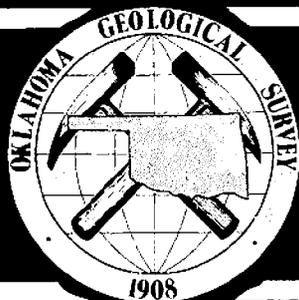




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OKLAHOMA GEOLOGY NOTES

Cover Picture

TOMBSTONE TOPOGRAPHY IN ARBUCKLE GROUP WICHITA MOUNTAINS

The cover photograph shows an outcrop of limestone beds of the McKenzie Hill Formation (Ordovician) in the middle part of the Arbuckle Group. The outcrop is north of State Highway 9, in sec. 14, T. 5 N., R. 13 W., Caddo County, Oklahoma. Limestone beds are dipping northeastward into the Anadarko basin, away from the Cambrian igneous rocks that form the core of the Wichita Mountains.

Differential weathering and erosion of alternating layers of resistant and nonresistant limestone produce the "tombstone topography" that is characteristic of parts of the Arbuckle Group in both the Wichita Mountains and the Arbuckle Mountains.

The McKenzie Hill is about 500 feet thick here, and it consists of light-gray to medium-gray calcarenites, mudstones, and intraformational conglomerates. Thin layers of chert are present in the upper part of the formation; the chert occurs as nodules and irregular masses replacing limestone. The McKenzie Hill was studied in this area by Harry E. Brookby. His master's thesis (1969), done at The University of Oklahoma, is entitled "Upper Arbuckle (Ordovician) Outcrops in the Richards Spur-Kindblade Ranch Area, Northeastern Wichita Mountains, Oklahoma."

—*Kenneth S. Johnson*

(Cover photograph by William E. Ham, 1968)

Editorial staff: William D. Rose, Rosemary Croy, Elizabeth A. Ham

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Short articles on aspects of Oklahoma geology are welcome from contributors. A set of guidelines will be forwarded on request.

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Compiled by ELIZABETH A. HAM² and WILLIAM D. ROSE²

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BIBLIOGRAPHY

1. Al-Shaieb, Zuhair, and Heine, R. R., 1974, Geochemical exploration for redbed copper deposits in north-central Oklahoma [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 94. (Reprinted in Oklahoma Geology Notes, v. 34, p. 111.)
Al-Shaieb, Zuhair, *see* Kent, D.C., Al-Shaieb, Zuhair, and Silka, Lyle
2. American Gas Association, American Petroleum Institute, and Canadian Petroleum Association, 1974, Reserves of crude oil, natural gas liquids, and natural gas in the United States and Canada and United States productive capacity as of December 31, 1973: v. 28 (June 1974), 252 p., maps, tables, charts.
American Petroleum Institute, *see* American Gas Association, American Petroleum Institute, and Canadian Petroleum Association
3. Ampian, S. G., 1974, Clays, *in* Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972: U.S. Bureau of Mines, p. 301-327.
4. Amsden, T. W., 1974, Late Ordovician and Early Silurian articulate brachiopods from Oklahoma, southwestern Illinois, and eastern Missouri: Oklahoma Geological Survey Bulletin 119, 154 p., 51 text-figs., 28 plates, 13 tables.
Annamalai, M., *see* Laguros, J. G., Kumar, Subodh, and Annamalai, M.
5. Asquith, G. B., 1974, Transverse braid bars in the Triassic sandstones of the Texas Panhandle [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 94-95. (Concerns Ouachita Mountains as source of sediments; reprinted in Oklahoma Geology Notes, v. 34, p. 112.)
6. Atkins, R. L., 1973, Oklahoma, *in* Exploration, pt. 1 of International oil and gas development: International Oil Scouts Association, v. 43, pt. 1, p. 227-238. (Discoveries and exploratory well records by county for 1972.)
7. Atkins, R. L., 1974, Oklahoma, *in* Exploration, pt. 1 of International oil and gas development: International Oil Scouts Association, v. 44, pt. 1, p. 233-244. (Discoveries and exploratory well records by county for 1973.)
8. Atkins, R. L., 1974, Oklahoma, *in* Production, United States and Canada, pt. 2 of International oil and gas development: International Oil Scouts Association, v. 43, pt. 2, p. 289-354. (Compiled from Vance Rowe Reports and Dwight's Natural Gas Well Production Histories.)

¹Includes some earlier listings.

²Oklahoma Geological Survey.

9. Aud, B. W., 1974, Abnormal pressure zones can be predicted by seismic data: *World Oil*, v. 179, no. 2, p. 37-39, 5 figs. (Includes Anadarko basin.)
10. Babitzke, H. R., 1974, Germanium, *in* *Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972*: U.S. Bureau of Mines, p. 1351-1352.
Bacskai, J. A., *see* Gregory, J. T., Bacskai, J. A., Brajnikov, B., and Munthe, K.
11. Baharloui, Abdolhossein, 1973, A comparison of the chemical composition of interstitial waters of shales and associated brines: University of Tulsa unpublished Ph.D. dissertation. (Abstract printed in *Oklahoma Geology Notes*, v. 35, p. 33, and in *Petroleum Abstracts*, v. 14, p. 327.)
12. Baker, D. R., 1974, Organic geochemistry of Cherokee Group in southeastern Kansas and northeastern Oklahoma, *in* *Origin of petroleum II: American Association of Petroleum Geologists Reprint Series No. 9*, p. 131-152, 9 figs., 7 tables. (First published in *AAPG Bulletin*, v. 46, p. 1621-1642.)
13. Baria, L. R., and Hanor, J. S., 1974, Depositional environment and early diagenesis in bedded barite deposits, southwestern Arkansas [abstract]: American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists Annual Meetings Abstracts, v. 1, p. 3-4. (Reprinted in *Petroleum Abstracts*, v. 14, p. 854.)
14. Barrett, N. D., and Thompson, J. C., 1974, A comparison of stimulation treatments in the deep Anadarko and deep Delaware basins: Society of Petroleum Engineers of American Institute of Mining Engineers Deep Drilling Symposium (Amarillo 9/8-10/74) Preprint no. SPE-5181. (Abstract printed in *Petroleum Abstracts*, v. 14, p. 1788 and p. 2091.)
15. Bennison, Allan (editor), 1973, "The Big Lime," southern margin of the Oologah Limestone banks: *Tulsa Geological Society Guidebook*, October 3, 1973, 31 p., 16 figs.
16. Bennison, A. P., 1974, Southern margin of the mid-Pennsylvanian Oologah Limestone banks, northeastern Oklahoma [abstract]: American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists Annual Meetings Abstracts, v. 1, p. 5-6. (Reprinted in *Oklahoma Geology Notes*, v. 34, p. 109, and in *Petroleum Abstracts*, v. 14, p. 865.)
17. Bennison, A. P., 1973, Southern margin of the Oologah Limestone banks, *in* "The Big Lime," southern margin of the Oologah Limestone banks: *Tulsa Geological Society Guidebook*, October 3, 1973, p. 1-2.
Bergman, D. L., *see* Bingham, R. H., Bergman, D. L., and Thomas, W. O.
Bergström, S. M., *see* Sweet, W. C., and Bergström, S. M.
Bickford, M. E., *see* Lewis, R. D., and Bickford, M. E.
18. Bifano, F. V., Guber, A. L., and Cuffey, R. J., 1974, Ostracode paleoecology in shales of the Wreford Megacyclothem (Lower Permian; Kansas and Oklahoma) [abstract]: *Geological Society of America Abstracts with Programs*, v. 6, p. 492. (Reprinted in *Oklahoma Geology Notes*, v. 34, p. 124.)

19. Bingham, R. H., Bergman, D. L., and Thomas, W. O., 1974, Flood of October 1973 in Enid and vicinity, north-central Oklahoma: U.S. Geological Survey Water Resources Investigations 27-74, 2 sheets.
20. Black, J. N. (compiler), Oklahoma Underground 1968-1974, subject index, Volume 1 through Volume 6: Oklahoma Underground, v. 6, p. 84-93.
21. Bleakley, W. B., 1974, Journal survey shows recovery projects up: Oil and Gas Journal, v. 72, no. 12, p. 69-76, 78, 2 tables.
22. Boellstorff, J. D., 1973, Tephrochronology, petrology, and stratigraphy of some Pleistocene deposits in the Central Plains, U.S.A.: Louisiana State University unpublished Ph.D. dissertation. (Abstract printed in Dissertation Abstracts International, Pt. B, v. 35, p. 891-B; abstract reprinted in Oklahoma Geology Notes, v. 34, p. 218-219.)
Boerngen, J. G., *see* Shacklette, H. T., Boerngen, J. G., and Keith, J. R.
23. Bolt, J. R., 1974, Armor of dissorophids (Amphibia, Labrynthodontia): an examination of its taxonomic use and report of a new occurrence: Journal of Paleontology, v. 48, p. 135-142, 3 figs., 1 table.
24. Bolt, J. R., 1974, Evolution and functional interpretation of some suture patterns in Paleozoic labrinthodont amphibians and other lower tetrapods: Journal of Paleontology, v. 48, p. 434-458, 16 figs.
25. Bonem, R. M., 1974, Comparison of ecology and sedimentation in Lower Pennsylvanian (Morrowan) algal-coral-bryozoan bioherms with those in modern patch reefs [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 96. (Reprinted in Oklahoma Geology Notes, v. 34, p. 112.)
26. Bonham, L. C., 1974, Geochemical investigation of crude oils, *in* Origin of petroleum II: American Association of Petroleum Geologists Reprint Series No. 9, p. 64-75, 4 figs., 6 tables. (First published in AAPG Bulletin, v. 40, p. 897-908.)
27. Borahay, A. A. H. A., 1973, Petrography, diagenesis, and environment of deposition of the Gasconade Formation, Lower Ordovician, southern Missouri: University of Missouri unpublished Ph.D. dissertation, 194 p. (Includes northeastern Oklahoma; abstract printed in Dissertation Abstracts International, Pt. B, v. 34, p. 3854-B; reprinted in Petroleum Abstracts, v. 14, p. 1525.)
28. Bowen, R. L., 1974, The enigma of Late Paleozoic orogeny in southeastern North America [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 336-337. (Includes Ardmore and Anadarko basins and Arbuckle and Ouachita Mountains; reprinted in Oklahoma Geology Notes, v. 34, p. 123.)
Bower, R. R., *see* Kidwell, A. L., and Bower, R. R.
29. Bradshaw, L. E., 1974, Ordovician conodonts from Black Knob Ridge, Oklahoma [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 494. (Reprinted in Oklahoma Geology Notes, v. 34, p. 125.)
Brajnikov, B., *see* Gregory, J. T., Bacskai, J. A., Brajnikov, B., and Munthe, K.

30. Brenkle, Paul, Lane, H. R., and Collinson, Charles, 1974, Progress toward reconciliation of Lower Mississippian conodont and foraminiferal zonations: *Geology*, v. 2, p. 433-463, 3 figs. (Refers to Moorefield Formation of northeastern Oklahoma.)
31. Briggs, T. C., 1974, Nitrogen, *in* Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972: U.S. Bureau of Mines, p. 881-896.
Brobst, D. A., *see* Pratt, W. P., and Brobst, D. A.
32. Brower, J. C., and Veinus, Julia, 1974, Middle Ordovician crinoids from southwestern Virginia and eastern Tennessee: *Bulletins of American Paleontology*, v. 66, no. 283, p. 1-125, 12 text-figs., pls. 1-13. (Refers to Oklahoma crinoids.)
33. Brown, B. C., 1974, Cement, *in* Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972: U.S. Bureau of Mines, p. 247-287.
34. Browne, R. G., and Pohl, E. R., 1973, Stratigraphy and genera of calcareous Foraminifera of the Fraileys facies (Mississippian) of central Kentucky: *Bulletins of American Paleontology*, v. 64, no. 280, p. 169-243, 6 text-figs., pls. 22-31. (Includes Oklahoma foraminifers and crinoids.)
Burman, H. R., *see* Shelton, J. W., and Burman, H. R.
Burman, H. R., *see also* Shelton, J. W., Burman, H. R., and Noble, R. L.
35. Busch, D. A., 1973, Genetic units in delta prospecting, *in* Weimer, R. J. (compiler), Sandstone reservoirs and stratigraphic concepts: American Association of Petroleum Geologists Reprint Series No. 7, p. 137-154, 24 figs., 1 table. (Includes Oklahoma examples; first published in AAPG Bulletin, v. 55, p. 1137-1154.)
36. Busch, D. A., Stratigraphic traps in sandstones—exploration techniques: American Association of Petroleum Geologists Memoir 21, 174 p., 115 figs., 4 tables, keyword index. (Includes Oklahoma examples.)
Busch, D. A., *see* Mannhard, G. W., and Busch, D. A.
37. Calkins, J. A., and Deiter, L. E., 1974, Uses of CRIB—a GIPSY-formatted mineral resources computer file [abstract]: *Geological Society of America Abstracts with Programs*, v. 6, 678-679.
Canadian Petroleum Association, *see* American Gas Association, American Petroleum Institute, and Canadian Petroleum Association.
38. Cannon, P. J., 1973, The application of radar and infrared imagery to quantitative geomorphic investigations: *Remote Sensing of Earth Resources*, v. 2, p. 503-519. (South-central Oklahoma.)
39. Cannon, P. J., 1973, Application of radar and infrared imagery to a quantitative geomorphological investigation of the Mill Creek drainage basin, south-central Oklahoma: University of Arizona unpublished Ph.D. dissertation, 230 p. (Abstract printed in *Dissertation Abstracts International*, Pt. B, v. 34, p. 3854-B, 3855-B; reprinted in *Petroleum Abstracts*, v. 14, p. 1527.)
40. Cannon, P. J., 1974, Dougherty anticline, Arbuckle Mountains: *Oklahoma Geology Notes*, v. 34, p. 45-46. (Cover photo and description.)
41. Cannon, P. J., 1973, Quantitative expressions of stream adjustment: *Geological Society of America Abstracts with Programs*, v. 5, p. 567. (South-central Oklahoma drainage basins.)

