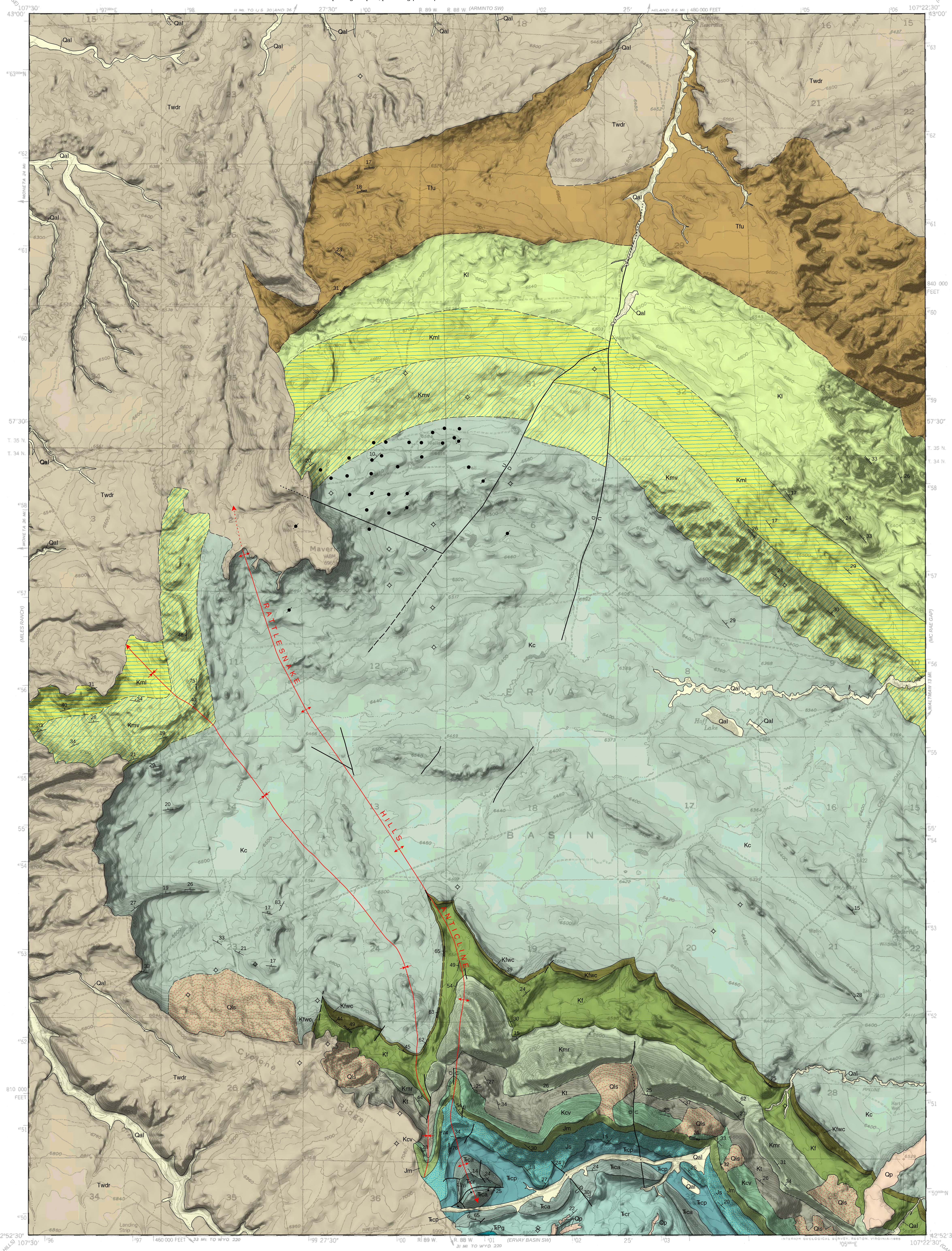
WYOMING STATE GEOLOGICAL SURVEY
Thomas A. Drean, Director and State Geologist
Laramie, Wyoming

Interpreting the past, providing for the future

OPEN FILE REPORT 2016-3
Ervay Basin 1:24,000-scale Bedrock Geologic Map



Base map from U.S. Geological Survey 1:24,000-scale topographic map of the Ervay Basin, Wyoming Quadrangle, 1952, photorevised 1986

Base hillshade derived from a U.S. Geological Survey tile of the National Elevation Dataset (NED), 10-meter Digital Elevation Model (DEM), 2013: azimuth 315º, sun angle 45º, vertical exaggeration 2.7

Projection: Universal Transverse Mercator (UTM), zone 13
North American Datum of 1927 (NAD 27)
1,000-meter grid ticks: UTM, zone 13
10,000-foot grid ticks: Wyoming State Plane Coordinate System, east central zone

