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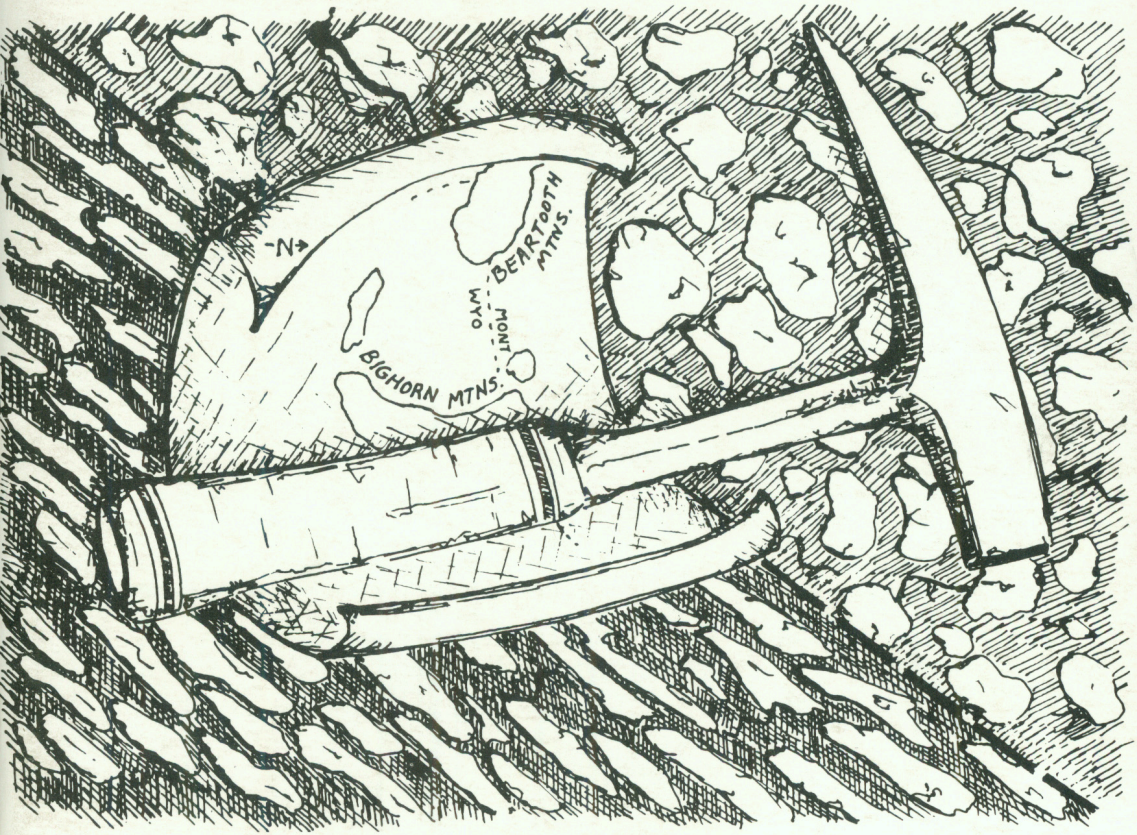
CURRENT GEOLOGICAL AND GEOPHYSICAL STUDIES IN MONTANA

compiled by

Richard B. Berg



Leopard rock textures, Beartooth Mountains, Montana.

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Montana Bureau of Mines and Geology

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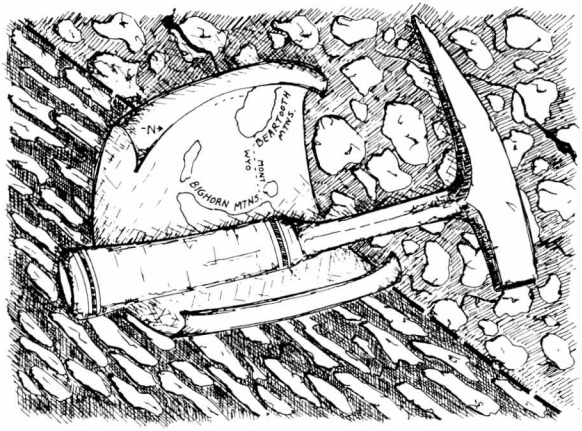

About the cover . . .

Leopard rock (upper right) is the proposed protolith for an ellipsoidal amphibolite (lower left) found in the North Snowy block of the Beartooth Mountains. The spots are megacrysts (phenocrysts?) of plagioclase found in certain dolerite dikes of the Big Horn (Wyoming) and Beartooth mountains. They are deformed by ductile shear and have become the ellipsoidal masses in amphibolite below the Pine Creek nappe complex in the Beartooths. (John C. Palmquist, written commun., 1983.)

Sketch by Chris Neumiller.

Contents

Sheets

Preface

This annual list of current geological and geophysical studies would not be possible without the assistance of those who took the time to send us information on their research. We appreciate this cooperation and hope that you will find this list useful.

Most studies are listed under one heading only, but because of the difficulty of assigning some studies to a single catgegory, some are listed under more than one heading. The date following the entry is the expected date of completion. Many of the entries are numbered and plotted on the index maps. An asterisk [*] indicates that the area of study is plotted on the index map of southwestern Montana [**Sheet 2, back pocket**]. All other numbered entries are plotted on the index map of Montana [**Sheet 1, back pocket**].

Completed theses are not included in this compilation. For information on theses dealing with Montana geology, see Montana Bureau of Mines and Geology Special Publication 77 (1977). A revised edition of this index (listing 1,000 theses) is in preparation and will be available in the fall of 1983. Northwest Geology, published annually by the Geology Department, University of Montana, is also an excellent source of information on theses dealing with the geology of Wyoming, Montana, Idaho, Oregon and Washington.

Many of the studies listed here are far from being completed. We suggest that anyone who wants more information on a specific project should correspond directly with the investigator.

Richard B. Berg
Economic Geologist
Montana Bureau of Mines and Geology

Butte
March 1, 1983

Areal Geology

1	Geology and mineral resources of the Belt 1:100,000 quadrangle, central Montana.	Richard B. Berg, Susan Vuke, Montana Bureau of Mines and Geology
2	Geologic map of the Jordan 1° x 2° quadrangle. [1984]	Robert N. Bergantino, Montana Bureau of Mines and Geology
3	Geologic map of the Miles City 1° x 2° quadrangle. [Late 1983 or early 1984]	Robert N. Bergantino, Montana Bureau of Mines and Geology
4	Bedrock geologic map of the Wolf Point 1° x 2° quadrangle. [1984 or 1985]	Robert N. Bergantino, Montana Bureau of Mines and Geology
5	Geology of Glacier National Park. [September 1984]	Robert L. Earhart USGS, Denver, Colorado
*6	Bedrock geology of the east flank of the Armstead anticline and Grasshopper Creek areas, Beaverhead County. [October 1983]	William V. Goodhue, Jr. Oregon State University
7	Geology of the Kalispell 1° x 2° quadrangle in conjunction with continuing study of the Precambrian Belt basin. [1987]	Jack E. Harrison USGS, Denver, Colorado
	Satellite photomap of northern Rocky Mountains and Great Plains. Scale 1:1,000,000.	H. L. James, Robert N. Bergantino, Montana Bureau of Mines and Geology
8	Geology of the northwest quarter of the White Sulphur Springs 1° x 2° quadrangle. Geology to be mapped at 1:24,000 and 1:62,500 scales starting in 1983. [1987]	Henry G. McClernan, Montana Bureau of Mines and Geology
*9	Geology of the Dillon 1° x 2° quadrangle. [1983]	Edward T. Ruppel USGS, Denver, Colorado
	Compilation of index maps for geologic maps in Montana by 1° x 2° quadrangles, including a bibliography of geologic maps. [Several quadrangles are completed; others will be completed at various intervals; completed ones are to be updated.]	Brenda Sholes Montana Bureau of Mines and Geology
*10	Geology and mineral resources of the Italian Peak Wilderness study area. [1983]	Betty A. Skipp USGS, Denver, Colorado
11	Geologic map of the Bozeman 1° x 2° quadrangle. [May 1983]	Donald L. Smith Montana State University
12	Reconnaissance-level photogeologic mapping of 8 7½′ quadrangles in Fergus County. [June 1983]	Susan Vuke, Montana Bureau of Mines and Geology
13	Mapping the bedrock geology of the Baker and Wibaux sheets, eastern Montana. Field mapping at a 1:24,000 scale will be published as a 1:100,000-scale map. [June 1983]	Susan Vuke, Mark A. Sholes Montana Bureau of Mines and Geology

