Changes in Stratigraphic Nomenclature by the U.S. Geological Survey, 1971

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CONTRIBUTIONS TO STRATIGRAPHY

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CHANGES IN STRATIGRAPHIC NOMENCLATURE BY THE U.S. GEOLOGICAL SURVEY, 1971

By GEORGE V. COHEE and WILNA B. WRIGHT

LISTING OF NOMENCLATURAL CHANGES

In the following table, stratigraphic names adopted, revised, reinstated, or abandoned are listed alphabetically. The age of the unit, the revision, and the area involved, along with the author's name and date of publication of the report, are given. The publication in which the changes in nomenclature were made are listed in the references at the end of this publication. The capitalization of age terms in the age column follows official usage.

The following formal designations of Precambrian time are now in use by the U.S. Geological Survey:

Precambrian Z—base of Cambrian to 800 m.y.
Precambrian Y—800 m.y. to 1,600 m.y.
Precambrian X—1,600 m.y. to 2,500 m.y.
Precambrian W—older than 2,500 m.y.

On the recommendation of a Special Panel—consisting of Precambrian specialists M. D. Crittenden, Jr. (Chairman), J. E. Harrison, and J. C. Reed, Jr., working in collaboration with H. L. James—the Geologic Names Committee and the Chief Geologist approved an interim scheme for subdivision of Precambrian time, to be used in reports of the Geological Survey.

The basic control for selection of time boundaries and units is a correlation chart for the Precambrian of the United States, prepared by Z. E. Peterman and C. E. Hedge of the U.S. Geological Survey (unpub. data). The time boundaries have been chosen so as to split as few of the known epochs of sedimentation, orogeny, and plutonism as possible. The boundaries do not correspond intentionally to geologic events.

The scheme of subdivision has been devised simply to facilitate depiction and analysis of the Precambrian history of the United States.

The scheme is intended as an interim measure, pending development of an internationally accepted standard.

For depiction on maps, only the letter designations (W, X, Y, Z) will be shown as map symbols, and lowercase letters will indicate the group or formation names as appropriate. If a unit extends across the boundary between letter-designated units, both letters, the younger first, will be used in the map symbol. When geochronologic data are not adequate for unit assignment, only the general term Precambrian

Name	Age	Location
Aguas Buenas Limestone Member (of Fajardo Formation).	Early Cretaceous	Puerto Rico
Alder Group	Precambrian	Central Arizona
Almirante Sur Sand Member (of Cibao Formation).	late Oligocene and (or) early Miocene.	Puerto Rico
Alutom Formation	late Eocene, Oligocene, early Miocene.	Guam
Analomink Red Shale Member (of Catskill Formation).	Late Devonian	Northeastern Pennsylvania.
Angelica Arkose	Early Cretaceous	Southern Arizona
Ardath Shale (of La Jolla Group).	middle Eocene	Southern California
Ashdown Tuff	early Miocene	Northwestern Nevada.
Attalla Chert Conglomerate Member (of Chickamauga Limestone).	Middle Ordovician	Northwestern Georgia.
Baird Group	Middle and Late Devonian and older(?).	Northern Alaska
Bancroft Springs Basalt (of Snake River Group).	late Pleistocene	Southern Idaho
Bannock Volcanic Member (of Pocatello Formation).	late Precambrian	Southeastern Idaho (Pocatello area).
Barker Porphyry	Eocene(?)	Montana
Barrazas Formation	Late Cretaceous (Cenomanian).	Northeastern Puerto Rico.
Bass Islands Dolomite	Late Silurian	Northern Ohio and southeastern Michigan.
Bates Mountain Tuff	Miocene	Nevada
Beaver Basin Formation	Pleistocene and Holocene	Utah
Bell Brook Formation	Silurian(?) and Devonian	Maine
Bena Gravel	Miocene	California
Big Blue Serpentinous Member (of Temblor Formation).	middle Miocene	California

and the symbol pC will be used. Rock units and events within a major time unit such as W, X, Y or Z, keyed to geochronologic data as available, will be shown on map explanations by simple sequential arrangement.

The previously used age designations for the Precambrian are given in the table because they were used by the authors in reports submitted to the Geologic Names Committee before the new scheme was adopted.

Revision and reference
Age changed from Late Cretaceous to Early Cretaceous. (Glover, 1971.)
Alder Group restricted to Mazatzal Mountains, its type locality, and removed from Yavapai Series. In Prescott-Jerome area, Big Bug Group (new) replaces Alder Group. (Anderson and others, 1971.) Almirante Sur Sand Member changed to Almirante Sur Sand Lentil. (Monroe, 1971.)
Age changed from late Eocene and Oligocene to late Eocene, Oligocene, and early Miocene. (Bukry and others, 1971.) Analomink Red Shale of Willard (1935) adopted as middle of three members of Catskill Formation. Overlies Delaware River Flags Member (not new); underlies Shohola Member (not new). (Alvord and Drake, 1971.) Angelica Arkose adopted. Overlies Whitcomb Quartzite (new); underlies Demetrie Volcanics (not new). (Cooper, 1971.) Ardath Shale adopted. Rocks were formerly part of Hanna's (1926) Rose Canyon Shale Member of La Jolla Formation of Clark (1926). Overlies Torrey Sandstone (not new); underlies Scripps Formation (new). (Kennedy and Moore, 1971.) Ashdown Tuff adopted. (Noble and others, 1970.)
Geographically extended into northwestern Georgia and raised to formational rank as Attalla Conglomerate. (Cressler, 1970.)
Age changed from Middle(?) and Late Devonian to Middle and Late Devonian and older(?). (Brosgé and Tailleur, 1971.) Bancroft Springs Basalt abandoned; rocks now considered part of McKinney Basalt, of Snake River Group. (Malde, 1971.) Bannock Volcanic Formation of Anderson (1928), as stratigraphically restricted by Ludlum (1942, 1943), adopted as Bannock Volcanic Member. Overlies unnamed lower member of Pocatello; underlies Scout Mountain Member (new). (Crittenden and others, 1971.) Age changed from post-Cretaceous to Eocene(?). (Witkind, 1971.) Barrazas Formation adopted; underlies Hato Puerco Formation. (Seiders, 1971.)
Bass Islands raised to group rank in Ohio and includes (ascending): Greenfield Dolomite, Tymochtee Formation, Put-in-Bay Dolomite, and Raisin River Dolomite. In Michigan, Bass Islands Dolomite (restricted) remains of formational rank and includes Put-in-Bay and Raisin River Dolomite Members. (Norris and Fidler, 1971.) Age changed from Oligocene or Miocene to Miocene. (McKee and Stewart, 1971.) Age changed from Pleistocene to Pleistocene and Holocene. (Birkeland and others, 1971.) Age changed from Silurian(?) or Devonian(?) to Silurian(?) and Devonian. (Pavlides, 1971.) Bena Gravel of Dibblee and Chesterman (1953) adopted. (Dibblee and Warne, 1970.) Name changed, removed from uppermost part of Temblor Formation, redefined by Adegoke (1969), and raised in rank to Big Blue Formation. Overlies Temblor Formation (now stratigraphically restricted) in New Idria area. (Lockwood, 1971.)

