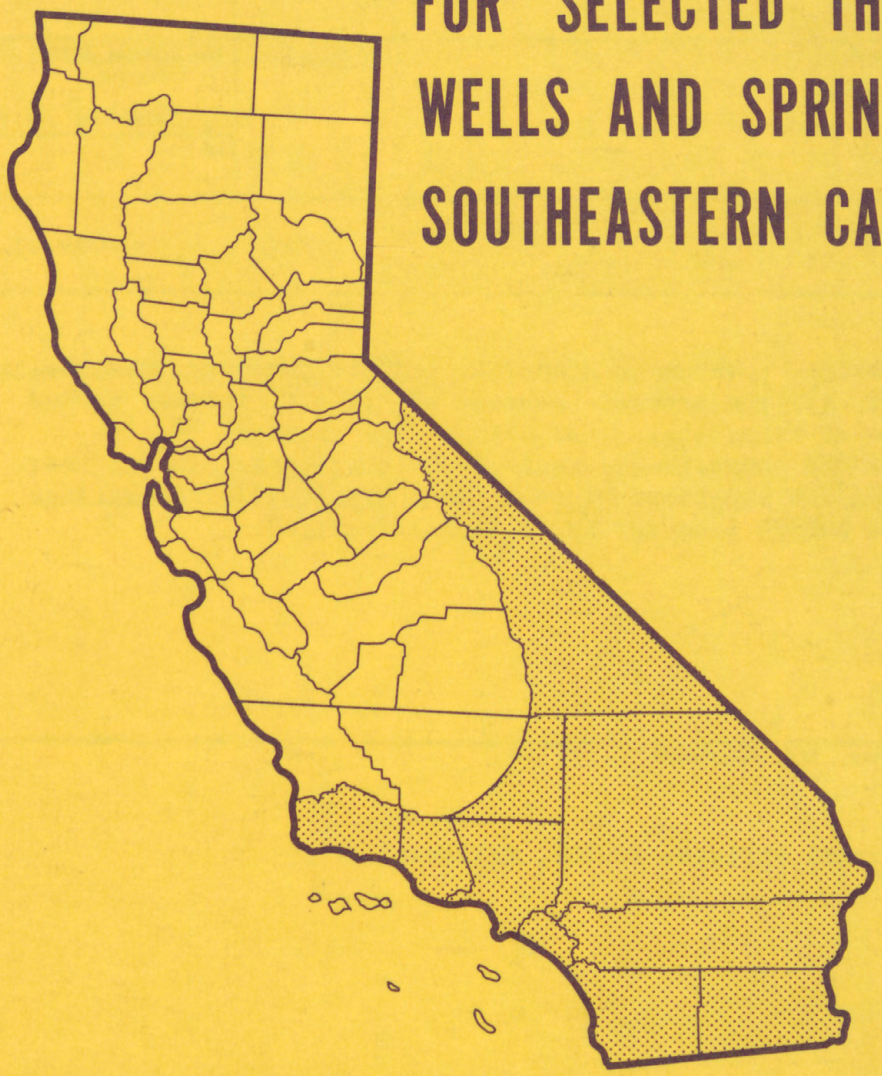
TEMPERATURE AND CHEMICAL DATA FOR SELECTED THERMAL WELLS AND SPRINGS IN SOUTHEASTERN CALIFORNIA



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This report provides government agencies, private industry, and the general public with: (1) the general location of areas of thermal ground water; (2) the range of temperature; (3) data on the chemical quality, pointing out some of the constituents that may be detrimental to its use; and (4) a map showing the locations of selected thermal wells and springs with relation to the public land net and cultural features.

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U.S. GEOLOGICAL SURVEY Water Resources Division

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UNITED STATES DEPARTMENT OF THE INTERIOR

Rogers C. B. Morton, Secretary

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TEMPERATURE AND CHEMICAL DATA FOR SELECTED THERMAL WELLS AND SPRINGS IN SOUTHEASTERN CALIFORNIA

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ABSTRACT

This report lists data on temperature and chemical quality for 95 wells or springs in southeastern California that contain water in excess of 38°C (Celsius) or 100°F (Fahrenheit). The highest temperature listed is 280°C (536°F).

INTRODUCTION

The interest in thermal ground water[1] in areas in southern California by government, private industry, and the general public prompted the preparation of this brief report. Federal and State agencies have under their jurisdiction large areas of public land that is sometimes leased or sold to the general public, and it is in the public interest to know all aspects of the potential resources of these lands. Private industry is interested in the possibility of producing electrical power from geothermal steam or in extracting the chemicals from the hot fluids that constitute the local water. The general public is interested in thermal areas for recreation and therapy, such as swimming and steam baths. The water of some of the thermal areas has been bottled and marketed, and claims have been made as to therapeutic or medicinal effects of some water.

