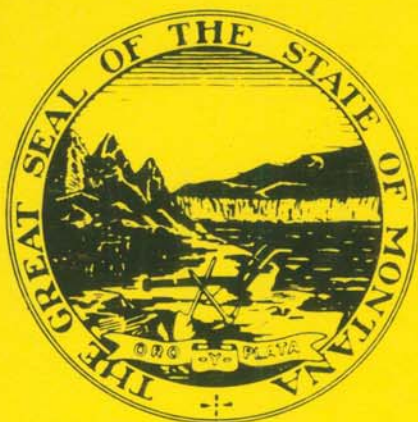
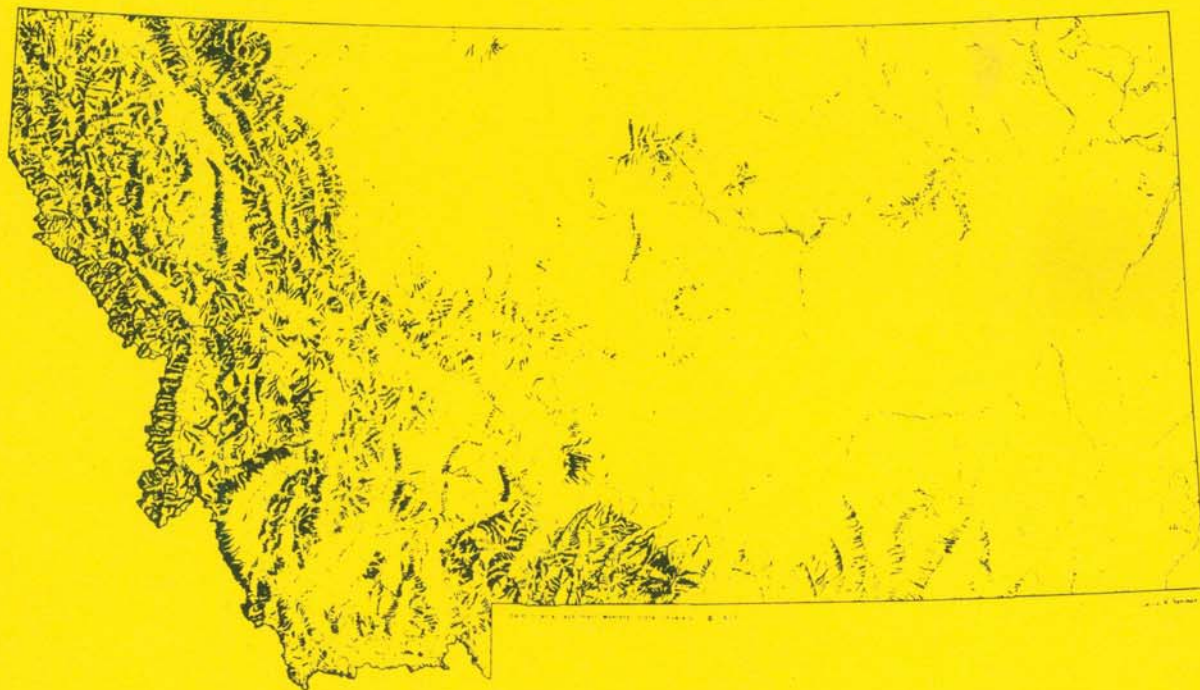


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# **CURRENT GEOLOGICAL AND GEOPHYSICAL STUDIES IN MONTANA**

compiled by  
**Richard B. Berg**



**OPEN-FILE REPORT 216**

**1989**

**Montana Bureau of Mines and Geology  
A Department of  
Montana College of Mineral Science and Technology**



## 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 category, 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.

Completed theses are not included in this compilation. Special Publication 88, Compilation and Index of Theses on Montana Geology 1899-1982 may be ordered from the Montana Bureau of Mines and Geology, Butte, Montana 59701, for \$10 postpaid. Compilation of information for an index of theses 1983-1988 is in progress.

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  
June 24, 1989

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## FIGURES

- 1 - Index map of Montana
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# AREAL GEOLOGY

## INVESTIGATOR

## SUBJECT

Bartholomew, Mervin J.  
Vuke-Foster, Susan  
Berg, Richard B.  
MBMG  
Colton, Roger B.  
USGS, Denver

Geology of the Stockett-Belt coal field area (Stockett and Belt 15-minute quadrangles).  
1 - Fig. 1

Bartholomew, Mervin J.  
MBMG  
Derkey, Robert E.  
Butte

Geology of the Dempsey, Sugarloaf Mtn., Avon, Deer Lodge and Baggs Creek 7 1/2-minute quadrangles. (in press)  
2 - Fig. 1

Bartholomew, Mervin J.  
MBMG

Structural study of the overthrust belt in southwestern Montana. Includes detailed geologic mapping of the Dixon Mountain and Dell 7 1/2-minute quadrangles.  
3 - Fig. 2

Berg, Richard B.  
Vuke-Foster, Susan  
MBMG  
Colton, Roger B.  
USGS, Denver  
O'Brien, Hugh  
Geological Survey of Finland

Geology of the Belt 30x60-minute quadrangle, central Montana. Geologic map at scale of 1:100,000. (in preparation)  
4 - Fig. 1

Bergantino, Robert N.  
Sholes, Brenda, and others  
MBMG

Preparation of maps showing geology, mineral resources, and ground-water resources at a scale of 1:250,000 on 1x2-degree quadrangles. (continuing)

Bergantino, Robert N.  
MBMG

Geological aspects of the Lewis and Clark expedition in Montana.

Colton, Robert B., and others  
USGS, Denver  
Vuke-Foster, Susan  
MBMG

Geology of the Glendive 1:100,000-scale quadrangle. (1991)  
5 - Fig. 1

## AREAL GEOLOGY

INVESTIGATORSUBJECT

Erslev, Eric  
Vargo, Ana  
Colorado State University

Basement profile from the southern Madison Range through the Tobacco Root Mountains evaluating Proterozoic reactivation of Archean basement with integrated structural, petrologic and geochemical data.  
(continuing)

Hall, William B.  
Univ. of Idaho

Study of Central portion of Madison/Gallatin block with emphasis on geomorphology, glacial history, and structural geology.  
(continuing)  
6 - Fig. 2

Hanneman, Debra  
Whitehall, Mont.

Tertiary-Quaternary geology of the Jefferson, Rocker and Divide-Melrose Valleys, southwestern Montana.  
7 - Fig. 2

Hanson, Tom  
Lundblad, Steve  
Reese, Joe  
Univ. of Wisconsin, Madison

Geology and structural analysis of an area in the Whitefish Range, Flathead County.  
8 - Fig. 1

Hyndman, Donald W.  
Univ. of Montana

A geological map of the Boulder batholith and a petrologic compilation and synthesis. (1991)  
9 - Fig. 1

Kellogg, Karl S.  
USGS, Denver

Tectonic framework of the northwestern Madison Range, southwestern Montana. (1991)  
10 - Fig. 2

Lewis, Sharon E.  
MBMG

Geology of the Lincoln Gulch 7 1/2-minute quadrangle.  
11 - Fig. 2

Lewis, Sharon E.  
MBMG

Geology of the Dickie Peak 7 1/2-minute quadrangle. (in press)  
12 - Fig. 2

## AREAL GEOLOGY

INVESTIGATORSUBJECT

Miller, Fred K  
USGS, Spokane

Geology of the Sandpoint 2-degree  
quadrangle.  
13 - Fig. 1

O'Neill, J. Michael  
USGS, Denver

Tectonic framework of the southern  
Gravelly and Madison Ranges. (1993)  
14 - Fig. 2

Pearson, Robert C.  
USGS, Denver

Study of the Bannack mining district  
including the geology of the Bannack  
7 1/2-minute quadrangle. Also  
includes some mapping in the Burns  
Mountain, Dalys and Eli Springs 7  
1/2-minute quadrangles.  
15 - Fig. 2

Perry, William J., Jr.  
Skipp, Betty,  
USGS, Denver

Geologic mapping of the Lima Peaks  
and Gallagher Gulch 7 1/2-minute  
quadrangles with emphasis on  
structural analysis of Cordilleran  
thrust belt/Rocky Mountain foreland  
interactions. (continuing)  
16 - Fig. 2

Qayyum, Mazhar  
Montana Tech

Analysis of Deer Lodge Basin  
southwestern Montana. (May 1990)  
17 - Fig. 1

Reynolds, Mitchell W.  
USGS, Denver

Geology of the White Sulphur Springs  
1x2-degree quadrangle.  
18 - Fig. 1

Reynolds, Mitchell W.  
USGS, Reston  
Tysdal, Russell G.  
USGS, Denver

Mineral resources of the Sleeping  
Giant Wilderness study area.  
19 - Fig. 1

Ruppel, Edward T.  
Bartholomew, Mervin J.  
MBMG  
Reynolds, Mitchell W.  
USGS, Denver  
and many others

Geologic map of Montana.

