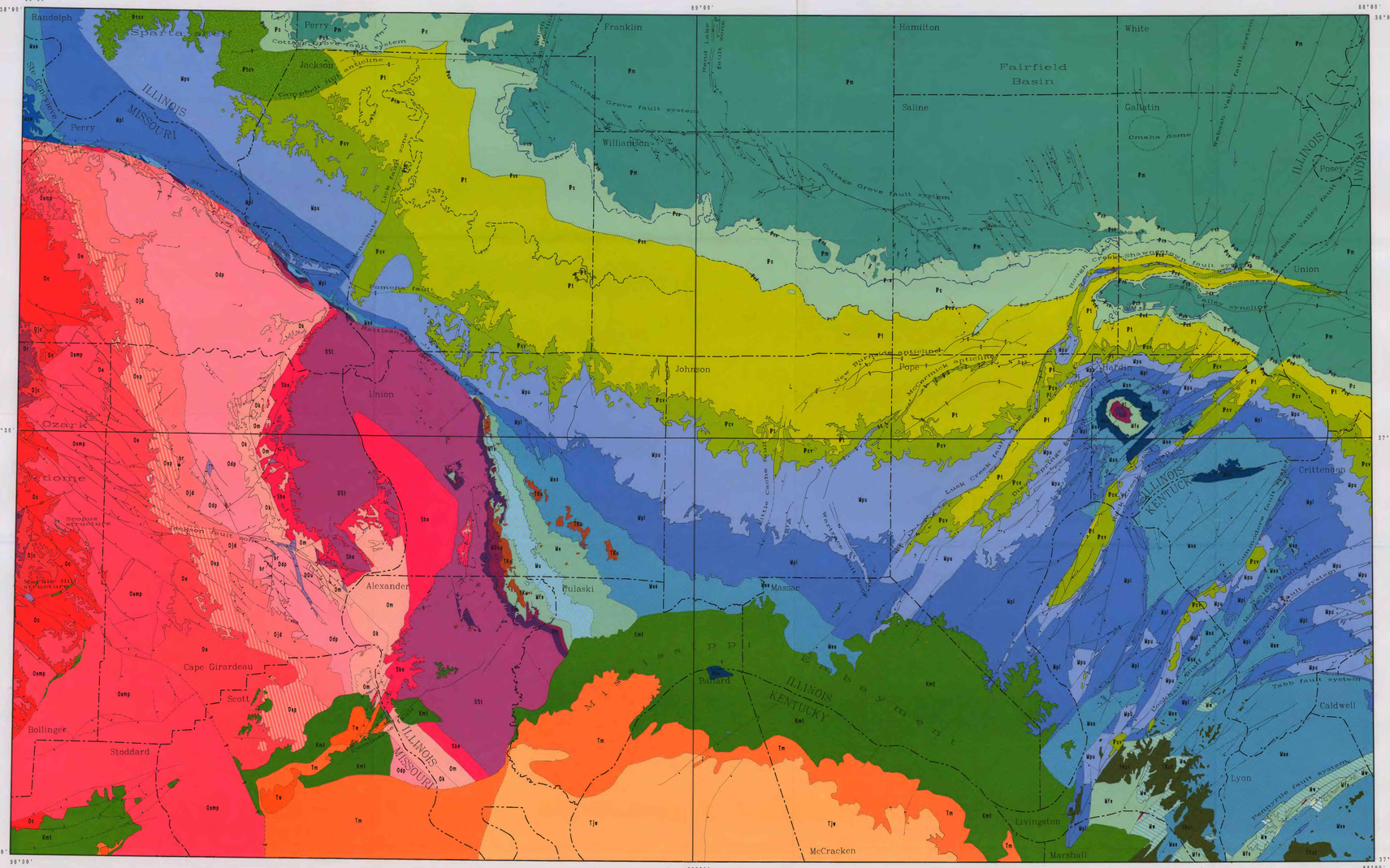

Digital geologic data prepared with ARC/INFO 7.0.4 running on a Sun workstation (Solaris 2.4)

SCALE 1:250 000

5 0 5 10 15 20 25 MILES

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Digital cartography by Barbara J. Stiff, Illinois State Geological Survey Champaign, Illinois

Bibliographic data for index map showing sources of geologic data (shown above)

1 Amos, D.H., 1965, Geology of the Shelterville and Rosiclare quadrangles, Livingston and Crittenden Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-400.

2 ——1966, Geologic map of the Golconda and Brownfield quadrangles, Livingston County, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-546.

3 ——1967, Geologic map of the Smithland quadrangle, Livingston County, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-657.

4 ——1974, Geologic map of the Burna quadrangle, Livingston County, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1150.