All values in table 3 have been rounded to conform to U.S. Geological Survey reporting practices. Analyses from non-Survey sources do not necessarily conform with analytical techniques and standards of accuracy adopted by the Geological Survey. As various laboratories use different analytical procedures, the reported analyses may not be strictly comparable one with another.

[1]Thermal water as used herein has a temperature of about 38°C (Celsius) (100°F (Fahrenheit)), or greater.

Purpose and Scope of the Report

The purpose of this report is to provide government agencies, private industry, and the general public with: (1) the general location of areas of thermal ground water; (2) the range of temperature; (3) data on the chemical quality, pointing out some of the constituents that may be detrimental to its use; and (4) a map showing the locations of selected thermal wells and springs with relation to the public land net and cultural features. Many of these wells and springs are alined along and associated with fault zones, as shown in figure 1, or are located in the Imperial Valley where high temperature ground water is found (Dutcher and others, 1972).

The scope of this report includes compilation of selected data in the files of the Geological Survey, some of it collected from other agencies and individuals, and which may be unpublished or available only in isolated publications not related to geothermal data. No attempt was made to republish data from comprehensive geothermal reports. The data presented here are adequate for general information on water quality and for determination of possible uses, such as human consumption, industrial use, or irrigation. The data should not be utilized for projecting geothermal gradients based on constituents such as silica. The silica (SiO_2) listed in this report may not include all colloidal silica present in the water.