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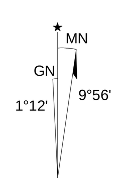
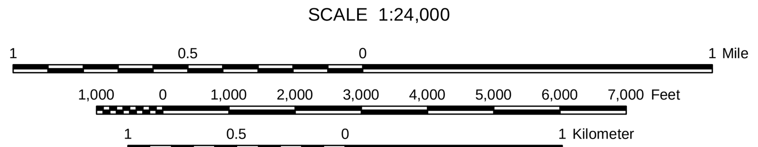
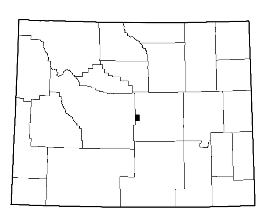


UTM GRID AND 2016 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24,000



CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



WYOMING QUADRANGLE LOCATION

Digital cartography by Amy M. Freye, Rachel N. Toner, and Ranie M. Lynds

Map edited by Suzanne C. Luhr

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PRELIMINARY GEOLOGIC MAP OF THE ERVAY BASIN QUADRANGLE, NATRONA COUNTY, WYOMING

by

Rachel N. Toner, Ranie M. Lynds, Amy M. Freye, and Wayne M. Sutherland

2016

EXPLANATION

CORRELATION OF MAP UNITS

Map units	Epoch/Series	Period	Era
Qal, Qls, Qp (?)	Holocene, Pleistocene	QUATERNARY	CENOZOIC
Unconformity			
Twdr	Eocene	TERTIARY – PALEOGENE	CENOZOIC
Unconformity			
Tfu	Paleocene	TERTIARY – PALEOGENE	CENOZOIC
Unconformity			
Kl, Kml, Kmv, Kc, Kfwc, Kf, Kmr	Upper Cretaceous	CRETACEOUS	MESOZOIC
Kt, Kcv	Lower Cretaceous	CRETACEOUS	MESOZOIC
Unconformity			
Jm	Upper Jurassic	JURASSIC	MESOZOIC
Js	Middle Jurassic	JURASSIC	MESOZOIC
Unconformity			
₮cp, ₮ca	Upper Triassic	TRIASSIC	MESOZOIC
₮cr	Lower Triassic	TRIASSIC	MESOZOIC
₮Pg	Permian	PERMIAN	PALEOZOIC

MAP SYMBOLS

Definitions: *Certain—Estimated location <25 m*
Approximate—Estimated location 25-100 m
Inferred—Estimated location >100 m

Formation contact—Continuous where certain; long dash where approximate; short dash where inferred

Fault—Continuous where certain; long dash where approximate; short dash where inferred; dotted where concealed; bar and ball on downthrown block of normal fault; upthrown (U) and downthrown (D) blocks designated when fault type is unknown

Anticline—Continuous where certain; dotted where concealed; arrow on end of axis indicates direction of plunge

Syncline—Continuous where certain; arrow on end of axis indicates direction of plunge

Strike and dip of inclined bedding (27)

Strike and dip of overturned bedding (75)

Strike and dip of inclined bedding in cross-bedded rocks (33)

Strike of vertical bedding

Oil well, producing

Oil well, no longer producing

Oil well, dry hole

DESCRIPTION OF MAP UNITS

Cenozoic

Qal **Alluvium (Holocene)**—Unconsolidated to poorly consolidated sand, silt, clay, coarse gravels, and cobbles, mainly along local intermittent stream courses; locally intermixed with colluvium. Thickness less than 8 m (26 ft)

Qls **Landslide debris (Holocene and Pleistocene[?])**—Blocks and slumps of locally derived bedrock from steep and unstable slopes; most common in Cloverly Formation as well as Wind River Formation along Cyclone Rim. Thickness less than 122 m (400 ft)

Qp **Pediment deposits (Holocene and Pleistocene[?])**—Unconsolidated subangular pebble and cobble gravels in a coarse sandy matrix of locally derived sedimentary rocks. Thickness less than 3 m (10 ft)

Twdr **Wind River Formation (Eocene)**—Variegated yellowish-brown to orange claystone, siltstone, sandstone, and conglomerate interbedded with white tuffs (Love, 1970); sandstones are arkosic, medium to coarse grained with an abundance of angular quartz grains; conglomerates are predominately comprised of Precambrian igneous and metamorphic cobbles. Basal contact is disconformable. Thickness is highly variable but generally less than 300 m (1,000 ft)