# AREAL GEOLOGY

## INVESTIGATOR

## SUBJECT

Ruppel, Edward T.  
MBMG

Study of the Proterozoic and Early  
Snowcrest Range Paleozoic structure  
of the cratonic region, including  
mapping of the Swamp Creek and Spur  
Mountain 7 1/2-minute quadrangles.  
20 - Fig. 2

Sholes, Brenda  
MBMG

A bibliographic compilation of index  
maps delineating areas covered by  
geologic mapping in Montana.  
(continuing)

Whipple, James W.  
USGS, Spokane

Geology of the Whitefish Range,  
northwestern Montana.  
21 - Fig. 1

# STRUCTURAL GEOLOGY/TECTONICS

<u>INVESTIGATOR</u>	<u>SUBJECT</u>
Anders, Mark Lamont-Doherty Geological Observatory	Thermal and mechanical effects of the Yellowstone hotspot. 22 - Fig. 1
Barnes, William C. Univ. of British Columbia	Structural history of the Overfold Mountain area, southeastern British Columbia (nearly adjacent to Montana). 23 - Fig. 1
Bartholomew, Mervin J. MBMG	Structural study of the overthrust belt in southwestern Montana. Includes detailed geologic mapping of the Dixon Mountain and Dell 7 1/2-minute quadrangles. 3 - Fig. 2
Bonini, William E. Princeton Univ.	Structural modeling of the Beartooth front. (continuing) 24 - Fig. 1
Erslev, Eric Colorado State Univ.	Laramide kinematics of the southeastern Beartooth Mountains. (1991) 25 - Fig. 1
Glaman, Linda R. B. Montana Tech	Geology of Negro Hollow area, southwestern Montana. 26 - Fig. 2
Hanneman, Debra Whitehall, Mont.	Cenozoic evolution of the Sage Creek-Blacktail basin, southwestern Montana. 27 - Fig. 2
Hanneman, Debra Whitehall, Mont.	Cenozoic basin evolution in part of southwestern Montana.
Hanson, Tom Lundblad, Steve Reese, Joe Univ. of Wisconsin, Madison	Geology and structural analysis of an area in the Whitefish Range, Flathead County. 8 - Fig. 1

# STRUCTURAL GEOLOGY/TECTONICS

## INVESTIGATOR

## SUBJECT

Hendrix, Thomas E.  
Grand Valley State College

Analysis of multiple duplex  
structure at Sandy Hollow, Madison  
County. (Late 1989)  
28 - Fig. 2

Herbst, Darrin W.  
Southern Illinois Univ.

Structural analysis of Precambrian  
Cherry Creek-type metamorphic rocks  
in the Gravelly Range. (Summer  
1989)  
29 - Fig. 2

Hess, David F.  
Western Illinois Univ.  
Vitaliano, Charles J.  
Indiana Univ.

Field aspects and structural  
relationships of amphibolites and  
metamorphic assemblages, Tobacco  
Root Mountains. (1990)  
30 - Fig. 2

Hyndman, Donald W.  
Parker, David  
Gunkel, Kristin  
Sears, Jim  
Alt, Dave  
Univ. of Montana

Relationship between granite and  
thrust belts in western Montana.  
(1991)  
31 - Fig. 1

Jolly, Arthur  
Univ. of Montana

Paleomagnetic investigation of Two  
Medicine volcanic rocks at Wolf  
Creek. The intention of this study  
is to document possible rotation of  
thrust sheets within the disturbed  
belt of western Montana. (Spring  
1990)  
32 - Fig. 1

Kellogg, Karl S.  
USGS, Denver

Tectonic framework of the  
northwestern Madison Range,  
southwestern Montana. (1991)  
10 - Fig. 2



# STRUCTURAL GEOLOGY/TECTONICS

INVESTIGATOR	SUBJECT
Lageson, David R. Montana State Univ.	Analysis of rock deformation fabrics in thrust sheets of the Disturbed Belt. Specifically, this project deals with pressure solution cleavages, fractures, boudinage, and other mesoscopic fabrics that may affect the porosity and permeability of potential oil and gas reservoir rocks in the fold and thrust belt. (1990) 33 - Fig. 1
Lageson, David R. Montana State Univ.	Field study of deeply eroded caldera complexes in the Boulder batholith and Elkhorn Mountains volcanic field, west-central Montana; ash-flow stratigraphy, structural geology, and economic geology (continuing) 34 - Fig. 1
McConnell, David Kansas State Univ.	Analysis of strain in foreland folds of the Tobacco Root Mountains, southwestern Montana. (Summer 1990) 35 - Fig. 2
Montagne, John Montana State Univ.	On-going study of the Cenozoic history, geomorphology, and glacial geology of the Yellowstone Valley from Gardiner to Livingston. 36 - Fig. 1
O'Neill, J. Michael USGS, Denver	Tectonic framework of the southern Gravelly and Madison Ranges. (1993) 14 - Fig. 2
Palmquist, John C. Lawrence Univ.	Leopard rock protolith for polyphase deformed amphibolite, Beartooth Mountains. (continuing) 36B - Fig. 1

# STRUCTURAL GEOLOGY/TECTONICS

## INVESTIGATOR

## SUBJECT

Perry, William J.  
Sandbreg, Charles A.  
USGS, Denver  
Sando, William J.  
United State National Museum

Structural and stratigraphic characterization of the northern Tendoy Mountains, with emphasis on the structural configuration of shelf-to-basin Mississippian carbonate rocks in the McKenzie thrust system (formerly northern Tendoy, Limekiln and Johnson thrust sheets). (continuing)  
37 - Fig. 2

Pratt, Walden P.  
USGS, Denver

Compilation of available subsurface data on basement lithologies to interpret the extent of lithologic terranes that comprise the Trans-Hudson orogen.

Rutland, Carolyn  
Schmidt, Christopher J.  
Western Michigan Univ.  
Swapp, Susan  
SUNY, Binghamton

Petrology, geochemistry and structural evolution of the eastern boundary of the Boulder batholith. (1989)  
38 - Fig. 2

Qayyum, Mazhar  
Montana Tech

Analysis of the Deer Lodge Basin southwestern Montana. (May 1990)  
17 - Fig. 1

Schmidt, Christopher J.  
Western Michigan Univ.  
O'Neill, J. M.  
USGS, Denver

Development of minor structures and solution cleavage in the frontal thrust belt adjacent to foreland anticlines in the Camp Creek-McCartney Creek area near Melrose. (continuing)  
39 - Fig. 2

Schmidt, Christopher J.  
Western Michigan Univ.  
Garihan, John M.  
Furman Univ.  
Dresser, Hugh  
Montana Tech  
O'Neill, J. M.  
USGS, Denver

Nature of control of earlier structures on basin and range faulting in southwestern Montana. (continuing)

# STRUCTURAL GEOLOGY/TECTONICS

## INVESTIGATOR

## SUBJECT

Schmidt, Christopher J.  
Western Michigan Univ.  
Hendrix, Thomas E.  
Grand Valley State College

Calcite twin strain and cleavage  
development in the Kootenai  
Formation in the Sandy Hollow duplex  
zone between Melrose and Dillon.  
(continuing)  
40 - Fig. 2

Sears, James W.  
Univ. of Montana

Metamorphism and thrusting in  
central western Montana. Includes  
mapping tectonic fabric and  
correlation with metamorphism and  
thrust faulting: Reconnaissance and  
case studies. (1989)

Sheriff, Steven D.  
Univ. of Montana

General paleomagnetic investigations  
and gravity/magnetic modelling,  
relative to tectonic development of  
the northern Rocky Mountains.  
(continuing)

Stickney, Michael C.  
Bartholomew, Mervin J.  
MBMG

Investigation of displacement  
histories on Neogene faults in the  
northern Basin and Range province.

