Service/News

Starred items (*) available from New Mexico Bureau of Mines and Mineral Resources

New Publications

NMBM&MR

Memoir 35—Geology and geochemistry of Precambrian rocks, central and south-central New Mexico, by Kent C. Condie and A. J. Budding, 1979, 60 p., 13 tables, 48 figs., 3 color sheets in pocket, chemical analyses on microfiche. Summarizes existing field, stratigraphic, petrographic, and geochronologic data from Precambrian terranes; evaluates major- and trace-element data for principal rock types in terms of alteration, models for magma origin, and sediment provenance. Also discusses origin and tectonic setting of Precambrian terrane. $11.00*

New Western Mining Directory now available

The second edition of the *Western Mining Directory* is off the press and available for purchase. This publication lists the developer, the particular mine and product produced, and the equipment and suppliers for a particular area in the Western states. This updated reference includes 786 active hardrock mines, 162 coal mines, 270 uranium-vanadium mines, and the West's active oil shale projects. Also listed are 2,332 mining companies, consultants, contractor-developers, and equipment and suppliers in the Western states. The 216-page directory lists names, addresses, and phone numbers in all these areas. In addition to state agencies and associations, Geological and Mineral Survey offices have been included along with state maps to assist the purchaser in locating mining towns and districts. Cost of this year's edition will be $15, which includes postage and handling. Prepaid orders are now being accepted, with checks payable to *Western Mining Directory,* 311 Steele Street, Suite 208, Denver, Colorado 80206.

U.S. Geological Survey

Circular 808—Background information to accompany folio of geologic, mineral resource, geochemical, aeromagnetic, and gravity maps of the Hillsboro and San Lorenzo Quadrangles, Sierra and Grant Counties, New Mexico, by D. C. Hedlund, with sections on geochemistry by K. C. Watts and H. V. Alminas; and geophysics by J. C. Wynn and D. C. Hedlund, 1979, 26 p., 17 figs., 6 tables. Gratis on application to Branch of Distribution, U.S. Geological Survey, 1200 Eads St., Arlington, VA 22202

Utah Geological and Mineral Survey

Special studies 49—Coal Studies—Three individual papers: 1) Methane content of Utah coals, by H. Doelling, A. Smith, and F. Davis; 2) Observations on the Sunnyside Coal Zone, by H. Doelling, A. Smith, F. Davis, and D. Hayhurst; 3) Chemical analyses of coal from the Blackhawk Formation, Wasatch Plateau coal field, Carbon, Emery, and Sevier Counties, Utah, by J. Hatch, R. Affolter, and F. Davis. $3.50

Special studies 50—Geology and petroleum resources of the major oil-impregnated sandstone deposits of Utah, by J. Campbell and H. Ritzma. $2.00

Circular 61—Bibliography of Utah Geology, 1978, a comprehensive listing by author and subject on Utah geology. $1.00

Circular 62—Utah Geological and Mienral Survey List of Publications 1979, a complete listing of all publications, maps, and guidebooks issued by UGMS dating back to 1908. $1.00

Circular 63—Rockhound guide to mineral and fossil localities in Utah, by C. Stowe. A complete description of over 100 areas in Utah for rock collecting. $2.50

Above publications can be ordered from Publication Sales, Utah Geological and Mineral Survey, 606 Black Hawk Way, Salt Lake City, Utah 84108.

Orders for publications should be accompanied by check or money order plus 10 percent for mailing (minimum mailing charge $0.75).

New projects

USGS—Mineral Resources

Resources, Mescalero Apache Reservation, New Mexico, by S. L. Moore. Plans to provide geologic, geochemical, and geophysical information to assist in the resource development on the Mescalero Apache Indian Reservation; in particular to complete geologic mapping at scales of 1:24,000 or 1:62,500 as appropriate to resource needs. Detailed geologic mapping and geochemical sampling of the Three Rivers Stock and Black Peak Stock of the reservation to determine the potential for: (1) molybdenum, gold, silver, and copper mineralization; (2) rare-earth elements; and (3) fluorite. Detailed stratigraphic studies of sedimentary rocks in the central and southern parts of the reservation to determine their potential copper, lead, silver, gold, uranium, gypsum, and high aluminum clay high aluminum clay content. Geologic mapping of coal-bearing Cretaceous rocks to guide detailed stratigraphic studies by personnel from Coal Resources Branch.