5 ——1981a, Geologic map of the Dongola quadrangle, Bollinger and Stoddard Counties, Missouri: U.S. Geological Survey Geologic Quadrangle Map GQ-1363.

6 ——1981b, Geologic map of the Whitewater quadrangle, Bollinger and Cape Girardeau Counties, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1256.

7 ——1981c, Geologic map of the Chaffee quadrangle, Scott and Cape Girardeau Counties, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1316.

8 ——1982a, Geologic map of the Millersville quadrangle, Cape Girardeau and Bollinger Counties, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1459.

9 ——1982b, Geologic map of the Buffordville quadrangle, Cape Girardeau and Bollinger Counties, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1385.

10 ——1984, Geologic map of the Sedgewickville quadrangle, Bollinger and Perry Counties, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1674.

11 ——1985a, Geologic map of the Crosstown 7.5-minute quadrangle, Perry County, Missouri: Missouri Geological Survey Open-File Map 85-222-GI.

12 ——1985b, Geologic map of the Rockwood 7.5-minute quadrangle, Perry County, Missouri: Missouri Geological Survey Open-File Map 85-223-GI.

13 ——1985c, Geologic map of the Altenburg 7.5-minute quadrangle, Perry County, Missouri: Missouri Geological Survey Open-File Map 85-221-GI.

14 ——1985d, Geologic map of the Centerville quadrangle, Cape Girardeau County, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1823.

15 ——1986a, Geologic map of the Belgique 7.5-minute quadrangle, Perry County, Missouri: Missouri Geological Survey Open-File Map 86-234-GI.

16 ——1986b, Geologic map of the Kaskaskia 7.5-minute quadrangle, Ste. Genevieve County, Missouri: Missouri Geological Survey Open-File Map 85-232-GI.

17 ——1986c, Geologic map of the Lithium 7.5-minute quadrangle, Perry and Ste. Genevieve Counties, Missouri: Missouri Geological Survey Open-File Map 86-233-GI.

18 ——1986d, Geologic map of the Perryville East 7.5-minute quadrangle, Perry County, Missouri: Missouri Geological Survey Open-File Map.

19 ——1987a, Geologic map of the Marble Hill quadrangle, Bollinger County, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1900.

20 ——1987b, Geologic map of the Scopus quadrangle, Bollinger County, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1910.

21 ——1987c, Geologic map of the Jackson quadrangle, Cape Girardeau County, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1935.

22 ——1987d, Geologic map of the Friedheim quadrangle, Cape Girardeau, Bollinger, and Perry Counties, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1905.

23 Amos, D.H., and Blankenship, D.D., 1980a, Geologic map of the Bell City quadrangle, Stoddard and Scott Counties, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1206.

24 ——1980b, Geologic map of the Advance quadrangle, Stoddard and Bollinger Counties, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1197.

25 Amos, D.H., and Finch, W.I., 1968, Geologic map of the Calvert City quadrangle, Livingston and Marshall Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-731.

26 Amos, D.H., and Hays, W.H., 1974, Geologic map of the Dycusburg quadrangle, Crittenden, Livingston, and Lyon Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1149.

27 Amos, D.H., and Wolfe, E.W., 1966, Geologic map of the Little Cypress quadrangle, Livingston, Marshall, and McCracken Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-554.

28 Baxter, J.W., and Desborough, G.A., 1965, Areal geology of the Illinois Fluorspar district, Part 2—Karbers Ridge and Rosiclare quadrangles: Illinois State Geological Survey Circular 385, 40 p.

29 ——1967, Areal geology of the Illinois Fluorspar district, Part 3—Herod and Shelterville quadrangles: Illinois State Geological Survey Circular 413, 41 p.

30 Baxter, J.W., Potter, P.E., and Doyle, F.L., 1963, Areal geology of the Illinois Fluorspar district, Part 1—Saline Mines, Cave in Rock, Dekoven, and Repton quadrangles: Illinois State Geological Survey Circular 342, 43 p.

31 Bristol, H.M., and Treworgy, J.D., 1979, The Wabash Valley fault system in southeastern Illinois: Illinois State Geological Survey Circular 509, 19 p., map scale approximately 1:400,000.

32 Desborough, G.A., 1961, Geology of the Pomona quadrangle, Illinois: Illinois State Geological Survey Circular 32, 16 p.

33 Devera, J.A., 1991, Geologic map of the Glendale quadrangle, Johnson and Pope Counties, Illinois: Illinois State Geological Survey Map IGQ-9.

34 ——1994, Geologic map of the Wolf Lake quadrangle: Illinois State Geological Survey, IGQ series.

35 ——in press, Geologic map of the Tamms quadrangle, Alexander County, Illinois: Illinois State Geological Survey, IGQ series.

