

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SELECTED ADMINISTRATIVE, LAND, AND RESOURCE DATA
FOR KNOWN GEOTHERMAL RESOURCES AREAS IN ARIZONA,
CALIFORNIA, IDAHO, NEVADA, OREGON, AND WASHINGTON

by

H. E. Burkhardt, C. A. Brook, and F. W. Smith

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Selected Administrative, Land, and Resource Data
for Known Geothermal Resources Areas in Arizona,
California, Idaho, Nevada, Oregon, and Washington

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INTRODUCTION

With the enactment of the Geothermal Steam Act of 1970, effective December 24, 1970, 43 Known Geothermal Resources Areas (KGRAs) were created in the States of Alaska, California, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, and Washington (Godwin and others, 1971). By late 1980, the number of KGRAs had increased to 107 as Arizona and Colorado were added to the list of States having KGRAs. Of this total, 80 KGRAs (75 percent) are in the six westernmost States--Arizona, California, Idaho, Nevada, Oregon, and Washington--administered by the Western Region of the U.S. Geological Survey's Conservation Division.

This is a summary of various administrative, land, and resource data for KGRAs in the six States. The data are compiled from published and unpublished classification, lease-sale evaluation, and resource assessment documents prepared by the Geological Survey and are current to December 1980. The KGRAs are listed alphabetically for each state. Because many of the KGRAs have undergone additions, deletions, and even name changes, additional classification actions for each KGRA are listed chronologically under the KGRA

name, thus affording a historical perspective of the KGRA's evolution.

EXPLANATION OF DATA SHEETS

The KGRA data summary for each State consists of two sets, A and B, indicated in brackets following the State name. Set A gives the following information for each KGRA and its additions and (or) deletions: the administrative number assigned to each classification document ("minutes"), three milestone dates, and five categories of acreage. Set B briefly describes the location of each KGRA, any surface geothermal expressions, and estimated reservoir temperatures where applicable. The various headings in the data sheets, though generally self-explanatory, are briefly defined here.

SET A

Minutes No.--The administrative number assigned to the document that defines or modifies a KGRA. This document is known as "Minutes of the Mineral Land Evaluation Committee" and contains the evidence supporting the classification action.

Minutes Date--An identifier date that appears in the heading of the minutes and generally indicates the beginning date (month-day-year) of minutes preparation.

Date Defined--The date (month-day-year) that the minutes and KGRA plat were signed by the Regional Conservation Manager, thereby officially promulgating the classification action.

Effective Date--The date (month-day-year) when the evidence supporting the classification action either was reviewed or became known, particularly in cases of competitive interest as defined in Title 43, Chapter II of the Code of Federal Regulations, subpart 3200.0-5(k)(3), or the date for the initial classification actions required by the Geothermal Steam Act of 1970 (see Godwin and others, 1971). Depending on the circumstances, the effective date precedes or coincides with the date that the KGRA was defined.

Total Acres Defined--The total, in acres, for land defined in each KGRA determination. "Total acres" is a sum of the approximate federal acres, which consist of federal competitive interest acres and federal non-competitive interest acres, and the private and State acres. Inasmuch as the acreages have been retabulated since definition of the KGRA, they may not correspond to the acreages reported in the minutes or on the KGRA plat (see footnote for set A of each State). Though not necessarily inaccurate, the acreages reported here should not be considered definitive for legal purposes.

Approximate Federal Acres--The total of federal competitive interest acres and federal non-competitive interest acres. For KGRAs that were originally defined with enactment of the Geothermal Steam Act of 1970 (see Godwin and others, 1971), federal competitive interest and federal non-competitive interest acres are listed as "0". Thus, the horizontal

summation of the competitive interest and non-competitive interest columns may not total to the acreage given in the "Approximate Federal Acres" column.

Federal Competitive Interest Acres--Land that was classified as a KGRA based on a formal determination by the Bureau of Land Management of competitive interest in that land. Competitive interest, as defined in Title 42, Chapter II of the Code of Federal Regulations, subpart 3200.0-5(k)(3), was demonstrated by lease applications that overlapped by at least one-half during the same filing period.

Federal Non-Competitive Interest Acres--Land that was classified as a KGRA based on geological information. At the time of classification, competitive interest did not exist.

Private and State Acres--The total of non-federal land.

SET B

Location/Township and Range, County, and BLM District or National Forest--
General geographic and administrative locators.

Surface Expression--A brief description of the surface geothermal manifestations that indicate the presence of a geothermal system.

Surface Temperature--The temperature(s) in degrees Celsius of thermal waters issuing at the surface.

Average Estimated Reservoir Temperatures--Three estimates--a minimum, maximum, and most likely--of characteristic reservoir temperatures in degrees Celsius, following the methodology of Brook and others (1979). In economic terms, reservoir temperatures give an approximation of the grade of the geothermal resource.

SOURCES OF ADDITIONAL INFORMATION

The back-up data for the classification actions are contained in the KGRA minutes for each action. These documents generally contain a description of the geology and other geotechnical data as they apply to defining KGRA boundaries, a brief description of any past exploration and development activities, a description of any geothermal manifestations (indicia), the legal basis for the action, a description of the lands involved, and a list of references. Copies of KGRA minutes can be purchased through a private vendor on contract with the Geological Survey. For the name, address, and phone number of the current vendor, contact the Office of the Deputy Conservation Manager, Resource Evaluation, Conservation Division, M/S 80, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, CA 94025; telephone (415) 323-8111 extension 2053. Requests to the vendor should include the KGRA name, State, and minutes number(s).

Reports by Mariner and others (1978) and Renner and others (1976) contain compilations of data on several individual hydrothermal convection systems, many of which are within KGRAs and formed the basis, in whole or in part, for the KGRA classification. These publications list the locations,

brief descriptions of hydrothermal manifestations, well depths and temperatures, water chemistry, geothermometry, estimates of reservoir temperatures and volumes, calculated thermal energy contents, and references for each hydrothermal system. Much of this information is summarized in Brook and others (1979) and Renner, White, and Williams (1975). Brook and others (1979) also list estimates of recoverable thermal energy, beneficial heat, and electrical energy for those hydrothermal systems reported by Mariner and others (1978).

