Table 1. *Locations of geothermal sites in the Aleutian arc, from west to east. Thermal manifestations listed in order of importance*

Map no.	Site names	Latitude N	Longitude W	Type of activity[a]
1	Little Sitkin	51°57'55"	178°28'50"[b]	F, HS?
2	Semisopochnoi	51°53'36"	179°37'40"[b]	WS?
3	Kanaga	51°55'00"	177°09'00"	SF
4	Kiguga Warm Springs	51°55'00"	176°50'00"	WSc
5	Andrew Bay Hot Springs	51°59'20"	176°37'00"	HSc
6	Great Sitkin	52°02'10"	176°05'40"	F, HSs, MP
7	Korovin	52°20'58"	174°14'50"	F, HSac, HSs, MP
8	Kluichef	52°19'18"	174°11'10"	F, HSac
9	Milky River	52°19'12"	174°08'50"	F, WSs
10	Seguam	52°18'00"	172°28'00"	HS?, MP?
11	Chuginadak	52°50'00"	169°52'00"	HS?
12	Kagamil	52°59'00"	169°42'00"	F, HS
13	Geyser Bight	53°12'51"	168°27'36"	HSc, Gc, SF, HSac
14	Hot Springs Cove	53°14'41"	168°21'39"	HSc
15	Partov Cove	53°13'42"	168°18'30"	HSc
16	Okmok Caldera	53°24'20"	168°11'00"	F
17	Makushin Volcano	53°53'15"	166°55'00"	F
18	Lower Glacier Valley	53°49'04"	166°54'26"	WSh
19	Upper Glacier Valley	53°50'48"	166°53'00"	SF, HSs
20	Makushin Valley	53°53'27"	166°50'09"	WLc, F, HSs, HSac, MP
21	Summer Bay	53°53'06"	166°26'54"	WLc, WSc
22	Akutan Fumaroles	54°08'49"	165°54'28"	F, HSac
23	Hot Springs Bay	54°08'55"	164°51'43"	HSc
24	Akun Strait	54°08'24"	165°38'24"	WSc
25	Pogromni	54°40'00"	164°42'00"	HS?
26	Mount Finch	54°40'00"	164°22'00"	F, CLac
27	Shishaldin	54°45'20"	163°58'15"	F
28	False Pass	54°55'48"	163°14'24"	HSc
29	Kenmore	54°54'12"	163°08'48"	WSc
30	Egg Island	54°56'06"	162°54'36"	HSc
31	Cold Bay	55°13'18"	162°24'42"	HSc
32	Emmons Lake	55°20'00"	162°08'24"	HSh
33	Hague	55°22'05"	161°57'30"	F
34	Pavlov	55°25'20"	161°53'30"	F
35	Port Moller	55°51'42"	160°29'30"	HSc
36	Kupreanof	55°59'07"	159°51'33"	F
37	Aniakchak	56°56'03"	158°07'10"	WSh
38	Mother Goose	57°10'48"	157°01'06"	HSh
39	Chiginagak	57°09'00"	156°58'48"	F
40	Ukinrek	57°50'00"	156°30'35"	CLc
41	Gas Rocks	57°51'16"	156°29'30"	WSc, GV
42	Mount Martin	58°10'10"	155°21'12"	F, CLac
43	Mount Magiek	58°11'41"	155°15'10"	SF, CLac
44	Novarupta	58°16'00"	155°09'24"	WSs, GV
45	Magiek Creek	58°11'40"	155°08'34"	WSh
46	Mount Trident	58°13'45"	155°06'50"	F
47	Mount Griggs	58°20'45"	155°06'22"	SF
48	Katmai Crater Lake	58°15'50"	154°58'30"	CLac
49	Snowy Mountain	58°20'10"	154°40'10"	SG
50	Kukak	58°27'10"	154°21'18"	F
51	Mount Douglas	58°51'24"	153°32'31"	SF, CLac
52	Augustine Volcano	59°21'48"	153°26'00"	SF
53	Iliamna	60°01'55"	153°05'25"	F
54	Redoubt	60°29'07"	152°41'31"	SG
55	Mount Spurr	61°17'58"	152°15'04"	F, SG
56	Crater Peak	61°15'56"	152°14'19"	F, CLac, WSh

[a]Abbreviations:

- ac - acid spring, ph <5.5.
- c - chloride anion dominant.
- CL - Crater Lake.
- F - fumarole.
- G - geyser.
- GV - gas vent, boiling point.
- h - bicarbonate anion dominant.
- HS - hot springs, T >50°C.
- MP - mud pot.
- s - sulfate anion dominant.
- SF - superheated fumarole.
- SG - steaming ground.
- WL - geothermal well.
- WS - warm spring, T <50°C.
- ? - activity questioned where unconfirmed.

[b]Sites 1 and 2 are east longitude.