42. Cannon, P. J., 1974, Rock type discrimination using radar imagery [abstract]: Remote Sensing of Earth Resources Meeting Papers, March 1974. (Mapping of Wichita and Arbuckle Mountains; reprinted in Oklahoma Geology Notes, v. 34, p. 128-129.)
Carleton, D. A., *see* Kirby, J. G., Carleton, D. A., and Moore, B. M.
43. Cebull, S. E., and Keller, G. R., 1974, Plate tectonics and the Ouachita system in Texas, Oklahoma, and Arkansas: reply: Geological Society of America Bulletin, v. 85, p. 147-148.
44. Cebull, S. E., Keller, G. R., Shurbet, D. H., and Russell, L. R., 1974, Transform faults as explanation for offsets in the southern Appalachian-Ouachita tectonic belt [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 341-342. (Reprinted in Oklahoma Geology Notes, v. 34, p. 123-124.)
45. Chamberlain, C. K., 1973, Bathymetry and paleoecology of Ouachita geosyncline of southeastern Oklahoma as determined from trace fossils, *in* Braunstein, Jules (compiler), Paleocology: American Association of Petroleum Geologists Reprint Series No. 6, p. 242-258, 8 figs., 2 tables. (First published in AAPG Bulletin, v. 55, p. 34-50.)
46. Chamberlain, C. K., 1974, Explaining the trace-fossil community in DSDP cores [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 498. (Includes fossils from Ouachita geosyncline; reprinted in Oklahoma Geology Notes, v. 34, p. 125.)
47. Choquette, P. W., and Pray, L. C., 1972, Geologic nomenclature and classification of porosity in sedimentary carbonates, *in* Carbonate rocks II: porosity and classification of reservoir rocks: American Association of Petroleum Geologists Reprint Series No. 5, p. 154-197, 13 figs., 3 tables. (Includes McLish Formation, Oklahoma; first published in AAPG Bulletin, v. 54, p. 207-250.)
48. Chowning, J. T., 1973, A multilayer aquifer model of the Ogallala Formation in Oklahoma: National Technical Information Service PB-230 424, 56 p., 22 figs., 8 tables. (Oklahoma State University M.S. thesis.)
Christ, C. L., *see* Siebert, R. M., Hostetler, P. B., and Christ, C. L.
49. Church, S. B., 1974, Lower Ordovician patch reefs in western Utah: Brigham Young University Geology Studies, v. 21, pt. 3, p. 41-62, 8 figs., 3 pls. (Refers to Ordovician mounds in Oklahoma.)
Clark, D. L., *see* Miller, J. F., Robison, R. A., and Clark, D. L.
50. Clarke, R. G., 1974, Abrasive materials, *in* Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972: U.S. Bureau of Mines, p. 123-134.
51. Clifton, R. L., 1973, Paleocology and environments inferred for some marginal middle Permian marine strata, *in* Braunstein, Jules (compiler), Paleocology: American Association of Petroleum Geologists Reprint Series No. 6, p. 43-62, 6 figs. (Concerns Blaine and Dog Creek Formations; first published in AAPG Bulletin, v. 28, p. 1012-1031.)
52. Coal Age, 1974, 1973 shipments of mining equipment, production and productivity from various methods of mining: Coal Age, v. 79, no. 2, p. 84-86, 7 tables. (Includes data on Oklahoma.)

53. Cocks, J. M., 1974, Dissepimental corals of the Upper Pennsylvanian Missourian rocks in the American Midcontinent [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 100. (Reprinted in Oklahoma Geology Notes, v. 34, p. 113.)
54. Collins, R. J., McCowan, F. P., Stonis, L. P., and Petzel, G., 1973, An evaluation of the suitability of ERTS data for the purposes of petroleum exploration [abstract]: Government Reports Announcements, v. 73, no. 16, p. 65. (Reprinted in Petroleum Abstracts, v. 14, p. 8.)
- Collinson, Charles, *see* Brenkle, Paul, Lane, H. R., and Collinson, Charles
- Corley, R. K., *see* Thomas, W. O., Jr., and Corley, R. K.
55. Cotton, Geoffrey, 1973, The rugose coral genera: Elsevier Scientific Publishing Company, 358 p. (Includes Oklahoma genera.)
56. Craig, F. F., Jr., and Parrish, D. R., 1974, A multiplot evaluation of the COFCAW process: Journal of Petroleum Technology, v. 26, p. 659-666, 8 figs., 2 tables. (Includes pilot test in waterflooded southwest Oklahoma Priddy sand reservoir.)
57. Cramer, F. H., and Diez, Maria del Carmen R., 1974, Early Paleozoic palynomorph provinces and paleoclimate, *in* Ross, C. A., (editor), Paleogeographic provinces and provinciality: Society of Economic Paleontologists and Mineralogists Special Publication No. 21, p. 177-188, 4 figs. (Includes Oklahoma Devonian and Silurian zones.)
58. Cromwell, David, 1974, Stratigraphy and environment of deposition of the lower Dornick Hills Group (Lower Pennsylvanian), Ardmore basin, Oklahoma: University of Oklahoma unpublished M.S. thesis, 138 p. (Abstract printed in Oklahoma Geology Notes, v. 34, p. 166-167.)
59. Crow, F. R., 1974, Evaporation from brine storage reservoirs: Oklahoma Water Resources Research Institute Final Technical Completion Report, March 1, 1974, 46 p., 15 figs., 10 tables. (National Technical Information Service PB-231 187; abstract printed in Selected Water Resources Abstracts, v. 7, no. 13, p. 6.)
- Croy, R. L., *see* Ham, E. A., Croy, R. L., and Rose, W. D.
- Cuffey, R. J., *see* Bifano, F. V., Guber, A. L., and Cuffey, R. J.
60. Cullers, R. L., 1974, The rare-earth element distribution in the clay-size fraction of the Permian Havensville and Eskridge shales of Kansas and Oklahoma [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 101. (Reprinted in Oklahoma Geology Notes, v. 34, p. 113.)
61. Dahlgren, E. G., 1974, In memoriam [Willard L. Miller]: Shale Shaker, v. 24, p. 148.
62. Damberger, H. H., 1974, Coalification patterns of Pennsylvanian coal basins of the eastern United States, *in* Dutcher, R. R., Hacquebard, P. A., Schoff, J. M., and Simon, J. A. (editors), Carbonaceous materials as indicators of metamorphism: Geological Society of America Special Paper 153, p. 53-74, 14 figs. (Includes Arkoma basin and Ozark dome.)
63. Davis, H. G., 1974, High pressure Morrow-Springer gas trend, Blaine and Canadian Counties, Oklahoma: Shale Shaker, v. 24, p. 104-118, 3 data sheets, 12 figs. (Abstract printed in Petroleum Abstracts, v. 14, p. 482.)

64. Davis, H. G., and Nondorf, J. L., 1974, Morrow-Springer pressures of the Anadarko basin: Society of Petroleum Engineers of American Institute of Mining Engineers Deep Drilling Symposium (Amarillo, 9/8-10/74) Preprint no. SPE-5174, p. 59-72. (Abstract printed in Petroleum Abstracts, v. 14, p. 1783 and 2082.)
Deiter, L. E., *see* Calkins, J. A., and Deiter, L. E.
65. Dennison, J. M., 1974, Gravity tectonic model for development of junction between Appalachian and Ouachita orogenic systems [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 708. (Reprinted in Oklahoma Geology Notes, v. 34, p. 215.)
66. DeVries, R. N., and Kent, D. C., 1973, Sensitivity of groundwater flow models to vertical variability of aquifer constants: Water Resources Bulletin, v. 9, p. 998-1005, 4 figs. (Computer model for Ogallala aquifer in Oklahoma and Texas Panhandles; abstract printed in Selected Water Resources Abstracts, v. 7, no. 3, p. 39.)
67. Dickey, P. A., and Soto, Carlos, 1974, Chemical composition of deep subsurface waters of the western Anadarko basin: Society of Petroleum Engineers of American Institute of Mining Engineers Deep Drilling and Production Symposium (Amarillo 9/8-10/74) Preprint no. SPE-5178, p. 111-128. (Abstract printed in Petroleum Abstracts, v. 14, p. 1773 and 2077.)
Diez, Maria del Carmen R., *see* Cramer, F. H., and Diez, Maria del Carmen R.
68. Dingess, P. R., 1974, Geology of the Creta copper deposit of Eagle Picher Industries, Inc., Jackson County, Oklahoma [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 101. (Reprinted in Oklahoma Geology Notes, v. 34, p. 114.)
Donaldson, E. C., *see* Lorenz, P. B., Donaldson, E. C., and Thomas, R. D.
69. Donovan, T. J., 1974, Mineral evidence for buried hydrocarbons—new exploration tool [abstract]: American Association of Petroleum Geologists Bulletin, v. 58, p. 913. (Includes Permian beds of Oklahoma; reprinted in Oklahoma Geology Notes, v. 34, p. 164.)
70. Donovan, T. J., 1974, Petroleum microseepage at Cement, Oklahoma: evidence and mechanism: American Association of Petroleum Geologists Bulletin, v. 58, p. 429-446, 16 figs., 8 tables.
71. Donovan, T. J., Friedman, Irving, and Gleason, J. D., 1974, Recognition of petroleum-bearing traps by unusual isotopic compositions of carbonate-cemented surface rocks: Geology, v. 2, p. 351-354, 5 figs. (Includes Cement and Davenport oil fields, Oklahoma.)
72. Dött, R. H., Jr., 1973, Dynamics of subaqueous gravity depositional processes, *in* Weimer, R. J. (compiler), Sandstone reservoirs and stratigraphic concepts II: American Association of Petroleum Geologists Reprint Series No. 8, p. 25-49, 19 figs., 3 tables. (Includes Johns Valley Shale; first published in AAPG Bulletin, v. 47, p. 104-128.)
73. Doyle, E. M., 1974, Oklahoma, *in* Reports from states and official observers: Oil and Gas Compact Bulletin, p. 50-53.
74. Drake, H. J., 1974, Stone, *in* Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972: U.S. Bureau of Mines, p. 1153-1173.

75. Durden, C. J., 1974, Biomerization: an ecologic theory of provincial differentiation, in Ross, C. A. (editor), Paleogeographic provinces and provinciality: Society of Economic Paleontologists and Mineralogists Special Publication No. 21, p. 18-53, 39 figs.
76. Ekebafé, S. B., 1973, Stratigraphic analysis of the interval from the Hogshooter Limestone to the Checkerboard Limestone, a subsurface study in north-central Oklahoma: University of Tulsa unpublished M.S. thesis. (Abstract printed in Oklahoma Geology Notes, v. 35, p. 34.)
77. Ellison, S. P., Jr., 1974, World-wide oil and gas statistics—important summaries (current to 1/15/74): Shale Shaker, v. 24, p. 192-195. (Includes Oklahoma production figures.)
 Fanelli, L. L., see Harper, W. B., and Fanelli, L. L.
 Fanelli, L. L., see also Wood, S. O., Jr., and Fanelli, L. L.
78. Farmer, G. T., Jr., 1974, The oldest well-preserved bryozoan fauna in the world?: Oklahoma Geology Notes, v. 34, p. 99-101, 1 fig.
79. Fay, R. O., 1974, The Berwyn Conglomerate: Oklahoma Geology Notes, v. 34, p. 193-194. (Cover photo and description.)
80. Fay, R. O., 1974, Origin of petroleum II, a summary review: Oklahoma Geology Notes, v. 34, p. 149-152.
81. Feenstra, R. E., 1974, Evolution of folds in the Blaylock Formation (Silurian), Ouachita Mountains, southeastern Oklahoma: University of Oklahoma unpublished M.S. thesis, 77 p.
82. Feenstra, R. E., 1974, Minor fold in the Blaylock Sandstone (Silurian), Ouachita Mountains, Oklahoma: Oklahoma Geology Notes, v. 34, p. 97-98. (Cover photo and description.)
 Friedman, Irving, see Donovan, T. J., Friedman, Irving, and Gleason, J. D.
83. Friedman, S. A., 1974, Coal resources of eastern Oklahoma [abstract]: American Chemical Society Meeting, Oklahoma Section Paper, March 1974. (Reprinted in Oklahoma Geology Notes, v. 34, p. 129.)
84. Friedman, S. A., 1974, An investigation of the coal reserves in the Ozarks section of Oklahoma and their potential uses: Oklahoma Geological Survey, 117 p., 24 figs., 77 tables. (Final report to the Ozarks Regional Commission.)
85. Friedman, S. A., 1974, Oklahoma, in 1974 Keystone coal industry manual: New York, McGraw-Hill Mining Publications, p. 535-538, 1 fig., 1 table.
86. Fulkerson, F. B., 1974, Vermiculite, in Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972: U.S. Bureau of Mines, p. 1295-1298.
87. Gann, D. E., and Hagni, R. D., 1974, Ore microscopy of copper ore at the Creta Mine, southern Oklahoma [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 104. (Reprinted in Oklahoma Geology Notes, v. 34, p. 114.)
88. Gentile, R. J., 1974, A new species of *Dentalium* from the Pennsylvanian of eastern Kansas: Journal of Paleontology, v. 48, p. 1213-1216, 1 fig. (Refers to species from Wewoka Formation.)
 Gleason, J. D., see Donovan, T. J., Friedman, Irving, and Gleason, J. D.
89. Gonzales, Serge, 1974, Relationship between petroleum accumulations and stratiform ore deposits within Paleozoic carbonate se-