REFERENCES CITED

- Brook, C. A., Mariner, R. H., Mabey, D. R., Swanson, J. R., Guffanti, Marianne, and Muffler, L. J. P., 1979, Hydrothermal convection systems with reservoir temperatures $\geq 90^{\circ}\text{C}$, in Muffler, L. J. P., ed., Assessment of geothermal resources of the United States--1978: U.S. Geological Survey Circular 790, p. 18-85.
- Godwin, L. H., Haigler, L. B., Rioux, R. L., White, D. E., Muffler, L. J. P., and Wayland, R. G., 1971, Classification of public lands valuable for geothermal steam and associated geothermal resources: U.S. Geological Survey Circular 647, 18 p.
- Mariner, R. H., Brook, C. A., Swanson, J. R., and Mabey, D. R., 1978, Selected data for hydrothermal convection systems in the United States with estimated temperatures $\geq 90^{\circ}\text{C}$ --Back-up data for U.S. Geological Survey Circular 790: U.S. Geological Survey Open-File Report 78-858, 493 p.
- Renner, J. L., and others, 1976, Selected geothermal resources data--Hydrothermal convection systems in the States of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming: Springfield, Virginia, U.S. Department of Commerce, National Technical Information Service, PB-250 377, 357 p.
- Renner, J. L., White, D. E., and Williams, D. L., 1975, Hydrothermal convection systems, in White, D. E., and Williams, D. L., eds., Assessment of geothermal resources of the United States--1975: U.S. Geological Survey Circular 726, p. 5-57.

DATA SHEETS

| | |
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| Arizona..... | 9 |
| California..... | 11 |
| Idaho..... | 16 |
| Nevada..... | 18 |
| Oregon..... | 23 |
| Washington..... | 26 |

| NAME OF KGRA | MINUTES NO. | MINUTES DATE | DATE DEFINED | EFFECTIVE DATE | 1 TOTAL ACRES DEFINED | 1 APPROX. FEDERAL ACRES | 1 FEDERAL COMPETITIVE INTEREST ACRES | 1 FEDERAL NON-COMPETITIVE INTEREST ACRES | 1 PRIVATE & STATE ACRES |
|--------------|-------------|--------------|--------------|----------------|-----------------------|-------------------------|--------------------------------------|--|-------------------------|
| CLIFTON | 1 | 09-24-74 | 11-25-74 | 02-01-74 | 780 | 780 | 780 | 0 | 0 |
| GILLARD | 2 | 09-25-74 | 09-27-74 | 02-01-74 | 2,460 | 2,460 | 2,460 | 0 | 0 |
| " ADDITION | 3 | 08-19-75 | 09-16-75 | 02-01-74 | 460 | 460 | 460 | 0 | 0 |
| " TOTAL | | | | | 2,920 | 2,920 | 2,920 | 0 | 0 |
| GRAND TOTAL | | 2 KGRA's | | | 3,700 | 3,700 | 3,700 | 0 | 0 |

1 The acreages reported here have been retabulated since the definition of the KGRA. For any of a variety of reasons, including recent cadastral surveys, recalculations of lake and land grant areas, and accounting errors, they may not be identical to those acreages reported in the KGRA minutes or on the KGRA plats. Although discrepancies are generally minor (less than 1 percent), these acreages should not be considered accurate for legal purposes.

| NAME OF KGRA | LOCATION TOWNSHIP & RANGE | COUNTY | BLM DISTRICT OR NATIONAL FOREST (N.F.) | SURFACE EXPRESSION | SURFACE TEMP. (°C) | ESTIMATED RESERVOIR TEMPERATURES (°C) | | |
|--------------|------------------------------|----------|---|-----------------------|-----------------------|--|------|----------------|
| | | | | | | MIN | MAX | MOST LIKELY |
| CLIFTON | T. 4 S., R. 30 E. | GREENLEE | SAFFORD | NONE | NONE | NONE | NONE | NONE |
| GILLARD | T. 5 S., R. 29 E. | GREENLEE | SAFFORD | HOT SPRINGS | 82 | 107 | 169 | 134 |

1 From USGS Open-File Report 78-858 or estimated from chemical geothermometry and (or) well temperatures.

| 1-NAME OF KGRA | MINUTES NO. | MINUTES DATE | DATE DEFINED | EFFECTIVE DATE | 2-TOTAL ACRES DEFINED | 2-APPROX. FEDERAL ACRES | 2-FEDERAL COMPETITIVE INTEREST ACRES | 2-FEDERAL NON-COMPETITIVE INTEREST ACRES | 2-PRIVATE & STATE ACRES |
|--|--|--------------|--------------|----------------|-----------------------|-------------------------|--------------------------------------|--|-------------------------|
| BECKWORTH PEAK | 26 | 06-04-75 | 07-02-75 | 02-01-74 | 2,558 | 2,558 | 2,558 | 0 | 0 |
| BODIE | 25 | | 06-03-75 | 05-01-74 | 640 | 640 | 640 | 0 | 0 |
| BRAWLEY | 12 | 04-02-71 | 04-12-71 | 12-24-70 | 28,885 | 0 | 0 | 0 | 28,885 |
| [CALISTOGA-REDESIGNATED IN GEYSERS-CALISTOGA KGRA] | | | | | | | | | |
| COSO HOT SPRINGS | 7 | 03-01-71 | 03-08-71 | 12-24-70 | 51,760 | 48,560 | 0 | 0 | 3,200 |
| " | ADDITION | 06-15-76 | 06-21-76 | 02-01-74 | 5,106 | 5,106 | 5,106 | 0 | 0 |
| " | ADDITION | | 04-06-78 | 01-02-78 | 49,886 | 46,407 | 1,119 | 45,288 | 3,479 |
| " | TOTAL | | | | 106,752 | 100,073 | 6,225 | 45,288 | 6,679 |
| DUNES | 13 | 04-02-71 | 04-12-71 | 12-24-70 | 7,680 | 7,680 | 0 | 0 | 0 |
| EAST MESA | 15 | 09-03-71 | 09-23-71 | 09-03-71 | 37,714 | 31,052 | 0 | 0 | 6,662 |
| FORD DRY LAKE | 17 | 05-30-75 | 07-02-75 | 02-01-74 | 7,687 | 7,167 | 7,167 | 0 | 520 |
| [GEYSERS-REDESIGNATED IN GEYSERS-CALISTOGA KGRA] | | | | | | | | | |
| GEYSERS-CALISTOGA | 16 | 12-18-74 | 12-24-74 | 02-01-74 | 92,509 | 2,478 | 2,478 | 0 | 90,031 |
| " | ADDITION | 03-13-75 | 03-13-75 | 02-01-74 | 118,622 | 56,572 | 51,974 | 4,598 | 62,050 |
| " | ADDITION | 04-24-78 | 05-22-78 | 09-01-77 | 1,120 | 720 | 720 | 0 | 400 |
| " | TOTAL (INCLUDES ORIGINAL GEYSERS AND CALISTOGA KGRA) | | | | 376,030 | 85,107 | 55,172 | 4,598 | 290,923 |
| GLAMIS | 14 | 04-02-71 | 04-12-71 | 12-24-70 | 25,460 | 23,539 | 0 | 0 | 1,921 |

