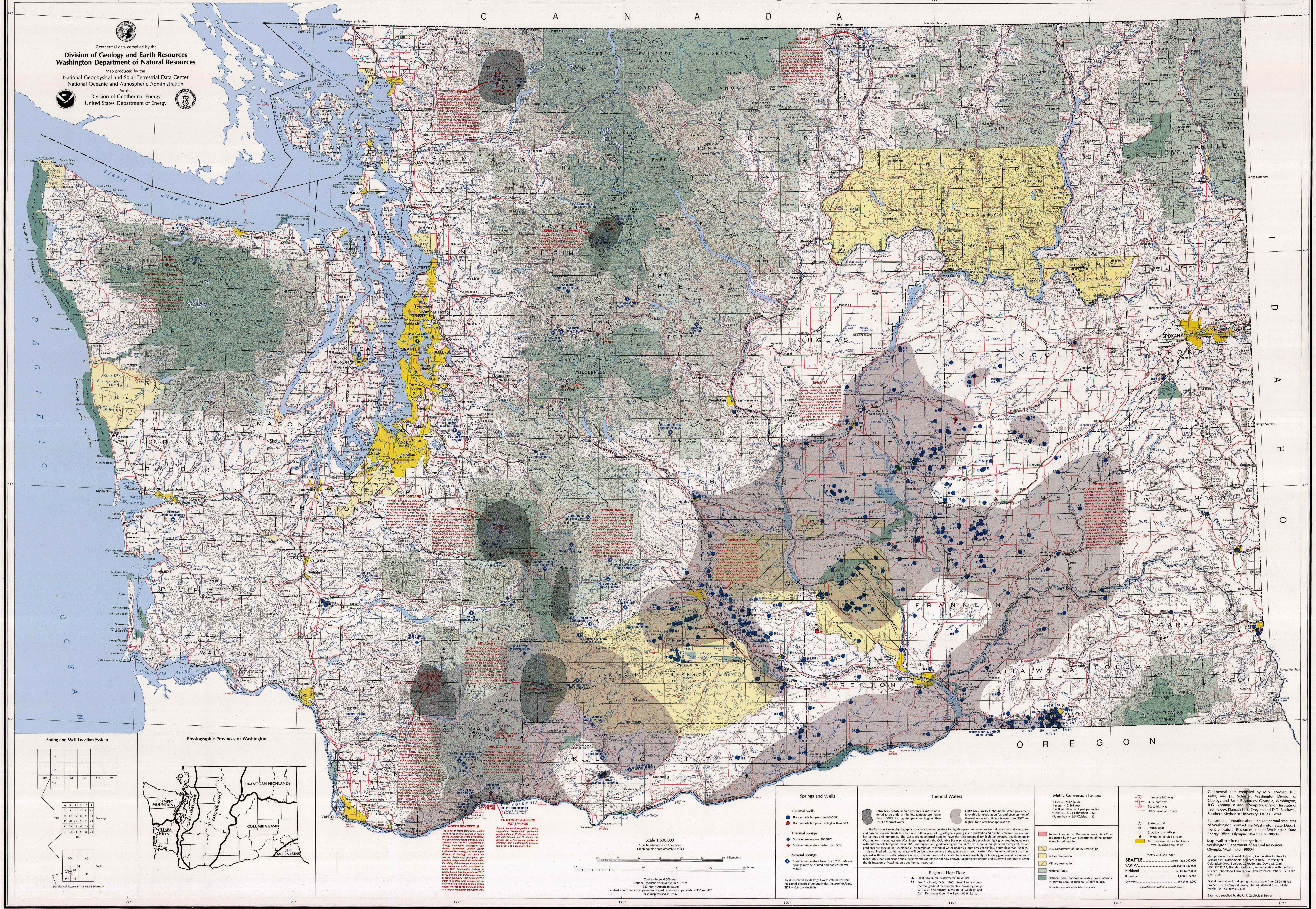
WASHINGTON DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGY AND EARTH RESOURCES

Geothermal Resources of Washington

1981

GEOLOGIC MAP
GM-25
Geothermal Resources of Washington
1981



Springs and Wells

Thermal wells
- Bottom-hole temperature 20°-50°C
- Bottom-hole temperature higher than 50°C

Thermal springs
- Surface temperature 20°-50°C
- Surface temperature higher than 50°C

Mineral springs
- Surface temperature lower than 20°C. Mineral springs may be diluted and cooled thermal waters.

