List of stratigraphic names used in northwest and central New Mexico

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LIST OF STRATIGRAPHIC NAMES USED IN NORTHWEST AND CENTRAL NEW MEXICO

by Christina Lochman-Balk

This lexicon is an alphabetical listing of the stratigraphic names which have been used in central and northwestern New Mexico for units that are Mississippian through Pleistocene in age. The form used is as follows:

1) Areal distribution given in original description.
2) Reference in which unit was first defined or mentioned.
3) Type locality.
4) Short lithologic description (and thickness) at the type locality or in the type area.
5) Age to stage; contacts; emending or refining descriptions of note; additional areal distribution; additional information on thickness, lithology, and character of the beds in the area of the tenth field conference (1959).

The following glossary of abbreviations contains those used in the list of names that are not widely used and known. Most abbreviations used herein for lithologic description are well known to all geologists, and are not included in the glossary.

alt. alternating
ascend. ascending, in ascending order
btw. between
correl. correlative or correlated
depos. deposited
descend. descending, in descending order
desig. designated
diat. diatomaceous
fagl. fanglomerate
fluv. fluvial
gradat. gradational
gr. grain (ed)
gran. granular
inv. investigation (s)
l. lower
lent. lenticular
lithog. lithographic
mass. massive
min. minimum
occas. occasional
perst. persistent
pred. predominantly
transit. transitional

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ABO FORMATION—Permian
1) Cent. New Mexico
3) Abo Canyon, S end of Manzano Mtns., Socorro Co. (redescribed by Needham and Bates, 1943)
4) Drk. red, purple, coarse-gr. ss., cgl. at base, some sh. (300'-800')
5) Wolfcampian-Leonardian; conf. and gradat. on Bursum fm., conf. (? ) on upper Madera Is., overlain conf. and gradat. by Yeso fm.; Pray and Otte, 1954, Abo is transit. S with Hueco marine and brackish seq., thin S 1,400' to 250' in S N. Mex. basal tongue is Powwow cgl. and upper tongue is Deer Mtn. red sh.; N. Mex. (widely spread) and subsurface W Tex.

ALLISON BARREN MEMBER (of Menefee formation) — U. Cretaceous
1) NW New Mexico
2) J. D. Sears, 1925, U. S. Geol. Survey Bull. 767, p. 18
3) Near village of Allison, McKinley Co.
4) Lt. gry. to wh. lent. sss. interb. with It. gry. shs. and thin coal seams (600'-800')
5) Eagle to Pierre; conf. on U. Gibson coal memb. (Cleary coal memb.), conf. overlain by Cliff House ss.

ARROYO PENASCO FORMATION — Mississippian
1) N and Cent. New Mexico
3) SW ¼ SE ¼ sec. 5, T. 16 N., R. 1 E., Pinos and Penasco Canyons, Nacimiento Mtns.
4) Base 18'-20' clean, calc. ss., interb. sh. and Is.; 31' fine to coarse gr. gry. to br. Is.; 70' lithog. to oolitic gry. med.-bedded Is. upper 10' wh. chert (140' max.)
5) Meramecian; conf. on Precam., overlain dis-conf. by Log Springs fm. or Sandia fm. (Penn.); farthest S exp. in S Sandia Mtns.

ATARQUE MEMBER (of Mesaverde formation) — U. Cretaceous
1) W-cent. New Mexico
2) W. S. Pike, 1947, Geol. Soc. America Mem. 24, p. 35
4) Gry. and tan interp. sss., ndy. shs., carb. shs., thin coals (127')
5) Early Carilite; conf. on lower Mancos sh., conf. overlain by Horsehead memb. of Mancos

ATRASADO MEMBER (of Madera limestone) — Pennsylvanian
1) N-cent. New Mexico (Lucero uplift)
3) Lucero uplift, no type sect. desig.
4) Med. gry., thin-bed., shly. Is., few mass. beds. interp. with thick gry. shs. (500'-700')
5) Missourian-Virgilian; conf. on Gray Mesa memb., conf. overlain by Red Tanks memb.
BACA FORMATION — Tertiary
1) Cent. New Mexico
2) R. H. Wilpolt and others, 1946, U. S. Geol. Survey Oil and Gas Inv. Prelim. Map 61
3) No type sect. or loc. given; presumably is same as Winchester's - N end of Bear Mtns., Socorro Co.
4) Interb. red.-purple to red. ylw. br. ark. ss., cgl., shs., and mudst. (684')
5) Eocene (?); unconf. or conf. (?) on Cret.; conf. on Cret., unconf.

BARTLETT BARREN MEMBER (of Crevasse Canyon formation) — U. Cretaceous
1) NW New Mexico
2) J. D. Sears, 1925, U. S. Geol. Survey Bull. 767, p. 17
3) Near old Bartlett mine shaft, near Dilco village, McKinley Co.
4) Lt. gry. to wh. ss., interb. gry. shs. and thin coal seams (330'-400')
5) Niobraran; conf. on Dilco coal memb., conf. by lower Gibson coal memb., is local equiv. of Dalton ss. (non-marine) and Mullato tongue (marine) of Mancos

*Bell Mountain sandstone member (of Miguel formation) — U. Cretaceous
1) Cent. New Mexico
2) D. E. Winchester, 1920, U. S. Geol. Survey Bull. 716-A, p. 8
3) Near foot of Bell Mountain, in T. 3 N., R. 9 W.
4) Thick bed., ylw.-gry. coarse ss. (80')
5) Basal Niobraran; conf. on D-Cross memb. of Mancos, conf. overlay by Crevasse Canyon fm.; Dane, and others, 1957, p. 187, name abandoned, as unit is an upfaulted duplication of Gallego ss. memb.

BIDAHOCHI FORMATION — Tertiary
1) NE Arizona and extreme NW New Mexico
2) A. B. Reagan, 1924, Pan-American Geologist, v. 41, p. 366
3) Type loc. not given. prob. 15 to 20 mi. E and N Bidahoichi, near Twin Buttes, Ariz.
4) Interb. lt. gry., lt. gn., pink, buff ss., tuff, bentonite, tuffaceous ss. mudst., aggl. and basalt flows (thick. ranges 500'-1,000')
5) Pliocene; unconf. on Cret. rocks, conf. or disconf. overlain by Pleistocene sand and gravel; Reagan, 1932, recog. four subdiv. - Cornfields-Sunrise Springs ser., Granado ser., White Cone ser., the latter in Hopi Buttes volcanic field; Repenning and Irwin, 1954, recog. three membs. of fm. at White Cone - (1) lower memb., fluv. and lacus. ss., mudst. and few beds of rhy. shards, (2) middle volc. memb., basalt flows, interb. lapilli tuff, aggl. and travert., (3) upper memb. fluv. ss. with some rhy. ash.