- quences [abstract]: American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists Annual Meetings Abstracts, v. 1, p. 39-40. (Includes Tri-State deposits.)
90. Goss, D. W., 1973, Relation of physical and mineralogical properties to stream stability: Water Resources Bulletin, v. 9, no. 1, p. 140-144. (Washita River study.)
 91. Gossett, L. D., 1973, Semiquantitative analysis of crude oil in lacustrine sediments: University of Tulsa unpublished M.S. thesis. (Lake Keystone sediment study; abstract printed in Oklahoma Geology Notes, v. 35, p. 34.)
 92. Greenfield, S. M., 1974, EPA—the environmental watchman, in Cook, T. D. (editor), American Association of Petroleum Geologists Memoir 18, p. 14-18. (Covers brine migration into fresh-water aquifers in Oklahoma.)
 93. Gregory, J. T., Bacskai, J. A., Brajnikov, B., and Munthe, K. (editors), 1973, Bibliography of fossil vertebrates: Geological Society of America Memoir 141, 733 p.
 94. Griffin, V. S., Jr., 1974, Plate tectonics and the Ouachita system in Texas, Oklahoma, and Arkansas: discussion: Geological Society of America Bulletin, v. 85, p. 145-146.
Guber, A. L., see Bifano, F. V., Guber, A. L., and Cuffey, R. J.
Hagni, R. D., see Gann, D. E., and Hagni, R. D.
 95. Ham, E. A., 1974, State of the State on topo map coverage: Oklahoma Geology Notes, v. 34, p. 155-157, 1 fig.
 96. Ham, E. A., Croy, R. L., and Rose, W. D., 1974, Bibliography and index of Oklahoma geology, 1973: Oklahoma Geology Notes, v. 34, p. 47-93. (Abstract printed in Petroleum Abstracts, v. 14, p. 993.)
Ham, W. E., see Waddell, D. E., Sanderson, G. A., and Ham, W. E.
Hanor, J. S., see Baria, L. R., and Hanor, J. S.
 97. Harper, W. B., and Fanelli, L. L., 1974, Natural gas, in Metals, minerals, and fuels, v. 1 of minerals yearbook 1972: U.S. Bureau of Mines, p. 807-847.
 98. Harrell, J. A., 1974, Mysterious grooved granites of the Wichita Mountains, Oklahoma: Oklahoma Geology Notes, v. 34, p. 169-170. (Cover photo and description.)
 99. Harris, S. A., 1973, Hydrocarbon accumulation in "Meramec-Osage" (Mississippian) rocks, Sooner Trend, northwest central Oklahoma: University of Oklahoma unpublished M.S. thesis, 92 p. (Abstract printed in Petroleum Abstracts., v. 14, p. 482, and under title Trapping mechanism for production of oil from Meramec (Mississippian) rocks on the Sooner Trend of north central Oklahoma in Oklahoma Geology Notes, v. 34, p. 42.)
 100. Hart, D. L., Jr., 1974, Reconnaissance of the water resources of the Ardmore and Sherman quadrangles, southern Oklahoma: Oklahoma Geological Survey Hydrologic Atlas 3 (prepared in cooperation with U.S. Geological Survey), 4 sheets, scale 1:250,000.
 101. Hatcher, R. D., Jr., 1974, North American Paleozoic foldbelts and deformational histories: a plate tectonics anomaly?: American Journal of Science, v. 74, p. 135-147, 3 figs. (Includes Ouachita Mountains. Abstract printed in Geological Society of America Abstracts with Programs, v. 5, p. 656; reprinted in Oklahoma Geol-

- ogy Notes, v. 34, p. 35, and in *Petroleum Abstracts*, v. 14, p. 395-396.)
102. Heckel, P. H., 1974, Carbonate buildups in the geologic record: a review, *in* Laporte, L. F. (editor), *Reefs in time and space, selected examples from the recent and ancient: Society of Economic Paleontologists and Mineralogists Special Publication No. 18*, p. 90-154, 9 figs. (Includes Oklahoma Ordovician reefs.)
 103. Hedberg, H. D., 1974, Significance of high-wax oils with respect to genesis of petroleum, *in* *Origin of petroleum II: American Association of Petroleum Geologists Reprint Series No. 9*, p. 188-203, 1 table. (Includes Oklahoma data; first published in *AAPG Bulletin*, v. 52, p. 736-750.)
 Hefner, R. A. III, *see* Kinchloe, R., Hefner, R. A., III, and Wheeler, R., Jr.
 Heine, R. R., *see* Al-Shaieb, Zuhair, and Heine, R. R.
 104. Henry, T. W., 1973, Brachiopod biostratigraphy and faunas of the Morrow Series (Lower Pennsylvanian) of northwestern Arkansas and northeastern Oklahoma: University of Oklahoma unpublished Ph.D. dissertation, 579 p. (Abstract printed in *Dissertation Abstracts International*, pt. B., v. 34, p. 5516-B; reprinted in *Petroleum Abstracts*, v. 14, p. 1841.)
 105. Henry, T. W., 1974, Brachiopod biostratigraphy of the Morrow Series (Lower Pennsylvanian) of northwestern Arkansas and northeastern Oklahoma [abstract]: *Geological Society of America Abstracts with Programs*, v. 6, p. 107. (Reprinted in *Oklahoma Geology Notes*, v. 34, p. 115.)
 106. Heyl, A. V., Landis, G. P., and Zartman, R. E., 1974, Isotopic evidence for the origin of Mississippi Valley-type mineral deposits: *Economic Geology*, v. 69, p. 992-1006, 10 figs. (Includes Tri-State district.)
 107. Hillmer, T. J., Jr., 1974, Water quality of Lake Thunderbird, June-November 1973: *Oklahoma Academy of Science Proceedings*, v. 54, p. 8-11, 1 fig., 2 tables.
 108. Hoover, W. B., 1974, New tectonic theory has origin in convection cells: *World Oil*, v. 178, no. 6, p. 104, 105-106, 2 figs. (Includes Arbuckle area and Ouachita front.)
 109. Horak, R. L., 1974, How Permian basin, Great Basin relate: *Oil and Gas Journal*, v. 72, no. 20, p. 136, 138, 140-141, 11 figs.
 Horn, M. K., *see* Shelton, J. W., Horn, M. K., and Lassley, R. H.
 Hostetler, P. B., *see* Siebert, R. M., Hostetler, P. B., and Christ, C. L.
 110. Howell, B. F., Jr., 1974, Seismic regionalization in North America based on average regional seismic hazard index: *Seismological Society of America Bulletin*, v. 64, p. 1509-1528, 6 figs., 3 tables. (Includes data on plains states and figure on Guthrie earthquake of 1952.)
 111. Hubbert, M. K., and Willis, D. G., 1972, Mechanics of hydraulic fracturing, *in* Cook, T. D. (editor), *Underground waste management and environmental implications: American Association of Petroleum Geologists Memoir 18*, p. 239-257. (Includes North Burbank field.)
 112. Hunt, H. B., 1974, Study looks at exploration model and gas prices: *Oil and Gas Journal*, v. 72, no. 16, p. 148-149, 4 figs. (Anadarko basin model.)

113. Independent Petroleum Association of America, 1974, The oil producing industry in your state: Independent Petroleum Association of America, Washington, D.C., 88 p. (Abstract printed in Petroleum Abstracts, v. 14, p. 1877.)
114. Interstate Oil Compact Commission and National Stripper Well Association, 1974, National stripper well survey, January 1, 1974: Interstate Oil Compact Commission, 13 p. (Reprinted in part in American Oil and Gas Reporter, v. 17, no. 9, p. 15-20.)
115. Ireland, J. L. 1973, Geology for land-use planning of western Rogers County and southern Washington County, Oklahoma: Oklahoma State University unpublished B.S. thesis. (Abstract printed in Oklahoma Geology Notes, v. 35, p. 27.)
Jackson, K. C., *see* Lines, W. B., and Jackson, K. C.
116. Jarjur, S. Z., and Peoples, J. A., 1974, Spectrum analysis in the study of surface waves on seismic records using optical method [abstract]: American Geophysical Union Transactions (EÖS), v. 55, p. 356. (Includes records from an Oklahoma area.)
117. Johnson, K. S., 1974, Maps and description of disturbed and reclaimed surface-mined coal lands in eastern Oklahoma: Oklahoma Geological Survey Map GM-17, 3 maps, scale 1:125,000; text to accompany maps, 12 p., 9 figs., 2 tables. (Prepared in cooperation with Oklahoma Department of Mines.)
118. Johnson, K. S., 1974, Permian copper shales of southwestern Oklahoma [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 108-109. (Reprinted in Oklahoma Geology Notes, v. 34, p. 115.)
119. Johnson, K. S., 1974, Permian copper shales of southwestern United States, *in* Gisements stratiformes et provinces cuprifères: Belgian Geological Society: Centenaire de la Société Géologique de Belgique, Liège, September 9-13, 1974, p. 383-393, 6 figs.
Johnson, K. S., *see* Southard, L. G., Johnson, K. S., and Roberts, J. F. Jones, R. M., *see* Stoever, E. C., Jr., and Jones, R. M.
120. Karcher, J. C., 1974, The reflection seismograph, its invention and use in the discovery of oil and gas fields: Unpublished report prepared for American Institute of Physics, 46 p.
121. Kehle, R. O., Mutis-Duplat, Emilio, and Schonfeldt, H. A., 1974, Mapping of stress field in the upper earth's crust of the U.S. [abstract]: American Geophysical Union Transactions (EÖS), v. 55, p. 425. (Includes data from Oklahoma oil and gas wells.)
Keith, J. R., *see* Shacklette, H. T., Boerngen, J. G., and Keith, J. R. Keller, G. R., *see* Cebull, S. E., and Keller, G. R.
Keller, G. R., *see also* Cebull, S. E., Keller, G. R., Shurbet, D. H., and Russell, L. R.
122. Kemmerly, P. R., 1973, Environmental geology of the Mannford area, Oklahoma: Oklahoma State University unpublished Ed.D. dissertation. (Abstract printed in Dissertation Abstracts International, Pt. B, v. 35, p. 2265-B, and in Oklahoma Geology Notes, v. 35, p. 28-29.)
123. Kent, D. C., Al-Shaieb, Zuhair, and Silka, Lyle, 1974, Ground-water geochemistry of a river alluvium and related environmental implications [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 109. (Reprinted in Oklahoma Geology Notes, v. 34, p. 116.)

- Kent, D. C., *see* DeVries, R. N., and Kent, D. C.
 Kent, D. C., *see also* Naney, J. W., and Kent, D. C.
124. Kessler, L. G., Jr., 1974, Braided rivers and related terrigenous depositional systems—useful but enigmatic exploration models [abstract]: American Association of Petroleum Geologists Bulletin, v. 58, p. 914. (Includes South Canadian River; reprinted in Oklahoma Geology Notes, v. 34, p. 164-165.)
 125. Kidwell, A. L., and Bower, R. R., 1974, Mineralogy and microtextures in the Flowerpot Shale of Oklahoma and Texas [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 110. (Reprinted in Oklahoma Geology Notes, v. 34, p. 116.)
 126. Kinchloe, R., Hefner, R. A., III, and Wheeler, R., Jr., 1973, The drilling and production of ultra-deep natural gas accumulations occurring below 20,000 feet in the Anadarko basin, U.S.A.: Twelfth International Gas Union World Gas Conference, Paper no. IGU/A 5-73, 17 p. (Abstract printed in Petroleum Abstracts, v. 14, p. 93.)
 127. King, R. E., 1974, Big reserve boost foreseen in Gulf of Mexico in 1974: World Oil, v. 178, no. 5, p. 71-76, 4 figs. (Includes Sho-Vel-Tum field, Anadarko basin, Morrow trend.)
 128. Kirby, J. G., Carleton, D. A., and Moore, B. M., 1974, Crude petroleum and petroleum products, *in* Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972: U.S. Bureau of Mines, p. 909-1026.
 129. Kirk, M. S., 1974, Mustang field: Shale Shaker, v. 25, p. 53-54, 2 figs.
 130. Kisvarsanyi, E. B., 1974, Operation Basement: buried Precambrian rocks of Missouri—their petrography and structure: American Association of Petroleum Geologists Bulletin, v. 58, p. 674-684, 4 figs. (Refers to basement rocks of Oklahoma; abstract printed in Petroleum Abstracts, v. 14, p. 731-732.)
 131. Knox, J. W., 1974, Biostratigraphic aspects of type Morrowan ostracods [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 522-523. (Includes Oklahoma ostracods: reprinted in Oklahoma Geology Notes, v. 34, p. 126.)
 132. Koelling, G. W., 1974, Helium, *in* Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972: U.S. Bureau of Mines, p. 605-610.
 133. Kornfeld, J. A., 1974, Higher gas prices boost Arkoma basin drilling: World Oil, v. 178, no. 2, p. 52-53., 1 fig., 1 table.
 134. Kornfeld, J. A., 1974, Oklahoma drilling hits 4-year high: World Oil, v. 179, no. 4, p. 73-74, 76, 3 figs. (Abstract printed in Petroleum Abstracts, v. 14, p. 1749.)
 135. Kotila, D. A., 1973, Algae and paleoecology of algal and related facies, Morrow Formation, northeastern Oklahoma: University of Oklahoma unpublished Ph.D. dissertation, 271 p. (Abstract printed in Dissertation Abstracts International, Pt. B, v. 34, p. 4453-B; reprinted in Oklahoma Geology Notes, v. 34, p. 218-219, and in Petroleum Abstracts, v. 14, p. 865.)
 136. Krason, Jan, 1974, Central European versus south central U.S.A. geologic settings of the Permian basins and associated copper mineralization [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 111. (Reprinted in Oklahoma Geology Notes, v. 34, p. 117.)
- Kumar, Subodh, *see* Laguros, J. G., Kumar, Subodh, and Annamalai, M.