LOCATION INDEX

Table 2. *Quaternary volcanoes of the Aleutian arc*

		Location[a]				Eruptive history			Eruptive products[b]		
Map no.	Volcano name	Latitude N	Longitude W	Elevation (m)	Current morphology[c]	No. since 1760	Most recent activity Date	Type	Compositional range	Most recent	Geothermal potential[d]
V1	Buldir	52°21'00"	175°54'38"[e]	656	Strato-P	0	Pleistocene	?	B,A	?	P
V2	East Cape	52°21'54"	175°56'24"[e]	610	Strato-P	0	Pleistocene	Dome	?	hb A	P
V3	Kiska	52°06'10"	177°36'07"[e]	1,220	Strato	6	1990	Explosive	B, px A, D	px A	F
V4	Segula	52°00'55"	178°08'08"[e]	1,160	Strato	0	Holocene	?	B, A	?	F
V5	Little Sitkin	51°57'00"	178°32'35"[e]	822; 1,174	Strato w/cald-A-5S	3	1900	Explosive	B, A, D	D	G
V6	Semisopochnoi	51°57'23"	179°37'50"[e]	180; 850	Shield w/cald-A-7S-P	7	1987	Explosive	B, A, D	?	F
V7	Gareloi	51°47'25"	178°47'38"	1,573	Composite-P	14	1987	Effusive	B, A, D	?	F
V8	Sajaka	51°52'32"	178°11'36"	1,304	Strato	0	?	?	B, A, D	?	F
V9	Tanaga	51°53'06"	178°08'45"	1,768	Composite	4	1914	Explosive	B, A, D	?	F
V10	Takawangha	51°52'22"	178°00'20"	1,449	Strato	0	Holocene	?	B, A, D	?	F
V11	Bobrof	51°54'36"	177°26'18"	738	Strato	0	?	?	B, A	?	P
V12	Kanaga	51°55'22"	177°10'04"	1,253; 1,313	Strato w/cald-C	12	1994	Explosive	px A	?	F
V13	Moffett	51°56'38"	176°44'48"	1,196	Strato-4P	0	Pleistocene	?	B, A	?	F
V14	Adagdak	51°59'16"	176°35'30"	610	Strato-P	0	Pleistocene	?	B, hb A	?	P
V15	Great Sitkin	52°04'34"	176°07'48"	1,280; 1,750	Strato w/cald-A-6P	11	1975	Dome, effusive	A, D	px A	G
V16	Kasatochi	52°10'39"	175°30'30"	314	Strato	3	1828	Dome	B, hb A, hb D	?	F
V17	Koniuji	52°13'36"	175°02'36"	273	Strato	0	?	?	B, hb A	?	P
V18	Korovin	52°22'52"	174°09'15"	1,533	Strato-C-P	7	1987	Explosive	B, some px A,D	?	F
V19	Kluichef	52°19'54"	174°08'12"	1,451	Strato-C-5P	1	1812	?	B, some px A,D	?	G
V20	Konia	52°21'37"	174°07'45"	1,125	Strato-C	0	Historic?	?	B, some px A, D	?	P
V21	Sarichef	52°20'52"	174°02'48"	610	Strato-C	1	1812?	?	B, some px A, D	?	F
V22	Seguam (Pyre Peak)	52°18'55"	172°30'35"	1,054	Strato-C-A-3P	9	1993	Lava flow	B, A, D, RD	B?	F
V23	Sequam East	52°20'00"	172°21'35"	854	Strato-C-A-3P	0	?	?	B, A, D, RD	?	F
V24	Amukta	52°30'00"	171°15'08"	1,067	Strato	5	1987	Explosive	A?	?	F
V25	Chagulak	52°34'36"	171°08'00"	1,142	Strato	0	Holocene	?	A?	?	P
V26	Yunaska	52°38'34"	170°37'43"	610	Strato w/cald-C-A-9P	5	1937	Explosive	?	?	F
V27	Herbert	52°44'32"	170°06'38"	1,280	Strato w/cald	0	Holocene	?	?	?	P
V28	Carlisle	52°53'38"	170°03'15"	1,620	Strato	4	1987	Explosive	?	?	P
V29	Cleveland	52°49'30"	169°56'38"	1,730	Strato	11	1987	Effusive	?	?	F
V30	Uliaga	53°03'54"	169°46'00"	888	Strato	0	Holocene	?	?	?	P
V31	Chuginadak East	52°50'26"	169°45'30"	1,170	Strato	0	?	?	?	?	P
V32	Kagamil	52°58'25"	169°43'00"	893	Strato	12?	1929	Explosive	?	?	F
V33	Vsevidof	53°07'48"	168°41'35"	2,134	Strato-P	4	1957	Explosive	A, D	D	F
V34	Recheshnoi	53°09'24"	168°32'20"	1,984	Strato-2P	0	3000 BP	Effusive	B, px A, px D, R	A	G
V35	Okmok	53°24'20"	168°10'45"	670; 1,072	Shield w/cald-A-7S-P	18	1988	Explosive	B, px A, D, R	B	F-G
V36	Bogoslof	53°55'46"	168°01'48"	44	Dome complex	12	1992	Dome	B, hb A	hb B	P
V37	Pakushin Cone	53°49'42"	166°58'43"	1,035	Strato	0	Holocene	?	B, A	A	P
V38	Makushin	53°53'27"	166°55'22"	2,036	Shield w/cald-A-S	20	1987	Explosive	B, A, D	D?	C
V39	Table Top Mountain	53°58'05"	166°40'38"	792	Strato	0	Holocene	?	B	B	P
V40	Wide Bay Cone	53°57'43"	166°36'46"	610	Strato	0	Holocene	?	B	B	P
V41	Akutan	54°08'04"	165°59'10"	1,303	Strato w/cald-A-S	33	1992	Explosive	B, A, D	A	G
V42	Gilbert	54°15'10"	165°39'35"	818	Strato	0	Pleistocene	?	?	?	P
V43	Pogromni	54°34'24"	164°41'48"	2,002	Strato-S-P	4	1830	Explosive	B	B	P
V44	Westdahl	54°31'06"	164°39'00"	1,560	Shield-S-P	3	1992	Effusive	B, A	A	P
V45	Fisher	54°40'44"	164°28'52"	1,094	Strato w/cald-A-S	2	1826	Ash	B, A, D	?	F
V46	Shishaldin	54°45'20"	163°58'00"	2,856	Strato-25P	35	1993	Ash, steam	B, A, D	?	F
V47	Isanotski	54°45'54"	163°43'21"	2,446	Strato	5	1845	Explosive	?	?	P
V48	Roundtop	54°48'00"	163°35'20"	1,871	Strato	0	Holocene	?	?	?	P
V49	Amak	55°25'26"	163°08'57"	488	Strato	1	1796	?	A	A	P
V50	Cold Bay	55°04'54"	162°48'50"	2,012	Strato	0	Holocene	?	B, A	?	F
V51	Dutton	55°10'05"	162°16'18"	1,474	Dome complex	0	Holocene	Block & ash flow	A, D	D?	P
V52	Emmons	55°20'26"	162°04'43"	1,326; 1,436	Strato-C	0	Holocene	?	B	B	F
V53	Hague	55°22'04"	161°59'30"	1,341	Strato-C-P	0	1990	Steam	B	B	F
V54	Double Crater	55°22'24"	161°58'20"	1,463	Strato-C	0	Holocene	?	B?	B	F
V55	Pavlof	55°25'00"	161°53'15"	2,519	Strato-C-S	41	1988	Explosive	B, BA	BA	P
V56	Pavlof Sister	55°27'10"	161°50'35"	2,143	Strato	1	1786	Explosive	B	?	P
V57	Dana	55°38'28"	161°12'50"	1,280	Dome complex	0	3480 BP	Block & ash flow	A, D	D?	P
V58	Kupreanof	56°00'40"	159°47'50"	1,890	Strato-5S	1	1987	Explosive	B, A, D	?	F
V59	Veniaminof	56°11'44"	159°23'18"	2,155; 2,500	Strato w/cald-A-S-P	11	1993	Explosive, effusive	B, A, D	?	F
V60	Black Peak	56°33'09"	158°47'05"	1,032	Strato w/cald-A	0	Holocene	Dome	A, D	D	F
V61	Aniakchak	56°52'55"	158°09'08"	1,020; 1,341	Strato w/cald-A	1	1931	Explosive, Dome?	B, A, D, RD	D	F
V62	Yantarni	57°01'07"	157°11'06"	1,345	Strato-2P	0	Holocene	?	A, D	?	P
V63	Chiginagak	57°08'06"	156°59'24"	2,221	Strato-P	3	1972	Explosive	A, D	A	F
V64	Kialagvik	57°12'10"	156°44'43"	1,677	Strato	0	Holocene	?	A, D	?	P
V65	Ukinrek	57°49'54"	156°30'35"	76	Maar	1	1977	Explosive	B	B	P
V66	Ugashik	57°43'43"	156°22'10"	840; 921	Strato w/cald-A-S	0	Pleistocene	?	D, R	?	P
V67	Peulik	57°45'03"	156°22'05"	1,471	Strato-C-S	2	1852	Explosive	B, A, D	?	P
V68	Kejulik	58°03'14"	155°40'08"	1,585	Strato	0	Pleistocene	?	px A	?	P
V69	Martin	58°10'20"	155°21'40"	1,863	Strato	2	1953	Explosive	px A, D	?	P-F
V70	Mageik	58°11'41"	155°15'10"	2,165	Strato	5?	1946?	Explosive?	A, D	?	P-F
V71	Cerberus	58°14'47"	155°11'56"	1,098	Dome	0	Holocene	?	D	D	P
V72	Falling Mountain	58°15'20"	155°10'19"	1,160	Dome	0	Holocene	?	D	D	P
V73	Novarupta	58°16'00"	155°09'24"	841	Dome	1	1912	Ashflow	A, D, R	D	F
V74	Trident	58°14'08"	155°06'00"	1,864	Strato-cluster	15	1968	Explosive	px A, D	A?	P-F
V75	Griggs	58°21'14"	155°05'30"	2,317	Strato	0	Holocene	?	A	A	P-F
V76	Katmai	58°16'47"	154°57'48"	2,047	Strato cluster w/cald-A	6	1912-1916	Dome	B, A, D, R	D	F
V77	Snowy Mountain	58°20'08"	154°40'55"	2,162	Strato	0	Holocene	?	A	?	P
V78	Dennison	58°25'04"	154°26'57"	2,287	Strato	0	Holocene?	?	A, D	?	P
V79	Kukak	58°27'10"	154°21'18"	2,043	Strato	0	Pleistocene	?	A, D	?	P
V80	Devils Desk	58°28'28"	154°18'20"	1,955	Strato	0	Pleistocene	?	A	?	P
V81	Kaguyak Crater	58°36'30"	154°01'40"	901	Strato w/cald-S	0	Holocene	Dome	A, D	?	F
V82	Fourpeaked	58°46'12"	153°40'20"	2,105	Strato	0	Pleistocene	?	A	?	P
V83	Douglas	58°51'19"	153°32'31"	2,135	Strato	0	Holocene	?	A	A	P-F
V84	Augustine	59°21'48"	153°26'00"	1,282	Strato, Dome complex	9	1986	Dome, nuee	A, D	A	F
V85	Iliamna	60°01'55"	153°05'25"	3,054	Strato-5S	14?	1987	Steam	A	?	P
V86	Redoubt	60°29'07"	152°44'31"	3,109	Strato	7	1990	Dome, nuee, lahar	B, A, D	A, D	P-F
V87	Spurr	61°17'58"	152°15'04"	3,374	Strato	0	Holocene	Explosive	A, D	D	F
V88	Crater Peak	61°16'10"	152°14'15"	2,309	Strato-C	4	1992	Explosive, lahar	A	A	F-G
V89	Hayes	61°38'25"	152°24'41"	3,034	Strato	0	3500 B.P.	Explosive	D	D	P

