

DR1. Thickness data of post-Laramide basin fill remnants. (A) Thicknesses in meters, (B) Numbers coincide with reference information in Table DR1.

Table DR1. Information for thickness calculations of post-Laramide basin fill remnants.

#	State	Location/basin	Unit	Thickness (m)		Source
				by unit	Total	
1	MT	North central - Northeast Montana	Flaxville Gravel	30	<100	Howard, 1960
2	MT	North central - Northeast Montana	Flaxville Gravel	30	<100	Howard, 1960
3	ND	Killdeer Mountains, Dunn County	White River Gp./Killdeer Fm.	80	<100	Stone, 1973
4	ND	Little Badlands, Stark County	White River Gp./Killdeer Fm.	70	<100	Stone, 1973
5	SD	Slim Buttes, NW South Dakota	White River & Arikaree Gps.	140	140	Lillegraven, 1970
6	SD	Black Hills	Ogallala Formation	50	160	Robinson et al., 1964
			Arikaree Group	60		
			White River Group	50		
7	SD	Badlands, SW South Dakota	White River (Chadron Mbr.)	55	190	Martin, 1987
			White River (Brule Mbr.)	100		
			Sharps (Arikaree equivalent)	30		
8	WY	NW Black Hills	White River Group	73	<100	Flanagan, 1990; Staatz, 1983; Robinson et al., 1964
			Ogallala Formation	15		
9	WY	Reconstruction of Oligocene-Miocene units over the Powder River Basin			360	McKenna and Love, 1972
10	WY	Darton's Bluff, Bighorn Range	unnamed Miocene rocks	43	130	McKenna and Love, 1972; Kochel and Ritter, 1982
			White River Group	91		
11	WY	Reconstruction of Oligocene units over the Bighorn Basin			470	McKenna and Love, 1972
12	WY	South of Yellowstone Park	White River Group	20-30	<100	Love et al., 1976
13	WY	South end of Bighorn Range	Split Rock Formation	259	470	Love, 1970
			White River Group	213		
14	WY	Reconstruction of Oligocene-Miocene units over the Wind River Basin			430	Nuccio and Finn, 1994
15	WY	Beaver Rim, Wind River Basin	White River Group	244-305	310	Seeland, 1985; Van Houten, 1964; Emry, 1973; Love, 1970
			Miocene/Split Rock Fm.	30		
16	WY	Southern Wind River Range	Split Rock Formation	229	350	Steidtmann and Middleton, 1986
			Circle Bar/Leckie beds	122		
17	WY	Northern Great Divide Basin	Split Rock Formation	457	640	Love, 1970
			White River Group	183		
18	WY	Granite Mountains	Moonstone Formation	274	850	Love, 1970
			Kortes Formation	396		
			White River Group	180		
19	WY	Flagstaff Rim, Powder River Basin	Miocene/Split Rock Fm.	40	270	Emry, 1973; Love, 1970
			Group	229		
20	WY	Bates Hole, Shirley Basin	White River Group	229	280	Evanoff, 1990; Denson and Harshman, 1969 Harshman, 1972
			Split Rock Formation	53		
21	WY	Pine Ridge, Powder River Basin	White River Group	216	220	Evanoff, 1990
22	WY	Cheyenne Tablelands near WY-NE border	White River Group	199	270	Cooley and Crist, 1981
			Arikaree Group	57		
			Ogallala Formation	9		
23	WY	Saratoga Basin	Browns Park Formation	762	760	Montagne, 1991
24	WY	Green River Basin	Bishop Conglomerate	60-75	<100	Hansen, 1986
25	NE	Western Nebraska, South of North Platte River	Ogallala Formation	15	350	Swinehart et al., 1985
			Arikaree Group	123		
			White River (Brule Mbr.)	200		
			White River (Chadron Mbr.)	15		
26	NE	Western Nebraska, North of North Platte River	Ogallala Formation	16	400	Swinehart et al., 1985
			Arikaree Group	138		
			White River (Brule Mbr.)	215		
			White River (Chadron Mbr.)	31		