Total dissolved solids (mg/L) were calculated from measured electrical conductivities (micromhos/cm). TDS = 0.6 (conductivity)

Thermal Waters

Dark Gray Areas. Darker gray area is known or inferred to be underlain by low-temperature (lower than 100°C) to high-temperature (higher than 150°C) thermal water

Light Gray Areas. Unbounded lighter gray area is favorable for exploration for, and development of, thermal water of sufficient temperature (20°C and higher) for direct heat applications

In the Cascade Range physiographic province low-temperature to high-temperature resources are indicated by stratovolcanoes and basaltic volcanic fields less than one million years old, geologically young silicic (andesitic and dacitic) volcanic centers, and hot springs and fumaroles. The Cascades geothermal systems have the best potential for high-temperature development in Washington. In southeastern Washington (generally the Columbia Basin physiographic province) light gray area includes wells with bottom-hole temperatures of 20°C and higher, and gradients higher than 45°C/km. Here, although neither temperatures nor gradients are spectacular, exploitable low-temperature thermal water underlies large areas at shallow depth (less than 1000 m)

It is not implied that thermal water will be found everywhere in the gray areas. In southeastern Washington cold wells are interspersed with warm wells. Absence of gray shading does not indicate there is no possibility of finding geothermal resources; it means only that surface and subsurface manifestations are not now known. Ongoing exploration and study will continue to refine the delineation of Washington's geothermal resources.

Regional Heat Flow

▲ Heat flow in milliwatts/meter² (mW/m²)

65 See Blackwell, D.D., 1980, Heat flow and geothermal gradient measurements in Washington up to 1979: Washington Division of Geology and Earth Resources Open-File Report 80-9, 524 p

Metric Conversion Factors

1 liter = .2642 gallon
1 meter = 3.281 feet
1 milligram/liter = 1 part per million
°Celsius = 5/9 (°Fahrenheit − 32)
°Fahrenheit = 9/5 °Celsius + 32

- Known Geothermal Resources Area (KGRA) as designated by the U.S. Department of the Interior. Name in red lettering.
- U.S. Department of Energy reservation
- Indian reservation
- Military reservation
- National forest
- National park, national recreation area, national wilderness area, or national wildlife refuge.

Private land may exist within federal boundaries

- Interstate highway
- U. S. highway
- State highway
- Other principal roads
- State capital
- County seat
- City, town, or village
- Scheduled service airport
- Built-up area shown for towns over 10,000 population

POPULATION KEY

SEATTLE .... more than 100,000
YAKIMA .... 25,000 to 100,000
Kirkland .... 5,000 to 25,000
Ritzville .... 1,000 to 5,000
Concrete .... less than 1,000

Population indicated by size of letters

Geothermal data compiled by M.A. Korosec, K.L. Kaler, and J.E. Schuster, Washington Division of Geology and Earth Resources, Olympia, Washington; R.G. Bloomquist, and S. Simpson, Oregon Institute of Technology, Klamath Falls, Oregon; and D.D. Blackwell, Southern Methodist University, Dallas, Texas.

For further information about the geothermal resources of Washington, contact the Washington State Department of Natural Resources, or the Washington State Energy Office, Olympia, Washington 98504

Map available free of charge from:
Washington Department of Natural Resources
Olympia, Washington 98504

Map produced by Ronald H. Smith, Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado/NOAA, Boulder, Colorado, and David M. Clark, NGSDC/NOAA, Boulder, Colorado, in cooperation with the Earth Science Laboratory/ University of Utah Research Institute, Salt Lake City, Utah

Digital thermal well and spring data available from GEOTHERM Project, U.S. Geological Survey, 345 Middlefield Road, MS84, Menlo Park, California 94025