| 1 NAME OF KGRA | MINUTES NO. | MINUTES DATE | DATE DEFINED | EFFECTIVE DATE | 2 TOTAL ACRES DEFINED | 2 APPROX. FEDERAL ACRES | 2 FEDERAL COMPETITIVE INTEREST ACRES | 2 FEDERAL NON-COMPETITIVE INTEREST ACRES | 2 PRIVATE & STATE ACRES |
|--|-------------|--------------|--------------|----------------|-----------------------|---|--------------------------------------|--|-------------------------|
| GLASS MOUNTAIN | 9 | 02-25-71 | 03-12-71 | 12-24-70 | 15,409 | 15,248 | 0 | 0 | 161 |
| " ADDITION | 23 | 05-30-75 | 05-30-75 | 02-01-74 | 17,927 | 17,667 | 13,746 | 3,921 | 260 |
| " TOTAL | | | | | 33,336 | 32,915 | 13,746 | 3,921 | 421 |
| HEBER | 11 | 04-02-71 | 04-12-71 | 12-24-70 | 58,568 | 10 | 0 | 0 | 58,558 |
| KNOXVILLE | 19 | 02-19-75 | 02-20-75 | 02-01-74 | 14,740 | 9,792 | 9,715 | 77 | 4,948 |
| [LAKE CITY-REDESIGNATED IN LAKE CITY-SURPRISE VALLEY KGRA] | 5 | 02-26-71 | 03-08-71 | 12-24-70 | 37,160 | 20,019 | 0 | 0 | 17,141 |
| LAKE CITY-SURPRISE VALLEY | 18 | 12-20-74 | 12-20-74 | 02-01-74 | 35,780 | Large uncertainties owing to resurveys; values are approximations. (30,000) (28,000) (2,000) (4,000) | | | |
| " TOTAL | | | | | 72,940 | (50,019) | (28,000) | (2,000) | (21,141) |
| LASSEN | 8 | 03-01-71 | 03-08-71 | 12-24-70 | 78,705 | 52,569 | 0 | 0 | 26,136 |
| LITTLE HORSE MOUNTAIN | 20 | 01-31-75 | 02-03-75 | 02-01-74 | 1,196 | 1,196 | 1,196 | 0 | 0 |
| LOVELADY RIDGE | 21 | 03-28-75 | 03-28-75 | 02-01-74 | 6,879 | 6,239 | 6,239 | 0 | 640 |
| MONO-LONG VALLEY | 3 | 02-17-71 | 03-01-71 | 12-24-70 | 458,514 | 352,072 | 0 | 0 | 106,442 |
| RANDBURG | 27 | 08-05-75 | 10-07-75 | 02-01-74 | 12,896 | 12,418 | 0 | 0 | 478 |
| SALINE VALLEY | 28 | 08-08-75 | 12-09-75 | 02-01-74 | 3,199 | 3,199 | 3,199 | 0 | 0 |
| SALTON SEA | 2 | 02-23-71 | 03-01-71 | 12-24-70 | 95,802 | 22,324 | 0 | 0 | 73,478 |
| " ADDITION | 33 | 09-05-80 | 09-19-80 | 09-05-80 | 7,085 | 0 | 0 | 0 | 7,085 |
| " TOTAL | | | | | 102,287 | 22,324 | 0 | 0 | 80,563 |
| SESPE HOT SPRINGS | 10 | | 03-22-71 | 12-24-70 | 7,035 | 6,036 | 0 | 0 | 999 |
| WENDEL-AMEDEE | 6 | 03-02-71 | 03-08-71 | 12-24-70 | 18,431 | 9,385 | 0 | 0 | 9,115 |
| WESTMORLAND | 32 | 07-30-80 | 08-25-80 | 07-30-80 | 3,200 | 0 | 0 | 0 | 3,200 |

| 1-NAME OF KGRA | MINUTES NO. | MINUTES DATE | DATE DEFINED | EFFECTIVE DATE | 2-TOTAL ACRES DEFINED | 2-APPROX. FEDERAL ACRES | 2-FEDERAL COMPETITIVE INTEREST ACRES | 2-FEDERAL NON-COMPETITIVE INTEREST ACRES | 2-PRIVATE & STATE ACRES |
|----------------|-------------|--------------|--------------|----------------|-----------------------|-------------------------|--------------------------------------|--|-------------------------|
| WITTER SPRINGS | 22 | 05-07-75 | 05-30-75 | 02-01-74 | 18,770 | 4,004 | 4,004 | 0 | 14,586 |
| GRAND TOTAL | 24 KGRAs | | | | 1,484,702 | *819,000 | *138,000 | *56,000 | 662,817 |

1 KGRAs in brackets have been either completely deleted or redesignated in other KGRAs and are included here for historical purposes.

2 The acreages reported here have been retabulated since the definition of the KGRA. For any of a variety of reasons including recent cadastral surveys, recalculations of lake and land grant areas, and accounting errors, they may not be identical to those acreages reported in the KGRA minutes or on the KGRA plats. Although discrepancies are generally minor (less than 1 percent), these acreages should not be considered accurate for legal purposes.