Teyssier, Christian  
Univ. of Minnesota

Tectonic significance of the  
Bitterroot shear zone including  
study of deformation mechanisms in  
its hanging wall. (1989)  
41 - Fig. 1

Zimmerman, Jay  
Southern Illinois Univ.

Total finite strain analysis of  
Cherry Creek-type rocks (Archean)  
from two deformed conglomerates in  
the central Ruby Range, Madison  
County. (1990)  
42 - Fig. 2

# STRATIGRAPHY, SEDIMENTARY PETROLOGY AND PALEONTOLOGY

## INVESTIGATOR

## SUBJECT

Basu, Abhijit  
Indiana Univ.

Evolution of Tertiary basins in  
southwestern Montana. (1990)

Belt, Edward S.  
Amherst College

Stratigraphy, sedimentology,  
paleobotany and paleomagnetism of  
the Lebo Member of the Fort Union  
Formation. Location: on either  
side of Route 12, at the Powder  
River crossing. (1989)  
43 - Fig. 1

Bown, T. M.  
USGS, Reston

Tertiary geochronology and basin  
analysis, Rocky Mountain basins.

Changshan, Li  
Montana Tech

Subsurface study of Kootenai  
Formation along the Sweetgrass Arch,  
northern Montana. (August 1989)  
44 - Fig. 1

Clemens, William A.  
Univ. of California, Berkeley

Stratigraphy and vertebrate faunas  
of the Hell Creek and Tullock  
formations in Garfield and McCone  
counties.

Coppinger, Walt  
Sontag, Leslie J.  
Trinity Univ.

Refinement of stratigraphy of the  
Precambrian Newland Limestone from  
data obtained from cores at the  
Golden Sunlight mine, Jefferson  
County. Attempts will be made to  
establish correlations with Newland  
Limestone exposed in the interior of  
the basin to the north. (Summer  
1989)  
45 - Fig. 2

Dyman, Thaddeus S.  
USGS, Denver

Cretaceous stratigraphy in  
southwestern Montana.

Elston, Donald P.  
USGS, Flagstaff

Paleomagnetic studies in the Belt  
basin of Montana and Idaho.  
(continuing)

# STRATIGRAPHY, SEDIMENTARY PETROLOGY AND PALEONTOLOGY

<u>INVESTIGATOR</u>	<u>SUBJECT</u>
Gassaway, Judith S. USGS, Denver	Studies of Paleocene silcrete, southeastern Montana.
Hanneman, Debra Whitehall, Mont.	Cenozoic basin evolution in part of southwestern Montana.
Hanneman, Debra Whitehall, Mont.	Cenozoic evolution of the Sage Creek-Blacktail basin, southwestern Montana. 27 - Fig. 2
Hansen, William B. BLM, Billings Hearn, David Consultant, Billings, MT	Re-evaluation of the environment of deposition of the Eagle Sandstone near Billings. (September, 1989) 46 - Fig. 1
Harrison, Jack E. USGS, Denver	Study of the Precambrian Belt basin.
Hickey, Leo J. Peabody Museum, Yale Univ.	Paleobotany and facies of the Fort Union Formation in the northern Big Horn basin, Montana and Wyoming. (1989) 47 - Fig. 1
Horner, John R. Museum of the Rockies, Montana State Univ.	Evolution of North American, upper Cretaceous dinosaurs and their terrestrial ecosystems. Study in the Two Medicine Formation sediments along the east slope of the Rockies, from the Canadian border to Wolf Creek, Montana. (1991)
James, Harold L. USGS, Port Townsend, Washington	Bedded Precambrian iron deposits of southwestern Montana.
Krause, David W. Dept. of Anatomical Sciences, State Univ. of New York, Stony Brook	Geology and mammalian paleontology of the Paleocene strata in the Crazy Mountains, Powder River, and Williston Basins.

# STRATIGRAPHY, SEDIMENTARY PETROLOGY AND PALEONTOLOGY

## INVESTIGATOR

## SUBJECT

Lofgren, Donald  
Univ. of California, Berkeley

Detailed lithostratigraphic and biostratigraphic analysis of the uppermost Hell Creek and lowermost Tullock formations in Garfield and McCone counties.  
48 - Fig. 1

Meyers, James H.  
Winona State Univ.

Influence of intraforeland uplift on marine Jurassic sedimentation, southwestern Montana. (continuing)

Meyers, James H.  
Winona State Univ.  
Mack, Greg  
New Mexico State Univ.

Tertiary basin evolution and provenance of sandstones in the Oligocene-Miocene Renova Formation, southwestern Montana. (continuing)  
49 - Fig. 2

Nichols, Douglas J.  
USGS, Denver

Detailed stratigraphic study of the Cretaceous/Tertiary boundary within and adjacent to the Powder River basin in Wyoming and Montana.  
(1989)

O'Neill, J. Michael  
USGS, Denver

Structural evolution of the Belt basin in and adjacent to the Highland Mountains, southwestern Montana.  
50 - Fig. 2

Paull, Rachel K.  
Paull, Richard A.  
Dept. of Geosciences, Univ. of Wisconsin-Milwaukee

Conodont biostratigraphy of Lower Triassic rocks in southwestern and south-central Montana. (1990)

Porter, Karen  
Montana State Univ.

Investigation of stratigraphic sequences and unconformities of the marine Jurassic Ellis Group in western Montana.  
51 - Fig. 2

Qayyum, Mazhar  
Montana Tech

Analysis of the Deer Lodge Basin southwestern Montana. (May 1990)  
17 - Fig. 1



# STRATIGRAPHY, SEDIMENTARY PETROLOGY AND PALEONTOLOGY

## INVESTIGATOR

## SUBJECT

Retallack, Greg J.  
Univ. of Oregon

Paleosols across the Cretaceous-Tertiary boundary in Bug Creek, McCone County.  
52 - Fig. 1

Rigby, J. Keith, Jr.  
Univ. of Notre Dame  
Rigby, J. K., Sr.  
Brigham Young Univ.  
Newman, Karl  
Colorado School of Mines  
Sloan, R. E.  
Univ. of Minnesota

Geology, depositional environments and paleontology of the Fox Hills, Hell Creek, Tullock and Lebo formations of McCone, Roosevelt, Richland and Dawson counties.  
(December 1989)

Ritter, Dale  
Southern Illinois Univ.  
Howes, Susan  
Lamar Univ.  
Kauffman, Marvin  
American Geological Institute

Study of dilution effect on sediment derived from the Stillwater Complex.

Sando, William J.  
United States National Museum,  
Washington D.C.

Stratigraphy and structure of Mississippian rocks in the Tendoy Range, Beaverhead County.  
53 - Fig. 2

Schmitt, James  
Montana State Univ.

Sedimentary and tectonic evolution of the Crazy Mountains basin. Investigation involves detailed sedimentologic, biostratigraphic, and structural studies of the Livingston Group and Fort Union Formation.  
54 - Fig. 1

Sigleo, Wayne R.  
USGS, Reston

Study of paleosols and duripans associated with the Cretaceous/Tertiary boundary and coal-bearing strata in the Powder River basin. (1991)

# STRATIGRAPHY, SEDIMENTARY PETROLOGY AND PALEONTOLOGY

## INVESTIGATOR

## SUBJECT

Suttner, Lee J.  
Malone, Andrew  
Indiana Univ.

Evaluation of the possible influence of the Belt Island on Late Jurassic (Morrison) sedimentation, northern Tobacco Root Mountains. (January 1990)  
55 - Fig. 2

Suttner, Lee J.  
Indiana Univ.

Tectonic controls of Mesozoic sedimentation in the foreland basin of western and central Montana.  
(continuing)

Utgaard, John  
Southern Illinois Univ.

