State of South Dakota
M. Michael Rounds, Governor

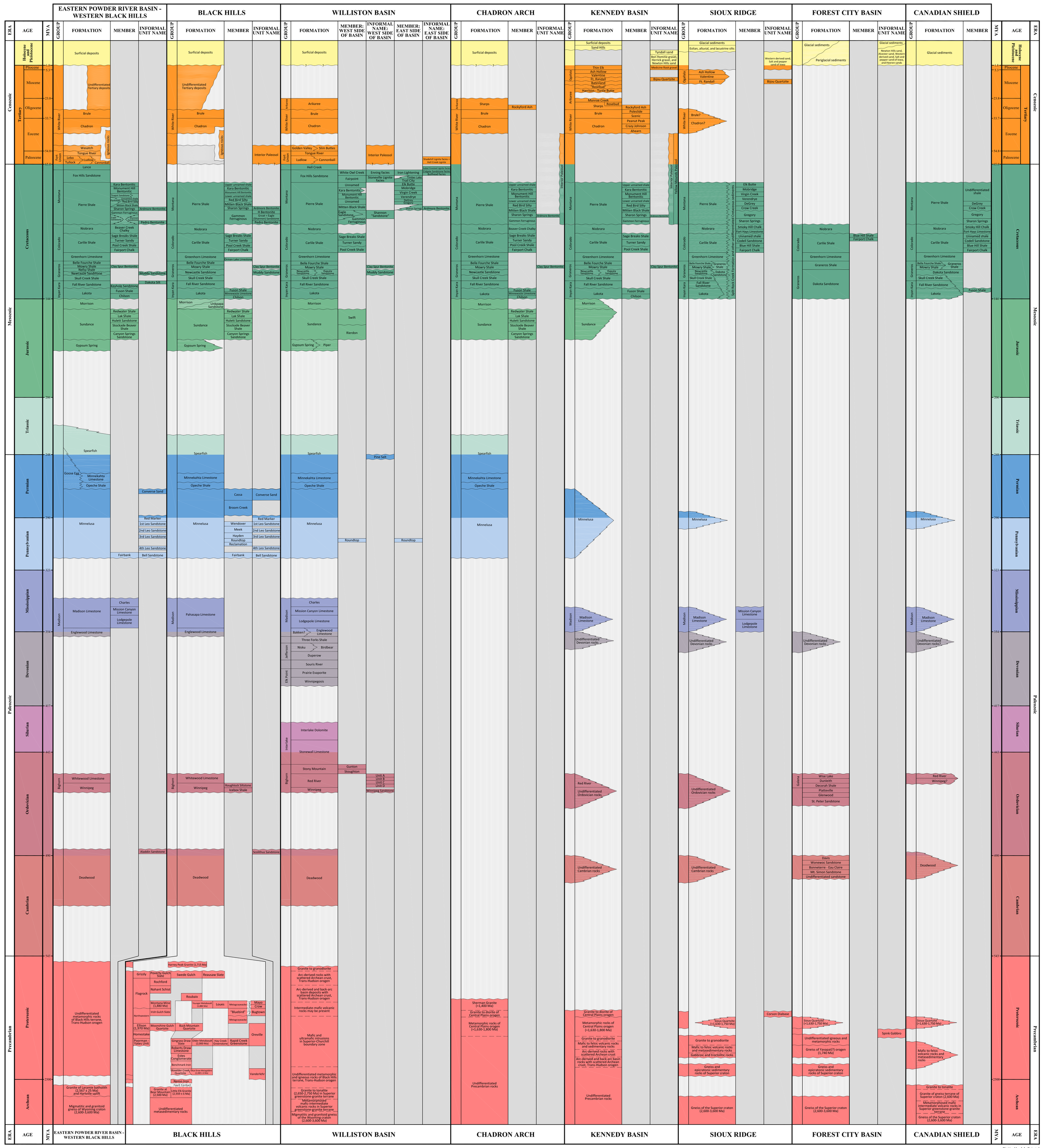
# South Dakota Stratigraphic Correlation Chart

by
M.D. Fahrenbach, F.V. Steece, J.F. Sawyer, K.A. McCormick, G.L. McGillivray, L.D. Schulz, J.A. Redden

