THE GEOLOGICAL SURVEY OF WYOMING
Gary B. Glass, State Geologist

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ONGOING STUDIES ON THE GEOLOGY OF WYOMING

by

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Introduction

This publication provides titles and brief descriptions of current studies on Wyoming geology, with the date the information was received. Recently published articles are included in cases where they are related to an ongoing study.

The information in this report was obtained primarily from replies to a questionnaire that was sent to major colleges and universities and to other agencies involved in Wyoming geology.

Entries are arranged alphabetically by state and by institutions within each state. In the subject index, all headings are arranged alphabetically.

Anyone wishing to include their ongoing projects is asked to submit pertinent information to the Geological Survey of Wyoming for inclusion in future editions of this bibliography. Send information to the Geological Survey of Wyoming, Box 3008, University Station, Laramie, Wyoming 82071, or call (307) 742-2054 and ask for Alan VerPloeg.

California

Occidental College
Los Angeles, California 90041

1. Prothero, D.R., Emry, R., and Kron, D., Magnetostratigraphy of the Oligocene White River Group, eastern Wyoming: study in progress (1987).

   For the past seven years, magnetostratigraphic studies of the mammal-bearing Oligocene White River Group in eastern Wyoming have been conducted. To date, the entire sequence has been correlated with Chrons C15r and C9 of the magnetic polarity time scale, and biostratigraphic events have been related to the global time scale by means of magnetostratigraphy. Some of these sequences have radiometric dates, which have proven important in calibrating the polarity timescale.

Prothero, D.R., 1985, Chadronian (early Oligocene) magnetostratigraphy of eastern Wyoming: implications for the age of the Eocene-Oligocene boundary: Journal of Geology, v. 93, p. 555-565.

Prothero, D.R., 1985, Mid-Oligocene extinction event in the North American land mammals: Science, v. 229, p. 55-551.

Prothero, D.R., 1985, North American mammalian diversity and Eocene - Oligocene extinctions: Paleobiology, v. 11, p. 389-405.

Pomona College
Claremont, California 91711

2. Zenger, D.H., Carbonate petrology and dolomitization, Bighorn Dolomite (upper Ordovician): study in progress (1987).

   The main geographic emphasis in this ongoing project, involving dolomitization patterns, has been the southern Wind River Range and to a lesser extent, a section in Cody Basin, Teton Range. Additional sections were studied and collected at Steamboat Point (Bighorn Mountains) and a composite one in Wind River Gorge (Owl Creek Mountains). Specimens collected are being prepared for petrologic analysis (XRD, SEM, CL, thin section petrography) both for this specific project and for a broader comparative study of Upper Ordovician burrow-mottled carbonates along the Ordovician Shelf in the eastern Cordilleran.

Zenger, D.H., 1984, Dolomitization patterns in the subtidal Bighorn Dolomite (Upper Ordovician), southeastern Wind River Range, Wyoming: American Association of Petroleum Geologists Bulletin, v. 68, p. 542-543.

3. Zenger, D.H., Dolomitization in the Madison Limestone, Sinks Canyon, Wyoming: study in progress (1987).

   This ongoing project (begun in 1985) involves a field and laboratory analysis of dolomitization in the Madison Limestone (Mississippian), Sinks Canyon. In 1985 a relatively complete section was measured on the north

side of the canyon and a petrologic study begun. In 1987, another section was studied, less than a mile from the first, on the south side of the canyon, in order to test any local variation in dolomitization. The petrologic study (XRD, SEM, thin section petrography) also continues.

Zenger, D.H., 1984, Dolomitization patterns in the subtidal Bighorn Dolomite (Upper Ordovician), southeastern Wind River Range, Wyoming: American Association of Petroleum Geologists Bulletin, v. 68, p. 542-543.

San Francisco State University
San Francisco, California 94132

4. Sullivan, R., Origin of lacustrine rocks of the Green River Formation, Wyoming: study in progress (1987).

This project is a subsurface correlation of the early Tertiary stratigraphic units in the Green River Basin and adjacent regions. The purpose of the study is to incorporate a more detailed stratigraphic synthesis into the interpretation of the depositional environment of the Green River Formation.

Sullivan, R., 1985, Origin of lacustrine rocks of the Wilkins Peak Member, Wyoming: American Association of Petroleum Geologists Bulletin, v. 69, p. 913-922.

San Jose State University
San Jose, California 95192

5. Andersen, D.W., Baldwin, R.J., Helm, R.L., and Wray, M.J., Sedimentology of the Wasatch and Fort Union Formations on the south flank of the Rock Springs uplift: study in progress (1986).

The stratigraphy and sedimentology of the Fort Union Formation and the main body of the Wasatch Formation are being investigated, with the aim of integrating tectonic and paleoclimatic controls on sedimentation. These fluvial deposits record low-gradient conditions within the Greater Green River Basin, and they comprise recognizable lobes of sediment contributed from four distinct sediment sources surrounding the basin.

Helm, R.L., 1985, Depositional history and petrology of the Fort Union Formation (Paleocene), southern flank of the Rock Springs uplift, Sweetwater County, Wyoming: M.S. thesis.

University of California
Berkeley, California 94720

6. Leopold, L.B., Hydraulics and sedimentology of braided rivers: study in progress (1986).

Colorado
Colorado School of Mines
Golden, Colorado 80401

7. Geissman, J.W., and Harlan, S.S., Precambrian paleomagnetism of the western United States: study in progress (1987).

Exposed in Laramide-age uplifts of the Rocky Mountain foreland in Wyoming are numerous well-dated Precambrian igneous rocks. The paleomagnetism of these units is being studied in hopes of ultimately providing a pre-early Late Precambrian (c.a. 1,300 m.y.) apparent polar wander path for the western United States. The data will be used to assess the coherence of the Wyoming province and immediately surrounding areas with respect to the rest of interior Laurentia in the Proterozoic. Hopefully this work will ultimately involve considerable Ar/Ar geochronologic work to more adequately assess ages of magnetization acquisition.

Harlan, S.S., and Giessman, J.W., 1986, Paleomagnetism of Proterozoic(?) mafic dikes in the southern Wind River Range, Wyoming: a reinvestigation: American Geophysical Union [EOS], Transactions, v. 67, p. 928.

Colorado State University
Fort Collins, Colorado 80523

8. Erslev, E.A., and Rogers, J., Foreland basement kinematics during the Laramide orogeny: study in progress (1987).

Detailed strain measurements on the rocks adjacent to the Forellen fault will be used to refine geologic models showing the evolution of basement-involved thrust-fold structures.

Erslev, E.A., 1986, Basement balancing of Rocky Mountain foreland uplifts: Geology, v. 14, p. 259-262.

9. Erslev, E.A., Hildebrandt, P., Miller, S., and Reed, J.C., Jr., Precambrian evolution of the Teton gneiss complex: study in progress (1987).

This research integrates mapping by John C. Reed, Jr. with detailed structural, metamorphic, and geochemical studies of the Teton gneiss complex. The eventual goal is the delineation of the tectonic history of the complex and its relationship to the surrounding exposures of Archean rocks. Preliminary results include the definition of strong NNE stretching fabrics and the discovery of a widespread granulite facies event which preceded the amphibolite facies whose imprint dominates the range.

Miller, S.H., Hildebrandt, P.K., Erslev, E.A., and Reed, J.C., Jr., 1986, Metamorphic and deformation history of the gneiss complex in the northern Teton Range, Wyoming, *in* Geology of the Beartooth uplift and adjacent basins: Montana Geological Society and Yellowstone Bighorn Research Association Joint Field Conference and Symposium, p. 91-110.

10. Hippe, D., Ethridge, F.G., and Needham, D., Depositional systems and petrology of the Mesaverde Formation, southeastern Wind River Basin, Wyoming: study in progress (1987).

An outcrop and subsurface analysis of depositional systems, sandstone petrology, and reservoir potential of the upper Cody Shale and Mesaverde Formation along the Rattlesnake Hills, Dutton anticline, and the adjacent subsurface. One fossil locality has been catalogued with the museum at the University of Wyoming. The Fales Sandstone, Parkman Sandstone, and unnamed middle member are progradational wave-dominated strand-plain and deltaic complexes. The Teapot Sandstone is a braided-belt and meander-belt deposit.

11. Moren, R.J., The depositional environment of the Pine Ridge Sandstone, northern Laramie Basin, Wyoming: M.S. thesis: study in progress (1987).

12. Needham, D.W., Hippe, D., and Ethridge, F.G., Depositional environments and diagenetic history of the Mesaverde Formation, southeastern Wind River Basin, Natrona County, Wyoming: study in progress (1987).

This sedimentologic/petrologic study concerns the Mesaverde Formation in the southeast arm of the Wind River Basin, Natrona County, Wyoming. The outcrops studied are along the southwest flank of the Casper arch from Arminto to the North Platte River near Alcova Reservoir. The primary purposes of this study are to delineate facies, determine depositional environments, and interpret the diagenetic history. The outcrop interpretations will be projected into the subsurface using electric logs and available core. At this time measured sections have been done and are being correlated with electric logs. The petrology is currently being done and will be supplemented with x-ray and SEM analysis.

University of Colorado
Boulder, Colorado 80304

13. Kraus, M.J., Early Eocene alluvial paleosols and their significance to reconstructing ancient alluvial sequences: study in progress (1987).

Paleosols formed on overbank deposits of the lower Eocene Willwood Formation can be subdivided into different stages on the basis of maturity. These stages permit detailed examination of the relationships between overbank deposits and channel deposits in both the lateral and temporal dimensions. This study will provide a new approach for elucidating the intrabasinal and extrabasinal factors that controlled the development of a specific alluvial sequence.

Kraus, M.J., 1985, Early Tertiary quartzite conglomerates of the Bighorn Basin and their significance for paleogeographic reconstruction of northwest Wyoming, *in* Flores, R.M., and Kaplan, S.S., editors, Cenozoic paleogeography of the west-central United States, Rocky Mountain Paleogeography Symposium 3: Rocky Mountain Section SEPM, Special Publication, p. 71-91.

Kraus, M.J., 1985, Sedimentology of early Tertiary rocks, northern Bighorn Basin, *in* Flores, R.M., and Harvey, M., editors, Field guide to modern and ancient fluvial systems in the United States: Third International Fluvial Sedimentology Conference Guidebook, p. 26-33.

Kraus, M.J., and Bown, T.M., 1986, Paleosols and time resolution in alluvial stratigraphy, *in* Wright, V.P., editor, Paleosols: their classification,

recognition, and significance, Princeton University Series in Geology: Oxford, Blackwell Scientific Publication, p. 180-207.

Connecticut
University of Connecticut
Storrs, Connecticut 06268

14. Geiser, P., Structural analysis in the Idaho-Wyoming thrust belt: study in progress (1986).

The Idaho-Wyoming thrust belt is being used to test newly developed methodologies for prediction of subsurface geology in fold/thrust belts. The Preston 1° x 2° quadrangle was chosen because it is well mapped and has been extensively explored with seismic and well data. Consequently, the predicted three-dimensional structure can be compared with the known structure and this affords an excellent test of the methods used.