Petrology and depositional environments of the Hulett Sandstone Member of the Sundance Formation in the northern Bighorn basin.  
(continuing)

Vice, Mari A.  
Utgaard, John E.  
Southern Illinois Univ.

Carbonate petrology of the lower Mission Canyon (Big Goose and Little Tongue Members) in an area extending from the northern Bighorn basin (Cottonwood and Clarks' Fork Canyons, Wyoming) northward into central Montana (Big Snowy and Little Belt Mountains).  
Fluorescence, cathodoluminescence, stable isotope analysis, scanning electron microscopy, fluid inclusion and clay mineralogical studies, and molecular organic geochemical analysis are planned to supplement data gathered through standard petrographic and field/core studies.  
(1992)

Wallace, Chester A.  
USGS, Denver

Stratigraphy, structural setting and sediment-dispersal system of the middle part of the Missoula Group of the Belt Supergroup. (1992)

Wardlaw, Bruce R.  
USGS, Reston

Extinctions at the upper Paleozoic system boundaries in the U.S.

# STRATIGRAPHY, SEDIMENTARY PETROLOGY AND PALEONTOLOGY

## INVESTIGATOR

## SUBJECT

Weishampel, David B.  
Johns Hopkins Univ.

A study of late Cretaceous  
dinosaurs, northwestern Montana.  
(1990)

White, Brian  
Smith College

Sedimentology of the Altyn Formation  
(Precambrian) of Glacier National  
Park: A study of microbiotas,  
stromatolites and evaporitic  
dolomites in shallowing upward  
cycles. (continuing)  
56 - Fig. 1

Wilde, Edith M.  
MBMG

Coal stratigraphy and correlation in  
the Sidney 30x60-minute quadrangle,  
eastern Montana and adjacent North  
Dakota. (in press)  
57 - Fig. 1

Winston, Don  
Univ. of Montana

Stratigraphy and sedimentology of  
Ravalli and Missoula Group rocks of  
the Belt Supergroup, western  
Montana. (continuing)

# GEOCHEMISTRY, MINERALOGY AND PETROLOGY

## INVESTIGATOR

## SUBJECT

Brookins, D. G.  
Univ. of New Mexico

Geochemistry and economic geology of hydrothermal vein carbonate-fluorspar deposits, western Montana. (continuing)

Carlson, Robert R.  
USGS, Denver

Geochemical and analytical studies of the platinum-group elements including samples from the Stillwater Complex.  
58 - Fig. 1

Carlson, Robert R.  
USGS, Denver  
Von Gruenewaldt, Gerhard  
Univ. of Pretoria, South Africa

Study of a "pyroxene marker" unit of the Stillwater Complex.  
59 - Fig. 1

Coppinger, Walt  
Swanson, Matt  
Trinity Univ.

Petrologic and geochemical study of late-stage mafic intrusives at the south end of the Bull Mountain, Jefferson County. Will include major, minor, and trace element analyses of primitive basaltic rocks. (Spring 1989)  
60 - Fig. 2

Duke, Edward F.  
Institute for Study of Mineral Deposits, South Dakota School of Mines and Technology

Origin of graphite vein deposits at the Crystal Graphite mine near Dillon, using geological, geochemical and carbon and oxygen isotopic data. (September 1989)  
61 - Fig. 2

Guy, Russell  
Virginia Polytechnic Institute and State Univ.

Geochronology and geochemistry of the Archean basement terrain in Yankee Jim and Lamar River Canyons, Montana and Wyoming. (January 1990)  
62 - Fig. 1

Hamilton, Wayne L.  
Natl. Park Service; Yellowstone National Park and Montana State Univ.

Tracking geothermal flows with radon and mercury anomalies. (1990)

# GEOCHEMISTRY, MINERALOGY AND PETROLOGY

## INVESTIGATOR

## SUBJECT

Hargrave, Phyllis A.  
Montana Tech

Field relationships and petrology of the Lowland Creek Volcanics in the Browns' Gulch and Flume Gulch areas. (December, 1989)  
63 - Fig. 2

Hearn, B. Carter  
USGS, Reston

Study of kimberlitic diatremes in Montana including chemical and isotopic analysis of mineral separates. (continuing)

Helz, Rosalind T.  
USGS, Reston

Trace element chemistry of fine-grained rocks from the Stillwater Complex with emphasis on the platinum-group elements and Cu, Ni and Ag.  
64 - Fig. 2

Hess, David F.  
Western Illinois Univ.  
Vitaliano, Charles J.  
Indiana Univ.

Petrology and petrochemistry of the Tobacco Root batholith. (Early 1990's)  
65 - Fig. 2

Hess, David F.  
Western Illinois Univ.  
Vitaliano, Charles J.  
Indiana Univ.

Geothermometry and geobarometry of amphibolites and relationship to metamorphic history of the Archean rocks of southwestern Montana. (1991)

Hyndman, Donald W.  
Parker, David  
Gunkel, Kristin  
Sears, Jim  
Alt, Dave  
Univ. of Montana

Relationship between granite and thrust belts in western Montana. (1991)  
31 - Fig. 1

Hyndman, Donald W.  
Tureck-Schwartz, K.  
Univ. of Montana

Petrology and geochemistry of the Square Butte laccolith, Highwood Mountains (1991)  
66 - Fig. 1

Hyndman, Donald W.  
Tureck-Schwartz, K.  
Foland, K. A.  
Univ. of Montana

Petrology and geochemistry of alkalic and subalkalic rocks of the Bearpaw Mountains. (1990)  
67 - Fig. 1

GEOCHEMISTRY, MINERALOGY AND PETROLOGY

INVESTIGATOR

SUBJECT

Lange, Ian  
Univ. of Montana

Mapping, petrology and geochemistry  
of the Hog Heaven volcanic field  
west of Flathead Lake. (1989)  
68 - Fig. 1

Loferski, Patricia J.  
USGS, Reston

Petrogenesis of anorthosites of the  
Stillwater Complex.  
69 - Fig. 1

Luedke, Robert G.  
USGS, Reston

Early and middle Cenozoic volcanic  
centers, western conterminous United  
States.

Maruyama, H.  
Akita Univ., Japan  
Volborth, Alex  
Montana Tech

Petrochemical and isotopic studies  
on the Boulder batholith.  
70 - Fig. 1

McCallum, I. S.  
Irving, A. J.  
Univ. of Washington

Petrologic/geochemical study of the  
Eocene volcanics of central Montana.  
(continuing)  
71 - Fig. 1

McCallum, I. S.  
Univ. of Washington

Petrologic/geochemical study of the  
Stillwater Complex. (continuing)  
72 - Fig. 1

McCarty, Douglas  
Univ. of Montana

Burial diagenesis of Tertiary  
sediments, western Montana. (June  
1989)

Mogk, David  
Montana State Univ.

Evolution of continental crust in  
the Archean basement of southwest  
Montana.

Mueller, Paul  
Univ. of Florida

Crustal evolution as shown by the  
Archean rocks of southwestern  
Montana.



# GEOCHEMISTRY, MINERALOGY AND PETROLOGY

<u>INVESTIGATOR</u>	<u>SUBJECT</u>
Page, Norman J. USGS, Reston	Ore deposits and processes in the early magmatic environment. (includes work in the Stillwater Complex) 73 - Fig. 1
Plymate, Thomas G. Southwest Missouri State Univ.	Variation in the structural state of alkalai feldspars in the Cretaceous/Tertiary sills exposed in Cottonwood Canyon, southeastern Jefferson County. 74 - Fig. 2
Pushkar, Paul Wright State Univ. Gutman, James Wesleyan Univ.	Field geology, petrology and geochemistry of the Lion Mountain volcanic center, Gravelly Range. 75 - Fig. 2
Reichl, Pavel Jan Univ. of Montana	Drill-core and surface geology, petrology and geochemistry of the mafic and ultramafic rocks in the ultramafic series of the Stillwater Complex in the West Fork Area including the A-H Chromitites. (Summer 1989) 76 - Fig. 2
Rutland, Carolyn Schmidt, Christopher J. Western Michigan Univ. Swapp, Susan SUNY, Binghamton	Petrology, geochemistry and structural evolution of the eastern boundary of the Boulder batholith. (1989) 38 - Fig. 2
Thompson, G. R. Univ. of Montana	Burial diagenesis of Tertiary continental clastic sediments in the Deerlodge Valley. 77 - Fig. 1
Thompson, G. R. Univ. of Montana	Nature and origin of bentonite and K-bentonites of the Sweetgrass arch and the disturbed belt.