Name	Age	Location
Big Bug Group	Precambrian	Central Arizona
Blackhawk Formation (of Mesaverde Group).	Late Cretaceous	Utah
Blackrock Canyon Limestone	late Precambrian	Southeastern Idaho (Pocatello area).
Blue Hill Granite Porphyry	Late Ordovician	Massachusetts
Borden Formation	Early and Late Mississippian.	Kentucky
Brigham Quartzite	late Precambrian to Middle Cambrian.	Northern Utah and southeastern Idaho.
Brodhead Creek Member (of Marcellus Shale).	Middle Devonian	Eastern Pennsylvania.
Bromley Shale Member (of Point Pleasant Formation).	Middle Ordovician	Northern Kentucky
Browns Hole Formation	late Precambrian	Northern Utah (Huntsville area).
Buttermilk Falls Limestone	Middle Devonian	Northeastern Pennsylvania.
Cabrillo Formation (of Rosario Group).	Late Cretaceous	Southern California
Caddy Canyon Quartzite	late Precambrian	Southeastern Idaho (Pocatello area) and possibly northern Utah (Huntsville area).
Caetano Tuff	Oligocene	Nevada
Cambalache Formation	Late Cretaceous	Northeastern Puerto Rico.
Camelback Mountain Quartzite	late Precambrian and Early Cambrian.	Southeastern Idaho (Pocatello area).
Canóvanas Formation	Late Cretaceous	Northeastern Puerto Rico.
Cape Ann Granite	Late Ordovician	Massachusetts
Carter Sandstone Member (of Pierre Shale).	Late Cretaceous	North-central Colorado.
Carter Caves Sandstone	Late Mississippian	Northeastern Kentucky.
Catskill Formation	Late Devonian	Pennsylvania and New Jersey.
Celada Formation	Late Cretaceous	Northeastern Puerto Rico.
Chainman Shale	Late Mississippian	East-central Nevada
Chainman Shale	Late Mississippian	East-central Nevada
Chalk Mountain Nevadite	Eocene	Colorado
Chaparral Volcanics	Precambrian	Arizona

Revision and reference
Big Bug Group adopted. Replaces Alder Group in Prescott-Jerome area. Includes (ascending): Green Gulch Volcanics, Spud Mountain Volcanics, and Iron King Volcanics. (Anderson and others, 1971.)
Kenilworth and Sunnyside Members of Young (1955) of Blackhawk Formation adopted. Formation includes (ascending): Aberdeen, Kenilworth, lower mudstone, Sunnyside, and upper mudstone members. (Maberry, 1971.)
Blackrock Canyon Limestone adopted. Same formation as Blackrock Limestone of Anderson (1928). Overlies Pocatello Formation (not new); underlies Papoose Creek Formation (new). (Crittenden and others, 1971.)
Age changed from Devonian(?) to Late Ordovician. (Zartman and Marvin, 1971.)
New Providence Shale reinstated in central Kentucky as basal member of Borden Formation. Nancy Member restricted to more silty, nonplastic shale within Nancy Member of previous usage. (Taylor and Lewis, 1971.)
In its type area, Wasatch Mountains, Brigham is raised to group rank. Includes (ascending): Caddy Canyon(?) Quartzite (new), Inkom(?) Formation (new), Mutual Formation, Browns Hole Formation (new), and Geertsen Canyon Quartzite (new). Brigham Quartzite remains in good usage in southeasternmost Idaho; Brigham restricted from usage in Pocatello area. (Crittenden and others, 1971.)
Brodhead Creek Member of Willard (1938) adopted as upper of three members of Marcellus Shale. Overlies Stony Hollow Member (not new). (Alvord and Drake, 1971.)
Bromley Shale of Bassler (1906) adopted as Bromley Shale Member of Point Pleasant Formation. (Luft, 1971.)
Browns Hole Formation adopted; assigned to Brigham Group (newly revised). Overlies Mutual Formation; underlies Geertsen Canyon Quartzite (new). (Crittenden and others, 1971.)
Buttermilk Falls Limestone of Willard (1939) adopted. Overlies Schoharie Formation; underlies Marcellus Shale. (Alvord and Drake, 1971.)
Cabrillo Formation adopted as uppermost formation of Rosario Group (not new); overlies Point Loma Formation (new). (Kennedy and Moore, 1971.)
Caddy Canyon Quartzite adopted. Overlies Papoose Creek Formation (new); underlies Inkom Formation (new). In Huntsville area of northern Utah only, tentatively assigned as lowermost formation of Brigham Group (newly revised), overlying Kelley Canyon Formation (new) and underlying Inkom(?) Formation of Brigham Group. (Crittenden and others, 1971.)
Age changed from Oligocene(?) to Oligocene. (Wells and others, 1971.)
Cambalache Formation adopted. Overlies Hato Puerco Formation; underlies Canóvanas Formation (new). Toma de Agua Vitrophyre Member (new) adopted with restricted occurrence at top of Cambalache. (Seiders, 1971.)
Camelback Mountain Formation adopted. Overlies Mutual Formation; underlies Gibson Jack Formation (new). (Crittenden and others, 1971.)
Canóvanas Formation adopted. Overlies Cambalache Formation (new); underlies Martín González Lava. (Seiders, 1971.)
Age changed from late(?) Paleozoic to Late Ordovician. (Zartman and Marvin, 1971.)
Carter Sandstone Member adopted; underlies and overlies two unnamed shale members of Pierre. (Izett and others, 1971.)
Carter Caves Sandstone adopted as uppermost Mississippian formation (at Mississippian-Pennsylvanian systemic boundary) in northeastern Kentucky. (Englund and Windolph, 1971.)
Delaware River Flags of White (1882) as used by Willard (1937), Analomink Red Shale of Willard (1935), and Shohola Formation of Willard (1936) adopted as basal, middle, and upper members, respectively, of Catskill Formation in report area. (Alvord and Drake, 1971.)
Celada Formation adopted. Overlies Infierno Formation (new). (Seiders, 1971.)
Age changed from Early and Late Mississippian to Late Mississippian in Diamond Peak area. (Gordon, 1971.)
Name changed to Chainman Formation in southern Diamond Mountains. Chainman Shale remains in good usage elsewhere. (Brew, 1971.)
Name changed to Chalk Mountain Rhyolite. (Bergendahl and Koschmann, 1971.)
Chaparral Volcanics abandoned; its rocks now included in upper part of Spud Mountain Volcanics. (Anderson and others, 1971.)

Name	Age	Location
Chattanooga Shale	Devonian and Mississippian.	Northwestern Georgia.
Cheaha Sandstone Member (of Talladega Slate).	Paleozoic(?)	Northwestern Georgia.
Chickamauga Limestone	Middle and Late Ordovician.	Northwestern Georgia.
Chirikof Formation	middle Tertiary	Southwestern Alaska.
Chopawamsic Formation	Cambrian or Ordovician.	North-central Virginia.
Chuniksak Formation	Miocene(?)	Southwestern Alaska.
Church Creek Formation	Eocene (Refugian)	California.
Coldwater Shale	Early Mississippian	Michigan.
Cornishville Bed (of Perryville Limestone Member) (of Lexington Limestone).	Middle Ordovician	Kentucky.
Dakota Sandstone	Early(?) and Late Cretaceous.	New Mexico.
Deaton Member (of Lenoir Limestone).	Middle Ordovician	Northwestern Georgia.
Delaware River Flags Member (of Catskill Formation).	Late Devonian	Northeastern Pennsylvania and southeastern New York.
Delmar Formation (of La Jolla Group).	middle Eocene	Southern California.
Demetrie Volcanics	Late Cretaceous	Southern Arizona.
Diamond Peak Formation	Early and Late Mississippian and Early Pennsylvanian.	East-central Nevada.
Draper Formation	Pleistocene and Holocene	Utah.
Eagle Valley Evaporite	Middle Pennsylvanian	Colorado.
Echo Canyon Conglomerate	Late Cretaceous	Northern Utah.
Edwards Creek Tuff	Oligocene or Miocene	Central Nevada.
Elk Ridge Limestone Member (of Minturn Formation).	Middle Pennsylvanian	Colorado.
Ely Limestone	Late Mississippian and Early Pennsylvanian.	Nevada (Eureka area).
Everett Formation	Cambrian(?) and Cambrian.	Massachusetts, Connecticut, and New York.
Fajardo Formation	Early Cretaceous	Puerto Rico.
Faneto Formation	late Tertiary or early Pleistocene.	Southwestern Alaska.
Farmers Member (of Borden Formation).	Early Mississippian	Eastern Kentucky.
Flowery Trail Granodiorite	Mesozoic(?)	Northeastern Washington.
Floyd Shale	Late Mississippian	Northwestern Georgia.
Fort Payne Chert	Early Mississippian	Northwestern Georgia.
Frailes Formation	Late Cretaceous	Northeastern Puerto Rico.

