

GENERALIZED SECTION of BENTONITE BEARING STRATA of the NORTHERN BLACK HILLS

SERIES	GROUP	FORMATION	MEMBER	BED	SECTION	THICK- NESS (feet)	CHARACTER OF ROCKS
CRETACEOUS	MONTANA	FOX HILLS				150-250	Brown sandy shale, sandstone, and siltstone. Contains marine fossils and forms low grass covered ridges.
		PIERRE SHALE	UNNAMED MEMBER			200	Soft dark-gray, fissile shale with ferruginous and limestone concretions. Locally contains sandy shale in upper part.
			MONUMENT HILL			150	Dark-gray shale, bentonitic shale, and thin bentonite beds. Upper one half of the member weathers light gray and contains several zones of large, light-gray, limestone concretions. Marine fossils are very abundant.
			UNNAMED MEMBER			450	Dark shale with abundant calcareous concretions. Sandy strata are present locally in the upper part of the member.
			MITTEN			150	Dark-gray fissile shale with few iron-stained concretions. Forms a prominent ridge. Thick bentonite bed I is present at the base of the member.
		GAMMON FERRUGINOUS MEMBER		Bed I			
				Bed H upper gammon		150	Gray shale with ferruginous and calcareous concretions. Thin bentonite bed H is present in the upper one half of the unit.
				great sandstone		50-150	Buff, massive, medium to fine-grained sandstone. Grades both upward and downward into enclosing shale through zones of argillaceous sandstone. Locally contains much glauconite and many marine fossils.
				lower gammon		500-600	Gray shale, contains many ferruginous concretions and thin lenses of silty mudstone. Outcrops of the unit are characterized by barren slopes and long narrow ridges.
		NIOBRARA				200	Brownish-gray marl that weathers very light yellowish gray. Contains many thin bentonite and some thin non-calcareous beds in the upper part of the formation. The formation is very soft and much of its areal extent is covered by alluvium.
		CARLILE SHALE	SAGE BREAKS			200-300	Gray shale with several zones of large, calcareous, septarian concretions which weather light-gray. The resistance of the concretion zones often supports small scarps and buttes.
			TURNER SANDY MEMBER			200-250	Sandy and silty shale with persistent zones of thin sandstone beds near base and top. Contains many claystone and calcareous concretions which weather yellow and rusty brown.
			LOWER CARLILE MEMBER			90-150	Dark-gray fissile shale, with a prominent zone of ironstone concretions in upper part. Locally contains thin bentonite beds and limestone concretions showing cone-in-cone structure.
LOWER CRETACEOUS	KARA	GREENHORN				125-370	Brownish-gray calcareous shale and marl, weathers light-gray to brownish-gray. Upper part contains many calcareous concretions, a few small limestone lenses, and thin bentonite beds. Middle part is generally less calcareous and darker colored. East of the Little Missouri River the lower one third of the formation contains several thin limestone beds which are sufficiently resistant to form scarps. These limestone beds pass into zones of concretions as the lower Greenhorn strata grade laterally into Belle Fourche shale.
		BELLE FOURCHE SHALE		Bed G Gray Red Bed F		425-950	Dark-gray fissile shale; lower 40 feet contains abundant manganiferous siderite concretions; middle part composed of very sandy shale with small sandstone lenses. Contains numerous bentonite beds including beds D and E in the lower 30 feet and the prominent Gray Red bed in the upper part. The formation thickens to the west as its upper boundary transgresses time units to include younger strata. Bentonite bed G is in the Belle Fourche shale west of the Little Missouri River, but east of that river bed G is part of the Greenhorn formation.
				Bed E Bed D			
				Clay Spur Bed B			
		MOWRY SILICEOUS SHALE				200-250	Hard, dark brownish-gray, siliceous shale that weathers light gray. Contains an abundance of fish remains and many bentonite beds. The most persistent bentonite beds are bed B and the Clay Spur bed in the upper part of the formation. Included at base is 10-20 feet of soft dark shale (Nesque shale) which is gradational upward into the siliceous part of the unit.
		NEWCASTLE SANDSTONE		Bed A		0-70	Variable unit of discontinuous beds of sandstone, siltstone, sandy shale, impure lignite, and bentonite.
		SKULL CREEK SHALE				250	Dark-gray fissile shale with a few ferruginous and calcareous concretions. Locally contains thin sandy strata and impure lignite beds in lower part. Many sandstone dikes in upper part.
LOWER CRETACEOUS	INYAN KARA	FALL RIVER SANDSTONE				90-120	Massive, cross-bedded, ripple-marked, sandstone interbedded with thin beds of sandy shale and siltstone. Locally with thin beds of impure lignite in lowerpart. Much of the sandstone is ironstained and the upper part commonly contains small ironstone concretions.
		FUSON				70-110	Variegated shale and siltstone. Locally gradational into superjacent Fall River sandstone.

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