Georgia
Georgia State University
Atlanta, Georgia 30303

15. Fritz, W.J., Sedimentology of early Tertiary rocks in Yellowstone park: study in progress (1986).

This ongoing research in Yellowstone involves the sedimentology and depositional environments of rocks burying the petrified forests. The current phase of the study is an examination of the orientations of clasts in mudflow units of the Lamar River and Sepulcher Formations in an attempt to determine the source peak that they came from. The author's previous work and that of Chadwick (1970) and the U.S. Geological Survey (Smedes and Prostka, 1972) have shown that numerous volcanic vents existed during Eocene time. This study attempts to determine the peak from which specific mudflow units came. This information will allow more accurate determination of the configuration of the depositional basin and the frequency of volcanic eruptions. Methods for this study have evolved from an examination of mudflows produced by recent eruptions of Mount St. Helens and Nevado del Ruiz in Columbia. Previous studies have assumed that clasts in volcanic mudflows are randomly oriented and of little use for determination of paleocurrents. However, oriented clasts in recent volcanic mudflows show a strong upcurrent imbrication like that in stream gravels, making them suitable for paleocurrent studies.

Fritz, W.J., and Harrison, S., 1985, Early Tertiary volcaniclastic sedimentary rocks of the Northern Rocky Mountains, *in* Flores, R.M., and Kaplan, S.S., editors, Cenozoic paleogeography of the west-central United States, Rocky Mountain Paleogeography Symposium 3: Rocky Mountain Section SEPM, Special Publication, p. 383-402.

Idaho
Idaho State University
Pocatello, Idaho 83209

16. Stoll, D., Neogene and Quaternary gravels in the canyon of the Snake River: M.S. thesis: study in progress (1987).

The purpose of this study is to document the periods of cutting and filling in both the Snake and Hoback River canyons. Cobble source, lithology, and timing of filling will be examined. Elevation measures made on distinct valley-fill materials indicate three, possibly four, filling and cutting episodes in the Snake River Canyon. The predominant source area of this fill material appears to have been Jackson Hole. Minor amounts of fill materials were supplied by the Hoback River and tributaries of both rivers. This relation and timing of infilling will be examined during the upcoming field season.

Ricks College
Rexburg, Idaho 83440

17. Hoggan, R.D., Stratigraphic and paleontological correlation across the Snake River Plain: study in progress (1987).

This project will compare fossils and measured stratigraphic sections of Paleozoic rocks from the west slope of the Teton Range with those in the southern Lemhi and southern Beaverhead Ranges. The study should give a better understanding of the changes occurring across the shelf-miogeocline transition zone. The project was initiated in the summer of 1987.

University of Idaho
Moscow, Idaho 83843

18. Teel S., Depositional environment and petrography of the Ordovician Bighorn Dolomite, south-central Montana and northern Wyoming: M.S. thesis: study in progress (1986).

The objectives of this study are: (1) measurement of seven detailed stratigraphic sections, (2) description of sedimentary lithofacies and petrography, (3) discussion of depositional environment, (4) description of diagenetic features and the development of a paragenetic sequence, and (5) discussion of an applicable model of dolomitization.

Illinois
Field Museum of Natural History
Chicago, Illinois 60605

19. Grande, L., Origin and evolution of the western North American fish fauna: study in progress (1987).

Phylogenetic relationships and historical biogeography of the Cenozoic nonmarine fish fauna (particularly the teleosts) of western North America.

Grande, L., 1985, Fish fossils in the Eocene Green River Formation of southwestern Wyoming: National Geographic Research Reports, v. 21, p. 201-205.

Grande, L., 1985, The use of paleontology in systematics and biogeography and a time control refinement for historical biogeography: Paleobiology, v. 11, no. 2, p. 234-243.

University of Illinois
Urbana, Illinois 61801

20. Lander, R.H., Origin and pedogenic and diagenetic alteration of White River Group/Formation pyroclastic rocks: study in progress (1987).

    The following aspects of the White River Group/Formation are being studied: (1) zeolitic diagenesis, (2) volcanic sources for pyroclasts, and (3) oxygen and carbon isotopic signatures of pedogenic calcite as possible paleoclimate indicators.

21. Langenheim, R.L., Jr., Gierlowski, T.C., Weibel, C.P., Bieler, D., and Palmquist, J., Geologic mapping on the east flank of the northern Bighorn Mountains: study in progress (1988).

    Geologic mapping of the West Pass, Dayton North, Columbus Peak, Burgess Junction, Skull Ridge, Dayton South, Wolf, Walker Mountain, Beckton, and Beaver Creek Hills 7½-minute Quadrangles is continuing. Preliminary maps of Beckton, Beaver Creek Hills, Walker Mountain, Wolf, Dayton South, Skull Ridge, and Burgess Junction have been published. Preliminary maps of the remaining three and an updated and expanded version of the Skull Ridge Quadrangle are in compilation. In all cases, only the rocks from the base of the Cambrian through the base of the Fort Union have been mapped, plus White River sediments and Quaternary materials.

Gierlowski, T.C., and Langenheim, R.L., Jr., 1985, Corals from the Late Ordovician Horseshoe Mountain Member, Bighorn Dolomite, Bighorn Mountains, Sheridan County, Wyoming: Wyoming Geological Association Earth Science Bulletin, v. 18, p. 1-21.

Weibel, C.P., 1985, Geology of the Burgess Junction Quadrangle, east flank of Bighorn Mountains, Wyoming, and structural aspects of the Tongue River lineament, Wyoming: Wyoming Geological Association Earth Science Bulletin, v. 18, p. 23-30.

Indiana
Purdue University
West Lafayette, Indiana 47907

22. Loucks, R.R., McCallum, M.E., Glasscock, J., and Muntean, J.L., Petrology and structure of the Mullen Creek and Lake Owen gabbroic intrusions, Medicine Bow Mountains, Wyoming: study in progress (1986).

Indiana University
Bloomington, Indiana 47405

23. Suttner, L.J., Middleman, B., Muffler, S.A., and Sareghan, M., Tectonic - stratigraphic analysis of Lower Cretaceous alluvial sediments in the Rocky Mountain foreland: in progress (1987).

    The purpose of this study is to determine the regional tectonic influences on Lower Cretaceous alluvial sedimentation in the Rocky Mountain foreland basin. Models developed on the basis of data collected in Montana are being tested through study of the Cloverly Formation in the Wind River Basin. The reconnaissance part of the project will in part form the basis for two or three masters theses.

    Muffler, S.A., 1986, Sedimentation in the Early Cretaceous Foreland Basin: The Cloverly Formation, Maverick Springs Dome, Wind River Basin, Wyoming: A.M. thesis, Indiana University, Bloomington Indiana, 75 p.

Indiana University/Purdue University
Indianapolis, Indiana 46202

24. Hall R.D., Glacial history of the Wind River Range: study in progress (1986).

    The type areas of the Rocky Mountain glacial chronosequence in and near the Wind River Range are being examined as a basis for comparison and correlation with similar sequences studied in Montana, Colorado, and New Mexico.

Iowa
Iowa State University
Ames, Iowa 50011

25. Ambardar, S., Stratigraphy and depositional history of the Lance Formation, Bighorn Basin, Wyoming: Ph.D. dissertation: study in progress (1988).

26. Carson, D., A regional analysis of calcite twinning strain in the Bighorn Mountains, northern Wyoming: M.S. thesis: study in progress (1988).

27. Healey, J., Stratigraphic relations of volcaniclastic rocks in the Carter Mountain area, Absaroka Range, Wyoming: M.S. thesis: study in progress (1988).

28. Khandarker, N., Stratigraphy and sedimentology of the Frontier Formation, Wyoming: Ph.D. dissertation: study in progress (1988).

29. McGowan, K., Geochemistry and geology of the Atlantic City-South Pass gold district, Fremont County, Wyoming: Ph.D. dissertation: study in progress (1988).

30. Soliman, H., Stratigraphic relations of the Sykes Mountain Formation, Wyoming: Ph.D. dissertation: study in progress (1988).

31. Walton, A., Geology of Spence Quadrangle, north-central Wyoming: M.S. thesis: study in progress (1988).

32. Weed, D., Evidence of an eolianite unit in the basal Morrison Formation, central Wyoming: M.S. thesis: study in progress (1988).

33. Yang, M., Stratigraphy and depositional history of the Meeteetse Formation, Bighorn Basin, Wyoming: Ph.D. dissertation: study in progress (1988).

University of Iowa
Iowa City, Iowa 52242

34. Ryan, M.P., Structural analysis of the Red Fork Powder River anticlines, Johnson County, Wyoming: M.S. thesis: study in progress (1986).

The subject of this thesis is several asymmetric anticlinal folds that trend northwest to southeast off the Bighorn Mountains. Orthophoto quadrangles were used to make a geologic map of the folds. Four cross sections were made to show the character of the folds as they die out to the southeast. Field evidence and fracture orientations will be used to determine possible fold mechanisms.

University of Northern Iowa
Cedar Falls, Iowa 50614

35. DeNault, K.J., Fuchsite in the Granite Mountains, Wyoming: study in progress, (1986).

This study involves detailed examination of the mineralogy of fuchsite discovered near Barlow Springs, Granite Mountains, Wyoming. The crystals have been compared with fuchsite found in cobbles at Clarkson Hills, Wyoming. The Barlow Spring locality may be the source for boulders at Clarkson Hill. The crystal chemistry of the fuchsite appears to be unusual in that both trioctahedral and dioctahedral layers are present.

36. DeNault, K.J., Evolution of the Tertiary igneous rocks in the Rattlesnake Hills, Wyoming: study in progress (1986).

The goal of this research is to determine the evolutionary trend of the Tertiary igneous rocks in the Rattlesnake Hills, Wyoming. Work to date has included detailed sampling and mapping of individual vents, computer modeling of petrographic trends, microprobe analysis of mineral phases, and pressure-temperature calculations.

37. DeNault, K.J., Style of volcanism in the Leucite Hills, Wyoming: study in progress (1986).

This project is examining the eruptive style of volcanism in the Leucite Hills, Wyoming. The few published reports differ on their estimations of viscosity of erupted lavas and the nature of the eruptions themselves. Work includes detailed mapping of flows and vents and theoretical viscosity calculations based upon field criteria.

38. DeNault, K.J., Pressure-temperature conditions in the lower crust as deduced from xenoliths erupted in lavas of the Leucite Hills, Wyoming: study in progress (1986).

Pressure-temperature conditions in the lower crust are being calculated from data derived from lower crustal xenoliths erupted in lavas of the Leucite Hills, Wyoming. The work is sponsored in part by the National Science Foundation and microprobe data is being gathered using equipment of the Institute of Meteoritics, University of New Mexico. Progress to date includes a detailed collection of xenoliths and over 1,000 microprobe analyses.

Louisiana
Louisiana State University
Baton Rouge, Louisiana 70803

39. Nummedal, D., and Tillman, R.W., Shelf sandstone facies of the Shannon Sandstone: study in progress (1986).

The study involves identification and characterization of shelf sandstone facies of the Shannon Sandstone in the areas of the Haystack Mountains and the Salt Creek anticline.

University of Southwest Louisiana
Lafayette, Louisiana 70504

40. Tucker, D.R., and Birdseye, R., Structural reinterpretation of Five Springs area: study in progress (1988).

This study was a structural reinterpretation of the west flank of the Bighorn mountains in the vicinity of the Five Springs area. Specifically, the contact between the uplifted Precambrian basement core and the deformed features in the Paleozoic-Mesozoic cover that resulted from the uplift were examined. A draft manuscript was completed in 1988.