[a]Latitude, longitude, and elevation are given for the highest point on the volcano, except for those volcanoes with calderas. If there is an active eruptive center within the caldera, the latitude, longitude, elevation listed are for the eruptive center. When the elevation of the eruptive center is lower than the elevation of the caldera rim, the maximum elevation of the rim is the second listed value. When there is no active eruptive center, the position given is for the center of the caldera, and listed elevation is for the highest point on the rim.
[b]Rock codes are B - basalt, BA - basaltic andesite, A - andesite, D - dacite, RD - rhyodacite, and R - rhyolite. Mineralogical modifiers are hb - hornblende and px - pyroxene.
[c]Letters used after the primary morphologic designation have the following meanings:
- A - indicates activity within a summit caldera or large crater.
- C - indicates that this new volcano formed on the rim or flank of an older caldera.
- P - indicates that smaller cones or vents occur on the flanks of calderas, stratovolcanoes, or shield volcanoes.
- S - indicates that larger satellite volcanoes occur on the flanks of calderas, stratovolcanoes, or shield volcanoes.
- # - a number combined with S or P gives the number of satellite volcanoes, cones, or vents. Sometimes this value is a minimum.

[d]Geothermal potential indicates estimated potential for presence of developable hydrothermal system.
- C - Confirmed: a hydrothermal system with temperatures suitable for power generation has been confirmed by direct observation or by drilling.
- G - Good: abundant thermal springs and/or fumarolic activity.
- F - Fair: some thermal springs and/or fumarolic activity or Holocene activity with geologic evidence of a shallow magmatic system.
- P - Poor: no surficial thermal manifestations or geologic evidence of a shallow magmatic system.

[e]Map numbers V1-V6 are east longitude.

Table 3. *Water chemistry, isotopic analyses, and geothermometry of thermal waters in the Aleutian arc. Waters collected and analyzed by DGGS unless otherwise noted*