Proposed starting date May 1980

Open-file reports

NMBM&MR open-file reports

100 History of New Mexico Bureau of Mines and Mineral Resources as recorded in legislation, annual reports, and notes, by Candace Holts $43.20*

105 Maps showing the regional extent of sandstone bodies within the Gallup Sandstone compiled for the San Juan Basin hydrogeologic study by Nancy H. Mizell and William J. Stone, August 1979 text $4.00, maps (5) $5.00*

110 Aeromagnetic maps of Tortugas Mountains, Doña Ana County, New Mexico, by G. R. Keller 2 maps reproducible, $2.00*

New USGS open-file reports

78-797 Map showing surface faults in the southeastern Houston Metropolitan Area, Texas by E. R. Verbeek, U.S. Geological Survey and U.S. Clanton, National Aeronautics and Space Administration

79-151—A preliminary report on the geology of the Dennison-Bunn uranium claim, Sandoval County, New Mexico, by Jennie L. Ridgley, 44 p.

79-1238—The geological parameters affecting *in situ* leaching of uranium deposits, by Robert A. Brooks, 44 p.

79-1435 Chemical analyses and norms of 81 volcanic rocks from part of the Mogollon-Datil Volcanic Field, southwestern New Mexico, by James C. Ratté and Terry Grotbo

79-1452—Aeromagnetic map of the north and west parts of the Silver City 1° x 2° quadrangle, New Mexico and Arizona, by U.S. Geological Survey, 5 oversize sheets

79-1507—Landsat linear feature data of the Gallup-Grants uranium district, New Mexico, by Robert S. Zech and Daniel H. Knepper, Jr., 35 p.

ERDA open-file reports GJBX series

GJBX-108 (79) Selected references on uranium geology and potential resources of uranium, by W. L. Chenoweth and E. A. Learned, DOE, 1979, 19 p.

GJBX-116 (79) Aerial gamma-ray and magnetic survey, Raton Basin project, Shiprock and Gallup quadrangles, Arizona/New Mexico, and Albuquerque quadrangle, New Mexico, by Geometrics, Inc., 1979. vol. 1 text, vol. 2, maps and radiometric profiles

GJBX-121 (79) Geological and geochemical aspects of uranium deposits, by J. M. Thomas, M. L. Brock, P. A. Garland, M. B. White, and E. W. Daniel, Oak Ridge National Laboratory, 1979, 272 p., annotated bibliography containing numerous references to New Mexico

Abstracts

National Technical Information Service

(U.S. Department of Commerce)

TOWARD ASSESSING THE GEOTHERMAL POTENTIAL OF THE JEMEZ MOUNTAINS VOLCANIC COMPLEX: A TELLURIC-MAGNETOTELLURIC SURVEY, *by J. F. Hermance, Los Alamos Scientific Lab., NM, 1979, 89 p.* **LA-7656-MS** *Price code: PC A05/MF A 01*

Telluric-magnetotelluric studies were performed in the Jemez Mountains of north-central New Mexico to characterize the total geothermal system of the Valles caldera and to be integrated with an east-west regional survey supported by the United States Geological Survey. The data from the regional survey indicate that electrically the San Juan Basin to the west of the Jemez Mountains is rather homogeneous in contrast to the eastern side near Las Vegas where the presence of a broad heterogeneous structure is clearly sensed. The data from the Jemez Mountain area are strikingly similar to other Rio Grande rift data and suggest a conducting layer at a depth of approximately 15 km. The telluric data indicate that the hydrothermal system in the area is of a localized nature. (ERA citation 04:033078)

MASS TRANSFER CHANGES INDUCED IN COAL BLOCKS DURING THERMAL PROCESSING, *by N. E. Vanderborgh, J. P. Bertino, and D. N. Hopkins, Los Alamos Scientific Lab., NM, 1978, 13 p. CONF-780417-9* **LA-UR-78-1183** *Price code: PC A02/MF A01*

In-situ processing of coals allows energy extraction from underground seams without usual societal and environmental costs of coal technology. Current concepts involve hot-gas underground processing to effect a partial oxidation of the coal, i.e., underground gasification. Modeling these processes requires comprehension of mass transfer mechanisms that drive the thermal transport processes within coal blocks. Mass transfer is initially limited by the relatively low permeability of the naturally occurring material. Pore geometries in coal suggest that mass transfer channels are near 50 nm. These pores are typically filled by absorbed moisture; moisture removal changes permeability by $10^{2.5}$. Once moisture is removed, other absorbed gases, CH_4, CO_2, etc., flush from the interior volume. These combined gases, during the drying steps, control preliminary heat transfer. Modeling studies suggest that heat transfer mechanisms switch from conduction to convection as permeability is changed from 0.01 md to 5 md, those variations in mass transfer resistance formed during coal drying. Results that predict heat transfer rates in blocks of subbituminous coals during the initial drying stages of in situ processing are described. (ERA citation 03:042119)