36 ——in press; Geologic map of the Gorham and Altenburg quadrangles, Jackson County, Illinois: Illinois State Geological Survey, IGQ series.

37 Devera, J.A., and Nelson, W.J., in press, Geologic map of the Cobden quadrangle, Jackson and Union Counties, Illinois: Illinois State Geological Survey, IGQ series.

38 ——in press, Geologic map of the Jonesboro and Ware quadrangles, Union County, Illinois: Illinois State Geological Survey, IGQ series.

39 ——in press, Geologic map of the Merrmet quadrangle, Johnson and Massac Counties, Illinois: Illinois State Geological Survey, IGQ series.

40 Dal, D.C., 1963, The geology of the NW1/4 of the Vienna quadrangle: Carbondale, Southern Illinois University, M.S. thesis, 66 p.

41 Finch, W.I., 1966, Geologic map of the Paducah West and Metropolis quadrangles, McCracken County, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-557.

42 ——1967, Geologic map of the Joppa quadrangle, McCracken County, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-652.

43 Gause, J.C., 1966, Areal geology of the Reevesville quadrangle: Carbondale, Southern Illinois University, M.S. thesis, 137 p.

44 Harrison, R.W., in press, Geologic map of the Thebes quadrangle, Illinois and Missouri: U.S. Geological Survey Geologic Quadrangle Map.

45 Hays, W.H., 1964, Geology of the Grand Rivers quadrangle, Lyon and Livingston Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-328.

46 Jacobson, R.J., 1989, Geologic map of the Goreville quadrangle, Johnson and Williamson Counties, Illinois: Illinois State Geological Survey Map IGQ-7.

47 Jacobson, R.J., and Weibel, C.P., 1993, Geologic map of the Makanda quadrangle, Jackson, Union, and Williamson Counties, Illinois: Illinois State Geological Survey Map IGQ-11.

48 Johnson, W.D., 1985a, Geologic map of the Scott City quadrangle and part of the Thebes quadrangle, Scott and Cape Girardeau Counties, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1803.

49 ——1985b, Geologic map of the Oran quadrangle, Scott and Stoddard Counties, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1804.

50 ——1985c, Geologic map of the Morley quadrangle, Scott County, Missouri: U.S. Geological Survey Miscellaneous Field Studies Map MF-1805.

51 Kehn, T., 1974, Geologic map of the Dekoven and Saline Mines quadrangles, Crittenden and Union Counties, Kentucky: U.S. Geological Survey and Kentucky Geological Survey Geologic Quadrangle Map GQ-1147.

52 Keys, J.N., and Nelson, W.J., 1980, The Rend Lake fault system in southern Illinois: Illinois State Geological Survey Circular 513, 23 p., map scale approximately 1:24,000.

53 Kolata, D.R., 1990, Geology of the southwest quarter of the Murphysboro quadrangle, Illinois: Carbondale, Southern Illinois University, M.S. thesis, 84 p.

54 Lamar, J.E., 1925, Geology and mineral resources of the Carbondale quadrangle: Illinois State Geological Survey Bulletin 48, 172 p.

55 McCormick, L.M., 1967, Bedrock geology of the NW1/4 of the Dongola quadrangle: Carbondale, Southern Illinois University, M.S. thesis, 114 p.

56 Middendorf, M.A., 1989, Preliminary geologic map of the Ware quadrangle, Missouri: Missouri Geological Survey, unpublished map.

57 Middendorf, M.A., and Whitfield, J.W., 1989a, Preliminary geologic map of the Perryville West quadrangle, Missouri: Missouri Geological Survey, unpublished map.

58 ——1989b, Preliminary geologic map of the Oak Ridge quadrangle, Missouri: Missouri Geological Survey, unpublished map.

59 Middendorf, M.A., Whitfield, J.W., and Robertson, C.E., 1988, Bedrock geologic map of the Cape Girardeau Northeast quadrangle, Cape Girardeau County, Missouri: Missouri Geological Survey, unpublished map.

60 Nelson, W.J., 1994, Geologic map of the Bloomfield quadrangle, Johnson County, Illinois: Illinois State Geological Survey Map IGQ-10.

61 ——in press, Geologic map of the Dongola quadrangle, Alexander and Union Counties, Illinois: Illinois State Geological Survey, IGQ series.

62 ——in press, Geologic map of the Reeversville quadrangle, Johnson, Massac, and Pope Counties, Illinois: Illinois State Geological Survey, IGQ series.

63 Nelson, W.J., Devera, J.A., and Masters, J.M., in press, Geologic map of the Mill Creek and McClure quadrangles, Alexander and Union Counties, Illinois: Illinois State Geological Survey, IGQ series.