*Entry plotted on **Sheet 2.**

Areal Geology *(continued)*

14	Geology of the Butte 1° x 2° quadrangle. [1983]	Chester A. Wallace USGS, Denver, Colorado
15	Geology of the Welcome Creek Wilderness area. [1983]	Chester A. Wallace USGS, Denver, Colorado
16	Geology and mineral resources of the Anaconda-Pintlar Wilderness area. [1983]	Chester A. Wallace USGS, Denver, Colorado
*17	Tectonic framework of the Pioneer Mountains. [1983]	E-an Zen USGS, Reston, Virginia

Structural Geology/Tectonics

*18	Economic geology and structural analysis of the Elkhorn mining district, Beaverhead County. [1983]	Peter R. Apostoluk Miami University, Ohio
19	Structural analysis of the disturbed belt in the Snedaker Basin quadrangle of west-central Montana. [May 1984]	Bill Banowsky University of New Mexico
*20	Petrographic and microstructural study of cataclasis of basement rocks in the Johnson and Cabin thrust plates, Tendoy and Beaverhead ranges. [1983?]	John M. Bartley University of North Carolina
21	Tectonic study of the Wolf Creek area utilizing Landsat photography. [June 1983]	Marcus Borengasser, University of Missouri, Columbia
*22	Structural geology of the Henneberry Ridge area, Beaverhead County. [May 1983]	Jeffery J. Coryell, Center for Tectonophysics, Texas A & M University
	Tectonics and lithostratigraphy of the Archean rocks of southwestern Montana. [Continuing]	Eric Erslev Lafayette College
*23	Structure, significance and metasomatism of the Madison mylonite zone, a major pre-Beltian shear zone, southwestern Montana (studies in the southern Madison Range and along the northwest margin of the Snowy Block of the Beartooth Range). [1985]	Eric Erslev Lafayette College
	Structural configuration of the top of the Madison Group in Montana east of the Rocky Mountains front. [1983]	Richard D. Feltis USGS, Billings, Montana
*24	Structure and petrology of the Archean basement complex, Ruby Range, southwestern Montana. [Continuing]	John M. Garihan Furman University
*25	Recurrent movement history of northwest-trending foreland faults in the Ruby, Highland, Tobacco Root and part of the Madison and Gallatin ranges, southwestern Montana. [Continuing]	John M. Garihan, Furman University; Christopher J. Schmidt, Western Michigan University

Structural Geology/Tectonics *(continued)*

26	Structural study of the southeast border zone, Bitterroot lobe, Idaho batholith, concentrating between Hamilton and Nez Perce Pass. [June 1983]	Lawrence Garmezy, Pennsylvania State University
	Monitoring seismicity in northeastern Montana and southern Saskatchewan and studies of related structural geology. [Continuing]	Don Gendzwill University of Saskatchewan
27	Geometry and mechanics of displacement transfer between thrust faults at different stratigraphic levels in the western Sawtooth Range near the Sun River. [May 1984]	Barbara Goldburg Texas A & M University
*28	Structure and geochemistry of metabasite (metadiabase) dikes, Tobacco Root Mountains.	Thomas B. Hanley Columbus College
29	Textural and chemical trends of progressively mylonitized granite, Bitterroot Range.	Vicki L. Hansen University of Montana
30	Radiometric dating of folded dikes and sills in the Virginia Peak-Robinson anticline area to determine time of thrusting in the Helena salient of the fold and thrust belt. Emphasis will be placed on structure, tectonics and igneous petrology. [June 1984]	Stephen S. Harlan Montana State University
31	Radial dikes and laccoliths of the central Montana alkaline province. [Continuing]	Donald W. Hyndman University of Montana
*32	A three-dimensional structural analysis of a thrust belt in southeastern Jefferson County will include computer modeling of the area and a reconstruction of the structural history. [June 1984]	Eric Jerde Washington State University
33	Study of strain distribution within thrusts between Marias Pass and the Sun River in Pondera, Teton and Lewis and Clark counties. [June 1984]	Diane Johnson Washington State University
34	Structural geology and timing of deformation of fold-thrust structures, western Crazy Mountains basin. [Initial phase—spring 1984]	David R. Lageson Montana State University
	Continuing research on the structural geology and tectonic evolution of the western Montana fold and thrust belt, especially east of the Boulder batholith. [Continuing]	David R. Lageson Montana State University
*35	Seismicity and structural geology of the greater Three Forks basin. [Continuing]	David R. Lageson Montana State University
36	Geology along the Beartooth highway, Gardiner Lake to Cooke City; a continuous strip map of Archean rocks and structures. [1983-1984]	Leonard H. Larsen University of Cincinnati
	Geophysical and geological analysis of the Precambrian basement of Montana to determine its influence on Phanerozoic tectonics and Laramide magmatism. [May 1983]	David M. L'Heureux Purdue University

Structural Geology/Tectonics *(continued)*

37	Compilation of a tectonic map of the Black Hills uplift, South Dakota-Wyoming-Montana. [March 1983]	Alvis L. Lisenbee, South Dakota School of Mines and Technology
38	Structural analysis of a portion of the disturbed belt located in Snedaker Basin quadrangle, west-central Montana. [June 1984]	Mark Longden University of New Mexico
39	Structural geology and tectonic history of the Ninemile Divide area. [November 1983]	Jeff Lonn University of Montana
*40	Investigation of the history of activity of the Madison Range fault along its 1959 rupture.	Elizabeth L. Mathieson Stanford University
41	Continuing research on the extent and characteristics of glacial phenomena and Quaternary tectonic features of the Yellowstone Valley south of Livingston, and the Madison Valley north of Raynolds Pass. [1984]	John Montagne Montana State University
*42	The deformation and transport direction of an allochthonous thrust sheet (associated with the Sapphire thrust plate) located in the southern Flint Creek Range of Montana. [September 1983]	Jeff Mow University of Michigan
43	A leopard rock protolith for polyphase deformed amphibolite, Beartooth Mountains. [Paper to be presented at 1983 meeting of Southeast Section of the G.S.A.]	John C. Palmquist Lawrence University
*44	Structural analysis of the Little Water syncline, Beaverhead County. [May 1983]	James Daniel Ponton Texas A & M University
45	Detailed structural analysis of sec. 4, 9, 16 and 21, T. 10 N., R. 1 W., Spokane Hills, and possible correlation of structure in this area with major thrust systems of the region. [February 1984]	Matthew J. Rhoades Washington State University
	Helium surveys will be conducted in the overthrust belt of Wyoming and Montana to determine whether the complex geology of the overthrust belt has a significant effect on the migration pathways for gases. These surveys will also try to determine whether soil-gas helium can be used to find the location and extent of thrust sheets. [1985]	Alan A. Roberts USGS, Denver, Colorado
*46	Samples of Canyon Creek Quartzite are being deformed and variable temperature, pressure and strain rate conditions are being applied to determine recrystallized grain size-stress relationships and also semi-brittle behavior of quartz in the alpha and beta fields. [July 1983]	John V. Ross, University of British Columbia
	Structural controls and movement patterns for late Cenozoic faults between 110°30'W and 112°30'W; 45°N and 46°N: A regional compilation. [1985]	Christopher Schmidt, Western Michigan University; Hugh Dresser, Montana Tech; John Garihan, Furman University

Structural Geology/Tectonics *(continued)*

*47	Structural controls for thrusting of basement rocks: Western Tobacco Root Range, western Ruby Range, northwestern Snowcrest and Greenhorn ranges, and western Madison Range. [1985]	Christopher Schmidt, Western Michigan University; John Garihan, Furman University
	Variation in deformational styles and fabric orientation along the Lewis and Clark line between St. Regis and Drummond, with a view toward relating structures at metamorphic and nonmetamorphic levels. [1984]	Jim Sears University of Montana
*48	Structural geology and Tertiary stratigraphy of the central Snowcrest Range between the East Fork Blacktail Creek and Snowcrest Mountain. [1983]	Mark Sheedlo Western Michigan University
49	Structural geology of the northern Sawtooth culmination, Swift Reservoir area, Pondera and Teton counties. [Winter 1985]	D. Scott Singdahlsen Montana State University
	Tectonic evolution of southwestern Montana, especially as reflected in the sedimentary record. [Continuing]	W. Thomas Straw Western Michigan University
*50	Structural geology, Tertiary stratigraphy and sedimentology of the Bull Mountain-Conrow Creek area northeast of Whitehall. [1983]	Michael Streeter Western Michigan University
*51	Structural geology of the Spanish Peaks and North Meadow Creek faults and the Jack Creek thrust system in the northwestern Madison Range near Ennis. [1983]	Mike Werkema, Western Michigan University; Susan Young, University of Texas
52	Structural geology of the Gardiner fault at Cinnabar Mountain. [1983]	M. Arthur Williams Western Michigan University
*53	Stratigraphy and structure of the east-central Tendoy Range, Beaverhead County. [August 1983]	Nancy S. Williams University of North Carolina
	[See Areal Geology.]	E-an Zen
*54	The seismicity and structure of the Three Forks basin, involving the use of microearthquake, gravity and seismic refraction studies. The main objective is to determine the locations and first-motions of active intrabasinal and boundary faults, their relation to preexisting structures, and resultant subsurface geometry of the Three Forks basin. [January 1984]	John C. Zim Montana State University