Base map supplied by the U.S. Geological Survey

Thermal and Mineral Springs

Name	Township	Range	Quarter-quarter section	Quarter section	Section	Temperature in °C	Flow in liters/minute	Total dissolved solids in milligrams/liter
CHELAN COUNTY								
LITTLE WENATCHEE SODA SPRING	27N	15E		NW	10	<20		
MEDICINE SPRING	26N	18E		SE	13	<20		
CLALLAM COUNTY								
OLYMPIC HOT SPRINGS	29N	8W		NW	28	48	500	192
PIEDMONT SULFUR SPRING	30N	9W			11	<20		
SOL DUC HOT SPRINGS	29N	9W		NW	32	50	560	210
COWLITZ COUNTY								
GREEN RIVER SODA SPRINGS	10N	4E		NE	2	13-25		5800
PIGEON SPRINGS	7N	1E	NE	NW	36	<20		
GRAYS HARBOR COUNTY								
NEWSKAH MINERAL SPRINGS	16N	9W			9	19	400	240
KING COUNTY								
DIAMOND MINERAL SPRING	21N	6E		SW	21	11		
FLAMING GEYSER SPRINGS	21N	6E		SE	27	13		
GOLDMEYER HOT SPRINGS	23N	11E		NW	14	53	350	138
LESTER HOT SPRINGS	20N	10E			21	49	200	312
MONEY CREEK SODA SPRINGS	26N	11E		SE	30	12		
RAVENNA PARK SULFUR SPRING	25N	4E			9	<20		
SCENIC HOT SPRINGS	26N	13E		NE	32	50	110	1410
SKYKOMISH SODA SPRINGS	26N	11E		NW	27	<20		
KITSAP COUNTY								
BREMERTON SULPHUR SPRING	24N	1E	SE	NE	3	<20		
KITTITAS COUNTY								
MEDICINE CREEK MINERAL SPRING	21N	17E	SE	SW	22	9	6	180
KLICKITAT COUNTY								
BLOCKHOUSE MINERAL SPRINGS	4N	15E		SW	9	12		426
FISH HATCHERY WARM SPRING	6N	13E	SE	NE	4	24	15	996
KLICKITAT MINERAL SPRINGS	4N	13E			24	15-29		900
KLICKITAT SODA SPRINGS	5N	13E	SE	NE	25	15-17		
LEWIS COUNTY								
ALPHA MINERAL SPRING	13N	2E			5	<20		
OHANAPECOSH HOT SPRINGS	14N	10E		NW	4	<50	110	2790
PACKWOOD HOT SPRING	13N	9E			32	38		
SUMMIT CREEK SODA SPRINGS	14N	11E	NE	SW	18	12	100	5100
VANCE MINERAL SPRING	12N	7E	NW	SW	22	<20		
OKANOGAN COUNTY								
HOT LAKE	40N	27E		NE	18	40-50		
POISON LAKE	39N	27E		SE	5	40-50		
PIERCE COUNTY								
LONGMIRE MINERAL SPRINGS	15N	8E		SE	29	25	250	3900
MT. RAINIER FUMAROLES	16N	8E			23	52-72		
ST. ANDREWS SODA SPRINGS	15N	7E			1	<20		
SKAMANIA COUNTY								
BONNEVILLE HOT SPRINGS	2N	7E		SW	16	36	80	480
COLLINS HOT SPRINGS	3N	9E		SW	31	40-50		
GOVERNMENT MINERAL SPRINGS	5N	7E			31	7	250	2340
LITTLE SODA SPRING	4N	7E		SE	5		150	2340
MT. ST. HELENS FUMAROLES	8N	5E			4	80-800		
ORR CREEK WARM SPRINGS	10N	10E		NE	19	22	100	108
ROCK CREEK HOT SPRINGS	3N	7E		NE	27	34		240
SHIPHERDS HOT SPRINGS	3N	8E		SE	21	42	100	135
ST. MARTINS HOT SPRINGS	3N	8E		SE	21	53		1410
SNOHOMISH COUNTY								
GAMMA HOT SPRINGS	31N	13E		SE	24	60	15	1680
GARLAND MINERAL SPRINGS	28N	11E		NW	25	29	100	
KENNEDY HOT SPRINGS	30N	12E		NE	1	38	60	2040
SUIATTLE RIVER MINERAL SEEP	31N	15E		NE	18	10	8	1410
SULPHUR CREEK HOT SPRINGS	32N	13E		NE	19	37	10	300
WALLA WALLA COUNTY								
WARM SPRINGS CANYON WARM SPRING	6N	32E		SE	2	22		
WHATCOM COUNTY								
BAKER HOT SPRING	38N	9E		SW	20	42	26	492
DORR FUMAROLE FIELD	38N	8E	NW	NW	17	90		
SHERMAN CRATER FUMAROLES	38N	8E	SW	NE	19	90-130		
YAKIMA COUNTY								
AHTANUM SODA SPRINGS	12N	15E		SW	8	10-14		660
BUMPING RIVER SODA SPRINGS	17N	13E		NW	34	<20		
GOOSE EGG SODA SPRINGS	14N	14E		SW	33	10	80	1620
INDIAN MINERAL SPRINGS	15N	12E	NE	NE	10	<20		
KLICKITAT MEADOW SODA SPRINGS	11N	13E	NW	SE	4	14	25	264
LITTLE RATTLESNAKE SODA SPRINGS	15N	14E			34	<20		
McCORMICK MEADOW SODA SPRINGS	11N	12E	NE	SW	24	10	8	900
MT. ADAMS FUMAROLES	8N	10E			1	>50		
SIMCOE SODA SPRINGS	11N	15E		SW	9	>20		
SODA SPRING CREEK SODA SPRING	9N	12E	NW	NE	35	<20		