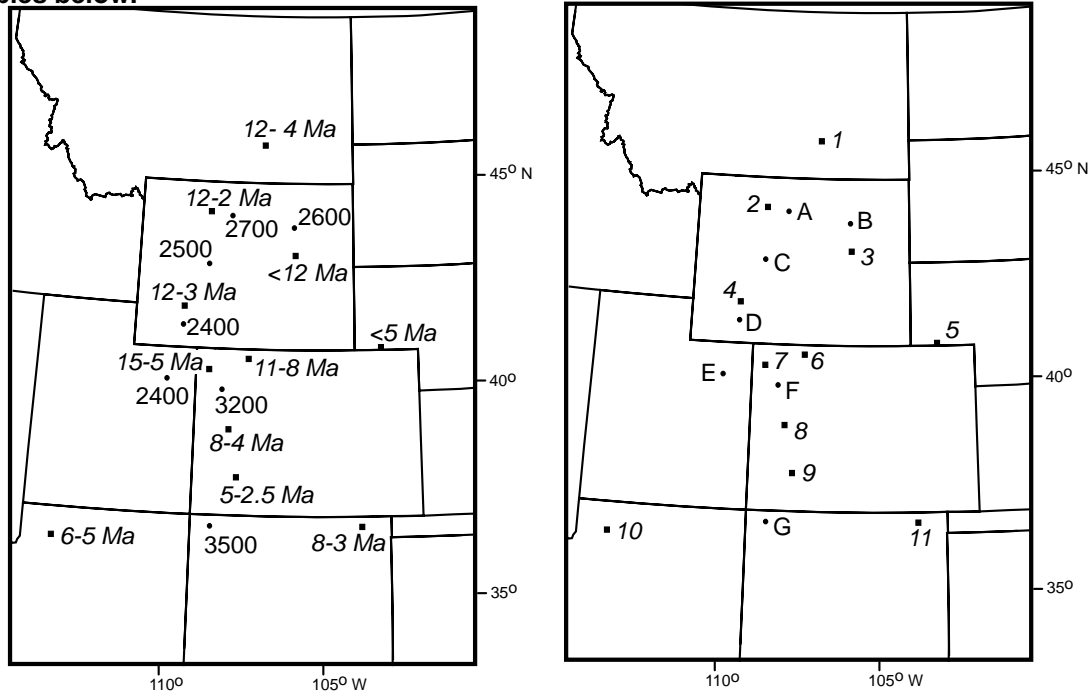
#	State	Location/basin	Unit	Thickness (m)		Source
				by unit	Total	
27	NE	Cheyenne Tablelands, western Great Plains	Ogallala Formation Arikaree Group White River (Brule Mbr.) White River (Chadron Mbr.)	193 85 146 15	440	Swinehart et al., 1985
28	CO	Maybell area	Browns Park Formation	555	560	Honey and Izett, 1988
29	CO	Elkhead Mountains, CO-WY border	Browns Park Formation	192-311	310	Buffler, 1967
30	CO	North Park, Basin	North Park Formation	610	610	Hail and Lewis, 1960
31	CO	Williams Fork Valley	Troublesome Formation	152	150	Tweto et al., 1978
32	CO	State Bridge, CO	Browns Park Formation	305	310	Tweto et al., 1978
33	CO	Southwest of Leadville, CO	Dry Union Formation	915	920	Tweto et al., 1978
34	CO	South Park Basin	Antero & Wagon Tongue Fms.	610	610	Gries et al., 1992
35	CO	Salida, Arkansas River valley	Dry Union Formation	1524	1520	Scott et al., 1978
36	CO	Wet Mountain valley	Santa Fe Group (?)	305	310	Scott and Taylor, 1975
37	CO	Rio Grande Rift	Santa Fe Group	1500	1500	Chapin and Cather, 1994
38	CO	Pawnee Butte, w. Great Plains	White River Group	183	180	Gries et al., 1992
39	KS	U.S. highway 40, CO/KS border	Ogallala Formation	120	120	Sharps, 1980
40	UT	south flank of Uinta Mountains	Bishop Conglomerate	244	240	Hansen, 1986
41	UT	Browns Park	Browns Park Formation Bishop Conglomerate	490 45	540	Hansen, 1986
42	TX	Western Great Plains	Ogallala Formation	180	180	Gustavson and Winkler, 1988
43	AZ	Northeastern Arizona	Bidahochi Formation	240	240	Scarborough, 1989
44	AZ	Chuska Mountains	Chuska Sandstone	305	310	Nations et al., 1985
45	NM	Reconstructed over San Juan Basin			760	Fassett, 1985
46	NM	Rio Grande Rift	Pliocene-Miocene rocks	1000	1000	Chapin and Cather, 1994
47	NM	Western Great Plains	Ogallala Formation	310	310	Hawley, 1993

Table DR2. Stratigraphic units used in selecting maximum elevations of youngest basin fill.