64 Nelson, W.J., and Krausse, H.F., 1981, The Cottage Grove fault system in southern Illinois: Illinois State Geological Survey Circular 522, 65 p.

65 Nelson, W.J., and Lumm, D.K., 1986a, Geologic map of the Shawneetown quadrangle, Gallatin County, Illinois: Illinois State Geological Survey Map IGQ-1.

66 ——1986b, Geologic map of the Equality quadrangle, Gallatin and Saline Counties, Illinois: Illinois State Geological Survey Map IGQ-2.

67 ——1986c, Geologic map of the Rudement quadrangle, Saline County, Illinois: Illinois State Geological Survey Map IGQ-3.

68 ——1989a, Geologic map of the Eddyville quadrangle, southern Illinois: Illinois State Geological Survey Map IGQ-5.

69 ——1989b, Geologic map of the Stonefort quadrangle, southern Illinois: Illinois State Geological Survey Map IGQ-6.

70 Olive, W.W., 1966a, Geologic map of the Heath quadrangle, McCracken and Ballard Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-561.

71 ——1966b, Geologic map of the Paducah East quadrangle, McCracken and Livingston Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-531.

72 ——1969, Geologic map of the Bandana and Olmsted quadrangles, McCracken and Ballard Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-799.

73 ——1971, Geologic map of parts of the Cairo and Barlow quadrangles, Ballard County, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-885.

74 Palmer, J.E., 1976, Geologic map of the Grove Center quadrangle, Kentucky-Illinois, and part of the Shawneetown quadrangle, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1314.

75 Pryor, W.A., and Ross, C.A., 1962, Geology of the Illinois parts of the Cairo, La Center, and Thebes quadrangles: Illinois State Geological Survey Circular 332, 39 p., map scale 1:62,500.

76 Rogers, W.B., 1963, Geology of the Eddyville quadrangle, Lyon and Caldwell counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-255.

77 Rogers, W.B., and Hays, W.H., 1967, Geologic map of the Fredonia quadrangle, Caldwell, Crittenden, and Lyon Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-607.

78 Ross, C.A., 1964, Geology of the Paducah and Smithland quadrangles in Illinois: Illinois State Geological Survey Circular 360, 32 p., map scale 1:62,500.

79 Satterfield, I.R., 1973, Bedrock geologic map of the Cape Girardeau and McClure quadrangles, southeastern Missouri: Missouri Division of Geology and Land Survey Open-File Map OFM-82-73-GI.

80 Seeland, D.A., 1968, Geologic map of the Repton quadrangle, Crittenden County, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-754.

81 Smith, W.H., 1957, Strippable coal reserves of Illinois, Part 1—Gallatin, Hardin, Johnson, Pope, Saline, and Williamson Counties: Illinois State Geological Survey Circular 228, 39 p., map scale 1:126,720.

82 ——1958, Strippable coal reserves of Illinois, Part 2—Jackson, Monroe, Perry, Randolph, and St. Clair Counties: Illinois State Geological Survey Circular 260, 35 p., map scale 1:126,720.

83 Smith, W.H., and Sprouls, E.P., [date unknown], Map of coal seams in part of southwestern Illinois: Illinois State Geological Survey, unpublished report.

84 Sonnefeld, R.D., 1981, Geology of northwestern Jackson County, with special emphasis on the Caseyville Formation: Carbondale, Southern Illinois University, M.S. thesis, 84 p.

85 Tanner, G.F., Stellavato, J.N., and Markey, J.C., 1980, Map of southern Posey County, Indiana, showing structure on Cypress Formation: Illinois State Geological Survey Miscellaneous Map 31, scale 1:31,680.

86 Swanson, R.W., 1978, Geologic map of the La Center quadrangle, Ballard and McCracken Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-141.

87 Taylor, R.F., 1967, Areal geology of the Brownfield quadrangle, southeastern Illinois: Carbondale, Southern Illinois University, M.S. thesis, 103 p.

88 Trace, R.D., 1962, Geology of the Salem quadrangle, Crittenden and Caldwell Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-547.

89 ——1966, Geologic map of the Marion quadrangle, Crittenden and Caldwell Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-547.

90 ——1974, Geologic map of the Cave-in-Rock quadrangle, Crittenden County, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1201.

91 ——1976, Geologic map of the Lola quadrangle, Crittenden and Livingston Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1288.

92 Trask, C.B., and Jacobson, R.J., 1989, Geologic map of the Creal Springs quadrangle, Johnson and Williamson Counties, Illinois: Illinois State Geological Survey Map IGQ-4.

93 Weibel, C.P., and Nelson, W.J., in press, Geologic map of the Lick Creek quadrangle, southern Illinois: Illinois State Geological Survey , IGQ series.