GEOCHEMISTRY, MINERALOGY AND PETROLOGY

INVESTIGATOR

SUBJECT

Toth, Thomas A.  
Indiana Univ.

Comparative study of the clay  
mineralogy of Cambrian shales and  
those in the Belt Supergroup,  
southwestern Montana.

Volborth, Alex  
Montana Tech

Mineralogy and geochemistry of the  
Stillwater palladium, platinum and  
rhenium mineralization.  
78 - Fig. 1

# ISOTOPE GEOLOGY AND GEOCHRONOLOGY

<u>INVESTIGATOR</u>	<u>SUBJECT</u>
Bown, T. M. USGS, Reston	Tertiary geochronology and basin analysis, Rocky Mountain basins.
Duke, Edward F. Institute for Study of Mineral Deposits, South Dakota School of Mines and Technology	Origin of graphite vein deposits at the Crystal Graphite mine near Dillon, using geological, geochemical and carbon and oxygen isotopic data. (September 1989) 61 - Fig. 2
Friedman, Irving USGS, Denver	Study of light stable isotopes in thermal waters of Yellowstone National Park area. (continuing) 79 - Fig. 1
Gustin, Mae Sexauer Indiana Univ./Purdue Univ.	Carbon and oxygen isotope study of several talc deposits in southwestern Montana. 80 - Fig. 2
Guy, Russell Virginia Polytechnic Institute and State Univ.	Geochronology and geochemistry of the Archean basement terrain in Yankee Jim and Lamar River Canyons, Montana and Wyoming. (January 1990) 62 - Fig. 1
Hearn, B. Carter USGS, Reston	Study of kimberlitic diatremes in Montana including chemical and isotopic analysis of mineral separates. (continuing)
Lewis, Sharon E. MBMG Russell, Gail Univ. of Southern Mississippi	Radiometric age of Quaternary deposits using U/Th techniques.
Maruyama, H. Akita Univ., Japan Volborth, Alex Montana Tech	Petrochemical and isotopic studies of the Boulder batholith. 70 - Fig. 1

# ISOTOPE GEOLOGY AND GEOCHRONOLOGY

## INVESTIGATOR

## SUBJECT

McCallum, I. S.  
Irving, A. J.  
Univ. of Washington

Petrologic/geochemical study of the  
Eocene volcanics of central Montana.  
(continuing)  
71 - Fig. 1

McCallum, I. S.  
Univ. of Washington

Petrologic/geochemical study of the  
Stillwater Complex. (continuing)  
72 - Fig. 2

Mueller, Paul  
Univ. of Florida

Crustal evolution as shown by the  
Archean rocks of southwestern  
Montana.

Rye, Robert O.  
USGS, Denver

Study of the Spar Lake copper-silver  
deposits in conjunction with stable  
isotope studies of ore deposits.  
Also sulfur isotope studies of the  
Yellowstone geothermal system.  
(continuing)  
81 - Fig. 1

Shuster, Robert D.  
Univ. of Nebraska-Omaha

Isotopic studies of the northeastern  
Idaho batholith.  
82 - Fig. 1

Tatsumoto, Mitsunobu  
USGS, Denver

Isotopic studies of mineral  
separates from the Stillwater  
Complex. (continuing)  
83 - Fig. 1

# GEOPHYSICS

INVESTIGATOR	SUBJECT
Belt, Edward S. Amherst College	Stratigraphy, sedimentology, paleobotany and paleomagnetism of the Lebo Member of the Fort Union Formation. (On either side of Route 12, at the Powder River crossing.) (1989) 43 - Fig. 1
De Noyer, John M. USGS, Reston	Preparation of gravity and magnetic maps of Montana.
Elston, Donald P. USGS, Flagstaff	Paleomagnetic studies in the Belt basin of Montana and Idaho. (continuing)
Gunderson, Jay A. Univ. of Montana	Paleomagnetism of the Late Cretaceous(?) Adel Mountain Volcanics near Cascade. (1989) 84 - Fig. 1
Hanna, William F. USGS, Reston	Interpretative aeromagnetic map and Bouguer gravity anomaly map of the Butte 1x2-degree quadrangle. 85 - Fig. 1
Jolly, Arthur Univ. of Montana	Paleomagnetic investigation of Two Medicine volcanic rocks at Wolf Creek. The intention of this study is to document possible rotation of thrust sheets within the disturbed belt of western Montana. (Spring 1990) 32 - Fig. 1
Kleinkopf, M. Dean USGS, Denver	Gravity and magnetic anomaly data for the western part of the Belt basin and the Libby thrust belt.
Lankston, Robert Univ. of Arkansas	Integrated geophysical study at the intersection of the Beaverhead and Blacktail Deer Basins. (May 1990) 86 - Fig. 2

# GEOPHYSICS

## INVESTIGATOR

## SUBJECT

Locke, William  
Montana State Univ.  
Bartholomew, Mervin J.  
MBMG

Assessment of earthquake hazard in  
Lewis and Clark County and the  
Helena Valley. (December, 1990)  
87 - Fig. 1

Nichols, Terry  
Montana Tech

Geophysical estimation of aquifer  
parameters in the Bozeman Fan.  
Gallatin County. (1989)  
88 - Fig. 1

Sheriff, Steven D.  
Univ. of Montana

General paleomagnetic investigations  
and gravity/magnetic modelling,  
relative to tectonic development of  
the northern Rocky Mountains.  
(continuing)

Smith, Robert B.  
Univ. of Utah

Operation of Seismograph network in  
Hebgen Lake area. (continuous)  
89 - Fig. 2

Sternberg, Robert S.  
Franklin and Marshall College

Magnetostratigraphy of the Paleocene  
Fort Union Formation, southeastern  
Montana. (1989)

Stickney, Michael C.  
MBMG

Regional seismic monitoring and  
seismicity studies in western  
Montana. Data collected by a 9-  
station seismograph network is used  
to locate and catalog earthquake  
hypocenters. (continuing)

Stover, C. W.  
USGS

Preparation of seismicity maps for a  
number of states including Montana.  
(continuing)



# ECONOMIC GEOLOGY

INVESTIGATOR	SUBJECT
Ambrustmacher, T. G. USGS, Denver	Geology and resources of thorium, niobium and tantalum.
Ashley, Roger P. USGS, Menlo Park	Gold resource appraisal (includes work in Montana).
Berg, Richard B. MBMG Honda, Sakuro Mining College, Akita Univ., Japan	Chloritic alteration of Precambrian metamorphic rocks in the Highland Mountains. 90 - Fig. 2
Blount, Alice M. Rutgers Univ.	Investigation of the association of corrensite, mixed-layer silicates, smectite, etc. with talc in hydrothermally altered dolomite in southwestern Montana in an effort to learn more about the nature of the hydrothermal fluids and conditions of talc formation. 91 - Fig. 2
Carlson, Robert R. USGS, Denver	Geochemical and analytical studies of the platinum-group elements including samples from the Stillwater Complex. 58 - Fig. 1
Czamanske, Gerald K. USGS, Menlo Park	Magmatic sulfides in mafic rocks. (Includes work in the Stillwater Complex.) 92 - Fig. 1
Derkey, Robert E. Butte Matsueda, Hiroharu Hokkaido Univ., Japan	Nature of ore deposits of the Boulder batholith region, southwestern Montana. (continuing) 93 - Fig. 1
Earhart, Robert USGS, Denver	Compilation of data on volcanogenic massive sulfide deposits including information from Montana.

## ECONOMIC GEOLOGY

### INVESTIGATOR

### SUBJECT

Elliott, James E.  
USGS, Denver

Study of the Wickes district and  
Montana Tunnels mine near Jefferson  
City.  
94 - Fig. 1

Foose, Michael P.  
USGS, Reston

Field studies of sulfide occurrences  
in the Stillwater Complex as part of  
a study of world nickel and cobalt  
resources. (continuing)  
95 - Fig. 1

Gustin, Mae Sexauer  
Indiana Univ./Purdue Univ.