Revision and reference
Maury Formation reduced in rank to member of Chattanooga Shale in northwestern Georgia. (Cressler, 1970.)
Geographically extended into northwestern Georgia. (Cressler, 1970.)
Attalla Chert Conglomerate Member of Chickamauga Limestone raised to formational rank as Attalla Conglomerate and geographically extended into northwestern Georgia. (Cressler, 1970.)
Chirikof Formation adopted. (Gates and others, 1971.)
Chopawamsic Formation adopted. (Southwick and others, 1971.)
Chuniksak Formation adopted. (Gates and others, 1971.)
Church Creek Formation of Dickinson (1965) adopted. (Brabb and others, 1971.)
Age changed from Mississippian to Early Mississippian. (Sable, 1970.)
Cornishville Limestone Member (of Perryville Formation) of Foerste (1912) adopted as Cornishville Bed of Perryville Limestone Member of Lexington Limestone. (Wolcott and Cressman, 1971.)
Twowells Sandstone Lentil (Pike, 1947) of Mancos Shale adopted as Twowells Tongue of Dakota Sandstone. Whitewater Arroyo Shale Member of Owen (1966) of Dakota Sandstone adopted as Whitewater Arroyo Tongue of Mancos Shale. (Green and Pierson, 1971.)
Deaton Formation of Spencer (1893) adopted as Deaton Member of Lenoir Limestone. (Cressler, 1970.)
Delaware River Flags of White (1882), as used by Willard (1937), adopted as lower of three members of Catskill Formation. Underlies Analomink Red Shale Member (not new). (Alvord and Drake, 1971.)
Delmar Sand of Hanna (1926), member of La Jolla Formation of Clark (1926), adopted as Delmar Formation of La Jolla Group (not new). Overlies Mount Soledad Formation (new); underlies Torrey Sandstone (not new). (Kennedy and Moore, 1971.)
Demetrie Formation of Thoms (1967) adopted as Demetrie Volcanics. Truncates several Mesozoic formations; underlies Red Boy Rhyolite (not new). (Cooper, 1971.)
In northern Pinyon Range, age of Diamond Peak Formation is Early and Late Mississippian and Early Pennsylvanian; elsewhere, age is Late Mississippian. (Gordon, 1971.)
Age changed from Pleistocene to Pleistocene and Holocene. (Birkeland and others, 1971.)
Age changed from Pennsylvanian and Permian to Middle Pennsylvanian. (Mallory, 1971.)
Echo Canyon Conglomerate of Williams and Madsen (1959) adopted. (Mullens, 1971.)
Edwards Creek Tuff adopted. (McKee and Stewart, 1971.)
Age changed from Pennsylvanian to Middle Pennsylvanian. (Mallory, 1971.)
Age changed from Pennsylvanian to Late Mississippian and Early Pennsylvanian. (Nolan and others, 1971.)
Age changed from Cambrian(?), Cambrian, or Ordovician, to Cambrian(?) and Cambrian. (Zen and Ratcliffe, 1971.)
Age changed from Late Cretaceous to Early Cretaceous. (Glover, 1971.)
Faneto Formation adopted. (Gates and others, 1971.)
Age changed from Mississippian to Early Mississippian. (Sable, 1970.)
Flowery Trail Granodiorite adopted. (Clark and Miller, 1968.)
Hartselle Sandstone reduced in rank to member of Floyd Shale in northwestern Georgia. (Cressler, 1970.)
Lavender Shale Member of Butts and Gildersleeve (1948) of Fort Payne Chert adopted. (Cressler, 1970.)
Leprocomio Siltstone Member of Guaynabo Formation reassigned to Frailes Formation as Leprocomio Mudstone Member. (Seiders, 1971.)

Name	Age	Location
Friars Formation (of La Jolla Group).	middle and late Eocene	Southern California
Frog Mountain Sandstone	Early and Middle Devonian.	Northwestern Georgia.
Gasconade Dolomite	Early Ordovician	Missouri
Geertsen Canyon Quartzite	late Precambrian and Early(?) Cambrian.	Northern Utah (Huntsville area).
Gibson Jack Formation	Early Cambrian	Southeastern Idaho (Pocatello area).
Golden Door Volcanics	Tertiary	Arizona and Nevada
Goshen Formation	Middle and Late Silurian to Early Devonian.	Massachusetts
Granite Mountain Porphyry	Paleocene	Southeastern Arizona.
Grant Mills Granodiorite	Mississippian(?) or older	Rhode Island
Graydon Channel Sandstone	Pennsylvanian	Missouri
Greenfield Dolomite Member (of Bass Islands Dolomite).	Late Silurian	Northern Ohio
Green Gulch Volcanics	Precambrian	Central Arizona
Guaracanal Andesite	Paleocene	Northeastern Puerto Rico.
Guaynabo Formation	Late Cretaceous	Northeastern Puerto Rico.
Gunsight Pass Member (of Pierre Shale).	Late Cretaceous	North-central Colorado.
Gunter Sandstone Member (of Van Buren Formation).	Early Ordovician	Missouri
Harkers Alluvium	Pleistocene	Utah
Hartselle Sandstone	Mississippian	Northwestern Georgia.
Hato Puerco Tuff	Late Cretaceous	Northeastern Puerto Rico.
Henderson Gneiss	late Precambrian or Paleozoic.	North Carolina
Henley Bed (of Farmers Member) (of Borden Formation).	Early Mississippian	Eastern Kentucky
Hickey Formation	late Miocene and Pliocene(?).	Central Arizona
Hickey Formation	late Miocene and early Pliocene.	Central and north-central Arizona.
Hillabee Chlorite Schist	post-Carboniferous	Northwestern Georgia.
Hornsilver Dolomite Member (of Minturn Formation).	Middle Pennsylvanian	Colorado
Huerfanito Bentonite Bed (of Lewis Shale).	Late Cretaceous	New Mexico
Hygiene Sandstone Member (of Pierre Shale).	Late Cretaceous	Colorado

