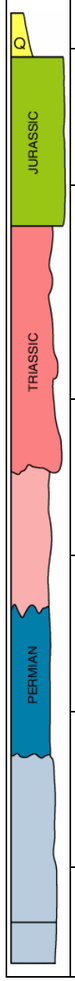
Formation Properties Table



Age	Unit Name (Symbol)	Features and Description	Erosion Resistance	Suitability for Development	Hazards	Potential Paleontologic Resources	Potential Cultural Resources	Mineral Specimens	Mineral Resources	Habitat	Recreation Potential	Global Significance
Q	Alluvium (Qal)	Sand, gravel, clay, and other river derived sediments; little study done in NABR area on recent sediments	Low	Unconsolidated, unsuitable for foundation material for buildings; campgrounds possible	Slide and slump potential in unconsolidated unit	Recent fauna and flora, packrat middens, dung pellets, extinct mountain goat fossils, spruce, limber pine and Douglas fir microfossils	Dwellings and artifacts possible	None documented	Gravel, sand, clay	Habitat for animals and plants	Good for most recreation	Unknown
JURASSIC	Wingate Sandstone (Jw)	Cliffs average 100-130 m (300 to 400 ft) thick; reddish-orange sandstone with massive eolian cross-beds; quartz grains frosted; fine-grained with some feldspar and traces of chert and other accessory minerals	Very high	Suitable for most development except where highly fractured; commonly present as cliff forming member thus care should be taken when building roads below it or trails near rim	Rockfall potential extreme; normally exposed in undercut cliffs; trails should not be developed near cliffs	None documented	Cliff faces may expose petroglyphs and unit is often undercut providing potential caves for dwelling	Frosted quartz grains	Attractive flagstone and building material	Cliff faces provide ledges and undercut areas provide caves for bird and animal habitat	Very attractive for climbers and mountain bikers; Suitable for most recreation unless at the base of a cliff	Records widespread sand seas, or ergs, present during the Jurassic
TRIASSIC	Chinle Formation (TRc)	100 to 200 m (300 to 600 ft) thick; Shinarump pebble conglomerate dominates lower beds - pebbles of quartz, quartzite, chert as well as uranium deposits; overlying members are a mixture of gray, red, pink, orange, and purple mudstone, sandstone and conglomerate interbeds with some limestone locally present	Moderate to high	Lower conglomeratic beds are suitable for most development unless highly fractured; upper beds (majority of unit) can be unstable along slopes especially where significant mudstone is present; mudstone can pose a problem with road development if clay content (especially bentonite) is high.	Slide and slump potential in mud-rich layers; rockfall hazard high for lower beds if undercut or exposed on a cliff face	Burrow and root casts as well as paleosols found locally; petrified wood	Petrified wood and varicolored rocks may have interested ancient Native Americans	Uranium-rich beds	Significant uranium deposits in Shinarump conglomerate; attractive flagstone material	Plucked pebbles in conglomerate provide holes for nests of birds and other small animals	Conglomeratic lower beds attractive for climbers, bentonitic and mud-rich layers should be avoided for trail development, susceptible to failure when wet	Widespread unit of Triassic age; significant deposits of uranium and petrified wood
TRIASSIC	Moenkopi Formation (TRm)	100 to 130 m (300 to 400 ft) thick; lower beds of coarse-grained sandstone, interbedded with chert pebble conglomerate, grayish-red, pale reddish-brown to yellowish-gray sandstone and sandy siltstone; features include ripple marks, cross laminations, and wavy bedding; limestones, gypsum beds, and bentonites are locally present	Low to moderate	High variability of unit renders it unstable along slopes; bentonitic clay shrinks and swells making road construction and trail development problematic on this unit	Slide and slump potential in mud-rich (especially bentonitic) bands; rockfall hazard if sandstone beds form low cliffs	Fossils of plants and animals present locally	Unknown	Gypsum crystals and layers	Gypsum; high concentrations of hydrocarbon rich rocks	Banded unit creates ledges and hollows attractive for birds and small animals for sheltered habitat	Poor for trails and most recreational uses due to susceptibility to slope failure	Records monsoonal wet-dry climate during Triassic time
PERMIAN	Organ Rock Formation (Po)	Averages about 100 m (300 ft) thick; reddish-brown to light red, feldspar rich, very fine- to fine-grained sandstone, siltstone, mudstone and minor carbonate-pebble conglomerate interbeds; appears banded due to alternating resistant and nonresistant beds; features include sand-filled desiccation cracks, and burrows as well as ripples and some crossbeds	Low to moderate	Banded nature of unit makes it relatively unstable where a slope is present; otherwise, unit is suitable for most development	Slide and slump potential in mud-rich bands; rockfall hazard if sandstone beds form low cliffs	Some root casts and petrified soil horizons found west of NABR; ferns, pteriodosperms, and conifer fossils, fish, amphibians and reptile fossils	Unknown	None documented	None documented	Banded unit creates ledges and hollows attractive for birds and small animals for sheltered habitat	Good for most uses, especially trails and mountain biking	Unit records increasingly arid conditions in the late Permian time
PERMIAN	Cedar Mesa Sandstone (Pc)	Unit averages 300 m (1000 ft) thick in NABR area; two distinct facies, the white sandstone facies and the red mudstone facies are present in monument; the first facies is composed of fine-grained sandstone with large scale eolian crossbeds; the second facies consists of horizontally laminated beds of red micaceous mudstone interbedded with fine-grained sandstone and some limestone beds locally	High	Suitable for most development unless highly fractured which may make waste facility development problematic; interbedded mudstones may compromise stability on slopes, thus buildings on slopes should avoid these layers	Rockfall potential high on cliff faces; slide potential in the mudstone-rich layers	Small marine fossils, conifer logs, reptile bones and teeth, plant stems and fern leaves, burrows and root casts	Cliff faces may expose petroglyphs, concretions in limestone layers may have provided tool material	Rhizoliths (large root casts)	Attractive flagstone material	Vugs in limestone may provide nesting habitat especially where exposed on cliffs	Good for most uses, attractive to rock climbers, trail development should avoid mudstone rich layers exposed on slopes	Evidence of large Permian age aeolian fields
PERMIAN	Lower Cutler Beds	Informal unit exposed near NABR, 122-152 m (400-500 ft) thick of arkose, dark red, orange and pinkish to light greenish-gray quartz sandstone, mudstone and limestone interbeds Grain size varies from fine to coarse with abundant crossbeds; some conglomerates exposed east of NABR	Moderate	Suitable for most development except where highly fractured, in which case waste facilities should not be developed	Slide potential where thin-bedded and shale rich	Fusulinids; some petrified wood, & vertebrate footprints	Chert present as nodules in limestone may have been used for tools	None documented	Attractive flagstone material	Vugs in limestone may provide nesting and den cavities	Good for most uses, especially trails, not a good climbing material	Pennsylvanian and Permian fusulinids