Massachusetts
North Adams State College
North Adams, Massachusetts 01247

41. Combs, H.L., Jr., Land reclamation following strip mining for coal: an evaluation: study in progress (1986).

Through an examination of pre-surface-mining landscapes, post-mining reclaimed surfaces, discussions with mine operators, and correspondence with state agencies, an attempt was made to evaluate the effectiveness of land reclamation following surface mining for coal in the High Plains of the western states generally, and the Powder River Basin specifically. Recognizing that although a century or so of time will provide a more acceptable response, if present and improving techniques are maintained, the semiarid high plains will suffer little (if any) permanent surface damage insofar as future land use and/or geomorphic processes are concerned.

University of Massachusetts
Amherst, Massachusetts 01003

42. Allison, M.L., Structural analysis of the Tensleep fault, Bighorn Basin, Wyoming: Ph.D. dissertation (1986).

Allison, M.L., 1986, Structural geometry along the Tensleep fault, Bighorn Basin, Wyoming, *in* Geology of the Beartooth uplift and adjacent basins: Montana Geological Society and Yellowstone Bighorn Research Association Joint Field Conference and Symposium, p. 145-153.

Montana
Eastern Montana College
Billings, Montana 59101

43. Zwick, T.T., Effects of the Little Ice Age (neoglacial) events in the Beartooth - Absaroka Range, Montana - Wyoming: study in progress (1986).

The project will investigate the distribution of neoglacial ice advances and associated climatic events, landforms, and periglacial processes.

Montana State University
Bozeman, Montana 59171

44. Locke, W., and Meyer, G., Late Holocene vertical deformation of Yellowstone Lake shorelines: study in progress (1987).

Precision leveling profiles across raised lake shorelines in the Yellowstone Basin have allowed the identification of at least six well-developed terraces. Correlation of these terraces reveals regional deformation both similar to and different from that determined by historical regional leveling. Dating of the shorelines (in progress), should allow the determination of absolute rates of deformation, and imply rates of uplift averaged more than 10 mm/yr over the past 2,500 years. This deformation, which has included both upward and downward components, is interpreted as the result of volcanotectonic deformation.

Meyer, G.A., 1986, Genesis and deformation of Holocene shoreline terraces, Yellowstone Lake, Wyoming: M.S. thesis, Montana State University, Bozeman, Montana.

Meyer, G.A., and Locke, W.W., 1986, Origin and deformation of Holocene shoreline terraces, Yellowstone Lake, Wyoming: Geology, v. 14, p. 699-702.

45. Olson, T.J., and Schmitt, J.G., Sedimentary evolution of the Miocene-Pliocene Camp Davis basin: study in progress (1987).

Detailed lithofacies and provenance analysis are being combined to provide new interpretations of the depositional environment of the Camp Davis Formation.

46. Schmidt, J.G., Processes of alluvial fan sedimentation in Yellowstone National Park, Wyoming: study in progress (1987).

Investigation of the textures of debris flow deposits on alluvial fans along the base of Mt. Everts in Yellowstone National Park is being carried out in order to better the understanding of debris flow transport mechanisms. Dating of buried trees is being utilized to determine frequencies of debris flow events.

47. Schmitt, J.G., Sedimentology and provenance of conglomerates in the Eocene Sepulcher Formation: study in progress (1987).

Detailed facies and petrographic analysis of prevolcanic conglomerates at the base of the Eocene Absaroka Volcanic Supergroup.

48. Schmitt, J.G., Sedimentary-tectonic evolution of the Wyoming - Idaho - Utah thrust belt: study in progress (1987).

Sedimentologic and provenance studies of the Cretaceous to Eocene foredeep basin deposits will be integrated to reevaluate the history of structural development in the thrust belt.

49. Schmitt, J.G., Sedimentology of the Upper Cretaceous Little Muddy Creek Conglomerate: study in progress (1987).

Lithofacies analysis of the Little Muddy Creek Conglomerate reveals deposition in a fan-delta environment.

50. Schmitt, J.G., and Olson, T.J., Sedimentology of recent debris flows: study in progress (1987).

Detailed analysis of texture and sedimentary structures of a newly discovered modern debris flow.

New Mexico
University of New Mexico
Albuquerque, New Mexico 87131

51. Kudo, A.M., Harvey, B.A., and Colvard, E., Geochemistry of Sunlight Basin intrusions: study in progress (1986).

Geologic mapping of parts of the Beartooth Butte, Deep Lake, and Dead Indian Peak Quadrangles is completed. The study also includes whole-rock and trace element analyses with extensive electron microprobe analyses of rocks and constituent minerals. Age determination is being attempted.

Kudo, A.M., and Broxton, D.E., 1985, High-potassium intrusive rocks of the Crandall ring-dike complex, Absaroka Mountains, Wyoming: Geological Society of America Bulletin, v. 96, p. 522-528.

New York
State University of New York
Stonybrook, New York 11794

52. Lindsley, D.H., Frost, B.R., Fuhrman, M.L., Kolker, A., and Stafford, J., Petrogenesis of the Laramie anorthosite complex: study in progress (1987).

Mapping, petrography, mineral chemistry, and geochemistry of anorthosites and associated monzonite - syenite series rocks are being examined.

North Dakota
University of North Dakota
Grand Forks, North Dakota 58202

53. Karner, F.R., Halvorson, D., Jenner, G., and White, S., Geology of the Bear Lodge Mountains and Devils Tower: study in progress (1987).

This is a comprehensive geological study of the carbonitite-pyroxenite-alkalic rock intrusive and extrusive continental igneous association.

Ohio
Case Western Reserve University
Cleveland, Ohio 44106

54 Aronson, J., and Hay, R., K-Ar dating of authigenic K-feldspar in the Green River Formation, Wyoming: study in progress (1987).

Dating of authigenic K-feldspar of correlated tuffs of the Green River Formation over a wide area to (1) test its retention of Ar^{40} and (2) help establish the diagenetic history of the Green River Formation.

University of Akron
Akron, Ohio 44325

55. Burford, A.E., Beck, W.C., and Berendson, E., Structural relations of Casper Mountain, Emigrant Gap anticline, and adjacent areas: study in progress (1987).

The structure and stratigraphy of the Casper area are being studied in detail. The southwest corner of the Powder River Basin and adjacent Casper arch and Casper Mountain exhibit complex interaction of tectonic stresses. Precambrian structures are strongly overprinted by Laramide deformation. The Precambrian of Casper Mountain has been studied in detail by Gable and Burford (1982, U.S. Geological Survey Open File Report No. 82-67). Sedimentary strata of the east and west ends of Casper Mountain and the entire length of Emigrant Gap anticline have been described in detail recently. Joints, faults, and flexural relations of the sedimentary strata of the Casper Mountain south flank remain to be examined.

Beck, W.C., and Burford, A.E., 1985, Stress analysis of the Casper Mountain - Emigrant Gap anticline juncture, Natrona County, Wyoming: Wyoming Geological Association 36th Annual Field Conference Guidebook, p. 59-65.

56. Corbett, R.G., Composition of wells, springs, and seeps in the Casper Mountain area: study in progress (1987).

Wells, springs, and seeps have been sampled and analyzed for major and some minor constituents. The composition of samples, as portrayed on piper diagrams, reflects the composition of rock types. The degree of saturation with respect to pure mineral phases will be determined.

57. Corbett, R.G., Gloeckler, E., Quick, T., and Manner, B., Concretions in the Morrison Formation, Natrona County, Wyoming: study in progress (1987).

Mineralogy, morphology, and origin of two related types of concretions in a transitional sandstone near the base of the Morrison Formation comprise the study. Methodology includes statistical interpretation of field data, X-ray identification, and wet chemical analysis. Modeling of a process by which smaller pyritic concretions alter to larger goethitic concretions (with a bulls-eye appearance) will conclude the study.

Miami University
Oxford, Ohio 45056

58. Charles, E.G., A structural analysis of the Cache Peak area and the Granite syncline, Sublette County, Wyoming: M.S. thesis: study in progress (1986).

This study in two areas of the Gros Ventre Range is designed to elucidate the local Laramide structural style and events by detailed structural analysis. In the southeast quarter of the Turquoise Lake Quadrangle a structurally complex area (12 miles square) is being mapped in detail at 1:24,000 scale. Features such as cleavage, shear fractures, faults, stylolites, and other pressure solution features are being studied to determine the principal strain direction. It is hoped that twinned calcite can be used as a quantitative measure of strain associated with folds adjacent to a major fault in the area.

Microscopic strain features (calcite twins) are being examined from exposures of Madison Limestone along the Swift Creek side of the Granite Creek syncline in the Open Door area of the Granite Falls Quadrangle. It is hoped that the nature of strain between the Cache Creek and Pyramid Peak faults can be determined.

59. Fay, D.A., Structural analysis of the Crystal Peak Quadrangle, Wyoming: M.S. thesis: study in progress (1986).

The Crystal Peak Quadrangle, T.40-41N., R.110W., has been mapped at a 1:24,000 scale with emphasis on the structures surrounding the Pyramid Peak and Shoal Creek faults. Strained calcite samples from the Mississippian Madison Formation have been measured to determine local shortening and deformation style.

60. Kochan, M., The Burnt Gulch Formation, a Pliocene-Pleistocene arkose conglomerate, in the northwestern Wind River Basin, Fremont County, Wyoming: M.S. thesis: study in progress (1986).

Objectives of the project are (1) to describe, map, and determine the stratigraphic position of the tectonic arkose conglomerate that occurs on the north wall of Torrey Valley and in other valleys along the Wind River Range, and (2) to compare this conglomerate with other Cenozoic strata of the northwestern Wind River Basin.

61. Sasala, C.S., Shear zones and ductile deformation mechanisms in Precambrian rocks of the Gros Ventre Mountains: M.S. thesis: study in progress (1986).

Shear zones and ductile deformation mechanisms within Precambrian basement rocks in the Gros Ventre Mountains are being studied. Samples have been collected and are being studied macroscopically and microscopically to determine the processes by which they are deformed. This information should be helpful in clarifying the problem of Laramide tectonics.

62. Thomas, S., Structural geology of the Crystal Creek area, Gros Ventre Mountains, Wyoming: M.S. thesis: study in progress (1986).

During the summers of 1984 and 1985, a study was made of the structural geology of the area adjacent to Crystal Creek in the Gros Ventre Mountains, Wyoming. A detailed geologic map (1:24,000) of the study area was completed with cross sections. Grizzly Lake and Crystal Peak Quadrangles of the U.S. Geological Survey 7½-minute series were used as base maps. The orientation of fractures was measured along five traverses using the Azimuth Verses Traverse Distance technique. Offsets along calcite-filled fractures established some of these fractures to be shear in nature. Twinned calcite crystals from oriented limestone samples were used to determine the principle devioric strain axes (Groshong, 1972) for a portion of the fold that divides the area. A comparison is being made between the structural relationships observed in the field and the fracture and strain studies so that the nature of tectonic stresses that produced the fold (i.e. horizontal or vertical) can be inferred.

Pennsylvania
Bryn Mawr College
Bryn Mawr, Pennsylvania 19010

63. Gray, M.B., Geology and strain in parts of the Elk Valley and Snowdrift Mountain 7½-minute Quadrangles: M.S. thesis: study in progress (1986).

Mapping at a scale of 1:24,000 was done in parts of the Elk Valley and Snowdrift Mountain 7½-minute Quadrangles in order to determine the extent of deformation in the footwall area of the Meade Thrust in the Wyoming-Idaho-Utah Thrust Belt. Strain analyses are being conducted on crushed pebbles within the Cretaceous Gannett Group conglomerates.