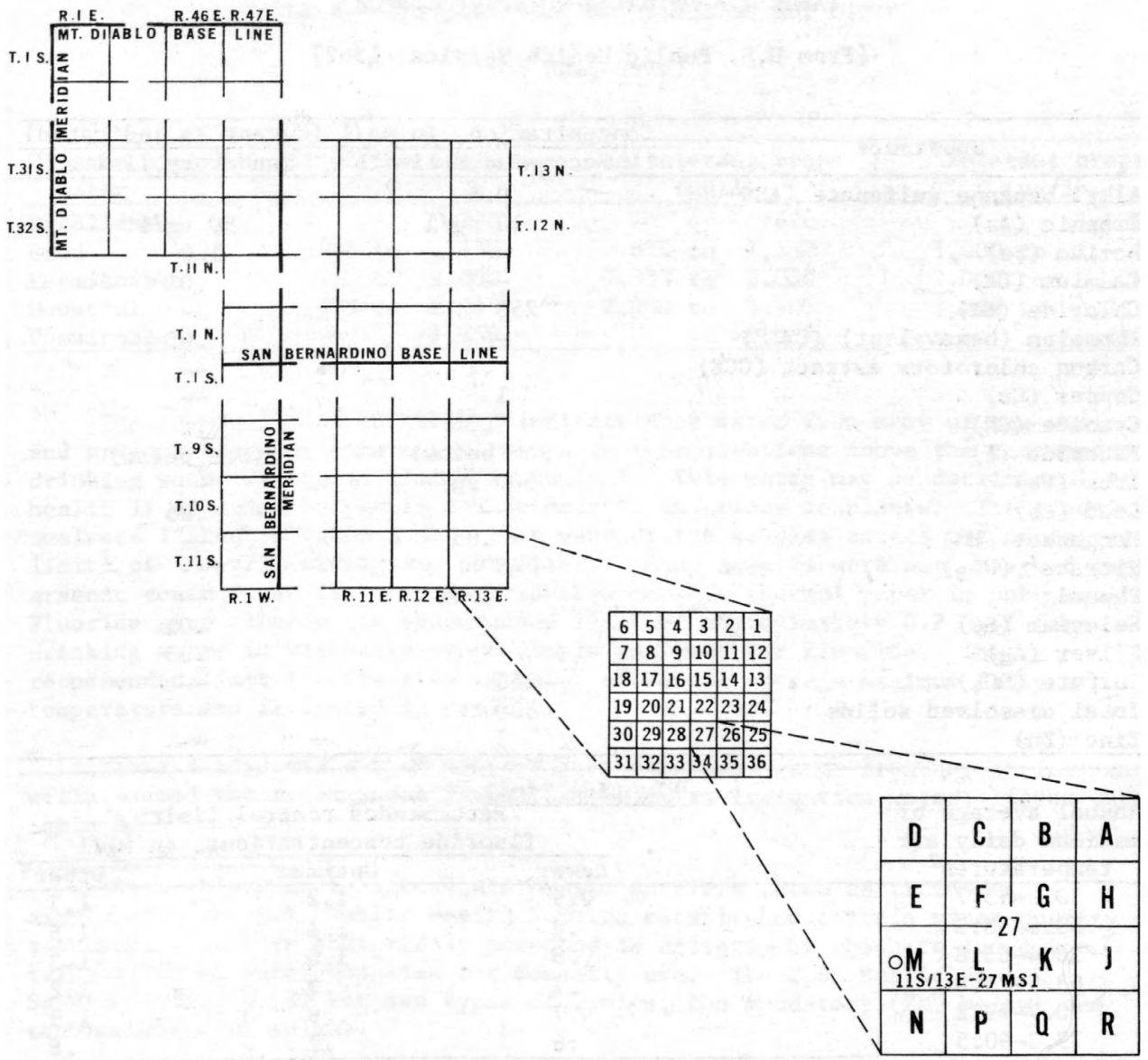
Well- and Spring-Numbering System

The well-numbering system in this report has been used by the Geological Survey since 1940. Wells and springs are assigned numbers according to their location in the rectangular system for the subdivision of public land. For example, in the number 11S/13E-27M1 S, the part of the number preceding the slash indicates the township (T. 11 S.) and the number between the slash and hyphen indicates the range (R. 13 E.); the digits following the hyphen indicate the section (sec. 27); the letter following the section number indicates the 40-acre subdivision of the section, as shown by the accompanying diagram.

Within each 40-acre tract, the wells are numbered serially, as indicated by the final digit. The final letter, separated from the rest of the number by a space, indicates the base line and meridian. Base-line and meridian designations are as follows: M, Mount Diablo; S, San Bernardino.

The system for numbering springs is identical to that for wells except that the letter "S" is added immediately after the letter which indicates the 40-acre subdivision. Thus, if the number described above were for a spring, it would be written 11S/13E-27MS1 S.

Well and spring numbers that contain an X or have a partial number only are approximately located.



TEMPERATURE AND CHEMICAL QUALITY OF WATER

The U.S. Public Health Service (1962) standards for drinking water are listed in table 1. The standards shown in table 2 for boron in irrigation water are from Hem (1970, p. 329).

The temperature and chemical data listed in table 3 are from the California Department of Water Resources, the U.S. Navy, private laboratories, and the Geological Survey. Published sources are listed in the references. Only the constituents listed in table 3 were analyzed in each sample. In many instances geothermal water contains uncommonly high quantities of dissolved salts and metals and consequently may contain additional constituents for which analysis was not made, but for which the standards are presented in table 1. Future analyses may reveal the presence of these additional constituents in some water.

TABLE 1.--*Drinking-water standards*

[From U.S. Public Health Service, 1962]

Substance	Concentration, in mg/l (except as indicated)	
	Recommended limits	Mandatory limits
Alkyl benzene sulfonate (ABS)	0.5	--
Arsenic (As)	10 µg/l	50 µg/l
Barium (Ba)	--	1.0
Cadmium (Cd)	--	.01
Chloride (Cl)	250	--
Chromium (hexavalent) (Cr^{+6})	--	.05
Carbon chloroform extract (CCE)	.2	--
Copper (Cu)	1	--
Cyanide (CN)	.01	.2
Fluoride (F)	(See below)	(See below)
Iron (Fe)	300 µg/l	--
Lead (Pb)	--	.05
Manganese (Mn)	.05	--
Nitrate[1] (NO_3)	45	--
Phenols	.001	--
Selenium (Se)	--	.01
Silver (Ag)	--	.05
Sulfate (SO_4)	250	--
Total dissolved solids	500	--
Zinc (Zn)	5	--

Annual average of maximum daily air temperatures[2]	Fluoride limit: Recommended control limits, fluoride concentrations, in mg/l		
	Lower	Optimum	Upper[3]
50.0-53.7	0.9	1.2	1.7
53.8-58.3	.8	1.1	1.5
58.4-63.8	.8	1.0	1.3
63.9-70.6	.7	.9	1.2
70.7-79.2	.7	.8	1.0
79.3-90.5	.6	.7	.8

[1]In areas in which the nitrate content of water is known to be in excess of the listed concentration, the public should be warned of the potential dangers of using the water for infant feeding.

[2]Based on temperature data obtained for a minimum of 5 years.