				Water chemistry									
Map no.	Site name	Date sampled	Temp. °C	pH	SiO_2	Ca	Mg	Na	K	Li	Sr	Al	Fe
Chloride waters													
4	Kiguga Warm Springs[c]	7-81	20	7.0	36	13	7	72	5.1	<0.01	--	<0.2	<0.05
5	Andrew Bay Hot Springs	7-21-81	57	6.0	172	1,430	76	6,000	420	6.1	33	--	0.01
13a	Geyser Bight - G8[d]	7-10-88	100	7.5	292	19	<0.16	485	35	3.6	0.14	0.047	<0.02
13b	Geyser Bight - H6[d]	7-16-88	104	7.9	187	33	<0.16	407	19	2.9	0.29	0.10	<0.02
13c	Geyser Bight - J1[d]	7-24-88	80	8.2	264	20	<0.16	464	33	3.2	0.15	0.13	<0.02
14	Hot Springs Cove - E1	7-29-80	94	6.5	120	164	1.1	664	34	2.6	1.6	--	0.08
15	Partov Cove	7-31-80	84	6.6	113	233	2.7	460	19	3.1	2.3	--	0.48
20	Makushin Valley, Well ST-1[e]	8-07-84	131	7.6	328	133	0.2	1,930	250	10	2.7	0.004	0.20
21a	Summer Bay - Well 1	9-26-80	50	--	35	460	6.3	332	6.5	0.16	2.0	--	0.10
21b	Summer Bay	8-07-80	35	7.0	18	202	1.0	150	3.0	0.03	0.94	--	0.09
23	Hot Springs Bay - A3	8-07-80	84	7.0	145	11	2.5	325	25	1.3	0.10	--	0.05
24	Akun Strait	8-10-80	43	7.5	50	475	46	1,660	35	0.55	6.0	0.19	0.19
28	False Pass	7-02-80	62	8.4	63	20	0.1	51	2.6	0.08	0.10	0.15	0.02
29	Kenmore	7-03-80	43	7.4	41	275	66	780	13	0.20	1.8	--	0.11
30	Egg Island	8-21-80	51	7.7	47	869	6.2	2,030	18	0.85	5.0	--	0.29
31	Cold Bay - L	7-06-80	54	6.7	125	162	5.7	751	16	0.95	0.86	0.050	1.3
35	Port Moller	8-18-80	71	8.2	63	228	0.2	790	12	0.34	2.9	0.05	0.03
40	Ukinrek	8-24-80	16	9.0	29	30	6.9	190	11	0.01	0.10	--	0.07
41	Gas Rocks	8-17-81	39	5.7	110	1,430	420	13,900	410	42	87	--	19
Mixed and peripheral waters													
18	Lower Glacier Valley - Gp	7-20-82	40	6.3	104	159	38	300	31	0.86	1.4	--	2.1
32	Emmons Lake	8-21-80	65	6.2	148	30	1.0	140	9.8	0.60	0.10	--	0.55
37	Aniakchak - Surprise Lake[f]	7-25-76	23	5.7	87	45	31	99	9.8	0.12	--	--	0.70
38	Mother Goose	8-23-80	66	6.4	245	227	131	198	47	0.22	0.42	0.05	0.12
44	VTTS - Mid-Valley Spring 2[g]	6-04-90	29	5.9	53	95	21	98	6.6	0.36	--	--	0.04
45	Mageik Creek 2[g]	8-03-82	42	6.8	111	116	65	252	29	0.64	0.57	--	1.2
56b	Crater Peak Warm Spring	8-03-85	40	6.4	125	95	99	266	75	0.42	--	--	--
Steam-heated waters													
6	Great Sitkin	7-22-81	79	5.7	62	20	2.1	11	1.8	<0.01	0.05	0.11	0.11
7	Korovin - A	7-15-80	99	4.2	140	57	19	16	9.3	0.01	0.23	6.0	1.4
8	Kluichef - A1	7-14-80	94	3.3	13	6	2.6	2	0.8	0.01	0.01	--	1.4
9	Milky River	7-29-81	45	5.3	160	33	7.6	43	20	0.02	0.05	0.02	0.02
19	Upper Glacier Valley - Gf	7-05-81	79	6.4	142	208	7.8	81	4.8	0.03	1.1	--	0.21
20	Makushin Valley - Mb	8-13-80	87	5.5	140	67	12	28	5.9	0.01	0.28	--	0.09
22	Akutan Fumaroles	7-09-81	92	2.6	220	32	13	17	3.5	0.01	0.05	--	41
Acid "volcanic" waters													
48	Katmai Crater Lake[h]	7-08-75	6-20	2.5	140	300	62	590	110	1.2	--	--	
51	Mount Douglas Crater Lake[d]	7-20-91	21	1.2	117	33	7.4	8.6	7.8	<0.04	0.15	52	21
56a	Crater Peak Crater Lake[i]	1972	--	2.2	--	182	70	75	7.3	--	--	--	--

		Water chemistry (continued)									Isotope analyses[a] (per mil, SMOW)		Geothermometry (°C)[b]								
Map no.	Site name	B	HCO_3	SO_4	Cl	F	Br	I	H_2S	TDS	$\delta^{18}O$	δD	Quartz	Chal	Na-K	Na-K-Ca	Na-K-Ca Mg corr	K-Mg	Mg-Li	Na-Li	$\delta^{18}O$ H_2O-SO_4
Chloride waters																					
4	Kiguga Warm Springs[c]	0.1	86	21	94	0.1	<0.02	--	--	--	--	--	87	54	153	82	43	56	--	--	--
5	Andrew Bay Hot Springs	81	485	180	12,000	0.4	60	1.8	--	20,712	-3.7	-41	170	147	188	187	157	143	118	186	--
13a	Geyser Bight - G8[d]	56	62	174	657	2.1	2.2	1.1	0.4	1,766	-8.5	-68	205	190	190	182	NC	174	225	249	265
13b	Geyser Bight - H6[d]	51	52	149	556	1.4	1.9	1.2	0.6	1,444	-8.7	-73	164	154	158	152	NC	151	215	248	225
13c	Geyser Bight - J1[d]	49	52	189	589	2.1	2.6	1.0	--	1,650	-7.6	-68	200	152	188	179	NC	172	220	242	265
14	Hot Springs Cove - E1	31	142	91	1,260	0.9	4.0	0.7	0.2	2,441	-8.6	-64	148	122	166	152	NC	130	160	143	--
15	Partov Cove	27	138	160	1,100	1.0	3.4	0.7	--	2,194	-8.5	-69	144	118	151	134	NC	100	150	219	--
20	Makushin Valley, Well ST-1[e]	67	12	97	3,500	1.2	12	--	1.0	6,360	-10.0	-82	206	202	240	225	NC	248	261	193	248
21a	Summer Bay - Well 1	0.5	--	528	923	0.4	3.0	0.2	2.0	2,294	-10.4	-70	60	27	109	24	NC	66	41	8	--
21b	Summer Bay	0.5	73	245	404	0.2	1.3	0.1	0.9	1,063	-10.5	-70	86	55	108	35	NC	63	57	42	--
23	Hot Springs Bay - A3	11	172	43	424	1.1	1.3	0.4	0.5	1,077	-9.2	-68	159	135	195	183	NC	109	123	168	186
24	Akun Strait	5.7	82	222	3,400	0.7	11	0.9	2.6	5,994	-9.2	-66	102	72	112	118	106	79	62	26	--
28	False Pass	1.5	45	47	53	0.3	--	--	0.6	262	-10.0	-65	113	84	165	49	NC	91	89	102	--
29	Kenmore	3.0	102	360	1,600	0.3	5.2	0.1	--	3,196	-9.3	-62	93	62	100	73	NC	52	38	17	--
30	Egg Island	33	67	27	4,500	0.4	15	2.9	0.2	7,558	-9.5	-75	99	69	71	69	NC	87	97	36	--
31	Cold Bay - L	25	248	14	1,370	0.7	4.1	1.0	0.4	2,601	-10.3	-81	150	125	114	116	NC	85	102	89	--
35	Port Moller	13	71	17	1,600	2.7	5.3	0.9	1.5	2,773	-11.6	-84	113	84	95	74	NC	124	120	37	--
40	Ukinrek	1.8	199	100	210	0.6	--	--	--	678	-5.9	-53	78	47	174	151	71	74	6	--	--
41	Gas Rocks	3.40	72	134	26,100	0.1	87	2.6	--	42,753	-2.6	-41	143	116	130	156	54	115	153	288	--
Mixed and peripheral waters																					
18	Lower Glacier Valley - Gp	9.9	590	180	380	<0.1	0.1	--	--	1,498	-10.9	-78	139	113	220	174	65	54	75	143	--
32	Emmons Lake	4.6	292	52	100	1.7	--	--	0.5	633	-12.1	-80	160	136	188	155	NC	95	113	176	184
37	Aniakchak - Surprise Lake[f]	--	388	23	86	0.7	--	--	--	573	--	--	130	102	216	80	33	54	35	87	--
38	Mother Goose	0.8	560	491	528	0.4	0.8	0.2	0.5	2,147	-12.7	-96	194	175	305	211	24	73	33	82	86
44	VTTS - Mid-Valley Spring 2[g]	1.0	204	225	90	2.8	--	--	--	693	-14.4	-108	104	74	185	53	NC	50	61	163	--
45	Mageik Creek 2[g]	4.2	377	330	279	2.8	--	--	--	1,379	-13.0	-96	143	117	230	180	23	70	62	134	--
56b	Crater Peak Warm Spring	7.7	622	477	254	1.0	0.5	0.1	0.1	1,707	-16.7	-138	150	125	325	237	17	88	48	103	--
Steam-heated waters																					
6	Great Sitkin	<0.5	0.3	73	10	0.1	--	--	--	180	-11.4	-74	--	--	--	--	--	--	--	--	--
7	Korovin - A	2.0	--	300	5.0	0.2	--	--	0.3	553	-6.7	-52	--	--	--	--	--	--	--	--	--
8	Kluichef - A1	0.5	--	40	5.0	0.0	--	--	--	71	-9.3	-67	--	--	--	--	--	--	--	--	--
9	Milky River	0.5	--	200	8.3	1.1	--	--	--	473	-11.5	-77	--	--	--	--	--	--	--	--	--
19	Upper Glacier Valley - Gf	<0.5	256	476	7.5	0.2	--	--	--	1,055	-12.5	-83	158	134	176	125	NC	78	23	31	--
20	Makushin Valley - Mb	--	191	155	5.0	0.1	--	--	--	508	-12.4	-81	157	133	290	45	NC	54	1	29	--
22	Akutan Fumaroles	0.5	--	1,300	5.2	0.0	--	--	--	--	-1.4	-39	--	--	--	--	--	--	--	--	--
Acid "volcanic" waters																					
48	Katmai Crater Lake[h]	14	--	1,200	1,750	1.1	--	--	--	4,180	--	--	--	--	--	--	--	--	--	--	--
51	Mount Douglas Crater Lake[d]	2.5	--	1,230	2,070	--	3.3	<0.01	--	3,556	--	--	--	--	--	--	--	--	--	--	--
56a	Crater Peak Crater Lake[i]	24	--	315	1,100	--	--	--	--	1,773	--	--	--	--	--	--	--	--	--	--	--