Thermal Wells

Number	Township	Range	Quarter-quarter section	Quarter section	Section	Bottom-hole temperature in °C	Depth in meters	Gradient A in °C/km	Gradient B in °C/km	Source reference
ADAMS COUNTY										
1	15N	28E	SW	NW	8	20.0	126.0		63	4
2	15N	28E	NW	NW	15	24.2	264.0		46	4
3	15N	28E	SE	SW	35	23.0	253.0		43	1
4	15N	29E	NE	NW	3	22.8	212.0		51	4
5	15N	29E	NE	SE	3	20.8	276.0		32	4
6	15N	29E	SE	SW	3	29.0	297.8		57	1
7	15N	29E	NE	NE	4	24.3	365.1		34	1
8	15N	31E	NE	SW	5	26.4	403.5		36	1
9	15N	31E	SW	NW	11	20.1	214.0	32.2	38	3
10	15N	31E	NE	NE	19	25.5	338.6		40	1
11	15N	32E	NW	NE	4	21.8	266.4		37	1
12	15N	32E	SW	NW	35	27.6	309.7		50	1
13	15N	33E	NE	NE	2	25.0	68.9		189	1
14	15N	34E	SE	SE	27	20.9	243.8		37	1
15	15N	36E	SE	NW	34	25.4	211.5		63	1
16	16N	29E	SE	SE	34	23.0	275.0		40	4,7
17	16N	30E	NW	NW	24	25.9	219.4	64.8	63	1
18	16N	30E	NE	NE	26	26.2	192.0	34.0	74	3
19	16N	30E	NE	SE	27	25.2	207.0	91.0	64	3
20	16N	30E	NW	SE	36	20.3	208.8		40	1
21	16N	30E	NW	SE	36	25.8	240.8		57	1
22	16N	31E	NW	NE	15	22.7	200.5		53	1
23	16N	31E	SW	SE	15	26.9	408.7		36	1
24	16N	32E	NW	NW	11	27.7	310.3		51	1
25	16N	32E	NE	NW	14	20.7	155.1		56	1
26	16N	32E	NW	NW	15	32.8	437.1		48	1
27	16N	32E	SW	SW	20	22.8	214.3		50	1
28	16N	32E	SW	SW	20	29.2	372.1		46	1
29	16N	32E	SW	NW	21	27.4	158.8		97	1
30	16N	32E	NW	NW	25	28.7	431.6		39	1
31	16N	32E	SW	SW	25	30.4	709.2		26	1
32	16N	32E	SW	NW	34	42.8	771.0	69.5	40	1
33	16N	32E	NW	NW	35	24.0	270.6		44	1
34	16N	32E	NW	NW	35	24.0	192.0		63	1
35	16N	35E	SW	SE	31	22.2	599.5		17	1
36	17N	31E	NW	NW	12	27.8	590.4		27	1
37	17N	32E	SE	SW	12	21.0	227.0		40	3
38	17N	37E	NW	NW	27	21.9	167.9		59	1
39	18N	31E	NE	NW	18	21.5	237.7		40	2,3
40	18N	31E	NW	NW	33	30.0	771.0		23	1
41	19N	31E	SW	NE	24	20.1	164.6		49	1
42	19N	32E	NW	SE	24	20.6	243.2		35	1
43	19N	32E	SW	SW	24	31.5	680.3		29	1
44	19N	33E	SW	SE	8	20.3	229.8		36	1
45	19N	33E	SW	SE	8	39.3	736.7		37	1
46	19N	36E	NW	SE	9	20.4	228.9		37	1
47	19N	36E	SW	SW	34	20.7	100.6		86	1
48	19N	38E	SE	NW	13	21.1	201.2	82.8	45	2
49	20N	34E	SW	SE	2	20.9	197.2		45	1
50	20N	35E	NW	NW	17	20.9	231.6	90.0	38	2
51	20N	35E	NW	NW	24	20.5	156.7		54	1
ASOTIN COUNTY										
52	10N	46E	SW	SE	5	23.0	554.0		20	4,7
53	11N	46E	SW	SE	30	23.3	406.0		28	4,5
54	11N	46E	NE	SW	32	26.2	405.0		35	2
55	11N	46E			32	23.4	387.7		29	1
BENTON COUNTY										
56	4N	24E	NW	NE	3	20.6	121.0		71	5
57	5N	26E	NW	NW	5	25.9	304.8		46	1
58	5N	28E	SE	SE	6	21.5	170.0		56	4
59	6N	24E	SE	NE	22	22.5	195.0		54	3
60	6N	26E	NW	SW	15	24.2	209.7		58	1
61	6N	30E	SW	SE	12	21.1	305.0	31.0	30	3
62	6N	30E	SW	SW	19	20.0	176.8		45	1
63	7N	24E	NW	NW	8	22.9	332.5		33	1
64	7N	25E	SW	SW	36	22.5	253.9		41	1
65	7N	25E	SW	SW	36	30.3	221.6		83	1
66	7N	25E	SW	SW	36	21.8	262.0		37	4
67	7N	26E	NW	NE	5	22.1	148.1		68	1
68	8N	24E	NE	SE	1	25.0	378.5		34	1
69	8N	29E	NE	NE	22	23.0	244.0		45	4
70	9N	25E	NW	NE	6	25.2	364.2		36	1
71	9N	26E	NW	SE	27	21.5	204.0		47	4
72	9N	28E	SE	NE	34	21.1	271.3		34	1
73	10N	25E	SW	NW	25	20.6	184.0	36.0	47	3
74	10N	25E	SW	SW	33	21.8	275.5		36	1
75	10N	28E	SW	SW	14	47.8	1079.9	34.6	33	2
76	11N	24E		SE	15	96.3	2500.0	37.1	34	2
77	11N	26E	SE	SE	34	24.0	305.0		39	4
78	12N	24E	SW	SW	20	26.0	366.0		38	4
79	12N	26E	SW	SW	4	21.4	117.0		80	4
80	12N	26E	NW	NE	7	20.7	126.0		69	4
81	12N	26E	SW	SE	7	20.4	99.0		85	4
82	12N	26E	SE	SW	8	21.2	98.0		94	4
83	12N	26E	SE	NE	12	21.0	158.0		57	4
84	12N	26E	NW	NW	14	21.1	117.0		78	4