[3]Upper limit (grounds for rejection) is twice the optimum.

The time variations in temperature and constituents at the same well or spring (table 3) are probably due to the fact that different observers collected samples from different locations in large spring areas, or from different depths in wells. In many instances the location within the spring area or the sample depth in a well was not described. The temperature of thermal water listed in table 3 ranges between 38° and 280°C, or 100° and 536°F. Even though their water temperatures are high, many of the wells and springs are used for domestic purposes.

TABLE 2.--*Irrigation-water standards for boron*

[From Hem, 1970]

Classes of water	Sensitive crops (µg/l)	Semitolerant crops (µg/l)	Tolerant crops (µg/l)
Excellent	<330	<670	<1,000
Good	330 to 670	670 to 1,330	1,000 to 2,000
Permissible	670 to 1,000	1,330 to 2,000	2,000 to 3,000
Doubtful	1,000 to 1,250	2,000 to 2,500	3,000 to 3,750
Unsuitable	>1,250	>2,500	>3,750

The chemical data in table 3 indicate that water from many of the wells and springs contains some constituents in concentrations above the recommended drinking water standards listed in table 1. This water may be detrimental to health if consumed by people and animals or injurious to plants. The arsenic analyses listed in table 3 show that many of the samples exceed the mandatory limit[1] of 50 µg/l (micrograms per liter). Many samples were not analyzed for arsenic content, so its true distribution in this thermal water is unknown. Fluoride also exceeds the recommended limit of approximately 0.9 mg/l for drinking water in virtually every sample analyzed for fluoride. The recommended limit for fluoride is based on annual average maximum daily air temperature and is listed in table 1.

Table 3 also shows that many of the samples of water from hot springs and wells exceed the recommended limits for boron in irrigation water, listed in table 2.

[1]With reference to interstate public carriers (such as trains and airplanes), the U.S. Public Health Service established certain water-quality standards that have been widely accepted as criteria by which to judge the suitability of water supplies for domestic use. The U.S. Public Health Service (1962, p. V) set two types of limits, the mandatory ("a" below) and recommended ("b" below).

"(a) Limits which, if exceeded, shall be grounds for rejection of the supply. Substances in this category may have adverse effects on health when present in concentrations above the limit.

"(b) Limits which should not be exceeded whenever more suitable supplies are, or can be made, available at reasonable cost. Substances in this category, when present in concentrations above the limit, are either objectionable to an appreciable number of people or exceed the levels required by good water-quality-control practices."

TABLE 3.--*Temperature and chemical data in thermal wells and springs in southeastern California*

[All values have been rounded to conform to Geological Survey reporting practices. Analyses from non-Survey sources do not necessarily conform with analytical techniques and standards of accuracy adopted by the U.S. Geological Survey. As various laboratories use different analytical procedures, the reported analyses may not be strictly comparable one with another]

Units of expression: The concentrations of chemical constituents are expressed in milligrams per liter (mg/l) for dissolved-solids content of concentrations less than 7,000. For concentrations greater than 7,000, the constituents are reported in parts per million (ppm). Iron, boron, and arsenic are in micrograms per liter (µg/l).

The U.S. Public Health Service drinking water standards shown in the table between the heading and the data are the recommended limits, except for arsenic which lists the recommended limit (lower figure) and the mandatory limit (upper figure). The mandatory limit is the limit set by the Public Health Service and is grounds for rejection for use for public supply.

Source of data and sample number: DWR, California Department of Water Resources; G, G. K. Gilbert (1875); GS, U.S. Geological Survey; H, Hornkohl Laboratories Inc., Bakersfield, Calif.; L, O. W. Lombardi, Naval Weapons Center, China Lake, Calif.; NAR, North American Rockwell, Downey, Calif.; USN, U.S. Navy, Southwest Division, San Diego, Calif.; PS, Pacific Spectrochemical Laboratory, Los Angeles, Calif.; RO, Richfield Oil Co.; SB, San Bernardino County Flood Control District; T, Trona Control Laboratories, Kerr-McGee, Trona, Calif.; USDA, U.S. Department of Agriculture.