-- = no data.
[a]Per mil with respect to standard mean ocean water (SMOW). DGGS samples analyzed at Southern Methodist University, Dallas, Texas.
[b]Geothermometers:
- Quartz -- Fournier and Potter (1982). Adiabatic geothermometer used for boiling springs.
- Chalcedony -- Founier and Potter (1982). Adiabatic geothermometer used for boiling springs.
- Na-K -- Fournier (1981). Fournier's equation used.
- Na-K-Ca -- Fournier (1981).
- Mg Correction to Na-K-Ca -- Fournier (1981); Fournier and Potter (1979). NC - no correction.
- K-Mg -- Giggenbach (1988).
- Mg-Li -- Kharaka and Mariner (1989).
- Na-Li -- Fouillac and Michard (1981).
- $\delta^{18}O$, H_2O-SO_4 -- McKenzie and Truesdell (1977).

[c]Katzenstein and Whelan (1985).
[d]Collected by DGGS. Analyzed by DGGS and University of Utah Research Institute (Salt Lake City, Utah).
[e]Analysis of water collected from Weber-separator at well-head (Motyka and others, 1988).
[f]Ivan Barnes, U.S. Geological Survey, written commun. (Menlo Park, California).
[g]VTTS = Valley of Ten Thousand Smokes; Keith and others (1992).
[h]Motyka (1977).
[i]Miller (1973).

Table 4. *Chemistry and geothermometry of gases emitted from geothermal fumarole fields and chloride thermal spring systems in the Aleutain arc*

						Gas chemistry[a]											Geothermometry (°C)		
							Dry composition (mole %)												
Map no.	Site names	Gas source[b]	Sample type[a]	Date sampled	Temp. °C	H_2O (mole %)	CO_2	H_2S[c]	H_2	CH_4	NH_4	N_2	O_2	Ar	He ppm	Ratio N_2/Ar	CO_2-H_2S-H_2-CH_4[d]	H_2/Ar[e]	CO_2/Ar[e]
Fumarole fields																			
6	Great Sitkin	F	NaOH+He	7-23-81	98	--	11.1	0.37	0.64	<0.01	--	69.6	17.4	0.82	12	85	NA	167	129
7	Korovin	HSac	NaOH+He	7-31-81	97	--	65.1	2.65	0.26	0.11	--	29.1	2.21	0.58	19	50	169	151	184
8	Kluichef	HSac	NaOH+He	7-29-81	96	--	58.7	6.14	4.18	0.07	--	27.8	2.51	0.56	13	50	254	236	183
9	Milky River	F	NaOH+He	7-29-81	96	--	71.9	15.2	7.36	0.03	--	5.23	0.07	0.10	4.6	52	287	306	227
17b	Makushin Volcano - ff5	F	NaOH	7-13-82	98	98.33	89.9	0.93	0.51	0.0039	0.027	8.25	0.28	0.065	<10	127	257	244	246
17c	Makushin Volcano - ff7	F	NaOH	8-20-83	97	97.34	81.2	1.79	1.09	2.45	0.18	13.0	0.24	0.085	<10	152	230	256	236
19a	Upper Glacier Valley - ff3	SF	NaOH	7-08-83	150	99.84	88.0	6.37	0.95	0.0096	0.14	4.48	0.013	0.056	6.4	80	298	261	244
19b	Upper Glacier Valley - ff4	HS	Reg	7-14-82	98	--	91.9	0.81	1.20	<0.01	--	6.12	0.18	0.06	<50	102	295	270	246
19c	Upper Glacier Valley - ff9	F	NaOH	7-11-83	99	99.22	91.4	3.94	0.85	0.0041	<0.01	3.72	0.024	0.026	17	143	294	282	262
20a	Makushin Valley - ff1	F	NaOH	7-17-83	98	99.83	81.8	2.27	0.21	0.039	0.37	15.1	0.11	0.18	<10	86	227	182	218
20b	Makushin Valley - ff2	HSac	NaOH	7-17-83	93	--	90.2	2.92	0.35	0.012	<0.01	6.38	0.042	0.073	<10	87	252	224	239
22	Akutan Fumaroles	F	NaOH	8-31-83	99	97.59	94.4	1.41	0.19	0.91	0.004	3.07	0.048	0.021	3.3	146	189	246	269
22	Akutan Fumaroles	HSac	NaOH	7-07-81	87	--	92.5	2.83	0.34	1.32	--	2.96	<0.01	0.02	7	148	208	261	267
Chloride thermal spring systems																			
5	Andrew Bay Hot Springs	HSc	He	7-21-81	57	--	95.1[f]	--[f]	<0.01	0.13	--	3.59	1.10	0.04	2.5	90	NA	NA	NA
13a	Geyser Bight	HSc	Reg	7-26-80	97	--	13.5	<0.01	0.09	0.04	--	85.3	0.70	0.78	100	109	NA	NA	NA
13a	Geyser Bight	HSac	He	7-14-81	98	--	41.2[f]	--[f]	0.03	<0.01	--	54.0	43.9	0.64	62	84	NA	NA	NA
18	Lower Glacier Valley	WSh	Reg	7-16-83	44	--	98.2	<0.02	<0.005	0.052	--	0.96	0.31	0.02	<50	48	NA	NA	NA
23	Hot Springs Bay	HSc	NaOH+He	7-09-81	85	--	10.3	6.26	0.45	4.58	--	76.7	<0.01	1.73	12	44	NA	NA	NA
31	Cold Bay	HSc	Reg	7-06-80	54	--	2.85	<0.01	0.10	66.04	--	27.1	6.03[g]	--	2,000	--	NA	NA	NA
32	Emmons Lake	HSh	Reg	8-21-80	65	--	47.4	<0.01	0.01	4.36	--	47.6	20.2	0.66	100	72	NA	NA	NA
35	Port Moller	HSc	Reg	8-18-80	71	--	0.02	<0.0	10.01	87.89	--	11.6	0.02	0.25	100	46	NA	NA	NA
41	Gas Rocks	HSc	He	7-21-81	39	--	99.99[f]	--[f]	0.0002	0.00045	--	0.0114	0.0026	0.00026	1	44	NA	NA	NA