Pennsylvania State University
University Park, Pennsylvania 16802

64. Farley, M.B., and Wing, S., Association of palynology with sedimentary environments in the lower Eocene, southern Bighorn Basin: study in progress (1986).

The occurrences of palynomorphs in lower Eocene carbonaceous nonmarine sediments are being studied to discover their association, if any, with detailed sedimentary depositional environments. The carbonaceous rocks represent two basic environments: channel fill (oxbow) lake and levee-crevasse splay. A distinctive pattern of occurrence of palynomorphs in these environments and their subenvironments is sought. These patterns, in turn, can be related to the megafossil plants from these environments, studied by Scott Wing. These combined data will be used for paleoecologic interpretation.

South Dakota
South Dakota School of Mines and Technology
Rapid City, South Dakota 57701

65. Lisenbee, A.L., and Roggenthen, W., Tertiary diatremes of the Black Hills uplift, Sundance, Wyoming - Deadwood, South Dakota: study in progress (1986).

Several breccia pipes laden with Precambrian igneous, Phanerozoic sedimentary, and Tertiary igneous xenoliths are present within the Paleocene - Eocene igneous complex of the Black Hills uplift. The present study is an attempt to explain their origin.

66. Lisenbee, A.L., and Jenkins, C., Structural evolution of the east margin of the Bighorn uplift: study in progress (1986).

This study involves tectonic analysis of the dual mechanisms of formation of the uplift to basin (Powder River) transition: a large-scale monocline on the north; complex reverse or thrust faults on the south.

67. Redden, J.A., and Rich, F., Pollen studies in an abandoned Little Missouri channel: study in progress (1986).

A core sample from a playa lake in an abandoned channel of Little Missouri River will be used for pollen studies and/or carbon dating of the capture of Little Missouri headwaters by the Belle Fourche River. Study of terrace distribution is planned to evaluate erosion rates and recent warping of the northern Black Hills.

68. Rich, F., Lisenbee, A.L., Fox, J.E., and Pish, T.A., Palynology of the Cambria coal, Lakota Formation, Weston County, Wyoming: study in progress (1986).

The purpose of the study is to identify the palynomorph assemblages of the Cambria coal, and to develop further insight into the coal's peculiar composition. Analysis of sandstones and shales may accompany this work,

and a detailed depositional system will be reconstructed, based, in part, on field mapping.

Tennessee
Memphis State University
Memphis, Tennessee 38152

69. Bieler, D.B., Projects in mapping, stratigraphy, and metamorphic petrology of the east flank of the Bighorn Mountains: work in progress (1987).

The first project involves tectonic controls on pre-Laramide stratigraphy. Detailed measured sections and mapping are being combined to make interpretations of the history of basement block movement during the Paleozoic and Lower Mesozoic. Preliminary data suggest that some faults have movement histories extending from Devonian through the Lower Cretaceous and that these faults were subsequently used during Laramide deformation.

A second project concerns the petrology of the Mesaverde Group. The focus is the sandstone petrology, clay mineralogy, and porosity development in the Parkman Sandstone and Teapot Sandstone.

Gerlock, J.L., 1985, Sedimentology and petrology of the Mesaverde Group (Upper Cretaceous), east flank, Bighorn Mountains, Wyoming: M.S. thesis.

Miller, D.C., 1985, Depositional history of the Tensleep Sandstone (Pennsylvanian), east flank, Bighorn Mountains, Wyoming: M.S. thesis.

University of Tennessee
Knoxville, Tennessee 37996

70. Woodward, N.B., Stratigraphic controls on thrust fault geometries: study in progress (1987).

Compilation has begun on stratigraphic information for critical structurally significant stratigraphic horizons, especially in the Upper Paleozoic and in the Triassic and Jurassic sections, with the goal of detailed correlations between regions of rapid structural changes and possible stratigraphic controls on those changes.

Woodward, N.B., 1986, Thrust fault geometry of the Snake River Range, Idaho and Wyoming: Geological Society of America Bulletin, v. 97, p. 178-193.

Texas
Baylor University
Waco, Texas 76703

71. Brown, W.G., Studies in structural geology: study in progress (1987).

Three students have begun M.S. work in Wyoming. One is doing a surface, subsurface, and seismic study along the Sheep Mountain, Alkali, and Goose

Egg anticlines in the Bighorn Basin. Another is doing a similar study at the up-plunge end of the Dallas-Derby line of folding on the flank of the Wind River Range. A third is doing similar work on the south flank of the Granite Mountains to the Shirley Mountains.

United Kingdom
Portsmouth Polytechnical Institute
Portsmouth, United Kingdom

72. Hall, R.P., and Hughes D.J., Composition of mafic and ultramafic intrusives: study in progress (1987).

There are various types of Proterozoic mafic and ultramafic intrusive rocks in Wyoming. They include normal tholeiitic dolerites and more magnesian noritic types which develop harzburgitic cumulates in larger intrusions. Preliminary geochemical results on 130 samples collected in 1985 demonstrate similarities between these rocks and dolerite and norite dykes in W. Greenland and N.W. Scotland, where different mantle sources have been suggested to account for the variation in basic magmatism (Hall and others, Geological Society of London Special Publication, in press). Initial microprobe analysis results show that the dolerites of Wyoming have highly complex pyroxene assemblages, as has been demonstrated in Proterozoic dolerites of Greenland (Hall and others, Journal of Petrology, 1985; Mining Magazine, 1986). The geochemical and mineralogical studies are continuing on 102 more samples collected in 1986.

Hall, R.P., Hughes, D.J., Friend, C.R.L., and Snyder, G.L., Proterozoic mantle heterogeneity: geochemical evidence from contrasting basic dykes, *in* Pharoah, T.C., Beckinsale, R.D., and Richard, D.T., editors, Geochemistry and mineralization of Proterozoic volcanic suites: Geological Society of London Special Publication, in press.

United States Government
Jet Propulsion Laboratory
Pasadena, California 91109

73. Lang, H.R., Paylor, E.D., and Conel, J.E., Multispectral analysis of sedimentary basins: study in progress (1986).

A three-year research program is proposed to evaluate the utility of remote sensing measurements for basin analysis. Using remote sensing data, stratigraphic columns and map variations in the lithology, geometry, and structure of sedimentary rocks in the Wind River/Bighorn Basin area, Wyoming, will be constructed.

Conel, J.E., Lang, H.R., and Paylor, E.D., 1985, Post-Laramide uplift and erosional history of northern Wind River Basin, Wyoming: American Association of Petroleum Geologists Bulletin, v. 69, p. 245.

Conel, J.E., Lang, H.R., Paylor, E.D., and Alley, R.E., 1985, Preliminary spectral and geological analysis of Landsat-4 Thematic Mapper Data, Wind River

Basin area, Wyoming: Institute of Electrical and Electronics Engineers, Transactions on Geoscience and Remote Sensing, v. GE-23, p. 562-573.

Lang, H.R., Paylor, E.D., and Adams, S.A., 1985, Remote stratigraphic analysis: combined TM and AIS results in the Wind River/Powder River Basins, Wyoming, *in* Vane, G., and Goetz, A.F.H., editors, Proceedings of the Airborne Imaging Spectrometer Data Analysis Workshop: Jet Propulsion Laboratory Publication 85-41, p. 32-35.

U.S. Geological Survey
Denver, Colorado 80225

74. Barker, F., Archean Wyoming Province: study in progress (1988).

75. Bown, T.M., and Rose, K.D., Bighorn Basin analysis: study in progress (1988).

This is a detailed basin analysis project dealing with the Early Tertiary history and sedimentary paleoenvironments of the Bighorn Basin, northwest Wyoming. Temporal control is obtained by establishment of an early Eocene mammalian biostratigraphy and by correlation of alluvial paleosols with modern analogues of the tropics. Currently, this project is concerned with relating different maturities of Eocene paleosols with local geographic differences on ancient floodplains in the Willwood Formation, and relating the combined paleopedology/fluvial sedimentology to mammalian evolutionary rates and mammalian paleoenvironments.

Beard, K.C., Rose, K.D., and Bown, T.M., 1986, Dental variation in the early Eocene Adapidae *Cantius* and *Copelemur* and some paleoecological implications: American Journal of Physical Anthropology, v. 69(2), p. 174.

Bown, T.M., 1985, Maturation sequence in lower Eocene alluvial paleosols, Willwood Formation, Bighorn Basin, Wyoming: Third International Fluvial Sedimentology Conference, August 7-9, 1985, Fort Collins, Colorado , Abstracts: 11.

Rose, K.D., and Bown, T.M., 1986, Gradual evolution and species discrimination in the fossil record, *in* Flanagan, K.M., and Lillegraven J.A., editors, Vertebrates, phylogeny, and philosophy: University of Wyoming Contributions to Geology Special Paper 3, p. 119-130.

Wing, S.L., and Bown, T.M., 1985, Late Paleocene-Early Eocene paleogeography of the Bighorn Basin, Wyoming: Society of Economic Paleontologists and Mineralogists Annual Midyear Meeting, Golden, Colorado, Abstracts II: 98.

76. Brown, J.L., Framework stratigraphy, chronostratigraphy, and depositional environments of the Upper Cretaceous through Lower Tertiary sequence in the Powder River Basin, Montana and Wyoming: study in progress (1988).

77. Coates, D.A., Origin of clinker and paleosols: study in progress (1988).

Late Cenozoic burning of coal beds has had a substantial role in development of landscape in the Powder River Basin. Burning coal beds bake

overlying sedimentary rock to a resistant metamorphic rock (clinker) that is left standing in relief by erosion. Fission-track ages of detrital zircons in clinker give the time of burning, as the zircons are annealed during heating. Dating of clinker allows estimates of rates of downwasting and slope retreat.

Statistical studies of structures in clinker show that structures are not random, as they appear to the eye, but are systematic and reflect the history of collapse as underlying coal was consumed by burning. This in turn allows interpretation of events during burning. Studies thus far include primarily the eastern Powder River Basin. Planned studies will include the western Powder River Basin and other western basins.

78. Denson, Norman, Tertiary geology and uranium occurrence, Powder River Basin, Wyoming and Montana: study in progress (1988).

Geologic maps (scale 1:100,000) and reports that describe the geology and heavy-mineral distribution in the Tertiary and uppermost Cretaceous rocks in the Douglas, Gillette, Sheridan, Birney, Buffalo, and Recluse 1° Quadrangles are in technical review. Regional maps showing structure contours on top of the Pierre Shale and Dakota Sandstone and an isopoch map of total coal have been completed.

79. Dolton, G.L., Methodology for resource assessment: study in progress (1986).

Field size, finding rate, and play analysis studies of the Minnelusa Formation, Powder River Basin, Wyoming and Montana, are in progress. A topical study of overpressured gas-bearing sandstones in southwestern Wyoming is also planned.

80. Dzurisin, Daniel, Physical processes in large silicic magma systems: study in progress (1988).

At Yellowstone National Park, this project will continue to: monitor contemporary crustal deformation and its relationship to other types of unrest; determine the caldera's Holocene deformation history; and develop a quantitative conceptual model to access the current balance between magmatic heating and hydrothermal cooling. A major goal of the monitoring effort is to resurvey the entire level network, which was last measured in 1977, and to establish a global Positioning System network to extend the coverage available through level and trilateration surveys. The field work is currently focused in Pelican Valley, and will pursue further the question of Holocene deformation at Yellowstone by surveying stream terraces and assessing stream responses to Holocene deformation. Repeat precise level and trilateration surveys are planned at the Yellowstone caldera.