BLUFF SANDSTONE (of San Rafael group) — U. Jurassic
1) SE Utah
2) A. A. Baker, C. H. Dane and J. B. Reeside, Jr., 1936, U. S. Geol. Survey Prof. Paper 183, p. 21
3) Bluff, Utah
4) Mass., X-bed., gry. to buff, well-sort. ss., minor mudst. lenses (200')
5) Conf. and gradat. with Summersville fm., gradat. with Cow Springs ss. conf. and gradat. with Salt Wash memb. of Morrison fm., overlain by Re-capture memb., NE Ariz., SW Colo., NW N. Mex.; thick. ranges 5'-350', is SW cont. (eolian) lateral equiv. of Summersville and Cow Springs

BRUSHY BASIN SHALE MEMBER (of Morrison formation) — U. Jurassic
1) SE Utah
2) H. E. Gregory, 1938, U. S. Geol. Survey Prof. Paper 188, p. 59
3) Brushy Basin, 8 mi. W of Blanding, Utah
4) Variegated sandy shs., few thin Is., ss., and chert cgl. lenses (450')
5) Conf. and gradat. with Westwater Canyon ss. memb., conf. overlay by Burro Canyon fm. or conf. by Dakota ss.; W Colo., NE Ariz. and NW N. Mex.; thins progress. SE to 100' at Thoreau, N. Mex.; fluv. origin

BURSUM FORMATION — Permian
1) Cent. New Mexico
4) Drk. purpl.-red and gn. sh. interbed. with arkose, ark. cgl., gry. Is., locally at base a reworked rubbly nodul. Is. (28'-234')
5) Wolfcampian; disconf. to gradat. with ark. memb. of Madera Is., overlay conf. and gradat. by Abo fm.; SE N. Mex.

Caloso formation — Mississippian
1) Ladrón Mtns.
3) Arroyo Caloso, Ladrón Mtns., T. 2 N., R. 2 W.
4) Is. sim. to Kelly Is., fossils in br. weather., cherty, gry. Is. (185')

CANAS GYPSUM MEMBER (of Yeso formation) — Permian
1) Cent. New Mexico
3) Secs. 4 and 5, T. 2 S., R. 2 E., and sec. 33, T. 1 S., R. 2 E., near Mesa del Yeso, Socorro Co.
4) Mass. beds of gyp., mostly pure, locally with thin silt partings or thin Iss. disappearing to N, thick. ranges 0'-115'
5) Leonardian; conf. on Torres memb., overlain conf. by Joyita ss. memb.; SE N. Mex. in sub-surface
CARMEL FORMATION (of San Rafael group) — M. and U. Jurassic
1) S-cent. and NE Utah
3) Mount Carmel, W Kane Co., Utah
4) Red and buff ss. and dense ls. at base, red and gn. shs., thin sss. and thick gyp. beds (200'-650')
5) Unconf. on Navajo ss., conf. overlain by Entrada ss.; NW N. Mex., N Ariz., W Colo.; in Navajo country only red silty facies present; littoral, basal ls. locally, to SW wh. sss. common; fm. thins S and SE to zero near N. Mex.-Ariz. state line

*Chamiso formation — U. Cretaceous
1) Cent. New Mexico
3) N of Blue Mesa in T. 2 N., R. 8 W.
4) Ylw. sss., sndy. shs. and coal beds, all non-marine (1,809')
5) Montanan; conf. on Miguel fm., unconf. overlain by Dalit fm.; Dane, and others, 1957, p. 191, recommend abandoning Chamiso fm. in favor of Crevasse Canyon fm., equiv. in Alamosa Cr. area.

Chavez member (of Morrison formation) — U. Jurassic
1) NW New Mexico
4) Variegated interb. gry. slsts., purple-red sndy. mudst., wh. to buff, coarse-gr., cgl. sss. (160')
5) Disconf. on Thoreau fm., conf. and gradat. with overlying Prewitt memb.; thick, range 100'-200'; equiv. of Recapture shale memb.

CHINLE FORMATION — U. Triassic
1) N Arizona, S Utah
3) Chinle Valley, NE Ariz.
4) Four units - red sh. and shly. ss., lenses of ls. cgl., and red sh., variegated shs. with ls. cgl., drk.-br. sndy. shs. (named Divs. A, B, C, D) (400'-1,000')

**Chupadera Formation — Permian
1) New Mexico
3) No type loc. or sect.
4) Drk. gry., ylw. br., pink sss., sndy. shs. over lain by cream, buff, blu. interb. ls. and gyp. beds
5) Leonardian; conf. on Abo ss., unconf. overlain by Triassic beds. All recent mapping has recog. the Yesso, Glorieta, and San Andres fms.; the term Chupadera fm. has lapsed from usage and should be abandoned

CLEARY COAL MEMBER (of Menefee formation) — U. Cretaceous
1) NW New Mexico
4) Interb. lt. gry. to buff ss., drk. gry. shs. with comm. coals (250'-300')
5) Telegraph Creek to Eagle; conf. on Point Look-out ss., Hosta tongue or Gibson coal memb., conf. overlain by Allison barren memb.

(G.) CLIFF HOUSE SANDSTONE (of Mesaverde group) — U. Cretaceous
1) SW Colorado and NW New Mexico
4) Lt. gry., buff, br. thin-bed. sss. (400')
5) Pierre; conf. on Menefee fm., conf. overlain by Lewis sh.; Silver, 1951, transgress. ss. in series of sand lenses, imbricated upward to SW as Chacra ss. and La Ventana ss.

COCONINO SANDSTONE — Permian
1) N Arizona
3) Coconino Plateau, no type sect. desig.
4) X-bed, gry. to wh. ss. (150'-610')
5) Late Wolfcampian; conf. and gradat. on Hermit sh. and Rico fm., conf. overlain by Toroweap, gradat. into De Chelly; Wengler and Matheny, 1958, lateral equiv. of upper Supai, Hermit, Halgaito, and Cedar Mesa; S Utah, and SE Nev.

COW SPRINGS SANDSTONE — U. Jurassic
1) N Arizona and S Utah
3) Cliff on N face of Black Mesa, 4 mi. E of Cow Springs, Ariz.
4) X-bed., gry. to wh. ss. (342')
CREVASSE CANYON FORMATION (of Mesaverde group)  
— U. Cretaceous  
1) NW New Mexico  
3) On a N fork of Catron Cr. about 3 mi. SW of mouth of Crevasse Canyon, San Juan Co.  
4) Interb. non-marine shs., sltst., coals, and fine-gr. thin buff ss. (700')  
5) Niobraran; conf. on Gallup ss., conf. overlain by Point Lookout ss.; thick. 420'-700'; divided ascend. - Dilco coal memb., Dalton ss. tongue (equiv. of Mulatto tongue of Mancos and Bartlett barren memb.) and lower Gibson coal memb.  

CURTIS FORMATION (of San Rafael group) — U. Jurassic  
1) SE and Cent. Utah and W Colorado  
3) Curtis Point, near head of Cottonwood Springs Wash, on NE side of San Rafael Swell, Utah  
4) Gry.-gn., glau. talc., fossil., x-bed. sss. with basal cgl., gn. sh., lense (193')  

CUTLER FORMATION — Pennsylvanian (top) and Permian  
1) SW Colorado  
2) C. W. Cross and E. Howe, 1905, U. S. Geol. Survey Silvery Folio 120  
3) Cutler Creek, 4 mi. N of Ouray, Colo.  
4) Bright red sss., lt. red to pink grits, cgl., alternating with snyd. shs., early or snyd. iss. (1,000')  
5) Conf. and gradat. on Hermosa fm., unconf. overlain by Triassic to Tertiary; Wengerd and Strickland, 1954, Rico marine facies a basal memb. of Cutler, transit. btw. Cutler cont. strata and Hermosa marine strata; SE Utah, NE Ariz., NW N. Mex., includes Hoskinnini, De Chelly, Organ Rock, Cedar Mesa, Halgaito tongues (O. G.) DAKOTA SANDSTONE — U. (?) Cretaceous  
1) Nebraska and Kansas  
4) Ylw., red and wh. sss., interb. with variegated clays and lignite (400')  
5) Unconf. on Morrison or Lower Cretaceous rocks, conf. or conf. overlain by Mancos; N. and S Dakota, SE Mont. (?), E Wyo. (?), E Colo., NW Okla., cent. and E N. Mex.; basal ss. of Cret. sects. W of Front Range are termed Dakota (?) fm., some units with fossils now known to be Lower Cretaceous - Burro Canyon fm. of SE Utah and SW Colo.; uranium deposits  

DATIL FORMATION — Tertiary  
1) Cent. New Mexico  
3) N end of Bear Mtns., Socorro Co.  
4) Wh. red, purple, ylw.-gry. interp. tuffs, rhy., cgl., sss., and mudst. (1,824')  
5) Unconf. on Baca fm. or Cret., disconf. or unconf. overlain by Santa Fe fm.; Wilpolt and others, 1946, remove lower 684' into Baca fm.; Tonking, 1957, adds 150' of weld. rhy. tuff and min. of 1,200' of basalt and bas. andesite flows to top of section (2,500'); char. volcanic material, thickness is variable  

D-CROSS TONGUE (of Mancos shale) — U. Cretaceous  
1) NW New Mexico  
3) NW New Mexico  
4) Lt. gry. to drk. gry. snyd. shs. and shs. with few thin br. ss. (175')  
5) Latest carlile; conf. with lower Gallup ss., conf. overlain by upper Gallup ss.; referred by Pike to the Pescado tongue.  