Stratigraphy, Sedimentary Petrology and Paleontology

*55	Tertiary sedimentary facies and depositional environments, northern Jefferson basin, southwestern Montana. [June 1984]	Russell Axelrod University of Montana

Stratigraphy, Sedimentary Petrology and Paleontology *(continued)*

	Sedimentary petrology of the Mount Shields Formation (Belt Supergroup), western Montana and northern Idaho. [June 1983]	David A. Barlow University of Montana
	Correlation of unusually thick Miocene deposits in Jackson Hole, Wyoming, with isolated exposures in west-central Montana. [1983]	Anthony D. Barnosky University of Washington
56	Sedimentology of the Lebo Member and the lower Tongue River Member of the Fort Union Formation. Field work was in the Pine Hills area east of Miles City. [1983 or 1984]	Edward S. Belt Amherst College
	Stratigraphy and sedimentology of the St. Mary River Formation in Montana.	Carol Bibler Montana State University
57	Tonsteins in the lower Tertiary coals on the Fort Peck Indian Reservation will be studied for use in correlating coal beds. Also a section across the Cretaceous-Tertiary boundary will be studied for evidence of a catastrophic event. [1985]	Bruce F. Bohor USGS, Denver, Colorado
	Paleontology and biostratigraphy of the Amsden Formation from three localities in southwestern Montana. [July 1983]	David P. Brewster Indiana University
	Stratigraphy and petrography of the Rhame bed (Paleocene) in southeastern Montana. Will determine environment of deposition and whether this is a good stratigraphic marker between the Ludlow and Tongue River members of the Fort Union Formation. [May 1984]	Kim Christensen Montana Tech
*58	Study of the sedimentary rocks exposed on the west flank of the Armstead anticline area, Beaverhead County. [January 1984]	Charles W. Clark Oregon State University
	Chronostratigraphy of mid-Cretaceous hydrocarbon source rocks, western interior. [1984]	William A. Cobban USGS, Denver, Colorado
	Geochemical survey of rocks of the Precambrian Belt Supergroup continues with emphasis on the Spokane Formation. [1983]	Jon J. Connor USGS, Denver, Colorado
	Biostratigraphy of coals and lignites in uppermost Cretaceous rocks in eastern Montana, primarily the Hell Creek Formation in Garfield, McCone and Dawson counties. [December 1983]	Ann L. Conrad University of Iowa
	Latest Cretaceous (Maestrichtian) sedimentation and paleogeography, western interior, U.S.A. (Includes several sites in the Fort Peck Reservoir area and Yellowstone River valley of eastern Montana—Fox Hills, Lance and Hell Creek formations.) [August 1983]	R. Keith Crowder University of Iowa

Stratigraphy, Sedimentary Petrology and Paleontology *(continued)*

59	Conodont biostratigraphy of the Alaska Bench Formation, central Montana—A discussion of the uppermost Chesterian to lower Morrowan conodonts of the Alaska Bench Formation. [1983]	Larry E. Davis Washington State University
	Depositional environments and sedimentology of the Kootenai Formation, southwestern Montana. [May 1984]	Peter A. DeCelles Indiana University
	Tertiary geology and uranium occurrences of the Powder River basin. [1983]	Norman Denson USGS, Denver, Colorado
	Study of western interior Cretaceous uranium basins. Includes work on the Cloverly, Eagle and Fox Hills formations. [1984]	Harry W. Dodge, Jr. USGS, Denver, Colorado
60	Stratigraphic and petrographic analysis of the Lower Blackleaf Formation near Lima. [June 1984]	Thaddeus S. Dyman Washington State University
	Tertiary geology and paleontology of western Montana and eastern Idaho intermontane basins.	Robert W. Fields University of Montana
61	Carbonate petrology, paleontology and hydrocarbon potential of a Devonian age reef? Bandbox Mountain, Judith Basin County. [Spring 1984]	Larry B. French University of Montana
	A sedimentologic-geochemical investigation of controls on reservoir quality in low-permeability gas reservoirs, including reservoirs in Cretaceous units in Montana. [1985]	Donald L. Gautier USGS, Denver, Colorado
62	A sedimentary and stratigraphic study of portions of the Two Medicine Formation in Teton and Pondera counties, as part of a paleoenvironmental reconstruction for the Willow Creek anticline dinosaur assemblage. [1984]	William Gavin Montana State University
63	Biostratigraphy and depositional environments of mud mounds in the Lodgepole Limestone, Swimming Woman Canyon, Big Snowy Mountains. [May 1983]	Brian F. Glenister, Elaine Winfrey, University of Iowa
64	Stratigraphy and depositional environment of the Big Snowy Group in south-central Montana. [March 1984]	Gary E. Guthrie Montana State University
*65	Sedimentary processes and tectonic implications of the Beaverhead Formation (Upper Cretaceous-Paleocene). Work will be concentrated in the vicinity of Red Conglomerate Peaks and Antone Peak. [September 1983]	J. Christopher Haley Johns Hopkins University
	Physical characteristics of carbonate reservoir rocks, including study of the Mission Canyon, Bakken and Red River formations of the Williston basin. [1985]	R. B. Halley USGS

Stratigraphy, Sedimentary Petrology and Paleontology *(continued)*

	[See Areal Geology.]	Jack E. Harrison
66	Paleocene floras and stratigraphy of the northern Big Horn basin, Montana and Wyoming. [1985]	Leo J. Hickey, Div. of Paleobotany, Smithsonian Inst., Washington, D.C.; Erling Dorf, Princeton University
67	Lithostratigraphic analysis of Waulsortian bioherms in the Paine Member of the Lodgepole Limestone, east-central Little Belt Mountains. [December 1983]	Ted Loukides Montana State University
	Study of petroleum source rock characteristics and depositional setting of Upper Mississippian and Lower Pennsylvanian beds in Utah, Idaho, Wyoming and Montana. [1985]	Edwin K. Maughan USGS, Denver, Colorado
68	Stratigraphy and sedimentation of the Burke and Revett formations (Belt Supergroup), Flathead Indian Reservation. [Summer 1983]	Jeffrey L. Mark University of Montana
*69	Petrology of the Bozeman Group, southwestern Montana. [Fall 1983]	Stewart Monroe Central Michigan University
	Subsurface study of the Ordovician Winnepeg Formation in the Williston basin. Includes data from wells in Montana, North Dakota and Canada. [May 1983]	Lawrence M. Monson, Mary Bitney Rocky Mountain College
	Petrology of the Eagle Formation. An effort will be made to correlate lithology as based on well-log parameters to production and exploration targets.	Lawrence M. Monson, Michele Kelley Rocky Mountain College
	Biostratigraphy and depositional environments of Tertiary nonmarine basins, Rocky Mountain foreland. Includes work in the Powder River basin. [1984]	Douglas J. Nichols USGS, Denver, Colorado
	Depositional environments and petrography of the Tyler Formation of central Montana. [December 1983]	Roger Noble Montana Tech
70	Biostratigraphic zonation of trilobites of Middle Cambrian Wolsey Shale, Fishtrap Lake area, Sanders County. [June 1983]	David P. O'Malley Washington State University
*71	Textural investigation of the Black Butte diamicton, Gravelly Range. Evidence for Eocene glaciation? [June 1984]	William J. Priore Wright State University
	Microstructure and environmental implications of late Devonian algal nodules from southwestern Montana. [Late 1983-1984]	Joaquin Rodriguez, Hunter College (CUNY); R. C. Gutschick, University of Notre Dame