Map number	Well or spring number	Name	Date of collection	Depth of well (feet)	Water temperature (°C)	Water temperature (°F)	Results in milligrams per liter (mg/l) except as noted: Silica (SiO_2)	Iron (Fe) (µg/l)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B) (µg/l)	Arsenic (As) (µg/l)	Bromine (Br)	Lithium (Li)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$	Noncarbonate hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Source of data and sample number
U.S. Public Health Service drinking-water standards (1962)								300							250	250		45		50 10			500						
1	3S/28E-31A1 M		6-20-66		53.3	128			51	0	360	38	549	0	120	258	11	0.8	11,000	1,850			1,380	127			1,890	6.8	DWR
2	3S/28E-13E81 M	Hot Spring	6-16-66		82.2	180			25	0	400	30	727	0	90	204	8.6	.8	9,400	1,100			1,240	63			1,910	7.1	DWR
			5-14-67		82.2	180										203				560	1.5	3.0					1,900	7.1	DWR-20900
3	3S/28E-25A81 M	Hot Spring	5-17-57		93.3	200	131		4	0	350	20	497	8	90	200	10	0	10,000	1,000			1,110	10			1,620	8.3	DWR
			5-12-66		87.8	190			3	1	325	22	481	0	84	190	8.6	1.2	9,200	1,100			1,040	12	0	95	1,540	8.2	DWR-19665
			5-14-67		84.4	184										190				680	1.8	2.2					1,570	7.5	DWR-20899
4	3S/28E-35E81 M	Hot Bubbling Pool	12-29-60				170		7	1	361	22	409	0	134	245	10	1.9	10,000				1,220	22			1,710	7.4	DWR
			6-14-66		73.9	165			7	2	372	23	451	0	107	264	11	.5	11,000	2,000			1,220	26			1,740	8.2	DWR
			5-14-67		72.8	163										249				1,200	1.7						1,730	8.0	DWR-20903
5	3S/29E-21L81 M	Dehy Hot Spring	6-11-66		53.3	128			28	0	380	37	791	0	60	160	4.9	.3	31,000	520			1,270	70	0	88	1,780	7.3	DWR-19819
			5-14-67		56.7	134										152				320	2.8	1.6					1,560	7.1	DWR-20902
6	3S/29E-21N81 M	Dehy Hot Spring	6-22-66		55.6	132			26	0	380	35	781	0	60	158	4.8	0	31,000				1,240	65	0	88	1,750	7.0	DWR-19813
7	3S/29E-31A81 M		6-25-60				110		15	1	306	20	482	0	77	181	7.0	4.3	8,000				964	42			1,440	7.3	DWR
			5-13-66		61.1	142			16	1	315	21	498	0	78	180	6.0	0	8,000	1,180			960	44	0	91	1,490	8.2	DWR-19669
			5-14-67		60.6	141										179					1.7						1,490	8.0	DWR-20901
8	2N/27E-31 M				80.0	176									72	182	7.8	0	600		.2		474	21		93	878	8.7	DWR-R2173
9	8S/32E-17FS1 M		2-16-56		58.9	138			8.6	0	161	5																	G
10	2S/31E-2X1 M		1875		58.9	138									52	21	3.2	2.5	140				259	5	0	97	370	9.3	DWR-R4313
			3-15-62		57.8	136	52		2	0	78	.8	18	42	69	178	8.0	0	460				470						DWR-5307
11	8S/33E-17G1 M		1-26-55		54.4	130			9	1	160	2.5	22	10	13	1.0	.5	4.3	10				293	13	0	68	168	7.4	DWR-R4480
12	22S/39E-4P1 M	Coso Hot Springs	5- 7-62	106.1	97.2	207	195		3	1	19	9.4	49	0	38	2,790	3.7	7.1	48,000				5,740	184				8.9	USN
13	22S/39E-4H8 M	Coso Hot Springs	7-12-67	375	115.6	240	50	150	73	.5	1,760	154	134	84	53	3,040	2.2		72,000	7,500	2.6		5,230				910	8.5	H-165232
			4-16-68				154		74	1.0	1,630	244	0	77	1,450	0	.9	3.0	600				2,260	380		3	6,440	2.2	GS-35690
14	22S/39E-7J1 M	Devil's Kitchen	12-14-60		96.7	206	326	28,000	18	81	14	28	0	0															GS
15	22S/41E-25F1 M		12-12-60	415.6	97.8	208									8,520	23,500			571,000				a53,900	11		100			T
16	24S/43E-9P1 M		7-26-63	600	58.3	137			3.6	.7	20,300			1,080	341	60	17	.5	500				700	38	0	92	1,130	8.4	DWR-14880
17	1N/8E-2N1 S		12-13-62		53.3	128	54		14	.6	215	3.0	37	7.2	596	178	4.2	0	1,300				1,000	137	101	83	1,850	7.7	DWR-L657
18	1N/9E-14C1 S		11-19-60		63.3	146	43		24	18	347	11	44	0	176	60	18						a451	27		92		9.2	SB
19	1N/9E-29F1 S		4- -41		47.8	118			10	.6	145		57	13	462	115	6.0	0	800				914				1,490	8.0	DWR-4036
20	2S/5E-30L1 S		2-24-54	315	44.4	112			34	2	275	4.0	51	0	552	142	5.0	2.8	1,300				1,100			85	1,480	8.2	DWR-R547
			2-23-55		41.1	106			45	0	314	7.7	40		583	184	8.3	.3	2,700				1,290			81	1,700	8.8	DWR-R557
21	3S/5E-10H1 S		2-23-55	331	93.3	200			52	6	340	12	32	.5	71	66	.04	15	200				289	114	47	51	509	7.8	DWR-L43
22	5S/6E-24N2 S		6-29-60	356	83.3	182	12		37	5.1	57	4.8	82	0	99	145	4.8	.9	230				421			86	747	8.3	DWR-R604
23	8S/9E-19Q1 S		4-19-55	387	42.8	109			14	3	139	1.0	58	0	111	133 118	3.5	0	500				448	20 23		94	766 734	8.4 8.6	DWR-T1840 DWR-T3278
24	8S/9E-29R1 S		4-30-58				14		8	0	162	1.5	73	0															
			5- 6-59		38.9	102							53	2.4															