81. Flores, R.M., Depositional environments of coal: study in progress (1988).

Field work and collection of stratigraphic and sedimentologic data in the Powder River and Raton coal basins will continue along with the preparation of cross sections, paleogeographic maps, and reports.

82. Fournier, R.O., Hydrothermal fluids: study in progress (1988).

This project will continue to oversee the operation of the stream-gaging stations and chemical-monitoring system in the Yellowstone National Park. A report interpreting the results of the first two years of operation of these systems will be prepared for publication. Interpretation of accumulated geochemical results from Yellowstone National Park, with emphasis on Norris data and chemical and hydrologic processes that have application to ore deposition, will also continue. Utilizing data supplied by the U.S. Fish and Wildlife Service, a geochemical classification of the lakes and streams in Yellowstone National park, with particular attention to hydrothermal water contribution, will be compiled.

Hot springs at Yellowstone National Park were submerged when Jackson Lake was formed by a dam; the lake has been drained for strengthening of the dam. This will provide an opportunity to sample the hot springs and to determine if those waters have chemical and isotopic similarities to the Yellowstone hydrothermal system.

83. Kent, B.H., Powder River Basin evolution: study in progress (1986).

A thin-section study of a preliminary collection of Lance sandstone samples will be completed, and statistical tests will be performed on the thin section data to determine whether or not there are different mineral assemblages indicative of different source areas within the Lance. Field excavation of a Paleocene fossil locality in the northwestern Powder River Basin, processing of samples, identification of investigations of selected drainages within the basin, and general reconnaissance of other parts of the basin will be underway. Selected geophysical logs in and around the Kaycee Quadrangle in Wyoming will be reinterpreted. The redox-zone stratigraphic occurrence along the Pine Ridge, southwestern Powder River Basin, will be mapped, and the absolute time of northern Casper arch activity, using mammalian and paleontological field data, will be determined. Regional chemical and mineralogic studies of the Wasatch and Fort Union Formations will continue (with emphasis on pyrite and sulfur content generally). These studies will include surface and subsurface stratigraphy and sedimentology of these formations in the southern part of the Powder River Basin. Structural and tectonic analyses of the southwestern and western (Bighorn) part of the basin and stratigraphic and sedimentologic studies of a Triassic and Jurassic interval along the western margin of the Powder River Basin will be initiated.

84. Kulik, D.L., Geophysical studies of Bureau of Land Management lands in Colorado, Wyoming, Idaho, Montana, and Utah: study in progress (1988).

Plotting of existing gravity and magnetic data will be completed and collection of additional field data will be initiated in the Sweetwater Canyon, Honeycombs, Cedar Mountain, Medicine Lodge, Alkali Creek, and Trapper Creek areas in Wyoming.

85. Law, B.E., Western tight gas reservoir research: study in progress (1988).

This study involves tight gas reservoirs in the Green River Basin of Wyoming as well as selected areas in Colorado and Utah. The study includes detailed petrographic analysis in the northern and eastern areas of the

Green River Basin; a resource assessment of the Pinedale anticline; and the timing of cooling events using fission-track dating.

86. Love, J.D., Geology of the Teton-Jackson Hole region, Wyoming: study in progress (1988).

The geologic map of the Grand Teton National Park has been submitted for publication. Geologic maps of the Cache Creek, Turquoise Lake, Teton Village, and Gros Ventre 7½-minute Quadrangles have been compiled and submitted for review and publication. Field work in the Lava Mountain, Togwotee Pass, and Tripod Peak 7½-minute Quadrangles is continuing.

87. Love, J.D., and Christiansen, A.C., Geologic maps for 1° x 2° quadrangles: study in progress (1988).

This is a cooperative project with the Geological Survey of Wyoming to revise and publish 1° x 2° geologic maps for the State. The Newcastle Quadrangle was published in December 1987. Work is now underway on the Gillette, Sheridan, and Torrington Quadrangles.

88. Nichols, D.J., Depositional environments and biostratigraphy, Powder River Basin: study in progress (1988).

89. Pierce, F.W., Geostatistical analysis of the coal resources of the Powder River Basin: study in progress (1988).

Coal correlations, necessary for establishing homogeneous data sets for geostatistics, are 90 percent complete for the Buffalo 1° Quadrangle. Approximately 25 percent of the stratigraphic framework for the Powder River Basin has been constructed; the remainder were completed in FY 1986. Structure contour and isopach maps of the principal coal beds in the Buffalo Quadrangle are in preparation.

90. Pierce, K.L., and Good, J.D., Age and dynamics of glaciations, Jackson Hole area, Wyoming: study in progress (1988).

With the help of Dave Love, mapping and study of the deposits and landforms formed by the Pinedale and a much larger, older glaciation will continue. With Steve Colman and Ken Parolski marine geophysical studies of the margins of Jackson Lake indicate 8-10 submerged paleoshorelines thought to have formed by downdropping of the west side of the lake basin on the Teton fault. With Melissa Connor and associates, the surficial geologic setting of eight archaeological sites in the area covered by the Jackson Lake Reservoir was studied. Next summer's work will concentrate on the Snake River delta area (including the Lawrence site). There, in addition to work on surficial archaeological materials with Melissa Connor, work will coordinate with George Frison and associates searching for buried paleo-Indian material in fine-grained, postglacial alluvial deposits.

Pierce, K.L., and Good, J.D., 1986, Quaternary geologic setting of archaeological sites, Jackson Lake, Wyoming: 44th Annual Plains Conference, Program and Abstracts, p. 50.

Pierce, K.L., and Scott, W.E., 1986, Migration of faulting along and outward from the track of thermo-volcanic activity in the eastern Snake River Plain region during the last 15 m.y.: American Geophysical Union Transactions, v. 64, no. 44, p. 1225.

Pierce, K.L., and Good, J.G., Quaternary geologic setting of archaeological sites, Jackson Lake, Wyoming: an interim administrative report concerned mostly with the Lawrence site (sent May, 1986, to Midwest Archaeological Center, Lincoln, Nebraska).

Pierce, K.L., 1986, *in* Loucke, W.W., editor, Quaternary evolution of the Yellowstone region: Friends of the Pleistocene, Rocky Mountain Cell, much of the Roadlog on Day One, p. 1-39, and Day Three, p. 63-83.

91. Reynolds, R.L., Source of magnetic anomalies over hydrocarbon deposits: study in progress (1986).

Causes of the pervasive magnetic overprint in the Preuss Formation in the Idaho-Wyoming-Utah thrust belt will be investigated. Rock magnetic properties, including magnetic strain parameters, and temperature constraints (from vitrinite reflectance and conodont alteration) will be determined and used to formulate a model of remagnetization. Diagenetic study of the Preuss Formation will be completed.

Studies of the magnetic properties of authigenic Fe-bearing minerals will continue to permit magnetic modeling of rocks that contain these minerals. Such minerals include pyrrhotite (from the cap rocks of a Louisiana salt dome and from the Green River Basin) and siderite (iron carbonate), which has a high magnetization of unknown origin.

92. Richmond, G.M., Glacial and Tertiary geology in the Wind River Range and adjacent Green River Basin: study in progress (1986).

This project has been in existence for many years. The glacial geology for thirty-nine 7½-minute quadrangles in the Wind River Range has been mapped. These are now being compiled in groups of four for publication at a scale of 1:48,000. They show the extent of the Illinoian and Wisconsinian ice cap on the uplands and of the tongues that extended from the cap to form the large piedmont glacier in the upper Green River Basin.

The Tertiary geology of the following 7½-minute quadrangles has been mapped with N.M. Denson: Mesa Spring, Two Buttes Reservoir, Boulder, Fremont Butte, Gobblers Knob, Square Top, Leckie, Leckie SW, Jensen Meadows, Leckie Reservoir, Prospect Mountains, and Halls Meadow Springs. The Tertiary alluvial and lacustrine formations are shown in considerable detail as well as their relationship to normal faults of late Tertiary or early Quaternary age. Dated volcanic ash deposits provide some specific age control.

93. Roehler, H.W., Green River Basin framework: study in progress (1986).

Regional surface and subsurface cross sections of the coal-bearing Fort Union and Lance Formations will be constructed along the eastern margin of

the greater Green River Basin. These cross sections will identify, correlate, and display thicknesses of coal beds. A regional surface and subsurface study of the Almond Formation will be undertaken along the eastern margins of the Great Divide and Washakie Basins. Reconnaissance of the area indicates that the continental Almond Formation is nearly 800 feet thick and coal-bearing to the south, but the formation completely wedges out in marine shales of the Lewis Formation to the north. Basinwide structure and isopach maps will be prepared for the Ericson-Pine Ridge-Teapot Sandstone. Investigations of cyclic deposition of coal in paralic Cretaceous rocks will continue. These cycles result from the alternate saltwater flooding and freshwater infilling of coastal bays. Investigations of the distribution of heavy-mineral placer deposits along a strand-plain shoreline in the Upper Cretaceous McCourt Tongue of the Rock Springs Formation will also continue. The deposits occur in six depositional settings, primarily as a result of pronounced southwest directed longshore currents. Entire Eocene sections have been measured and described for surface rocks in the Green River and Washakie Basins west and east of the Rock Springs uplift. The stratigraphy of the Wasatch, Green River, and Bridger Formations in these sections will be correlated and stratigraphic nomenclature problems will be resolved.

94. Sandberg, C.A., Application of conodonts to sedimentary processes: study in progress (1986).

The purpose of the project is to investigate the direct applications of conodont biostratigraphy to sedimentary processes and to analyze middle Paleozoic rocks in sedimentary basins throughout the United States. Effort will be concentrated primarily on Devonian and Mississippian rocks of the Powder River, Uinta-Piceance, and San Juan Basins and secondarily on the Anadarko and Central Appalachian Basins or other basins of interest to the Evaluation of Sedimentary Basins (ESB) Program. Isopach and paleotectonic maps will be compiled and interpreted; measuring and describing sections and collecting bulk conodont samples are also planned.

95. Schenk, C.J., Geological characteristics of enhanced oil recovery reservoirs: study in progress (1986).

The sedimentology, diagenesis, and geochemistry of Cretaceous shelf sandstones and late Paleozoic sandstones of the Powder River Basin, Wyoming, will be characterized to provide a geologic data base for future enhanced oil recovery projects.

96. Seeland, D.A., Stratigraphic analysis of Tertiary basins: study in progress (1986).

A report on the early Eocene paleogeography of the Bighorn Basin is being prepared. Study of electric logs of Tertiary rocks in the Kaycee area of the southwestern Powder River Basin will continue; stratigraphic cross sections and isolith maps will be prepared, and uranium and coal occurrences will be related to lithologic patterns as interpreted from log and outcrop studies. A cooperative stratigraphic-sedimentologic study of the Tertiary rocks of the Powder River Basin will be initiated with geologists of the Energy Minerals, Coal, and Oil and Gas branches.

97. Snyder, G.L., Southwest continental core, Wyoming: study in progress (1988).

Field work has been completed in the Spanish Mines and Q-Ranch 7½-minute Quadrangles. Geologic maps of the Seminoe Dam, Reese Mountain, Hightower SW, Fletcher Park, and Johnson Mountain Quadrangles and a professional paper on the Hartville uplift, with geologic map, are being prepared for review and publication.