94 Weibel, C.P., Nelson, W.J., and Devera, J.A., 1991, Geologic map of the Waltersburg quadrangle, Pope County, Illinois: Illinois State Geological Survey Map IGQ-8.

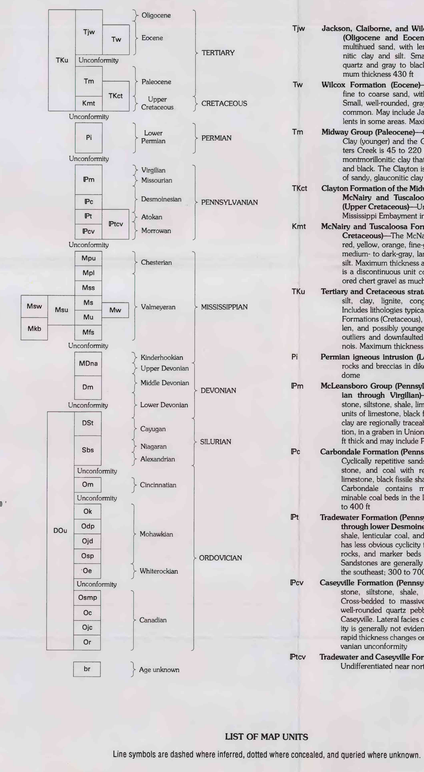
95 Weller, S., and Krey, F.F., with contribution by Weller, J.M., 1939, Preliminary geologic map of the Mississippian formations in the Dongola, Vienna, and Brownfield quadrangles: Illinois State Geological Survey Report of Investigations 60, 11 p., map scale 1:62,500.

96 Weller, S., and Weller, J.M., 1939, Preliminary geological maps of the pre-Pennsylvanian formations in part of southwestern Illinois—Waterloo, Kimmswick, New Athens, Crystal City, Renault, Baldwin, Chester, and Campbell Hill quadrangles: Illinois State Geological Survey Report of Investigations 59, 15 p., map scale 1:62,500.

97 Whitfield, J.W., and Middendorf, M.A, 1988, Bedrock geologic map of the Neelys Landing quadrangle, Cape Girardeau and Perry Counties, Missouri: Missouri Geological Survey, unpublished report.

98 Not mapped; no outcrops.

CORRELATION OF MAP UNITS



LIST OF MAP UNITS

Line symbols are dashed where inferred, dotted where concealed, and queried where unknown.

- Tjw — Jackson, Claiborne and Wilcox Formations
- Tw — Wilcox Formation (in Scott and Stoddard Counties, Missouri)
- Tm — Midway Group
- TKct — Clayton and McNairy Formations and Tuscaloosa Gravel
- Kmt — McNairy Formation and Tuscaloosa Gravel (in Illinois)
- TKu — Tertiary and Cretaceous strata undivided (in Alexander and Union Counties, Illinois)
- Pi — Permian igneous intrusion
- Permian igneous dike
- Permian intrusion along a fault
- IPm — McLeansboro Group
- IPc — Carbondale Formation
- IPt — Tradewater Formation
- IPcv — Caseyville Formation
- IPtcv — Tradewater and Caseyville Formations
- IPch — Herrin Coal Member or coal bed
- IPcs — Springfield Coal Member or coal bed
- IPcc — Colchester Coal Member
- IPcd — Davis Coal Member or coal bed
- IPcm — Murphysboro Coal Member (in Tradewater Formation)
- Mpu — Pope Group, above Glen Dean Limestone
- Mpl — Pope Group, below Glen Dean Limestone
- Mss — Ste. Genevieve and St. Louis Limestones (includes Salem Limestone in Kentucky)
- Ms — Salem Limestone
- Mu — Ullin Limestone
- Msw — 'Warsaw' Limestone (in Kentucky)
- Msu — Salem and Ullin Limestones (in Illinois)
- Mkb — Salem and Warsaw Formations (in Missouri)
- Mfs — Fort Payne Formation and Springville Shale
- Mkb — Keokuk, Burlington Limestones and Fern Glen Formation, within Ste. Genevieve fault zone
- MDna — New Albany Shale
- Dm — Muscatatuck Group
- DSt — Tamms group of Rogers (1972) (Clear Creek, Backbone, Grassy Knob, and Bailey Formations)
- DOu — Devonian, Silurian, and Ordovician strata, undivided
- Sbs — Bainbridge Formation and Sexton Creek Limestone
- Om — Maquoketa Formation
- Ok — Kimmswick Limestone
- Odp — Decorah, Plattin and 'Pecatonica' Formations
- Ojd — Joachim and Dutchtown Formations
- Osp — St. Peter Sandstone
- Knox Group
  - Oe — Everton Formation
  - Osmp — Smithville and Powell Formations
  - Oc — Cotter Dolomite
  - Ojc — Jefferson City Dolomite
  - Or — Roubidoux Formation
- Breccia of sedimentary rock fragments (in grabens in Cape Girardeau County, Missouri)
- Contact
- Anticline
- Syncline
- Monocline
- Fault, normal or type unknown
- Reverse fault
- Small thrust fault
- Strike-slip fault
- Oblique strike-slip fault
- Oblique reverse fault
- Contact unknown
- State boundaries
- County boundaries