* Because of uncertainty for Lake City-Surprise Valley KGRA, values are rounded to nearest thousand.

| 1-NAME OF KGRA | LOCATION TOWNSHIP & RANGE | COUNTY | BLM DISTRICT OR NATIONAL FOREST (N.F.) | SURFACE EXPRESSION | SURFACE TEMP. (°C) | 2-AVERAGE ESTIMATED RESERVOIR TEMPERATURES (°C) | | MOST LIKELY |
|---|------------------------------|----------------------------------|--|---|---|---|------|----------------|
| | | | | | | MIN | MAX | |
| BECKWORTH PEAK | T. 22-23 N., R. 14 E. | PLUMAS | PLUMAS N.F. | NONE | NONE | NONE | NONE | NONE |
| BODIE | T. 4 N., R. 26 E. | MONO | BAKERSFIELD | NONE | NONE | NONE | NONE | NONE |
| BRAWLEY | T. 12-13 S., R. 14 E. | IMPERIAL | RIVERSIDE | NONE | NONE | 230 | 280 | 250 |
| [CALISTOGA- REDESIGNATED IN GEYSERS-CALISTOGA KGRA] | T. 8-9 N., R. 6-7 W. | NAPA | UKIAH | HOT SPRINGS | 78 | 137 | 153 | 141 |
| COSO HOT SPRINGS | T. 20-22 S., R. 37-39 E. | INYO | BAKERSFIELD, CHINA LAKE NAVAL ORDINANCE TESTING SITE | HOT SPRINGS | 97 | 190 | 240 | 230 |
| DUNES | T. 15-16 S., R. 19 E. | IMPERIAL | RIVERSIDE | NONE | NONE | 105 | 170 | 120 |
| EAST MESA | T. 15-17 S., R. 16-18 E. | IMPERIAL | RIVERSIDE | NONE | NONE | 165 | 200 | 180 |
| FORD DRY LAKE | T. 6-7 S., R. 19 E. | RIVERSIDE | RIVERSIDE | NONE | NONE | NONE | NONE | NONE |
| [GEYSERS- REDESIGNATED IN GEYSERS-CALISTOGA KGRA] | T. 10-14 N., R. 7-9 W. | LAKE, SONOMA | UKIAH | FUMARoles, HOT SPRINGS, STEAM WELLS | 101 | 215 | 255 | 240 |
| GEYSERS-CALISTOGA | T. 10-15 N., R. 5-10 W. | LAKE, MENDOCINO, NAPA, SONOMA | UKIAH | HOT SPRINGS | SEE DATA FOR GEYSERS AND CALISTOGA KGRAS | | | |
| GLAMIS | T. 13-14 S., R. 17-18 E. | IMPERIAL | RIVERSIDE | NONE | NONE | 105 | 170 | 120 |
| GLASS MOUNTAIN | T. 43-44 N., R. 3-4 E. | SISKIYOU | KLAMATH, MODOC, SHASTA N.F. | WEAK FUMAROLE | NONE | NONE | NONE | NONE |
| HEBER | T. 16-17 S., R. 13-16 E. | IMPERIAL | RIVERSIDE | NONE | NONE | 160 | 185 | 180 |
| KNOXVILLE | T. 11-12 N., R. 4-5 W. | LAKE, NAPA, YOLO | UKIAH | WARM SPRINGS, SPRING DEPOSITS | 22 | NONE | NONE | NONE |
| [LAKE CITY- REDESIGNATED IN LAKE CITY- SURPRISE VALLEY KGRA] | T. 43-44 N., R. 15-17 E. | MODOC | SUSANVILLE | HOT SPRINGS, SMALL MUD VOLCANOES | 98 | 129 | 185 | 143 |

| NAME OF KGRA | LOCATION TOWNSHIP & RANGE | COUNTY | BLM DISTRICT OR NATIONAL FOREST (N.F.) | SURFACE EXPRESSION | SURFACE TEMP. (°C) | AVERAGE ESTIMATED RESERVOIR TEMPERATURES (°C) | | |
|-------------------------------|------------------------------|-------------------|---|-------------------------------|-----------------------------|---|------|----------------|
| | | | | | | MIN | MAX | MOST LIKELY |
| LAKE CITY- SURPRISE VALLEY | T. 41-45 N., R. 15-17 E. | MODOC | SUSANVILLE, MODOC N.F. | HOT SPRINGS | SEE DATA FOR LAKE CITY KGRA | | | |
| LASSEN | T. 29-30 N., R. 4-6 E. | PLUMAS, TEHAMA | LASSEN N.F. | HOT SPRINGS | 95 | 176 | 245 | 230 |
| LITTLE HORSE MOUNTAIN | T. 16 N., R. 8-9 W. | LAKE | MENDOCINO N.F. | NONE | NONE | NONE | NONE | NONE |
| LOVELADY RIDGE | T. 16 N., R. 6 W. | COLUSA | UKIAH | NONE | NONE | NONE | NONE | NONE |
| MONO-LONG VALLEY | T. 1-4 S., R. 26-30 E. | MADERA, MONO | FOLSOM, BAKERSFIELD, INYO N.F. | FUMARoles, HOT SPRINGS | 94 | 100 | 250 | 180 |
| RANDBURG | T. 29-30 S., R. 41-42 E. | SAN BERNARDINO | RIVERSIDE | STEAM WELL, BOILING | 115 | 250 | 250 | 150 |
| SALINE VALLEY | T. 13 S., R. 39 E. | INYO | BAKERSFIELD | HOT SPRINGS | 65 | 65 | 96 | 65 |
| SALTON SEA | T. 9-12 S., R. 12-14 E. | IMPERIAL | RIVERSIDE | HOT SPRINGS, COOL MUD POTS | 101 | 300 | 340 | 330 |
| SESEPE HOT SPRINGS | T. 6 N., R. 20 W. | VENIURA | LOS PADRES N.F. | HOT SPRINGS | 89 | 109 | 148 | 136 |
| WENDEL-AMEDEE | T. 28-29 N., R. 15-16 E. | LASSEN | SUSANVILLE | HOT SPRINGS | 96 | 107 | 143 | 128 |
| WESTWORLD | T. 13 S., R. 13. E. | IMPERIAL | RIVERSIDE | HOT WELLS | NONE | 180 | 225 | 190 |
| WITTER SPRINGS | T. 15-16 N., R. 10-11 W. | MENDOCINO | UKIAH | NONE | NONE | NONE | NONE | NONE |

1 KGRAs in brackets have been either completely deleted or redesignated in other KGRAs and are included here for historical purposes.

