding older references that were not included and studies completed since 1990.

Bibliography of geologic reports and maps for Apache County, Arizona, south of Interstate 40: R.A. Trapp, Open-File Report 94-20 (Pub. number OFR 94-20), 22 p., $4.00

The Plateau Cattle Company No.1 well, Alpine geothermal test hole, and the Pinta Dome, Navajo Springs, and East Navajo Springs helium fields are within this area. More than 350 maps and reports are listed.

The Arizona Geological Survey (AZGS) released 21 new publications, described below, since May 1994. Please use the publication number to identify those you want to purchase and mail your order to AZGS Publications, 845 North Park Ave., #100, Tucson, AZ 85719-4816. Orders are shipped by UPS, which requires a street address for delivery. All orders must be prepaid by check or money order payable in U.S. dollars to the Arizona Geological Survey. Please add these shipping and handling charges to your total order:

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Geologic Maps

Surficial geology of the Santan Mountains piedmont area, northern Pinal and eastern Maricopa County area, Arizona: Gary Huckleberry, 1994, Open-File Report 94-7 (Pub. number OFR 94-7), 32 p., 2 sheets, scale 1:24,000. $8.00

Most of the alluvial deposits, which blanket the study area (Chandler Heights and Sacaton NE 7.5-minute quadrangles) were derived from weathering of the Santan Mountains. The communities of Chandler Heights and Queen Creek are within the study area.

Bedrock geology of the eastern and central Tank Mountains, Yuma County, Arizona: C.A. Ferguson, S.J. Skotnicki, and J.E. Spencer, 1994, Open-File Report 94-8 (Pub. number OFR 94-8), 33 p., 2 plates, scale 1:24,000. $10.00

The Tank Mountains consist of early Miocene volcanic rocks, sedimentary breccias, and less abundant Proterozoic crystalline rocks. Tertiary rocks are largely unmineralized, but the Proterozoic rocks are commonly altered and are locally crushed and contain pervasive hematite and minor gold. The map area includes part of the Yuma Proving Ground.

Geologic map of the Palomas Mountains, Yuma County, Arizona: S.J. Skotnicki and C.A. Ferguson, 1994, Open-File Report 94-9 (Pub. number OFR 94-9), 12 p., scale 1:24,000. $5.00

The Palomas Mountains in west-central Arizona consist of middle Tertiary volcanic rocks and a Tertiary granitic pluton. Known mineral deposits are minor and are largely confined to relict sulfides and secondary copper minerals along the margin of the pluton or the margins of mafic dikes. The map area includes part of the Yuma Proving Ground.

Surficial geology of the Apache Junction area, northern Pinal and eastern Maricopa Counties, Arizona: Gary Huckleberry, 1994, Open-File Report 94-10 (Pub. number OFR 94-10), 25 p., 2 sheets, scale 1:24,000. $6.50

The study area (Apache Junction and Desert Well 7.5-minute quadrangles) is along the eastern margin of the Phoenix basin where the valley floor meets the Superstition and Goldfield Mountains. The upper piedmont in the area consists largely of a pediment formed in granite. Lower elevations are covered with alluvial fan deposits.

Detailed geologic map and cross sections of the Ramsay Mine area, southeastern Plomosa Mountains, west-central Arizona: S.M. Richard and J.E. Spencer, 1994, Open-File Report 94-14 (Pub. number OFR 94-14), 16 p., 2 sheets, scale 1:12,000. $6.00

The Ramsay Mine area contains a well exposed sequence of Paleozoic and Jurassic metasedimentary and metavolcanic rocks, Jurassic to Cretaceous metasedimentary rocks of the McCoy Mountains Formation, and Tertiary conglomerate and volcanic rocks. Numerous faults disrupt these strata, and pre-Tertiary units are commonly overturned. Mineral deposits include numerous mineralized shear zones, some of which are within Tertiary rocks, and a few veins.

Compilation geologic map of the central Gila Bend Mountains, Maricopa County, Arizona: S.J. Skotnicki, 1994, Open-File Report 94-18 (Pub. number OFR 94-18), 17 p., scale 1:50,000. $5.00

The central Gila Bend Mountains in west-central Arizona consist primarily of middle Tertiary volcanic rocks and less abundant sandstone, conglomerate, and intrusive rocks. Known mineral deposits are minor and are largely confined to areas of massive-sulfide mineralization in Proterozoic rocks around Webb Peak at the east edge of the map area. The map area includes mapping previously released as OFR 91-7.

Geology of the Phoenix Mountains, Maricopa County, Arizona: D.C. Shank and T.L. Péwé, 1973, Contributed Map 94-D (Pub. number CM 94-D), 1 sheet, scale 1:15,000. $3.50

Precambrian quartzite, schist, and phyllite units are overlain by Tertiary basalt. Quaternary alluvium covers much of the map area.