137. Lago, O. K., and Walters, J., 1974, Price increases spark activity in Mid-Continent: *Drilling Contract*, v. 30, no. 5, p. 38-41. (Abstract printed in *Petroleum Abstracts*, v. 14, p. 1664.)
138. Laguros, J. G., Kumar, Subodh, and Annamalai, M., 1974, A comparative study of simulated and natural weathering of some Oklahoma shales: *Clays and Clay Minerals*, v. 22, p. 111-115, 2 figs., 3 tables.
139. Landes, K. K., 1974, Eometamorphism, and oil and gas in time and space, in *Origin of petroleum II: American Association of Petroleum Geologists Reprint Series No. 9*, p. 162-175, 9 figs. (First published in *AAPG Bulletin*, v. 51, p. 828-841.)
Landis, G. P., *see* Heyl, A. V., Landis, G. P., and Zartman, R. E.
140. Lane, H. R., 1974, Mississippian of southeastern New Mexico and west Texas—a wedge-on-wedge relation: *American Association of Petroleum Geologists Bulletin*, v. 58, p. 269-282, 7 figs. (Refers to Pierson Formation of northeastern Oklahoma.)
141. Lane, H. R., and Straka, J. J., II, 1974, Late Mississippian and early Pennsylvanian conodonts, Arkansas and Oklahoma: *Geological Society of America Special Paper 152*, 144 p.
Lane, H. R., *see* Brenkle, Paul, Lane, H. R., and Collinson, Charles
142. Lange, D. E., Moore, C. B., and Rhoton, Kendall, 1973, The Willowbar meteorite: *Meteoritics*, v. 8, no. 3, p. 263-275. (Comparison with Keyes, Oklahoma, meteorite.)
Lassley, R. H., *see* Shelton, J. W., Horn, M. K., and Lassley, R. H.
143. Leach, D. L., 1973, A study of the barite-lead-zinc deposits of central Missouri and related mineral deposits in the Ozark region: University of Missouri unpublished Ph.D. dissertation. (Abstract printed in *Dissertation Abstracts International*, Pt. B, v. 35, p. 1741-B; reprinted in *Oklahoma Geology Notes*, v. 35, p. 30-31.)
144. Leary, G. L., 1974, North Dibble field (Osborne sand): *Shale Shaker*, v. 25, p. 50-52, 3 figs., 1 table.
145. LeBlanc, R. J., 1972, Geometry of sandstone reservoir bodies, in Cook, T. D. (editor), *Underground waste management and environmental implications: American Association of Petroleum Geologists Memoir 18*, p. 133-190. (Includes Oklahoma examples.)
146. Leeds, D. J., and Ryland, S. L., 1974, Seismotectonics of the North American Midcontinent [abstract]: *Earthquake Notes*, v. 45, special issue, June 1974.
147. Lewis, R. D., and Bickford, M. E., 1974, U-Pb ages of the Spavinaw and Tishomingo Granites [abstract]: *Geological Society of America Abstracts with Programs*, v. 6, p. 844-845. (Reprinted in *Oklahoma Geology Notes*, v. 34, p. 216.)
148. Lines, W. B., and Jackson, K. C., 1974, Depositional environment of the Hartshorne sandstone (Pennsylvanian), Arkansas Valley, Arkansas [abstract]: *Geological Society of America Abstracts with Programs*, v. 6, p. 113. (Reprinted in *Oklahoma Geology Notes*, v. 34, p. 118.)
149. Linville, Bill, 1974, Tertiary oil recovery is target of Bu Mines project: *American Oil and Gas Reporter*, v. 17, no. 1, p. 46-47, 3 figs.
150. Lockwood, R. P., 1974, Geochemistry and petrology of some Oklahoma redbed copper occurrences [abstract]: *Geological Society of America Abstracts with Programs*, v. 6, p. 114-115.

151. London, W. W., 1973, A geological and engineering study of the Mustang pool, Canadian County, Oklahoma: University of Oklahoma unpublished M.S. thesis, 78 p.
LoPiccolo, R. D., see Lowe, D. R., and LoPiccolo, R. D.
152. Lorenz, P. B., Donaldson, E. C., and Thomas, R. D., 1974, Use of centrifugal measurements of wettability to predict oil recovery: U.S. Bureau of Mines Report of Investigations 7873, 26 p., 11 figs. (Includes experiments on Oklahoma sands.)
153. Lowe, D. R., and LoPiccolo, R. D., 1974, The characteristics and origins of dish and pillar structures: *Journal of Sedimentary Petrology*, v. 44, p. 484-501, 12 figs.
154. Lowry, W. D., 1974, North American geosynclines—test of continental-drift theory: *American Association of Petroleum Geologists Bulletin*, v. 58, p. 575-620, 6 figs. (Includes Ouachita geosyncline.)
155. Lundin, R. F., and Petersen, L. E., 1974, Ostracoda from the Rockhouse Formation (Devonian) of western Tennessee: *Journal of Paleontology*, v. 48, p. 236-255, 2 figs., 3 pls. (Correlates Rockhouse with Henryhouse Formation of Oklahoma.)
156. Lutz-Garihan, A. B., The brachiopod genus *Composita* from the Wrexford Megacyclothem (Lower Permian) in Nebraska, Kansas, and Oklahoma [abstract]: *Geological Society of America Abstracts with Programs*, v. 6, p. 527. (Reprinted in *Oklahoma Geology Notes*, v. 34, p. 126-127.)
157. McCaslin, J. C., 1974, Anadarko basin setting hole records: *Oil and Gas Journal*, v. 72, no. 8, p. 83.
158. McCaslin, J. C., 1974, Deep wildcat to probe Arkoma basin: *Oil and Gas Journal*, v. 72, no. 5, p. 127.
159. McCaslin, J. C., 1974, Hunton data help predict future discoveries: *Oil and Gas Journal*: v. 72, no. 24, p. 93.
160. McCaslin, J. C., 1974, Oklahoma's Springer sand trend surges: *Oil and Gas Journal*, v. 72, no. 28, p. 99, 1 fig.
McCowan, F. P., see Collins, R. J., McCowan, F. P., Stonis, L. P., and Petzel, G.
161. McFarland, W., and Meyer, R., 1974, A resume of the drilling fluids used on the world's deepest well: *Society of Petroleum Engineers of American Institute of Mining Engineers Deep Drilling and Production Symposium* (Amarillo, September 8-10, 1974) Preprint no. SPE-5182, p. 161-168. (Abstract printed in *Petroleum Abstracts*, v. 14, p. 1780, 2083.)
162. McGuire, M. J., 1974, Geology for land-use planning of southeastern Osage, eastern Pawnee, northern Creek, and western Tulsa Counties, Oklahoma: Oklahoma State University unpublished M.S. thesis. (Abstract printed in *Oklahoma Geology Notes*, v. 35, p. 29-30.)
163. McHargue, T. R., 1974, The lower Middle Ordovician multielement conodont genus *Multioistodus* [abstract]: *Geological Society of America Abstracts with Programs*, v. 6, p. 529. (Reprinted in *Oklahoma Geology Notes*, v. 34, p. 127.)
164. McMahan, A. D., Hague, J. M., and Babitzke, H. R., Zinc, in *Metals, minerals, and fuels*, v. 1 of *Minerals yearbook 1972*: U.S. Bureau of Mines, p. 1299-1333.

165. MacMillan, R. T., 1974, Salt, *in* Metals, minerals, and fuels, *v. 1 of Minerals yearbook 1972*: U.S. Bureau of Mines, p. 1093.
166. McMurtry, Wilbur, 1974, In memoriam [Bing Yee]: Shale Shaker, v. 24, p. 119-120.
167. McNabb, Dan, 1974, Gas prices stir risky new Oklahoma play: Oil and Gas Journal, v. 72, no. 9, p. 24-25, 1 fig.
168. Manger, W. L., Saunders, W. B., and Quinn, J. H., 1974, Lower Pennsylvanian (Morrowan) ammonoids from the Primrose Member, Golf Course Formation, south-central Oklahoma [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 115-116. (Reprinted in Oklahoma Geology Notes, v. 34, p. 118-119.)
169. Manghnani, M. H., and Ramanantoandro, R., 1974, Compressional and shear wave velocities in granulite facies rocks and eclogites to 10 kbar: Journal of Geophysical Research, v. 79, p. 5427. (Includes data from Oklahoma.)
170. Mankin, C. J., 1974, Oklahoma Geological Survey, annual report, July 1, 1973-June 30, 1974: Oklahoma Geology Notes, v. 34, p. 171-183.
171. Mannhard, G. W., and Busch, D. A., 1974, Stratigraphic trap accumulation in southwestern Kansas and northwestern Oklahoma: American Association of Petroleum Geologists Bulletin, v. 58, p. 447-463, 13 figs. (Abstract printed in Petroleum Abstracts, v. 14, p. 549.)
172. Masroua, L. F., 1973, Patterns of pressure in the Morrow sands of central Oklahoma: University of Tulsa unpublished M.S. thesis. (Abstract printed in Oklahoma Geology Notes, v. 35, p. 35.)
173. Meisinger, A. C., 1974, Pumice and volcanic cinder, *in* Metals, minerals, and fuels, *v. 1 of Minerals yearbook 1972*: U.S. Bureau of Mines, p. 1069-1073.
174. Merwin, R. W., 1974, Sulfur and pyrites, *in* Metals, minerals, and fuels, *v. 1 of Minerals yearbook 1972*: U.S. Bureau of Mines, p. 1175-1190.
175. Meyer, R. F., 1974, U.S. Department of the Interior energy data files [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 868. (Reprinted in Oklahoma Geology Notes, v. 34, p. 216.)
Meyer, R., *see* McFarland, W., and Meyer, R.
176. Meyers, W. C., and Simpson, H. M., 1974, *Centonites*—a stratigraphically useful palynomorph restricted to Upper Pennsylvanian rocks [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 117-118. (Reprinted in Oklahoma Geology Notes, v. 34, p. 119.)
177. Miller, J. F., Robison, R. A., and Clark, D. L., 1974, Correlation of Tremadocian conodont and trilobite faunas, Europe and North America [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 1048-1049. (Reprinted in Oklahoma Geology Notes, v. 34, p. 217.)
178. Mining Informational Services, 1974, 1974 Keystone coal industry manual: New York, McGraw-Hill Mining Publications, 859 p.
179. Miotke, Franz-Dieter, 1969 [1974], Gipskarst östlich Shamrock/Nordtexas, *in* Morphologie des Karstes: *v. 1 of 5*. Inter-

- nationaler Kongress für Speläologie, Stuttgart, 1969, Abhandlungen, p. M 22/1-M 22/14, illus. (Includes Oklahoma Permian gypsums and karst areas.)
- Moore, B. M., *see* Kirby, J. G., Carleton, D. A., and Moore, B. M.
- Moore, C. B., *see* Lange, D. E., Moore, C. B., and Rhoton, Kendall
180. Morning, J. L., 1974, Technologic trends in the mineral industries (metals and nonmetals except fuels), *in* Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972: U.S. Bureau of Mines, p. 61-82.
- Morrissey, N. S., *see* Rummersfield, B. F., and Morrissey, N. S.
181. Morton, R. B., 1973, Preliminary investigation of the hydrogeology of the Permian to Tertiary rocks of the Oklahoma Panhandle: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-738, 2 sheets. (In cooperation with the Oklahoma Water Resources Board.)
- Munthe, K., *see* Gregory, J. T., Bacsikai, J. A., Brajnikov, B., and Munthe, K.
- Mutis-Duplat, Emilio, *see* Kehle, R. O., Mutis-Duplat, Emilio, and Schonfeldt, H. A.
182. Namy, J. N., 1974, Origin of a Lower Pennsylvanian depositional cycle: *Journal of Sedimentary Petrology*, v. 44, p. 795-805, 5 figs. (Refers to tectonic activity in Ouachita structural belt.)
183. Naney, J. W., and Kent, D. C., 1974, Evaluating the effects of permeability distribution on downstream ground-water flow using a mathematical model [abstract]: *Geological Society of America Abstracts with Programs*, v. 6, p. 118. (Reprinted in *Oklahoma Geology Notes*, v. 34, p. 119-120.)
- Naney, J. W., *see* Yost, Coyd, Jr., and Naney, J. W.
- Nassichuk, W. W., *see* Strimple, H. L., and Nassichuk, W. W.
- National Stripper Well Association, *see* Interstate Oil Compact Commission and National Stripper Well Association
184. Newland, C. T., 1973, Soil survey of Craig County, Oklahoma: U.S. Soil Conservation Service and Oklahoma Agricultural Experiment Station, 65 p., 9 figs., maps, 10 tables.
- Niem, A. R., *see* Picha, Frantisek, and Niem, A. R.
- Noble, R. L., *see* Shelton, J. W., Burman, H. R., and Noble, R. L.
- Noble, R. L., *see also* Shelton, J. W., and Noble, R. L.
- Nondorf, J. L., *see* Davis, H. G., and Nondorf, J. L.
185. Oklahoma Baptist University Speleology Class, 1974, A cave of Woodward County, Oklahoma: *Oklahoma Underground*, v. 6, p. 75-79, 3 figs.
186. Oklahoma Baptist University Speleology Class, 1974, Caves of Seminole County, Oklahoma: *Oklahoma Underground*, v. 6, p. 53-64, 7 figs.
187. Oklahoma Baptist University Speleology Class, 1974, Caves of the Arbuckle Mountains, Murray County, Oklahoma: *Oklahoma Underground*, v. 6, p. 65-74, 7 figs.
188. Oklahoma City Geological Society, 1974, Oklahoma and the world energy crisis: *Shale Shaker*, v. 25, p. 9-16, 8 figs., 1 table.
189. Oklahoma Energy Advisory Council, 1974, Energy in Oklahoma, volume one: Final Report, 47 p.