2007

South Dakota Geological Survey
Derric L. Iles, State Geologist

Oil and Gas Investigation 1




## EXPLANATION

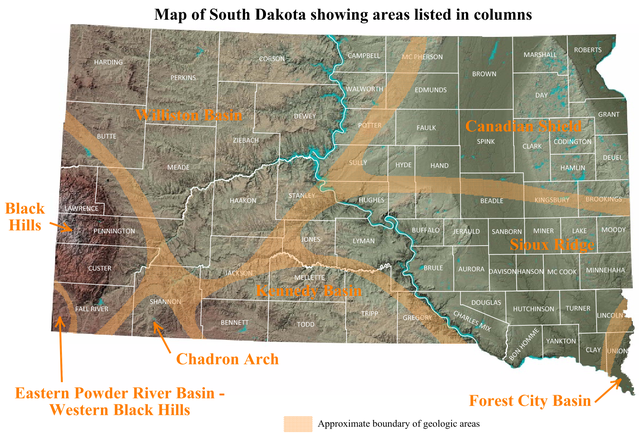
- Unconformable contact. Queried where uncertain
- Conformable contact
- Area of intertonguing or pinch out
- Fault contact
- Uncertain stratigraphic relationship
- Interval where rock units of a particular age are absent
- Formation, member, or informal name not designated

## DISCUSSION

The South Dakota Stratigraphic Correlation Chart depicts a chronostratigraphic classification for the geologic strata within the various geologic areas shown on the index map. The chronological scale is not linear and is expanded or compressed depending on the number of rock units that are shown within each time interval. Minor intraformational discontinuities are not shown. In the Williston Basin, members and informal names are shown for the eastern and western portions of the basin because of its stratigraphic complexity and the large size of the basin. The Eastern Powder River Basin - Western Black Hills column reflects units that extend into Wyoming to illustrate the nomenclatural relationships between these two regions. The Pahasapa Limestone, which has its type locality in the Black Hills, is referred to as Madison Limestone in the subsurface. In the Eastern Powder River Basin and Black Hills, the Whitewood Limestone and Winnipeg Formation are absent by erosion to the south. Precambrian stratigraphy is generalized and numerous hiatuses are known to exist; they are shown only where specific information is available. Dashed lines between Precambrian units are used where relationships are uncertain. The Precambrian rocks in the Black Hills are generally arranged with the stratigraphy of the northern Black Hills on the left side of the column, central Black Hills at the center, and southern Black Hills on the right.

This correlation chart was compiled from the references listed and from well logs and other information from the Minerals and Mining Program and the Geological Survey Program, South Dakota Department of Environment and Natural Resources. J.E. Fox is acknowledged for his contribution to this publication.

