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PRELIMINARY HEAT FLOW ESTIMATES
FOR WYOMING AND MONTANA

by

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DISCUSSION

Enclosed is a table containing basic thermal data for preliminary heat flow estimates in Wyoming and Montana. The thermal data include thermal conductivities of rock samples from drill holes, temperature gradients, depth ranges for the least-squares calculation of the temperature gradients, and the computed heat flow values.

Other data listed in the table include the following items. The county code refers to the county code listing on the 1983 map entitled "Geothermal Resources of Wyoming" by H.P. Heasler, B.S. Hinckley, K.L. Buelow, S.A. Spencer, and E.R. Decker (available from the Wyoming Geological Survey, P.O. Box 3008, Laramie, Wyoming 82071). However, county codes B102, B103, BE1, BE2, BE4, BE5 are not listed on the 1983 map. The locality refers to the topographic quadrangle on which the drill hole was sited. The locations of the drill holes are also given in west longitude and north latitude. The elevation of each drill hole is given in meters.

A brief description of measurement techniques and selected references is included in the table.

BASIC THERMAL DATA FOR PRELIMINARY HEAT FLOW ESTIMATES DETERMINED BY THE UNIVERSITY OF WYOMING, U.S. DOE CONTRACT DE-FC07-7921D12026

Conductivity refers to the mean thermal conductivity of measurements of samples from indicated borehole, or of measurements of "representative" samples from nearby holes.

Gradient refers to the slope of the least-squares straight line that was fitted to temperature-depth data for the indicated "Depth-Range."

Heat flows are products of indicated mean conductivity multiplied by the indicated least-squares gradient.

Abbreviations for counties in Wyoming: AL= Albany; B= Big Horn; CA= Campbell; CB= Carbon; CO= Converse; FR= Fremont; JO= Johnson; PA= Park; and SW= Sweetwater.

BE refers to localities in southern Montana (Carbon County).

County Code	Locality	West Longitude deg-min	North Latitude deg-min	Elevation m	Conductivity <u>mcal</u> cmsec deg C	Depth-Range m	Gradient deg C/km	Heat Flow <u>microcal</u> cmcm sec
AL 8	Boot Heel	105-49.7	42-10.5	2121	6.5	20-87	25.8	1.68
AL 9	Boot Heel	105-49.4	42-10.5	2121	5.8	20-90	23.5	1.36
AL 11	Boot Heel	105-58.0	42-09.9	2122	5.7	20-90	22.3	1.27
AL 12	Boot Heel	105-45.8	42-09.3	2140	6.7	40-83	14.1	.94
AL 13	Boot Heel	105-46.1	42-09.1	2146	5.8	40-137	23.2	1.35
AL 14	Boot Heel	105-46.1	42-09.1	2140	5.8	90-150	21.0	1.22
AL 17	Boot Heel	105-47.8	42-08.4	2140	5.7	10-100	30.0	1.71
AL 45	Bootheel Quad	105-47.4	42- 4.1	2196	4.83	30-190	19.3	.93
B 102	Kerr McGee 3	107-38.3	42-11.2	2347	5.8	90-490	11.0	.64
B 103	Kerr McGee 8	107-45.8	42-10.4	2199	5.8	50-518	17.3	1.00
CA 1	North Butte	105-59.0	43-48.9	1467	5.5	40-110	25.0	1.38
CA 2	North Butte	105-59.8	43-48.8	1455	4.93	70-130	19.8	.98
CA 3	North Butte	105-59.7	43-48.8	1463	5.5	20-170	21.3	1.17
CA 5	North Butte	105-59.0	43-48.8	1467	4.03	40-189	21.7	.87
CA 8	Fort Reno SE	106- 0.1	43-48.4	1432	4.4	40-90	26.7	1.17
CA 9	North Butte	105-59.6	43-48.4	1467	4.82	100-177	17.9	.91
CA 10	North Butte	105-59.6	43-48.3	1467	5.7	30-190	22.4	1.38
CA 11	Fort Reno SE	106- 0.0	43-48.2	1447	5.0	80-152	21.7	1.09
CA 12	North Butte	105-59.2	43-48.2	1509	5.0	60-72	65.0	3.3
CB 3	Hanna	106-40.3	41-46.8	2142	4.91	30-268	21.2	1.04
CB 6	Rattlesnake Pass	106-37.1	41-43.6	2220	4.89	60-227	20.8	1.02
CB 11	Finley Res	106-40.0	41-27.5	2201	5.9	20-83	34.7	2.05
CB 14	Finley Res	106-44.1	41-27.3	2116	4.69	70-204	33.0	1.54
CB 15	Walck Ranch	106-53.8	41-26.2	2166	6.0	30-171	20.0	1.20
CB 16	Walck Ranch	106-55.1	41-26.0	2172	5.7-6.0	25-170	21.7	
CB 26	Poison Basin	107-45.9	41-03.8	2018	6.0	30-215	20.0	1.20
CO 1	Coal Draw	105-34.3	43-19.6	1506	4.59(?)	0-40	27.2	1.24
CO 2	Coal Draw	105-33.4	43-18.9	1530	4.59(?)	10-329	36.2	1.66
CO 3	Coal Draw	105-35.8	43-16.5	1573	4.59	50-140	27.0	1.24
CO 8	Highland Flats	105-42.1	43-02.9	1689	5.4	90-170	15.6	.84
CO 18	Highland Flats	105-33.6	43-0.3	1634	4.28	40-80	18.5	.79
CO 19	Squaw Springs	106-03.9	42-27.4	2338	5.7	30-257	29.0	1.65
FR 33	Bringolf Ranch	108-19.4	42-52.2	1655	6.0	20-215	19.2	1.15
FR 34	Bringolf Ranch	108-17.3	42-52.2	1646	6.0	40-290	17.8	1.07
FR 35	Bringolf Ranch	108-17.6	42-51.5	1628	6.0	50-180	19.6	1.18
FR 36	Bringolf Ranch	108-17.3	42-50.5	1655	6.0	40-120	18.1	1.09