Stratigraphy, Sedimentary Petrology and Paleontology *(continued)*

	Stratigraphic framework and facies analysis of the Mississippian system, western North America. [1984]	William J. Sando, USGS and U.S. National Museum, Washington, D.C.
	Sedimentology and paleotectonics of the Quadrant Formation, southwestern Montana. [May 1984]	Herb Saperstone Colorado State University
72	Sedimentology and stratigraphy of the lower Belt in the Helena embayment (includes the Neihart Quartzite, Chamberlain Shale and Newland Formation). [1983-1984]	Juergen Schieber University of Oregon
	Included in a study of reservoir rock properties will be an investigation of the Bakken Formation in the Williston basin, Montana and North Dakota, with emphasis on physical parameters, organic matter content and source rock maturity of the formation. [1985]	James W. Schmoker USGS, Denver, Colorado
	Stratigraphic analysis and modeling of Tertiary basins of western Montana. Work is concentrated on basins containing coal. [1985]	Gary B. Schneider USGS, Denver, Colorado
*73	Depositional environment-paleoclimate study of carbonate nodule-bearing Kootenai and Blackleaf lithologies in the Pioneer Mountains-McCarthy Mountain area, southwestern Montana. [1984]	Robert K. Schwartz Allegheny College
*74	Facies analysis of the lowermost Blackleaf Formation in the McCarthy Mountain area, southwestern Montana. [1984]	Robert K. Schwartz Allegheny College
	[See Structural Geology.]	Mark Sheedlo
*75	Depositional environment and biostratigraphy of the Lower Triassic Thaynes Formation, southwestern Montana. [September 1983]	Pamela G. L. Sikkink University of Montana
*76	Mineral resources of the Madison-Gallatin Wilderness. Includes stratigraphic and sedimentologic studies of Upper Cretaceous section. [1983]	Frank S. Simons USGS, Denver, Colorado
	Stratigraphy and carbonate petrology of the Madison Group, central and southwestern Montana. [Continuing]	Donald L. Smith Montana State University
	The control and distribution of porosity in the Red River Formation 'C' zone in Sheridan, Roosevelt and Richland counties, Montana, and Divide and Williams counties, North Dakota. [December 1983]	James R. Stimson Montana State University
	[See Structural Geology.]	Michael Streeter
	Tectonic controls on Mesozoic sedimentation in southwestern Montana. [Continuing]	Lee J. Suttner Indiana University
	Paleoclimatic interpretations from Tertiary basin deposits, Montana and Idaho. [1983]	Gray Thompson University of Montana

Stratigraphy, Sedimentary Petrology and Paleontology *(continued)*

	Origin and significance of limestone and siltstone clast conglomerates in the Kootenai Formation in southwestern Montana. [May 1983]	Todd Alan Thompson Indiana University
77	Petrology, paleoecology and depositional environments of laminated carbonates and associated facies of the Sundance Formation (Jurassic), northern Bighorn basin, Montana and Wyoming. [1983]	John Utgaard Southern Illinois University
	Compilation of data sheets and revised stratigraphic columns for all major stratigraphic units of western Montana as part of the American Association of Petroleum Geologists COSUNA project (Correlation of Stratigraphic Units of North America). [Will be published by AAPG this year.]	Susan Vuke Montana Bureau of Mines and Geology
	Biostratigraphy and organic metamorphism, upper Paleozoic and Triassic rocks, overthurst belt, western United States. [1984]	Bruce R. Wardlaw USGS, Denver, Colorado
	Study of Mississippian crinoids of central and western Montana. This is a continuing study in midphase. 1984-1986]	G. D. Webster Washington State University
	Depositional framework of the Fox Hills Sandstone and Lower Hell Creek Formation (Upper Cretaceous), northeastern Montana—Fort Peck Reservoir area. [August 1983]	Karen L. Wheeler University of Iowa
78	Sedimentology of the Altyn Formation (Precambrian) of Glacier National Park—A study of microbiotas, stromatolites, and evaporitic dolomites in shallowing-upward cycles. [Continuing]	Brian White Smith College
79	Investigation of the occurrence of ash beds in a varve sequence at Marias Pass. [1985]	Ray E. Wilcox USGS, Denver, Colorado
80	Stratigraphy and petrography of the Fox Hills Formation in the Baker and Wibaux 1:100,000 quadrangles, eastern Montana. [1983]	Edith Wilde Montana Tech
	[See Structural Geology/Tectonics.]	Nancy S. Williams
	Carbonate petrography of the Madison Group in central Montana (Little Belt Mountains, Big Snowy Range and Little Rockies.) [1983]	James Lee Wilson University of Michigan
	Stratigraphy and sedimentology of Ravalli Group, middle Belt carbonate and Missoula Group units within the Belt Supergroup, northwest Montana and northern Idaho.	Don Winston University of Montana

Geochemistry, Mineralogy and Petrology

81	Petrologic and geochemical studies of the alkaline complexes at Rainy Creek, Haines Point and Skalkaho area will constitute part of a study of thorium resources. [1985]	Theodore J. Armbrustmacher, USGS, Denver, Colorado
82	Geochemical and petrologic analysis of xenoliths from the Late Cretaceous Lodgepole intrusive (near Nye, Montana), including Stillwater Complex cumulate-textured, Paleozoic sedimentary and Precambrian metasedimentary xenoliths. Comparisons will be made between the Stillwater-type xenoliths and the exposed Stillwater Complex outcrop five miles to the south. [May 1983]	R. A. Borzdowski, G. C. Ulmer, Temple University; D. P. Gold, Pennsylvania State University
*83	Geochemical study of the mass transfer associated with the formation of talc deposits, Ruby Range. [September 1984]	John B. Brady Smith College
	Geochemistry and economic geology of hydrothermal vein carbonate-fluorspar deposits, western Montana. [Continuing]	D. G. Brookins University of New Mexico
84	Leucocratic and mafic monzonite bodies bordering the Boulder batholith. [June 1983]	Barbara Ann Butler University of Montana
85	Volcanic and related intrusive rocks of the Gallatin Range and adjacent region. [Continuing]	Robert A. Chadwick Montana State University
86	Evolution of the volcanic field in the Yellowstone Plateau-Island Park area of Wyoming, Idaho and Montana. [1985]	Robert L. Christiansen USGS, Menlo Park, California
	Study of clinker produced by burning of coal beds in Montana and Wyoming; will include radiometric dating. [1983]	Donald A. Coates USGS, Denver, Colorado
	[See Stratigraphy, Sedimentary Petrology and Paleontology.]	Jon J. Connor
87	Resource evaluation of oil and metals in the Heath Formation (Mississippian) south of Lewistown. [June 1983]	Pamela Dunlap Derkey Montana Bureau of Mines and Geology
	Geology and mineral deposits of Cretaceous-Tertiary volcanic rocks in the vicinity of the Boulder batholith. [1988]	Robert E. Derkey Montana Bureau of Mines and Geology
*88	Petrology, petrography and geochemistry of numerous satellitic intrusions of the Pioneer batholith between Argenta and Melrose, Beaverhead County. [Spring 1983]	Gary D. Eaton University of Montana
	[See Structural Geology/Tectonics.]	Eric Erslev
*89	Petrology and structure of the metasedimentary rocks associated with the Black Butte iron deposit. [1984]	Eric Erslev, Margaret Roll Lafayette College

Geochemistry, Mineralogy and Petrology *(continued)*

*90	Heavy-metal reconnaissance survey along the Madison River and its tributaries, Gravelly Range, latitude 44°55'00"-45°10'00", longitude 111°35'00"-111°50'00". [June 1983]	Philip K. Fairbank Wright State University
91	Geology and geochemistry of the Slough Creek Tuff and the Ash Mountain area, Park County. [Continuing]	James T. Gutmann Wesleyan University
	[See Structural Geology/Tectonics.]	Thomas B. Hanley
	[See Structural Geology/Tectonics.]	Stephen S. Harlan
	Continuing study of kimberlitic diatremes in Montana.	B. Carter Hearn USGS, Reston, Virginia
92	As part of an investigation of the petrology of basalt, the basal zone of the Stillwater Complex will be studied. [1983]	Rosalind T. Helz USGS, Reston, Virginia
	Study of geochemistry of clinker produced by natural burning of coal beds will include analysis of samples from Montana. [1984]	James R. Herring USGS, Denver, Colorado
*93	Mineralogic and geochemical study of amphibolites in the Tobacco Root Mountains, Madison County. [1984 or 1985]	David F. Hess, Western Illinois University; Charles J. Vitaliano and others, Indiana University
94	Origin of K-bentonites in the disturbed belt. Field work is concentrated in the Sawtooths and especially back of Sun River Canyon. [June 1984]	John Hower, Stephen Altoner University of Illinois
95	Petrologic-tectonic study of the Bitterroot lobe of the Idaho batholith, Lochsa Canyon, northern Idaho and Bitterroot Range, western Montana. [Continuing]	Donald Hyndman University of Montana
96	Study of the K-rich alkaline rocks of the central Montana alkaline province. [Continuing]	Donald Hyndman University of Montana
97	Geology, petrology and geochemistry of the Elkhorn Peak area, southwestern Montana. [June 1983]	Eirik J. Krogstad Western Washington University
98	Continued geologic mapping of igneous bodies of Crazy Mountains; Coffin Butte and Little Elk dome in the northern part are targeted. [1983]	Leonard H. Larsen University of Cincinnati
*99	Mapping, geochemical sampling and fission track age dating of numerous Tertiary volcanic deposits in Sage and Blacktail creeks, Beaverhead and Madison counties. [June 1983]	Kim L. Marcus Western Washington University
*100	Geology and petrology of volcanic rocks of the Lobo Mesa, Gravelly Range, Madison County. [December 1984]	Neal D. McCall Wright State University