Carbon and oxygen isotope study of  
several talc deposits in  
southwestern Montana.  
80 - Fig. 2

Johnson, Todd W.  
Washington State Univ.

Gold in skarn and replacement  
deposits in the New World mining  
district, Park County. (January  
1991)  
96 - Fig. 1

Lageson, David R.  
Montana State Univ.

Field study of deeply eroded caldera  
complexes in the Boulder batholith  
and Elkhorn Mountains volcanic  
field, west-central Montana; ash-  
flow stratigraphy, structural  
geology, and economic geology  
associated with caldera complexes.  
(continuing)  
34 - Fig. 1

Lockwood, Mark  
New Mexico Institute of Mining and  
Technology

Geology of the Virginia City  
district, Madison County.  
97 - Fig. 2

Page, Norman J.  
USGS, Reston

Ore deposits and processes in the  
early magmatic environment.  
(Includes work in the Stillwater  
Complex.)  
73 - Fig. 1

# ECONOMIC GEOLOGY

## INVESTIGATOR

## SUBJECT

Pearson, Robert C.  
USGS, Denver

Study of the Bannack mining district including the geology of the Bannack 7 1/2-minute quadrangle. Also includes some mapping in the Burns Mountain, Dalys and Eli Springs 7 1/2-minute quadrangles.  
15 - Fig. 2

Reynolds, Mitchell W.  
USGS, Reston  
Tysdal, Russell G.  
USGS, Denver

Mineral resources of the Sleeping Giant Wilderness study area.  
19 - Fig. 1

Sinclair, Alastair J.  
Gareau, M.  
Univ. of British Columbia, Canada

Lithogeochemical study of the Golden Sunlight deposit, southwestern Montana. (1989)  
98 - Fig. 2

Van Voast, Wayne  
Wheaton, John  
MBMG

Study of crude bentonite for shot-hole plugging.

Volborth, Alex  
Montana Tech

Mineralogy and geochemistry of the Stillwater palladium, platinum and rhenium mineralization.  
78 - Fig. 1

Woodward, Lee  
Univ. of New Mexico

Tectonic-metallogenic map of White Sulphur Springs 1 x 2-degree quadrangle. (1989)  
99 - Fig. 1

Zeihen, Lester  
Earll, Fred  
Montana Tech  
Ishikawa, R.  
Ishiyama, D.  
Akita Univ., Japan

Investigation of metalliferous veins in the western part of the Butte mining district.  
100 - Fig. 2

Zeihen, Lester  
Montana Tech

Mineralogy of the Black Pine mine, Granite County. (continuing)  
101 - Fig. 1

ECONOMIC GEOLOGY

INVESTIGATOR

Zientek, M. L.  
USGS, Menlo Park

SUBJECT

Magmatic sulfide deposits of the  
Stillwater Complex. (1991)  
102 - Fig. 1

# ENERGY

## INVESTIGATOR

## SUBJECT

Bartholomew, Mervin J.  
Vuke-Foster, Susan  
Berg, Richard B.  
MBMG  
Colton, Roger B.  
USGS, Denver

Geology of the Stockett-Belt coal field area (Stockett and Belt 15-minute quadrangles).  
1 - Fig. 1

Burruss, R. C.  
USGS

Study of the thermal history and fluid migration in sedimentary basins includes analysis of coal samples from the Powder River basin. (1991)

Denson, Norman  
USGS, Denver

Tertiary geology and uranium occurrences in the Powder River basin, northeast Wyoming and southeast Montana.

Dolton, Gordon L.  
USGS, Denver

Field size, finding rate and play analysis studies for the Minnelusa Formation in the Powder River basin will be utilized in the development of methodology for resource assessment.

Flores, Romeo M.  
USGS, Denver

Evolution of the Powder River basin.

Hickcox, David H.  
Ohio Wesleyan Univ.

Water management, water policy and coal development in eastern Montana focusing on the Yellowstone and Tongue River basins. (continuing)

Lageson, David R.  
Montana State Univ.

Analysis of rock deformation fabrics in thrust sheets of the Disturbed Belt. Specifically, this project deals with pressure solution cleavages, fractures, boudinage, and other mesoscopic fabrics that may affect the porosity and permeability of potential oil and gas reservoir rocks in the fold and thrust belt. (1990)

# ENERGY

## INVESTIGATOR

## SUBJECT

Pierce, Frances, W.  
USGS, Denver

Geostatistical analysis of the coal resources of the Powder River Basin. (1989)

Sholes, Mark A.  
Vuke-Foster, Susan  
MBMG

Stratigraphy and sedimentology of coal-bearing strata in Montana: A synthesis. (1990)

Sholes, Mark A.  
MBMG

Petrographic studies of Montana coals and correlation of petrographic data with chemical and sedimentologic data. (continuing)

Sholes, Mark A.  
MBMG  
Sugawara, T.  
Akita Univ., Japan

Correlation between chemical and petrographic characteristics of Montana coals and the effectiveness of pretreating these coals to reduce sulfur.

Simon, Frederick, O.  
USGS, Reston

Study of coal geochemistry includes an investigation of the effect of ground-water composition on the sodium content of coal in the Powder River basin. (1989)

Stanton, Ronald W.  
USGS, Reston

Study of coal petrology includes analysis of samples from Wasatch Formation coal beds in Montana and Wyoming. (1989)

Wilde, Edith M.  
MBMG

Coal resource evaluation of the Glendive 30x60-minute quadrangle in eastern Montana using the National Coal Resources Data System.  
103 - Fig. 1

Wilde, Edith M.  
MBMG

Coal resource evaluation of the Sidney 30x60-minute quadrangle in eastern Montana using the National Coal Resources Data System. (1989)  
104 - Fig. 1

INVESTIGATOR

Wilde, Edith M.  
MBMG

SUBJECT

Coal stratigraphy and correlation in  
the Sidney 30x60-minute quadrangle,  
eastern Montana and adjacent North  
Dakota. (in press)  
57 - Fig. 1

# HYDROGEOLOGY

## INVESTIGATOR

## SUBJECT

Appleman, Richard A.  
Montana Tech  
Stanford, Jack  
Univ. of Montana

Characterization of suspended sediment and baseline conditions related to the proposed Cabin Creek Coal mine in the headwaters of the North Fork of the Flathead River. (December 1989)  
105 - Fig. 1

Bergantino, Robert N.  
Sholes, Brenda, and others  
MBMG

Preparation of maps showing geology, mineral resources, and ground-water resources at a scale of 1:250,000 on 1 x 2-degree quadrangles. (continuing)

Briar, David  
USGS, Helena

The hydrology and water quality of valley fill deposits on the Fort Belknap Indian Reservation, north central, Montana. (September 1990)  
106 - Fig. 1

Cannon, Michael  
USGS, Helena

Development of a geographic-information-system (GIS) data base for hydrology of coal areas in southeastern Montana. (September 1990)

Clark, David W.  
USGS, Helena

Occurrence of pesticides in ground water and soils in agricultural areas of Montana. Sampling in three areas of Montana with different soil types and agriculture. (September 1989)

Clark, David W.  
USGS, Helena

Investigation of mine-spoils geochemistry near Colstrip and Decker mine in southeastern Montana to determine geochemical changes along flow paths. (September 1990)  
107 - Fig. 1

Duaime, Terence E.  
Sonderegger, John A.  
MBMG

Hydrologic projects for the Anaconda smelter site.  
108 - Fig. 2



# HYDROGEOLOGY

## INVESTIGATOR

## SUBJECT

Duaime, Terence E.  
Moore, Herman R.  
Miller, Marvin R.  
MBMG

Impacts on water quality from  
plowout and saline seep reclamation  
practices, Stillwater County,  
Montana. (December 1990)  
109 - Fig. 1

Duaime, Terence E.  
Sonderegger, John A.  
MBMG

Monitoring of the Butte mine  
flooding. (continuing)  
110 - Fig. 2

Duaime, Terence E.  
MBMG  
Appleman, Richard A.  
Montana Tech

Monitoring the effects of  
thunderstorms on surface water  
quality in the Upper Clark Fork  
Basin (in cooperation with the  
U.S.G.S.  
111 - Fig. 1

Duaime, Terence E.  
MBMG  
Appleman, Richard A.  
Montana Tech  
Sonderegger, John A.  
Montana Tech  
Metesh, John  
MBMG

Aquifer test at the Travona Mine in  
the Butte district.  
112 - Fig. 2

Friedman, Irving  
USGS, Denver

Study of light stable isotopes in  
thermal waters of Yellowstone  
National Park area. (continuing)  
79 - Fig. 1

Hamilton, Wayne L.  
Natl. Park Service; Yellowstone  
National Park and Montana State  
Univ.