98. Stanton, R.W., Black Thunder coal study: study in progress (1988).

This multidisciplinary project addresses physical and biological processes that have influenced the character and distribution of thick coal deposits in the Tongue River Member of the Fort Union Formation in eastern Wyoming.

The study integrates stratigraphic, coal petrologic, geochemical, and palynological data to provide a more complete understanding of peat accumulation and coal deposition, particularly in the Wyodak-Anderson coal bed and its correlatives elsewhere in the basin. Variations in fluvial activity and modes of peat deposition will be evaluated in terms of paleoclimatic and/or tectonic changes which may have both local and regional import.

99. Stuckless, J.S., Uranium granite source rocks, Wyoming and Utah: study in progress (1988).

100. Toth, Margo, Resource appraisal, Wyoming: study in progress (1988).

This study involves appraisal of mineral resources on BLM lands. It includes geologic mapping of parts of the following 7½-minute quadrangles: Alkali Creek, Medicine Lodge, Trapper Creek, Cedar Mountain, Honeycombs, McCullough Peaks, Sweetwater Canyon, Bobcat Draw, Encampment River, Prospect Mountain, and Owl Creek.

Utah
Utah State University
Logan, Utah 84322

101. McCalpin, J., Geologic hazard inventory mapping: study in progress (1986).

Slope failures are being mapped on 270,000 acres of the Bridger-Teton National Forest for the U.S. Forest Service. Photogeologic mapping on 1:15,840 air photos was transferred to 1:24,000 topographic bases or orthophotoquads.

102. Rice, J.B., Jr., Spatial and temporal landslide distribution and hazard evaluation analyzed by photogeologic mapping and relative-dating techniques, Salt River Range, Wyoming: M.S. thesis: study in progress (1987).

The distribution of landslide types and ages was analyzed to determine the causes and timing of landsliding and to assess landslide hazards in the

study area. 1,174 landslides and zones of landsliding were mapped on 1:15,840-scale air photos and given symbols designating their style of movement and age. Slides were assigned to one of four age classes based on their degree of morphologic modification visible on air photos. Relative dating (RD) methods previously applied to glacial deposits were used to refine and calibrate the age classification.

Landslides account for 15 percent and 10 percent respectively of the outcrop areas of the Paleozoic and Triassic-Jurassic sections. Slump flows and debris flows dominate sliding in both sections, with minor numbers of rock slides present. Debris flows pose the greatest hazard in both sections. Fine-grained stratigraphic units have the highest landslide densities in both sections. The previous event locations define areas susceptible to future sliding.

Washington
Yakima Valley College
Yakima, Washington 98907

103. Campbell, N., Caves and fossil karst of northwestern Wyoming: study in progress (1986).

This is an ongoing study of caves in the Bighorn and Teton Mountains. It includes the study of exhumed karst in Mississippian carbonates and mapping and hydrology of caves in each area.

Wisconsin
University of Wisconsin - Eau Claire
Eau Claire, Wisconsin 54701

104. Myers, P.E., Geology and chemistry of obsidian in the southern Tetons and northern Snake River Range: study in progress (1986).

University of Wisconsin - Madison
Madison, Wisconsin 53706

105. Decker, P.L., and Craddock, C., Detachment structures in the Greybull River - South Fork Shoshone area, Absaroka Range: study in progress (1987).

This study will focus on the origin of a group of displaced masses of Eocene volcanic rocks which rest on various volcanic and volcaniclastic units in the Absaroka volcanic series. These transported masses occur in the upper drainages of the Greybull and Wood Rivers west and southwest of Meeteetse, Wyoming, and the drainage of the South Fork of the Shoshone River southwest of Cody, Wyoming. The purposes of the study are to reveal the structural geometries of upper and lower plate rocks, to identify positively the stratigraphic units involved with respect to the modern stratigraphic nomenclature of the Absaroka province, to decide whether these displaced masses were transported as a formerly continuous allochthon or were emplaced separately, to constrain the timing and duration of the

event(s), and to identify transport directions, mechansims of emplacement, and factors which may have initiated detachment.

Field study will include detailed mapping and observation of the detachment surface(s), upper and lower plate units, and rock units of adjacent areas. This will be followed by laboratory research involving fabric studies, petrographic work, and perhaps radiometric dating and chemical analyses. While the principal emphasis of the investigation will remain on structural geometry, kinematics, and timing, mechanical modeling of these structures based on field relationships, laboratory findings, and published data on the physical properties of such rocks will also be attempted.

University of Wisconsin - Milwaukee
Milwaukee, Wisconsin 53201

106. Paull, R.A., and Paull, R.K., Conodont biostratigraphy of the Lower Triassic Dinwoody Formation: study in progress (1988).

This is an ongoing biostratigraphic study of the Lower Triassic Dinwoody Formation in the Western Cordillera utilizing conodonts for detailed zonation to facilitate sedimentological analysis. An aspect of this work involves an evaluation of the Permian-Triassic unconformity and the rate and pattern of transgressions and regressions during the Early Triassic.

Paull, R.A., and Paull, R.K., 1986, Depositional history of Lower Triassic Dinwoody Formation, Bighorn Basin, Wyoming, and Montana, *in* Geology of the Beartooth uplift and adjacent basins: Montana Geological Society and Yellowstone Bighorn Research Association Joint Field Conference and Symposium, p. 13-25.

Paull, R.K., and Paull, R.A., 1986, Epilogue for the Permian in the western Cordillera - a retrospective view from the Triassic: University of Wyoming Contributions to Geology, v. 24, no. 2, p. 243-252.

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107. Case, J.C., Landslides in Wyoming: study in progress (1988).

The Geologic Hazards Division is currently working on a landslide inventory for the State of Wyoming. The project is funded through the U.S. Geological Survey Landslide Hazard Reduction Program. All existing information on landslides in the State has been compiled and used as a guide to flag areas that need additional mapping. Nearly all compiled information will be checked on aerial photographs, and some will be checked on the ground. Detailed mapping is being conducted in Uinta, Lincoln, Teton, Park, Sublette, and Fremont Counties, as the compilations have indicated that those areas have the highest incidence of slope instability in the State. A map showing landslides and landslide occurrence zones will be available in 1988.

108. Case, J.C., Geological hazards mapping in Wyoming: study in progress (1988).

Numerous geologic hazards other than landslides are being mapped or investigated in Wyoming. Much historic data on earthquakes has been compiled, as has information on active faults. All suspected active faults in the State will be examined on aerial photographs in 1988, with emphasis on faults in Lincoln, Sweetwater, and Uinta Counties. It is expected that some of the faults will be trenched in an attempt to estimate how often movement has occurred.

Naturally occurring toxic elements are also under investigation. Information is being compiled on radon and its decay products. The Division is participating in a radon monitoring program for the State. Selenium is another element under investigation. Most available information has been collected on the occurrence of selenium in Wyoming. A reconnaissance-level selenium sampling program may begin in portions of the State in 1988.

Information on shrinking-swelling clays is being compiled. Where possible, both geologic and soils information is included in the compilation.

Case, J.C., and Cannia, J.C., 1986, Planning-guide map for radon studies in Wyoming: Geological Survey of Wyoming Open File Report 86-18, one sheet, scale 1:500,000.

Case, J.C., 1986, Earthquakes and related geologic hazards in Wyoming: Geological Survey of Wyoming Public Information Circular 26, 22 p.

Case, J.C., and Cannia, J.C., 1988, Guide to potentially seleniferous areas in Wyoming: Geological Survey of Wyoming Open File Report 88-1.

109. DeBruin, R.H., Oil and gas resources in the Powder River Basin, Wyoming: study in progress (1988).

A high percentage of oil exploration in the state in the past ten years has taken place in the Powder River Basin. This project will show geographic extent of oil and gas production, will describe the stratigraphic framework of the reservoir rocks, and will derive estimated resources in the basin. The project is being funded in part by the U.S. Geological Survey's Branch of Sedimentary Processes (Evolution of Sedimentary Basins Program).

110. Harris, R.E., and King, J.K., Ongoing projects of the Industrial Minerals and Uranium Division (1988).

Background gamma-radiation in Wyoming.

Field measurements on the background gamma radiation for each mappable rock unit in the State are being compiled on 1:250,000 topographic quadrangles. The Torrington, Cheyenne, and Newcastle Quadrangles are completed; Ashton and Casper Quadrangles are nearing completion. After all 16 maps covering the State are complete, a 1:500,000-scale map and explanation will be prepared.

Harris, R.E., 1985, Background gamma radiation of the Torrington 1° x 2° Quadrangle, Wyoming and Nebraska: Geological Survey of Wyoming Open File Report 85-9, 20 p., 2 sheets, scale 1:250,000.

Wyoming bentonite.

Bentonite throughout the State is being sampled and studied for variability in chemical, mineralogical, and rheological properties. The southern quarter of Wyoming has been sampled.

Uranium resources of Wyoming.

Information of Wyoming's uranium occurrences and production statistics are being compiled.

Nonconformity-related uranium in Wyoming.

The Precambrian-Phanerozoic nonconformity in Wyoming is being studied to determine its favorability for nonconformity-related (Australian- and Canadian-type) uranium deposits.

Nonmetallic mineral resources of Wyoming.

The Division is compiling and collecting information on industrial minerals in Wyoming. Interim data is being published as Open File Reports. Reports on sulfur, diatomite, pumice, sinter, ballast, potash, alum, epsomite, clay (excluding bentonite), columbium, and tantalum have been completed. A report on rare earth elements is complete. Reports on silica and fluorite are underway.

Harris, R.E., and King, J.K., 1986, Sulfur resources of Wyoming: Geological Survey of Wyoming Open File Report 86-15, 13 p.

Harris, R.E., and King, J.K., 1986, Diatomite (diatomaceous earth) in Wyoming: Geological Survey of Wyoming Open File Report 86-16, 7 p.

Harris, R.E., and King, J.K., 1986, Pumice, scoria, and pumicite in Wyoming: Geological Survey of Wyoming Open File Report 86-17, 19 p.

Harris, R.E., and King, J.K., 1986, Sinter (including travertine) resources of Wyoming: Geological Survey of Wyoming Open File Report 86-20, 15 p.

Harris, R.E., 1986, Ballast in Wyoming: Geological Survey of Wyoming Open File Report 86-22, 18 p.

Harris, R.E., 1986, Potash resources of Wyoming: Geological Survey of Wyoming Open File Report 86-23, 8 p.

Harris, R.E., and King, J.K., 1986, Alum minerals in Wyoming: Geological Survey of Wyoming Open File Report 86-24, 9 p.

Harris, R.E., 1987, Geology and economic potential of a high-calcium limestone and dolomitic limestone deposit near Manville, Niobrara County, Wyoming: Geological Survey of Wyoming Report of Investigations 39.

Harris, R.E., 1987, Epsomite (magnesium sulfate) in Wyoming: Geological Survey of Wyoming Open File Report 87-2, 7 p.

Harris, R.E., and King, J.K., 1987, Clay resources of Wyoming (excluding bentonite and Fuller's earth): Geological Survey of Wyoming Open File Report 87-3, 26 p.

Harris, R.E., and King, J.K., 1987, Columbium (niobium) and tantalum in Wyoming: Geological Survey of Wyoming Open File Report 87-6, 21 p.

King, J.K., and Harris, R.E., 1987, Rare earth elements and yttrium in Wyoming: Geological Survey of Wyoming Open File Report 87-8, 43 p.

111. Hausel, W.D., Economic geology, geochemistry, and petrology of South Pass greenstone belt: study in progress (1988).

