GL02773-1

Table 1. Stream Data (July/August 1977) - Part II

Location	Description	Flow (cfs)	Temp (°C)	Spec. Cond. (μmhos @ 25°C)
10S01E07ACCA	Wolf Creek	4.	20.	189
17DBD	Moose Creek	14.9	16.	110
33DDBD	Squaw Creek	0.6	15.	75
11S01E10DCB	Gazelle Creek	11.2	11.	109
10DCB	Papoose Creek	7.9	13.	67
15DDC	Bogus Creek	0.26	12.	188
22DDCD	Soap Creek	6.6	14.5	78
24BACD	Deadman Creek	3.1	12.8	92
24BBD	Curlew Creek	1.2	16	134
34BAB		0.02	17.1	166
12S01E08DDA	Freeze Out Creek	8.3	15.5	153
09BBD		0.04	14	166
17BD	Elk River	22.5	16.	231
12S02E03C	Mile Creek	4.	17	202
13S03W27CCC		0.4	21	147
13S02W17CCCC	Murphy Creek	7.8	27.	616
18CDC	Metzel Creek	4.9	16.1	384
18DCC		.007	21.	131
13S02E20BAAB	Poison Creek	0.5	10.6	220
14S03W13DAAB	Creek west of Curry Creek	1.1	13.	352
13DBA		0.02	19.5	454
21DDDA	Tipton Creek	8.	16.	308
22AAD		1.4	19.9	369
28BAC	Jones Creek	3.9	15.1	309
29AAC	Creek west of Jones Cemetery	0.1	23.9	555
14S02W06BDD	At lower Red Rock Lake Dam	83.7	15.8	164
16CCAA	Duff Creek	0.4	12.	371
17CBDC	Matsingale Creek			
18ACD	Creek east of Lakeview Cemetery	2.7	11.9	260
18BCD		4.7	10.	192
18CBB	Curry Creek	Dry		
18DAA		1.6	12.	333
22BAAD	Humphrey Creek	1.6	12.	247
24CCCD	Irrigation Ditch	2.9	17.4	209
25AABB	-----do-------	7.9	14.	163
25ABAA	O'dell Creek	2.1	19.	168
14S01W01AADA	Elk Springs Creek	25.8	17.	211
21DDC		0.07	10.	346
21DDDB		0.4	7.5	300
23BDD	Shambow Creek	5.7	7.	148
30AAAA	Irrigation Ditch	6.8	13.	157
30BAAB	------do------	4.5	13.	156
14S01E18BCAB	Red Rock Creek	22.5	16.2	216
18CCA		0.2	11.5	293
24BCC		0.8	11.9	181
24BDDC	Hell Roaring Creek	13.2	17.	239
29ACD	E. Fk. of Mt. Creek above W. Fk. of Antelope Creek	0.6	15.2	299

NAME	LOCATION T	R	S	tract	TEMPERATURE °C	°F	FLOW l/min	gpm	cfs	TOPOGRAPHIC MAP	ALTITUDE meters	feet	APPARENT SOURCE OF WATER	SAMPLED BY agency	date	WATER CHEM. DATA sc @25°C	pH	Stan. Anal
Thexton (see Ennis)																		
Toston	4N	3E	6	DADC		57			20	Toston 15'	1205	3960	Pennsylvanian; Madison	MBMG	11-24-64	TDS 238	N.D.	No
Trudau	7S	4W	7	DCACCC						Metzel Ranch 7.5'	1730	5675						
Tyler 1&2 (see Durfee Creek 1&2)																		
Vigilante	9S	3W	22	BDDD		> 90		500-1500		Varney 15'	1890	6200	Madison; Kootenai					
Warm Springs-State Hospital	5N	10W	24		77	160	600	60		Anaconda 15'	1470	4820	Boulder bath. (?)	USGS*	08-19-74	1510	6.46	Yes
														MBMG	04-08-65	TDS 1308	N.D.	No
Warm Springs (see Medicine Lodge)																		
Warm Springs (see Landusky Plunge)																		
Warner	5N	1E	22	DBBC		65				Radersburg 15'	1250	4100	Alluvium; Tert. sed.; Precambrian	MBMG	08-29-72	929	8.84	Yes
Weeping Child (see Sleeping Child)																		
West Fork Swimming Hole	12S	1E	18	CAD	25-28				1.1	Cliff Lake 15'	2040	6700	Alluvium; Pleistocene volc. (?)	MBMG*	09-29-77	322	8.30	Yes
White Sulphur Springs	9N	7E	18	BB	46	95-125 ?	>1500	500		White Sulphur Springs 7.5'	1530	5025	Tert. sed.; Precambrian	MBMG	09-01-61	TDS 1450	N.D.	No
														USGS*	08-17-74	2220	6.8	Yes
Wolf Creek	10S	1E	9	BBBA	54-66				0.7	Cliff Lake 15'	1860	6100	Tert. sed.; Precambrian	MBMG*	09-30-77	494	11.03	Yes
Ziegler (see Apex or New Biltmore)																		

*Symbol after analysis indicates a preferred analysis, conducted for geothermal evaluation, with a field (rather than laboratory) pH measurement.