Tracking geothermal flows with radon  
and mercury anomalies. (1990)

Hickcox, David H.  
Ohio Wesleyan Univ.

Water management, water policy and  
coal development in eastern Montana  
focusing on the Yellowstone and  
Tongue River basins. (continuing)

# HYDROGEOLOGY

## INVESTIGATOR

## SUBJECT

Metesh, John J.  
MBMG

Hydrogeologic investigation of the  
Travona Mine and Margret Ann Mine,  
Butte. (December 1989)  
113 - Fig. 2

Nichols, Terry  
Montana Tech

Geophysical estimation of aquifer  
parameters in the Bozeman Fan.  
Gallatin County. (1989)  
88 - Fig. 1

Parrett, Charles  
Briar, Daniel  
USGS, Helena

Water-resources investigation of the  
upper Pryor Creek basin, Crow Indian  
Reservation, south-central Montana.  
(1992)  
114 - Fig. 1

Patton, Thomas W.  
Miller, Marvin R.  
Sholes, Brenda  
Schmidt, Fred  
MBMG

Ground water information center  
library, basic data, interpretative  
and field services. (continuing)

Patton, Thomas W.  
MBMG

Turner-Hogeland ground-water  
recharge study.  
115 - Fig. 1

Patton, Thomas W.  
MBMG  
Colton, Roger B.  
USGS, Denver

Identification of glaciofluvial and  
buried preglacial aquifers in the  
Havre, Harlem and Whitewater 30 x  
60-minute quadrangles.  
116 - Fig. 1

Patton, Thomas W.  
MBMG

Turner-Hogeland aquifer study.  
117 - Fig. 1

Reiten, Jon  
MBMG

Brine contamination of shallow  
ground-water supplies, Sheridan  
County. (continuing)  
118 - Fig. 1

# HYDROGEOLOGY

## INVESTIGATOR

## SUBJECT

Reiten, Jon  
MBMG

Study of oil field reserve pit  
contamination, Richland County.  
(continuing)  
119 - Fig. 1

Schmidt, Fred  
Moore, Herman R.  
MBMG

Monitoring of ground water and  
surface water in the Poplar River  
area.  
120 - Fig. 1

Sonderegger, John  
Montana Tech

Evaluation of arsenic contamination  
of alluvial and Tertiary aquifers  
between Beartrap Canyon and Three  
Forks. (June 1989)  
121 - Fig. 2

Thamke, Joanna  
USGS, Helena

Ground-water monitoring network on  
the Fort Peck Indian Reservation.  
(Dec. 1989)  
122 - Fig. 1

Tuck, Lori K.  
USGS, Helena

Investigation of the hydrogeologic  
framework of the Sweet Grass Hills  
in an effort to determine the  
feasibility of using ground water to  
supplement surface-water resources.  
(1992)  
123 - Fig. 1

Van Voast, Wayne  
Reiten, Jon  
Lalley, Joe  
Wheaton, John  
MBMG

Study includes column leach  
experiments to improve ways of  
interpretating overburden salinity  
data for hydrologic uses.  
Overburden salinity data are from  
coal deposits in southeastern  
Montana. (continuing)

Van Voast, Wayne  
Reiten, Jon  
Lalley, Joe  
Wheaton, John  
MBMG

Coal lands hydrologic monitoring  
study utilizes more than 200  
observation wells in and near active  
coal mines. (continuing)

## HYDROGEOLOGY

### INVESTIGATOR

### SUBJECT

Wheaton, John  
Reiten, Jon  
Van Voast, Wayne  
MBMG

Evaluation of ground water for  
irrigation use from underground  
mines in the Roundup area. (1991)  
124 - Fig. 1

Wheaton, John  
MBMG

Evaluation of ground water for  
irrigation along the north flank of  
the Pryor Mountains, south central  
Montana. (continuing)  
125 - Fig. 1

Wylie, Allan  
Univ. of Montana

Hydrologic investigation of Pine  
Butte and McDonald swamps in Teton  
County.  
126 - Fig. 1

# GEOMORPHOLOGY AND GLACIAL GEOLOGY

<u>INVESTIGATOR</u>	<u>SUBJECT</u>
Adams, Ken Montana State Univ.	Obsidian hydration dating of naturally abraded samples along the Madison River near West Yellowstone, Montana and in the Yellowstone Lake Basin, Wyoming. 127 - Fig. 1
Carrara, Paul E. USGS, Denver	Quaternary chronology - Glacier National Park. 128 - Fig. 1
Hall, Robert D. Indiana Univ.; Purdue Univ., Indianapolis	Hornblende depletion and etching as an indicator of relative age of glacial deposits in the Tobacco Root Mountains. (continuing) 129 - Fig. 2
Hall, Robert D. Indiana Univ.; Purdue Univ., Indianapolis	Glacial geology of the Bear Gulch, North Meadow, and South Willow Creek valleys, Tobacco Root Mountains. (continuing) 130 - Fig. 2
Hall, William B. Univ. of Idaho	Study of central portion of the Madison/Gallatin block with emphasis on geomorphology, glacial history, and structural geology. (continuing) 6 - Fig. 2
Locke, William Montana State Univ.	Glaciation and glacial climates of western Montana. (continuing)
Montagne, John Montana State Univ.	On-going study of the Cenozoic History, geomorphology, and glacial geology of the Yellowstone Valley from Gardiner to Livingston. 36 - Fig. 1
Murray, Donald R. Montana State Univ.	Late Pleistocene glacier dynamics and paleoclimatic reconstruction of southwestern Montana and northeastern Idaho. (June 1989)

GEOMORPHOLOGY AND GLACIAL GEOLOGY

INVESTIGATOR

Vandeberg, Gregory S.  
Montana State Univ.

SUBJECT

Study of glacial geology and  
geomorphology of the Tom Miner Basin  
to determine temporal and spatial  
relationships between Late  
Quaternary local ice and the  
Yellowstone outlet glacier.  
(February 1990)  
131 - Fig. 1

# ENVIRONMENTAL AND ENGINEERING GEOLOGY

## INVESTIGATOR

## SUBJECT

Appleman, Richard A.  
Montana Tech  
Duaine, Terence E.  
Moore, Herman R.  
MBMG

Monitoring operation at Montana Pole  
Plant hazardous waste site.  
(continuing)  
132 - Fig. 2

Bartholomew, Mervin J.  
Wilde, E. M.  
Stickney, M. C.  
Daniel, F.  
MBMG  
Dresser, H. W.  
Montana Tech  
Colton, R. B.  
Brabb, E. E.  
USGS

Landslide map of Montana (1:500,000)

Custer, Stephan G.  
Clozton, Marlow  
Montana State Univ.

Study of the role of grazing and  
ground-water discharge in sediment  
production from a low-order water  
shed near Ennis. (continuing)  
133 - Fig. 2

Custer, Stephan G.  
Jacobsen, Jeff  
Kresge, Paul  
Montana State Univ.