DILCO COAL MEMBER (of Crevasse Canyon formation) — U. Cretaceous  
1) NW New Mexico  
2) J. D. Sears, 1925, U. S. Geol. Survey Bull. 767, p. 17  
3) NW New Mexico  
4) Lt. gry. to wh. ss., lt. gry. shs. interp. with comm. coal (240'-300')  
5) Niobraran; conf. on Gallup ss., conf. overlain by Bartlett barren memb. or Dalton ss.; equiv. of section (2,500')  

ENTRADA SANDSTONE (of San Rafael group) — U. Jurassic  
1) E, SE, and NE Utah  
3) Entrada Point, in N part of San Rafael Swell, Utah  
4) Thin-bedded red sh. and ss. at base, mass. red-br., earthy sss. (265'-844')  
5) Conf. on Carmel or unconf. on Wingate, conf. and gradat. with Todilto Is., disconf. with Summerville; W and cent. Colo., N N. Mex., NE Ariz.; Harshbarger, Repenning, and Irwin, 1957, in Navajo country recog. three membs. - ascend. - clean snyd. facies, red slyt. facies, clean snyd. facies, lower snyd. memb. in W grades E and NE into med. slyt. memb., upper snyd. memb. prominent in N. Mex.; shallow marine, littoral, and shore (eolian) origin  

GALLEGO SANDSTONE MEMBER (of Gallup sandstone) — U. Cretaceous  
1) Cent. New Mexico  
2) D. E. Winchester, 1920, U. S. Geol. Survey Bull. 716-A, p. 6  
3) Pueblo Viejo mesa, sec. 17, T. 4 N., R. 7 W.  
4) Mass. ylw. ss., friable 150'-90') occurs 900' above Dakota ss.  
5) Earliest Niobraran; conf. on D-Cross memb. of Mancos, conf. overlain by Crevasse Canyon fm.; Dane and others, 1957, retain the Gallego memb. as indicated but abandoned the Miguel fm.
(O. G.) **GALLUP SANDSTONE** (of Mesaverde group) — U. Cretaceous
1) NW New Mexico
2) J. D. Sears, 1925, U. S. Geol. Survey Bull. 767, p. 17
3) At Gallup, N. Mex.
4) Three perst. mass. pink or lt. gry. sss. interb. with gry. shs. and coals (180' - 250')
5) Carlile-Niobraran; conf. on lower Mancos, including Horsehead tongue and Pescado tongue; conf. overlain by Crevasse Canyon fm.

**GIBSON COAL MEMBER** (of Menefee formation) — U. Cretaceous
1) NW New Mexico
2) J. D. Sears, 1925, U. S. Geol. Survey Bull. 767, p. 17-18
3) At village of Gibson, McKinley Co.
4) Lt. gry. to wh. lent. mass. X-bed sss. interb. with fissile gry. shs. and comm. coals (150' - 175')
5) Niobraran; conf. on Bartlett barren memb. or upper Dalton ss., conf. overlain by Allison barren memb.; Silver, 1951, section thickens to 350' near Catron Cr. and is split in two parts by Hosta ss. and Satan tongues of Mancos; originally included as part of Crevasse Canyon fm.; Beaumont and others, 1956, introduced Cleary coal memb., replacing upper Gibson coal memb.

**GILA CONGLOMERATE** — Tertiary - Quaternary
1) Arizona and SW New Mexico
3) Along steep E face of Gray Mesa, from Comanche Eqv. to Monte de Belen, T. 5 N., R. 3 W., Valencia Co.
4) Variegated sss., shs., and sltsts. (100' - 1,000')
5) Disconf. on Spears memb., conf. overlain by La Jara Peak memb.; max. thick. up to 2,000' in Gallinas Mtns.; corrs. to 120' of qtz. rhy. plus overly. 150' of rhy. in Winchester's type section; middle memb. - a rhy. tuff seq.

**GLEN CANYON GROUP** — U. Triassic-Jurassic
1) S and E Utah, N Arizona
3) Glen Canyon of Colorado River, Kane Co., Utah
4) Variegated sss., shs., and sltsts. (100' - 1,000')
5) Conf. on Chiricahua cent. outcrop area, disconf. both to W and SE, disconf. overlain by San Rafael group; James Gilluly and J. B. Reeside, Jr., 1928, recog. three fms. - ascend. - Wingate ss., Todilto (?) fm., Navajo ss. all cont. (esolian or fluv.) origin; Baker, Dane, and Reeside, 1936, renamed Todilto (?) fm. - the Kayenta fm.; SW Colo., NW N. Mex.

**GLORIETA SANDSTONE** — Permian
1) Cent. N New Mexico
3) S-cent. part of T. 15 N., R. 12 E., on Glorieta Mesa, 1 mi. W of village of Rowe, San Miguel Co. (desig. by Needham and Bates, 1943)
4) Wh.-gry. med.-coarse qtzitic. ss., beds 2' - 6' thick, cliff-form.; at base 20' buff-wh., thin-bed. ss. (12' - 300')
5) Leonardian; conf. on Yeso fm., conf. overlain by San Andres Is.; cent. and SE N. Mex., subsurface of W Tex.

**GRAY MESA MEMBER** (of Madera limestone) — Pennsylvanian
1) Cent. New Mexico (Lucera uplift)
3) Along steep E face of Gray Mesa, from Camanche Arroyo to Monte de Belen, T. 5 N., R. 3 W., Valencia Co.
4) Thick-bed., occas. mass., cherty gry. Iss. (900')
5) Lampasan (?) - Desmoinesian; conf. (?) on Sandia fm., conf. overlain by Atrasado memb.

**HILLS MESA MEMBER** (of Datil formation — M. (?) Tertiary)
1) Cent. New Mexico
3) At Hells Mesa in secs. 17 and 20, T. 1 N., R. 4 W., Socorro Co.
4) Wh., lt.-gry., and pink weld, rhy. tuff., xtal rhy. tuff and rhy. aggl. (250')
5) Disconf. on Spears memb., conf. overlain by La Jara Peak memb.; max. thick. up to 2,000' in Gallinas Mtns.; corrs. to 120' of qtz. rhy. plus overly. 150' of rhy. in Winchester's type section; middle memb. - a rhy. tuff seq.