A standard analysis includes: Ca, Mg, Na, K, Fe, Mn, SiO_2, CO_3, HCO_3, SO_4, Cl, F, NO_3, pH, and specific conductance.

Flow values and chemistry for some springs may not agree because of multiple sampling; some questionable values have been included.

Abbreviations:

Health, Montana State Board of Health
MBMG, Montana Bureau of Mines and Geology
USGS, United States Geological Survey
N.D., Not determined
T.R., Tobacco Root

NAME	LOCATION T	R	S	tract	TEMPERATURE °C	°F	FLOW l/min	gpm	cfs	TOPOGRAPHIC MAP	ALTITUDE meters	feet	APPARENT SOURCE OF WATER	SAMPLED BY agency	date	WATER CHEM. DATA sc @25°C	pH	Stan. Anal
Paradise (see Quinns)																		
Pipestone 1&2	2N	5W	28	BDDD	57	134	300			Dry Mountain 7.5'	1380	4530	Boulder bath.	USGS*	08-18-74	455	8.72	Yes
														MBMG	08-06-64	TDS 328	N.D.	No
Plunkets	4N	1E	27			62		4000		Radersburg 15'	1275	4180	Precambrian-Spokane					
Polaris (see Elkhorn)																		
Potosi 1	3S	2W	7	CABA		100		550		Harrison 15'	1860	6100	Tobacco Root Stock	MBMG	1964	TDS 320	N.D.	No
														(Can not determine which Potosi Spring)				
Potosi 2	3S	2W	6	CACC						Harrison 15'	1865	6120	Tobacco Root Stock					
Potosi 3	3S	2W	6	CBD	49.5		> 200			Harrison 15'	1870	6130	Tobacco Root Stock	USGS*	08-21-74	471	8.63	Yes
														Possibly Potosi 3				
Pullers 1	8S	5W	1	AACC		95; 108		150		Metzel Ranch 7.5'	1670	5485	Tert. Sed.; pre-Belt					
Pullers 2	7S	5W	25	DACDD						Metzel Ranch 7.5'	1655	5435	Tert. sed.; pre-Belt					
Quinns	18N	25W	9	CDADA		109		20		Plains 15'	780	2560	Precambrian Piegan	?	04-08-65	TDS 192	N.D.	No
														MBMG	08-09-72	205	7.91	Yes
Renova	1N	4W	32	C						Vendome 7.5'								
Ross' Hole (see Gallogly)																		
Ryan Canyon (see Browns)																		
Silver Spring	5S	5W	14	CCCCA						Sheridan 7.5'	1505	4935						
Silver Star (see Barkells)																		
Siparyann 1&2 (see Landusky 1&2)																		
Sleeping Child	4N	19W	7	DCDDBB		124		115		Deer Mountain 7.5'	1450	4750	Idaho bath., 2 sources	Health	08-04-64	TDS 400	N.D.	No
						108		115						MBMG	08-10-72	568	7.98	Yes
					45		>2000							USGS*	08-15-74	538	8.20	Yes
Sloan Cow Camp	12S	1E	19	CDA	29.5-30				0.77	Cliff Lake 15'	2000	6560	Alluvium: Pleistocene volc.(?)	MBMG*	09-29-77	410	10.05	Yes
State Hospital (see Warm Springs)																		
Staudenmeyer Ranch	13S	2W	17	CBA	28				4.0	Lower Red Rock Lake 15'	2055	6750	Pleistocene rhyolite, 5 springs	MBMG*	10-03-77	646	7.5	Yes
Sunnyside	8N	3W	16	ACAA						Clancy 15'	1325	4350	Boulder bath.					
Sun River	22N	10W	26	CAB		84		500		Arsenic Peak 7.5'	1465	4800	Kootenai Jurassic, Madison					
Symes	21N	24W	4	AAD		115				Hot Springs 7.5'	865	2830	Precambrian	MBMG	08-09-72	394	8.42	Yes