85	12N	26E	NE	NW	15	21.7	134.0		72	4
86	12N	26E	SW	NW	18	20.5	177.0		48	4
87	12N	26E	SW	NE	18	20.8	85.0		104	4
88	12N	27E	NW	SW	16	20.5	65.0		131	4
89	13N	24E	SW	NW	25	24.2	237.0		51	4,7
90	13N	24E	SW	NE	26	20.0	215.0		37	7
91	13N	24E	NW	NW	36	24.0	333.0		36	4,7
92	13N	25E	SW	SW	1	23.0	241.0		46	4,5
93	13N	25E	SE	NE	11	39.1	32.0		847	4
94	13N	25E	SW	NE	30	26.8	339.0		44	4,7
95	13N	26E			25	21.9	183.0	37.2	54	2
96	13N	26E	SW	NE	35	25.0	1726.0		8	4
97	14N	26E	NW	SW	14	32.5	24.0		854	4
98	14N	26E	SW	NE	28	20.7	24.0		363	4
CHELAN COUNTY										
99	22N	20E	NW	NW	26	35.7	900.0	26.8	26	2
COLUMBIA COUNTY										
100	12N	38E	SW	NW	1	21.6	241.1		40	1
101	13N	38E	SW	NW	26	20.0	74.0		108	4,5
DOUGLAS COUNTY										
102	23N	26E	NW	NW	20	27.8	244.4		65	1
103	23N	26E	NW	NW	20	29.3	362.7		48	1
FRANKLIN COUNTY										
104	9N	30E	SE	NE	18	21.0	315.0		29	4
105	9N	31E	SW	NW	7	24.6	167.6	33.4	75	1
106	11N	31E	SE	NE	21	24.2	354.8		34	1
107	12N	29E	SE	NW	28	20.0	213.0		38	4
108	13N	28E	SW	SW	13	27.6	341.0		46	4
109	13N	34E	NW	SW	30	31.3	355.1	56.4	54	1
110	14N	29E	NE	NE	9	22.3	263.0		39	4,7
111	14N	29E	NE	NE	9	22.2	215.0	57.6	47	3
112	14N	31E	NE	SE	9	21.2	330.1		28	1
113	14N	31E	NE	SE	36	25.0	337.0		39	4
114	14N	32E	SE	SW	2	27.2	242.3	50.2	63	1
115	14N	32E	SW	NW	13	25.6	187.1		73	1
116	14N	32E	NW	NW	31	29.4	303.0	38.0	57	1,3
117	14N	33E	SW	SW	21	27.3	349.3		44	1
118	14N	36E	SW	SW	19	22.5	262.7		40	1
GARFIELD COUNTY										
119	12N	42E	NE	SW	31	23.0	304.0		36	4,7
GRANT COUNTY										
120	14N	25E	NW	NW	1	27.5	285.0		54	4,7
121	14N	25E	NW	NE	21	22.0	159.0		63	4,7
122	14N	27E	NE	NW	24	30.0	426.0		42	4,7
123	15N	27E	NE	SW	34	21.5	194.0		49	4,7
124	16N	24E	SW	NE	1	23.5	244.0		47	4,7
125	16N	24E	SW	NE	1	24.5	279.0		45	4,7
126	17N	25E	SE	NW	1	25.3	239.0		56	1
127	17N	27E	NW	NW	31	20.8	247.0		36	4
128	17N	30E	SW	NE	1	23.0	299.0		37	7
129	17N	30E	NW	SE	33	22.2	306.0		33	4,7
130	17N	30E	NW	SE	33	23.5	222.0		52	4
131	18N	25E	SW	NW	15	25.6	297.0		46	4
132	18N	25E	SW	NW	15	22.4	270.3		38	1
133	18N	25E	SW	NW	15	29.3	488.0	35.2	35	1
134	18N	25E	NE	SE	23	21.2	190.2		48	1
135	18N	25E	SW	SW	27	21.2	228.0		40	3
136	18N	25E	NW	NE	28	22.4	211.5		49	1
137	18N	26E	NW	SE	31	22.5	214.6	46.0	49	1,3
138	18N	29E	SW	SE	6	20.6	202.4		42	1
139	19N	27E	NW	NW	31	23.3	233.2		48	1
140	19N	28E	SW	SE	15	22.2	277.0		37	4
141	19N	28E	NW	NW	23	23.7	280.4		42	1
142	19N	28E	NW	NW	23	20.6	292.0		29	4,5
143	19N	28E	NW	SE	28	22.6	294.4		36	1,3
144	19N	29E	SE	NW	3	22.5	321.2		33	1
145	19N	29E	SE	NE	4	24.6	280.4		45	1
146	19N	29E	NE	SE	9	20.5	97.5		87	1
147	19N	29E	SW	SW	16	28.4	190.5		86	1
148	19N	30E	SE	NW	13	20.2	201.0		41	3
149	19N	30E	NW	SW	17	20.3	220.6		38	1
150	19N	30E	NW	NW	20	25.8	310.9		44	1
151	20N	24E	SE	SE	7	21.0	131.0		69	4
152	20N	29E	SE	NE	7	20.1	213.3		38	1
153	20N	29E	NE	NW	25	21.8	400.8		24	1
154	20N	29E	NE	NE	35	25.0	292.6		44	1
155	20N	30E	SE	NW	21	26.4	322.7	53.7	45	2,3
156	20N	30E	SW	NE	21	22.0	351.7		28	1
157	20N	30E	SW	NE	21	28.0	466.3		34	1
158	20N	30E	NE	NE	23	21.5	219.4		43	1
159	20N	30E	SW	NW	23	34.8	337.0	101.0	68	1,3
160	20N	30E	SE	SE	28	20.4	178.3		47	1
161	20N	30E	SE	SE	28	28.5	181.0		91	3
162	20N	30E	NW	SE	32	21.2	381.0		24	1
163	21N	26E	NW	SW	8	30.0	305.0		59	4
164	21N	26E	SE	NE	15	20.9	561.4		16	1
165	21N	26E	SW	NW	21	25.5	188.0		72	4
166	21N	30E	NW	SW	10	30.0	640.0		28	3
167	21N	30E	SW	NE	26	20.7	170.7		51	2
168	22N	27E	SW	SW	19	27.0	142.0		106	4