Revision and reference
Friars Formation adopted as uppermost formation of La Jolla Group (not new). Rocks were formerly part of Hanna's (1926) Rose Canyon Shale Member of La Jolla Formation of Clark (1926). Overlies Scripps Formation (new). (Kennedy and Moore, 1971.)
Geographically extended into northwestern Georgia. (Cressler, 1970.)
Rocks of Van Buren Formation included in Gasconade Dolomite except in southeastern part of State. There, in its type locality, Van Buren remains in good usage. (Gann and others, 1971.)
Geertsen Canyon Quartzite adopted as uppermost formation in Brigham Group (newly revised); overlies Browns Hole Formation (new). Rocks formerly called Brigham Quartzite (restricted). (Crittenden and others, 1971.)
Gibson Jack Formation adopted. Overlies Camelback Mountain Formation (new). (Crittenden and others, 1971.)
Golden Door Volcanics is same rock unit as Patsy Mine Volcanics; Golden Door abandoned in favor of Patsy Mine Volcanics. (Anderson, 1971.)
Age changed from Silurian and Devonian to Middle and Late Silurian to Early Devonian. (Hatch and others, 1970.)
Age changed from early Tertiary(?) to Paleocene. (Phillips and others, 1971.)
Age changed from Devonian or older to Mississippian(?) or older. (Quinn, 1971.)
Graydon Channel Sandstone abandoned. (Gann and others, 1971.)
Greenfield Dolomite Member of Bass Islands Dolomite raised to formational rank in Bass Islands Group. (Norris and Fidler, 1971.)
Removed from Alder Group and made basal unit of Big Bug Group (new). Alder Group restricted to its type locality. (Anderson and others, 1971.)
Guaracanal Andesite redefined as Guaracanal Formation in northeastern Puerto Rico. Age changed from Paleocene and early Eocene(?) to Paleocene. (Seiders, 1971.)
In northeastern Puerto Rico, Martín Gonzáles Lava Member of Guaynabo Formation removed from Guaynabo and raised to formational rank. Leprocomio Siltstone Member removed from Guaynabo Formation and assigned to Frailes Formation as Leprocomio Mudstone Member. Guaynabo Formation not used in report. (Seiders, 1971.)
Gunsight Pass Member adopted; underlies and overlies unnamed upper unit and unnamed shale unit of Pierre, respectively. (Izett and others, 1971.)
In Missouri, Gunter Sandstone Member changed to member of Gasconade Dolomite except in southeastern part of State where it remains member of Van Buren Formation. Usage remains unchanged elsewhere. (Gann and others, 1971.)
Harkers Fanglomerate of Slentz (1955) adopted and renamed Harkers Alluvium. (Tooker and Roberts, 1971a.)
Reduced in rank to member of Floyd Shale in northwestern Georgia. (Cressler, 1970.)
Hato Puerco Tuff redefined and name changed to Hato Puerco Formation. Age changed from Late Cretaceous(?) to Late Cretaceous. (Seiders, 1971.)
Age changed from Ordovician to Devonian to late Precambrian or Paleozoic. (Bryant and Reed, 1970.)
Age changed from Mississippian to Early Mississippian. (Sable, 1970.)
Age changed from Pliocene(?) to late Miocene and Pliocene(?). (Krieger and others, 1971.)
Age changed from late Miocene and Pliocene(?) to late Miocene and early Pliocene. (McKee and Anderson, 1971.)
Geographically extended into northwestern Georgia. (Cressler, 1970.)
Age changed from Pennsylvanian to Middle Pennsylvanian. (Mallory, 1971.)
Huerfanito Bentonite Bed adopted. (Fassett and Hinds, 1971.)
Hygiene Sandstone Member extended into north-central Colorado; underlies and overlies two unnamed shale members of Pierre. (Izett and others, 1971.)

Name	Age	Location
Idaho Canyon Tuff	late Miocene	Northwestern Nevada and southeastern Oregon.
Imuruk Volcanics	late Tertiary to middle Pleistocene.	Alaska
Infierno Formation	Late Cretaceous	Northeastern Puerto Rico.
Inkom Formation	late Precambrian	Southeastern Idaho (Pocatello area) and possibly northern Utah (Huntsville area).
Iron King Volcanics (of Alder Group).	Precambrian	Central Arizona
Jacque Mountain Limestone Member (of Minturn Formation).	Middle Pennsylvanian.	Colorado
Juana Diaz Formation	early and middle Oligocene.	Puerto Rico
Keeler Canyon Formation	Middle Pennsylvanian to Early Permian.	California
Kelley Canyon Formation	late Precambrian	Northern Utah (Huntsville area).
Kenilworth Member (of Blackhawk Formation).	Late Cretaceous	Utah
Kessler Limestone Member (of Bloyd Formation).	Early Pennsylvanian (Morrow).	Northeastern Oklahoma.
Kidder Limestone Member (of Monteagle Limestone).	Late Mississippian	Kentucky and Tennessee.
Kirtland Shale	Late Cretaceous and Paleocene (in Mesa Portales area).	Northwestern New Mexico.
Kremmling Sandstone Member (of Pierre Shale).	Late Cretaceous	North-central Colorado.
Krugloi Formation	Mesozoic or Tertiary	Southwestern Alaska
Kugruk Volcanics	late Tertiary and early Pleistocene(?).	Alaska
Kulthieth Formation	Paleocene to Oligocene	Southern Alaska
La Jolla Group	early(?), middle, and late Eocene.	Southern California
Latonia Shale	Late Ordovician	Kentucky and Ohio
Lavender Shale Member (of Fort Payne Chert).	Early Mississippian (Osage).	Northwestern Georgia.
Leitchfield Formation	Late Mississippian (Chester).	Kentucky
Lenoir Limestone	Middle Ordovician	Northwestern Georgia.
Lenox Hills Formation	Early Permian (Wolfcamp).	Texas
Leprocomio Siltstone Member (of Guaynabo Formation).	Late Cretaceous	Northeastern Puerto Rico.
Lewis Shale	Late Cretaceous	New Mexico

Revision and reference
Idaho Canyon Tuff adopted. (Noble and others, 1970.)
Kugruk Volcanics abandoned; its rocks now included in Imuruk Volcanics. Age changed from early(?) and middle Pleistocene to late Tertiary to middle Pleistocene. (Hopkins and others, 1971.)
Infierno Formation adopted. Overlies Hato Puerco Formation; underlies Celada Formation (new). (Seiders, 1971.)
Inkom Formation adopted. In Huntsville area of northern Utah only, tentatively assigned to Brigham Group (newly revised). Overlies Caddy Canyon Quartzite (new) (only tentatively in Huntsville area); underlies Mutual Formation. (Crittenden and others, 1971.)
Removed from Alder Group, which is restricted to its type locality, and reassigned to the Big Bug Group (new). (Anderson and others, 1971.)
Age changed from Pennsylvanian to Middle Pennsylvanian. (Mallory, 1971.)
Age changed from middle Oligocene to early and middle Oligocene. (Glover, 1971.)
Age changed from Pennsylvanian and Early Permian to Middle Pennsylvanian to Early Permian. (Hall, 1971.)
Kelley Canyon Formation adopted. Overlies Maple Canyon Formation (new); underlies Caddy Canyon(?) Quartzite (new) (only tentatively in Huntsville area), lowermost formation of Brigham Group (newly revised). (Crittenden and others, 1971.)
Kenilworth Member of Young (1955) of Blackhawk Formation adopted. Overlies Aberdeen Member; underlies unnamed lower mudstone member. (Maberry, 1971.)
Geographically extended into northeastern Oklahoma. (Haley and Hendricks, 1971.)
Kidder Limestone Member adopted as upper member of Monteagle. Overlies Ste. Genevieve Limestone Member. (Lewis, 1971.)
In Mesa Portales area, age changed from Late Cretaceous to Late Cretaceous and Paleocene. (Fassett and Hinds, 1971.)
Kremmling Sandstone Member adopted. Underlies unnamed shale member of Pierre; overlies Sharon Springs Member of Pierre. (Izett and others, 1971.)
Krugloi Formation adopted. (Gates and others, 1971.)
Kugruk Volcanics abandoned; its rocks now included in overlying Imuruk Volcanics (revised). (Hopkins and others, 1971.)
Age changed from Eocene and Oligocene to Paleocene to Oligocene. (Addicott and Plafker, 1971.)
La Jolla Formation of Clark (1926) adopted and raised in rank to La Jolla Group; includes (ascending): Mount Soledad Formation (new), Delmar Formation (not new), Torrey Sandstone (not new), Ardath Shale (new), Scripps Formation (new), and Friars Formation (new). (Kennedy and Moore, 1971.)
Latonia Shale abandoned; its rocks now included in Kope Formation. (Luft, 1971.)
Lavender Shale Member of Butts and Gildersleeve (1948) of Fort Payne Chert adopted. (Cressler, 1970.)
Vienna Limestone reduced in rank to member of Leitchfield Formation in Nolin Reservoir area. Remains in formational rank elsewhere. (Gildersleeve, 1971.)
Lenoir Limestone and its Mosheim Member geographically extended into northwestern Georgia. Deaton Formation of Spencer (1893) adopted as uppermost member of Lenoir in northwestern Georgia. (Cressler, 1970.)
Lenox Hills Formation of Ross (1959) adopted. Replaces, in part, Wolfcamp Formation, which is revised, in its type locality, to Wolfcamp Series. (Grant, 1971.)
Leprocomio Siltstone Member removed from Guaynabo Formation and reassigned to Frailes Formation as Leprocomio Mudstone Member in northeastern Puerto Rico. (Seiders, 1971.)
Huerfanito Bentonite Bed (new) adopted and included in Lewis Shale. (Fassett and Hinds, 1971.)