See footnote at end of table.

TABLE 3.--*Temperature and chemical data in thermal wells and springs in southeastern California*--Continued

Map number	Well or spring number	Name	Date of collection	Depth of well (feet)	Water temperature (°C)	Water temperature (°F)	Results in milligrams per liter (mg/l) except as noted: Silica (SiO_2)	Iron (Fe) (µg/l)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)
25	8S/12E-36 S	Pilger Estates	4- 8-65		82.2	180	79		107	16	888	33	268	0
26	9S/9E-4K1 S		5-19-67		46.1	115			607	48	3,320	21	29	0
27	9S/12E-2X1 S		4-22-52		78.9	174			170	26	1,120		451	0
			6- 3-57	325	76.7	170	25		138	33	978	53	397	0
28	10S/3E-25DS1 S	Warner Hot Springs	10-17-25		64.4	148								
			9- 2-54		57.2	135			2	.6	93	1.3	60	2
			8-16-60		54.4	130			1	1	95	2.7	52	45
			9-22-64		59.4	139	107		.4	.2	97	1	55	40
29	10S/10G-18N1 S		5-19-67		40.0	104			9	6	1,480	12	1,210	0
30	10N/20E-13R1 S	Flamingo Well	5-14-61		40.0	104	35		3.4	.9	118	1.3	65	12
			5-24-62		40.0	104	27		5	1.1	117	.8	50	10
			5-13-64		39.4	103	27		2.6	.5	115	3.2	73	12
31	11S/9E-2B1 S		5-19-67		57.8	136			0	0	860	6	459	0
32	18S/8E-7 S	Jacumba Hot Spring	9- 8-64		37.8	100	53		1	1	101	1	17	36
33	18S/8E-7J3 S		5- 2-61		38.3	101	37		2	.7	101	.5	31	27
			1-30-64		36.7	98			2.1	0	99	.8	48	20
34	7S/3W-14 S	Murietta Hot Springs	9-22-64		55.6	132	64		7	5	237	4		16
35	3S/2W-23 S	Eden Hot Springs	9-21-64		42.8	109	56		0	.1	106	0	61	18
36	7S/3W-14N S	Temecula Hot Springs	11-22-64		46.7	116	71		7	0	244	1	6	23
37	7S/6E-6 S	San Juan Hot Springs	1875		50.6	123								
					50.6	123	83		1	1	89	1	13	30
38	2S/5E-33M S		1965	215	44.4	112	38		38		303	6.5	31	3
39	3S/5E-10H1 S		3- 9-55		93.3	200			52	6	340	12	32	1
40	3S/5E-10H2 S		10-30-63		80.0	176			52	0	365	10	22	3.6
41	3S/5E-10H3 S		5-27-63		95.6	204								
42	3S/5E-10H4 S		7- 3-63	500	97.8	208								
43	3S/5E-11N S		5-16-61		87.8	190								
44	3S/5E-11M3 S		10-30-63		81.1	178			48	0	365	10	19	4.2
45	3S/6E-17J S		1-13-53		48.9	120								
46	2S/5E-32H2 S		8-28-64		76.7	170								
47	3S/6E-21F S		1-15-65	430	44.4	112	18		42	3	223	4	69	
48	2S/5E-30H S		2-19-68		46.7	116			35	4	285	10	40	
49	1N/4W-11 S		9- -14		94.4	202								
50	12S/13E-10D S		2- 6-59	4,720	167.8	334	156	13,000	1,660	76	12,000	1,160		
51	11S/13E-10 S			737	117.2	243								
52	13S/14E-15F S			8,350	138.9	282								
53	11S/13E-13E S			500	88.9	192								
54	11S/13E-23 S		5-18-64	4,859	232.2	450								
55	11S/13E-27M1 S			7,117	280.0	536								
56	15S/15E-36 S		3- 2-14	14	42.8	109								
57	15S/15E-18 S		3- 7-14		37.8	100								
58	14N/16E-22 S		3- 3-14		47.2	117								