Name	LOCATION T	R	S	tract	TEMPERATURE °C	°F	FLOW l/min	gpm	cfs	TOPOGRAPHIC MAP	ALTITUDE meters	feet	APPARENT SOURCE OF WATER	SAMPLED BY agency	date	WATER CHEM. DATA sc@25°C	pH	Stan. Anal
Lolo	11N	23W	7	ADCCC	44		100			Lolo Hot Springs 7.5'	1266	4155	Wallace; Idaho bath.	USGS*	08-17-74	225	9.27	Yes
						112		50						MBMG	08-09-72	234	7.87	Yes
Lost Trail (see Gallogly)																		
Lovells	8S	9W	28	BD		72		1125		Gallagher Mountain 7.5'	1675	5490	Tert. sed.; Tert. volc.; Madison					
Mc Menomey Ranch	9S	10W	29	AAA						Dalys 7.5'	1660	5449						
Matthews (see Bozeman)																		
Medicine	1N	20W	12	CCA		120		100		Medicine Hot Springs 7.5'	1355	4440	Idaho bath.	Health	08-05-64	TDS 170	N.D.	No
								100						MBMG	08-09-72	377	8.08	Yes
					45		400							USGS*	08-16-74	343	8.59	Yes
Medicine (see Gallogly)																		
Medicine (see Sun River)																		
Medicine Lodge	12S	11W	7	ABDDD						Deer Canyon 7.5'	2010	6595	Madison					
Medicine Rock (see Sleeping Child)																		
Mockels (see Plunkets)																		
Montanapolis	6S	10E	29	AAC						Emigrant 15'	1805	5920	Tert. granite; Madison; Cambrian	MBMG	1964	TDS 3264	N.D.	No
Morrison Butte (see Landusky Plunge)																		
Naves (see Plunkets)																		
New Biltmore	4S	7W	28	BDA		126		100		Beaverhead Rock 7.5'	1458	4783	Madison	MBMG	08-06-64	TDS 2004	N.D.	No
						130		100						MBMG	07-10-72	2140	7.34	Yes
					53		> 100							USGS*	08-17-74	2160	6.76	Yes
New Biltmore "Cold Spring"	4S	7W	28	ACBC		62		8		Beaverhead Rock 7.5'	1458	4783	Madison					
Nimrod	11N	15W	14	CDAA		72		200		Bearmouth 15'	1160	3800	Cambrian, Madison	Health	08-03-64	TDS 722	N.D.	No
					19									USGS	03-18-72	856	7.63	Yes
Nissler Junction	3N	8W	19	BA			stopped flowing circa. 1920			Butte North 15'	1640	5375	Tert. Sed.. Boulder bath.					
Norris	3S	1W	14	DAB	52.5		400			Norris 15'	1465	4805	Pre Belt; Tobacco Root Stock	USGS*	08-21-74	903	7.58	Yes
														MBMG	11-1964	TDS 620	N.D.	No
						124	88							Private	05-04-70	TDS 700	N.D.	No