190. Oklahoma Energy Advisory Council, 1974, Energy in Oklahoma, volume two: Final Report, 288 p.
191. Oklahoma Energy Advisory Council, 1974, Report from the Committee on Economic Influences on Production and Reserves: Shale Shaker, v. 25, p. 26-36, 15 figs. (Reprinted from Oklahoma Energy Advisory Council, Energy in Oklahoma, volume two, p. 151-179.)
192. Oklahoma Energy Advisory Council, 1974, Report from the Committee on Energy Demand: Shale Shaker, v. 25, p. 55-71, illus. (Reprinted from Oklahoma Energy Advisory Council, Energy in Oklahoma, volume two, p. 1-41.)
193. Oklahoma Geological Survey, 1974, Index, volume 34, 1974: Oklahoma Geology Notes, v. 34, p. 219-232.
194. Oklahoma Water Resources Institute, 1974, Evaporation from brine storage reservoirs: National Technical Information Service PB-231 187, 46 p., 15 figs., 10 tables. (Abstract printed in Selected Water Resources Abstracts, v. 7, no. 13, p. 6.)
195. Oklahoma Water Resources Research Institute, 1974, Ninth annual report of the Oklahoma Water Resources Research Institute, fiscal year 1974: National Technical Information Service PB-231 271, 91 p. (Abstract printed in Selected Water Resources Abstracts, v. 7, no. 13, p. 101.)
196. Pabian, R. K., and Strimple, H. L., 1974, Biometrical study of the morphology and development of a new species of *Terpnocrinus* Strimple and Moore, Pennsylvanian, Nebraska, pt. 4 of Fossil crinoid studies: University of Kansas Paleontological Contributions, Paper 73, p. 38-52, figs. 18-30, 2 tables.
197. Pabian, R. K., and Strimple, H. L., 1974, Crinoid studies: part 1. Some Pennsylvanian crinoids from Nebraska: Bulletins of American Paleontology, v. 64, no. 281, p. 244-290, 2 text-figs., pls. 32-38, 29 tables. (Includes Oklahoma species.)
198. Pabian, R. K., and Strimple, H. L., 1974, Crinoid studies: part 2. Some Permian crinoids from Nebraska, Kansas, and Oklahoma: Bulletins of American Paleontology, v. 64, no. 281, p. 290-337, 2 text-figs., pls. 38-41, 10 tables. (Abstract printed in Petroleum Abstracts, v. 14, p. 284.)
199. Pabian, R. K., and Strimple, H. L., 1974, Miscellaneous Pennsylvanian crinoids from Kansas, Oklahoma, and Nebraska, pt. 1 of Fossil crinoid studies: University of Kansas Paleontological Contributions, Paper 73, p. 2-19, 6 figs.
200. Padgett, Ward, 1973 [1974], Sixty-fifth annual report, Department of Mines, Chief Mine Inspector, year ending December 31, 1973: Oklahoma Department of Mines, 70 p.
201. Pajalich, Walter, 1974, Sand and gravel, in Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972: U.S. Bureau of Mines, p. 1103-1121.
- Parrish, D. R., see Craig, F. F., Jr., and Parrish, D. R.
- Peoples, J. A., see Jarjur, S. Z., and Peoples, J. A.
202. Person, W. J. (editor), 1974, Seismological notes—January-February 1974: Bulletin of the Seismological Society of America, v. 64, p. 1603-1606. (Lists Feb. 1974 earthquake in Texas Panhandle felt in Oklahoma.)
- Petersen, L. E., see Lundin, R. F., and Petersen, L. E.

- Peterson, R. J., *see* Shockey, P. N., Renfro, A. R., and Peterson, R. J.
203. Petroleum Information Corporation, 1974, 1973 resume: oil and gas operations in the Midcontinent, Rocky Mountain and Northeast regions: Dallas, 186 p. (Abstract printed in *Petroleum Abstracts*, v. 14, p. 928.)
204. Pettijohn, F. J., Potter, P. E., and Siever, Raymond, 1973, *Sand and sandstone*: Springer-Verlag, 618 p. (Includes Oklahoma sands.)
 Petzel, G., *see* Collins, R. J., McCowan, F. P., Stonis, L. P., and Petzel, G.
205. Picha, Frantisek, and Niem, A. R., 1974, Distribution and extent of beds in flysch deposits, Ouachita Mountains, Arkansas and Oklahoma: *Journal of Sedimentary Petrology*, v. 44, p. 328-335, 5 figs.
206. Pirson, S. J., 1974, Unified magneto-electrotelluric exploration method, part 2: *Oil and Gas Journal*, v. 72, no. 12, p. 142, 144, 146, 148, figs. 5-8, 1 table.
207. Pita, F. W., 1972, Zinc, lead and cadmium distribution and mode of occurrence in Oklahoma reservoir sediments: University of Tulsa unpublished M.S. thesis. (Abstract printed in *Oklahoma Geology Notes*, v. 35, p. 36-37.)
208. Pitt, W. D., 1974, Structure of the western end of the Potato Hills, Latimer and Pushmataha Counties, Oklahoma: *Oklahoma Geology Notes*, v. 34, p. 135-147, 11 figs. (Abstract printed in *Petroleum Abstracts*, v. 14, p. 1657.)
 Pohl, E. R., *see* Browne, R. G., and Pohl, E. R.
209. Potter, P. E., 1973, Sand bodies and sedimentary environments: a review, *in* Weimer, R. J. (compiler), *Sandstone reservoirs and stratigraphic concepts*: American Association of Petroleum Geologists Reprint Series No. 7, p. 30-58, 12 figs., 6 tables. (Includes Oklahoma deposits; first published in *AAPG Bulletin*, v. 51, p. 337-365.)
 Potter, P. E., *see* Pettijohn, F. J., Potter, P. E., and Siever, Raymond
210. Pratt, W. P., and Brobst, D. A., 1974, Mineral resources: potentials and problems: U.S. Geological Survey Circular 698, 20 p.
 Pray, L. C., *see* Choquette, P. W., and Pray, L. C.
 Quinn, J. H., *see* Manger, W. L., Saunders, W. B., and Quinn, J. H.
 Ramanantoandro, R., *see* Manghnani, M. H., and Ramanantoandro, R.
211. Reed, A. H., 1974, Gypsum, *in* *Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972*: U.S. Bureau of Mines, p. 597-604.
212. Reeder, L. R., 1974, The control of potential Arbuckle hydrocarbon traps in northeastern Oklahoma by Precambrian topography: *Shale Shaker*, v. 24, p. 84-93, 96, 5 figs., 1 table. (Abstract printed in *Petroleum Abstracts*, v. 14, p. 284.)
213. Reiter, Leon, 1974, An interpretation of Midcontinent seismicity [abstract]: *Earthquake Notes*, v. 45, special issue, June 1974, p. 52.
214. Renfro, A. R., 1974, Genesis of evaporite-associated stratiform metaliferous deposits— a sabkha process: *Economic Geology*, v. 69, p. 33-45, 8 figs. (Includes Oklahoma Permian copper-shales.)
 Renfro, A. R., *see* Shockey, P. N., Renfro, A. R., and Peterson, R. J.
 Rhoton, Kendall, *see* Lange, D. E., Moore, C. B., and Rhoton, Kendall

215. Riley, L. R., 1974, Recent Sycamore development in Stephens County, Oklahoma: *Shale Shaker*, v. 25, p. 37-43, 10 figs.
216. Roberts, J. F., 1974, Statistics of Oklahoma's petroleum industry, 1973: *Oklahoma Geology Notes*, v. 34, p. 195-202, 4 figs., 4 tables. (Abstract printed in *Petroleum Abstracts*, v. 14, p. 469.)
- Roberts, J. F., see Southard, L. G., Johnson, K. S., and Roberts, J. F.
217. Robinson, R. B., 1972, Classification of reservoir rocks by surface textures, in *Carbonate rocks II: porosity and classification of reservoir rocks: American Association of Petroleum Geologists Reprint Series No. 5*, p. 95-107, 14 figs., 2 tables. (Includes Oklahoma Oswego Limestone, Bartlesville Sandstone, and "Wilcox" sandstone; first published in *AAPG Bulletin*, v. 50, p. 547-559.)
- Robison, R. A., see Miller, J. F., Robison, R. A., and Clark, D. L.
- Rose, W. D., see Ham, E. A., Croy, R. L., and Rose, W. D.
218. Rowland, T. L., 1973, Generalized petrographic description of the Oologah Limestone in the eastern portion of Tulsa County, in "The Big Lime," southern margin of the Oologah Limestone banks: *Tulsa Geological Society Guidebook*, October 3, 1973, p. 1-5 (paged separately at back).
219. Rowland, T. L., 1974, The historic 1 Baden Unit and a brief look at exploration in the Anadarko basin: *Oklahoma Geology Notes*, v. 34, p. 3-9, 2 figs., 2 tables. (Abstract printed in *Petroleum Abstracts*, v. 14, p. 482.)
220. Rowland, T. L., 1974, Lone Star 1 Rogers Unit captures world depth record: *Oklahoma Geology Notes*, v. 34, p. 185, 1 fig., 2 tables.
221. Rowland, T. L., 1974, World's largest land-based drilling rig used for record well: *Oklahoma Geology Notes*, v. 34, p. 1-2. (Cover photo and description.)
- Rowland, T. L., see Shelton, J. W., and Rowland, T. L.
222. Ruiz, C. S., 1974, Chemical composition of deep subsurface waters of the Anadarko basin: University of Tulsa unpublished M.S. thesis. (Abstract printed in *Oklahoma Geology Notes*, v. 35, p. 37.)
223. Rummersfield, B. F., and Morrisey, N. S., 1974, Justify exploration costs by finding needed reserves: *Oil and Gas Journal*, v. 72, no. 44, p. 121-125, 5 figs., 3 tables. (Includes southern Oklahoma.)
224. Runnegar, Bruce, 1974, Evolutionary history of the bivalve subclass Anomalodesmata: *Journal of Paleontology*, v. 48, p. 904-939, 10 figs., 5 pls. (Includes Oklahoma specimens.)
225. Russell, J. L., 1974, Comparison of two Late Paleozoic red shales of the Midcontinent region: University of Nebraska unpublished Ph.D. dissertation. (Includes Eskridge Shale; abstract printed in *Dissertation Abstracts International*, Pt. B, v. 35, p. 2265-B, and in *Oklahoma Geology Notes*, v. 35, p. 31-32.)
- Russell, L. R., see Cebull, S. E., Keller, G. R., Shurbet, D. H., and Russell, L. R.
226. Ryan, J. P., 1974, Lead, in *Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972: U.S. Bureau of Mines*, p. 695-725.
- Ryland, S. L., see Leeds, D. J., and Ryland, S. L.
227. Sackett, W. M., 1974, Carbon isotope composition of natural methane occurrences, in *Origin of petroleum II: American Association of Petroleum Geologists Reprint Series No. 9*, p. 183-187, 1 fig., 2 tables. (Includes studies of Gilcrease sand; first published in *AAPG Bulletin*, v. 52, p. 853-857.)

228. Sanderson, G. A., 1974, A bibliography of the family Fusulinidae: addendum 9: *Journal of Paleontology*, v. 48, p. 833-839. (Includes references on Oklahoma fusulinids.)
Sanderson, G. A., *see* Waddell, D. E., Sanderson, G. A., and Ham, W. E.
229. Sargent, K. A., 1974, Chemical and isotopic investigation of stratigraphic and tectonic dolomites in the Arbuckle Group, Arbuckle Mountains, south-central Oklahoma: University of Oklahoma unpublished Ph.D. dissertation, 183 p. (Abstract printed in *Oklahoma Geology Notes*, v. 34, p. 165-166.)
230. Sauer, V. B., 1974, An approach to estimating flood frequency for urban areas in Oklahoma: U.S. Geological Survey Water Resources Investigations 23-74, 10 p., 3 figs.
231. Sauer, V. B., 1974, Flood characteristics of Oklahoma streams: U.S. Geological Survey Water Resources Investigations 52-73, 303 p., 21 figs., 4 tables.
232. Saunders, W. B., 1973, Upper Mississippian ammonoids from Arkansas and Oklahoma: Geological Society of America Special Paper 145, 110 p., 32 figs., 8 pls., 8 tables. (Abstract printed in *Petroleum Abstracts*, v. 14, p. 360.)
233. Saunders, W. B., and Spinosa, Claude, 1974, Unusual fossil cephalopod jaws from Nevada [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 248. (Includes Oklahoma specimens; reprinted in *Oklahoma Geology Notes*, v. 34, p. 122.)
Saunders, W. B., *see* Manger, W. L., Saunders, W. B., and Quinn, J. H.
234. Scheffer, W. F. (editor), 1974, Energy impacts on public policy and administration: Norman, Oklahoma, University of Oklahoma Press, 238 p.
Schonfeldt, H. A., *see* Kehle, R. O., Mutis-Duplat, Emilio, and Schonfeldt, H. A.
235. Scott, R. W., 1974, Bay and shoreface benthic communities in the Lower Cretaceous: *Lethaia*, v. 7, p. 315-330, 11 figs., 2 tables. (Mentions material from Purgatoire Formation.)
236. Shacklette, H. T., Boerngen, J. G., and Keith, J. R., 1974, Selenium, fluorine, and arsenic in surficial materials of the conterminous United States: U.S. Geological Survey Circular 692, 14 p. (Includes data on Oklahoma materials.)
237. Shaver, R. H., and Smith, S. G., 1974, Some Pennsylvanian Kirbyacean ostracods of Indiana and Midcontinent series terminology: Indiana Geological Survey Report of Progress 31, 59 p., 5 figs., 3 pls. (Includes discussion of Atokan Series in Oklahoma and Morrowan Series in Arkansas.)
238. Shaw, F. C., 1974, Simpson Group (Middle Ordovician) trilobites of Oklahoma: *Paleontological Society Memoir* 6, *Journal of Paleontology*, v. 48, pt. 2 of 2, Supplement to no. 5, 54 p., 6 text-figs., 3 tables, 12 pls. (Abstract printed in *Petroleum Abstracts*, v. 14, p. 2029.)
239. Shea, J. H., 1974, Deficiencies of clastic particles of certain sizes: *Journal of Sedimentary Petrology*, v. 44, p. 985-1003, 9 figs., 3 tables. (Include data on Canadian River.)
240. Shelton, J. W., and Burman, H. R., 1974, Grain orientation in shallow marine-shoreface sandstones: *Shale Shaker*, v. 25, p. 4-7, 3 figs., 1 table.