-- = not done; NA = not applicable.
[a]Gas analyses:
NaOH: sodium hydroxide-charged evacuated flasks; analyzed by R.J. Motyka (DGGS), C.J. Janik (U.S. Geological Survey, Menlo Park, California), M.A. Moorman (DGGS), and S.A. Liss (DGGS).
He: helium impermeable 1720 Corning glass evacuated flask, analyzed by J.A. Welhan and R.J. Poreda (Scripps Institution of Oceanography, LaJolla, California), and R.J. Motyka (DGGS).
Reg: uncharged evacuated flasks; analyzed by W.C. Evans (U.S. Geological Survey) and R.J. Motyka (DGGS).
NaOH+He: Mole % CO_2 and sulfur gases determined from NaOH sample by R.J. Motyka (DGGS). Ratio of CO_2 + sulfur gases to total dry gases and all other constituents determined from He flask by J.A. Welhan (Scripps Institution of Oceanography, LaJolla, California).
[b]Abbreviations: F = fumaroles; SF = super heated fumaroles; HS = thermal spring, T > 50°C; WS = thermal spring, T < 50°C; lower case letters, c = chloride, h = bicarbonate, ac = acid spring.
[c]Total mole % sulfur gases collected in NaOH charged flasks are reported as H_2S which is the stable equilibrium sulfur gas phase in most hydrothermal systems.
[d]D'Amore and Panichi (1980).
[e]Giggenbach and Goguel (1989).
[f]Reported as CO_2 + H_2S.
[g]Reported as O_2 + Ar.

Table 8. *Additional sites suspected of having hydrothermal systems*

Reservoir temperatures unknown, probably >150°C.

Map no.	Site name	Land status[a]	System type[b]	Map no.	Site name	Land status[a]	System type[b]
1	Little Sitkin	NWR, W	V, G	42	Mount Martin	NPP, W	V
3	Kanaga	NWR, W	V	43	Mount Mageik	NPP, W	V
10	Seguam	NWR, W	V?	44	Novarupta	NPP, W	V
12	Kagamil	NWR, W	G	46	Mount Trident	NPP, W	V
13d	Geyser Bight SF	N, AK	G	47	Mount Griggs	NPP, W	V
16	Okmok Caldera	N	V	48	Katmai Crater Lake	NPP, W	V
17a	Makushin Volcano Summit	N	V	49	Snowy Mountain	NPP, W	V
26	Mount Finch	NWR, W	V	50	Kukak	NPP, W	V
27	Shishaldin	NWR, W	V	51	Mount Douglas	NPP, W	V
33	Hague	NWR	V	52	Augustine Volcano	AK	V
34	Pavlov	NWR	V	53	Iliamna	NPP	V
36	Kupreanof	NWR	V, G	54	Redoubt	NPP, W	V
37	Aniakchak	NMP	V	55	Mount Spurr	NPP, AK	V
38	Mother Goose	BLM, N	G	56	Crater Peak	AK	V, G
39	Chiginagak	NWR	V				

Reservoir temperatures unknown, probably < 150°C.

Map no.	Site name	Land status[a]	System type[b]	Map no.	Site name	Land status[a]	System type[b]
2	Semisopochnoi	NWR, W	?	40	Ukinrek	N	V
11	Chuginadak	NWR, W	?	44	Novarupta - Mid-Valley Springs	NPP, W	V, G
18	Lower Glacier Valley	N	G	45	Mageik Creek	NPP, W	V, G
25	Pogromni	NWR, W	?				

[a]Land status: AK = State of Alaska; BLM = Bureau of Land Management; N = Native lands; NMP = National Monument and Preserve; NPP = National Park and Preserve; NWR = National Wildlife Refuge; W = Wilderness.
[b]Type of system: G = geothermal; V = volcanic vent.

Table 5. *Chemistry of gases emitted from fumaroles associated with volcanic vents in the Aleutain arc*

						Gas chemistry[a]														
							Dry gas composition (mole %)													
Map no.	Site name	Gas source[b]	Sample type[a]	Date sampled	Temp. °C	H_2O (mole %)	CO_2	St[c] (or SO_2)	Ns[d] (or H_2S)	H_2	HCl	HF	CH_4	NH_4	N_2	O_2	Ar	CO	He (ppm)	Ratio N_2/Ar
16	Okmok Caldera	Cone - F	NaOH+He	7-14-81	97	--	57.0	0.09	--	0.20	--	--	<0.01	--	35.8	6.55	0.42	--	30	85
17a	Makushin Volcano	Crater Rim - F	NaOH	7-18-82	96	98.33	87.5	5.53	--	0.21	--	--	0.047	<0.01	6.57	0.093	--[e]	--	<50	--
17a	Makushin Volcano	Crater Rim - F	He	7-14-85	94	--	89.8	--	(6.3)	0.019	--	--	0.019	--	3.7	0.04	0.0061	--	14	607
40	Ukinrek[f]	Crater - CL	Reg	8-24-77	81	--	77.5	nr	--	<0.01	--	--	1.88	nr	15.1	3.19	0.34	--	<200	45
43	Mount Magiek[g]	Crater Rim - SF	NaOH	7-10-79	167	99.15	90.1	4.3	-0.1	2.84	0.66	0.028	0.0762	0.18	1.81	<0.00001	0.011	--	<1	160
44	Novarupta[g]	Dome - GV	NaOH	6-16-78	47	--	10.9	--	--	--	0.28	--	--	--	72.7	15.3	0.88	--	--	83
46	Mount Trident[g]	Summit - F	NaOH	7-03-79	97	99.59	36.0	52.3	>4.0	2.17	2.3	0.12	<0.00027	0.0022	6.98	0.012	0.099	--	10	71
47	Mount Griggs[g]	Summit - SF	NaOH	7-02-79	105	99.35	79.6	13.1	2.1	0.292	5.85	0.091	0.042	<0.0013	1.05	0.016	0.010	--	9.5	101
51	Mount Douglas	Crater Rim - F	Reg	8-02-82	94	--	90.3	9.91	<0.05	--	--	--	<0.01	--	1.76	0.08	--[e]	--	--	--
51	Mount Douglas	Crater Rim - SF	NaOH	7-21-91	114	95.03	23.4	27.2	--	0.016	8.07	Tr	<0.001	<0.001	36.5	4.4	0.45	<0.0001	<10	81
51	Mount Douglas	Crater Rim - SF	Reg	7-21-91	114	--	52.1	(39.7)	(<0.001)	0.048	--	--	<0.0002	--	10.0	0.0045	0.12	<0.001	23	86
52	Augustine Volcano	1976 Dome - SF	NaOH	7-84	357	99.83	19.5	9.43	--	53.7	13.7	0.59	0.094	--	2.95	0.1	0.038	0.017	300	78
52	Augustine Volcano	1976 Dome - SF	Reg	7-84	357	--	7.12	(1.4)	(<0.01)	62.0	--	--	<0.01	--	23.8	7.4	0.36	0.035	<500	66
52	Augustine Volcano[h]	1986 Dome - SF	NaOH	8-28-87	870	74.84	14.8	46.4	--	3.54	34.8	--	nr	--	0.44	0.006	--[e]	0.11	nr	--
56	Crater Peak	Crater Rim - F	NaOH	8-04-82	95	97.89	94.7	0.77	--	0.32	--	--	0.034	<0.001	4.09	0.042	0.055	--	<10	74