2 From USGS Open-File Report 78-858 or estimated from chemical geothermometry and (or) well temperatures.

| 1 NAME OF KGRA | MINUTES NO. | MINUTES DATE | DATE DEFINED | EFFECTIVE DATE | 2 TOTAL ACRES DEFINED | 2 APPROX. FEDERAL ACRES | 2 FEDERAL COMPETITIVE INTEREST ACRES | 2 FEDERAL NON-COMPETITIVE INTEREST ACRES | 2 PRIVATE & STATE ACRES |
|---|-------------|--------------|--------------|----------------|-----------------------|-------------------------|--------------------------------------|--|-------------------------|
| BRUNEAU | 3 | 06-13-75 | 02-10-75 | 02-01-74 | 5,120 | 2,600 | 2,600 | 0 | 2,520 |
| CASTLE CREEK | 5 | 06-13-75 | 06-13-75 | 11-01-74 | 79,722 | 51,030 | 1,132 | 49,898 | 28,692 |
| CONDA | 10 | 08-17-78 | 08-29-78 | 01-01-78 | 2,566 | 1,242 | 1,242 | 0 | 1,324 |
| CRANE CREEK | 8 | 10-30-75 | 11-18-75 | 02-01-74 | 4,342 | 3,240 | 2,443 | 797 | 1,102 |
| [FRAZIER-REDESIGNATED IN RAFT RIVER KGRA] | 2 | 02-23-71 | 02-23-71 | 12-24-70 | 7,680 | 4,120 | 0 | 0 | 3,560 |
| ISLAND PARK | 7 | 10-15-75 | 11-18-75 | 04-01-75 | 28,539 | 28,539 | 28,539 | 0 | 0 |
| MOUNTAIN HOME | 4 | 03-21-75 | 03-21-75 | 02-01-74 | 9,520 | 5,103 | 5,103 | 0 | 4,417 |
| RAFT RIVER | 9 | 02-20-76 | 02-24-76 | 05-01-75 | 22,529 | 17,430 | 17,021 | 409 | 5,099 |
| " TOTAL (INCLUDES FRAZIER KGRA) | | | | | 30,209 | 21,550 | 17,021 | 4,529 | 8,659 |
| VULCAN HOT SPRINGS | 6 | 07-23-75 | 08-01-75 | 02-01-74 | 3,836 | 3,836 | 3,836 | 0 | 0 |
| YELLOWSTONE | 1 | 02-24-71 | 03-16-71 | 12-24-70 | 14,164 | 14,164 | 0 | 14,164 | 0 |
| GRAND TOTAL | | 9 KGRA | | | 178,018 | 131,304 | 61,916 | 69,308 | 46,794 |

1 KGRA in brackets have been either completely deleted or redesignated in other KGRA and are included here for historical purposes.

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| 1 NAME OF KGRA | LOCATION TOWNSHIP & RANGE | COUNTY | BLM DISTRICT OR NATIONAL FOREST (N.F.) | SURFACE EXPRESSION | SURFACE TEMP (°C) | 2 AVERAGE ESTIMATED RESERVOIR TEMPERATURES (°C) | | MOST LIKELY |
|--|------------------------------|------------------------|---|-------------------------------|----------------------|---|------|----------------|
| | | | | | | MIN | MAX | |
| BRUNEAU | T. 7 S., R. 6 E. | OWYHEE | BOISE | HOT SPRINGS | 41 | 90 | 120 | 110 |
| CASTLE CREEK | T. 3-5 S., R. 1-3 E. | ADA, ELMORE, OWYHEE | BOISE | THERMAL WELLS, HOT SPRINGS | 83 | 90 | 120 | 110 |
| CONDA | T. 8 S., R. 42 E. | CARIBOU | IDAHO FALLS | NONE | NONE | NONE | NONE | NONE |
| CRANE CREEK | T. 11 N., R. 3-4 W. | WASHINGTON | BOISE | HOT SPRINGS | 92 | 151 | 200 | 163 |
| [FRAZIER-REDESIGNATED IN RAFT RIVER KGRA] | T. 15 S., R. 26 E. | CASSIA | BURLEY | SEE DATA FOR RAFT RIVER KGRA | | | | |
| ISLAND PARK | T. 10-12 N., R. 42-45 E. | FREMONT | IDAHO FALLS, TARGHEE N.F. | NONE | NONE | NONE | NONE | NONE |
| MOUNTAIN HOME | T. 3-4 S., R. 8-9 E. | ELMORE | BOISE | HOT SPRING | 55 | 110 | 150 | 125 |
| RAFT RIVER (INCLUDES FRAZIER KGRA) | T. 13-16 S., R. 26-27 E. | CASSIA | BURLEY | HOT WELLS, WARM SEEPS | 93 | 135 | 164 | 147 |
| VULCAN HOT SPRINGS | T. 14 N., R. 6 E. | VALLEY | BOISE N.F. | HOT SPRINGS | 87 | 87 | 140 | 138 |
| YELLOWSTONE | T. 12-14 N., R. 45 E. | FREMONT | TARGHEE N.F. | NONE | NONE | NONE | NONE | NONE |

1 KGRAs in brackets have been either completely deleted or redesignated in other KGRAs and are included here for historical purposes.