NAME	LOCATION T	R	S	tract	TEMPERATURE °C	°F	FLOW l/min	gpm	cfs	TOPOGRAPHIC MAP	ALTITUDE meters	feet	APPARENT SOURCE OF WATER	SAMPLED BY agency	date	WATER CHEM. DATA sc @25°C	pH	Stan.Anal
Garrison	10N	9W	19	A		77				Garrison 15'	1495	4900	Cretaceous-near Madison	MBMG	08-08-72	737	7.30	Yes
Giant Springs	21N	4E	33	BDAC		53			605	Northeast Great Falls 7.5'	988	3240	Kootenai; Madison	N.D.	03-20-53	TDS 410	7.5	No
Granite	11N	23W	7	ABDBA		126		50		Lolo Hot Springs 7.5'	1275	4180	Wallace; Idaho bath.					
Green Springs	20N	24W	33	ADDD		66				Perma 15'	860	2820	Alluvium; Precambrian Piegan	MBMG	1964	TDS 162	N.D.	No
Gregson	3N	10W	2	BDCA	70	154	1000			Anaconda 15'	1565	5130	Tert. volc.; Boulder bath.	USGS*	08-19-74	761	8.41	Yes
														Health(?)	04-08-65	TDS 560	N.D.	No
Hapgood (see Norris)																		
Helena (see Boradwater)																		
Hunters	1S	12E	9	CCADC	59 (ave)	150	5000	1500		Hunters Hot Springs 7.5'	1335	4380	Livingston; Cret. volc.; Tert. granite	USGS*	07-02-75	354	9.13	Yes
														MBMG	07-25-72	387	8.52	Yes
Jackson	5S	15W	25	CBBB		134				Jackson (advance) 7.5'	1970	6470	Alluvium; Tert. sed.; Missoula	MBMG	08-06-64	TDS 662	N.D.	No
														MBMG	07-28-72	1020	9.04	Yes
					58		>1000							USGS*	08-16-74	972	6.77	Yes
Jardine (see Jackson)																		
Kimpton (see Warner)																		
La Duke	8S	8E	32	CDBA	65	151	500	500		Miner 15'	1610	5280	Madison	USGS*	07-02-75	2460	6.52	Yes
														MBMG	07-26-72	2400	7.62	Yes
La Hood Park	1N	3W	12	ACA		66		4		Jefferson Island 15'	1430	4700	Precambrian near Madison					
Landusky 1	25N	24E	32	DABCC		70		600		Hays 7.5'	1130	3710	Madison; Jurassic	MBMG	08-16-73	801	8.03	Yes
Landusky 2	25N	24E	32	DACAAA						Hays 7.5'	1130	3710	Madison; Jurassic					
Landusky Plunge	24N	24E	12	CDDAB		76		3000		Hays SE 7.5'	1125	3690	Madison; Jurassic	MBMG	08-16-73	1262	8.09	Yes
Lithia (see Andersons)																		
Little Warm Springs 1	26N	26E	30	DABD						Bear Mountain 7.5'	1085	3560	Madison; Jurassic					
Little Warm Springs 2	26N	26E	32	ACAAA		79		1200		Bear Mountain 7.5'	1025	3360	Madison; Jurassic	MBMG	08-16-73	2082	8.06	Yes
						72		5000						MBMG	05-1977	N.D.	N.D.	No
Little Warm Springs 3	26N	26E	32	ADB	22.5					Bear Mountain 7.5'	1025	3360	Madison; Jurassic	USGS	10-04-73	1823	7.92	Yes
Lodgepole 1	26N	25E	24	CAAD						Bear Mountain 7.5'	1100	3600	Madison					
Lodgepole 2	26N	25E	24	CABD	26	87		2700		Bear Mountain 7.5'	1125	3700	Madison	analysis by USGS & MBMG -- identification of spring not clear				Yes
Lodgepole 3	26N	25E	24	DBC						Bear Mountain 7.5'	1100	3600	Madison					

NAME	LOCATION T	R	S	tract	TEMPERATURE °C	°F	FLOW l/min	gpm	cfs	TOPOGRAPHIC MAP	ALTITUDE meters	feet	APPARENT SOURCE OF WATER	SAMPLED BY agency	date	WATER CHEM. DATA sc @ 25°C	pH	stan. anal.
Brooks	17N	18E	19	DBDBB		70		80000		Lewistown 15'	1145	3760	Kootenai;Madison	Health	08-19-64	TDS 670	N.D.	No
						68								MBMG	08-17-73	1754	7.92	Yes
					19.5				151					USGS	09-23-75	882	7.68	Yes
Browns	8S	9W	30	DCB	23				7.6	Dalys 7.5'	1700	5575	Madison; Tert. volc.	MBMG	09-06-77	618	N.D.	No
Byrnes (see Nimrod)																		
						110-114								MBMG	11-24-64	TDS 270	N.D.	No
Camas	21N	24W	3	BBB	45		> 200			Hot Springs 7.5'	860	2830	Piegan; Diorite sill	USGS*	07-03-75	367	9.39	Yes
					44									USGS	09-15-75	394	9.11	Yes
Chico	6S	8E	1	CDCD	42		> 500			Emigrant 15'	1610	5280	Tert. sed. w/Tert. granite and Madison	USGS*	08-25-74	379	7.38	Yes
						119								MBMG	11-24-64	TDS254	N.D.	No
Clarks (see Potosi 1)																		
Cliff Lake (see W. Fk. Swimming Hole)																		
Corwin (see La Duke)																		
Diamond Bar Inn (see Jackson)																		
Diamond S (see Boulder)																		
Durfee Creek 1	12N	22E	13	DDD		66		.75		Roundup 1°x 2°	1400	4600	Madison; Pennsylvanian	MBMG	08-15-73	2535	8.08	Yes
Durfee Creek 2	12N	23E	19	BB		71		15000		Roundup 1°x 2°	1550	5100	Madison; Pennsylvanian					
Elkhorn	4S	12W	29	ACAD	48.5		400			Polaris 15'	2190	7200	Boulder bath.	USGS*	08-20-74	209	8.94	Yes
						114		450						MBMG	07-27-72	219	8.49	Yes
Emigrant Gulch (see Chico)																		
Ennis	5S	1W	28	DCAD		172		15		Ennis 15'	1500	4920	Tert. sed. over pre-Belt (T.R. Stock?)	Health(?)	02-06-69	TDS 310	N.D.	No
Fairmont (see Gregson)																		
Ferris (see Bozeman)																		
Flat Mountain	15N	20E	6				stopped flowing in the early 1900's			Judith Peak 15'	1675	5500						
Gallatin Canyon	6S	4E	33							Garnet Mountain 15'	1830	6000	Madison					
Gallogly	1S	19W	15	BCCCAC		100		120		Lost Trail Pass 7.5'	1645	5400	Idaho bath	Health	08-05-64	TDS 144	N.D.	No
						120		120						MBMG	08-10-72	202	7.81	Yes