(0. G.) **HERMOSA FORMATION** — Pennsylvania
1) SW Colorado
2) C. W. Cross and A. C. Spencer, 1899, U. S. Geol. Survey La Plata Folio 60, p. 8
3) Animas River valley, near Hermosa, Colo.
4) Upper pt. shs. with occass. Iss., middle pt. bands of mass. drk.-gry. fossil. Iss. alternating with sss. and cglss., lower pt. gn.-gry. sss. and shs. (1,800')
5) Desmoinesian, Missourian, Virgilian, and Wolfcampian; conf. and gradat. on Paradox fm., conf. and gradat. overlain by Rico memb. of Cutler; Wengerd and Strickland, 1954, consists of a carbonate facies (gry. argil. Iss. and gry. calc. sh. overlain by gry., fine-gr., sly. to sndy. Iss.) and a clastic facies (ark. ss., fine-med. qtzose. ss., silt., clast., thin ark. to micaceous Iss.) 0'-5,000'; Wengerd and Matheny, 1958, raise Hermosa to group status - contains ascend. - Pinkerton Trail, Paradox, Honaker Trail fms.; SE Utah, NE Ariz. (subsurface), NW N. Mex.

**HOLBROOK MEMBER** (of Moenkopi formation) — L. Triassic
1) NE Arizona
2) Dorsey Hager, 1922, Min. and Oil Bull., v. 8, nos. 1 and 3
4) Red, thin-bed. to thick-bed., x-bed. channel sss. and sltsts., mud-pellet cglss., red mudst. (48'-200')
5) Conf. or disconf. on Moqui memb., but to E unconf. on Permian, disconf. overlain by Shinarump memb. of Chinle; upper memb. of Moenkopi
Honaker Trail formation — Pennsylvanian
1) Paradox Salt Basin, Four Corners area
3) Honaker Trail, sec. 29, T. 41 S., R. 18 E., along San Juan Canyon, San Juan Co., Utah
4) Gry.-red, gry., fine-gr. to coarse gr. Is. with gry. and red chert, red.-gry. calc. sandy sltst. (550')
5) Desmoinesian-Virgilian; conf. on Paradox fm., overlain conf. by Rico memb. of Cutler; facies varies across Paradox basin; thick. 0.-1,750'

Horsehead tongue (of Mancos shale) — U. Cretaceous
1) W-cent. New Mexico
2) W. S. Pike, 1947, Geol. Soc. America Mem. 24, p. 35
4) Drk. gry. marine sh. (408')
5) Prob. middle Carlile; conf. on Atarque memb. of Mesaverde, conf. overlain by lower Gallup ss.; lowest tongue

HOSTA SANDSTONE TONGUE (of Point Lookout sandstone) — U. Cretaceous
1) NW New Mexico
2) J. D. Sears, 1934, U. S. Geol. Survey Bull. 860-A, p. 18
3) Hosta Butte at W side of S end of Dalton Pass, McKinley Co.
4) Lt. gry. to ylw. massive ss. (0'-250')
5) Lower part - late Niobraran, upper part - Telegraph Creek to middle Pierre; conf. on lower Gibson coal memb., conf. overlain by upper Gibson coal memb. (Cleary coal memb.); Hosta littoral ss. split by Satan tongue of Mancos; Pike, 1947, upper Hosta ss. is lateral equiv. of Point Lookout ss.

JOYITA SANDSTONE MEMBER (of Yeso formation) — Permian
1) Cent. New Mexico
3) Sec. 33, T. 1 S., R. 2 E., near Mesos del Yeso, Socorro Co.
4) Soft, X-bed. ss. and pink-ylw., orange thin-bed. ss., uppermost unit of Yeso fm. (100'-185')
5) Leonardian; conf. on Canas gyp. memb. or Torres memb., conf. overlain by Glorieta ss.

KAIBAB LIMESTONE — Permian
1) N. Arizona
3) Koibab Gulch, 8 mi. SW of Poria, Utah
4) Dense, gry., cherty Is. (820')
5) Leonardian; conf. and gradat. with Toroweap, unconf. overlain by Moenkopi; S Utah and SE Nev.; probable equivalent of part of San Andres Is.

KAYENTA FORMATION (of Glen Canyon group) — L. Jurassic(?)
1) SE and S Utah
3) 1 mi. NE of Kayenta, Ariz.
4) Pale red-purple to red-br., fine-gr. qtzose. ss. (144')
5) Unconf. on Wingate ss. or conf. on Moenave fm., conf. and gradat. with Navajo ss.; unit is more fully described in Baker, 1933, SW of type loc. Kayenta thickens (max. 678' at Ward Terrace) and grades into intercal. sltsts., mudsts., and fine sss.; NE Ariz. and SW Colo., extreme NW N. Mex.; fluv. origin

KELLY LIMESTONE — Mississippian
1) Magdalena Mtns.
2) C. L. Herrick, 1904, Am. Geologist v. 13, p. 310 (*Graphic-Kelly Is.)
3) Kelly mining dist., Magdalena Mtns., Socorro Co.
4) Lt. blu.-gry., med.-coarse xtal. crinoid., thick-bed. Iss. with 5' dense arg. Is. near middle, called "Silver Pipe" because of close assoc. with ore shoots (125')
5) Late Osagian (Keokuk equiv.); conf. on Calosso fm., overlain unconf. by Magdalena group; Armstrong, 1958, restricted unit at type locality to upper 70.1' of Iss., including "Silver Pipe" near base, lower 34.9' is Calosso fm.; cent. and SW N. Mex.; 130' on Bear Mtn., W of Silver City, 51' in Lemitar Mtns., 35' near Rio Salado, 7 Ladrorn Mtns., beveled to zero at 3 mi. N of Rio Salado

La Cruz Peak formation — U. Cretaceous
1) Cent. New Mexico
3) On La Cruz Peak, secs. 13 and 24, T. 2 N., R. 6 W., 4 mi. SW of Puertecito, Socorro Co.
4) Interb. marine drk. gry. shs. and three massive ylw.-gry. sss. (600')
5) Carlile-earliest Niobraran; conf. on Tres Hermanos (?) ss., conf. overlain by Crevasse Canyon fm.; fm. includes equiv. of lower Manços sh., lower Gallup ss., Pescado tongue, and Gallego ss. memb. of upper Gallup ss.

La Jara Peak member (of Datil formation) — M. Tertiary
1) Cent. New Mexico
3) In N Bear Mtns. in secs. 27 and 34, T. 2 N., R. 6 W., 4 mi. SW of Puertecito, Socorro Co.
4) Interb. marine drk. gry. shs. and three massive ylw.-gry. sss. (600')
5) Carlile-earliest Niobraran; conf. on Tres Hermanos (?) ss., conf. overlain by Crevasse Canyon fm.; fm. includes equiv. of lower Manços sh., lower Gallup ss., Pescado tongue, and Gallego ss. memb. of upper Gallup ss.

La Jara Peak member (of Datil formation) — M. Tertiary
1) Cent. New Mexico
3) In N Bear Mtns. in secs. 27 and 34, T. 2 N., R. 6 W., 3-3/2 mi. SW of La Jara Peak, Socorro Co.
4) Basalt and porphyritic basalt-andesite flows with interb. vol. ss. and cgl. beds at top (2,000'-2,500')
5) Conf. on Hells Mesa memb., unconf. or unconf. overlain by Santa Fe; uppermost vol. ss. and cgl. beds lithologically like Santa Fe; basaltic dikes cut all membs. of Datil fm. but not Santa Fe beds; uppermost memb. - basalt seq.
**MAGDALENA GROUP** — Pennsylvanian

1. Cent. New Mexico
2. C. H. Gordon, 1907, Jour. Geology v. 15, p. 807-816
3. Magdalena Mtns. — no type sect. desig.
4. Divided into - descend. - Madera Is. (300'-700') drk. blu. Iss., and Sandia fm. (500'-700') interb. blu. and blk. clay shs., dense earthy Iss., cgl., sss. or qtzite. (max. 1,400')
5. Restricted to Penn. desconf. on Miss. Iss., desconf. or conf. with Permian beds; N. Mex. (widespread) and W Tex.