Tfu **Fort Union Formation (Paleocene)**—Chalky white to gray, noncalcareous, occasionally arkosic, sandstone, conglomerate, and siltstone, interbedded with lenses of dark-brown ferruginous hard sandstone, with sparse carbonaceous shale, coal, and variegated claystone beds; abundant glauconite occurs in some sandstones, and rock fragments in conglomerates are mostly noncalcareous Paleozoic and Mesozoic rocks (Love, 1970). Basal contact is mapped at a slight angular unconformity from satellite imagery; not observed in outcrop (access not granted). Thickness generally 305 m (1,000 ft) or less (Keefer and Rich, 1957)

Mesozoic

Kl **Lance Formation (Upper Cretaceous)**—Whitish to buff, fine- to coarse-grained, subangular to rounded, moderately to well-sorted, noncalcareous sandstone, with thin laminations of gray mudstone, carbonaceous shale, and conglomeratic lenses. Sandstone is sometimes friable, may contain larger clasts and rip-ups, and weathers to peach-tan outcrop. Sandstones are ridge- and cliff-formers, interbedded with poorly exposed shale and carbonaceous shale. Basal contact is conformable. Thickness on the north end of Rattlesnake Hills is 810 m (2,670 ft) (Keefer and Rich, 1957)

Kml **Meeteetse Formation and Lewis Shale, undivided (Upper Cretaceous)**—Interbedded dark-gray shale, light-gray fine- to medium-grained sand lenses, carbonaceous shales, and bentonitic shales and siltstones. Iron-stained, concretionary beds with boulder-sized nodules, and petrified wood fragments are common. Basal contact is conformable, and thickness ranges 210–260 m (700–850 ft) (Keefer and Rich, 1957)

Kmv **Mesaverde Formation (Upper Cretaceous)**—Includes three distinct members: upper Teapot Sandstone Member is characterized by white- to light-gray, fine- to medium-grained, cross-bedded, ridge-forming sandstones; unnamed middle member consists of gray interbedded carbonaceous shales and sands; lower Phayles Member in the map area consists of a thick buff to white fine-grained cross-bedded sandstone. Barwin (1961) indicates the Phayles Member may also include a middle carbonaceous shale layer and an upper interbedded sandstone, shale, and coquina sequence not seen in the map area. Basal contact is conformable and partially intertongues with the Cody Shale. Thickness is approximately 260 m (863 ft) (Barwin, 1961)

Kc **Cody Shale (Upper Cretaceous)**—Poorly exposed dark-gray shales and claystones with bentonite layers in the lower part grading to a sandier upper section with persistent siltstone and sandstone ridges. Upper sandstones are fine grained, tan to buff, well sorted, and well rounded with common thin cross-bedding; bedding-parallel trace fossils are locally well preserved. The Phayles member of the Mesaverde Formation intertongues with, and separates the Wallace Creek Tongue of the Cody Shale from main body of the formation (Barwin, 1961). Basal contact is transitional and sometimes sharp (Keefer, 1972). Approximately 1,400 m (4,500 ft) thick along the northeastern flank of the Rattlesnake Hills (Barwin, 1961)

Frontier Formation (Upper Cretaceous)

Kfwc **Wall Creek Sandstone Member**—Dark-brown, medium-grained, moderately sorted, angular to subangular sandstone. Lower portion is mottled and bioturbated while the upper part is cross-bedded, undisturbed, displays an orange stain, and contains abundant rusty concretions. Forms a distinctive upper ridge that caps the Frontier Formation. Thickness is 23 m (74 ft) thick (Bogrett, 1951)

Kf **Frontier Formation, main body**—Interbedded siltstone, black shale, and gray to brown, fine- to coarse-grained sandstone. Middle and lower sand beds are fine to medium grained, well sorted with rounded grains; subangular dark lithics give sandstones a ‘salt and pepper’ appearance. Sandstones create small ridges between less resistant shales, siltstones, bentonites, and coals. Basal contact is conformable and sharp. Thickness approximately 204 m (670 ft) (Bogrett, 1951)

Kmr **Mowry Shale (Upper Cretaceous)**—Organic, black to dark-gray, siliceous shale that contains abundant fish scales and numerous bentonite beds. Bedding and laminations are usually less than two centimeters thick. Weathers silver gray and forms prominent slopes and resistant ridges. Basal contact is conformable (Roth, 1955). Thickness is 116 m (380 ft) (Bogrett, 1951)

Kt **Thermopolis Shale (Lower Cretaceous)**—Nonresistant, dark-gray to black, fissile, bioturbated shale and siltstone that is noncalcareous and carbonaceous; occasional thin resistant siltstones and sandstones throughout; iron concretions are present near the top (Pekarek, 1978). Basal contact is conformable. Approximately 58 m (190 ft) thick (Bogrett, 1951)