### Map of South Dakota showing areas listed in columns




## REFERENCES


| Reference (Shading in the columns to the right indicates that a reference was used in a particular area to determine the geologic units.) | Eastern Powder River Basin - Western Black Hills | Black Hills | Williston Basin | Chadron Arch | Kennedy Basin | Sioux Ridge | Forest City Basin | Canadian Shield |
|---|---|---|---|---|---|---|---|---|
| Agnew, A.F., and Tychsen, P.C., 1965, *A guide to the stratigraphy of South Dakota:* South Dakota Geological Survey Bulletin 14, 195 p. | | | | | | | | |
| Andrews, R., Dietrich, S., Glaze, R., Ordonez, S., and Ruddiman, B., 1989, *Stratigraphic nomenclature chart:* Wyoming Geological Association. | | | | | | | | |
| Bluemle, J.P., Anderson, S.B., and Carlson, C.G., 1981, *Williston Basin stratigraphic nomenclature chart:* North Dakota Geological Survey Miscellaneous Series 61. | | | | | | | | |
| Carlson, C.G., 1979, *Geology of Adams and Bowman Counties, North Dakota:* North Dakota Geological Survey Bulletin 65, pt. 1, 29 p. | | | | | | | | |
| Christensen, C.M., 1974, *Geology and water resources of Bon Homme County, South Dakota; Part I: Geology:* South Dakota Geological Survey Bulletin 21, 48 p. | | | | | | | | |
| Dahl, P.S., Hamilton, M.A., Wooden, J.L., Foland, K.A., Frei, R., McCombs, J.A., and Holm, D.K., 2006, *2480 Ma mafic magmatism in the northern Black Hills, South Dakota: A new link connecting the Wyoming and Superior cratons:* Canadian Journal of Earth Science, v. 43, p. 1579-1600. | | | | | | | | |
| Denson, N.M., and Gill, J.R., 1965, *Uranium-bearing lignite and carbonaceous shale in the southwestern part of the Williston Basin - A regional study:* U.S. Geological Survey Professional Paper 463, 75 p. | | | | | | | | |
| DeWitt, E., Redden, J.A., Buscher, D., and Wilson, A.B., 1989, *Geologic map of the Black Hills area, South Dakota and Wyoming:* U.S. Geological Survey Miscellaneous Investigations Series Map I-1910, scale 1:250,000. | | | | | | | | |
| Dyman, T.S., Fouch, T.D., Merewether, E.A., Molenaar, C.M., Ethridge, F.G., and Weimer, R.J., 1991, *East-trending stratigraphic transects; Western Interior Cretaceous (WIK) project:* Geological Society of America Abstracts with Programs, v. 23, no. 5, p. 294. | | | | | | | | |
| Goldich, S.S., Lidiak, E.G., Hedge, C.E., and Walthall, F.G., 1966, *Geochronology of the Midcontinent region, United States, 2, Northern area:* Journal of Geophysical Research, v. 71, p. 5389-5408. | | | | | | | | |
| Gries, J.P., and Martin, J.E., 1981, *Composite outcrop section of the Paleozoic and Mesozoic strata in the Black Hills and surrounding areas,* in Rich, F.J., ed., *Geology of the Black Hills, South Dakota and Wyoming:* Geological Society of America, American Geological Institute, Rocky Mountain Section, Field Trip Guidebook, p. 261-292. | | | | | | | | |
| Hammond, P.D., 1996, *Hydrogeologic investigation of the Herrick Formation near the city of Herrick, South Dakota:* South Dakota Geological Survey Open-File Report on Urban and Rural Studies 75, 31 p. | | | | | | | | |
| Hammond, R.H., 1991, *Geology of Lake and Moody Counties, South Dakota:* South Dakota Geological Survey Bulletin 35, 49 p. | | | | | | | | |
| Harksen, J.C., 1966, *The Pliocene-Pleistocene medicine root gravel of southwestern South Dakota:* Southern California Academy of Science Bulletin, v. 65, no. 4, p. 251-257. | | | | | | | | |
| Harksen, J.C., and Green, M., 1971, *Thin Elk Formation, Lower Pliocene, South Dakota:* South Dakota Geological Survey Report of Investigations 100, 7 p. | | | | | | | | |
| International Oil Scouts Association, 1960, *Correlation chart - Montana and adjacent areas:* International Oil Scouts Association, v. 31, pt. 1, p. 182-183. | | | | | | | | |
| Love, J.D., Christiansen, A.C., McGrew, L.W., and King, J.K., 1990, *Geological map of the Gillette 1° X 2° quadrangle, northeastern Wyoming and western South Dakota:* Geological Survey of Wyoming Map Series 25-G. | | | | | | | | |
| Mapel, W.J., and Pillmore, C.L., 1963, *Geology of the Newcastle area, Weston County, Wyoming:* U.S. Geological Survey Bulletin 1141-N, 85 p. | | | | | | | | |
| Martin, J.E., 1983, *Composite stratigraphic section of the Cenozoic deposits in western South Dakota:* Dakoterra, v. 2, pt. 1, p. 1-8. | | | | | | | | |
| McCormick, K.A., 2005, *Drilling of an aeromagnetic anomaly in southeastern South Dakota: Results from analysis of Paleozoic and Precambrian core:* South Dakota Geological Survey Report of Investigations 116, 19 p. | | | | | | | | |
| McCormick, K.A., and Hammond, R.H., 2004, *Geology of Lincoln and Union Counties, South Dakota:* South Dakota Geological Survey Bulletin 39, 43 p. | | | | | | | | |
| Medaris, L.G., and Dott, R.H., Jr., 2003, *The Sioux Quartzite revisited: Sedimentology, metamorphism, geochemistry and the origin of pipestone:* Iron Mountain, Mich., 49th Annual meeting of the Institute on Lake Superior Geology, pp. 53-54. | | | | | | | | |
| Merewether, E.A., 1983, *Lower Upper Cretaceous strata in Minnesota and adjacent areas - Time-stratigraphic correlation and structural attitudes,* in *Stratigraphy and paleontology of Mid-Cretaceous rocks in Minnesota and contiguous areas:* U.S. Geological Survey Professional Paper 1253, 52 p. | | | | | | | | |
| Palmer, A.R., and Geissman, J., 1999, *1999 Geologic time scale:* Geological Society of America Product CTS004. | | | | | | | | |
| Pipiringos, G.N., Chisholm, W.A., and Kepferle, R.C., 1965, *Geology and uranium deposits in the Cave Hills area, Harding County, South Dakota:* U.S. Geological Survey Professional Paper 476-A, 64 p. | | | | | | | | |