(O. G.) **MANCOS SHALE** — U. Cretaceous

1. W Colorado
2. C. W. Cross, 1899, U. S. Geol. Survey Telluride Folio 57
3. Mancos Valley near town of Mancos, SW Colo.
4. Drk.-gry. snds. shs., ext. with BSD. lenses and fossil calc. sh. and thin slt. Iss. (2,000')
5. Conf. or desconf. on Dakota or Dakota(?), conf. overlain by Mesaverde gr.; E Utah, S and cent. Wyo., NE Ariz., N. Mex. (widespread); oscil. of the shore across W N. Mex. caused intertong. of the marine Mancos with non-marine Mesa- verde, marine tongues ascend. - Horsehead tongue, Pescado tongue, D-Cross tongue, Mulatto tongue

**MANZANO GROUP** — Permian

1. Cent. New Mexico
2. C. L. Herrick, 1900, Am. Geologist v. 25, p. 337
3. No type loc. or sect. given
4. Coarse red qtzites, and sss. interb. with drk. earthy Iss., shs. (1,000-2,000')
5. Wolfcampian-Leonardian; unconf. on Madera Is., conf. overlain by Triassic beds; all recent mapping has recognized four or five fms., ascend. - Bursum fm., Abo fm., Yeso fm., Glorieta ss. and San Andres Is. in this series of beds, and the term Manzano group has lapsed from usage and should be abandoned

**MENEFEE FORMATION** (of Mesaverde group) — U. Cretaceous

1. SW Colorado and NW New Mexico
4. Interb. gry.-buff, mass. to thin sss., with Gry. shs. and coal seams and comm. coal (400')
5. Telegraph Creek to Pierre; conf. on Point Lookout ss. or lower Gibson coal memb., conf. overlain by Cliff House ss.; pred. cont. (lagoon, swamp, and fluv.) but does contain marine units; divided ascend. - Cleary coal memb. (equiv. of upper Gibson coal memb.) and Allison barren memb.

**MESA REDONDO MEMBER** (of Chinle formation) — U. Triassic

1. NE Arizona
4. Gry., red-purple, fine-gr. sly. ss., sltst. and mudst., a medial cgl. Iss. (159')
5. Conf. and gradat. on Shinarump memb., gradat. with lower red memb., conf. with Petrified Forest memb.; is S lateral equiv. of lower red memb., Monitor Butte memb. in Monument Valley area, a different facies, is N and W equiv. of lower red memb.

**MADERA LIMESTONE** (of Magdalena group) — Pennsylvanian

1. Bernalillo Co.
2. C. R. Keyes, 1903, Ores and Metals, v. 12, p. 48
3. E slope of Sandia Mtns.
4. Blu. to gry. Isss. beds (300')
5. Desmoinesian-Virgilian; conf. and gradat. on San Andres Is. in this series of beds, and the term Manzano group has lapsed from usage and should be abandoned

**MADORO LIMESTONE** (of Chinle formation) — U. Triassic

1. NE Arizona
4. Gry., red-purple, fine-gr. sly. ss., sltst. and mudst., a medial cgl. Iss. (159')
5. Conf. and gradat. on Shinarump memb., gradat. with lower red memb., conf. with Petrified Forest memb.; is S lateral equiv. of lower red memb., Monitor Butte memb. in Monument Valley area, a different facies, is N and W equiv. of lower red memb.

**LUKACHUKAI MEMBER** (of Wingate sandstone) — U. Triassic

1. Navajo country, NE Arizona, SE Utah, W Colorado, NW New Mexico
4. Pale red-br. fine-gr. qtz. ss., mass. and X-bed. (300')
5. Disconf. on Chinle fm. or conf. and gradat. on Rock Pinn memb., conf. overlain by Moenave fm. or unconf. by Kayenta fm.; memb. widespread in Navajo country but pinches out to E near Correa, N. Mex., and also to W and S; eolian origin

**MENEFEE FORMATION** (of Mesaverde group) — U. Cretaceous

1. SW Colorado and NW New Mexico
4. Interb. gry.-buff, mass. to thin sss., with Gry. shs. and coal seams and comm. coal (400')
5. Telegraph Creek to Pierre; conf. on Point Lookout ss. or lower Gibson coal memb., conf. overlain by Cliff House ss.; pred. cont. (lagoon, swamp, and fluv.) but does contain marine units; divided ascend. - Cleary coal memb. (equiv. of upper Gibson coal memb.) and Allison barren memb.

**MESA REDONDO MEMBER** (of Chinle formation) — U. Triassic

1. NE Arizona
4. Gry., red-purple, fine-gr. sly. ss., sltst. and mudst., a medial cgl. Iss. (159')
5. Conf. and gradat. on Shinarump memb., gradat. with lower red memb., conf. with Petrified Forest memb.; is S lateral equiv. of lower red memb., Monitor Butte memb. in Monument Valley area, a different facies, is N and W equiv. of lower red memb.

**MADERO LIMESTONE** (of Magdalena group) — Pennsylvanian

1. Bernalillo Co.
2. C. R. Keyes, 1903, Ores and Metals, v. 12, p. 48
3. E slope of Sandia Mtns.
4. Blu. to gry. Isss. beds (300')
(O. G.) MESAVERDE GROUP — U. Cretaceous
1) W Colorado and NW New Mexico
3) Mesa Verde, Montezuma Co., Colo.
4) Divided descend. - upper ss., 190' mass., ss., mid. coal group of 800'-900' of ss., sh. marl and lignite, lower ss., 120' mass. ss. (1,200'-1,500')
5) Carille to Pierre; conf. on Dakota ss. or Mancos sh., conf. overlain by Lewis sh.; Collier, 1919, named the divisions descend. - Cliff House ss., Menefee fm., Point Lookout ss.; thick. range - 1,000'. NE 422' to SW 3,100', NE Ariz., E Utah, S and Cent. and N Wyo.(?), N. Mex. (widespread)

MESETA BLANCA SANDSTONE MEMBER (of Yeso formation) — Permian
1) N New Mexico (Encinamiento Mtns.)
3) Near Canon, in sec. 3, T. 16 N., R. 2 E., and in area immed. N in Canon de San Diego Grant
4) Mass.-bed. orange to red, X-bed. ss., cliff-form. (O'-400')
5) Leonardian; conf. on Abo fm. to S, tongues with Abo to N and Cutler to NW, conf. overlain by San Ysidro memb. or other membs. of Yeso

*Miguel formation — U. Cretaceous
1) Cent. New Mexico
2) D. E. Winchester, 1920, U. S. Geol. Survey Bull. 716-A, p. 6-7
3) Two mi. W of I.N.M. ranch, Socorro Co.
4) Four mass. perst. ss., interb. with thin-bed ss., sandy sh. and thin-bed ss., claysh. with coal (2,082')
5) Coloradosan; conf. on Dakota ss., conf. overlain by Chamafo fm.; Dane, et al., 1957, p. 187, name abandon. because of orig. incorrect de- nomenclature, and duplication of beds as mapped and measured in type area

MOENKOPI FORMATION — L. Triassic
1) Cent. New Mexico
2) L. F. Ward, 1901, Am. Jour. Sci. (4) v. 12, p. 401-413
3) Moenkopi Wash, Grand Canyon, Ariz.
4) Drk. br., argill. gypsif. shs., argill. and shs., wh. calc. shs. and thin Is. (700')
5) Unconf. on Permian, conf. overlain by Chinle fm.; McKee, 1934, thick. ranges from 2,000' on the W to zero in E, cont. and marine beds of six lithologic types, recog. three membs. in NE Ariz. ascend. - Wupatki, thin-bed. sly. ss. and red fine-gr. ss., X-bed., Moqui, gry. thin, lent. gypsif. Is., siltst., mudst. and thick-bed. gyp., Holbrook, pale red, thin to thick-bed ss., some siltst., marine Is. only in lower half of fm.; S Utah, SE Nev., SW Colo., NW N. Mex.