PRELIMINARY LIST OF THERMAL SPRINGS IN MONTANA
BY THE MONTANA BUREAU OF MINES AND GEOLOGY
(Compilation by R. N. Bergantino and J. L. Sonderegger, November, 1977)

NAME	LOCATION T	R	S	tract	TEMPERATURE °C	°F	FLOW l/min	gpm	cfs	TOPOGRAPHIC MAP	ALTITUDE meters	feet	APPARENT SOURCE OF WATER		SAMPLED BY agency	date	WATER CHEM. DATA sc @25°C	pH	Stan. Anal
Alhambra	8N	3W	16	ACAA	56.5	134	40	150-250		Clancy 15'	1330	4360	Boulder batholith		USGS*	08-23-74	929	7.23	Yes
															MBMG	09-01-72	192	7.83	Yes
Anaconda	3 miles east of Anaconda ?									Anaconda 15'									
Andersons	3S	13E	29	ABAB		77				McLeod Basin 7.5'	1690	5540	Madison		MBMG	07-25-72	414	7.84	Yes
Andersons Pasture	13S	2W	18	ACD	23.5-28				2.0	Lower Red Rock Lake 15'	2085	6840	Pleistocene volcanics	2 springs	MBMG*	10-03-77	609	7.4	Yes
Apex	5S	9W	10	AADADD						Glen 7.5'	1600	5240							
Barkells	2S	6W	1	CBD	71.5	162	150	150		Twin Bridges 15'	1430	4700	Boulder bath.		USGS*	08-18-74	808	8.17	Yes
															MBMG	07-10-72	847	8.40	Yes
Bear Creek	9S	9E	19	DB		90		30		Gardiner 15'	1700	5600	Madison						
Bearmouth 1	11N	14W	11	DCCCD						Bearmouth 15'	1170	3840	Madison						
Bearmouth 2	11N	13W	18	AB	15					Bearmouth 15'	1173	3850	Madison		USGS	03-18-72	610	7.69	Yes
Beartrap (see Norris)																			
Beaverhead Rock	5S	7W	22	ABBD		81		100		Beaverhead Rock 7.5'	1470	4810	Tertiary sed. over Madison (?)						
Bedford	7N	1E	23	ABBC		74		1200-1500		Townsend 15'	1180	3880	Precambrian Spokane Fm.		Health	12-09-64	TDS 266	N.D.	No
Big Hole (see Jackson)																			
Big Warm Springs (see Lodgepole 1,2,3)																			
Big Warm Springs (see Brooks)																			
Birch Creek (see Apex)																			
Blue Joint 1	2S	23W	1	A		84			0.6	Painted Rocks Lake 15'	1535	5040	Idaho bath.; Precambrian Ravalli		MBMG	08-11-72	162	8.12	Yes
Blue Joint 2	2S	22W	6	BA		85			0.5	Painted Rocks Lake 15'	1505	4940	Idaho bath.; Precambrian Ravalli		MBMG	08-11-72	180	8.22	Yes
Boulder	5N	4W	10	C	62; 76	100		250		Boulder 15'	1480	4850	Boulder bath.		USGS*	08-22-74	523	8.50	Yes
															Health	11-24-64	TDS 388	N.D.	No
Bozeman	2S	4E	14	DDBAA	50	130-135		inactive (former flow 60 gpm)		Bozeman 15'	1443	4735	pre-Belt		USGS*	08-25-74	624	8.58	Yes
															Health	1964	TDS 428	N.D.	No
Brewers (see White Sulphur Springs)																			
Broadwater	10N	4W	28	A	62	138	< 50	75		Helena 15'	1250	4100	Belt and Boulder bath.		USGS*	08-24-74	796	8.53	Yes
															Health	09-17-64	TDS 563	N.D.	No

Table 2.—Chemical composition of thermal springs originating in the Madison Group.

