IDEALIZED STRATIGRAPHIC COLUMN

Northern Gallatin and Madison Ranges Montana

Compiled by

John Montagne Professor of Geology , Department of Earth Sciences Montana State University

Assisted by John Goering Drafting by Cecilia Vaniman

7	IME	UNITS	тніск.	FORMATION		LITHOGRAPHIC COLUMN	ABBREVIATED LITHOLOGY
ERA	PER.	EPOCH	(AVG.)	ALLUVIUM	Г		
		HOLOCENE (RECENT)	0- 100'	COLLUVIUM MASSWASTING AEOLIAN DEP NEOGLACIATION		BEOPER PER	Chaotic debris Loess and sand Till restricted to cirques
	QUATERNARY	PLEISTOCENE	0 200'	PINEDALE GLACIATION BULL LAKE			Lacustrine silts from ice dammed lakes Fresh till
CENOZOIC	LYNÖ	2 M.Y.B.P. (Million Years Before Present)	0-200	GLACIATION PRE BULL LAKE GLACIATION HUCKLEBERRY RIDGE TUFF		0	Partly weathered till Deeply weathered till Welded rhyolite tuff Streamgravel, unconsolidated Assorted conglomerate sandstone,
CENO		PLIOCENE	0-100'	GRAVEL]/[siltstone and shale, mostly light' colored, calcareous and tuffaceous
		MIOCENE	0-?	BOZEMAN GROUP]		
		OLIGOCENE			┝	0000000	Andesite lava flows, flow breccias and
	TERTIARY	EOCENE (MIDDLE)	3000'-	GALLATIN - ABSAROKA VOLCANICS			stratified volcanic breccia
		(EARLY)	0 - 50'	CONGLOMERATE and SILTSTONE	1	0000000000	Conglomerate consisting of Precambrian and later boulders and cobbles
		PALEOCENE 70 M.Y.B.P.	100'+	LIVINGSTON GROUP ?			Siltstone , shale , some andesitic sandstone
		UPPER	1000'+			90 00 00 00 00 00 00 00 00 00 00 00 00 0	Sandstone and chert pebble conglomerate Latite or monzonite porphyry sill
	CRETACEOUS		440'	ALBINO FORMATION			Gray siliceous shale with interbedded hard, white tuff Well cemented salt and pepper sandstone Black shale with interbedded bentonite seams Pastel colored claystone, mudstone, and shale with interbedded sandstone ? Andesite porphyry sill (local only)
	ETAC		70'	MUDDY SS			Grayish – green to buff cross – bedded salt and pepper sandstone
	CRI	LOWER	150'	THERMOPOLIS SHALE			Medium to dark gray, fissile carbonaceous shale
MESOZOIC			400'	KOOTENAI FORMATION	, v.		Well sorted white to hematite stained quartz sandstone Fresh water limestone with overlying variegated red, yellow - brown, and groy mudstone Yellow - brown to maroon mudstone and shale, limy siltstone, and fresh water limestone Gray, thick bedded, cross-bedded
		135 M.Y.B.P.				200000000000000000000000000000000000000	coarse grained sandstone. Conglomeratic at base (chert pebble cgl)
	l		I	I	1	*see post page for lur	I

		ı			~~~~~	
	JURASSIC	UPPER	350'	MORRISON FORMATION		Variegated red, green, and gray mudstone, shale, and siltstone with thin interbedded yellow to brown ver fine grained sandstone or siltstone beds
			100	SWIFT SS		Yellow calcareous, cross-bedded, very fine to medium grained fossiliferous sandstone
		MIDDLE	120'	SAWTOOTH SHALE		Gray - brown densely colific limestone and calcareous shale Grayish, thin- bedded fine - grained limestone, shaly limestone and calcareous shale, oyster shells
	TRIASSIC	225 M.Y.B.P.	0-100'	DINWOODY FM.		Dark to light brown, thick - bedded sandy limestone and calcareous siltsto
			0 - 100'	SHEDHORN SS		Dark brown dolomitic sandstone with abundant chert
	PERM. 1		135'	QUADRANT FORMATION		Pale cream - colored to white clean washed dolomitic sandstone
	PENN.	UPPER	150'	AMSDEN FORMATION		Red shale, gray to cream colored limestone and siltstone. Locally fossiliferous
	MISSISSIPIAN	LOWER	675'	MISSION CANYON FORMATION		Light gray medium to thick - bedded and massive dolomite, dolomitic limestone and limestone. Abundant che nodules and stringers. Solution brecci at top
			600'	LODGE POLE FORMATION		Yellow, thin to medium bedded lime— stone and interbedded argillaceous limestone or calcareous shale. Medium to dark gray, dense, thin — bedded fossiliferous limestone
		UPPER	50'	SAPPINGTON FM.		Yellow to brownish calcareous siltston mudstone, sandy limestone and sandsto
	N		100'	THREE FORKS FORMATION		Medium gray, dense, thin-bedded dolom or dolomitic limestone. Red, yellow a greenish-orange argillaceous carbona
	DEVONIAN		400'	JEFFERSON FORMATION		breccia and massive dolomite. Medium - bedded to massive gray and brown dolomitic limestone, and limest with interbedded greenish argillaceous dolomite or limestone and solution
		MIDDLE	31'	MAYWOOD FM.		breccia zones. Pale brownish-gray, silty, sandy and pebbly dolomite. Yellow-gray to yellov orange dolomitic, sandy and cong. silty
OIC	CAMBRIAN	UPPER	150'	SAGE PEBBLE CGL. MEMBER		Limestone pebble conglomerate, che nodules and stringers, ribbony algal siltstone and fossil hash
50ZC			50'	MEMBER DRY CK SH MEM		Gray-green fissile shale with interbed yellow-brown fine grained quartz
PALEOZOIC			200'	PILGRIM LS.		sandstone or siltstone. Green and gray, fossil fragmental glauconitic limestone, oolitic in part with some flat pebble limestone conglomerate. Green - brown, medium colitic, massive limestone and dolom matted, some mottling
		MIDDLE	180'	PARK SH.	CONTRACTOR OF THE STATE OF THE	Gray-green and maroon fissile, micaceous shale with interbedded brown, very fine grained quartz sandstone or siltstone, glauconite in upper part
						Thin bedded dark gray, dense limes with interbedded green shale, fossiliferous
			450'	MEAGHER LS.		Massive, dense, brittle, dark gray limestone. Some gold and blue mottli
						Interbedded yellow and gray-green calcareous shale with limestone pebble conglomerate beds
			170'	WOLSEY SH.		Gray – green and maroon fissile micaceous shale with interbedded micaceous sandstone and siltstone
		550 M.Y.B.P.	130'	FLATHEAD FM.		White, yellow brown, and red, medi to coarse—grained, cross—bedded quartz sandstone, locally conglomeral and arkosic
PRE- AMBRIAN		PRE-BELTIAN (ARCHEAN)	INDE F.	CRYSTALLINE METAMORPHIC ROCKS		Gneiss, schist, amphibolite, pegmatit and basic dike rocks