241. Shelton, J. W., Burman, H. R., and Noble, R. L., 1974, Directional features in braided-meandering-stream deposits, Cimarron River, north-central Oklahoma: *Journal of Sedimentary Petrology*, v. 44, p. 1114-1117, 3 figs., 1 table.
242. Shelton, J. W., Horn, M. K., and Lassley, R. H., 1974, Relation of geothermal patterns to major geologic features in U.S. [abstract]: American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists Annual Meetings Abstracts, v. 1, p. 82. (Refers to Arkoma basin and Wichita-Amarillo-Cimarron uplift; reprinted in *Oklahoma Geology Notes*, v. 34, p. 110.)
243. Shelton, J. W., and Noble, R. L., 1974, Depositional features of braided-meandering stream [geologic note]: American Association of Petroleum Geologists Bulletin, v. 58, p. 742-749, 5 figs., 1 table. (Discusses Cimarron River, Oklahoma.)
244. Shelton, J. W., and Rowland, T. L., 1974, Guidebook to the depositional environments of selected Pennsylvanian sandstones and carbonates of Oklahoma: Oklahoma State University and Oklahoma Geological Survey, Guidebook for GSA Field Trip (1974 South-Central Section annual meeting), 75 p., 33 figs., 15 pls.
245. Sheridan, E. T., 1974, Coke and coal chemicals, *in* Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972: U.S. Bureau of Mines, p. 427-460.
246. Sheriff, R. E., 1973, Encyclopedic dictionary of exploration geophysics: Society of Exploration Geophysicists, 266 p.
247. Shockey, P. N., Renfro, A. R., and Peterson, R. J., 1974, Copper-silver solution fronts at Paoli, Oklahoma [scientific communication]: *Economic Geology*, v. 69, p. 266-268, 2 figs.
Shurbet, D. H., *see* Cebull, S. E., Keller, G. R., Shurbet, D. H., and Russell, L. R.
248. Siebert, R. M., Hostetler, P. B., and Christ, C. L., 1974, Activity-product constants of aragonite at 90° and 51°C: U.S. Geological Survey Journal of Research, v. 2, p. 447-455, 7 tables. (Includes tests run on dolomite from Picher, Oklahoma.)
Siever, Raymond, *see* Pettijohn, F. J., Potter, P. E., and Siever, Raymond
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Simmons, R. W., *see* Work, P. L., Stevens, O. D., and Simmons, R. W.
249. Simpson, H. M., 1974, Palynology and the vertical profile of sedimentation of lower Missourian strata, Tulsa County, Oklahoma [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 122. (Reprinted in *Oklahoma Geology Notes*, v. 34, p. 120.)
Simpson, H. M., *see* Meyers, W. C., and Simpson, H. M.
250. Simpson, L. C., 1974, Paleocology of the East Manitou site, southwestern Oklahoma: *Oklahoma Geology Notes*, v. 34, p. 15-27.
251. Smith, G. E., 1974, Sabkha and tidal-flat facies control of red-bed copper deposits in north Texas [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 122-123.
Smith, S. G., *see* Shaver, R. H., and Smith, S. G.
252. Society of Exploration Geophysicists, 1974, Geophysical activity in

- 1973: Geophysics, v. 39, p. 870-886, 15 tables. (Contains statistics on Oklahoma exploration in table 6, p. 881.)
253. Sondermayer, R. V., 1974, Thorium, *in* Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972: U.S. Bureau of Mines, p. 1201-1208.
- Soto, Carlos, *see* Dickey, P. A., and Soto, Carlos
254. Southard, L. G., 1974, The mineral industry of Oklahoma in 1973 (preliminary): Oklahoma Geology Notes, v. 34, p. 9-10.
255. Southard, L. G., Johnson, K. S., and Roberts, J. F., 1974, The mineral industry of Oklahoma, *in* Area reports: domestic, v. 2 of Minerals yearbook 1972: U.S. Bureau of Mines, p. 549-563, 11 tables.
- Spinosa, Claude, *see* Saunders, W. B., and Spinosa, Claude
- Stevens, O. D., *see* Work, P. L., Stevens, O. D., and Simmons, R. W.
256. Stoever, E. C., Jr., 1974, Incorporation of results of current crustal evolution studies into K-12 curricula: National Association of Geology Teachers: 48 p., illus. (Report of conference on K-12 crustal-evolution education held at Western Hills State Lodge, Oklahoma, September 16-18, 1974.)
257. Stoever, E. C., Jr., and Jones, R. M., 1973, A systems design for improvement of earth science instruction K-12: Geological Society of America Abstracts with Programs, v. 5, p. 823-824. (Concerns Oklahoma project.)
- Stonis, L. P., *see* Collins, R. J., McCowan, F. P., Stonis, L. P., and Petzel, G.
- Straka, J. J., II, *see* Lane, H. R., and Straka, J. J., II
258. Strimple, H. L., 1974, *Abyssocrinus* from the Haragan Formation (Devonian) of Southern Oklahoma: Oklahoma Geology Notes, v. 34, p. 160-162, 2 figs.
259. Strimple, H. L., and Nassichuk, W. W., 1974, Pennsylvanian crinoids from Ellsmere Island, Arctic Canada: Journal of Paleontology, v. 48, p. 1149-1155, 1 fig., 1 pl. (Refers to Oklahoma species.)
- Strimple, H. L., *see* Pabian, R. K., and Strimple, H. L.
260. Suhm, R. W., 1974, Stratigraphy of Everton Formation (early medial Ordovician), northern Arkansas: American Association of Petroleum Geologists Bulletin, v. 58, p. 685-707, 20 figs., 1 table. (Includes correlation with Simpson Group of Oklahoma; abstract printed in Petroleum Abstracts, v. 14, p. 726.)
261. Sutherland, P. K., 1974, Significance of the stratigraphic distribution of colonial rugose corals in the Pennsylvanian System of North America [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 124. (Reprinted in Oklahoma Geology Notes, v. 34, p. 120.)
262. Sutton, J. A., 1974, Columbium and tantalum, *in* Metals, minerals, and fuels, v. 1 of Minerals yearbook 1972, p. 461-471.
263. Sweet, W. C., and Bergström, S. M., 1974, Provincialism exhibited by Ordovician conodont faunas, *in* Ross, C. A. (editor), Paleogeographic provinces and provinciality: Society of Economic Paleontologists and Mineralogists Special Publication 21, p. 189-202, 8 figs.
264. Swenson, F. A., 1974, Rates of salt solution in the Permian basin: U.S. Geological Survey Journal of Research, v. 2, p. 253-257, 1 fig. (Abstract printed in Petroleum Abstracts, v. 14, p. 1118.)
265. Tanner, W. F., 1974, Bed-load transport in a chain of river segments:

- Shale Shaker, v. 24, p. 128-134, 5 figs. (Study of Arkansas River from Tulsa to river's mouth; abstract printed in Petroleum Abstracts, v. 14, p. 641.)
266. Taylor, J. A., 1974, Comparative analysis of Hunton oil and gas fields in Oklahoma and Texas [abstract]: American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists Annual Meetings Abstracts, v. 1, p. 89. (Reprinted in Petroleum Abstracts, v. 14, p. 913.)
- Taylor, M. E., *see* Yochelson, E. L., and Taylor, M. E.
267. Terrell, D. M., 1974, Trend and genesis of the Pennsylvanian Elgin Sandstone in the western part of northeastern Oklahoma, part 1: Shale Shaker, v. 24, p. 144-147, 3 figs.
268. Terrell, D. M., 1974, Trend and genesis of the Pennsylvanian Elgin Sandstone in the western part of northeastern Oklahoma, part 2: Shale Shaker, v. 24, p. 160-168, 6 figs., 4 tables. (Abstract printed in Petroleum Abstracts, v. 14, p. 1079.)
269. Thomas, J. B., 1973, Mineralogical dispersal patterns in the Vanoss Formation, south-central Oklahoma; University of Oklahoma unpublished Ph.D. dissertation, 162 p. (Abstract printed in Oklahoma Geology Notes, v. 35, p. 32-33.)
- Thomas, R. D., *see* Lorenz, P. B., Donaldson, E. C., and Thomas, R. D.
 Thomas, W. O., *see* Bingham, R. H., Bergman, D. L., and Thomas, W. O.
270. Thomas, W. O., Jr., and Corley, R. K., 1974, Floodflows from small drainage areas in Oklahoma: progress report and data compilation: U.S. Geological Survey open-file report, Oklahoma City, Oklahoma, 50 p., 19 figs., 8 tables.
271. Thompson, G. D., 1973, Petrography of a portion of the marine banks of the Oologah Limestone (Pennsylvanian), Tulsa County, Oklahoma, in "The Big Lime," southern margin of the Oologah Limestone banks: Tulsa Geological Society Guidebook, October 3, 1973, p. 3-5.
- Thompson, J. C., *see* Barrett, N. D., and Thompson, J. C.
272. Tien, P., 1973, Petrology and mineralogy of underclays in Cherokee Group (Middle Pennsylvanian), Kansas: University of Kansas unpublished Ph.D. dissertation, 138 p. (Study of Cabaniss and Krebs Formations; abstract printed in Dissertation Abstracts International, Pt. B, v. 34, p. 2719-B, 2720-B, and in Petroleum Abstracts, v. 14, p. 320.)
273. Tiratsoo, E. N., 1973, Oilfields of the world: Beaconsfield, England, Scientific Press Ltd., 376 p.
274. Toomey, D. F., 1974, The biota of the Pennsylvanian (Virgilian) Leavenworth Limestone, Midcontinent region, part 4: distribution of agglutinated and silicified Foraminifera: Journal of Paleontology, v. 48, p. 326-343, 3 figs., 4 pls. (Refers to Oklahoma Foraminifera; abstract printed in Petroleum Abstracts, v. 14, p. 817-818.)
275. U.S. Board on Geographic Names, 1974, Decisions on geographic names in the United States, January through March 1974, Decision List no. 7401: U.S. Department of the Interior, 27 p. (Names and defines Ivanhoe Creek.)
276. U.S. Board on Geographic Names, 1974, Decisions on geographic

- names in the United States, April through June 1974, Decision List no. 7402: U.S. Department of the Interior, 27 p. (Names and defines Seneca Creek.)
277. U.S. Bureau of Mines, 1974, Metals, minerals, and fuels, *v. 1 of Minerals yearbook 1972*, 1369 p.
278. U.S. Bureau of Mines, 1974, Statistical Summary, *in* Metals, minerals, and fuels, *v. 1 of Minerals yearbook 1972*: U.S. Bureau of Mines, p. 83-121.
279. U.S. Geological Survey, 1974, Summary of October 1973 rainstorm, Enid and vicinity, north-central Oklahoma: Oklahoma Geology Notes, v. 34, p. 209-212.
280. Valderrama, Rafael, 1974, The Skinner Sandstone zone in central Oklahoma: University of Tulsa unpublished M.S. thesis. (Abstract printed in Oklahoma Geology Notes, v. 35, p. 37.)
Veinus, Julia, *see* Brower, J. C., and Veinus, Julia
281. Visher, G. S., 1973, Use of vertical profile in environmental reconstruction, *in* Weimer, R. J. (compiler), Sandstone reservoirs and stratigraphic concepts: American Association of Petroleum Geologists Reprint Series No. 8, p. 86-106, 16 figs. (Includes Oklahoma sequences; first published in AAPG Bulletin, v. 49, p. 41-61.)
282. Waddell, D. E., Sanderson, G. A., and Ham, W. E., 1974, Stratigraphy of Buckhorn Limestone (Pennsylvanian) of southern Oklahoma [abstract]: American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists Annual Meetings Abstracts, v. 1, p. 94. (Reprinted in Petroleum Abstracts, v. 14, p. 913-914, and in Oklahoma Geology Notes, v. 34, p. 110-111.)
Walters, J., *see* Lago, O. K., and Walters, J.
283. Ward, D. C. (editor), 1973, Bibliography of theses in geology, 1967-1970: Geological Society of America Special Paper 143, 434 p.
284. Webster, G. D., 1973, Bibliography and index of Paleozoic crinoids, 1942-1968: Geological Society of America Memoir 137, 341 p.
285. Welch, J. R., 1974, Silver, *in* Metals, minerals, and fuels, *v. 1 of Minerals yearbook 1972*: U.S. Bureau of Mines, p. 1129-1142.
286. West, Jim, 1974, Explorers flock back to the Palo Duro: Oil and Gas Journal, v. 72, no. 43, p. 38-39, 1 fig.
287. Westerstrom, L. W., 1974, Coal—bituminous and lignite, *in* Metals, minerals, and fuels, *v. 1 of Minerals yearbook 1972*: U.S. Bureau of Mines, p. 329-393.
288. Westphal, K. W., 1974, New fossils from the Middle Ordovician Platteville Formation of southwest Wisconsin: Journal of Paleontology, v. 48, p. 78-83, 4 figs., 1 pl. (Refers to Oklahoma cystoid.)
Wheeler, R., Jr., *see* Kinchloe, R., Hefner, R. A., III, and Wheeler, R., Jr.
- Willis, D. G., *see* Hubbert, M. K., and Willis, D. G.
289. Wilson, L. R., 1974, Observations on the morphology and stratigraphic distribution of *Hamiapollenites* [abstract]: Geological Society of America Abstracts with Programs, v. 6, p. 130. (Reprinted in Oklahoma Geology Notes, v. 34, p. 121.)
290. Wood, S. O., Jr., and Fanelli, L. L., 1974, Natural gas liquids, *in*

- Metals, minerals, and fuels, *v. 1 of Minerals yearbook 1972*: U.S. Bureau of Mines, p. 849-870.
- Wood, S. O., Jr., *see* Zaffarano, R. F., and Wood, S. O., Jr.
291. Woodmansee, W. C., 1974, Uranium, *in* Metals, minerals, and fuels, *v. 1 of Minerals yearbook 1972*: U.S. Bureau of Mines, p. 1261-1285.
292. Work, P. L., Stevens, O. D., and Simmons, R. W., 1974, Digitized well logs in Morrow sand exploration: *Oil and Gas Journal*, v. 72, no. 7, p. 61-63, 7 figs.
293. Wroblewski, E. F., 1974, Developments in Oklahoma and Panhandle of Texas in 1973: *American Association of Petroleum Geologists Bulletin*, v. 58, p. 1592-1594, 1 fig., 2 tables.
294. Wu, D. C., 1974, Mineralogy and origin of a mixed-layer clay mineral in the Flowerpot Shale, Oklahoma: *Geological Society of China Proceedings*, no. 17, p. 57-65, 1 pl. (Abstract printed in *Petroleum Abstracts*, v. 14, p. 1410.)
295. Yochelson, E. L., and Taylor, M. E., 1974, Late Cambrian *Matthevia* (Mollusca, Matthevida) in North America [abstract]: *Geological Society of America Abstracts with Programs*, v. 6, p. 88. (Includes Oklahoma Upper Cambrian trilobite: reprinted in *Oklahoma Geology Notes*, v. 34, p. 121.)
296. Yost, Coyd, Jr., and Naney, J. W., 1974, Water quality effects of seepage from earthen dams: *Journal of Hydrology*, v. 21, p. 15-26, 3 figs., 2 tables. (Concerns dams on Washita River tributaries.)
297. Zaffarano, R. F., and Wood, S. O., Jr., 1974, Carbon black, *in* Metals, minerals, and fuels, *v. 1 of Minerals yearbook 1972*: U.S. Bureau of Mines, p. 237-245.
- Zartman, R. E., *see* Heyl, A. V., Landis, G. P., and Zartman, R. E.