DESCRIPTION OF MAP UNITS

Tjw **Jackson, Claiborne, and Wilcox Formations, undivided (Oligocene and Eocene)**—Fine- to coarse-grained multihued sand, with lenses and interbeds of kaolinitic clay and silt. Small, well-rounded pebbles of quartz and gray to black chert are common. Maximum thickness 430 ft

Tw **Wilcox Formation (Eocene)**—White to yellowish-brown, fine to coarse sand, with lenses of clay and lignite. Small, well-rounded, gray to black chert pebbles are common. May include Jackson and Claiborne equivalents in some areas. Maximum thickness 250 ft

Tm **Midway Group (Paleocene)**—Comprises the Porters Creek Clay (younger) and the Clayton Formation. The Porters Creek is 45 to 220 ft thick and is mostly blocky montmorillonitic clay that is greenish gray, olive gray, and black. The Clayton is a thin (5 to 20 ft thick) unit of sandy, glauconitic clay

TKct **Clayton Formation of the Midway Group (Paleocene) and McNairy and Tuscaloosa Formations, undivided (Upper Cretaceous)**—Undifferentiated at east edge of Mississippi Embayment in Kentucky

Kmt **McNairy and Tuscaloosa Formations, undivided (Upper Cretaceous)**—The McNairy is composed of white to red, yellow, orange, fine-grained, micaceous sand and medium- to dark-gray, laminated, micaceous clay and silt. Maximum thickness about 450 ft. The Tuscaloosa is a discontinuous unit composed largely of light-colored chert gravel as much as 180 ft thick

TKu **Tertiary and Cretaceous strata, undivided**—Gravel, sand, silt, clay, lignite, conglomerate, and sandstone. Includes lithologies typical of Tuscaloosa and McNairy Formations (Cretaceous), lignitic clay with Eocene pollen, and possibly younger Tertiary gravel. Occurs in outliers and downfaulted blocks in southwestern Illinois. Maximum thickness at least 100 ft

Pi **Permian igneous intrusion (Lower Permian)**—Ultramafic rocks and breccias in dikes and diatremes near Hicks dome

IPm **McLeansboro Group (Pennsylvanian; upper Desmoinesian through Virgilian)**—Cyclically repetitive sandstone, siltstone, shale, limestone, and thin coal. Many units of limestone, black fissile shale, coal, and underclay are regionally traceable. The thickest known section, in a graben in Union County, Kentucky, is 2,600 ft thick and may include Permian strata at the top

IPc **Carbondale Formation (Pennsylvanian; Desmoinesian)**—Cyclically repetitive sandstone, siltstone, shale, limestone, and coal with regionally traceable units of limestone, black fissile shale, coal, and underclay. The Carbondale contains most of the commercially minable coal beds in the Illinois Basin. Thickness 175 to 400 ft

IPt **Tradewater Formation (Pennsylvanian; upper Morrowan through lower Desmoinesian)**—Sandstone, siltstone, shale, lenticular coal, and limestone. The Tradewater has less obvious cyclicity than younger Pennsylvanian rocks, and marker beds are more difficult to trace. Sandstones are generally sublitharenites. Thickens to the southeast. 300 to 700 ft thick

IPcv **Caseyville Formation (Pennsylvanian; Morrowan)**—Sandstone, siltstone, shale, thin coal, rare limestone. Cross-bedded to massive quartz arenite containing well-rounded quartz pebbles is characteristic of the Caseyville. Lateral facies changes are rapid, and cyclicity is generally not evident. Thickness 190 to 500 ft; rapid thickness changes on deeply incised sub-Pennsylvanian unconformity

IPtcv **Tradewater and Caseyville Formations (Pennsylvanian)**—Undifferentiated near northwest corner of map area

Mpu **Pope Group, upper part (Mississippian; Chesterian)**—Sandstone/shale formations alternate with limestone/shale formations. The upper part of the Pope Group comprises units from the Kinkaid Limestone downward through the Tar Springs Sandstone and is 200 to 700 ft thick

Mpl **Pope Group, lower part (Mississippian; Chesterian and upper Valmeyeran)**—Sandstone/shale and limestone/shale formations alternate. Units from the Glen Dean Limestone downward through the Aux Vases Sandstone are included. Thickens eastward from about 400 to 700 ft thick