Map number	Results in milligrams per liter (mg/l) except as noted--Continued: Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B) (µg/l)	Arsenic (As) (µg/l)	Bromine (Br)	Lithium (Li)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$	Noncarbonate hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Source of data and sample number
25	225	1,360	5.0		4,400	60			2,990	332			5,890	7.7	RO-B8125
26	463	5,950	2.6	4.6	10,000		0.8	1.4	11,100	1,710	1,690	81	17,000	7.1	DWR-20994
27	195	1,680	2.7	4.9	3,600				3,550				5,780	6.7	DWR-N326
	208	1,530	2.0	0	900				3,540				4,900	7.7	DWR-T493
28	139	4	2.4	.7	700				351	7	0	96	453	8.8	DWR
	58	25	4.7	0	200				341	8	0	95	468	9.4	DWR
	40	19			900	20			372	2			442	9.8	RO-B7329
29	0	1,600	1.6	.8	5,900		.16	.64	3,750	47	0	98	6,490	8.2	DWR-20991
30	72	50	17	1.0	230				369	13	0	95	608	8.7	DWR-12644
	78	66	15	0	210				322	18	0	93	582	9.0	DWR-2724
	80	65	3.4	0	420				336	8	0	95	510	8.8	DWR-16786
31	119	960	3.4	1.1	6,600				2,260	0	0	100	3,930	8.1	DWR-20993
		91	18		600	2			322	5			463	9.8	RO-B7271
32	32	80	3.0	0	700				284	9	0	96	500	9.1	DWR-L1118
31	31	81	4.0	.5	500				316	5	0	97	499	9.5	DWR-R187
32	18	350			4,500	20			712	20			1,160	9.5	RO-B7237
33	32	15			1,400	20			322	3			411	9.6	RO-B7236
34	14	347			4,400	20			718	18			1,230	9.2	RO-B7240
35	33	73			1,000	20			325	4		435		9.7	RO-B7238
36		123	9	5.5		80			1,060	65				8.5	RO
37	583	184	8.3		2,700									8.8	RO
	6.1	178	7.0			110				106				8.4	DWR
38															DWR
39															DWR & RO
40															RO
41	627	176	8.0		2,000	86				97				8.5	DWR
42															RO
43															DWR
44	350	136	.6		1,400				1,120	110				7.8	RO
45	498	133	5.8	4	800		.3		985	105		84	1,580	7.9	DWR-R2179
46															GS
47					260,000		8.6		38,500						PS
48															GS
49															GS
50															GS
51															GS
52															GS
53															GS
54															GS
55															GS
56															USDA
57															USDA
58															USDA

See footnote at end of table.

TABLE 3.--*Temperature and chemical data in thermal wells and springs in southeastern California*--Continued