State	Reference	Map Symbol	Map Units
AZ	Hirschberg and Pitts, 2000	Tb Tby Tsy Tso	Basaltic rocks Pliocene to late Miocene Basaltic rocks late to middle Miocene Pliocene to mid Miocene (includes Bidahochi Formation) Sedimentary rocks Oligocene to Eocene (includes Chuska Sandstone)
CO	Green, 1992	Tgv To Tbb Tbp Tnp Ta Tlp Td Ts Tt Tos Twr	Gravels on old erosion surfaces on Front Range/Never Summer Ranges Ogallala Formation Basalt flows (3.5 - 26 Ma) Browns Park Formation North Park Formation Arikaree Formation Los Pinos Formation Dry Union Formation Santa Fe Formation Troublesome Formation Oligocene Sedimentary Rocks White River Formation
MT	Raines and Johnson, 1996	Tf Ta Twr	Flaxville Gravel Arikaree Formation White River Formation
NM	Green and Jones, 1997	Qa/QTs Qe/QTs Qoa/To Qp/QTs Qp/Tsf QTs QTsf Tc To Tsf Tus	Santa Fe Group Santa Fe Group Ogallala Formation Santa Fe Group Santa Fe Group Santa Fe Group Santa Fe Group Chuska Sandstone Ogallala Formation Santa Fe Group Upper Tertiary Sedimentary units (includes Bidahochi Formation)
UT	Hintze et al., 2000	Tpb Tmb T5 T4 Ti	Basalt flows of Southwestern Utah (Pliocene) Basalt flows of Southwestern Utah (Miocene) Browns Park Formation Bishop Conglomerate Laccolith intrusions

State	Reference	Map Symbol	Map Units
WY	Green and Drouillard, 1994	Tmu	Upper Miocene rocks
		Tsl	Salt Lake Formation
		Tm	Miocene rocks
		Tml	Lower Miocene rocks, Bighorn Mountains
		Tmo	Lower Miocene and Upper Oligocene rocks
		Tbi	Bishop Conglomerate
		Twr	White River Formation
		Twru	White River Formation, upper conglomerate Member
		Twrb	White River Formation - Brule Member
		Twrc	White River Formation - Chadron Member
		Tu	Post-Eocene Sandstone and Conglomerate
		Tr	Red Conglomerate on top of Hoback and Wyoming Ranges
KS, OK, ND, NE, SD, TX	Schruben et al., 1994	Tpc	Pliocene continental deposits
		Tmc	Miocene continental deposits
		Toc	Oligocene continental deposits

DR3. Upper limits on maximum elevation of reconstructed surface from proxy data and timing of incision data. (A) Elevations in meters, First time value is before incision began, second time value is after incision was initiated, (B) Numbers/letters coincide with reference information in Tables below.



Reconstructed surface elev.

This study: Other studies:

	State	Location	(meters)	(meters)	based on	References
A	WY	Bighorn Basin	2400	2700	vitrinite reflectance	Hagen and Surdam, 1984
B	WY	Powder River Basin	1900	2600	fission track thermochronology	Naeser, N.D., 1992
C	WY	Wind River Basin	2100	2500	vitrinite reflectance	Nuccio and Finn, 1994
D	WY	Green River Basin	2300	2400	reconstructed burial history	Dickinson, 1989
E	UT	Uinta Basin	2300	2400	fission track thermochronology	Pitman et al., 1982
F	CO	Piceance Basin	2200	3200	vitrinite reflectance	Nuccio and Johnson, 1990
G	NM	San Juan Basin	2800	3500	reconstructed burial history	Bond, 1984

Age of highest, youngest marker

Age of lowest, oldest marker

	State	Location	(based on)	(based on)	References
1	MT	North-central Montana	8-12 Ma (NALMA)	6-4 Ma (ash)	Tedford et al., 1987; Wayne et al., 1991
2	WY	Bighorn Basin	8-12 Ma (NALMA)	2 Ma (pollen)	McKenna and Love, 1972; Rohrer and Leopold, 1963
3	WY	Powder River Basin	12 Ma (fission track age)	?	Naeser, N.D., 1992
4	WY	Green River Basin	8-12 Ma (NALMA)	3 Ma (volcanic flow)	Dickinson, 1989; Lange et al., 2000
5	NE	Cheyenne Tablelands	5 Ma (ash)	?	Naeser, C.W. et al., 1980
6	CO	Elkhead Mountains	12 Ma (volcanic flow)	8 Ma (volcanic flow)	Buffler, 2003; Segerstrom and Young, 1972; Snyder, 1980; Izett, 1975
7	CO	Piceance Basin	15 Ma (fission track age)	5 Ma (fission track age)	Nuccio and Johnson, 1990; Kelley and Blackwell, 1990
8	CO	Western Colorado	8 Ma (volcanic flow)	4 Ma (volcanic flow)	Larson et al., 1975; Izett, 1975; Kunk et al., 2002
9	CO	San Juan Mountains	5 Ma (volcanic flow)	2.5 Ma (authigenic minerals)	Rye et al., 2000
10	AZ	Western Grand Canyon	6 Ma (volcanic flow)	5 Ma (volcanic flow)	McKee and McKee, 1972; Lucchitta, 1989
11	NM	Raton-Clayton volcanic field	8 Ma (volcanic flow)	3 Ma (volcanic flow)	Stormer, 1972; Stroud, 1997

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