169	22N	30E	SW	NE	26	23.5	239.9	34.7	48	1
170	23N	28E	SW	NW	27	22.4	195.7		53	1
171	25N	28E	NE	SW	24	29.2	189.0		91	1
172	25N	28E	NW	NE	25	23.0	177.0		62	3
KITTITAS COUNTY										
173	15N	19E	NE	SW	22	22.8	183.0		59	4
174	15N	19E	NE	SW	22	23.4	121.9		94	1
175	16N	19E	NE	NW	28	27.9	309.7		51	1,4
176	18N	18E	SW	NW	35	20.8	272.4		32	1
177	18N	18E	NW	NE	36	28.4	262.2		63	3
KLICKITAT COUNTY										
178	4N	13E	SE	NE	24	27.2	90.0		169	4,5
179	4N	14E	NE	NW	19	22.8	61.0		177	5
180	5N	20E	NW	NE	27	22.8	276.0	41.0	39	3
181	5N	20E	NE	NW	27	23.1				1
182	5N	22E	NE	NE	27	28.2	321.0	42.0	50	1,3
183	5N	23E	NE	SE	13	26.2	329.8		43	1
184	5N	23E	NW	NW	29	25.5	61.0		221	1
185	6N	23E	SW	SW	11	22.0	272.0		37	4
186	6N	23E	SW	SE	11	21.0	204.0		44	4,5
187	6N	23E	SE	NE	15	25.2	275.0		48	1
188	6N	23E	SE	NE	15	21.0	193.0		47	4
189	6N	23E	NE	SE	22	21.3	141.7		66	1
LEWIS COUNTY										
190	12N	1W	NW	NE	7	25.2	565.0	33.2	30	2
191	12N	1W	SW	SW	8	24.7	540.0	30.8	31	2
192	12N	1W	SE	NE	8	21.3	409.0	34.6	33	2
193	12N	1W			17	30.0	792.0	26.0	27	3
194	12N	1W	SW	SW	37	25.7	578.0	21.5	31	2
LINCOLN COUNTY										
195	21N	31E	NW	SW	10	65.8	1342.5	40.0	40	1,2,3
196	21N	31E	NW	SW	10	30.4	229.0		80	4
197	21N	31E	NW	NE	25	28.3	194.8		84	1
198	21N	31E	SE	SE	30	22.8	263.6		41	1
199	21N	31E	NW	NW	32	21.1	211.0		43	1,3
200	21N	32E	SE	NW	23	22.0	298.7		33	1,2
201	21N	34E	NE	NW	33	24.4	252.7		49	1
202	21N	35E	SW	NE	7	20.1	128.0		63	3
203	23N	32E	NE	SE	4	28.7	211.8		79	1
204	23N	32E	SW	NE	17	21.2	206.3	36.5	45	1
205	23N	33E	NE	SE	10	21.6	231.6		41	1
206	24N	31E	SW	NW	16	20.1	227.0		36	1,3
207	24N	33E	SE	SW	23	25.9	308.7		45	1
208	25N	37E	NE	SW	21	24.0	226.5		53	1
SPOKANE COUNTY										
209	23N	41E	SW	SE	14	29.1	341.4		50	1
210	23N	41E	SW	SE	14	31.9	648.6		31	1
WALLA WALLA COUNTY										
211	6N	33E	SE	NW	1	31.8	305.0	69.6	65	2
212	6N	34E	NW	NE	2	25.1	175.3		75	1
213	6N	34E	NW	NE	6	28.8	470.0		36	1
214	6N	34E	NW	SE	7	40.7	407.2	77.8	70	2,3
215	6N	35E	SW	SW	3	20.0	416.0		19	6
216	6N	35E	SE	SW	10	25.0	350.0		37	6,7
217	6N	35E	SE	NE	12	21.0	214.0		42	6
218	6N	35E	SW	SW	12	22.0	180.0		56	5,6
219	6N	35E	NE	NE	18	20.3	154.8		54	1
220	6N	35E	NE	NE	18	21.3	177.7		52	1
221	6N	35E	NE	NE	18	36.1	396.2	41.8	61	1,3,4
222	6N	36E	NW	SW	5	21.0	188.0		48	6
223	6N	36E	SE	SE	5	27.0	554.0		27	6
224	6N	36E	NW	SW	6	22.0	186.0		54	6
225	6N	36E	NW	NW	7	22.0	171.0		58	6
226	6N	36E	NE	SW	9	22.0	352.0		28	6
227	6N	36E	SE	SW	9	23.0	629.0		17	6
228	7N	32E	SW	SE	36	24.0	310.0		39	4
229	7N	33E	SW	SE	24	23.2	433.7	19.3	26	1
230	7N	33E	NW	SE	31	27.7	268.8		58	1
231	7N	34E	SW	SW	25	20.0	336.0		24	6
232	7N	35E	NW	SW	23	20.0	157.0		51	5
233	7N	35E	NW	SW	23	20.0	175.0		46	6
234	7N	35E	SE	NW	25	20.0	207.0		39	6
235	7N	35E	SE	SW	25	20.0	189.0		42	6
236	7N	35E	SE	NE	33	24.0	217.0		55	5
237	7N	35E	NE	SW	34	24.0	219.4	47.4	55	1,3
238	7N	35E	NE	NE	35	20.0	183.0		44	6
239	7N	35E	NE	NE	35	20.5	310.0	22.1	27	2
240	7N	35E	NE	NW	36	20.0	195.0		41	6
241	7N	35E	SE	NW	36	20.4	247.0		34	4,6
242	7N	35E	SE	NW	36	21.0	186.0		48	6
243	7N	35E	SE	NW	36	20.0	216.0		37	4,6
244	7N	35E	SE	NE	36	21.0	189.0		48	6
245	7N	36E	SE	SW	14	25.9	406.9		34	1
246	7N	36E	NE	SW	17	39.1	716.0		38	2
247	7N	36E	SW	NW	19	30.2	468.8		39	1,3
248	7N	36E	SE	SE	19	28.0	485.0		33	4,6
249	7N	36E	SW	NE	20	27.0	467.0		27	4,6
250	7N	36E	SE	SE	28	23.5	333.0		35	4,7
251	7N	36E	NE	SE	31	21.0	523.0		17	6
252	7N	36E	NW	NW	33	25.9	185.9		75	1