Name	Age	Location
Lisburne Group	Mississippian, Pennsylvanian, and Permian.	Northern Alaska
Lomas Formation	Late Cretaceous	Northeastern Puerto Rico.
Lone Mountain Dolomite	Silurian (in Eureka area)	Nevada (Eureka area).
Lusardi Formation (of Rosario Group).	Late Cretaceous	Southern California
McKinney Basalt (of Snake River Group).	Pleistocene	Southern Idaho
Magothy Formation	Late Cretaceous	New Jersey
Mahlac Member (of Alutom Formation).	early Miocene	Guam
Malpais Basalt	Pliocene	Nevada
Mancos Shale	Late Cretaceous	New Mexico
Maple Canyon Formation	late Precambrian	Northern Utah (Huntsville area).
Marcellus Shale	Middle Devonian	Pennsylvania and New Jersey.
Martín González Lava Member (of Guaynabo Formation).	Late Cretaceous	Northeastern Puerto Rico.
Massacre Bay Formation	late Tertiary or early Pleistocene.	Southwestern Alaska
Maury Formation	Early Mississippian	Northwestern Georgia.
Middle Canyon Formation	Late Mississippian	South-central Idaho
Middlefield Granite	Early(?) Devonian	Massachusetts
Milton Formation	Jurassic	California
Minturn Formation	Middle Pennsylvanian	Colorado
Mission Valley Formation (of Poway Group).	late Eocene	Southern California
Mitchell Creek Formation	Pennsylvanian	Northern Nevada
Moberly Channel Sandstone	Pennsylvanian	Missouri
Monacillo Formation	Late Cretaceous and early Tertiary(?).	Northeastern Puerto Rico.
Monk Formation	Precambrian	Northeastern Washington.
Monotony Tuff	late Oligocene	Nevada
Monteagle Limestone	Late Mississippian	Kentucky and Tennessee.
Moreno Formation	Late Cretaceous and Paleocene.	California
Mosheim Member (of Lenoir Limestone).	Middle Ordovician	Northwestern Georgia.
Mount Roberts Formation	Pennsylvanian(?)	Northwestern Washington.
Mount Soledad Formation (of La Jolla Group).	early(?) and middle Eocene.	Southern California
Mount Stuart Granodiorite	Late Cretaceous	Central Washington.
Muddy Buttes Sandstone Member (of Pierre Shale).	Late Cretaceous	North-central Colorado.

Revision and reference
Age changed from Early Mississippian to Middle Pennsylvanian to Mississippian, Pennsylvanian, and Permian. (Brosgé and Tailleur, 1971.)
Lomas Formation adopted; restricted to fault blocks. (Seiders, 1971.)
Age changed from Silurian and Early Devonian(?) (locally) to Silurian in Eureka area. (Nolan and others, 1971.)
Lusardi Formation of Nordstrom (1970) adopted as basal formation of Rosario Group; underlies Point Loma Formation (new). (Kennedy and Moore, 1971.)
Age changed from Holocene to Pleistocene. (Malde, 1971.)
Old Bridge Sand Member removed from Raritan Formation and made basal member of Magothy Formation. (Wolfe and Pakiser, 1971.)
Age changed from Oligocene to early Miocene. (Bukry and others, 1971.)
Age changed from Pliocene or Pleistocene to Pliocene. (Hedge and Noble, 1971.)
Whitewater Arroyo Shale Member of Owen (1966) of Dakota Sandstone adopted as Whitewater Arroyo Tongue of Mancos Shale. Twowells Sandstone Lentil of Pike (1947) of Mancos Shale adopted as Twowells Tongue of Dakota Sandstone. (Green and Pierson, 1971.)
Maple Canyon Formation adopted. Underlies Kelley Canyon Formation (new). (Crittenden and others, 1971.)
Brodhead Creek Member of Willard (1938) and Stony Hollow Member of Cooper (1941) adopted as upper and middle members, respectively, of Marcellus Shale in report area. Stony Hollow overlies Union Springs Shale Member, basal member of Marcellus. (Alvord and Drake, 1971.)
In northeastern Puerto Rico, Martín González Lava Member raised to formational rank as Martín González Lava; Guaynabo Formation not used. Usage remains unchanged elsewhere. (Seiders, 1971.)
Massacre Bay Formation adopted. (Gates and others, 1971.)
Reduced in rank to member of Chattanooga Shale in northwestern Georgia. (Cressler, 1970.)
Middle Canyon Formation of Huh (1967) adopted. (Mamet and others, 1971.)
Age changed from late Carboniferous or post-Carboniferous to Early(?) Devonian. (Hatch and others, 1970.)
Age changed from Triassic and Jurassic to Jurassic. (James, 1971.)
Age changed from Pennsylvanian (Des Moines and younger) to Middle Pennsylvanian. (Mallory, 1971.)
Mission Valley Formation adopted as middle formation of Poway Group. Overlies Stadium Conglomerate (new); underlies unnamed formation. (Kennedy and Moore, 1971.)
Mitchell Creek Formation adopted. (Coats, 1971.)
Moberly Channel Sandstone abandoned. (Gann and others, 1971.)
Age changed from Late Cretaceous to Late Cretaceous and early Tertiary(?). (Seiders, 1971.)
Age changed from Cambrian(?) to Precambrian. (Yates, 1970.)
Monotony Tuff adopted. (Ekren and others, 1971.)
Kidder Limestone adopted as upper member of Monteagle Limestone, overlying Ste. Genevieve Limestone Member. (Lewis, 1971.)
Age changed from Late Cretaceous and Paleocene(?) to Late Cretaceous and Paleocene. (Bukry and others, 1971.)
Geographically extended into northwestern Georgia. (Cressler, 1970.)
Mount Roberts Formation of LeRoy (1913) adopted as used by Little (1960). (Yates, 1971.)
Mount Soledad Formation adopted as basal formation of La Jolla Group (not new); underlies Delmar Formation (not new). (Kennedy and Moore, 1971.)
Age changed from pre-Tertiary to Late Cretaceous. (Engels and Crowder, 1971.)
Muddy Buttes Sandstone Member adopted; underlies and overlies two unnamed shale members of Pierre. (Izett and others, 1971.)