2 From USGS Open-File Report 78-858 or estimated from chemical geothermometry and (or) well temperatures.

| 1 NAME OF KGRA | MINUTES NO. | MINUTES DATE | DATE DEFINED | EFFECTIVE DATE | 2 TOTAL ACRES DEFINED | 2 APPROX. FEDERAL ACRES | 2 FEDERAL COMPETITIVE INTEREST ACRES | 2 FEDERAL NON-COMPETITIVE INTEREST ACRES | 2 PRIVATE & STATE ACRES |
|--|-------------|--------------|--------------|----------------|-----------------------|-------------------------|--------------------------------------|--|-------------------------|
| BALTAZOR | 23 | 08-19-75 | 09-10-75 | 02-01-74 | 5,617 | 5,537 | 5,537 | 0 | 80 |
| BOWMANE | 1 | 02-19-71 | 03-01-71 | 12-24-70 | 12,711 | 5,971 | 0 | 5,971 | 6,740 |
| " ADDITION | 16 | 10-17-74 | 11-19-74 | 02-01-74 | 20,512 | 10,639 | 10,639 | 0 | 9,873 |
| " DELETION | 39 | 12-10-79 | 12-10-79 | 12-10-79 | 7,044 | 2,764 | 2,764 | 0 | 4,280 |
| " TOTAL | | | | | 26,180 | 13,846 | 7,875 | 5,971 | 12,333 |
| [BRADY HOT SPRINGS- REDESIGNATED IN BRADY-HAZEN KGRA] | 5 | 02-24-71 | 03-04-71 | 12-24-70 | 19,020 | 10,646 | 0 | 10,646 | 8,374 |
| BRADY-HAZEN | 15 | 05-16-74 | 06-13-74 | 05-16-74 | 79,488 | 41,530 | 20,991 | 20,539 | 37,958 |
| " TOTAL (INCLUDES BRADY HOT SPRINGS KGRA) | | | | | 98,508 | 52,176 | 20,991 | 31,185 | 46,332 |
| COLADO | 22 | 08-12-75 | 08-13-75 | 02-01-74 | 640 | 640 | 640 | 0 | 0 |
| DARROUGH HOT SPRINGS | 7 | 02-26-71 | 03-04-71 | 12-24-70 | 8,363 | 5,843 | 0 | 5,843 | 2,520 |
| DIXIE VALLEY | 30 | 10-20-75 | 10-22-75 | 04-01-74 | 38,348 | 37,472 | 36,272 | 1,200 | 876 |
| " ADDITION | 38 | 03-28-79 | 03-28-79 | 02-01-79 | 29,274 | 29,274 | 28,634 | 640 | 0 |
| " DELETION | 40 | 07-10-80 | 07-28-80 | 07-10-80 | 5,720 | 5,720 | 5,080 | 640 | 0 |
| " TOTAL | | | | | 61,902 | 61,026 | 59,826 | 1,200 | 876 |
| DOUBLE HOT SPRINGS | 10 | 02-25-71 | 03-08-71 | 12-24-70 | 10,815 | 10,375 | 0 | 10,375 | 440 |
| " ADDITION | 21 | 06-31-75 | 08-19-75 | 03-01-74 | 18,511 | 18,431 | 17,868 | 563 | 80 |
| " TOTAL | | | | | 29,326 | 28,806 | 17,868 | 10,938 | 520 |
| ELKO HOT SPRINGS | 13 | 03-05-71 | 03-12-71 | 12-24-70 | 8,960 | 1,940 | 0 | 1,940 | 7,020 |
| FLY RANCH | 2 | 02-17-71 | 03-01-71 | 12-24-70 | 5,125 | 2,080 | 0 | 2,080 | 3,045 |
| " ADDITION | 18 | 02-13-75 | 02-20-75 | 03-01-74 | 15,633 | 13,212 | 13,212 | 0 | 2,421 |
| " TOTAL | | | | | 20,758 | 15,292 | 13,212 | 2,080 | 5,466 |
| FLY RANCH NORTHEAST | 29 | 11-14-75 | 12-05-75 | 08-01-74 | 7,680 | 7,680 | 7,680 | 0 | 0 |

| NAME OF KGRA | MINUTES NO. | MINUTES DATE | DATE DEFINED | EFFECTIVE DATE | 2TOTAL ACRES DEFINED | 2APPROX. FEDERAL ACRES | 2FEDERAL INTEREST ACRES | | 2PRIVATE & STATE ACRES |
|------------------------|-------------|--------------|--------------|----------------|----------------------|------------------------|----------------------------|--------------------------------|------------------------|
| | | | | | | | COMPETITIVE INTEREST ACRES | NON-COMPETITIVE INTEREST ACRES | |
| GERLACH | 8 | 02-25-71 | 03-08-71 | 12-24-70 | 8,972 | 7,823 | 0 | 7,823 | 1,149 |
| " ADDITION | 28 | 09-29-75 | 10-06-75 | 10-01-74 | 17,354 | 16,914 | 14,994 | 1,920 | 440 |
| " TOTAL | | | | | 26,326 | 24,737 | 14,994 | 9,743 | 1,589 |
| GERLACH NORTHEAST | 25 | 08-26-75 | 10-07-75 | 10-01-74 | 7,971 | 7,971 | 4,135 | 3,836 | 0 |
| HOT SPRINGS POINT | 17 | 11-08-74 | 11-13-74 | 02-01-74 | 8,549 | 5,341 | 5,341 | 0 | 3,208 |
| KYLE HOT SPRINGS | 37 | 03-19-76 | 04-22-76 | 03-19-76 | 2,560 | 2,400 | 0 | 2,400 | 160 |
| LEACH HOT SPRINGS | 3 | 02-16-71 | 03-01-71 | 12-24-70 | 9,006 | 8,446 | 0 | 8,446 | 560 |
| " ADDITION | 36 | 08-23-76 | 08-24-76 | 02-01-74 | 3,840 | 3,800 | 3,800 | 0 | 40 |
| " TOTAL | | | | | 12,846 | 12,246 | 3,800 | 8,446 | 600 |
| MOANA SPRINGS | 9 | 02-24-71 | 03-08-71 | 12-24-70 | 5,120 | 0 | 0 | 0 | 5,120 |
| MOMTE NEVA HOT SPRINGS | 12 | 02-16-71 | 03-12-71 | 12-24-70 | 10,302 | 7,547 | 0 | 7,547 | 2,755 |
| PIMTO HOT SPRINGS | 24 | 10-15-75 | 12-23-75 | 03-01-74 | 8,015 | 7,975 | 4,140 | 3,835 | 40 |
| RUBY VALLEY | 32 | 11-19-75 | 11-26-75 | 04-01-74 | 5,743 | 4,023 | 3,702 | 321 | 1,720 |
| RYE PATCH | 19 | 08-12-75 | 08-12-75 | 04-01-74 | 801 | 801 | 801 | 0 | 0 |
| SALT WELLS BASIN | 34 | 12-22-75 | 01-16-76 | 03-01-74 | 19,233 | 19,217 | 19,217 | 0 | 16 |
| SAN EMIDIO DESERT | 20 | 08-25-75 | 08-08-75 | 03-01-74 | 7,678 | 5,512 | 5,231 | 281 | 2,166 |
| SILVER PEAK | 26 | 09-25-75 | 10-03-75 | 02-01-74 | 5,117 | 5,079 | 5,079 | 0 | 38 |
| SOLDIER MEADOW | 31 | 10-15-75 | 01-19-76 | 02-01-74 | 5,967 | 3,984 | 3,984 | 0 | 1,983 |
| STEAMBOAT SPRINGS | 4 | 02-22-71 | 03-01-71 | 12-24-70 | 8,912 | 1,548 | 0 | 1,548 | 7,364 |
| STILLWATER-SODA LAKE | 6 | 02-24-71 | 03-04-71 | 12-24-70 | 225,260 | 116,872 | 0 | 116,872 | 108,388 |
| TRECO | 33 | 11-13-75 | 12-23-75 | 02-01-74 | 7,013 | 7,013 | 7,013 | 0 | 0 |
| WABUSKA | 11 | 03-01-71 | 03-08-71 | 12-24-70 | 11,520 | 5,640 | 0 | 5,640 | 5,880 |