253	7N	36E	NW	NW	33	28.6	425.0	74.7	39	2,3
254	8N	31E	SE	NW	14	24.5	335.9	36.5	37	1
255	8N	31E	NE	NE	14	25.4	146.0		92	4
256	8N	33E		SE	21	24.1	290.0	37.7	42	2
257	9N	32E	NE	NW	13	22.2	215.0		47	2
258	11N	35E	SW	SE	14	28.4	282.5		58	1
259	12N	36E	SE	NE	26	22.2	182.0		56	1
WHITMAN COUNTY										
260	14N	45E	NW	NE	5	20.0	50.0		160	5
261	14N	45E	NW	NW	5	21.0	51.0		176	5
262	16N	43E	SW	NE	11	23.5	183.0		63	5
YAKIMA COUNTY										
263	7N	22E	NW	NE	23	23.4	299.9	34.9	38	1
264	8N	22E	SW	NE	1	23.0	329.0	36.0	33	3
265	8N	22E	NE	NE	11	22.8	161.5		58	1
266	9N	21E	NW	SW	26	28.0	295.0		54	3
267	9N	21E	SE	SW	27	22.0	35.0		286	4
268	9N	22E	NE	SE	11	20.3	166.0	43.1	50	3
269	10N	17E	NW	NW	14	20.5	23.0		370	4
270	10N	17E	NE	SE	23	20.3	213.0		39	4
271	10N	17E	NE	SE	26	23.8	305.0		39	4
272	10N	17E	SW	SE	27	26.0	460.0		30	4
273	10N	17E	SW	NE	28	22.4	268.0		39	4
274	10N	17E	NW	NE	35	21.2	245.0		38	4
275	10N	18E	SW	SW	5	20.6	202.0		43	3
276	10N	18E	SW	SW	31	23.8	318.0		37	4
277	10N	20E	NE	NE	4	22.6	312.0		34	4
278	10N	20E	NE	NE	9	20.5	256.0		33	3
279	10N	22E	SE	NW	25	20.0	480.0		17	3
280	10N	23E	NE	SW	36	22.9	352.9		31	1
281	10N	23E	NE	NW	36	26.7	400.8		37	1
282	10N	23E	NE	NW	36	22.3	284.1		35	1
283	11N	16E	SE	SW	25	25.4	259.1		52	1
284	11N	16E	NW	NE	35	24.0	139.0		68	4
285	11N	17E	SE	NW	1	24.2	358.0		34	4
286	11N	17E	SE	NW	2	25.5	265.0		51	4
287	11N	17E	NE	SW	3	25.2	301.0		44	4
288	11N	17E	SE	NW	36	31.6	302.0		65	4
289	11N	17E	SE	NE	16	20.8	233.0		38	4
290	11N	18E	NE	SW	9	23.0	122.0		90	4
291	11N	18E	NE	SW	26	26.4	16.0		900	4
292	11N	19E	NE	NE	15	20.8	179.2		49	3
293	11N	20E	NW	NE	6	28.1	457.1		35	1
294	11N	20E	SE	NW	1	21.5	350.8		27	1
295	11N	20E	NE	NE	6	20.2	166.1		49	1
296	11N	20E	SE	NE	13	28.5	328.6		50	1
297	11N	21E	NW	NE	5	25.8	378.8		36	1
298	11N	21E	NE	NE	6	29.2	364.2		47	1
299	11N	21E	NE	SW	6	29.6	392.0		45	1
300	11N	21E	NE	NW	20	21.6	190.5		50	1
301	11N	21E	NW	NW	21	26.9	279.2		53	1
302	11N	21E	SW	NE	21	23.7	299.3	33.2	39	1
303	11N	21E	NW	SE	29	21.6	319.4	7.5	43	1
304	11N	21E	NW	SE	36	21.5	213.3		45	1
305	11N	22E	SW	SW	21	22.3	207.0		50	3
306	11N	22E	SW	NE	29	21.6	340.4		28	1
307	11N	22E	SW	NE	30	20.3	206.3		40	1
308	12N	16E	SW	NE	12	24.9	268.2		48	1
309	12N	17E	NE	SE	13	22.2	265.0		38	4
310	12N	18E	SW	NE	6	23.6	305.0		38	4
311	12N	18E	SE	NE	27	29.6	311.0		57	4
312	12N	18E	SE	SE	31	22.2	258.0		37	4
313	12N	18E	SE	SE	31	22.2	358.0		37	4
314	12N	18E	NE	SE	32	27.9	379.0	39.0	42	3
315	12N	18E	SW	SE	33	29.5	290.0		47	4
316	12N	18E	NW	NE	33	28.0	312.7		51	4
317	12N	19E	SE	NE	1	30.0	404.0		45	1
318	12N	20E	NW	SE	13	27.9	374.9	35.9	42	1
319	12N	20E	NW	NW	16	21.0	153.9		58	1
320	12N	20E	SW	SW	20	30.4	396.2		46	1
321	12N	20E	NW	SE	27	27.5	409.0	48.0	38	3
322	12N	20E	SW	SW	34	25.9	274.0		51	1
323	12N	20E	NW	SW	34	33.1	429.0		49	1
324	12N	21E	NE	SW	17	27.8	472.7		33	1
325	12N	21E	NW	NE	20	25.0	313.6		41	1
326	12N	22E	SE	SE	2	23.1	267.0		42	1
327	12N	22E	NW	NE	29	23.0	430.1		26	1
328	13N	18E	NE	NE	12	24.8	201.0		64	3
329	13N	18E	NE	NE	13	24.8	250.8		51	1
330	13N	19E	SW	SE	22	20.0	82.0	70.0	98	3
331	13N	19E	SW	NE	24	20.0	230.0	38.0	35	3
332	13N	19E	NW	NW	19	22.0	253.3	19.3	39	1
333	13N	20E	NW	NW	29	22.7	176.0		61	3
334	13N	20E	NE	SW	33	22.9	227.1	39.3	48	1
335	13N	21E	SE	NE	34	21.7	310.9		31	1,3
336	14N	18E	SW	SE	20	28.4	324.0		51	1
337	14N	19E	SW	NE	16	23.2	267.3		42	1
338	14N	19E	NW	NE	28	21.0	183.0		49	4,7