Name	Age	Location
Mutual Formation	late Precambrian	Northern Utah (Huntsville area) and southeastern Idaho (Pocatello area).
Nancy Member (of Borden Formation).	Early Mississippian	Kentucky
Neal Ranch Formation	Early Permian (Wolfcamp).	Texas
Nevidiskov Formation	middle Tertiary	Southwestern Alaska
New Pass Tuff	Miocene	Central Nevada
New Providence Shale	Early Mississippian	Kentucky
Niobrara Formation	Late Cretaceous	Northwestern Colorado.
Northbridge Granite Gneiss	early Paleozoic	Rhode Island and Massachusetts.
Norwood Tuff	Eocene and Oligocene	Utah
Old Bridge Sand Member (of Raritan Formation).	Late Cretaceous	New Jersey
Ottawanah Rhyolite	Eocene or Oligocene	Northern Nevada.
Ox Frame Volcanics	Triassic	Southern Arizona
Papoose Creek Formation	late Precambrian	Southeastern Idaho (Pocatello area).
Patapsco Formation	Early and Late Cretaceous.	Maryland, Delaware, Virginia, Pennsylvania, and New Jersey.
Peabody Granite	Late Ordovician	Massachusetts
Peoria Loess	late Pleistocene	Western Kentucky.
Perkinsville Formation	Pliocene or Pleistocene	Central Arizona
Perkinsville Formation	late Pliocene	Central and north-central Arizona.
Perryville Limestone Member (of Lexington Limestone).	Middle Ordovician	Kentucky
Pierre Shale	Late Cretaceous	North-central Colorado.
Pinto Diorite	Precambrian	Montana
Pinyon Conglomerate	Late Cretaceous and Paleocene.	Northwestern Wyoming (Yellowstone Park area).
Piper Formation	Middle Jurassic	Central Montana
Pleasanton Formation	Late Pennsylvanian (Missouri).	Missouri
Pocatello Formation	late Precambrian	Southeastern Idaho (Pocatello area).
Point Loma Formation (of Rosario Group).	Late Cretaceous	Southern California
Point Pleasant Formation	Middle and Late Ordovician.	Northernmost Kentucky.

Revision and reference
Geographically extended to Pocatello area of southeastern Idaho. Overlies Inkom Formation (new); underlies Camelback Mountain Formation (new). In Huntsville area of northern Utah only, Mutual assigned to Brigham Group (newly revised), overlying Inkom(?) Formation and underlying Browns Hole Formation (new) of Brigham Group. (Crittenden and others, 1971.)
New Providence Shale reinstated in central Kentucky as basal member of Borden Formation. Nancy Member restricted to more silty, nonplastic shale within Nancy Member of previous usage. (Taylor and Lewis, 1971.)
Neal Ranch Formation of Ross (1959) adopted. Replaces, in part, Wolfcamp Formation, which is revised, in its type locality, to Wolfcamp Series. (Grant, 1971.)
Nevidiskov Formation adopted. (Gates and others, 1971.)
New Pass Tuff adopted. (McKee and Stewart, 1971.)
New Providence Shale reinstated in central Kentucky as basal member of Borden Formation. Nancy Member restricted to more silty, nonplastic shale within Nancy Member of previous usage. (Taylor and Lewis, 1971.)
Reduced in rank and included as member of Mancos Shale in northwestern Colorado. (Izett and others, 1971.)
Age changed from Precambrian to early Paleozoic. (Quinn, 1971.)
Age changed from Oligocene to Eocene and Oligocene. (Mullens, 1971.)
Removed from Raritan Formation and included as basal member of Magothy Formation. (Wolfe and Pakiser, 1971.)
Ottawanah Rhyolite adopted. (Coats, 1971.)
Ox Frame Formation of Lootens (1965, 1966) adopted as Ox Frame Volcanics. Unconformably overlies Paleozoic rocks; disconformably underlies several Mesozoic formations. (Cooper, 1971.)
Papoose Creek Formation adopted. Overlies Blackrock Canyon Limestone (new); underlies Caddy Canyon Quartzite (new). (Crittenden and others, 1971.)
Geographically extended into New Jersey. Age changed from Early Cretaceous to Early and Late Cretaceous. (Wolfe and Pakiser, 1971.)
Age changed from late(?) Paleozoic to Late Ordovician. (Zartman and Marvin, 1971.)
Geographically extended into western Kentucky. (Finch, 1971.)
Age changed from Pliocene(?) to Pleistocene(?) to Pliocene or Pleistocene. (Krieger and others, 1971.)
Age changed from Pliocene or Pleistocene to late Pliocene. (McKee and Anderson, 1971.)
Cornishville Member (of Perryville Formation) of Foerste (1912) adopted as Cornishville Bed of Perryville Limestone Member of Lexington Limestone. (Wolcott and Cressman, 1971.)
In north-central Colorado, Pierre Shale includes (ascending): lower unit, Sharon Springs Member, Kremmling Sandstone Member (new), shale member, Muddy Buttes Sandstone Member (new), shale member, Hygiene Sandstone Member, shale member, Carter Sandstone Member (new), shale member, Gunsight Pass Member (new), and upper unit. (Izett and others, 1971.)
Age changed from post-Cretaceous(?) to Precambrian. (Witkind, 1971.)
Age changed from Paleocene to Late Cretaceous and Paleocene. Basal contact changed from bottom to top of conglomerate. (McKenna and Love, 1970.)
Name changed to Piper Limestone in central Montana. (Witkind, 1971.)
Warrensburg Channel Sandstone reduced in rank and assigned to Pleasanton Formation as Warrensburg Sandstone Member. (Gann and others, 1971.)
Pocatello Formation of Ludlum (1942) adopted. Includes (ascending): unnamed lower member, Bannock Volcanic Member (not new), Scout Mountain Member (new), and unnamed upper member. Underlies Blackrock Canyon Limestone (new). (Crittenden and others, 1971.)
Point Loma Formation adopted as middle formation of Rosario Group. Overlies Lusardi Formation (not new); underlies Cabrillo Formation (new). (Kennedy and Moore, 1971.)
Bromley Shale of Bassler (1906) adopted as Bromley Shale Member of Point Pleasant Formation. (Luft, 1971.)

Name	Age	Location
Potomac Group	Early and Late Cretaceous.	Maryland, New Jersey, Virginia, Delaware, and Pennsylvania.
Poway Conglomerate	middle(?) and late Eocene.	Southern California.
Put-in-Bay Dolomite Member (of Bass Islands Dolomite.)	Late Silurian	Northern Ohio and southeastern Michigan.
Quail Porphyry	early Tertiary	Colorado
Quincy Granite	Late Ordovician	Massachusetts and Rhode Island.
Quinnville Quartzite (of Blackstone Series).	Precambrian(?)	Rhode Island
Quivira Shale Member (of Cherryvale Formation).	Late Pennsylvanian	Western Missouri.
Raisin River Dolomite Member (of Bass Islands Dolomite).	Late Silurian	Northern Ohio and southeastern Michigan.
Raritan Formation	Late Cretaceous	Maryland and New Jersey.
Red Boy Rhyolite	Late Cretaceous	Southern Arizona
Resolution Dolomite Member (of Minturn Formation).	Middle Pennsylvanian.	Colorado
Robinson Limestone Member (of Minturn Formation).	Middle Pennsylvanian.	Colorado
Rockmart Slate	Middle Ordovician	Northwestern Georgia.
Rodolfo Formation	Triassic	Southern Arizona
Rosario Group	Late Cretaceous	Southern California.
Round Pass Mudflow	Holocene	Washington
Rowe Schist	Early to Late Cambrian and Early Ordovician.	Massachusetts, Vermont, and New York.
Roxana Silt	late Pleistocene	Western Kentucky.
Sabana Hoyos Limestone Member (of Cariblanco Formation).	Late Cretaceous	Puerto Rico
San Diego Lapilli Tuff Member (of Coamo Formation).	Late Cretaceous	Puerto Rico
Sandpoint Conglomerate	Late(?) Cretaceous	Idaho
Santa Ana Limestone Member (of Coamo Formation).	Late Cretaceous	Puerto Rico
Scott Peak Formation	Late Mississippian	Idaho
Scout Mountain Member (of Pocatello Formation).	late Precambrian	Southeastern Idaho (Pocatello area).
Scripps Formation (of La Jolla Group).	middle and late Eocene.	Southern California.