Kcv **Cloverly Formation (Lower Cretaceous)**—Resistant buff to gray, brown-weathering, quartz and chert pebble conglomerate with rounded pebbles and granules at base, variegated shale and claystone in middle, and capped by a fine-grained cross-bedded, slabby sandstone and locally by a white recrystallized limestone. The conglomeratic unit forms a ridgetop in the mapped area; commonly broken by landslides. Basal contact is unconformable. Thickness is approximately 21 m (70 ft) (Bogrett, 1951)

Jm **Morrison Formation (Upper Jurassic)**—Dominated by variegated calcareous red to purple shales and siltstones interbedded with buff, very fine to fine-grained, cross-bedded sandstone channels. The shales weather gray green and form slopes below the Cloverly Formation ridges. Basal contact is gradational in mapped area (Wroble, 1953). Thickness is approximately 64 m (210 ft) (Pekarek, 1977)

Js **Sundance Formation (Upper and Middle Jurassic)**—Consists of a basal buff to gray, fine-grained, partially glauconitic, calcite-cemented, cross-bedded sandstone; overlain by a nonresistant, thinly bedded fine-grained sandstone interbedded with red and gray calcareous shales. Upper section is dominated by pale-green to olive-green shales and thinly laminated siltstones, glauconite, ooids, and limey sands. Abundant fossil hash and belemnites occur throughout the formation but decrease in abundance below the uppermost glauconitic layer. The bulk of the formation is a slope former, except for the lower sandstones which crop out in low ridges. Basal contact is erosional and unconformable. Thickness 111 m (365 ft) (Pekarek, 1977)

Chugwater Formation (Triassic)

₮cp **Popo Agie Member**—Red, calcareous shale and siltstone with very fine to fine-grained, subrounded, very well sorted, tan to white and red sandstone lenses. Moderately resistant sand lenses less than 0.6 m (2 ft) thick weather gray to dark gray and are commonly capped by ripple marks. Red siltstones are nonresistant and calcareous, and weather to orange-red soils. Exposed in valley bottoms. Basal contact is conformable (Wroble, 1953). Thickness is approximately 91 m (300 ft) (Bogrett, 1951)

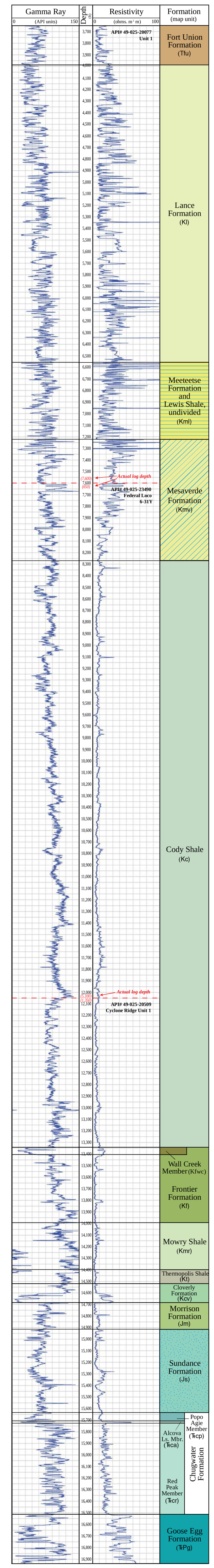
₮ca **Alcova Limestone Member**—Pinkish-gray to purple micritic limestone, thinly bedded with undulating bedding planes and frequent stromatolites. Weathers to white with orange lichen. Typically forms resistent hogbacks along northeast limb of Rattlesnake Hills anticline. Basal contact is conformable. Thickness is approximately 6 m (20 ft) (Pekarek, 1977)

₮cr **Red Peak Member**—Interbedded reddish-orange to brick red shales, siltstones, and sandstones with minor thin gray to green beds of calcareous siltstones and shales. Forms gradual slopes and valleys below the Alcova Limestone Member. Basal contact is conformable (Paull and Paull, 1990). Thickness is approximately 241 m (790 ft) (Pekarek, 1977)

Mesozoic and Paleozoic

₮Pg **Goose Egg Formation (Permian and Lower Triassic)**—Sequence of pink to orangish-red, gypsum-rich shales and siltstones alternating with buff to gray to purple limestones and dolomites locally interbedded with thin chert layers. The members in descending order are Little Medicine Limestone Member, Freezeout Shale Member, Ervay Limestone Member, Difficulty Shale Member, Forelle Limestone Member, Glendo Shale Member, Minnekahta Limestone Member, and Opeche Shale Member (Paull and Paull, 1990). The limestones form prominent flatirons along the north end and northeast limb of the Rattlesnake Hills anticline. Basal contact is unconformable (Bogrett, 1951). Thickness is approximately 119 m (390 ft) (Pekarek, 1977)

GEOPHYSICAL TYPE LOG



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