Gradients

Gradient A - Straight-line gradient observed on a well log over a depth interval of several tens of meters

Gradient B - Calculated from well depth and the difference between bottom-hole temperature and estimated mean annual surface temperature of 12°C. In Lewis County actual mean annual ground temperature was used

Source Reference for Wells

1) Washington State University, Pullman, well logs collected by James W. Crosby from 1972 to 1978
2) Southern Methodist University, Dallas, Texas, and Washington Division of Geology and Earth Resources, Olympia, well logs and thermal gradient data collected by David D. Blackwell (SMU) and J. Eric Schuster (DGER) from 1971 to 1979
3) U.S. Geological Survey, Tacoma, Washington, well logs collected from 1972 to 1976
4) U.S. Geological Survey, Tacoma, Washington, well data on WATSTORE computer file collected from 1950 to 1978
5) Newcomb, R.C., 1972, Quality of the ground-water in basalt of the Columbia River group, Washington, Oregon, and Idaho: U.S. Geological Survey Water-Supply Paper 1999-N, 71 p
6) Newcomb, R.C., 1965, Geology and ground-water resources of the Walla Walla River basin, Washington-Oregon: Washington State Division of Water Resources Water-Supply Bulletin 21, 151 p
7) Van Denburgh, A.S., and Santos, J.F., 1965, Ground-water in Washington; its chemical and physical quality: Washington State Division of Water Resources Water-Supply Bulletin 24, 93 p