Mss **Ste. Genevieve and St. Louis Limestones, undivided, of the Mammoth Cave Group (Mississippian; Valmeyeran)**—The Ste. Genevieve Limestone, 45 to 300 ft thick, is largely light-gray, cross-bedded, oolitic and skeletal grainstone. The St. Louis Limestone, 75 to 500 ft thick (as mapped), is typically medium- to dark-gray, cherty lime mudstone to fine-grained packstone. Boundaries of units intertongue and were mapped inconsistently by different geologists. In Kentucky, the Salem Limestone was mapped together with the St. Louis and Ste. Genevieve

Ms **Salem Limestone of the Mammoth Cave Group (Mississippian; Valmeyeran)**—Fossil-fragmental limestone, ranging from light-gray grainstone and packstone to dark-gray, argillaceous and cherty wackestone and lime mudstone. Rounded and oolitically coated fossil grains are common. The Salem, like most Valmeyeran limestone formations, was mapped inconsistently by different authors. Thickness (as mapped) ranges from 110 to 500 ft

Mu **Ullin Limestone of the Mammoth Cave Group (Mississippian; Valmeyeran)**—The upper part is light-gray, coarse, cross-bedded, crinoid-bryozoan packstone and grainstone; the lower part is darker, finer grained, and slightly cherty. Contacts are gradational and intertonguing. The Ullin was mapped in Illinois only. Thickness ranges from 125 to 700 ft; commonly thins as underlying Fort Payne thickens

Msw **"Warsaw" Limestone of the Mammoth Cave Group (Mississippian; Valmeyeran)**—The "Warsaw" Limestone in Kentucky is lithologically similar and temporally equivalent to the Ullin Limestone and lower part of the Salem Limestone in Illinois

Msu **Salem and Ullin Limestones, undivided, of the Mammoth Cave Group (Mississippian; Valmeyeran)**—Mapped near Hicks dome in Hardin County, Illinois

Msw **Salem Limestone of the Mammoth Cave Group and Warsaw Formation, undivided (Mississippian; Valmeyeran)**—Mapped in Missouri only. The Warsaw Formation is composed of interbedded shaly, fossiliferous limestone and gray, calcareous, fossiliferous shale. Thickness ranges from 130 to 210 ft

Mfs **Fort Payne Formation and Springville Shale (Mississippian; Valmeyeran)**—The Fort Payne consists of limestone and dolomite that are dark colored, fine grained, glauconitic, and very cherty and siliceous. It thickens eastward from a feather-edge to 600 ft thick. The Springville consists of 5 to 60 ft of greenish-gray silty shale and siltstone that generally coarsen upward

Mkb **Keokuk, Burlington Limestones and Fern Glen Formation (Mississippian; Valmeyeran)**—The Keokuk and Burlington Limestones are mostly white to light brownish gray, coarse crinoidal limestones that contain abundant chert layers and nodules. Together, they are 200 to 400 ft thick. The Fern Glen is yellowish brown, fossiliferous, cherty limestone with interbeds of green to brown shale; it is 50 to 160 ft thick

MDna **New Albany Shale (Mississippian (Kinderhookian) and Upper Devonian)**—Dark olive to greenish-gray and black shale that is fissile, silty, pyritic, and rich in disseminated organic matter. Absent in places in western third of quadrangle; maximum thickness is 460 ft in Hardin County, Illinois

Dm **Muscatatuck Group (Middle and upper Lower Devonian)**—Comprises the St. Laurent Formation and the Grand Tower Limestone. The St. Laurent, 100 to 200 ft thick, is largely dark, fine-grained, cherty limestone that is interbedded with calcareous shale and siltstone. The Grand Tower is lighter gray, coarser, skeletal limestone that is sandy and includes a basal quartz arenite, the Dutch Creek Sandstone Member. The Grand Tower is as much as 230 ft thick and thickens to the east

DSt **Tamms group of Rogers (1972) (Lower Devonian and Silurian; Cayugan)**—Constituent units are the Clear Creek Formation (youngest), Backbone or Little Saline Limestone, Grassy Knob Chert, and Bailey Limestone. Light-colored, fine-grained, highly siliceous and cherty limestone and dolomite predominate. The Backbone or Little Saline is coarse crinoidal grainstone. Largely absent northeast of Ste. Genevieve fault zone due to Late Devonian erosion; the group thickens southward to 1,200 ft

DOu **Devonian, Silurian, and Ordovician rocks, undifferentiated**—Tilted and jumbled blocks, as much as several thousand feet in maximum dimension, of various Canadian through Lower Devonian formations; found in pull-apart grabens in Missouri