Revision and reference
Age changed from Early Cretaceous to Early and Late Cretaceous. (Wolfe and Pakiser, 1971.)
Redefinition of Poway Conglomerate by Hanna (1926) accepted; rank raised to Poway Group. Includes (ascending): Stadium Conglomerate (new), Mission Valley Formation (new), and unnamed formation. Age changed from late Tertiary to middle(?) and late Eocene. (Kennedy and Moore, 1971.)
Put-in-Bay Dolomite Member of Bass Islands Dolomite raised to formational rank in Bass Islands Group in Ohio; member rank is retained in Michigan. (Norris and Fidler, 1971.)
Age changed from Late Cretaceous or early Tertiary to early Tertiary. (Bergendahl and Koschmann, 1971.)
Age changed from Devonian(?) to Late Ordovician. (Zartman and Marvin, 1971.)
Quinnville Quartzite adopted. (Quinn, 1971.)
Geographically extended into western Missouri. (Connor and others, 1971.)
Raisin River Dolomite Member of Bass Islands Dolomite raised to formational rank in Bass Islands Group in Ohio; member rank is retained in Michigan. (Norris and Fidler, 1971.)
Excluded from Maryland; so-called Raritan in Maryland now considered upper part of Patapsco Formation. Old Bridge Sand Member removed from Raritan Formation in New Jersey and made basal member of Magothy Formation. (Wolfe and Pakiser, 1971.)
Red Boy Rhyolite of Thoms (1966, 1967) adopted. Mainly overlies Demetrie Volcanics (not new) and, to lesser extent, Ox Frame Volcanics (not new); is uppermost Cretaceous formation in Tascuela area. (Cooper, 1971.)
Age changed from Pennsylvanian to Middle Pennsylvanian. (Mallory, 1971.)
Age changed from Pennsylvanian to Middle Pennsylvanian. (Mallory, 1971.)
Rockmart Slate of Hayes (1891) adopted. (Cressler, 1970.)
Rodolfo Formation adopted. Unconformably overlies Paleozoic rocks; underlies Whitcomb Quartzite (new). (Cooper, 1971.)
Rosario Formation of Beal (1924) and Anderson and Hanna (1935) extended into southern California from Baja California and raised to group rank. Includes (ascending): Lusardi Formation (not new), Point Loma Formation (new), and Cabrillo Formation (new). (Kennedy and Moore, 1971.)
Round Pass Mudflow adopted. (Crandell, 1971.)
Age changed from Early to Late Cambrian and Early Ordovician(?) to Early to Late Cambrian and Early Ordovician. (Osberg and others, 1971.)
Geographically extended into western Kentucky. (Finch, 1971.)
Changed from member of Cariblanco Formation to member of Maravillas Formation. (Glover, 1971.)
Changed from San Diego Lapilli Tuff Member of Coamo Formation to San Diego Member of Maravillas Formation. (Glover, 1971.)
Sandpoint Conglomerate of Anderson (1930) adopted. (Harrison and Schmidt, 1971.)
Changed from member of Coamo Formation to member of Maravillas Formation. (Glover, 1971.)
Scott Peak Formation of Huh (1967) adopted. (Mamet and others, 1971.)
Scout Mountain Member adopted. Overlies Bannock Volcanic Member (not new); underlies unnamed upper member of Pocatello. (Crittenden and others, 1971.)
Scripps Formation of La Jolla Group (not new) adopted. Its rocks formerly part of Hanna's (1926) Rose Canyon Shale Member of La Jolla Formation of Clark (1926). Overlies Ardath Shale (new); underlies Friars Formation (new). (Kennedy and Moore, 1971.)

Name	Age	Location
Sehoo Formation	Pleistocene and Holocene	Nevada
Sharon Springs Member (of Pierre Shale).	Late Cretaceous	North-central Colorado.
Shingle Pass Tuff	early Miocene	Nevada
Shohola Member (of Catskill Formation).	Late Devonian	Northeastern Pennsylvania.
Silver Point Quartz Monzonite	Tertiary	Northeastern Washington.
Sloane Peak Member (of State Bridge Formation).	Early Triassic	Colorado
Snake River Group	Pleistocene and Holocene	Southern Idaho
Soldier Meadow Tuff	late Miocene	Northwestern Nevada.
Sophie Mountain Formation	Late Cretaceous(?)	Northwestern Washington.
South Creek Formation	Late Mississippian (Chester).	Idaho
Stadium Conglomerate (of Poway Group).	middle(?) and late Eocene.	Southern California
Stansbury Formation	Late Devonian	Northwestern Utah
Starvation Flat Quartz Monzonite.	Mesozoic(?)	Northeastern Washington.
State Bridge Formation	Permian and Early Triassic.	Colorado
Stevens Mountain Rhyolite	Late Triassic or Early Jurassic.	Southern Arizona
Stony Hollow Member (of Marcellus Shale).	Middle Devonian	Southeastern New York and northeastern Pennsylsylvania.
Sullivan Buttes Latite	late Oligocene and early Miocene.	Central Arizona
Summit Lake Tuff	late Miocene	Northwestern Nevada.
Sunnyside Member (of Blackhawk Formation).	Late Cretaceous	Utah
Surrett Canyon Formation	Late Mississippian	South-central Idaho.
Tabonuco Formation	Early Cretaceous	Northeastern Puerto Rico.
Tahkandit Limestone	Early Permian	East-central Alaska
Talladega Slate	Precambrian(?) to Carboniferous(?).	Northwestern Georgia.
Tascuela Red Beds	Triassic	Southern Arizona
Temblor Formation/Sandstone	Oligocene and Miocene	California