Spring number	1	4	5	7	8	9	12	14	16	18	19	20	20, 21, or 22?	24	25	30
Temperature (°C)	25	15	19.5	42	65	19	25	21	24	26	22.5	26	30.6	53	19	77
Laboratory pH	7.84	7.69	7.68	7.38*	6.52*	8.08	7.30	8.03	8.09	8.06	7.92	7.96	8.06	6.76*	7.63	6.46*
Specific conductance (μmho/cm)	414	610	882	379	2,460	2,535	737	801	1,262	2,082	1,823	1,430	1,980	2,160	856	1,510
SiO_2 (mg/l)	12.2	16	8.9	34	49	12.8	18.2	18.2	17.8	16	15.9	14.5	16.3	46	21	56
Fe (mg/l)	<.01	0.03	<.01	–	–	0.09	<.01	<.01	<.01	0.10	<.01	<.01	<.01	––	0.01	–
Mn (mg/l)	<.01	0.01	<.01	<.02	0.02	0.02	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.03	0.01	0.05
Ca (mg/l)	47	89	133	35	320	533	77	266	161	289	276	187	268	290	126	220
Mg (mg/l)	23	28	40.3	8.8	58	165	35	86	65	110	91	69	96	73	36	22
Na (mg/l)	1.6	7.6	3.4	35	230	14	24	39	24	72	66.3	52.5	75	160	15.5	120
K (mg/l)	1.3	1.8	1.4	6.8	23	3.2	5.2	9.0	6.7	13.3	10.4	8.5	13	24	3.4	26
HCO_3 (mg/l)	88	220	195	170*	297*	59	59	109	101	101	196	153	81	226*	168	258*
SO_4 (mg/l)	139	163	336	41	1,200	1,870	335	982	620	1,140	936	650	1,062	1,100	340	670
Cl (mg/l)	0.5	1.5	0.95	10	45	4.1	3.4	18.8	9.5	59	42	38	57	46	2.7	5.0
F (mg/l)	0.4	0.5	1.3	0.9	3.6	1.8	1.3	1.5	1.6	1.4	1.7	0.9	1.1	3.3	0.8	3.9
NO_3 (mg/l)	0.3	0.2	0.8	–	–	ND	0.2	1.1	1.1	0.1	ND	1.7	0.1	–	0.4	–
B (mg/l)	–	–	–	0.06	0.46	–	–	–	–	–	–	–	–	0.92	–	0.10
Al (mg/l)	–	–	–	–	<.001	–	–	–	–	–	–	–	–	0.002	–	<.001
Li (mg/l)	<.01	–	–[1]	0.03	0.24	0.04	0.15	0.09	0.05	0.14	–	–	0.14	0.18	–	0.36
H_2S* (mg/l)	–	–	–	0.6	<1.	–	–	–	–	–	–	–	–	1.1	–	0.7
NH_4* (as N, mg/l)	–	–	–	<.1	0.22	–	–	–	–	–	–	–	–	0.2	–	<.1
Total Dissolved Solids (calculated, mg/l)	313	527	622	256	2,076	2,665	558	1,531	1,008	1,806	1,635	1,175	1,669	1,856	715	1,251
Total hardness as $CaCO_3$ (mg/l)	211	334	498	124	1,038	1,998	335	1,014	669	1,171	1,056	747	1,059	1,025	462	640
Total alkalinity as $CaCO_3$ (mg/l)	72	180	195	139	244	48	48	89	83	83	161	125	67	185	138	212
Sodium Adsorption Ratio	0.0	0.2	0.0	1.4	3.1	0.1	0.6	0.5	0.4	0.9	0.9	0.8	1.0	2.2	0.3	2.1

*Field determination; ND-Not detected; – Not determined;

[1] Value of 0.02 mg/l on previous sample; analyses for spring 7, 8, 24, and 30 from U.S. Geological Survey Open-File Report 76-480.

Table 1.—Thermal springs originating in the Madison Group.