ELECTRICITY FROM HOT DRY ROCK GEOTHERMAL ENERGY: TECHNICAL AND ECONOMIC ISSUES, *by J. W. Tester, G. E. Morris, R. G. Cummings, and R. L. Bivins, Los Alamos Scientific Lab., NM, 1979, 27 p.* **LA-7603-MS** *Price code: PC A03/MF A01*

Extraction of energy from hot dry rock would make available a nearly unlimited energy source. Some technical problems and possible economic tradeoffs involved in a power generating system are examined and possible solutions proposed. An intertemporal optimization computer model of electricity production from a hot dry rock geothermal source has been constructed. Effects of reservoir degradation, variable fluid flow rate, and drilling operations are examined to determine optimal strategies for reservoir management and necessary conditions for economic feasibility. (ERA citation 04:029813)

TIME DOMAIN SURVEY OF THE LOS ALAMOS REGION, NEW MEXICO, *by Williston, McNeil and Associates, Inc., Lakewood, CO, 1979, 52 p.* **LA-7657-MS** *Price code: PC A04/MF A01*

A time domain electromagnetic sounding survey of the region surrounding the city of Los Alamos, New Mexico, was carried out. Results show that a linear trough, trending northeast-southwest runs beneath the city. The southern boundary is somewhat to the south of the city, the northern boundary was not established. The geoelectric section consists of three layers; the total thickness of the section is in excess of 3,000 m. Resistivities of the second layer are as low as 2.5 omega m. If the salinities are in the region of 7,000 ppm, the resistivities could indicate that water with a temperature of 150°C may be found at a depth of 3,000 m. (ERA citation 04: 029773)

DATA ACQUISITION FOR THE HOT DRY ROCK GEOTHERMAL ENERGY PROJECT, *by R. G. Lawton and E. H. Horton, Los Alamos Scientific Lab., NM, 1979, 7 p. CONF-790505-2* **LA-UR-79-812** *Price code: PC A02/MF A01*

The data acquisition system for the Hot Dry Rock Geothermal Energy Project at Fenton Hill, in northern New Mexico, has evolved to a computer-controlled system complete with visual displays and emergency alarms. The system is comprised of two units. One unit monitors all surface facilities and during an energy extraction experiment is on-line 24 hours a day. The other system is used for specialized downhole experiments. The data acquisition system is operator oriented so that a minimum crew can maintain the system. (ERA citation 04:036208)

GEOTHERMAL STUDIES IN SOUTHWEST NEW MEXICO, *by Chandler A. Swanberg, New Mexico Energy Institute, Las Cruces, NM, 1976, 69 p. NMEI-3* **PB-295 836/1WE** *Price code: PC A04/MF A01*

The research consists of three parts: (1) a detailed water chemistry study of thermal and nonthermal waters in Doña Ana County, (2) a reconnaissance water chemistry study of the hot springs of southwest New Mexico, and (3) a detailed gravity and magnetic study of the Lightning Dock KGRA (Known Geothermal Resource Area) in the Animas Valley of southwest New Mexico.

GEOTHERMAL APPLICATION FEASIBILITY STUDY FOR THE NEW MEXICO STATE UNIVERSITY CAMPUS, *by Narendra N. Gunaji, Edward F. Thode, Lokehs Chaturvedi, Arun Walvekar, and Leo LaFrance, New Mexico Energy Institute, Las Cruces, NM, 1978, 127 p., NMEI-13* **PB-295 846/OWE** *Price code: PC A07/MF A01*

The present project exploring the use of geothermal energy on campus was prompted by the belief, based on geochemical survey, that a substantial geothermal resource exists on NMSU property, not far from the main campus. The purpose of the project was to better define the potential resource and to examine alternatives for its use from a technical-economic standpoint.