MOLAS FORMATION — Pennsylvanian
1) SW Colorado
2) C. W. Cross and E. Howe, 1905, U. S. Geol. Survey Silvertone Folio 120
3) Molas Lake, Needle Mtns. quad., Colo.
4) Red calc. shs. and ss. with chert, Is., and quartzite. pebbles and thin fossil. Is. lenses (75')

MOQUI MEMBER (of Moenkopi formation) — L. Triassic
1) NE Arizona (S and W Black Mesa basin)
2) E. D. McKee, 1954, Geol. Soc. Amer. Mem. 61
4) Pale br.-olive gry. siltst., claysh. with gry.-gn. gyp. beds (55')
5) Conf. on Wupatki memb. conf. or disconf. overlain by Holbrook memb.; is mid. memb. of Moen- kopis, disting. by gyp. and lt. color; name replaced Winslow memb. of Moenkopi fm. of McKee, 1951

(M.) MORRISON FORMATION — U. Jurassic
1) Colorado, W S. Dakota, Wyoming
3) Morrison, near Denver, Colo.
4) Variegat. calc. mudst., siltst., shs. (200')

MULATTO TONGUE (of Mancos shale) — U. Cretaceous
1) NE Arizona (S and W Black Mesa basin)
3) S end of Canyon Mulatto, 9 mi. NW of San Mateo
4) In S It. fan marine sly. sh. with thin ss. and local grits, N grading into drk.-gry. shs. (250'-400')
5) Mid. Niobraran; conf. on Dico coal memb., conf. overlain by Doltan ss. memb.

NACO LIMESTONE — Pennsylvanian and Permian
1) SE Arizona
2) F. L. Ransome, 1904, U. S. Geol. Survey Prof. Paper 21, p. 44-46
3) Naco Hills, Bisbee quad. - no type sect. desig.
4) Thin - to mass.-bed. llt. gry., fine-gr., fossil. Iss., crinoid., chert common (1,500'-2,000')
5) Atokan thru Leonardian; appar. conf. on Miss. Iss., unconf. overlain by basal Cret.; Gilluly, Cooper, and Williams, 1954, raised to Naco gr.; E-cent. Ariz., SW and W-cent. N. Mex.

NAVAJO SANDSTONE (of Glen Canyon group) — L. Jur- assic
1) N Arizona
3) Navajo Canyon, Ariz.
4) Lt.-red, mass. X-bed. qtz. shs. (400')
5) Conf. and gradat. on Kayenta fm., unconf. over- lain by fms. of San Rafael gr.; Harshbarger, Repenning, and Irwin, 1957, max. thick. 1,400' in NW Navajo country, thins S and SE to zero, lent. beds of fresh-water cherty. Is.; S Utah, W Colo., extreme NW N. Mex.; eolian origin
OWL ROCK MEMBER (of Chine formation) — U. Triassic
1) SE Utah
3) Owl Rock, N of Kayenta, Ariz.
4) Pale red to red-br., slststs. intercal. with thin to thick Iss. (150'-250')
5) Conf. on Petrified Forest memb., conf. overlain by Church Rock memb. of Chine or disconf. by Wingate ss.; thick. ranges from 0'-450'; NE Ariz., NW N. Mex.

(P. G.) PARADOX FORMATION — Pennsylvanian
1) SE Utah, SW Colorado
2) A. A. Baker, 1933, U. S. Geol. Survey Bull. 841, p. 13-18
3) Paradox Valley, Montrose Co., Colo. - no type sect. desig.
4) Salt, gyp. and anhyd. interb. with blk. and br. shs., a few Iss.

Pescado tongue (of Mancos shale) — U. Cretaceous
1) W-cent. New Mexico
2) W. S. Pike, 1947, Geol. Soc. America Mem. 24, p. 34
3) N side of valley of Pescado Cr., below Pescado village, in sec. 32, T. 11 N., R. 17 W. and sec. 5, T. 10 N., R. 17 W.
4) Gry. marine sh., (50')
5) Mid.-late Carlile; conf. on lower Gallup ss. (35' cliff), conf. overlain by Dilo-lower Gibson or upper Gallup ss.; base of tongue occurs 209' above top of main Mancos sh.

PETRIFIED FOREST MEMBER (of Chine formation) — U. Triassic
1) S Utah and N Arizona
3) E side of Virgin River valley near Springdale, Utah (fig. 36)
4) Variegated, red, orange, purple, gn. benton. sltsts. and clay., sss.; fossil wood common (650'-800')
5) Conf. on lower red memb., conf. overlain by Owl Rock memb.; Akers, Cooley, and Repenning, 1958 recog. in NE Ariz. - lower pt., med.-red-purple, blu.-gry. mudst. and thin X-bed. ss. and sltst., petrified logs, Middle Sonsensea ss. bed, upper pt., variegated mudst., red sndy, sltst., and lent. sss., 800'-1,000'; NW N. Mex.

Pinkerton Trail formation — Pennsylvanian
1) Paradox Salt Basin, Four Corners area
3) Pinkerton Trail, 12 mi. N of Durango, Colo. on W side of U. S. Hwy. 550
4) Drk.-gry., fine to coarse-xtall., crinoid. and fusulinid Iss. with some dark. sh. (0'-200')
5) Atokan-earliest Desmoinesian; conf. on Molas fm., overlain conf. by Paradox fm., merges with and indisting. from Hermosa fm. where Paradox absent; equiv. to lower memb. of Hermosa fm. of Bass, 1944

(O. G.) POINT LOOKOUT SANDSTONE (of Mesaverde group) — U. Cretaceous
1) SW Colorado and NW New Mexico
3) Cliffs at Point Lookout, about 7½ mi. SW of Mancos, Colo.
4) Mass. It. gry. to ylw. sss. (250'-300')
5) Telegraph Creek to mid. Pierre; conf. on upper Mancos sh., conf. overlain by Maneefee fm.

Popotosa formation — Tertiary
1) Cent. New Mexico
2) C. S. Denny, 1940, Jour. Geol. v. 48, p. 77-84
3) Interb. red tuff. ss., cgl. sndy. silt and tuff overlain by X-bed ss., cgl., and pink and gry. tuff (3,000'-5,000')
5) Late Miocene; locally conf. on Mio.(?) volcs., unconf. overlain by Santa Fe gr.

Prewitt sandstone member (of Morrison formation) — U. Jurassic
1) NW New Mexico
3) S of Mt. Powell in sec. 9, T. 14 N., R. 13 W., Thoreau quad.
4) Mass., coarse-gr., X-bed., pink-red, cgltic. ss., sltst. lenses (182'-190')
5) Disconf. on Chavez memb., conf. and gradat. with Brushy Basin memb., equiv. of Westwater Canyon ss. memb.