This project will result in a study of Archean gold mineralization, wall rock alteration, structure, petrology, and regional geology of the South Pass granite-greenstone terrain. 1:24,000-scale maps (Anderson Ridge, Halls Creek Meadow, Louis Lake, South Pass City, Atlantic City, Miners Delight, Radium Springs, and Lewiston Lakes) will be completed and compiled into a 1:50,000 scale regional map. Historic gold mines are being mapped at a 1:240 scale.

Hausel, W.D., 1985, Geology and gold mineralization of the South Pass granite-greenstone terrain, western Wyoming (with a discussion on supracrustal rocks of the Wyoming Province of eastern Idaho, northern Utah, and Wyoming): Utah Geological Association Publication 14, p. 183-192.

Hausel, W.D., 1986, Preliminary report on the geology and gold mineralization of the South Pass greenstone belt, Wind River Mountains, Wyoming: Society of Mining Engineers of AIME Preprint 86-15, 10 p.

Hausel, W.D., 1986, Preliminary geologic map of the Lewiston gold district, Radium Springs Quadrangle, Fremont County, Wyoming: Geological Survey of Wyoming Open File Report 86-25, scale 1:24,000.

Hausel, W.D., 1986, Preliminary report on the geology and gold mineralization of the South Pass granite-greenstone terrain, Wind River Mountains, Wyoming (USA), *in* DeWitt, M.J. and Ashwal, L.D. (editors), Tectonic evolution of greenstone belts, Lunar and Planetary Institute Technical Report 86-10, p. 114-115.

Hausel, W.D., 1986, Preliminary geologic map of the Anderson Ridge Quadrangle, Fremont County, Wyoming: Geological Survey of Wyoming Open File Report 86-26, scale 1:24,000.

Hausel, W.D., 1987, Preliminary report on gold mineralization, petrology, and geochemistry of the South Pass granite-greenstone belt, Wind River Mountains, Wyoming: Wyoming Geological Association 38th Annual Field Conference Guidebook, p. 287-304, 1 plate (scale 1:100,000).

Hausel, W.D., 1987, Structural control of gold deposits in the South Pass greenstone belt, Wind River Mountains, western Wyoming (USA), *in* Abstracts for

the North American Conference on Tectonic Control of ore deposits and the vertical and horizontal extent of ore systems: University of Missouri-Rolla, October 6-8, p. 30.

Hausel, W.D., 1987, Revised geologic map of the Miners Delight Quadrangle, Fremont County, Wyoming: Geological Survey of Wyoming Open File Report 87-10, scale 1:24,000.

Hausel, W.D., 1988, Revised geologic map of the South Pass City Quadrangle, Fremont County, Wyoming: Geological Survey of Wyoming Open File Report 88-2, scale 1:24,000.

Hausel, W.D., 1988, Geologic map of the Lewiston Lake Quadrangle, Fremont County, Wyoming: Geological Survey of Wyoming Open File Report 88-3, scale 1:24,000.

Hausel, W.D., 1988, Structural control of gold deposits in the South Pass granite-greenstone belt, Wind River Mountains, Wyoming, *in* Proceedings of the North American Conference on tectonic control of ore deposits and the vertical and horizontal extent of ore systems, 6 p., in press.

Hausel, W.D., 1988, Archean gold mineralization within the South Pass greenstone terrain, Wyoming, *in* V. Hollister (editor), Case histories of gold deposits related to exhalites: Society of Mining Engineers of AIME, in press.

112. Hausel, W.D., and Sutherland, W., Exploration for diamondiferous kimberlitic and related rocks: study in progress (1988).

    Stream sediment samples are being collected to search for kimberlite indicator minerals. Over 100 anomalous samples have been collected to date in the Laramie Range and Green River Basin.

113. Hausel, W.D., Precious metal resources of Wyoming: study in progress (1988).

    Wyoming has hundreds of precious metal anomalies, deposits, and mines for which there is little known. In this project these occurrences will be identified, described, mapped, sampled, and researched. Gold for example, is found in hypothermal lode and related placers in Wyoming's Precambrian exposures, as epithermal deposits associated with Tertiary volcanics, and as unexplained anomalies in the basin's sediments.

Albert, K.G., 1986, Reported gold concentrations in sediment samples from U.S. Department of Energy's National Uranium Resources Evaluation (NURE) Reports: Geological Survey of Wyoming Open File Report 86-4, scale 1:1,000,000.

Hausel, W.D., 1988, The geology of Wyoming's precious metal lode and placer deposits: Geological Survey of Wyoming Bulletin 68, in progress.

114. Hausel, W.D., Strategic mineral resources of Wyoming: study in progress (1988).

    Undoubtedly, one of the more diverse assemblages of strategic mineral resources occur in Wyoming. An ongoing project to catalog, sample, and map

these deposits will lead to a better understanding of the State's resources.

Hausel, W.D., 1987, The geology and occurrence of critical strategic metals (chromium, cobalt, manganese, and platinum) in Wyoming: Geological Survey of Wyoming Open File Report 87-7, 34 p.

115. Jones, R.W., Coal resources in the Powder River Basin, Wyoming: study in progress (1988).

The Powder River Basin is one of the largest coal-producing regions in the United States. This project will summarize, in map form, the major coal deposits in the basin, current coal production activity, transportation networks, and known coal resources. Outcrops of major coal beds, overburden limits, and known geographic extent of these beds will be shown. The project is being funded, in part, by the U.S. Geological Survey's Branch of Sedimentary Processes, Evolution of Sedimentary Basins Program.

116. Jones, R.W., and Hogle, D.G., Stratigraphic framework and coal resources of the Wind River and Bighorn Basins, Wyoming: study in progress (1988).

The Coal Division is compiling all surface and subsurface data on coal and coal-bearing rocks in these two basins and entering the data into the U.S. Geological Survey's National Coal Resources Data System (NCRDS). Maps at 1:100,000 scale are being prepared to show lateral and vertical distribution of coal beds, stratigraphic relationships of coal-bearing formations, coal quality information where available, and coal resources. Additional geologic framework studies are presented on 1:250,000 scale maps. Funding for the project is provided, in part, by a cooperative agreement and grant with the U.S. Geological Survey, Branch of Coal Resources.

117. Jones, R.W., Results of coal drilling projects in Wyoming: study in progress (1988).

The Coal Division, in cooperation with the U.S. Bureau of Land Management (BLM) is compiling and publishing drill hole and analytical data from previously unpublished coal exploration projects in Wyoming. Most of the data is on Federally-owned coal and was generated through Federally-funded projects. A series of open file reports for coal drilling projects in each BLM district in Wyoming will be published during the five-year study. Funding is provided, in part, by the BLM, Wyoming State Office.

118. VerPloeg, A.J., and Greer, P.L., Geologic mapping of the southeastern flank of the Bighorn Mountains, Johnson, Natrona, and Washakie Counties, Wyoming: study in progress (1988).

The southeastern flank of the Bighorn Mountains was last mapped by Darton in 1906 at a scale of 1:250,000. The area represents a major recharge area for Paleozoic aquifers and has potential for shallow oil or tar sand occurrences. This project, funded by the U.S. Geological Survey COGEOMAP program, proposes to map a total of twenty 7½-minute quadrangles in the

area west of Kaycee, Wyoming. Five quadrangles have now been completed. The Poker Butte and Turk Springs Quadrangles will be mapped in 1988.

VerPloeg, A.J., and Greer, P.L., 1987, Preliminary geologic map of the Mayoworth Quadrangle, Johnson County, Wyoming: Geological Survey of Wyoming Open File Report 87-4, 2 sheets, scale 1:24,000.

VerPloeg, A.J., and Greer, P.L., 1987, Preliminary geologic map of the Red Fork Powder River Quadrangle, Johnson County, Wyoming: Geological Survey of Wyoming Open File Report 87-5, 2 sheets, scale 1:24,000.

VerPloeg, A.J., DeBruin, R.H., and Greer, P.L., 1988, Preliminary geologic map of the Barnum Quadrangle, Johnson County, Wyoming: Geological Survey of Wyoming Open File Report 88-5, 1 sheet, scale 1:24,000.

VerPloeg, A.J., DeBruin, R.H., and Greer, P.L., 1988, Preliminary geologic map of the Fraker Mountain Quadrangle, Johnson County, Wyoming: Geological Survey of Wyoming Open File Report 88-4, 1 sheet, scale 1:24,000.

VerPloeg, A.J., and Greer, P.L., 1988, Preliminary geologic map of the Tabletop Quadrangle, Washakie and Johnson Counties, Wyoming: Geological Survey of Wyoming Open File Report 88-6, 1 sheet, scale 1:24,000.

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119. Angevine, C.L., and Babits, S., Isostatic compensation of the Laramide uplifts of Wyoming: study in progress (1987).

The mechanism of isostatic compensation of several Laramide basement uplifts in the Wyoming foreland province is under study. Free air gravity anomalies over the uplifts and adjacent sedimentary basins show the uplifts to be undercompensated and the basins to be overcompensated. Given the short wavelength of the uplifts, it is likely that the uplifts are regionally compensated by flexure of the lithosphere.

120. Angevine, C.L., and Flanagan, K., Epeirogenic uplift of the Wyoming province: study in progress (1987).

This is an investigation of the timing and magnitude of the post-Laramide uplift of the Wyoming province. Backstripping techniques are employed to determine paleo-sea level. By comparison with extant sea level curves, the magnitude of the uplift is determined. Assuming that subcrustal thermal processes are responsible for this uplift, some constraints on timing of the uplift are obtained.

121. Chronic, L.M., Faunal patterns across two trilobite extinctions: M.S.thesis: study in progress (1987).

122. Davidson, J.R., Stratigraphy and mammalian paleontology of Cooper Lake Basin: M.S. thesis: study in progress (1986).

This project is primarily designed to provide a description of previously undescribed mammalian faunas from the Cooper Lake Basin area. These faunas, from the Wind River Formation of the Laramie Basin, will be correlated with other Early Eocene faunas. The number of taxa represented in the faunas have nearly doubled since the faunal list was first published by Princhinello (1971). Interesting additions include multituberculates, insectivores, and aptiodactyls.

123. Fountain, D.M., Gorham, J., Minnich, G., and Burke, M., Seismic properties of rocks from the Wind River Range: study in progress (1986).

The project involves measurement of seismic properties of Wind River Range rocks at high pressures to examine the nature of reflectivity of the Archean crust.

124. Frost, C.D., and Frost, B.R., Archean geology of the northern Wind River Range: study in progress (1987).

We are working to establish the sequence of Archean events which produced the crust in this part of the Wyoming province. The project includes detailed mapping, characterization of metamorphic conditions during at least two high grade metamorphic events, and isotopic dating of Late Archean granites.

Koesterer, M.E., 1986, Archean history of the Medina Mountain area, Wind River Range: M.S. thesis, University of Wyoming, Laramie, Wyoming, 99 p.

125. Harris, M.T., Geobotanical association of sedimentary rocks, Deadman Butte area, southern Bighorn Mountains: M.S. thesis: study in progress (1987).

This is an examination of the vegetation communities and their association with recognized formations and lithologic units occurring on the flank of the Bighorn Mountains. The study attempts to identify those botanical variations that might influence the spectral response of these units.

126. Heasler, H.P., Preliminary numerical analysis of the thermal regime south of Yellowstone National Park in Jackson Hole, Wyoming: study in progress (1987).