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EAGLE-PICHER CLOSES CRETA COPPER MINE AND MILL

Eagle-Picher Industries, Inc., has shut down the open-pit copper mine it had operated at Creta in southwestern Oklahoma since 1965. The mine, located about 15 miles southwest of Altus in Jackson County, produced about 200,000 tons of ore annually. The ore is a chalcocite-bearing shale of Permian age that is about 7 inches thick, and the copper content averages about 2.3 percent.

The mine closing, according to company officials, resulted from lower copper prices and higher production costs. After reaching a record domestic price of about 87 cents a pound for electrolytic copper in June, July, and August 1974, the price of copper fell to about 63 cents a pound in March and April of 1975. The price reduction resulted from a copper surplus caused by the construction slump that began early in 1974 and accelerated during the second half of the year.

Rising production costs were standard for the mining industry during 1974-75; expenses for labor, materials, and mining operations were all higher at Creta. In addition, increased costs for smelting the copper concentrate in El Paso reduced the return to Eagle-Picher. Higher wages, more expensive materials, and the addition of pollution-control devices to minimize adverse environmental effects from the smelting of copper-sulfide ores combined to increase smelter costs.

Mining at Creta ceased February 23, and the 1,000-ton-per-day mill closed March 28. The future of the mine is undecided, but, inasmuch as there are still reserves on the property, it is possible for the mine to reopen if the demand for copper and the price of copper both increase.

—Kenneth S. Johnson

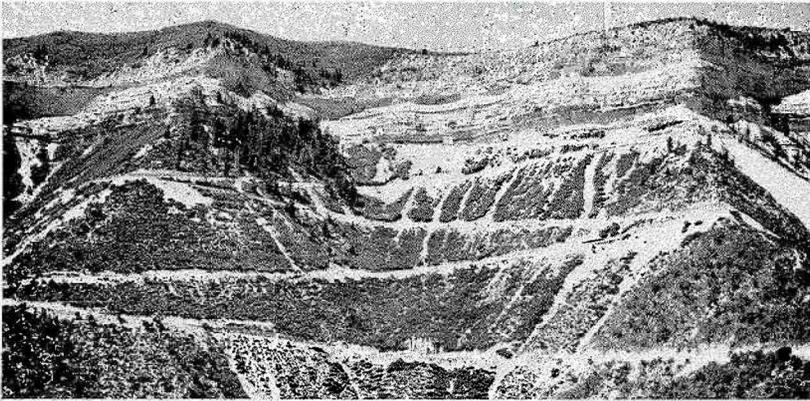
1975 Petroleum Encyclopedia Available

A publication date of July 1 has been announced for *International Petroleum Encyclopedia 1975*. The Petroleum Publishing Company, which also publishes the *Oil and Gas Journal*, bills their encyclopedia as the "oilman's total reference book" and affirms that it contains "more information . . . than any other single volume on petroleum."

In addition to updating information in last year's volume, the new edition features a rundown on the world's geothermal areas; a special section on the technology, pipeline facilities, new discoveries, and production potential of the North Sea area; a report on the outlook for synthetic natural gas; and new maps of the Gulf Coast of the United States.

Individual copies of the encyclopedia sell for \$37.50; orders should be addressed to The Petroleum Publishing Company, P.O. Box 1260, Tulsa, Oklahoma 74101.

Colorado Headquarters Set for OU Energy-Fuels Course



Switchback road leading to oil shales in cliff face, Piceance basin, near Rifle, Colorado.

For the third straight summer, Kenneth S. Johnson, economic and environmental geologist with the Oklahoma Geological Survey, will direct the Energy Fuels Field Course and Workshop sponsored by The University of Oklahoma School of Petroleum and Geological Engineering.

The 3-week course—actually three 1-week courses—will be held July 28-August 15. It is designed to explore the geologic setting and the energy-fuel resources of the Piceance basin, the Uinta basin, and the Uravan mineral belt—all on the north side of the Colorado Plateau and the western slope of the Rockies. Oil shales, nuclear fuels, nuclear stimulation, coal, petroleum, and asphalt will be major topics. Informal discussion and instruction by engineers and scientists actively engaged in energy production by current and experimental methods are invaluable aspects of the program.

Although enrollment is offered on the basis of 1, 2, or 3 weeks, last year 15 of the 17 participants attended the entire course sequence, and the others signed up for 2 weeks. The group taking the course consisted of 6 faculty members from other colleges and universities, 5 geology graduate students, 2 geography students, 1 physics major, and 3 engineering students. Academic credit is assigned at the rate of 1 credit hour per week of instruction.

Headquarters for the class will be in Grand Junction, Colorado, but participants will camp out four nights on the Colorado Plateau and in the Rocky Mountains. Scenic areas surrounding the Colorado, Dinosaur, Black Canyon of the Gunnison, and Arches National Monuments will be high points of the field excursions.

For additional information concerning the course, please contact Dr. Johnson at the Oklahoma Geological Survey, The University of Oklahoma, Norman, Oklahoma 73069 (phone 405/325-6541 or 325-3031).

Survey Director Appointed to NRC Panel

Charles J. Mankin, director of the Oklahoma Geological Survey and The University of Oklahoma School of Geology and Geophysics, was recently named to the National Research Council (NRC) Panel on Gas Reserve Estimates.

The panel was established as a result of a request made to the National Academy of Sciences (NAS) by the Secretary of the Interior. The Secretary asked for an evaluation of the techniques and procedures used by the Federal Power Commission, in cooperation with the U.S. Geological Survey, in preparing a report on gas reserves in shut-in leases on the outer continental shelf. The NRC, which is the research arm of the NAS, turned to one of its member boards, the Board on Mineral Resources, for assistance, and the creation of an 8-member panel (under the direction of Dr. Charles L. Drake of Dartmouth College) ensued.

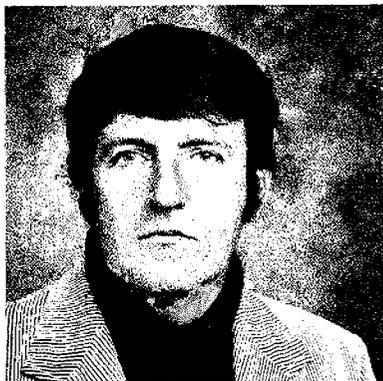
The Panel on Gas Reserve Estimates has already met twice, once in Dallas and once in New Orleans, and a second meeting is scheduled for New Orleans in July. That city was chosen because of the accessibility of data on shut-in leases. The group will restrict itself to data available to the Federal Power Commission staff in early 1974 when the agency made its study. The report issued by the FPC was severely criticized by some individuals, including several congressmen, for being biased toward the oil industry. Determining the validity of the charge will be the underlying task of the investigative panel.

Dr. Mankin is president of the Association of American State Geologists, and he served as co-chairman last year of the Crude Oil Committee for the Oklahoma Energy Advisory Council.

Robin Vaught Receives BEST Award

The National Association of Geology Teachers has selected Robin Eugene Vaught, a teacher at Broken Bow High School, for the BEST—Best Earth-Science Teacher in Oklahoma—Award.

The award is presented each year to reward excellence in earth-science teaching. John Naff, OSU professor of geology and chairman of the selection committee for the BEST Award, reports that approximately 30 teachers were nominated for the honor by their colleagues and their principals.



Mr. Vaught has been teaching for 15 years. He received his B.S. degree in education from Southeastern State College, Durant, Oklahoma; he was a

2-year participant in an NSF (National Science Foundation) earth-science institute at Oklahoma State University from 1970 to 1971; and he completed requirements for an M.S. degree from OSU in July 1973. He is a member of the Oklahoma Education Association, the Southwestern Naturalists Association, the American Society of Mammalogists, the Broken Bow Jaycees, and the McCurtain County Education Association. In 1969, he was named the Oklahoma Jaycees' Outstanding Young Educator.

Our compliments to Mr. Vaught for his fine work; we extend our congratulations to him on receipt of this recognition.

OKLAHOMA ABSTRACTS

AAPG-SEPM ANNUAL MEETINGS DALLAS, TEXAS, APRIL 7-9, 1975

The following abstracts are reprinted from The American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists *Annual Meetings Abstracts*, v. 2, April 1975. Page numbers are given in brackets below each abstract. Permission of the authors and of Gary Howell, AAPG managing editor, to reproduce the abstracts is gratefully acknowledged.

Rock Type Discrimination Using Radar Imagery

P. JAN CANNON, Bureau of Economic Geology, The University of Texas at Austin, Austin, Texas

Geologic mapping from radar imagery of the Wichita and Arbuckle Mountains of southern Oklahoma indicates that in areas of sparse to moderate vegetation, certain rock types can be readily discriminated on the radar imagery. They can be distinguished because the returns of radar energy from rock outcrops are strongly influenced by the geometry of the rock surfaces. The angular configuration exhibited by the outcrop is the most important factor in returning the propagated radar energy to an air-

OKLAHOMA ABSTRACTS is intended to present abstracts of recent unpublished papers relating to the geology of Oklahoma and adjacent areas of interest. The editors are therefore interested in obtaining abstracts of formally presented or approved documents, such as dissertations, theses, and papers presented at professional meetings, that have not yet been published.

borne receiver. The outcrop geometry can vary greatly between rock types due to the differences in grain size, rates of weathering, and structure. The scale of the outcrop geometry in relation to the wavelength of the propagated radar energy is also an influencing factor of importance. [8-9]

Middle Pennsylvanian (Strawn Group) Depositional Systems, North-Central Texas

ARTHUR W. CLEAVES, Department of Geology, Wayne State University, Detroit, Michigan

Fluvial and deltaic facies comprising the Strawn Group were deposited within the Fort Worth Foreland Basin and on the adjacent Concho Platform. Variations in the rates of subsidence within the adjacent basins led to development of unique sandstone geometry, facies distribution patterns and sandstone thickness.

Nine cycles of delta progradation and abandonment were delineated; 5,000 wells provided the principal source of data. Both high-constructive elongate and lobate deltaic facies have been recognized. Principal source areas include the Arbuckle Mountains of Oklahoma and the Ouachita Fold-belt of Texas.

When subsidence decreased within the Fort Worth Basin, deltas of the Strawn Group prograded across the foreland basin and onto the slowly subsiding Concho Platform. Deltaic facies deposited on the platform comprise thin (less than 200 feet thick), elongate, multilateral lobate delta systems. A typical vertical sequence of facies includes (upward) prodelta mudstone, delta front sheet sandstone, channel-mouth bar sandstone, distributary channel-fill sandstone and delta plain mudstone. Initial deltas prograded to the western edge of the Concho Platform; the Midland Basin to the west was poorly defined and no shelf-edge or slope facies of Middle Pennsylvanian age have been recognized.

High-constructive elongate delta systems (greater than 200 feet thick) were deposited in the northwestern end of the Fort Worth Basin during periods of active subsidence. These thicker deltas are characterized by linear, multistory sandstone bodies resembling barfinger sands of the Holocene Mississippi Delta. Incised, valley-fill fluvial deposits commonly overlie the high-constructive deltaic facies. [11-12]

Seismic Stratigraphic Model of Depositional Platform Margin, Eastern Anadarko Basin

W. E. GALLOWAY, M. S. YANCEY, and A. P. WHIPPLE, Continental Oil Company, Ponca City, Oklahoma

Three-dimensional stratigraphic analysis of cratonic basin margins has, in recent years, demonstrated complex interrelationships between shelf, shelf edge, and basalinal facies. Application of seismic stratigraphic modeling has proved useful in analyzing the geometry of a cratonic platform margin in the Hoxbar Group (Missourian) of the eastern Anadarko Basin.

Seismic modeling requires four principal steps: (1) Tabulation of petrophysical parameters of the lithologies included in the model; (2) Construction of a series of model stratigraphic sequences along a line of section; (3) Generation of synthetic seismograms for each model sequence; (4) Comparison of the synthetic traces with corresponding field traces. Results of such a model study, combined with subsurface geologic data, suggest the following interpretation of Hoxbar platform evolution.