**Puertecito formation — Triassic-L. Cretaceous
1) Cent. New Mexico (Socorro and Valencia Cos.)
3) Puertecito dist. Socorro and Valencia Cos. - no type sect. desig.
4) Sed. beds btw. Perm. and Cret., purple-red and purple-gry. sss., shs., few cgls. (1,150'-1,250')
5) N. Mex. Bur. Mines recommends abandoning term; has not subsequently been used

RECAPTURE SHALE MEMBER (of Morrison formation) — U. Jurassic
1) SE Utah
3) Near mouth of Recaputure Creek, 6 mi. E of Bluff, Utah
4) Red to variegated calc., gypsf. shs., thin wh. ss. (100'-300')
5) Disconf. on San Rafael gr., conf. and gradat. with Cow Springs ss.; Salt Wash memb., and overly. Westwater Canyon memb.; NE Ariz., NW N. Mex.; Harshbarger, et al., 1958, max. thick. 483' in Chuska Mtns., thins S to 59' at Ft. Wingate, then thickens E to Thoreau; equiv. of Chavez memb., fluv. origin
RED TANKS MEMBER (of Madera limestone) — Permian and uppermost Pennsylvanian(?)
1) Cent. New Mexico (Lucero uplift)
3) W side of Red Tanks Arroyo, NW ¼ sec. 4 and NE ½ sec. 5, T. 3 N., R. 3 W., 1 mi. W of Saladito ranch, Valencia Co.
5) Wolfcampian (approx. equiv. of Bursum fm.); conf. on Atrasado memb., conf. and gradat. with overly. Abo

ROCK POINT MEMBER (of Wingate sandstone) — U. Triassic
1) Navajo country, NE Arizona (Black Mesa basin)
4) Pale red.-br. sst., sst., and sst., thin-bed. (344')
5) Conf. on Chinle in type sect., conf. and gradat. overlain by Lukachukai memb.; NW N. Mex.; deposited in shallow basin, max. thick., 804' at Hopi Buttes area; known early as Div. A of Chinle (Gregory, 1917); fluv. origin

SAN ANDRES LIMESTONE — Permian
1) Cent. New Mexico (Sandia, Manzano, and San Andres Mtns.)
3) Rhodes Canyon, San Andres Mtns., in sec. 29, T. 12 S., R. 2 E.
4) Lt. to drk. gry., mass.-bed. often cherly, poorly fossil. Is. (15'-1,200')
5) Leonardian; conf. on Glorieta ss., conf. and gradat. overlain by Bernal fm. or younger Permian beds; SE, cent., and NW N. Mex.

SANDIA FORMATION (of Magdalena group) — Pennsylvanian
1) Cent. New Mexico (Sandia, Manzano, and San Andres Mtns.)
2) C. L. Herrick, 1900, Jour. Geol. v. 8, p. 112-126
3) S end of Sandia Mtns. — no type sect.
4) Sst., cgl., and shs. with occas. bands of sndy. Is. (150')
5) Morrowan-Desmoinesian; conf. on Miss. Is. or Precam., conf. overlain by Madera Is.; Sandia fm. is now used as defined by C. H. Gordon, 1907 (see Magdalena gr.); in Zuni Mtns. basal ark. red beds (called Abo) locally contain fossil. Is., sst., with Desmoinesian, Missourian, or Virgilian faunas

SANTA FE GROUP — Tertiary - Quaternary
1) N New Mexico and S-cent. Colorado
3) Valley of Rio Grande at Santa Fe, N. Mex.
4) Interb. Is., sst., sillst., and cgl., wh., buff to ylw. br. (1,200'-1,500')
5) Latest Miocene-Pleistocene; conf. and gradat. (?); on La Jara Peak memb. of Datil fm., unconf. overlain by Recent gravels; interb. with young basalt flows and caliche beds; thick. range 500'-8,000'; gravels deriv. from Datil and older fms.; fang. origin; cent. and S N. Mex.

SAN RAFAEL GROUP — late M. and U. Jurassic
1) S and E Utah
3) San Rafael Swell, Utah
4) Variegated shs., sst., sltsts. and some Is. (100'-1,000')
5) Unconf. on Navajo ss., conf. and gradat. overlain by Morrison fm.; includes, ascend. - Carmel, Entrada, Todillo, Curtis, Thoreau, all marine, littoral, or shore (eolian) facies; W Colo., NE Ariz., N N. Mex.

SAN YSIDRO MEMBER (of Yeso formation) — Permian
1) N New Mexico (Nacimiento Mtns.)
3) NE Ariz.; known as Div. A of Chinle (Gregory, 1917); fluv. origin

SALT WASH SANDSTONE MEMBER (of Morrison formation) — U. Jurassic
1) E-cent. Utah and W-cent. Colorado
3) Salt Wash, 30 mi. SE of Green River, Utah
4) Gry., coarse-gr. ss. with cgl. lenses (150'-175')
5) Disconf. on San Rafael gr., conf. and gradat. with Recapture memb.; NE Ariz.; Harshbarger, Repenning, and Irwin, 1958, memb. thicken to 616' at Navajo Point, Ariz., thins SE to zero, intertongues S with overlying Recapture, Cow Springs, and upper Bluff ss.

SATAN TONGUE (of Mancos shale) — U. Cretaceous
1) NW New Mexico
3) Saltan Pass, 12 mi. W of Mt. Taylor coal field
4) Drk. gry. marine shs. (200'-300')
5) Late Niobraran to earliest Montanan; conf. on lower Hosta ss., conf. and gradat. with overly. Hesperia fm.

SHINARUMP CONGLOMERATE MEMBER (of Chinle formation) — U. Triassic
1) W Utah and N Arizona
2) G. K. Gilbert, 1875, U. S. Geol. and Geog. Surv. W. 100th Mer. v. 3
3) Shinarump Cliffs, S of Vermilion Cliffs, Kane Co., Utah
4) Ylw.-wh., coarse to fine, cgl., ss., wh., (0'-125')
5) Disconf. on Moenkopi fm., conf. and gradat. with Monitor Butte memb. of Chinle fm.; recog. as basal memb. of Chinle, Comp. et al., 1927, H. R. Stewart, 1927, entire S Utah, NW N. Mex., SE Nev.; max. thick. 225', thins E and NE, uranium producer; cont. origin
Sunsela sandstone bed (of Petrified Forest member) — U. Triassic
1) SE Utah and NE Arizona
3) One mi. S of Guy Spears ranch Hdq., in sec. 8, T. 1 N., R. 4 W., Socorro Co.
4) Med. gry. to gry. purple thin-thick bed. tuffac. ss., cgl., flow breccias aggl., thin beds of silt and clay (1,350′)
5) Appar. conf. to unconf. on Baca fm., conf. overlain by Helso Mels memb.; corrs. to the 1,020′ of strata below “qtz. rhy.” in Winchester type sect.; flow breccias consp. contain Perm., Trias., and Baca blks.; basal memb. - a qtz. latite tuff seq.

SUMMERVILLE FORMATION (of San Rafael group) — U. Jurassic
1) SE Utah and SW Colorado
3) Summersville Point, San Rafael Swell, Utah
4) Thin-bed., drk. br. sss., earthy red-br. sltst., shs., some gyp., few gry. iss (125′-331′)
5) Disconf on Todilto, gradat. and conf. with Curtis, conf. and gradat. with Cow Springs ss.; NW N. Mex., and NE Ariz.; Harshbarger, Repenning, and Irwin, 1957, recog. lower slty. facies, and upper gry. facies, lower facies is near-shore deposit. equiv. of Curtis; to S upper slty. facies predom., grades into eolian shore deposits of Cow Springs ss.