Sbs **Bainbridge Formation and Sexton Creek Limestone, undivided (Silurian; Cayugan to Alexandrian)**—The Moccasin Springs Member of the Bainbridge (Cayugan and Niagaran) is composed of interbedded reddish to greenish-gray marly limestone and calcareous shale, 60 to 200 ft thick. The St. Clair Limestone Member of the Bainbridge (Niagaran) is reddish-gray lime mudstone that contains scattered red crinoid grains and is 12 to 60 ft thick. The Sexton Creek Limestone (Alexandrian) is thinly bedded, light-gray lime mudstone and skeletal wackestone that contains numerous layers of caramel-colored chert. It is 15 to 125 ft thick

Om **Maquoketa Formation (Ordovician; Cincinnatian)**—Comprises four members, in descending order: Girardeau Limestone Member, lime mudstone with dark shale interbeds; Orchard Creek Shale Member, dark-gray calcareous shale with thin limestone interbeds; Thebes Sandstone Member, siltstone to very fine grained sandstone that is laminated and burrowed; Cape La Croix Shale Member, dark-gray, very soft shale. Total thickness of Maquoketa is 100 to 300 ft

Ok **Kimmswick Limestone (Ordovician; Mohawkian)**—Coarse-grained, white to light-pink and gray crinoidal grainstone that is quarried for high-calcium limestone. Thickness 50 to 165 ft

Odp **Decorah Formation, Plattin Limestone, and Pecatonica(?) Formation, undivided (Ordovician; Mohawkian)**—The Decorah is a thin unit (10 to 30 ft thick) of interbedded fossiliferous limestone and greenish-gray calcareous shale. The Plattin and Pecatonica(?) both are dominantly dark-gray micritic limestone that is commonly laminated and burrowed ("fucoidal"). Thickness is 350 to 600 ft, increasing to the south. Distinguishing the Pecatonica(?) from the Plattin is problematic

Ojd **Joachim Dolomite and Dutchtown Formation (Ordovician; Mohawkian)**—The Joachim is 130 to 275 ft thick and is composed of gray to brownish-gray, microcrystalline to finely crystalline dolomite that contains thin interbeds of shale and sandstone. The Dutchtown is dark-gray micritic limestone and dolomite that contains bitumen-filled vugs and emits a petroliferous odor when struck. It thickens southward from 20 to 185 ft

Osp **St. Peter Sandstone (Ordovician; Mohawkian)**—The sandstone is composed of nearly 100 percent white to clear quartz grains that are frosted and well-rounded. Thickness varies in irregular fashion from 50 to 210 ft

Knox Group (Ordovician; Canadian and Whiterockian)

Oe **Everton Formation (Whiterockian)**—Contains varying proportions of quartz arenite (similar to St. Peter Sandstone), dolomitic sandstone, and sandy dolomite. Thickness 70 to 400 ft, increasing to the southeast

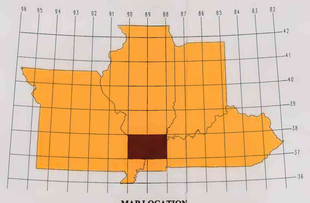
Osmp **Smithville and Powell Dolomites (Canadian)**—Largely light brownish gray, microcrystalline to finely crystalline dolomite that is cherty and contains greenish shale interbeds. Thickness ranges from 170 to 600 ft. The two formations were not defined or mapped consistently by various authors

Oc **Cotter Dolomite (Canadian)**—Light brownish gray, microcrystalline to medium-crystalline dolomite that is silty and sandy, thickly bedded, and contains thick chert bands and nodules. Thickens eastward from 90 to 380 ft

Ojc **Jefferson City Dolomite (Canadian)**—Microcrystalline to finely crystalline dolomite that is shaly, thin bedded to medium bedded, and cherty. Thickness is 165 to 280 ft

Or **Roubidoux Formation (Canadian)**—Light to medium brownish gray, sandy dolomite, most of which is thickly bedded. Interbeds of dolomitic sandstone composed of rounded, frosted quartz grains. Maximum exposed thickness 160 ft; total thickness 155 to 320 ft

br **Breccia (age unknown)**—Confined to small pipes and pull-apart grabens in northern Cape Girardeau County, Missouri. Consists of sedimentary rock fragments, including chert derived from the Bailey Limestone (Upper Silurian and Lower Devonian), in a groundmass of dark-red, plastic clay. Origin may be a combination of tectonic extension and solution collapse



MAP LOCATION

BEDROCK GEOLOGIC MAP OF THE PADUCAH 1°×2° QUADRANGLE, ILLINOIS, INDIANA, KENTUCKY, AND MISSOURI

Compiled by
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