JO 10	Fort Reno SE	106-01.8	43-50.1	1442	5.5	50-78	23.5	1.29
JO 11	Fort Reno SE	106-01.8	43-50.0	1445	5.1	40-68	8.6	.95
JO 14	Fort Reno SE	106-03.2	43-49.2	1388	5.1	40-153	16.4	.84
JO 15	Fort Reno SE	106-3.3	43-49.0	1393	4.66	50-148	11.9	.55
JO 18	Fort Reno SE	106-2.6	43-49.0	1405	4.98	60-110	18.4	.92
JO 19	Fort Reno SE	106-2.5	43-49.0	1400	4.42	30-58	14.7	.65
JO 23	Fort Reno	106-2.7	43-48.9	1397	4.45	50-105	16.4	.73
JO 25	Fort Reno SE	106-02.6	43-48.9	1388	4.8	20-110	6.9	.33(?)
JO 27	Fort Reno SE	106-2.6	43-48.9	1388	4.42	50-110	19.4	.86
JO 28	Fort Reno SE	106-2.5	43-48.9	1394	4.92	60-110	15.8	.78
PA 7	Sunlight Basin	109-23.9	44-45.8	1938	4.29	40-122	7.9	.4 (?)
PA 10	Sunlight Basin	109-24.3	44-45.0	1951	4.79	50-220	36.2	1.80
PA 11	Pat Ohara Mtn.	109-25.3	44-44.9	1891	4.42	80-254	24.5	1.5
PA 12	Pat Ohara Mtn.	109-21.6	44-43.0	2316	5.93	17-60	10.1	.60
PA 14	Cody, Wyoming	109-5.7	44-30.1	1560	4.88	3-99	157.5	7.67
PA 15	Cody, Wyoming	109-5.7	44-29.7	1573	5.30	10-117	216.5	11.47
PA 16	Cody, Wyoming	109-5.6	44-29.4	1579	5.23	5-70	189.9	9.93
PA 17	Cody, Wyoming	109-5.6	44-29.1	1573	5.53	5-97	3.6	.2 (?)
PA 18	Cody, Wyoming	109-6.5	44-29.0	1609	6.23	18-85	108.1	6.73
PA 19	Cody, Wyoming	109-5.7	44-29.0	1588	3.71	5-105	76.9	2.85
PA 24	Irish Rock	109-18.3	44-18.5	2560	3.07	120-186	23.3	.90
SW 5	Bull Springs	107-35.9	42-06.4	2116	5.3	140-237	14.4	.76
SW 15	Bull Springs	107-36.1	42-05.9	2104	5.0	20-154	18.5	.93
SW 17	Bull Springs	107-36.1	42-5.6	2104	5.20	20-60	12.5	.65
SW 26	Superior	108-58.4	41-51.5	2210	6.40	50-90	8.2	.52
SW 29	Superior	108-57.3	41-50.6	2225	6.02	60-80	20.2	1.21
BE 1	Tolman Flat	109-14.0	45- 5.4	2001	4.38	40-156	48.5	2.12
BE 2	Tolman Flat	109-14.2	45-5.3	2054	4.27	0-123	41.0	1.75
BE 4	Tolman Flat	109-14.1	45-4.7	2301	4.55	50-230	29.0	1.17
BE 5	Tolman Flat	109-14.1	45- 4.9	2261	4.55	50-230	29.9	1.36

PROCEDURES

Basic thermal data were collected using systems and procedures like those described by Roy et al. (1968) and Decker (1973). Briefly, temperatures were measured at discrete depths in the holes with thermistor probes in combination with 3- and 4-lead cables, Wheatstone-type bridges, and electronic null detectors. Thermal conductivities of water-saturated rotary chips or core samples were measured using steady-state, divided-bars that were calibrated with quartz and silica glass. "Representative" porosity of 20% or 30% was assumed for the rotary-drilled chips from the relatively shallow sediments.

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