SUPAI FORMATION — Pennsylvanian and Permian
1) N Arizona
3) Supai village, Cataract Creek, N Ariz.
4) Top 400′ red sndy. sh., thin red ss., lower pt. coarse to fine red ss., slabbly to X-bed., 75′ of red sh. and ss. at base (1,400′)
5) Desmoinesian - Leonardian; conf. on Naco or unconf. on Redwall Is., overlain disconf. or gradat. by Hermit sh. or Rico memb. of Cutler; Noble, 1922, placed top 317′ in Hermit sh., added 200′-500′ of Penn. red sndy. sh., gry. Is. with red chert, red calc. ss., at base; oldest beds in W-cent. Ariz., base rises in sect. in all direct. from here; correl. with Abo and Yeso fms. of N. Mex.

Thoreau formation (of San Rafael group) — U. Jurassic
1) NW and W-cent. New Mexico
3) Cliffs N of Thoreau, N. Mex. in secs. 9 and 17, T. 14 N., R. 13 W., Thoreau quadr.
4) Lower pt. thin, interb., red, br., wh. sltst. and ss., local Is. lense at base, upper pt. mass., X-bed., med.-gr. ss. (384′)
5) Conf. and gradat. with Todilto Is.; disconf. overlain by Morrison fm.; lower memb. equiv. of upper sndy. memb. of Summerville, thins E, upper memb. equiv. of Cow Springs ss.

TODILTO LIMESTONE (of San Rafael group) — U. Jurassic
1) NW New Mexico and extreme NE Arizona
3) Todilto Park, McKinley Co., N. Mex.
4) At base mudst. with lenses ylw.-orange ss., olive-gry., fine-gr. Is. and pebbles at base, field, upper pale red-purple mudst. (25′)
5) Conf. and gradat. or local. conf. (?) on Entra- da; disconf. overlain by Summerville; calc. mudst. perdom. in W, eastward to Prewitt, N. Mex. Is. reach max. thick. 25′, and 111′ gyp. found near San Ysidro, N. Mex.; shallow marine and littoral

TRES HERMANOS SANDSTONE — U. Cretaceous
1) W-cent. New Mexico
2) C. L. Herrick, 1900, Am. Geol. v 25, p. 331-346
3) No type sect. or loc. given; on pl. 9, Herrick shows conf. overlain by Canas gyp. memb.; informally known as the middle evaporites, Is. and gyp.; thickens SE

TORS MEMBER (of Yeso formation) — Permian
1) Cent. New Mexico
2) R. H. Wilpolt, et. al., 1946, U. S. Geol. Survey Oil and Gas Inv. Prelim. Map 61
3) In tributary of Agua Torres Canyon (on Sevilleta Grant), 7 mi. S of Black Butte, Socorro Co.
4) Alternat. beds of orange-red and buff ss. and slts., gry. Is. and gyp., basal memb. of upper div. of Yeso fm. (350′-600′)
5) Leonardian; conf. on lower elastic div. of Yeso, conf. overlain by Canas gyp. memb.; informally known as the middle evaporites, Is. and gyp.; thickens SE

Tres Hermosas sandstone — U. Cretaceous
1) W-cent. New Mexico
2) C. L. Herrick, 1900, Am. Geol. v 25, p. 331-346
3) No type sect. or loc. given; on pl. 9, Herrick shows Cret. outcrop at Tres Hermosas Buttes, N of Alma- moso Cr.; Pike, 1947, orig. type loc. may be sss. 1 mi. E of Tres Hermosas Buttes in sec. 26, T. 3 N., R. 7 W. (now ref. to Rio Salado)
4) Mass. ylw. ss. (175′); lies 150′ to 250′ above Dakota
5) Name has been applied to one or more of the Mesa Verde ss tongues which extend east across N and cent. N. Mex. into the Mansco shs. (W. T. Lee, 1912, 1915, 1917; D. E. Winchester, 1920; C. B. Hunt, 1936) but because no type loc. was given, each subseq. author has refer. to diff. sss.

Twoells sandstone lentil (of Mancos shale) — U. Cretaceous
1) W-cent. New Mexico
2) W. S. Pike, 1947, Geol. Soc. America Mem. 24, p. 35-36
3) Near Two Wells, T. 12 N., R. 19 W.
4) Mass., tan-pink, ss. with drk.-br. lenses of Ino- ceramus labiatus (0′-35′)
5) Prob. Greenhorn; lies 30′-75′ above base of Manscos sh.
WESTWATER CANYON SANDSTONE MEMBER (of Morrison formation) — U. Jurassic
1) SE Utah
2) H. E. Gregory, 1938, U. S. Geol. Survey Prof. Paper 188, p. 59
3) Westwater Canyon, 15 mi. SW of Blanding, Utah
4) Lt. gry. to gn.-ylw. coarse to med. ss., few cgl. and red mudst. lenses (222'-295')

WINGATE SANDSTONE (of Glen Canyon group) — U. Triassic
1) W New Mexico (Zuni Plateau)
3) Fort Wingate, McKinley Co., N. Mex.
4) Masss., bright red to red-br. sss., sltst., and shs. (450')
5) Conf. on Chinle in cent. outcrop area, disconf. to W and SE, disconf. overlain by Kayenta fm. or San Rafael gr.; Baker, Dane, and Reeside, 1947, recommend abandon. type loc.; Harshbarger, Repenning, and Irwin, 1957, divide Wingate in Navajo country into two map. units - ascend., Rock Point memb., and Lukachukai memb.; lower 355' of type sect. is Lukachukai memb.; max. thick. in Navajo country 1,700'; NE Ariz., SE Utah and W Colo.

WINSON FORMATION — U. Jurassic
1) S and SW Utah
3) Winsor Cove, 3 mi. S of Mount Carmel, W Kane Co., Utah
4) Thin even-bed., wh., ylw.-wh., red sss., few cgl. lenses (180'-300')
5) Disconf. on Curtis or Entrada, disconf. overlain by Dakota; max. thick. in Paria Valley, 450'-800'; Harshbarger, et al., white sandy facies of Carmel and Entrada in SW Navajo Country similar to Winsor, but Winsor prob. younger, Cow Spring ss. may be cont. equiv. of at least part of Winsor

WUPATKI MEMBER (of Moenkopi formation) — L Triassic
1) NE Arizona (S and W Black Mesa basin)
3) Wupatki Nat. Mon., Ariz. (Wupatki Pueblo)
4) Interb. mass. ss., thin-bed. sltst., soft mudst. (95')
5) Unconf. on Kaibab Is., conf. overlain by Moqui memb.; basal memb. of Moenkopi, thins to zero to E and S

YESO FORMATION — Permian
1) Cent. New Mexico
3) 11.2 mi. N46'E of Socorro, at point where E edge of Socorro quad. intersects the 34'10' parallel; from this point NE in secs. 4 and 5, T. 2 S., R. 2 E., and in sec. 33, T. 1 S., R. 2 E., Socorro Co.
4) Variegated sss., soft, coarse-gr., friable to hard, fine-gr., pink-ylw., often gypsif. shs., earthy Is., mass. wh. gyps. (1,000'-2,000')
5) Leonardian; conf. and gradat. on Abo fm., conf. overlain by Glorieta ss.; N. Mex. (widespread) and subsurface of W Tex.; R. L. Bates et al., 1947, no general agreement on position of boundary btw. Abo and Yeso fms., 100'-300' difference, all beds of apparent marine origin considered in Yeso

ZUNI SANDSTONE — U. Jurassic
1) W New Mexico
3) Along SW flanks of Zuni Plateau, btw. Zuni and Wingate, N. Mex.
4) Variegated, band. to mass. sss. and sandy. shs. with occas. gyp. beds (800'-1,300')
5) Divid. into Morrison and San Rafael group from Cow Springs thru Todilto