The primary purpose of the study is to investigate the possibility of high temperature (greater than 150°C) heat sources in the general area of Jackson Hole. This will be accomplished through finite difference numerical modeling of conductive and convective heat transport. Constraints for the computer model will be from existing hydrologic, thermal, and geologic data.

127. Heller, P.L., Paola, C., Angevine, C.L., Frerichs, W.E., and Winslow, N.S., Tectonics versus sea level in the Cretaceous of the western interior: study in progress (1987).

This study centers on the relationship between thrusting in the Sevier orogenic belt, eustatic fluctuations, and sedimentation in the western interior during Cretaceous time. The first part of this project concerns

the tectonic significance of widespread Lower Cretaceous gravels across the western interior. The second part is concerned with developing techniques to tell if the origin of Cretaceous delta formation in Wyoming and Utah was caused by thrusting events in the Sevier belt or sea level changes.

Heller, P.L., Bowdler, S.S., Chambers, H.P., Coogan, J.C., Hagen, E.S., Shuster, M.W., Winslow, N.S., and Lawton, T.F., 1986, Time of initial thrusting in the Sevier orogenic belt, Idaho, Wyoming, and Utah: Geology, v. 14, p. 388-391.

Winslow, N.S., 1986, Timing and tectonic significance of Upper Jurassic and Lower Cretaceous nonmarine sediments, Bighorn Basin, Wyoming and Montana: M.S. thesis, University of Wyoming, Laramie, Wyoming, 131 p.

Winslow, N.S., and Heller, P.L., 1987, Evaluation of unconformities in Upper Jurassic and Lower Cretaceous nonmarine deposits, Bighorn Basin, Wyoming and Montana, U.S.A.: Sedimentary Geology, v. 53, p. 181-202.

128. LeFebre, G., Subsidence and tectonic development of the Hanna Basin, Wyoming: Ph.D. dissertation: study in progress (1988).

129. McElhaney, D.A., Depositional environments and provenance of the Tertiary Ferris and Hanna Formations, Hanna Basin, southeastern Wyoming: M.S. thesis: study in progress (1988).

130. Marlatt, G., Lithologic discrimination of a body of mafic rocks in the Laramie Range, southeastern Wyoming: M.S. thesis: study in progress (1988).

    This is a project to produce a map of a 55-square-mile body of metavolcanic and metasedimentary rocks of Proterozoic age in the Laramie Range. Includes whole rock analysis, petrography, structural analysis, and a probable genesis of the area. Mapping on a scale of 1:24,000 includes parts of the Granite, Hecla, and Sherman Mountains Quadrangles.

131. Marlatt, G., Organically mediated gold deposits in Wyoming basins: study in progress (1988).

    The project is concerned with establishing boundaries of gold anomalies within Wyoming basins and determining if the genesis is chemical in nature. Results so far indicate that they are and that they represent a new and wholly unrecognized and undescribed class of ore body. The project has been underway for two years utilizing a mobile geochemical field lab sample analysis.

132. Marlatt, G., and Surdam, R.C., Black water as a possible fossil diagenetic fluid: study in progress (1988).

    The project will attempt to correlate chemical analyses of "black water" (organic-rich trona brines) with bench test results of metal solubilities in various organic acids. Results may be used to explain a large surface gold anomaly within the Green River Basin.

133. Marrs, R.W., Analysis of the tectonic framework of the Bighorn Basin: study in progress (1986).

Landsat imagery of the area has been interpreted, and major structural features are interpreted by statistical analysis of the image interpretation. Features identified by image analysis will be correlated with features identified from other geological data and geophysical surveys. Maps will be completed at 1:1,000,000 scale.

134. Mears, B., Jr., High level erosion surfaces: in progress (1988).

Writing is in progress in a review of proposed numbers, age, and origins of plateau-like surfaces in Wyoming Rocky Mountains.

135. Mears, B., Jr., Nonglacial geomorphic development of the Laramie Basin: study in progress (1987).

Topics include: the structural setting of the Laramie Basin, fluviatile landforms and their history, periglacial features, microtopography, and eolian depositional and erosional features. A paper is currently being edited for inclusion in the Geological Society of America Centennial Volume on nonglacial features of basins in the Rocky Mountains.

136. Mizell, S.A., Kerr, G., and Wiersma, U., Stream-aquifer interaction as a possible source of recharge to the Paleozoic aquifer along the Laramie Mountains, Laramie County, Wyoming: study in progress (1986).

This project has two objectives. First is the estimation of recharge to a regional aquifer from surface streams crossing the outcrop of the aquifer. Second is the characterization of recharge flow through fractures and joints in the aquifer. Recharge is being estimated by measurement of stream losses up and down stream of the aquifer outcrop and by monitoring shallow ground-water pressure head as an indicator of the vertical movement of water. These data have been collected routinely for about four months and suggest that up to 50 percent of the stream flow may be lost through the study reach. Field work to characterize recharge flow through fractures was initiated during the spring and summer of 1986. Techniques to be employed include mini-piezometer installation in fracture zones and detailed analysis of stream flow across individual fracture zones.

137. Myers, J.D., The Precambrian Lake Owens Mafic Complex, southeastern Wyoming: a detailed petrologic investigation of an oxide-rich, unusual, layered mafic complex: study in progress (1986).

This is a detailed petrologic study of the Lake Owens Mafic Complex (LOMC), a Precambrian body in southeastern Wyoming. This intrusion is a cup-like, layered body that has been tilted to reveal a 4.5 km thick section. Preliminary mapping indicates the body contains norite, gabbro, troctolite, and anorthosite, has isomodal, mineral- and size-graded layers, and is unmetamorphosed. The LOMC has many characteristics that set it apart from most other layered mafic bodies. In particular, it is characterized by: 1) a cyclic distribution of oxide phases in the basal and upper portion; 2) early, primary cumulus orthopyroxene and a general absence of olivine; 3) an overall leucocratic nature; and 4) a lack of extreme differentiation. Such characteristics suggest that oxides were an early crystallizing phase (i.e. at low percent solidification) and $aSiO_2$ was

high in the primary liquid. Thus, a detailed study of this body may expand our knowledge of the processes that generate layered bodies. Because of the absence of detailed geologic and geochemical data, the present proposal is designed to acquire such data and begin preliminary petrologic studies. Specific objectives include: 1) mapping the LOMC in detail; 2) obtaining basic petrographic data; 3) analyzing a representative suite of samples for bulk rock (major and trace element) compositions; and 4) acquiring microprobe data on cumulus and intracumulus minerals. These data will be used to calculate T, P, $aSiO_2$, and fO_2 of crystallization and determine how these variables changed as the magma crystallized. Due to the apparently high fO_2 and $aSiO_2$, changes in these variables may have been very different from those that accompanied crystallization of most layered intrusions (e.g. Skaergaard, Kiglapait). Indeed, the probable high fO_2 of the parental liquid suggests it may have followed a fractionation trend dominated by oxide crystallization (Osborn, 1959). If so, this body is unique among most layered bodies and volcanic suites.

138. Renner, J.M., Stratigraphic and sedimentologic significance of the Paleozoic-Mesozoic boundary, southeastern Wyoming: M.S. thesis: study in progress (1988).

139. Schmidt, K., Spectral stratigraphy of sedimentary rocks, northern Laramie Basin: M.S. thesis: study in progress (1986).

Thematic mapper imagery is used as a data base to define the spectral character of sedimentary units cropping out along the margin of the Laramie Basin. The lateral continuity of these spectral features are examined to determine the potential for using the image data to define facies contrasts.

140. Steidtmann, J.R., Laramide basement uplift and basin subsidence in the vicinity of the COCORP Wind River Seismic Profile: study in progress (1987).

Geologic studies have most commonly focused on uplifts as evidence of foreland crustal deformation, but information concerning both basement uplift and basin subsidence is necessary in order to construct a comprehensive tectonic theory for this structural style. This study will examine the spatial and temporal characteristics of uplift and subsidence in and adjacent to the southern end of the Wind River Range, Wyoming, where unparalleled geometric information is available from the COCORP seismic studies and the synorogenic sedimentary record is relatively complete.

These investigations will utilize stratigraphic analysis and mapping in conjunction with petrologic and sedimentologic studies of unroofing sequences, petrofacies, sandstone architecture, and pedogenic features in the synorogenic sediments. Information concerning source area uplift (petrologic studies) and basin stability (sedimentologic studies) will be integrated within the context of the Late Cretaceous and Tertiary time-stratigraphic framework in order to delineate the temporal and spatial character of the uplift-basin couple.

These observations will supply answers to specific questions regarding the relative motion, intermittency and duration of uplift, and subsidence

and thus provide constraints for the refinement of theories regarding mechanisms of foreland deformation.

Steidtmann, J.R., 1986, Eocene-Pliocene stratigraphy along the southern margin of the Wind River Range, Wyoming: revisions and implications from field and fission-track studies: Mountain Geologist, v. 23, p. 19-25.

Steidtmann, J.R., and Groll, P., 1986, Fluvial response to Eocene tectonism, the Bridger Formation, southern Wind River Range, Wyoming: submitted, Third International Fluvial Sedimentology volume.

Steidtmann, J.R., and Shuster, M.W., 1986, Fluvial-sandstone architecture and thrust induced subsidence, northern Green River Basin, Wyoming: submitted, Third International Fluvial Sedimentology volume.

Steidtmann, J.R., Middleton, L.T., Bottjer, R.J., Jackson, K.E., McGee, L.C., Southwell, E.H., and Lieblang, S., 1985, Geometry, distribution, and provenance of syntectonic conglomerates along the southern margin of the Wind River Range, Wyoming, *in* Peterson, J.A., editor, Paleotectonics and sedimentation in the Rocky Mountain Region, United States: American Association of Petroleum Geologists Memoir 41, 693 p.

141. Steidtmann, J.R., Origin of the Hanna Basin: study in progress (1987).

The debate as to the nature of deformation in the Rocky Mountain foreland has, of late, resolved into one of vertical vs. horizontal tectonics, although wrench faulting is still considered as important by some. Understanding the tectonic development and sedimentary fill of the Hanna Basin may be a key to understanding this basement involved deformation. Because of its small size (2,600 square kilometers), great depth (16,000 meters relief on the Precambrian) and extremely thick Upper Cretaceous through Tertiary syntectonic sedimentary fill (6,000 meters), the Hanna Basin in southeastern Wyoming is unique. Whereas the author's ongoing research has shown that the Laramide Green River Basin most likely owes its origin to tectonic loading and consequent depression of the crust by the overriding Precambrian block, the tectonic setting of the Hanna Basin provides no obvious similar explanation for either its location or great depth.

Detailed analyses of the syntectonic sedimentary fill (chronostratigraphy, depositional environments, petrology, paleocurrents, provenance and sandstone architecture) and of the tectonic setting (structural relations within the basin and along the basin margin) will be conducted. In addition, fission-track dating of apatite as an indicator of basin subsidence and uplift will be used. This information will then be used as the basis for modeling the history of basin subsidence and identifying probable causal relations. Modeling techniques will include a backstripping procedure to determine depth to basement through time; present-basin geometry profiling, which compares predicted basin configuration with present observed configuration; and sediment-thickness profiling, which relates stratigraphic thickness to coeval tectonic loading.

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142. Emry, R.J., Vertebrate paleontology and mammalian biostratigraphy of the White River Group in central and eastern Wyoming: study in progress (1986).

SUBJECT INDEX