AN APPRAISAL STUDY OF THE GEOTHERMAL RESOURCES OF ARIZONA AND ADJACENT AREAS IN NEW MEXICO AND UTAH AND THEIR VALUE FOR DESALINATION AND OTHER USES, *by Chandler A. Swanberg, Paul Morgan, Charles H. Stoyer, and James C. Witcher, New Mexico Energy Institute, Las Cruces, NM, 1977, 98 p. NMEI-6-1* **PB-295 859/3WE** *Price code: PC A05/MF A01*

This report is an appraisal investigation of the geothermal resources of a portion of the Lower Colorado River Region of the U.S. Bureau of Reclamation. The study area includes most of Arizona, part of western New Mexico west of the continental divide, and a small part of southwestern Utah. Almost 300 water samples have been collected from the study area and chemically analyzed.

GEOTECHNICAL STUDIES OF GEOTHERMAL RESERVOIRS, *by H. R. Pratt and E. R. Simonson, Terra Tek, Inc., Salt Lake City, UT, 1976, 56 p. Microfiche copies only.* **TID-28703** *Price code: MF A01*

It is proposed to delineate the important factors in the geothermal environment that will affect drilling. The geologic environment of the particular areas of interest are described, including rock types, geologic structure, and other important parameters that help describe the reservoir and overlying caprock. The geologic environment and reservoir characteristics of several geothermal areas were studied, and drill cuttings were obtained from most of the areas. The geothermal areas studied were: (1) Geysers, CA, (2) Imperial Valley, CA, (3) Roosevelt Hot Springs, UT, (4) Baca Ranch, Valle Grande, NM, (5) Jemez Caldera, NM, (6) Raft River, ID, and (7) Marysville, MT. (ERA citation 04:029819)

Cieneguilla Creek

(continued from page 3)

vergences occur where metasediments are strongly folded.

Exposures are poor and age relationships are obscure although most data suggest invasion of the metasediments by the granite prior to the last Precambrian metamorphism. The age of the Precambrian rock deformation in the Picuris area southwest of Moreno Valley is estimated at 1.3 b.y. (billion years) by Miller and others (1963); several Precambrian events in the Sangre de Cristo Mountains are dated between 800 million and 1.7 b.y. (Callendar, Robertson, and Brookins, 1976). Precambrian exposures in the basin are limited and geochronology has not been done. Of the several dated events above, it is impossible to determine which may be represented by the Cieneguilla Creek Precambrian rock sequence; at least two are present.

MESOZOIC-CENOZOIC DEFORMATION—Deformation began with the Laramide Orogeny in latest Mesozoic time and continued intermittently throughout the Cenozoic. Initially, broad open folding of late Paleozoic and Mesozoic sediments was the principal deformational pattern. As east-west compression increased, faulting became more pronounced and high-angle reverse and low-angle thrust faults were formed. During Cenozoic time normal faulting with north-south as well as northwest-southeast and northeast-southwest trends was dominant. The southern end of the basin exhibits the most complex deformation (fig. 1).

FOLDING—Folding is not pronounced. Anticlines and synclines east of Cieneguilla Creek are broad, open folds with minimum relief; the anticlines and synclines are minor flexures in the Moreno Valley synclinorium, as suggested by Ray and Smith (1941). The synclines are filled in part by volcanics (basalt and ash-flow tuff) from Agua Fria Mountain and in part by Quaternary deposits of sand, gravel, and slope debris. Small folds associated with thrust faulting on the west side of the valley were mapped. We recognized structural terraces and overturned bedding in several places, but tracing structures along strike is difficult due to excessive tree cover and forest litter. Some structural features can be traced because of street development in the Angel Fire properties area.

FAULTING—Faulting in the southern part of Cieneguilla Creek drainage basin is intense. Three types are evident: the oldest, high-angle reverse or low-angle thrust faults; intermediate age normal faults, and younger transverse faults.

High-angle and low-angle reverse faults are confined to a 1½- to 2-mile-wide zone in the southwestern part of the basin. The zone strikes in a northerly direction and is partially concealed by valley fill (fig. 2). Clark (1966) recognized similar structures in the same relative position north of the basin. In addition, a complex structural zone between Mora and Las Vegas may be a similar southern continuation.

Normal faults are best exposed in the eastern half of the valley. Previous work north of the basin by Clark (1966) and geophysical evidence obtained from seismic reflection lines run by Charles Reynolds and Associates, Inc. (1978) suggest normal faulting is present throughout the valley rather than being confined to a particular area. The normal faults strike in a northerly direction similar to the older reverse or thrust faults.

Transverse faults strike transversely across the valley either west-northwest or east-northeast, and are found throughout the drainage basin; they disappear along the southern boundary of the mapped area. Their movements are usually normal, but they differ ☞