| 1-NAME OF KGRA | MINUTES NO. | MINUTES DATE | DATE DEFINED | EFFECTIVE DATE | 2-TOTAL ACRES DEFINED | 2-APPROX. FEDERAL ACRES | 2-FEDERAL COMPETITIVE INTEREST ACRES | 2-FEDERAL NON-COMPETITIVE INTEREST ACRES | 2-PRIVATE & STATE ACRES |
|--------------------|-------------|--------------|--------------|----------------|-----------------------|-------------------------|--------------------------------------|--|-------------------------|
| WARM SPRINGS | 35 | 12-16-75 | 01-20-76 | 03-01-74 | 3,812 | 3,532 | 1,320 | 2,212 | 280 |
| WILSON HOT SPRINGS | 27 | 11-05-75 | 11-03-75 | 02-01-74 | 1,294 | 1,294 | 654 | 640 | 0 |
| GRAND TOTAL | | | 30 KGRAS | | 651,972 | 435,518 | 213,040 | 222,478 | 216,454 |

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- 2 The acreages reported here have been retabulated since the definition of the KGRA. For any of a variety of reasons, including recent cadastral surveys, recalculations of lake and land grant areas, and accounting errors, they may not be identical to those acreages reported in the KGRA minutes or on the KGRA plats. Although discrepancies are generally minor (less than 1 percent), these acreages should not be considered accurate for legal purposes.

| 1-NAME OF KGRA | LOCATION | | COUNTY | BLM DISTRICT OR NATIONAL FOREST (N.F.) | SURFACE EXPRESSION | SURFACE TEMP. (°C) | ESTIMATED RESERVOIR TEMPERATURE (°C) | | MOST LIKELY |
|------------------------|------------------------------|--|---------------------|--|-------------------------------------|--------------------|--------------------------------------|---------|-------------|
| | TOWNSHIP & RANGE | | | | | | MIN | MAX | |
| BALTAZOR | T. 46-47 N., R. 28-29 E. | | HUMBOLDT | WINNEMUCCA | HOT SPRING | 80 | 152 | 165 | 158 |
| BROWNE | T. 30-32 N., R. 47-49 E. | | EUREKA, LANDER | BATTLE MOUNTAIN, ELKO | FUMARoles, MUDPOTS, BOILING SPRINGS | 98 | 211 | 251 | 226 |
| [BRADY HOT SPRINGS] | T. 22-23 N., R. 26-27 E. | | CHURCHILL | WINNEMUCCA, CARSON CITY | FUMARoles, HOT SPRINGS | 86-BOILING | 140-208 | 170-229 | 155-225 |
| *BRADY-HAZEN | T. 20-23 N., R. 25-28 E. | | CHURCHILL, LYON | WINNEMUCCA, CARSON CITY | SEE DATA FOR BRADY HOT SPRINGS KGRA | | | | |
| COLADO | T. 28 N., R. 32 E. | | PERSHING | WINNEMUCCA | HOT WELLS | 60 | 61 | 128 | 101 |
| DARROUGH HOT SPRINGS | T. 11 N., R. 42-43 E. | | NYE | BATTLE MOUNTAIN | HOT SPRINGS | 95 | 129 | 136 | 132 |
| DIXIE VALLEY | T. 22-26 N., R. 34-38 E. | | CHURCHILL, PERSHING | WINNEMUCCA, CARSON CITY | HOT SPRINGS | 72 | 79-127 | 114-145 | 86-145 |
| DOUBLE HOT SPRINGS | T. 35 1/2-37 N., R. 26-27 E. | | HUMBOLDT, PERSHING | WINNEMUCCA | HOT SPRINGS | 80-90 | 114-116 | 140-148 | 122-127 |
| ELKO HOT SPRINGS | T. 34 N., R. 55 E. | | ELKO | ELKO | HOT SPRINGS | 56 | 80 | 114 | 86 |
| FLY RANCH | T. 33-34 N., R. 23-24 E. | | WASHOE, PERSHING | WINNEMUCCA | HOT SPRINGS | 80 | 99 | 126 | 100 |
| FLY RANCH NORTHEAST | T. 35 N., R. 23 E. | | PERSHING | WINNEMUCCA | NONE | NONE | NONE | NONE | NONE |
| GERLACH | T. 31-33 N., R. 23-24 E. | | WASHOE, PERSHING | WINNEMUCCA | HOT SPRINGS | 96 | 158 | 205 | 170 |
| GERLACH NORTHEAST | T. 33-34 N., R. 24 E. | | PERSHING | WINNEMUCCA | NONE | NONE | NONE | NONE | NONE |
| HOT SPRINGS POINT | T. 29-30 N., R. 48-49 E. | | EUREKA | ELKO | HOT SPRINGS | 54 | 74 | 116 | 87 |
| KYLE HOT SPRINGS | T. 29 N., R. 36 E. | | PERSHING | WINNEMUCCA | HOT SPRINGS | 77 | 154 | 161 | 161 |
| LEACH HOT SPRINGS | T. 31-32 N., R. 38-39 E. | | PERSHING | WINNEMUCCA | HOT SPRINGS | 92 | 155 | 170 | 160 |
| MOANA SPRINGS | T. 19 N., R. 19 E. | | WASHOE | CARSON CITY | HOT WELLS | 90 | 96 | 155 | 96 |
| MONTE NEVA HOT SPRINGS | T. 21 N., R. 63-64 E. | | WHITE PINE | ELY | HOT SPRING | 79 | 79 | 104 | 79 |
| PINTO HOT SPRINGS | T. 20 N., R. 28 E. | | HUMBOLDT | WINNEMUCCA | HOT SPRING DEPOSITTS | 92 | 153 | 190 | 176 |