No.	Name	T.	R.	Sec.	Tract	Discharge (gpm)	Temp °C	ΔH_1 (18°C) (billion Btu/yr.)	ΔH_2 (10°C) (billion Btu/yr.)	Source and comments
1.	Anderson's	3 S.	13 E.	29	ABAB	10 45	21 25	0.24 2.5	0.87 5.3	MBMG Analysis 72-861; Madison.
2.	Bear Creek	9 S.	9 E.	19	DB	30	32	3.3	5.2	Madison
3.	Bear Mouth No. 1	11 N.	14 W.	11	DCCCD	?	?			Madison
4.	Bear Mouth No. 2	11 N.	13 W.	18	AB	?	15			MBMG Analysis 72-109; Madison
5.	Brooks	17 N.	18 E.	19	DBDBB	68,000	19.5 21	810. 1,610.	5,100. 5,910.	MBMG Analysis 75M1510; Madison (?) through Kootenai (Cretaceous). Water used for irrigation.
6.	Brown's	8 S.	9 W.	30	DCB N½	360	22 42	11.4 >25.	34. >33.	Madison (?) under Tertiary volcanics. Discharge reported in USGS Prof. Paper 492; visual estimate in August 1975 was 3,000 gpm.
7.	Chico	6 S.	8 E.	1	CDCD	>130	48	>31.	>39.	Analysis by USGS; Madison (?) through Tertiary volcanics and sediments. Water used for resort.
8.	Corwin (LaDuke)	8 S.	8 E.	32	CDBA	500	65	186.	220.	Analysis by USGS; Madison (?) along fault. Water unused (July 1975); previously used for space heating.
9.	Durfee Creek No. 1	12 N.	22 E.	13	DDD	1	19 23	0.008 0.039	0.071 0.102	MBMG Analysis 73-842; spring near Madison-Pennsylvanian contact. Water used for livestock.
10.	Durfee Creek No. 2	12 N.	23 E.	19	BB	15,000	22	470.	1,420.	Spring near Madison-Pennsylvanian contact.
11.	Gallatin Canyon	6 S.	4 E.	33	BCC	?	?			Best location currently available; Madison.
12.	Garrison	10 N.	9 W.	19	Center	?	25			MBMG Analysis 72-868; Madison. Water not used (8/8/72).
13.	Giant Springs	21 N.	4 E.	33	BDAC	90,000	12	–	1,420	Not a "warm" spring, but included for purposes of comparison.
14.	Landusky No. 1	25 N.	24 E.	32	DABCC	950 1,250	18 20	– 19.7	60. 99.	MBMG Analysis 73-844; spring near Madison-Jurassic contact. 1,250 gpm flow measured by MBMG in May 1977.
15.	Landusky No. 2	25 N.	24 E.	32	DACAA	?	?			Spring near Madison-Jurassic contact.
16.	Landusky Plunge	24 N.	24 E.	12	CDDAB	3,200	24	152.	350	MBMG Analysis 73-843; spring near Madison-Jurassic contact. Flow measured by MBMG in May 1977. Domestic and livestock water use.
17.	Little Warm Springs No. 1	26 N.	26 E.	30	DABD	?	?			Spring near Madison-Jurassic contact.
18.	Little Warm Springs No. 2	26 N.	26 E.	32	ACAAA	1,200 5,000	26 26	76. 320.	152. 640.	MBMG Analysis 73-841; spring near Madison-Jurassic contact. 5,000 gpm flow measured by MBMG in May 1977. Domestic and livestock use.
19.	Little Warm Springs No. 3	26 N.	26 E.	32	ADB	1,200	22	38.	114.	MBMG Analysis 73-879; spring near Madison-Jurassic contact. Water used for irrigation.
20.	Lodgepole No. 1	26 N.	25 E.	24	CAAD	1,500	29	130.	230.	MBMG Analysis 73-878; these three Lodgepole springs issue from the Madison Group. We have a second analysis (MBMG 73-840), but the location is not precise enough to assign it to the proper spring. Total flow for all three springs was estimated at 3,000 gpm, yielding ΔH_1 and ΔH_2 values of 284 and 474 billion Btu's per year, respectively. Prof. Paper 492 lists flow at 10,000 gpm, and some estimates have been as high as 50,000 gpm.
21.	Lodgepole No. 2	26 N.	25 E.	24	CABD	?	32			
22.	Lodgepole No. 3	26 N.	25 E.	24	DBC	?	32			
23.	Lovell	8 S.	9 W.	28	BD	1,125	22	36.	107.	Tertiary sediment adjacent to Madison outcrop. Tertiary volcanics to west. Location corrected from that in USGS Prof. Paper 492.
24.	New Biltmore	4 S.	7 W.	28	BDA	100	54	28.	35.	Analysis by USGS; Madison.
25.	Nimrod	11 N.	15 W.	14	CDAA	100	19 22	0.79 3.2	7.1 9.5	MBMG Analysis 72-112; Cambrian or Mississippian limestone along faults—spring issues from Tertiary sediments.
26.	Staudenmeyer's Spring No. 1	13 S.	2 W.	17	CB	3,200	27	230.	430.	Spring adjacent to contact between Tertiary (?) volcanics and limestone of uncertain age. Flow estimated with float and watch. Composite of four warm springs and one cold spring.
27.	Staudenmeyer's Spring No. 2	13 S.	2 W.	18	ACC	900	26	57.	114.	Spring issues from silicified limestone (?) of uncertain age. Staudenmeyer's springs are used for flood irrigation of hay.
28.	Staudenmeyer's Spring No. 3	13 S.	2 W.	18	BAD	2,400	22	76.	230.	Spring issues near contact of volcanics and limestone.
29.	Sun River	22 N.	10 W.	26	CABA	500	29	43.	75.	Madison, Jurassic, or Kootenai.
30.	Warm Springs State Hospital	5 N.	10 W.	24	A	150	77	70.	80.	Analysis by USGS; source beneath Tertiary sediments. Ca/Na ratio suggests limestone aquifer contact. Water being considered for space heating.