Map number	Well or spring number	Name	Date of collection	Depth of well (feet)	Water temperature (°C)	Water temperature (°F)	Results in milligrams per liter (mg/l) except as noted: Silica (SiO_2)	Iron (Fe) (µg/l)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)
59	15N/15E-12 S		1-28-14		41.1	106								
60	4S/4E-14ES1 S	Agua Caliente Spring	1875		38.0	100.4								
			10-28-53		42.2	108	41	1,500	4.2	2.5	68	1.3	51	21
			6-15-58		40.6	105	20		0	0	70	.4	46	24
61	21N/7E-33PS1 S		2-15-68		42.2	108			5	1	816	29	700	
62	21N/7E-28P1 S		1967	400	47.8	118								
63	12N/1E-7MS1 S	Paradise Spring	2-12-08		38.9	102	36	220	8	3.1	151		26	58
			3- 9-54		37.8	100	20	10	4.6	3.4	163		67	12
64	14S/7E-18P5S	Agua Caliente Spring	9- 5-65		38.3	101								
65	1N/4W-5 S	Arrowhead Hot Spring	1875		67.8	154								
66	1N/4W-5 S		1875		98.9	210								
67	1N/3W-32N3 S		3- 7-51	194	54.4	130								
68	1N/3W-33M1 S		3-15-51	500	51.1	124								
69	1S/3W-6C3 S		3-13-51	138	43.3	110								
70	1S/4W-16J2 S			175	41.1	106								
71	1S/4W-16L3 S		4-13-51	600	41.7	107								
72	1S/4W-22A1 S			642	44.4	112								
73	1S/4W-22H3 S		3- 1-51	852	51.1	124								
74	1S/4W-22H4 S		3- 1-51	975	43.3	110								
75	1S/13W-19E S	Bimini Hot Spring	1915		40.0	104								
76	6S/4W-5 S	Elsinore Hot Spring	1915		51.7	125								
77	5S/5W-8 S	Glen Ivy Hot Spring	1915		38.9	102								
78	1N/4W-11H2 S		8- 9-60		75.0	167	90		27	0	255	12	73	12
79	1N/4W-11J1 S		6-30-60		87.8	190	98		27	0	300	14	81	0
80	5S/1W-2 S	Soboba Hot Springs			43.9	111								
81	4S/3W-12K1 S		4- 6-30		42.2	108			4	1	100		82	
82	5S/1W-16C1 S		5-25-33		38.9	102			246	2	381	10	88	
83	4S/1E-30D1 S		12-20-55		38.9	102	59		2	0	72	1	7	54
84	3S/2W-7P1 S		8-10-53		40.0	104			7	5	202		326	27
85	4S/1W-9K1 S		5-25-33		47.2	117			53		199	16	73	
86	4N/26W-7 S	{Montecito / Santa Barbara} Hot Spring	1915		47.8	118								
87	6N/20W-17 S	Sespe Hot Spring	1915		88.3	191								
88	5N/32W-22 S	San Marcos Hot Spring	1915		42.2	108								
89	3S/7W-11F1 S		1925	917	48.3	119								
90	13S/39E-18Q81 M	Lower Warm Spring or Burro Warm Spring	1963		43.3	110	54		51	22	231	22	368	9.4
91	13S/39E-18HS1 M	Hot Pool at Palm Springs	1963		48.9	120	53		86	5	190	24	370	19
92	5S/14W-21 S	White Point Hot Spring			45.6	114								
93	11S/42E-3RS1 M	Grapevine Spring	4-30-71		37.9	100								
94	9S/1W-30H1 S		9-29-71	702	38.0	100								
95	1N/5E-12D1 S		9-29-69	477	42.0	107.6								
			9-16-56	300					2.0	0	74	.8	134	5.0

a. Calculated (sum of determined constituents).

Results in milligrams per liter (mg/l) except as noted--Continued: Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B) (µg/l)	Arsenic (As) (µg/l)	Bromine (Br)	Lithium (Li)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$	Noncarbonate hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Source of data and sample number
														USDA
														G
36	20	2.4	2.5					a225	21		98	323	9.5	GS-9419
37	24	2.5	0	110				235	0		99	332	9.0	DWR-9339
	454	4.8	0	8,800	300	1.8		2,250	17		97	3,560	8.2	DWR-R2174
														GS
														GS
169	48							623	33					DWR
153	52	20					0.3	495						GS
														G
														G
														GS
														GS
														GS
														GS
														GS
														GS
														GS
														GS-LA11
														GS-R5
														GS-R3
428	65	8.8	.5	2,600				900	66	0	87	1,270	8.3	DWR-11680
522	81	9.6	.5	3,200				1,060	68	2	88	1,490	7.8	DWR-11681
														--
21	103			1,410					14			525		DWR
133	507		7.0	7,100				1,210	622			2,030		DWR
41	19	2.0	0					264	5			358	9.2	DWR
25	96	3.0	7.0	300					38			946	8.1	DWR
256	221			2,840				878	132			1,360		DWR
														GS-SB7
														GS-V1
														GS-SB2
														DWR
210	67	6.4	.02			10.5	.21	1,050					7.9	L
190	65	5.4	.04			10	.10	1,000					8.0	L
														NAR
												1,180		GS
												470		GS
		10						334				527		GS-59612
19	17	5.0	5	440				215	4.0	0	97	339	8.2	SB-3984

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