| Reference (Shading in the columns to the right indicates that a reference was used in a particular area to determine the geologic units.) | Eastern Powder River Basin - Western Black Hills | Black Hills | Williston Basin | Chadron Arch | Kennedy Basin | Sioux Ridge | Forest City Basin | Canadian Shield |
|---|---|---|---|---|---|---|---|---|
| Ratté, J.C., and Zartman, R.E., 1970, *Bear Mountain gneiss dome, Black Hills, South Dakota - Age and structure:* Geological Society of America Abstracts with Programs, v. 2, no. 5, p. 345. | | | | | | | | |
| Redden, J.A., Peterman, Z.E., Zartman, R.E., and DeWitt, E., 1990, *U-Th-Pb geochronology and preliminary interpretation of Precambrian tectonic events in the Black Hills, South Dakota,* in Lewry, J.F., and Stauffer, M.R., eds., *The Early Proterozoic Trans-Hudson orogen of North America:* Geological Association of Canada Special Paper 37, p. 229-251. | | | | | | | | |
| Rice, D.D., and Shurr, G.W., 1983, *Patterns of sedimentation and paleogeography across the Western Interior Seaway during time of deposition of Upper Cretaceous Eagle Sandstone and equivalent rocks, northern Great Plains,* in Reynolds, M.W., and Dolly, E.D., eds., *Mesozoic paleogeography of west-central United States:* Society for Sedimentary Geology, Rocky Mountain Section, p. 337-358. | | | | | | | | |
| Robinson, C.S., Mapel, W.J., and Bergendahl, M.H., 1964, *Stratigraphy and structure of the northern and western flanks of the Black Hills uplift, Wyoming, Montana, and South Dakota:* U.S. Geological Survey Professional Paper 404, 134 p. | | | | | | | | |
| Schoon, R.A., 1967, *Stratigraphic cross section of Paleozoic rocks of South Dakota,* in *Stratigraphic cross section of Paleozoic rocks Oklahoma to Saskatchewan:* American Association of Petroleum Geologists, p. 10-12. | | | | | | | | |
| _____1971, *Geology and hydrology of the Dakota Formation in South Dakota:* South Dakota Geological Survey Report of Investigations 104, 55 p. | | | | | | | | |
| _____1974, *Generalized stratigraphic column of central and northwestern South Dakota:* South Dakota Geological Survey Educational Map 6. | | | | | | | | |
| Sims, P.K., Peterman, Z.E., Hildenbrand, T.G., and Mahan, S., 1991, *Precambrian basement map of the Trans-Hudson orogen and adjacent terranes, northern Great Plains, U.S.A.:* U.S. Geological Survey Miscellaneous Investigations Series Map I-2214, scale 1:1,000,000. | | | | | | | | |
| Steece, F.V., and Kenyon, T.L., 1983a, *Generalized stratigraphic correlation chart for South Dakota,* in *South Dakota geology: A rig-side overview:* North Dakota/South Dakota Water Well Drillers Association 27th Annual Convention, South Dakota Geological Survey. | | | | | | | | |
| _____1983b, *Map of South Dakota showing major structural features,* in *South Dakota geology: A rig-side overview:* North Dakota/South Dakota Water Well Drillers Association 27th Annual Convention, South Dakota Geological Survey. | | | | | | | | |