Revision and reference
Age changed from Pleistocene to Pleistocene and Holocene. (Birkeland and others, 1971.)
Geographically extended into north-central Colorado. Underlies Kremmling Sandstone Member (new) of Pierre; overlies unnamed lower unit of Pierre. (Izett and others, 1971.)
Age changed from Miocene to early Miocene. (Ekren and others, 1971.)
Shohola Formation of Willard (1936) adopted as Shohola Member, upper of three members of Catskill Formation. Overlies Analomink Red Shale Member (not new). (Alvord and Drake, 1971.)
Age changed from Mesozoic(?) to Tertiary. (Miller, 1971.)
Sloane Peak Member adopted. (Freeman, 1971.)
Stratigraphic succession revised. Formations are (ascending): Madson Basalt, Sugar Bowl Gravel, Thousand Springs Basalt, Crowsnest Gravel, Sand Springs Basalt, Wendell Grade Basalt, McKinney Basalt, Melon Gravel, and, locally, Holocene lava flows. Bancroft Springs Basalt abandoned; its rocks now part of McKinney Basalt. In southeastern Idaho the group also includes Big Hole Basalt. (Malde, 1971.)
Soldier Meadow Tuff adopted. (Noble and others, 1970.)
Sophie Mountain Conglomerate of Bruce (1917) adopted as used by Little (1960) and renamed Sophie Mountain Formation. (Yates, 1971.)
South Creek Formation of Huh (1967) adopted. (Mamet and others, 1971.)
Stadium Conglomerate adopted as basal formation of Poway Group; underlies Mission Valley Formation (new). (Kennedy and Moore, 1971.)
Stansbury Formation of Stokes and Arnold (1958) adopted. Overlies Laketown Dolomite; underlies Gardner Formation. (Tooker and Roberts, 1971b.)
Starvation Flat Quartz Monzonite adopted. (Clark and Miller, 1968.)
Sloane Peak of Early Triassic age adopted as member of State Bridge Formation. State Bridge divided into (ascending): Permian sandstone of the Fryingpan River and unnamed beds; Lower Triassic Sloane Peak Member (new), unnamed beds, and coarse unit at Toner Creek. Permian South Canyon Creek Member recognizable at north edge of quadrangle and pinches out 2 miles south of north edge. (Freeman, 1971.)
Stevens Mountain Rhyolite of Thoms (1966, 1967) adopted. Overlies Tascuela Red Beds (not new); underlies Demetrie Volcanics (not new). (Cooper, 1971.)
Stony Hollow Member of Cooper (1941) adopted as middle member of Marcellus Shale. Overlies Union Springs Shale Member; underlies Brodhead Creek Member (not new). (Alvord and Drake, 1971.)
Sullivan Buttes Latite adopted. (Krieger and others, 1971.)
Summit Lake Tuff adopted. (Noble and others, 1970.)
Sunnyside Member of Young (1955) of Blackhawk Formation adopted. Overlies unnamed lower mudstone member; underlies unnamed upper mudstone member. (Maberry, 1971.)
Surrett Canyon Formation of Huh (1967) adopted. (Mamet and others, 1971.)
Tabonuco Formation adopted. Overlies unnamed sequence of volcaniclastic rocks; underlies Hato Puerco Formation. (Seiders, 1971.)
Age changed from Permian to Early Permian. (Brabb and Grant, 1971.)
Cheaha Sandstone Member of Talladega Slate geographically extended into northwestern Georgia. (Cressler, 1970.)
Tascuela Red Beds of Thoms (1966, 1967) adopted. Overlies Ox Frame Volcanics (not new); underlies Stevens Mountain Rhyolite (not new) or Demetrie Volcanics (not new). (Cooper, 1971.)
Big Blue Serpentinous Member removed from uppermost part of Temblor Formation and redefined as Big Blue Formation, overlying now stratigraphically restricted Temblor Formation in New Idria area. (Lockwood, 1971.)

Name	Age	Location
Texas Gulch Formation	Precambrian	Central Arizona
Toma de Agua Vitrophyre Member (of Cambalache Formation).	Late Cretaceous	Northeastern Puerto Rico.
Torrey Sandstone (of La Jolla Group).	middle Eocene	Southern California
Trujillo Alto Limestone Member (of Monacillo Formation).	Late Cretaceous and early Tertiary(?).	Northeastern Puerto Rico.
Turupah Formation	Holocene	Nevada
Twowells Tongue (of Dakota Sandstone).	Late Cretaceous	New Mexico
Twowells Tongue (of Dakota Sandstone).	Late Cretaceous	New Mexico
Tymochtee Formation	Late Silurian	Northern Ohio
Valley Springs Formation	Miocene	Eastern California
Van Buren Formation	Early Ordovician	Missouri
Van Duzer Limestone	Devonian(?)	Northern Nevada
Verde Formation	late Pliocene	Central and north-central Arizona.
Vienna Limestone	Late Mississippian (Chester).	Kentucky
Wahoo Limestone	Early Pennsylvanian to Permian.	Northern Alaska
Warrensburg Channel Sandstone.	Pennsylvanian	Missouri
Wendell Grade Basalt (of Snake River Group).	Pleistocene	Southern Idaho
Westerville Limestone Member (of Cherryvale Formation).	Late Pennsylvanian	Kansas, Nebraska, Iowa, and Missouri.
Whitcomb Quartzite	Early Cretaceous(?)	Southern Arizona
White Quail Limestone Member (of Minturn Formation).	Pennsylvanian	Colorado
White Quail Limestone Member (of Minturn Formation).	Middle Pennsylvanian	Colorado
Whitewater Arroyo Tongue (of Mancos Shale).	Late Cretaceous	New Mexico
Whitewater Arroyo Tongue (of Mancos Shale).	Late Cretaceous	New Mexico
Witnet Formation	early Tertiary	California
Wolf Porphyry	Eocene(?)	Montana
Wolfcamp Formation	Early Permian (Wolfcamp).	Texas
Wrangell Lava	Miocene to Holocene	Southern Alaska
Yorktown Formation	late Miocene and early Pliocene.	Virginia, North Carolina, Maryland, South Carolina, and District of Columbia.

Revision and reference
Removed from Alder Group, which is restricted to its type locality. Overlies Big Bug Group (new). (Anderson and others, 1971.)
Toma de Agua Vitrophyre Member adopted with restricted occurrence at top of Cambalache Formation (new). (Seiders, 1971.)
Torrey Sand of Hanna (1926), member of La Jolla Formation of Clark (1926), adopted as Torrey Sandstone of La Jolla Group. Overlies Delmar Formation (not new); underlies Ardath Shale (new). (Kennedy and Moore, 1971.)
Age changed from Late Cretaceous to Late Cretaceous and early Tertiary(?). (Seiders, 1971.)
Age changed from Pleistocene to Holocene. (Birkeland and others, 1971.)
Twowells Sandstone Lentil of Pike (1947) of Mancos Shale adopted as Twowells Tongue of Dakota Sandstone. (Green and Pierson, 1971.)
Name changed from Twowells Tongue to Twowells Sandstone Tongue. (Dane and others, 1971.)
Assigned to Bass Islands Group. (Norris and Fidler, 1971.)
Age changed from Miocene(?) to Miocene. (Clark, 1970.)
In Missouri, Van Buren Formation is restricted to its type locality in southeastern part of State. Elsewhere in Missouri, these rocks are included in Gasconade Dolomite. Van Buren remains in good usage in Oklahoma, Kansas, and Arkansas. (Gann and others, 1971.)
Van Duzer Limestone of Decker (1962) adopted. (Coats, 1971.)
Age changed from Pliocene or Pleistocene to late Pliocene. (McKee and Anderson, 1971.)
Included as member of Leitchfield Formation in Nolin Reservoir area. Remains formation or member of Buffalo Wallow Formation elsewhere. (Gildersleeve, 1971.)
Age changed from Early and Middle Pennsylvanian to Early Pennsylvanian to Permian. (Brosgé and Tailleur, 1971.)
Reduced in rank and name changed to Warrensburg Sandstone Member of Pleasanton Formation. (Gann and others, 1971.)
Age changed from Holocene to Pleistocene. (Malde, 1971.)
Geographically extended into western Missouri. (Connor and others, 1971.)
Whitcomb Quartzite adopted. Overlies Rodolfo Formation (new); underlies Angelica Arkose (new). (Cooper, 1971.)
Age changed from Pennsylvanian and Permian(?) to Pennsylvanian. (Bergendahl and Koschmann, 1971.)
Age changed from Pennsylvanian to Middle Pennsylvanian. (Mallory, 1971.)
Whitewater Arroyo Shale Member of Owen (1966) of Dakota Sandstone adopted as Whitewater Arroyo Tongue of Mancos Shale. (Green and Pierson, 1971.)
Name changed from Whitewater Arroyo Tongue to Whitewater Arroyo Shale Tongue. (Dane and others, 1971.)
Age changed from pre-middle Miocene to early Tertiary. (Dibblee and Louke, 1970.)
Age changed from post-Cretaceous to Eocene(?). (Witkind, 1971.)
Wolfcamp Formation, in its type locality, revised to Wolfcamp Series. Wolfcamp is now used everywhere as a time-stratigraphic term (provincial series) rather than a rock-stratigraphic term (formation). Neal Ranch and Lenox Hills Formations (not new) adopted for rocks formerly within the Wolfcamp Formation. (Grant, 1971.)
Age changed from Tertiary to Holocene to Miocene to Holocene. (MacKevett, 1970.)
Age changed from Miocene to late Miocene and early Pliocene. (Hazel, 1971.)

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