Table 2. Spring Data (July/August 1977) - Part II

Location	Description	Flow gpm	Temp (°C)	S.C. 25°C	PPM SiO_2	Fl
10S01E09BBB	Wolf Creek Hot Springs	359	55.	536**	90	2
11S02E32C	E. of Ghosttown of Cliff Lake Spring	2.2	11.7	247	10	1
12S01E11ADD	Wade Lake Spring	50*	11.8	204	10	1
12S02E20D	Horn Creek Spring	2.77	11.5	260	19	1
13S03W22CCBC	Lousy Spring	.92*	7.5	380	17	1
22DAAB		4	9.5	322	17	1
23ABD		3	7	313	30	1
13S02W05CAAA	Cayuse Spring	.05	5.9	336	20	
18BDAD	Staudenmeyers Horse Water Spring	5.39*	22	709	20	2
18DB	--------do--------	25	24.5	614	20	1
13S01W04DCC	Tepee Creek Spring	200	5	79	15	1
10BBA	Tepee Creek Spring	2	7.4	61	15	1
12DAAC	Springs S. of Two Drink Springs	8	9.2	91	24	1
		8	6.1	94		
		3	11	84	21	1
13S01E07AAD	Brimstone Creek Spring	5.	9.9	86		1
09DBC	Hidden Lake Spring	37.5	6.9	192	34	1
28AACD	Spring for Stock	2	9.	322	15	1
31DCAB	Upper Elk Springs	1.4*	8.5	223	31.5	1
33AAC	Limestone Creek Spring	2	11.75	235	20	1
36DDD	Spring for Livestock	.5	18.9	150	17	1
13S02E19DADB	--------do--------	10	17.8	168	26	
20CBB	--------do--------	18	10.8	189	27	1
31CADD	--------do--------	5	11.3	80	11	1
32BB	Upper Antelope Creek Spring	1*	8.9	158	15	1
32CAB	Main Antelope Creek	56	7.9	122	17	1
32CDA	--------do--------	24	11.25	53	17	
14S03W23BBD	Huntsman Ranch	58	9.5	292	26	1
14S01W21DCCB	Upper Red Rock Lake Camp Spring	15	8.75	396	11	1
22DAB	Numerous Springs in marsh above lake	1.*	8	418	4	1
23DBA	--------do--------	1	6.1	355	10	1
23DBC	--------do--------	1	6	356	10	1
21DDD	--------do--------	2	8.5	362		
14S01E03CAD	Springs for Livestock	1.5*	5.5	140	15	1
03CBAD	--------do--------	5	17.8	176	15	1
08DACC	Culver Spring (west)	30*	7.5	294	13	1
13BDA	Huntsman Spring (Alaska Basin)	1.82*	8.	283	16	1
15CC	Fruin Spring	18.75	8.2	290	17	1
20CAB	Spring above Walsh Ranch	.25	14	78	23	1
23BCC	E. of Tobe Morton's	59	7	102	28	1
23CDC	Picnic Creek Spring	107	5.8	50	23	1
29DBAB	Spring @ W. Fk. of Antelope Creek source	77	5.1	80	12	1
14S02E06CBD	Spring for Stock	13	21.2	216	12	1
06CCCB	--------do--------	29	19	230	12	1
07CBAD	--------do--------	1*	8	297	11	1
07DDC	--------do--------	5	16.25	327	18	1

flow in c.f.s.
approximate