The origin of high extractable  
potassium soils in the western U.S.  
(continuing)  
134 - Fig. 1

Locke, William  
Montana State Univ.  
Bartholomew, Mervin J.  
MBMG

Assessment of earthquake hazard in  
Lewis and Clark County and the  
Helena Valley. (December, 1990)  
87 - Fig. 1

Sonderegger, John  
Montana Tech

Laboratory and field studies of  
metals mobility in the unsaturated  
zone of tailings-damaged soils in  
the southern Deer Lodge Valley.  
(June 1989)  
135 - Fig. 1

Van Voast, Wayne  
Reiten, Jon  
Lalley, Joe  
Wheaton, John  
MBMG

Study includes column leach  
experiments to improve ways of  
interpretating overburden salinity  
data for hydrologic uses.  
Overburden salinity data are from  
coal deposits in southeastern  
Montana. (continuing)

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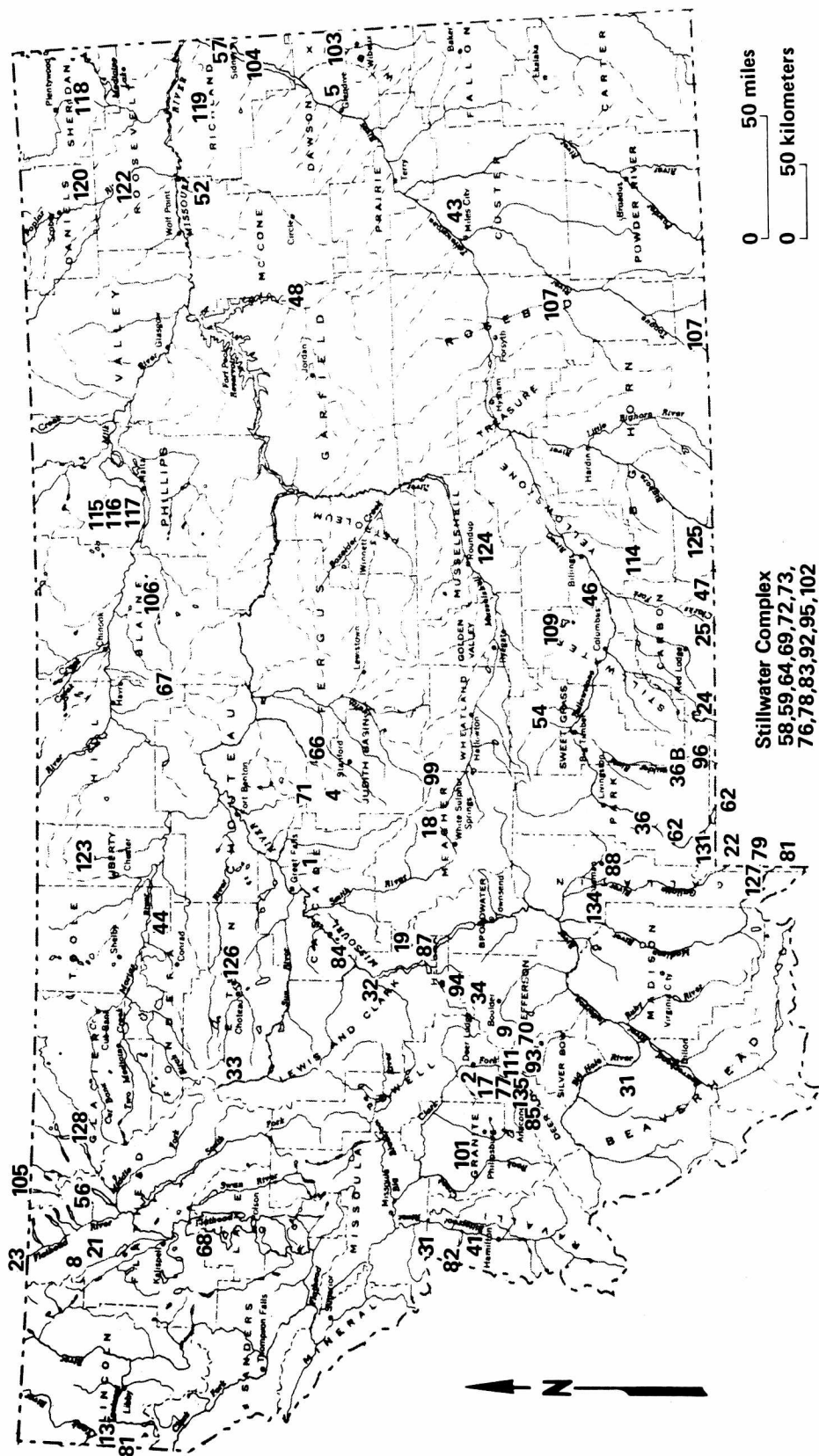
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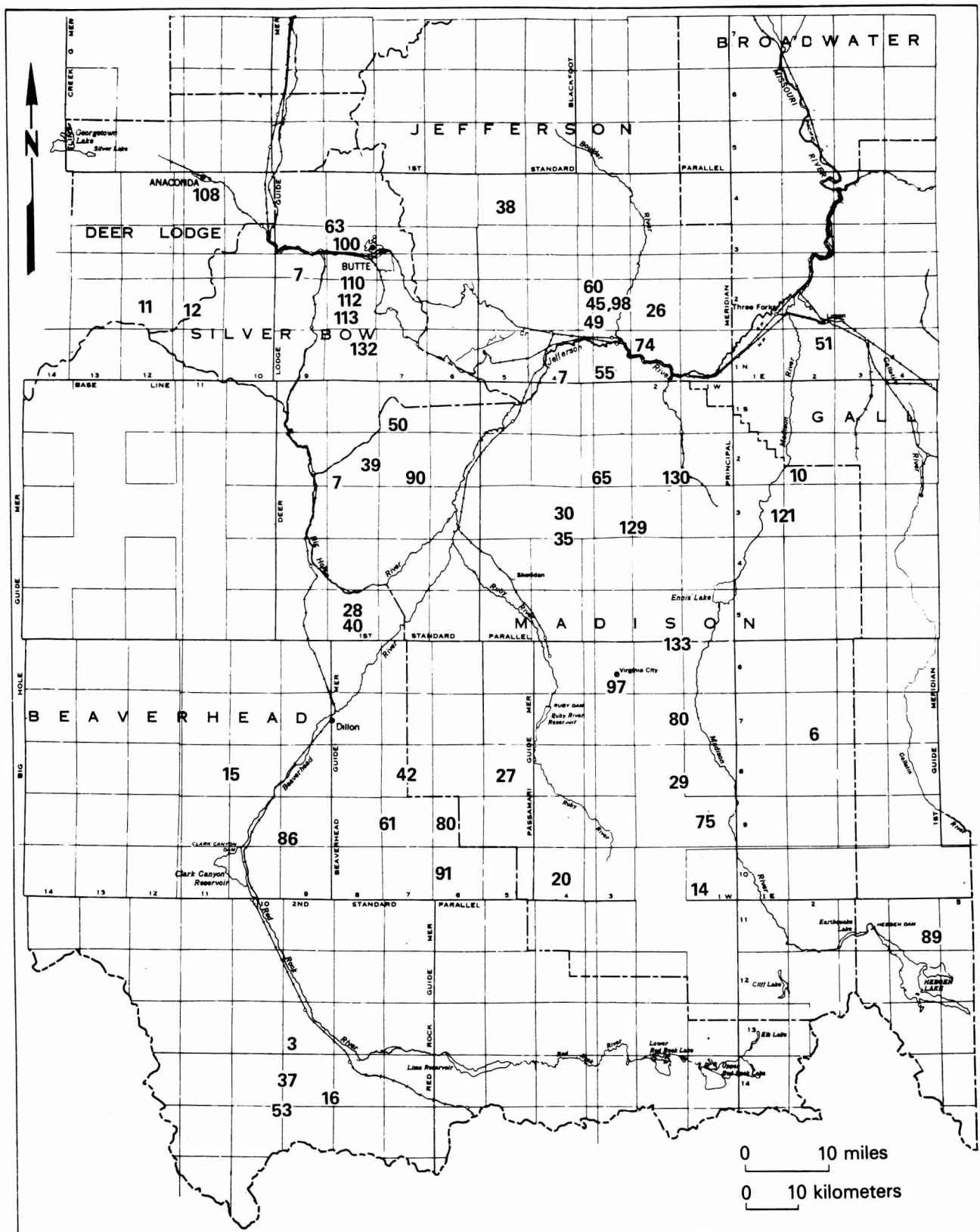


Figure 2. Index map of southwestern Montana.