A progradational deltaic platform extended westward into the basin, producing an initial relief of approximately 500 feet (Phase I). Abandonment of the delta resulted in compactional subsidence and deposition of shallow water carbonates along the platform margin (Phase II). Contemporaneous with carbonate deposition on the platform, terrigenous clastic sediment accumulated on the basin floor as a submarine fan complex. Renewed influx of terrigenous sediment produced a second cycle of deltaic progradation, which extended across the carbonate shelf as a rapidly deposited, thin clastic veneer and constructed a thick progradational wedge basinward of the subjacent platform edge (Phase III). This younger progradational wedge is capped by distributary channel and delta margin sands of a fluvial-dominated, lobate delta system.

[28-29]

Ammonoids of the Upper Wapanucka Limestone and Their Bearing on the Morrowan-Atokan Boundary in Oklahoma

MACKENZIE GORDON, JR., U.S. Geological Survey, Washington, D. C., and
PATRICK K. SUTHERLAND, The University of Oklahoma, Norman, Oklahoma

Ammonoids from the upper part of the Wapanucka Limestone are latest Morrowan in age. A small collection of these fossils was made by Sutherland from a roadcut on the Indian Nations Turnpike, 13.4 miles northwest of Daisey, Oklahoma, in the frontal Ouachita Mountains. The ammonoids include *Gastrioceras* sp., *Diaboloceras neumeieri* Quinn and Carr, *Christioceras?* sp., *Proshumardites morrowanus* Gordon, and *Stenopronorites arkansiensis* (Smith), as identified by Gordon. These are typical of the *Diaboloceras neumeieri* Zone, which, in the type Morrowan section of northwest Arkansas, is found in the upper part of the Trace Creek Member of the Bloyd Shale and is the highest Morrowan ammonoid zone.

Data from collections of the U.S. Geological Survey indicate that the underlying *Axinolobus modulus* Zone of middle Bloyd age is represented in the middle part of the Wapanucka Limestone and the *Branneroceras branneri* Zone of early Bloyd (Brentwood) age probably has equivalents in the lower part of the formation. Two species of *Gastrioceras* of Brentwood age are also fairly common in the upper few hundred feet of the underlying Springer Shale of the frontal belt.

This evidence indicates a lateral equivalence of the Wapanucka Limestone with most of the Bloyd Shale, excluding only the lower part of the Brentwood Limestone Member. It would preclude the correlation of any part of the Wapanucka with the Atoka Formation, or any part of the Atoka, including the Barnett Hill Formation and its zone of *Profusulinella*, with the type Morrowan.

[30]

Evaporites from the Sea? A Western Kansas Permian Enigma

KATRINE A. HOLDOWAY, University of Kansas, Lawrence, Kansas

An unusual red-bed evaporite sequence of the Nippewalla Group, upper Leonardian, Permian, in Wichita County, Kansas, was cored for the Atomic Energy Commission in 1972. The core is 170 meters long, and extends upwards from the Harper and Salt Plains Siltstones, through the Cedar Hills Sandstone, Flowerpot Shale and the Blaine Formation. In the core, the Harper and Salt Plains Siltstones and the Cedar Hills Sandstone are typical red-bed deposits, frequently cemented by halite. Overlying the Cedar Hills, the sediments corresponding to the Flowerpot Shale and the Blaine Formation are composed of fine to coarsely crystalline halite crystals, which are intimately associated with varying amounts of red, silty mudstone.

The bromine concentration of the halite is very low throughout the section, frequently being less than 5 ppm. The textural and stratigraphic relationships of the sediments suggest that this is not the result of widespread post-depositional recrystallization.

The low bromine concentration of the halite, minor amount of carbonate in the sequence, and the intimate association of evaporites with red-beds suggest that the deposition of these sediments took place in a continental basin, which was subject to occasional flooding by the sea.

[36]

Stratigraphy of the Permian Blaine Formation and Associated Strata in North-Central Texas

K. S. JOHNSON, Oklahoma Geological Survey, Norman, Oklahoma, W. D. WOLFE, U.S. Army Corps of Engineers, Tulsa, Oklahoma, and M. V. SMITH, U.S. Army Corps of Engineers, Tulsa, Oklahoma

A Permian red bed-evaporite sequence, consisting of (ascending order) the San Angelo, Flowerpot, Blaine, and Dog Creek Formations, comprises 600 to 700 feet of strata cropping out on the northeast shelf of the Permian basin. The three uppermost formations were previously called the "Blaine of Texas," but they can be subdivided now on the basis of cores and detailed field work. The proposed subdivisions are consistent with nomenclature and stratigraphic concepts used for these same formations northward for 300 miles along their outcrops into Oklahoma and Kansas.

A complete cycle of evaporite deposition in the region includes (ascending) dolomite, gypsum/anhydrite, salt (halite), red-brown shale, and gray shale. Individual beds in each cycle are typically 3-20 feet thick. The main part of the evaporite sequence contains 15 to 20 complete or partial cycles.

Strata dip gently to the southwest into the basin, but outcropping units are collapsed and disturbed where soluble evaporite layers have been dissolved by ground water. Gypsum layers have been removed at a number of places at and near the outcrop, and salt layers have been dissolved where they are within 500 to 800 feet of the present surface: these solution and collapse features locally obscure the stratigraphic and structural relations.

[39-40]

Evidence for and Use of the Model of a Hot Deep Origin of Petroleum in Exploration

L. C. PRICE, U.S. Geological Survey, Geologic Division, Office of Energy Resources, Branch of Oil and Gas Resources, Denver Federal Center, Bldg. 25, Rm. 2403, Denver Colorado

The model of a hot deep origin of petroleum places rigid constraints on the migration and entrapment of crude oil. Specifically, oil escaping from depth must migrate vertically along faults and be emplaced in suitable traps at shallower horizons. This model predicts that petroleum accumulations are situated in traps adjacent to and updip from faults extending into the basin deep. The model also predicts several new exploration plays, the major one being stratigraphic trapping updip from major faults. Empirical evidence from petroleum basins worldwide is consistent with such a model.

The basin structural style governs the distribution, types, and amounts of hydrocarbons expected and thus the exploration strategy. For example, production from Tertiary depocenters (U.S. Gulf Coast, Niger Delta) is from structures associated with major growth faults, and structures not associated with such faulting are barren. Production in block-faulted basins is from horst blocks next to deep troughs (Central Basin Platform of West Texas and the Sirte basin, Libya). Major accumulations are also found in traps adjacent to basin-margin upthrusts (Southern Oklahoma and some Laramide basins of the Rocky Mountains). In highly structured basins (Los Angeles and Ventura) the main oil occurrences can be specifically predicted by analysis of both the fault systems and possible hydrocarbon migration routes. This model also applies to prospecting on the stable shelf (Western Canada and Anadarko Shelf). There hydrocarbons from the deep basin undergo long lateral migration and are emplaced in a generally predictable manner in laterally continuous reservoirs and are not charged into isolated reservoirs from a local source. [60-61]

The Significance of Light Mineral Fractions in Sandstone Provenance Studies

JOHN B. THOMAS, Department of Geology, College of William and Mary, Williamsburg, Virginia

It is common for much emphasis to be placed on the suite of heavy minerals when studying sandstone provenance. Less value is placed on clay mineral and light mineral fractions of the same rock. A detailed study of the Permo-Pennsylvanian Vanoss Formation in south-central Oklahoma was undertaken to test the validity of this generalization and to map its mineralogic dispersal patterns.

Since the source rocks for the Vanoss are exposed in the Arbuckle Mountains, it is possible to compare directly source rock mineralogy to that of the Vanoss Formation. Without knowledge of the two principal sources; (1) the pre-Vanoss Paleozoic sedimentary rocks and (2) the Precambrian "core" granites of the Arbuckles, interpretations as to the nature of the source rocks would have been incorrect.

Dominant in the non-opaque heavy minerals are zircon, tourmaline, rutile and garnet. These minerals are found in both known source rock complexes, but their presence in the Vanoss implies either a sedimentary, metamorphic or mixed sedimentary-metamorphic source. Intrastratal solution has removed most of the heavies which would have been diagnostic of the igneous source.

Diagenesis has obscured the original clay mineralogy of the Vanoss, too. Only in more argillaceous portions of the Formation has kaolinitization not completely destroyed the original clay suite.

The light mineral fraction is zoned into carbonate-chert rock fragment material in westernmost outcrops of the Vanoss, a mixed carbonate-silicate clastic phase in the middle and a quartz-feldspar granite rock fragment suite along the eastern outcrop margins. According to Slemmons (1962) the high ratios of albite-to Carlsbad-twinned plagioclase is a good metamorphic indicator. High ratios in the Vanoss, however, are found to be due to disintegration of the coarser, simple Carlsbad twins during transport from the granitic source.

It is concluded, therefore, that the mineralogy of the light mineral fraction should be carefully considered in future provenance studies of sandstones, especially when comparison to the original source rocks is impossible. [73-74]

Geotectonic Evolution of Fort Worth Basin

JACK L. WALPER, Texas Christian University, Fort Worth, Texas

The Fort Worth basin had its origin in the culminating Ouachita orogeny which formed as the result of a sequence of Paleozoic tectonic events and associated sedimentation. A Precambrian continent, composed of what is now North and South America and Africa, rifted forming a proto-Atlantic Ocean. Thermal doming associated with this rifting produced the Wichita and Delaware aulacogens of Oklahoma and West Texas respectively. Epeiric seas transgressed the retreating and subsiding plate margin flooding into the aulacogens, as they subsided more rapidly, to deposit the thick carbonates of Cambro-Ordovician age in Texas and Oklahoma. Subsequent closing of the proto-Atlantic began with subduction along the North American margin of this sea, forming volcanic arcs that supplied clastic detritus for the "Ouachita facies" of the early Paleozoic. It is suggested that, as the Afro-South American plate collided with the volcanic arcs, an orogenic welt grew and was thrust toward the craton. This orogenic welt and back-arc thrust belt supplied the early synorogenic deposits of the Stanley-Jackfork sequence and its correlatives. As plate collision continued the orogen grew and was thrust cratonward, particularly where it encountered the weaker, aulacogen zones, composed of a thick, incompetent sedimentary prism. Broad dilation arcs of thrust faults and folds comprising the Ouachita and Marathon salients formed in these areas. In areas where the craton was rigid and stable, as was the Texas craton, the advancing plate impinged against this buttress forming pericratonic basins such as the Kerr and Fort Worth. Here the early-formed synorogenic sequence or flysch was crushed and thrust against the cratonic margin which subsided along a

series of migrating hinge lines, under the onslaught of the advancing tectonic belt to allow for the deposition of a postorogenic or molasse sequence represented by the Atoka and Strawn Series.

[78]

GSA ANNUAL MEETING, NORTH-CENTRAL SECTION
WATERLOO, ONTARIO, MAY 15-17, 1975

The following abstract is reprinted from the *Abstracts with Programs* of The Geological Society of America, v. 7, no. 6. The page number is given in brackets below the abstract. Permission of the authors and of Mrs. Jo Fogelberg, managing editor of GSA, to reproduce the abstract is gratefully acknowledged.

Exceptional Radiolaria and Associated Conodonts from the Sycamore Limestone, Arbuckle Mountains, Oklahoma

ALLEN R. ORMISTON and H. RICHARD LANE, Research Center, Amoco Production Company, P.O. Box 591, Tulsa, Oklahoma

An abundant (40,000 specimens) and diverse ($D=0.8$) fauna of exceptionally preserved Radiolaria has been recovered together with conodonts from a burrowed lime mudstone near the base of the Sycamore Limestone. Ten spumellarine and three albailellarine genera are present. Some of these have European Lower Carboniferous occurrences; others are new. The Sycamore Radiolaria supply data on structure and variability conducive to a more rational taxonomy of Paleozoic Radiolaria.

This Sycamore radiolarian fauna is associated at its lowest occurrence with *Gnathodus punctatus* Zone conodonts assignable to the *Siphonodella* biofacies of Druce (1973) and 35 feet higher with a younger Osage, gnathodid-dominated fauna. The equivalent interval in the Lawrence Uplift (pre-Welden Shale, Welden Limestone, and, possibly, part of the post-Welden Shale) contains abundant conodont faunas with more varied platform elements but no Radiolaria.

The presence of a low-diversity, gnathodid-dominated conodont fauna, seemingly analogous with gnathodid-rich Permian faunas regarded as shallow water by Clark (1974), seems incongruous in a radiolarian-rich lime mudstone which is extensively burrowed by *Scalarituba* and *Zoophycos*, devoid of shelled benthos, and has other biotic and sedimentary attributes incompatible with a shallow setting. Although the common equation of abundant Radiolaria and deep water settings is questionable in light of Casey's (1971) studies of modern radiolarian distributions, the radiolarian horizons in the Sycamore seem at least to qualify as intermediate-depth deposits. The Sycamore example may be a warning against facile analogies of conodont environmental requirements through time.

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AAPG Researches Oil Probability

The Kansas Geological Survey and Stanford University are sponsoring a conference that will survey the application of probability methods to oil exploration. The American Association of Petroleum Geologists Computer Application Committee is assisting with arrangements for the August 21-22 meeting, which has been set up as an AAPG Research Conference, and Stanford University, Stanford, California, will be the site.

Topics for discussion include statistical forecasting of the volume of undiscovered oil and gas in sedimentary basins; the use of statistical methods for the combined analysis of structural, stratigraphic, geophysical, and production data; statistical relationships between oil-field size and sequence of discoveries; estimating numerical probabilities of favorable results for specific oil plays and prospects before drilling; the state of the art in computer mapping and analysis; the use of computer well-data systems in subsurface mapping; and the statistical assessment of the reliability of exploration maps.

John C. Davis, Geologic Research Section, Kansas Geological Survey, and John W. Harbaugh, Professor of Applied Earth Sciences, Stanford University, are the conference conveners. For additional information, please contact Dr. Harbaugh, Department of Applied Earth Sciences, Stanford University, Stanford, California 94305.

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