-- = not done; nr = not reported; Tr = trace.
[a]Analyses of gases collected by DGGS: NaOH = sodium-hydroxide charged evacuated flasks analyzed by R.J. Motyka (DGGS), C.J. Janik (U.S. Geological Survey, Menlo Park, California), M.A. Moorman (DGGS), and S.A. Liss (DGGS). He = helium impermeable 1720 Corning glass evacuated flask analyzed by A.W.A. Jeffrey (Global Geochemistry Inc., Canoga Park, California), R.J. Poreda (Scripps Institution of Oceanography, LaJolla, California), and R.J. Motyka (DGGS). Reg: uncharged evacuated flasks analyzed by W.C. Evans (U.S. Geological Survey, Menlo Park, California) and R.J. Motyka (DGGS). NaOH+He = mole % CO_2 and sulfur gases determined from NaOH sample by R.J. Motyka (DGGS); ratio of CO_2 + sulfur gases to total dry gases and all other constituents determined from He flask by J.A. Welhan (Scripps Institution of Oceanography, LaJolla, California).
[b]Abbreviations: F = fumaroles; SF = super-heated fumaroles; GV = gas vent below boiling point; CL = crater lake.
[c]Total mole % sulfur gases collected in NaOH-charged flasks or mole % SO_2 (for gases collected in uncharged flasks).
[d]Average oxidation state of sulfur in NaOH flasks (cf. Giggenbach and Goguel, 1989) or mole % H_2S (for uncharged flasks).
[e]Reported as O_2 + Ar.
[f]Barnes and McCoy (1979).
[g]Sheppard and others (1992).
[h]Symonds and others (1990).

Table 6. *Isotopic analyses of gases emitted from geothermal fumarole fields, thermal springs, and fumaroles associated with volcanic vents in the Aleutian arc*

					Isotope analysis							
					$\delta^{13}C$[c]		δD[d]			$\delta^{18}O$[d]		$\delta^{15}N$[e]
Map no.	Site names	Gas source[a]	Date sampled	$^3He/^4He$ R/Ra[b]	CO_2	CH_4	CH_4	H_2	H_2O[f]	CO_2	H_2O[f]	N_2
Geothermal fumarole fields												
6	Great Sitkin	F	7-23-81	6.8	-13.3	-35.8	--	-384	--	-30.5	--	--
7	Korovin	HSac	7-31-81	5.3	-9.6	-43.7	--	-488	--	-40.8	--	--
8	Kluichef	HSac	7-29-81	5.8	-11.0	-44.5	--	--	--	-40.8	--	--
9	Milky River	F	7-29-81	6.3	-15.0	--	--	-629	--	-32.2	--	--
17b	Makushin Volcano - ff5	F	7-14-85	5.3	-12.4	--	-139	-542	--	-34.1	--	-1.7
17c	Makushin Volcano - ff7	F	7-14-85	6.3	-9.5	-31.6	--	-587	-118	-26.3	-19.3	-0.3
19a	Upper Glacier Valley - ff3	SF	7-08-83	4.5	-10.2	--	-139	-582	-74	-41.3	-11.2	-1.2
19b	Upper Glacier Valley - ff4	HS	7-14-82	--	-12.5	-31.4	-129	-619	--	--	--	-1.2
19c	Upper Glacier Valley - ff9	F	7-11-83	--	-12.1	--	--	-610	-96	-31.1	-13.7	-4.3
20a	Makushin Valley - ff1	F	7-17-83	6.7	-13.0	-32.3	-143	-588	-86	-17.0	-13.9	-1.0
20b	Makushin Valley - ff2	HSac	7-17-83	5.1	-12.2	-31.5	--	-587	--	-15.7	--	+3.1
22	Akutan Fumaroles	HSac	7-07-81	7.1	-11.2	-34.9	--	-298	--	-28.3	--	--
Thermal springs												
5	Andrew Bay Hot Springs	HSc	7-21-81	6.6	-7.2	--	--	--	--	--	--	--
13a	Geyser Bight	HSac	7-14-81	7.5	--	--	--	--	--	--	--	--
18	Lower Glacier Valley	WSh	7-16-83	2.8	-13.8	--	--	--	--	-14.0	--	--
23	Hot Springs Bay	HSc	7-09-81	6.5	-18.1	-39.2	--	-194	--	-18.1	--	--
31	Cold Bay	HSc	7-06-81	3.9	--	--	--	--	--	--	--	--
35	Port Moller	HSc	8-18-80	2.1	--	--	--	--	--	-	--	--
41	Gas Rocks	HSc	7-21-81	6.9	-7.1	--	--	--	--	-27.4	--	--
Volcanic vents												
16	Okmok Caldera	Cone - F	7-14-81	6.5	-12.0	--	--	--	--	-36.8	--	--
17a	Makushin Volcano	Crater rim - F	7-18-82	7.8	-11.5	-30.6	--	-719	-107	-39.5	-13.0	--
17a	Makushin Volcano	Crater rim - F	7-14-85	8.0	-10.5	--	--	--	--	-23.7	--	-1.3
47	Mount Griggs	Summit - SF	6-20-78	7.7	--	--	--	--	--	--	--	--
51	Mount Douglas	Crater rim - F	8-02-82	8.0	-6.0	--	--	--	-85	-31.4	-8.7	--
51	Mount Douglas	Crater rim - SF	7-21-91	7.1	-6.6	--	--	--	-49	--	+1.7	--
52	Augustine Volcano ff1	1976 dome - SF	7-25-84	--	-8.6	--	--	-300	-27	--	+0.7	--
52	Augustine Volcano ff2	1976 dome - SF	7-25-84	7.6	+2.4	-22.3	--	-311	-20	-53.3	+4.0	--
56	Crater Peak	Crater rim - F	8-04-82	6.6	-12.4	--	--	--	--	-22.5	--	--