Geochemistry, Mineralogy and Petrology *(continued)*

101	Igneous history of the Highwood Mountains. [1986]	I. S. McCallum, A. J. Irvine, H. O'Brien, University of Washington
102	Petrology and geochemistry of the Stillwater Complex. [1984-1985]	I. S. McCallum, University of Washington; A. Boudreau, L. Criscenti, L. Raedeke, L. Haskin, P. Salpas, Washington University (St. Louis)
	Study of the dissolution chemistry and element availability of beds in the Fort Union Formation, with particular emphasis on beds rich in smectite. [1983]	James M. McNeal USGS, Denver, Colorado
103	Stratigraphy of the upper and banded zones in the Stillwater Complex from the Benbow mine area. [May 1983]	Lawrence M. Monson, Pat Lemke, Rocky Mountain College
104	Archean evolution of the Beartooth Mountains and surrounding areas of Montana and Wyoming. [Continuing]	Paul A. Mueller University of Florida
	[See Structural Geology/Tectonics.]	John C. Palmquist
*105	Field mapping, petrology and geochemistry of Black Butte, Gravelly Range. [Manuscript in preparation.]	Paul Pushkar, Wright State University; James Gutmann, Wesleyan University
*106	Field mapping, petrology and geochemistry of the Lion Mountain volcanic center, Gravelly Range. [1984?]	Paul Pushkar, Wright State University; James Gutmann, Wesleyan University
	Origin of silicified wood associated with coals in southeastern Montana. [Fall 1983]	Mark A. Sholes, Montana Bureau of Mines and Geology
*107	Petrologic study of four tuff sections in the Lion Mountain-Black Butte area in the Gravelly Range, approximately 50 miles south of Ennis. [Spring 1984]	Kathy Shoop Wright State University
108	Alteration petrology and volcanic geology, Hog Heaven mining district. [1983]	Gray Thompson University of Montana
*109	Petrography and petrochemistry of the 10 N pluton, Broadwater County.	Charles J. Vitaliano Indiana University
*110	Petrography and petrochemistry of the Tobacco Root batholith, Madison County.	Charles J. Vitaliano Indiana University
*111	Detailed petrologic, petrochemical and structural study of the Tobacco Root batholith, Madison County. [Continuing]	Charles J. Vitaliano, Indiana University; John Smith, Standard Oil of California; David F. Hess, Western Illinois University
*112	Geology of the Argenta stock, Beaverhead County. [Spring 1983]	John Welch Purdue University

Geochemistry, Mineralogy and Petrology *(continued)*

	Study of ultramafic inclusions in basalts will include a study of feldspathic peridotite-gabbro xenoliths in Montana. [1983]	Howard G. Wilshire USGS, Menlo Park, California
113	Studies of the macroscopic and microscopic fluid dynamics of the Stillwater Complex. (1985]	Thomas L. Wright USGS, Reston, Virginia
*114	Geochemistry of gold and uranium in the upper Ruby River basin. [May 1983]	Lon Yandell, Western Washington University
115	The mineralogy of the Black Pine mine, Granite County.	Lester Zeihen Montana Tech

Isotope Geology and Geochronology

*116	Geochronologic studies include work on rocks from the Pioneer Mountains. [1985]	Joseph G. Arth USGS, Reston, Virginia
117	A delta-D study of water in and adjacent to Yellowstone National Park will try to determine the connection, if any, between the Yellowstone geothermal system and adjacent hydrologic basins. A study of the chloride flux out of Yellowstone National Park will also be initiated. [1985]	Irving Friedman USGS, Denver, Colorado
*118	Absolute ages of Quaternary deposits in the Tobacco Root Range. [August 1983]	Robert D. Hall, Indiana University/Purdue University
	[See Structural Geology/Tectonics.]	Stephen S. Harlan
	[See Geochemistry, Mineralogy and Petrology.]	John Hower, Stephen Altoner
119	Stable isotope ratios of runoff and geothermal water in and around Yellowstone National Park and constraints on the hydrology of the geothermal features. [1986]	T. Kurtis Kyser University of Saskatchewan
	[See Structural Geology/Tectonics.]	David R. Lageson
120	Mineralization and geochronology of the Stemple Pass area plutons.	Ian M. Lange University of Montana
	The Radiometric Age Data Bank now contains about 95 percent of the published radiometric ages for 18 states, including Montana.	Richard F. Marvin USGS, Denver, Colorado
	[See Geochemistry, Mineralogy and Petrology.]	Paul A. Mueller
121	K-Ca and Ar-Ar dating of minerals from the Stillwater Complex will continue in an effort to better understand isotopic systems. [1985]	Charles W. Naeser USGS, Denver, Colorado
*122	A mineralogic, fluid inclusion and stable isotope study of the Golden Sunlight gold deposit, Whitehall mining district, Jefferson County. [September 1983]	Elise W. Porter, Edward M. Ripley Indiana University

Isotope Geology and Geochronology *(continued)*

	Chemical and isotopic evidence of the origins of natural gases. [1985]	Dudley D. Rice USGS, Denver, Colorado
123	The Spar Lake copper-silver deposits will be investigated in conjunction with stable isotope studies of ore deposits. Also sulfur isotope studies of the Yellowstone geothermal system will continue. [1985]	Robert O. Rye USGS, Denver, Colorado
	Geochronologic investigations will include zircon age determinations on samples from Montana. [1985]	Thomas W. Stern USGS, Reston, Virginia
	[See Stratigraphy, Sedimentary Petrology and Paleontology.]	Ray E. Wilcox

Geophysics

	A series of vertical seismic profiles is planned in Montana and Wyoming in order to measure the acoustic properties of tight gas sands before and after hydrofracturing. [1985]	Alfred H. Balch USGS, Denver, Colorado
124	Seismic refraction profile in the Beartooth Mountains. [August 1983]	L. W. Braile Purdue University
125	Columbia University's new Mark II airborne spectroradiometer system will be used to acquire airborne spectroradiometer data at mineralized sites, including Cotter basin, Montana. [October 1986]	Frank C. Canney USGS, Denver, Colorado
126	A reflection seismic survey over a shallow coal seam, Colstrip, Montana. [1983]	Ed Crase, Geophysical Engineering Department, Montana Tech
*127	A study of the paleomagnetics of mineralized terranes will include the Pioneer batholith. [1986]	Donald P. Elston USGS, Flagstaff, Arizona
	Paleomagnetic sampling in Proterozoic and Phanerozoic rocks of northern Arizona, western Montana and adjacent parts of Idaho. [1985]	Donald P. Elston USGS, Flagstaff, Arizona
	[See Structural Geology/Tectonics.]	Don Gendzwill
128	Gravity investigation near White Sulphur Springs. A regional investigation plus a detailed investigation near the hot springs location. [December 1983]	John Gogas, Geophysical Engineering Department, Montana Tech
129	Gravity and automagnetotelluric studies in the Butte 1° x 2° quadrangle. [1983]	William F. Hanna USGS, Reston, Virginia
*130	Gravity studies in the Dillon 1° x 2° quadrangle. [1983]	William F. Hanna USGS, Reston, Virginia
131	Geoelectrical survey of the Ten Lakes Wilderness area. [1985]	Donald B. Hoover USGS, Denver, Colorado

Geophysics *(continued)*

	Gravity surveys in the Kalispell, Great Falls, White Sulphur Springs and Bozeman 1° x 2° quadrangles. [1985]	M. Dean Kleinkopf USGS, Denver, Colorado
132	Gravity surveys of the Ten Lakes and Italian Peaks Wilderness areas. [1984]	M. Dean Kleinkopf USGS, Denver, Colorado
	[See Structural Geology/Tectonics.]	David R. Lageson
133	A comparison of resistivity surveys conducted at the Bozeman Hot Springs and White Sulphur Springs. [May 1983]	Kandidus Lupindu, Geophysical Engineering Department, Montana Tech
	[See Structural Geology/Tectonics.]	Elizabeth L. Mathieson
*134	A resistivity survey of the Norris Hot Spring area. Several Schlumberger-type soundings to AB/2 of 1,000 meters were made and are being interpreted. [May 1983]	Janet Peterson, Geophysical Engineering Department, Montana Tech
135	Investigation of the spectral reflectance of mineralized areas will include an alteration map and lineament analysis of the Anaconda-Pintlar Wilderness area. [1985]	Lawrence C. Rowan USGS, Reston, Virginia
	Crustal studies in western Montana and surrounding areas; methods of investigation are largely seismic, gravitational and magnetic. [Continuing]	Steven D. Sheriff University of Montana
	Relationship between thermal evolution of continental lithosphere and long-wavelength gravity anomalies east of the Cordilleran axis. [Continuing]	Steven D. Sheriff University of Montana
*136	Seismic monitoring in the Butte-Anaconda area, with supplemental data from Helena and Missoula. [Continuing]	Michael C. Stickney Montana Bureau of Mines and Geology
	Crustal seismic refraction profile between Butte and the Thompson Creek mine southwest of Challis, Idaho. [Results to be presented at the 1983 Rocky Mountain-Cordilleran G.S.A. meeting.]	Michael C. Stickney Montana Bureau of Mines and Geology
137	Gravity survey of Glacier National Park and a regional gravity transect from the Glacier-Toole County line, 50 miles east of the park, to Kila Mountains, 50 miles west of the park. [1985]	Dolores M. Wilson USGS, Denver, Colorado
	[See Structural Geology/Tectonics.]	John C. Zim

Economic Geology

	The Montana Bureau of Mines and Geology has substantially increased the size of its core and cuttings repository. Core from more than 70 drill holes is now cataloged and available for examination.	Montana Bureau of Mines and Geology Core Repository

[Continued on page 17.]