Hazards and Limitations

Surficial and environmental geology of the Sierra Vista area, Cochise County, Arizona: K.A. Demsey and P.A. Pearthree, 1994, Open-File Report 94-6 (Pub. number OFR 94-6), 14 p., scale 1:24,000. $6.75

Potential geologic hazards and limitations, including floods, debris flows, soil conditions, and seismicity, are described. Information such as this may be used as a general guide in assessing possible geologic impacts on existing and future development. This project was done in cooperation with Cochise County, the U.S. Soil Conservation Service, U.S. Forest Service, and U.S. Geological Survey.

A reconnaissance of earth fissures near Apache Junction, Chandler Heights, and southwestern Picacho basin: R.C. Harris, 1994, Open-File Report 94-11 (Pub. number OFR 94-11), 5 p., 2 sheets, scale 1:24,000 and 1:27,000. $4.00

Unpublished maps of earth fissures, based on a helicopter survey in 1987, were field checked to verify that the fissures were correctly plotted on maps and to determine whether new fissures had formed or old ones had enlarged or extended.

Surficial processes on two fluvially dominated alluvial fans in Arizona: J.J. Field, 1994, Open-File Report 94-12 (Pub. number OFR 94-12), 31 p. $8.50

Cottonwood and White Tank alluvial fans were studied in detail to learn more about alluvial fan processes in desert climates. Distinct differences in the drainage-basin characteristics of the fans enabled the author to assess the importance of regional and local controls on fan processes. Surficial features associated with two recent floods on each fan provided a unique opportunity to study whether changes in flood magnitude affect process types and distribution. The project was completed in cooperation with the Flood Control District of Maricopa County and the Arizona Department of Water Resources.

Processes of channel migration on fluvially dominated alluvial fans in Arizona: J.J. Field, 1994, Open-File Report 94-13 (Pub. number OFR 94-13), 40 p. $6.25

The influence of large- and small-scale geomorphological events on the

see JUST RELEASED, page 4

Alpine Geothermal Test

Alpine No. 1 Federal Final Report – Executive Summary: J. C. Witcher, Contributed Report 94-D (Pub. number CR 94-D), 20 p. $3.75

This well was drilled in 1993 to determine the hot-dry-rock geothermal potential. CR 94-D includes background information, drilling data, conclusions about geothermal potential, and recommendations.

Alpine No. 1 Federal Final Report – Part 1, Drilling Report: J.C. Witcher, Larry Pisto, W.R. Hahman, and C.A. Swanberg, Contributed Report 94-E (Pub. number CR 94-E), 92 p. $12.00

This is a summary of drilling, from site selection to well completion, including drilling rates, bit performance, mud program, and drilling problems.

Alpine No. 1 Federal Final Report – Part 2, Temperature Gradients, Geothermal Potential, and Geology: J. C. Witcher, W.R. Hahman, and C.A. Swanberg, Contributed Report 94-F (Pub. number CR 94-F), 127 p. $14.50

This report provides technical information, conclusions, and recommendations.

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process and frequency of channel migration was examined on five fluvially dominated alluvial fans in southern Arizona. Historical air photos and field reconnaissance were used to document the processes and events associated with recent channel diversions. The project was completed in cooperation with the Flood Control District of Maricopa County and the Arizona Department of Water Resources.

A geomorphic and hydraulic evaluation of an extraordinary flood discharge estimate: Bronco Creek, Arizona:
P.K. House and P.A. Pearthree, 1994, Open-File Report 94-19 (Pub. number OFR 94-19), 21 p., 8 figs. $4.50

The authors reevaluated the August 19, 1971 Bronco Creek flood discharge using paleohydrological techniques to estimate peak discharges in stable, bedrock-controlled channel reaches near the mouths of the three major sub-basins of the watershed.

Mineral Resources

The location and production history of the Chimney No. 1 uranium-vanadium mine, Apache County, Arizona:
W. L. Chenoweth, 1994, Contributed Report 94-B (Pub. number CR 94-B), 7 p. $1.25

The Chimney No.1 mine produced the Salt Wash Member of the Upper Jurassic Morrison Formation on the west side of Altar Mesa in the Carrizo Mountains. Mineralization occurred in petrified tree trunks and stringers in sandstone.

Geology and production history of the Alma-Seegan uranium mine, Navajo County, Arizona:
W. L. Chenoweth, 1994, Contributed Report 94-C (Pub. number CR 94-C), 9 p. $1.50

The Alma-Seegan mine, located in Monument Valley, was in channel deposits of the basal Shinarump Member of the Chinle Formation. The channels were cut into the underlying Moenkopi Formation.

Geology and production history of the Big Four No. 2 uranium mine, Navajo County, Arizona:
W.L. Chenoweth, 1994, Contributed Report 94-G (Pub. number CR 94-G), 8 p. $1.25

CR94-G summarizes the geology and production of the mine, located in the El Capitan Flat area of Monument Valley 15 miles north of Kayenta within the Navajo Indian Reservation.

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GEOLOGIC MAP OF SONORA

The geologic map of Sonora, Mexico, recently published in color at 1:500,000 scale, may be purchased from the Arizona Geological Survey. The folded map costs $15.00 plus $4.50 for shipping and handling. Please request publication number NP 9.

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