-- = not done.
[a]Abbreviations same as for tables 3 and 4.
[b]R/Ra: ratio of $^3He/^4He$ in sample to $^3He/^4He$ in atmosphere corrected for air contamination. Analyses performed by R.J. Poreda (Scripps Institution of Oceanography, La Jolla, California).
[c]$\delta^{13}C$ in per mil referenced to PDB (Fritz and Fontes, 1980). Analyses performed at U.S. Geological Survey (Menlo Park, California) and Global Geochemistry Inc. (Canoga Park, California).
[d]δD and $\delta^{18}O$ are in per mil referenced to standard mean ocean water (SMOW) (Fritz and Fontes, 1980). Analyses of δD-CH_4, δD-H_2, and $\delta^{18}O$-CO_2 performed at U.S. Geological Survey (Menlo Park, California) and at Global Geochemistry, Inc. (Canoga Park, California). Analyses of δD and $\delta^{18}O$ of H_2O-vapor (fumarole condensates) performed at Southern Methodist University (Dallas, Texas).
[e]$\delta^{15}N$ in per mil referenced to standard NBS-14 (Fritz and Fontes, 1980). Analyses of gas samples collected in July 1985 performed at Global Geochemistry, Inc. (Canoga Park, California).
[f]Steam phase.

Table 7. *Estimates of reservoir temperatures, volumes, and energy stored in identified hydrothermal systems*

			Reservoir[a]						Wellhead[b]			
			Estimated temperature (°C)[c]									
Map no.	Site name	Land[d] status	Min	Max	Most likely	Mean	Estimated volume (km³)	Thermal energy (10^{18} J)	Thermal energy (10^{18} J)	Available work (10^{18} J)	Electrical energy (MWe for 30 yr)	Beneficial heat (10^{18} J)
>150°C												
5	Andrew Bay Hot Spring	USN	157 e	188 c	170 a	172	3.3	1.4	0.35	0.070	28	--
6	Great Sitkin	NWR-W	129 l	167 k	167 k	154	3.3	1.2	0.31	0.057	23	--
7	Korovin	N	151 k	184 l	169 j	168	3.3	1.4	0.34	0.067	27	--
8	Kluichef	N	183 l	254 j	236 k	224	3.3	1.9	0.47	0.12	46	--
9	Milky River	N	227 l	306 k	287 j	273	3.3	2.3	0.58	0.17	67	--
13	Geyser Bight	N & AK	190 c	265 i	205 a	220	14.2	7.8	1.96	0.48	191	--
14	Hot Springs Cove	N	148 a	166 c	152 d	155	3.6	1.4	0.34	0.063	25	--
17b	Makushin Volcano ff5	N	244 k	257 j	246 l	249	3.3	2.1	0.52	0.14	56	--
17c	Makushin Volcano ff7	N & AK	230 j	256 k	236 l	241	3.3	2.0	0.50	0.13	53	--
19	Upper Glacier Valley	N	244 l	298 j	261 k	268	10.6	7.2	1.80	0.52	207	--
20	Makushin Valley	P	200 w	248 i	240 c	229	13.5	7.8	1.95	0.49	197	--
22	Akutan Fumaroles	N	189 j	269 l	255 k	238	3.3	2.0	0.50	0.13	52	--
23	Hot Springs Bay	N	159 a	195 c	186 i	180	4.7	2.1	0.53	0.11	44	--
32	Emmons Lake	NWR	160 a	188 c	184 i	177	3.3	1.4	0.36	0.074	30	--
90-150°C												
15	Partov Cove	N	144 a	151 c	151 c	149	3.3	1.2	0.30	--	--	0.071
31	Cold Bay	NWR-W	116 d	150 a	125 b	130	3.3	1.0	0.26	--	--	0.062
35	Port Moller	BLM & AK	74 d	124 f	120 g	106	3.3	0.8	0.20	--	--	0.049
41	Gas Rocks	N	54 e	153 g	116 b	108	3.3	0.8	0.21	--	--	0.050
<90°C												
4	Kiguga Warm Springs	USN	43 e	56 f	54 b	51	1	0.10	0.024	--	--	
21	Summer Bay	N	50 w	66 f	55 b	57	1	0.11	0.028	--	--	
24	Akun Strait	N	72 b	106 e	79 f	86	1	0.19	0.048	--	--	
28	False Pass	N	62 v	91 f	84 b	79	1	0.17	0.043	--	--	
29	Kenmore	N	62 b	73 d	73 d	69	1	0.15	0.037	--	--	
30	Egg Island	N	69 b	97 g	69 d	78	1	0.17	0.043	--	--	

-- = not applicable.
[a]Reservoir temperatures, volumes, and stored thermal energy estimated following methods discussed in Mariner and others (1978), Brook and others (1979) and Sorey and others (1983).
a. Reservoir temperatures estimated using geothermometry and geothermal well data.
b. Estimated volumes for unexplored systems calculated using 1.67 km for mean reservoir thickness (Mariner and others, 1978). Subsurface area represents the largest uncertainty in estimating reservoir volume. Area estimates are based on surface expressions of the geothermal resource. Where the only evidence of a hot water reservoir is one spring or fumarole or a group of springs or fumaroles, the subsurface reservoir volume is assumed to be 3.3 km³ for T > 90°C (Mariner and others, 1978; Brooks and others, 1979) and 1 km³ for T < 90°C (Sorey and others, 1983).
c. Thermal energy stored in the geothermal reservoir calculated from $Q_r = \rho c * V * (T - T_{ref})$, where Q_r is reservoir thermal energy in joules; ρc is volumetric specific heat of rock plus water (2.7 J/cm³/°C); V is estimated reservoir volume; T is mean reservoir temperature; and T_{ref} is reference temperature, 15°C.
[b]Wellhead thermal energy, available work, electrical energy, and beneficial heat calculated using methods described in Brooks and others (1979).
a. Wellhead thermal energy computed from $Q_{wh} = R_g * Q_r$ where R_g is a recovery factor (assumed at 0.25).
b. Available work calculated from $W_a = R_a * Q_r$ where R_a is the ratio of available work to reservoir thermal energy (determined from figure 5 in Brooks and others, 1979).
c. Electrical energy (MWe for 30 yr) computed from $E = W_a * N_u$ where N_u is a utilization factor. The value of 0.4 is assigned to N_u for these calculations based on discussion in Brooks and others (1979).
d. Beneficial heat calculated from $B_h = Q_{wh} * U_b$ where U_b is a beneficial heat utilization factor equal to 0.24 (Brooks and others, 1979).
[c]Lower-case letters "a" through "l" keyed to tables 3 and 4; w = geothermal well temperature; v = vent temperature.
[d]Land status: AK = State of Alaska; BLM = Bureau of Land Management; N = Native lands; NWR = National Wildlife Refuge; P = Private land; USN = U.S. Navy; W = Wilderness.

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Part 4 - Supplemental Data

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1993

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