Economic Geology *(continued)*

	Recent acquisitions of core are from McCartney Mountain (north of Dillon), Rochester Creek (northwest of Twin Bridges), Finley basin area (north of Anaconda), and Carter County. Individuals wanting to examine this core and companies interested in donating core should contact Robert E. Derkey at the Montana Bureau of Mines and Geology, 406/496-4169.	
	Geochemical exploration in western Montana. [Continuing]	John C. Antweiler USGS, Denver, Colorado
	[See Structural Geology/Tectonics.]	Peter R. Apostoluk
	Geology of Montana barite deposits (some information in MBMG Open-File Report 95).	Richard B. Berg, Montana Bureau of Mines and Geology
	[See Areal Geology.]	Richard B. Berg, Susan Vuke
	Determination of geochemical attributes of precious-metal deposits in southwestern Montana and the relation of these deposits to the genesis of batholithic rocks. [September 1986]	Byron R. Berger USGS, Denver, Colorado
	[See Geochemistry, Mineralogy and Petrology.]	John B. Brady
*138	Geochemical reconnaissance survey of the west flank of the Gravelly Range, Madison County. [June 1983]	Mark Brooks Wright State University
139	Geochemical study of a Cu-Ag vein system 8 to 10 miles north of Lincoln. [June 1983]	Greg Byer University of Montana
	[See Geophysics.]	Frank C. Canney
*140	Geology and ore deposits of selected mines in the Virginia City district. [March 1983]	Marshall Cole Montana State University
141	Geology, hydrothermal alteration and fluid inclusion study of the Alice E. breccia pipe, New World mining district, Park County. [May 1983]	Edward L. Cope Colorado State University
*142	General economic geology of the Golden Sunlight disseminated gold deposit east of Whitehall, Jefferson County: geologic setting, mineralization, alteration, ore controls and economics. [Fall 1983/Spring 1984]	Walter W. Coppinger Trinity University
*143	A study of the mechanisms and rates involved in the surficial weathering of a protore assemblage in the Butte district.	Aric B. Cunningham, University of California, Berkeley
144	The geology and mineralization of the Clinton mining district, Missoula County. [June 1983]	Barbara L. DeAngelis University of Montana
	[See Geochemistry, Mineralogy and Petrology.]	Pamela Dunlap Derkey
	Manganese in Montana. [1985]	Robert E. Derkey, Montana Bureau of Mines and Geology

Economic Geology *(continued)*

	[See Geochemistry, Mineralogy and Petrology.]	Robert E. Derkey
145	Mineral resources of the Anaconda-Pintlar Wilderness. [1983]	James E. Elliott USGS, Denver, Colorado
146	Mineral resources of the Butte 2° quadrangle (CUSMAP). [1983]	James E. Elliott USGS, Denver, Colorado
	[See Geophysics.]	Donald P. Elston
147	Field studies of sulfide occurrences in the Stillwater Complex will continue as part of a study of world nickel and cobalt resources. [Continuing]	M. P. Foose USGS
	Titanium resources of the United States. Includes work on the titanium in porphyry metal deposits of the western U.S. [1985]	Eric R. Force USGS, Reston, Virginia
	Evaluation of deposits of western bentonite, including Montana deposits. [September 1985]	John W. Hosterman USGS, Reston, Virginia
	Bedded Precambrian iron deposits of southwestern Montana. [September 1985]	Harold L. James, USGS Port Townsend, Washington
*148	Geology and ore deposits of the Red Pine mine and vicinity, Sheridan mining district, Madison County. [December 1983]	Teresa M. Kinley Montana State University
149	Origin and geochemistry of the Cu-Ag mineralization near Wolf Creek.	Ian M. Lange University of Montana
150	Geology, paragenesis and geochemistry of mineralization in the Hog Heaven mining district.	Ian M. Lange University of Montana
	[See Isotope Geology and Geochronology.]	Ian M. Lange
151	Geology of chromite. Includes geochemical investigation of the Stillwater Complex. [September 1985]	Bruce R. Lipin USGS, Reston, Virginia
	[See Geochemistry, Mineralogy and Petrology.]	I. S. McCallum and others
152	Geochemical exploration, Tobacco Root Mountains. [1983]	H. G. McClernan, Montana Bureau of Mines and Geology
*153	Metallogenic map of the Dillon 2° quadrangle. [1983]	H. G. McClernan, Montana Bureau of Mines and Geology
	Metallic mineral deposits, Lewis and Clark County. [Manuscript in preparation, MBMG.]	H. G. McClernan, Montana Bureau of Mines and Geology
	Gold deposits in carbonate units of the Belt Supergroup. [1986]	H. G. McClernan, Montana Bureau of Mines and Geology
	Development of geochemical exploration techniques for stratabound Cu-Ag deposits in Montana. [October 1986]	Elwin L. Mosier USGS, Denver, Colorado

Economic Geology *(continued)*

154	Investigation of occurrences of platinum-group metals in stratiform basic and ultramafic rocks. Includes work in the Stillwater Complex of Montana. [1985]	Norman J. Page USGS, Menlo Park, California
*155	Detailed mapping and sampling of epithermal gold deposits at the Golden Sunlight and Beals Mountain mines, southwestern Montana. [September 1984]	Robert C. Pearson USGS, Denver, Colorado
	Study of metals in Mississippian shales in western Montana. [September 1985]	Forrest G. Poole USGS, Denver, Colorado
	[See Isotope Geology and Geochronology.]	Elise W. Porter, Edward M. Ripley
*156	Description of main stage and pre-main stage structural patterns, alteration zoning and metal zoning of the Butte deposit. Interpretation of zoning in relation to chemistry of metal transport and hydrothermal metasomatism. [1984]	Mark Reed University of Oregon
	[See Geophysics.]	Lawrence C. Rowan
*157	A petrologic study of precious-metal mineralization along a section of the Bismark fault, Potosi mining district, Madison County. [September 1984]	Meg Saunders, Ed Ripley Indiana University
158	Strategic and critical mineral study of Cr, Co, Mn, Ni and Pt in the United States (including Montana resources, especially the Stillwater Complex). [February 1983]	Arnold J. Silverman University of Montana
*159	Mineral resources of the Madison-Gallatin Wilderness area. [September 1983]	Frank S. Simons USGS, Denver, Colorado
	[See Areal Geology.]	Betty A. Skipp
	[See Geochemistry, Mineralogy and Petrology.]	Gray Thompson
160	Mineral resources of the Mt. Henry Wilderness area. [1983]	Richard E. Van Loenen USGS, Denver, Colorado
	[See Areal Geology.]	Chester A. Wallace
161	Study of resistance factors in soil bacteria developed over the Cotter basin deposit. [September 1984]	J. R. Watterson USGS
162	Mineral resources of the Ten Lakes Wilderness area. [1983]	James W. Whipple, USGS Spokane, Washington
	[See Geochemistry, Mineralogy and Petrology.]	Lester Zeihen