| Stratigraphic Nomenclature Committee, 1969, *Wyoming stratigraphic nomenclature chart:* Wyoming Geological Association. | | | | | | | | |
| Stevenson, R.E., 1957, *Revision and interpretation of the Bijou Formation:* South Dakota Academy of Science, Proceedings, v. 36, p. 134-138. | | | | | | | | |
| Tedford, R.H., Swinehart, J.B., Swisher, C.C., III, Prothero, D.R., King, S.A., and Tierney, T.E., 1996, *The Whitneyan-Arikareean transition in the high plains,* in Prothero, D.R., and Emry, R.J., eds., *The terrestrial Eocene-Oligocene transition in North America:* United States, Cambridge University Press, p. 312-334. | | | | | | | | |
| Tedford, R.H., Albright, L.B., III, Barnosky, A.D., Ferrusquia-Villafranca, I., Hunt, R.M., Jr., Storer, J.E., Swisher, C.C., III, Voorhies, M.R., Webb, S.D., and Whistler, D.P., 2004, *Mammalian biochronology of the Arikareean through Hemphillian interval (Late Oligocene through Early Pliocene epochs),* in Woodburne, M.O., ed., *Late Cretaceous and Cenozoic mammals of North America-biostratigraphy and geochronology:* New York, N.Y., Columbia University Press, p. 169-231. | | | | | | | | |
| Terry, D.O., Jr., 1998, *Lithostratigraphic revision and correlation of the lower part of the White River Group: South Dakota to Nebraska:* Geological Society of America Special Paper 325, p. 15-37. | | | | | | | | |
| Tomhave, D.W., 1997, *Geology of Spink County, South Dakota:* South Dakota Geological Survey Bulletin 38, 61 p. | | | | | | | | |
| Van Schmus, W.R., 2005, *Archean-Paleoproterozoic transition in the northern United States:* Geological Society of America Abstracts with Programs, North-Central Section, 39th Annual Meeting, v. 37, no. 5, p. 4. | | | | | | | | |
| Witzke, B.J., 1980, *Middle and Upper Ordovician paleogeography of the region bordering the Transcontinental Arch,* in Fouch, T.D., and Magathan, E.R., eds., *Paleozoic paleogeography of west-central United States:* Society for Sedimentary Geology, Rocky Mountain Section, west-central United States Paleogeography Symposium, p. 1-18. | | | | | | | | |
| Witzke, B.J., Hammond, R.H., and Anderson, R.R., 1996, *Deposition of the Crow Creek Member, Campanian, South Dakota and Nebraska:* Geological Society of America Special Paper 302, p. 433-456. | | | | | | | | |
| Witzke, B.J., Ludvigson, G.A., Poppe, J.R., and Ravn, R.L., 1983, *Cretaceous paleogeography along the eastern margin of the Western Interior Seaway, Iowa, southern Minnesota, and eastern Nebraska and South Dakota,* in Reynolds, M.W., and Dolly, E.D., eds., *Mesozoic paleogeography of west-central United States:* Society for Sedimentary Geology, Rocky Mountain Section, p. 225-252. | | | | | | | | |
| Zartman, R.E., and Stern, T.W., 1967, *Isotopic age and geologic relationships of the Little Elk Granite, northern Black Hills, South Dakota,* in *Geological Survey Research, 1967:* U.S. Geological Survey Professional Paper 575-D, p. 157-163. | | | | | | | | |


Digitized by: L.L. Roinstad