Energy

	[See Geochemistry, Mineralogy and Petrology.]	Theodore J. Armbrustmacher
163	Coal resources of the Culbertson 1:100,000-scale quadrangle. [1985]	Harold H. Arndt USGS, Denver, Colorado
	[See Geophysics.]	Alfred H. Balch
164	Geology and coal resources of the Greenleaf-Miller area, Rosebud County, northern Powder River basin. [1984]	Gary Berg BLM-Resource Evaluation Billings, Montana
165	Geology and coal resources of the Downey Coulee coal lease tract, Rosebud County. [1983]	Gary Berg BLM-Resource Evaluation Billings, Montana
166	Geology and geothermal resources of the Jackson Hot Springs area, Big Hole valley. [June 1983]	Geoffrey A. Black Montana State University
	[See Stratigraphy, Sedimentary Petrology and Paleontology.]	Bruce F. Bohor
	Anomalous vitrinite reflectance in outcrops over known oil fields in Montana, Wyoming and Oklahoma will be evaluated as a tool for exploration. [1985]	Neely H. Bostick USGS, Denver, Colorado
167	Geology and coal resources of the Red Lodge coal field, Carbon County, Montana. [1985]	Ed Burks BLM-Resource Evaluation Billings, Montana
168	Geology and coal resources of the Terry Badlands Wilderness study area, Prairie County, eastern Montana. [1984]	Ed Burks BLM-Resource Evaluation Billings, Montana
169	Geology and coal resources of the Colstrip Maintenance and "C" coal lease tracts, Rosebud County, northern Powder River basin. [1983]	Ed Burks BLM-Resource Evaluation Billings, Montana
170	Geology and coal resources of the Foster Creek area, Custer County, northern Powder River region. [1984]	Ed Burks BLM-Resource Evaluation Billings, Montana
171	Geology and coal resources of the Colstrip area, Rosebud County, northern Powder River basin. [1984]	Ed Burks BLM-Resource Evaluation Billings, Montana
	Data collection, validation and entry in the National Coal Resource Data System (NCRDS) will continue in cooperation with the Montana Bureau of Mines and Geology. [Continuing]	M. D. Carter USGS
	Geochemistry of sedimentary organic matter, crude oil and natural gas. Will include a report on the hydrocarbon generation and oil and gas potential of the northern Montana disturbed belt. [Continuing]	Jerry L. Clayton USGS, Denver, Colorado
	[See Stratigraphy, Sedimentary Petrology and Paleontology.]	Ann L. Conrad

Energy *(continued)*

172	Geology and coal resources of the Ashland (Decker-Birney) and northwest Otter Creek coal lease tracts, Rosebud and Powder River counties, northern Powder River basin. [1983]	David Coppock BLM-Resource Evaluation Billings, Montana
173	Geology and coal resources of the Tongue River area, northern Powder River. [1984]	David Coppock BLM-Resource Evaluation Billings, Montana
174	Geology and coal resources of the Terret Ranch area, Powder River County. [1984]	David Coppock BLM-Resource Evaluation Billings, Montana
175	Coal drilling during the 1982 field season in the Birney-East Decker area, Rosebud and Big Horn counties, northern Powder River basin. [To be published as an open-file report, 1983.]	William C. Culbertson USGS, Denver, Colorado; Bill Hansen, BLM-Resource Evaluation, Billings, Montana
176	Coal geology of the Birney 1° quadrangle. [1983]	William C. Culbertson USGS, Denver, Colorado
	Petrology of Montana coals.	John Daniel, Montana Bureau of Mines and Geology
	[See Geochemistry, Mineralogy and Petrology.]	Pamela Dunlap Derkey
	Study of thrust-related uranium concentrations in the overthrust and disturbed belts of central and western Montana. [1984]	Harry W. Dodge, Jr. USGS, Denver, Colorado
177	Biogeochemical prospecting for petroleum. Includes analysis of samples from the Bell Creek field, Montana. [1985]	Terrence J. Donovan USGS, Flagstaff, Arizona
	Aeromagnetic detection of diagenetic magnetite over oil fields. [1985]	Terrence J. Donovan USGS, Flagstaff, Arizona
	Tertiary oil basins of the western United States. [1983]	Thomas D. Fouch USGS, Denver, Colorado
	[See Stratigraphy, Sedimentary Petrology and Paleontology.]	Donald L. Gautier
	[See Geophysics.]	John Gogas
178	Geology and coal resources of the Kirby-Birney coal field, Big Horn and Powder River counties, northern Powder River basin. [1984]	Jim Gruber BLM-Resource Evaluation Billings, Montana
179	Geology and coal resources of the Pumpkin Creek coal field, Powder River County. [1983]	Scott Haight, Myra Funkhouser, BLM-Resource Evaluation, Billings, Montana
	[See Stratigraphy, Sedimentary Petrology and Paleontology.]	R. B. Halley
180	Geology and coal resources of the Moorhead-East Moorhead coal field, Big Horn and Powder River counties. [1984]	Bill Hansen BLM-Resource Evaluation Billings, Montana

Energy *(continued)*

181	Geology and coal resources of the Hanging Woman and Mud Springs coal lease tracts, Big Horn and Powder River counties. [1983]	Bill Hansen BLM-Resource Evaluation Billings, Montana
182	Geology and coal resources of the East Decker and Hanging Woman Creek coal fields, Big Horn County. [1984]	Bill Hansen BLM-Resource Evaluation Billings, Montana
	[See Geochemistry, Mineralogy and Petrology.]	James R. Herring
	[See Geophysics.]	Kandidus Lupindu
	National Coal Resources Data System (NCRDS). This is a program of the USGS, in cooperation with state agencies, to establish a national computerized coal data base.	Jane Mathews, Jan Butori Montana Bureau of Mines and Geology
	[See Stratigraphy, Sedimentary Petrology and Paleontology.]	Edwin K. Maughan
183	Geology and coal resources of the Decker and Spring Creek coal areas, Big Horn County, northern Powder River basin. [1984]	John McKay BLM-Resource Evaluation Billings, Montana
184	Geology and coal resources of the Wolf Mountain coal lease tract, Big Horn County, northern Powder River basin. [1983]	John McKay BLM-Resource Evaluation Billings, Montana
185	Coal geology of the Broadus 1° quadrangle. [1984]	Marguerite McLellan USGS, Denver, Colorado
	Gas-bearing strata of mid-Cretaceous age in western Wyoming and adjacent areas. [1985]	E. A. Merewether USGS, Denver, Colorado
	[See Stratigraphy, Sedimentary Petrology and Paleontology.]	Lawrence M. Monson, Michelle Kelley
186	Interpretation of the subsurface geology and evaluation of the hydrocarbon potential of the Blackfoot Indian Reservation. [1983]	Melville R. Mudge USGS, Denver, Colorado
187	Reservoir studies of the Madison Group, disturbed belt, Montana. [1985]	K. M. Nichols USGS, Denver, Colorado
	Collection and compilation of geotechnical information on the Fort Union and Wasatch formations in the coal-mining areas of the Powder River basin. [1985]	Frank W. Osterwald USGS, Denver, Colorado
188	Geology and coal resources of the Pine Hills coal field, Custer County. [1984]	Hal Owen BLM-Resource Evaluation Billings, Montana
	Oil and gas in overthrust terrains, Montana. [1984]	William J. Perry, Jr. USGS, Reston, Virginia
	[See Geophysics.]	Janet Peterson

Energy *(continued)*

	Geology and oil and gas resource potential of the U.S. western overthrust belt. [1985]	Richard B. Powers USGS, Denver, Colorado
	Remote sensing for uranium exploration in the Powder River basin. [1985]	Gary L. Raines USGS, Denver, Colorado
	[See Structural Geology/Tectonics.]	Alan A. Roberts
189	Coal resources of the Hardin 1:100,000-scale quadrangle. [1984]	Laura N. Robinson USGS, Denver, Colorado
	Regional correlation of coal-bearing rocks in the Rocky Mountains. [Continuing]	Henry W. Roehler USGS, Denver, Colorado
	A stratigraphic, tectonic and petroleum source-rock analysis of the Devonian and Mississippian of two related petroleum provinces—the developing overthrust belt and the related eastern Great Basin frontier province. [1985]	Charles A. Sandberg USGS, Denver, Colorado
	[See Stratigraphy, Sedimentary Petrology and Paleontology.]	James W. Schmoker
	[See Stratigraphy, Sedimentary Petrology and Paleontology.]	Gary B. Schneider
190	Petroleum reservoir rocks of the western United States. Will include field work in the Madison Group exposed in the disturbed belt. [1983]	Peter A. Scholle USGS, Denver, Colorado
	Chemical analysis and geologic evaluation of coal from western interior coal basins of the United States. [1983]	Frederick O. Simon USGS, Reston, Virginia
	Preparation of a series of three illustrative reports summarizing the geology, hydrology and coal resources of eastern and south-central Montana and north-central Wyoming. [1983]	Steven Slagle USGS, Helena, Montana
191	Geology and coal resources of the Broadus area, Powder River County, northern Powder River basin. [1984]	John Spencer BLM-Resource Evaluation Billings, Montana
192	Geology and coal resources of the North Decker I and II coal lease tracts, Big Horn County. [1983]	John Spencer BLM-Resource Evaluation Billings, Montana
	Petrology of coals from the Powder River basin of Wyoming and Montana. [1984]	R. W. Stanton USGS
	[See Stratigraphy, Sedimentary Petrology and Paleontology.]	James R. Stimson
	[See Areal Geology.]	Susan Vuke, Mark A. Sholes
	[See Stratigraphy, Sedimentary Petrology and Paleontology.]	Bruce R. Wardlaw

Hydrogeology

193	Ground-water map of the Miles City 1° x 2° quadrangle. [1984]	Robert N. Bergantino Montana Bureau of Mines and Geology
194	Ground-water map of the Wolf Point 1° x 2° quadrangle. [1984]	Robert N. Bergantino Montana Bureau of Mines and Geology
195	Determination of the probable impacts of coal mining on the hydrology of the Otter Creek area in southeastern Montana. Coal beds of the area are hydraulically connected to the Otter Creek alluvial valley, and considerable controversy has arisen concerning the impacts of mining on agricultural lands and water supplies. [October 1984]	Michael R. Cannon USGS, Helena, Montana
*196	Base-line monitoring report: Well installation and development at Butte-Silver Bow's Metro sewer sludge injection site.	Terence E. Duaime Montana Bureau of Mines and Geology
*197	Water monitoring and reclamation construction alternatives for the Colorado tailings, Butte.	Terence E. Duaime, Rodney A. James, Robert N. Bergantino, John L. Sonderegger, H. G. McClernan and D. C. Lawson, Montana Bureau of Mines and Geology
	[See Structural Geology/Tectonics.]	Richard D. Feltis
198	Hydrologic base-line study of the Stillwater Complex and adjacent areas. [1983]	Richard D. Feltis USGS, Billings, Montana
199	The surficial geology and ground-water geology of the northern Bitterroot Valley. The objective of this study is to identify aquifers and determine ground-water movement. [December 1984]	Sue Ann Finstick-Smith University of Montana
	[See Isotope Geology and Geochronology.]	Irving Friedman
	Analysis of water resources and the impact of coal mining on water resources in the Yellowstone River basins, emphasizing the Tongue River basin. Reprints of publications are available. [Continuing]	David H. Hickcox Ohio Wesleyan University
	[See Isotope Geology and Geochronology.]	T. Kurtis Kyser
200	Evaluate and quantify the ground-water resources of the buried-channel aquifer of the ancestral valley of the Missouri River in northeastern Montana. [1984]	Gary Levings USGS, Helena, Montana
201	Reconnaissance hydrologic study of the upper Big Hole basin in order to describe and define the base-line hydrologic system. [April 1984]	Julianne Levings USGS, Helena, Montana

Hydrogeology *(continued)*

202	Hydrologic studies of the Horse Creek, Little Bear Creek and southwest Glendive areas, as part of the high-priority coal lease tract program. Studies define the hydrologic systems, document water-quality conditions and evaluate the potential impacts of strip mining. [September 1984]	Neal E. McClymonds USGS, Helena, Montana
	Map of known saline seeps in Montana at scale of 1:1,000,000. [Publication: mid-1983]	Marvin R. Miller, Robert N. Bergantino, Montana Bureau of Mines and Geology
	Statewide hydrogeological data system—collection, analysis, compilation, storage and retrieval. [Continuing]	Marvin R. Miller, Wayne A. Van Voast, Tom W. Patton, Robert N. Bergantino, Judeykay Schofield, Roger Noble, Fred A. Schmidt, Art Middelstadt, Terence E. Duaime, Marek Zaluski, Montana Bureau of Mines and Geology
	Hydrogeology of northeastern Montana—Emphasis on ground-water development and conservation.	Marvin R. Miller, Wayne A. Van Voast, Keith S. Thompson, Robert N. Bergantino, Terence E. Duaime, Montana Bureau of Mines and Geology; Joe E. Moreland, Gary Levings, USGS, Helena, Montana
203	Evaluation of the ground-water contribution to Muddy Creek from the Greenfield Bench irrigation district.	Thomas J. Osborne, Roger A. Noble, Fred A. Schmidt, Marek Zaluski, Montana Bureau of Mines and Geology
204	Hydrogeology and preliminary reclamation design of acid mine drainage, Stockett-Sand Coulee coal field, Cascade County.	Thomas J. Osborne, John L. Sonderegger, Wayne A. Van Voast, Montana Bureau of Mines and Geology
	[See Energy.]	Steven Slagle
*205	Geothermal aquifer resource evaluation in the Deer Lodge and Madison valleys, and in the Bozeman Hot Springs area.	John L. Sonderegger, Marek Zaluski, Montana Bureau of Mines and Geology
	Investigation of soluble salts in coal overburden and the qualities of ground waters in spoils. [1984]	Wayne A. Van Voast, Keith S. Thompson, Anne Harrington, Montana Bureau of Mines and Geology, Billings
206	Mining-related hydrologic evaluations near the Rosebud, Big Sky and Decker mines, southeastern Montana. [Continuing]	Wayne A. Van Voast, Keith S. Thompson, Anne Harrington, Montana Bureau of Mines and Geology, Billings
207	Hydrogeology of arsenic contamination in the vicinity of Milltown. [June 1984]	William W. Woessner University of Montana

Hydrogeology *(continued)*

208	Hydrogeology of Kokanee spawning sites near the shoreline of Flathead Lake. [September 1984]	William W. Woessner University of Montana

Geomorphology and Glacial Geology

209	Surficial geologic map of the Wolf Point 1°x 2° quadrangle. [1984 or 1985]	Robert N. Bergantino Montana Bureau of Mines and Geology
210	Quaternary chronology in Glacier National Park. [1985]	Paul E. Carrara USGS, Denver, Colorado
*211	Glacial geology of the Bear Gulch valley, Tobacco Root Mountains. [August 1983]	Robert D. Hall, Indiana University/Purdue University
	[See Isotope Geology and Geochronology.]	Robert D. Hall
*212	Hornblende depletion and etching as an indicator of relative age of glacial deposits in the Tobacco Root Range. [May 1983]	Robert D. Hall, Robert Martin, Denis Michaud, Indiana University/Purdue University
*213	Glacial geology of the South Willow Creek valley, Tobacco Root Mountains. [December 1983]	Robert D. Hall, Robert Martin, Guy Swinford, Indiana University/Purdue University; Bonnie K. Moore, Montana State University
	[See Areal Geology.]	H. L. James, Robert N. Bergantino
*214	Alpine to sub-alpine drainage-head geomorphic features in the Taylor-Hilgard Mountains; water purification and retardation as affected by moraines, avalanche tongues, rock glaciers, landslides and talus. [1984]	John Montagne Montana State University
215	Downstream changes in the components of flow resistance in natural gravel-bed streams—East Rosebud and Red Lodge creeks. [1984]	Karen L. Prestegaard Franklin and Marshall College
*216	Rock glaciers in the Tobacco Root Range. [May 1984]	Philip N. Ward, Robert D. Hall, Indiana University/Purdue University

Environmental and Engineering Geology

217	Engineering geology of the Hardin and Lodge Grass 1° quadrangles. [1985]	Sherry S. Agard USGS, Denver, Colorado
	Weathering effects on the geotechnical properties of coal-bearing rocks. [1984]	Alan F. Chleborad USGS, Golden, Colorado
*218	A study of the Bear Creek-Johnson Ranch landslide area, Deer Lodge County. (SW¼ sec. 25 and SE¼ sec. 26, T. 2 N., R. 12 W., about 8.3 miles northwest of Wise River.) [1985?]	Willard E. Cox Montana Tech

Environmental and Engineering Geology *(continued)*

219	Measurement of coarse bedload transport using the natural magnetism of cobbles as a tracer. The study is on Squaw Creek, Gallatin County. [June 1985]	Stephan G. Custer Montana State University
220	Study of landslide processes includes preparation of a report on a small landslide near Portage, Montana. [1985]	Robert W. Fleming USGS, Denver, Colorado
	Geochemical composition, sources and transport of natural and polluted atmospheric dusts collected from ice, snow, rock and soil materials at many sites, including some in Montana. [1983]	Todd K. Hinkley USGS, Denver, Colorado
221	Engineering geology of the Birney 1° quadrangle. [1984]	Robert M. Lindvall USGS, Denver, Colorado
	[See Geochemistry, Mineralogy and Petrology.]	James M. McNeal
	Trace-metal contamination in lake and reservoir sediments near Missoula and Helena. [Continuing]	Johnnie N. Moore University of Montana
	[See Energy.]	Frank W. Osterwald
*222	Quaternary dating and neotectonics. Includes obsidian hydration dating of pre-1959 faulting and ages of scarps in the Hebgen, Montana, earthquake area. [Continuing]	Kenneth L. Pierce USGS, Denver, Colorado

Late Entries

Structural analysis of a segment of the Montana overthrust belt in the Argenta-Melrose area. Work in progress reexamines the problem of the origin of the folding and thrusting along the eastern flank of the Pioneer Mountains. [June 1983]	William C. Brandon University of Montana
Coal geology of the Sidney 1:100,000 sheet. [1983]	Jane Mathews, Montana Bureau of Mines and Geology

Back Pocket

Sheet 1—Index map of Montana.

Sheet 2—Index map of southwestern Montana.

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