| 1 NAME OF KGRA | LOCATION | | COUNTY | BLM DISTRICT OR NATIONAL FOREST (N.F.) | SURFACE EXPRESSION | SURFACE TEMP. (°C) | 2 AVERAGE ESTIMATED RESERVOIR TEMPERATURE (°C) | | MOST LIKELY |
|----------------------|--------------------------|-----------|-----------------|---|---------------------------|-----------------------|--|-------------|----------------|
| | TOWNSHIP & RANGE | | | | | | MIN | MAX | |
| RUBY VALLEY | T. 31-32 N., R. 59 E. | ELKO | ELKO | | HOT SPRINGS | 93 | 171 | 183 | 181 |
| RYE PATCH | T. 31-32 N., R. 33 E. | PERSHING | WINNEMUCCA | | HOT SPRING DEPOSITS | NONE | | NONE | |
| SALT WELLS BASIN | T. 17-18 N., R. 30-31 E. | CHURCHILL | CARSON CITY | | NONE | NONE | | NONE | |
| SAN EMIDIO DESERT | T. 29 N., R. 23 E. | WASHOE | WINNEMUCCA | | HOT SPRINGS | 95 | 125 | 189 | 185 |
| SILVER PEAK | T. 2 S., R. 39 E. | ESMERALDA | LAS VEGAS | | HOT SPRINGS | 48 | | NONE | |
| SOLDIER MEADOW | T. 40 N., R. 24-25 E. | HUMBOLDT | WINNEMUCCA | | THERMAL SPRINGS | 54 | 64 | 113 | 84 |
| STEAMBOAT SPRINGS | T. 17-18 N., R. 19-20 E. | WASHOE | CARSON CITY | | HOT SPRINGS | 96 | 186 | 207 | 207 |
| STILLWATER-SODA LAKE | T. 19-21 N., R. 27-31 E. | CHURCHILL | CARSON | | HOT SPRINGS, HOT WELLS | 96 | 140- 144 | 165- 177 | 159- 161 |
| TREGO | T. 34 N., R. 25-26 E. | PERSHING | WINNEMUCCA | | HOT SPRINGS | 84 | 96 | 124 | 124 |
| WABUSKA | T. 15 N., R. 25 E. | LYON | CARSON CITY | | HOT SPRING | 97 | 106 | 146 | 140 |
| WARM SPRINGS | T. 4 N., R. 50 E. | NYE | BATTLE MOUNTAIN | | HOT SPRING | 61 | 61 | 111 | 80 |
| WILSON HOT SPRINGS | T. 10-11 N., R. 25 E. | LYON | CARSON CITY | | STEAM VENTS(?) | NONE | | NONE | |

1 KGRAs in brackets have been either completely deleted or redesignated in other KGRAs and are included here for historical purposes.

2 From USGS Open-File Report 78-858 or estimated from chemical geothermometry and (or) well temperatures.

* Includes the "Desert Peak" prospect.

| 1 NAME OF KGRA | MINUTES NO. | MINUTES DATE | DATE DEFINED | EFFECTIVE DATE | 2 TOTAL ACRES DEFINED | 2 APPROX. FEDERAL ACRES | 2 FEDERAL | | 2 PRIVATE & STATE ACRES |
|------------------------------|-------------|--------------|--------------|----------------|-----------------------|-------------------------|----------------------------|--------------------------------|-------------------------|
| | | | | | | | COMPETITIVE INTEREST ACRES | NON-COMPETITIVE INTEREST ACRES | |
| ALVORD | 11 | 01-21-75 | 01-30-75 | 08-01-74 | 176,835 | 106,798 | 40,376 | 66,422 | 70,037 |
| BELKNAP-FOLEY HOT SPRINGS | 10 | 08-23-74 | 08-29-74 | 02-10-74 | 5,066 | 4,546 | 4,546 | 0 | 520 |
| BREITENBUSH HOT SPRINGS | 1 | 02-25-71 | 03-04-71 | 12-24-70 | 8,960 | 8,800 | 0 | 8,800 | 160 |
| " | 16 | 06-12-75 | 06-12-75 | 03-01-74 | 4,485 | 4,485 | 4,485 | 0 | 0 |
| " | TOTAL | | | | 13,445 | 13,285 | 4,485 | 8,800 | 160 |
| [BURNS BUTTE] | 13 | 11-26-74 | 11-27-74 | 02-01-74 | 640 | 640 | 640 | 0 | 0 |
| " | 19 | 02-11-80 | 02-27-80 | 02-11-80 | 640 | 640 | 640 | 0 | 0 |
| " | TOTAL | | | | 0 | 0 | 0 | 0 | 0 |
| CAREY HOT SPRINGS | 6 | 02-25-71 | 03-08-71 | 12-24-70 | 7,579 | 7,427 | 0 | 7,427 | 152 |
| GRUMP GEYSER | 2 | 02-23-71 | 03-04-71 | 12-24-70 | 21,304 | 3,769 | 0 | 3,769 | 17,535 |
| " | 14 | 05-29-75 | 05-29-75 | 02-01-74 | 64,359 | 35,414 | 5,143 | 30,271 | 28,945 |
| " | TOTAL | | | | 85,663 | 39,183 | 5,143 | 34,040 | 46,480 |
| KLAMATH FALLS | 7 | 03-31-71 | 04-12-71 | 12-24-70 | 17,300 | 40 | 0 | 40 | 17,260 |
| " | 17 | 11-13-75 | 11-25-75 | 02-01-74 | 33,000 | 10,023 | 9,833 | 190 | 22,977 |
| " | 20 | 08-26-80 | 09-05-80 | 09-01-80 | 20,431 | 7,660 | 7,660 | 0 | 12,771 |
| " | TOTAL | | | | 29,869 | 2,403 | 2,173 | 230 | 27,466 |
| LAKEVIEW | 5 | 02-26-71 | 03-08-71 | 12-24-70 | 12,165 | 0 | 0 | 0 | 12,165 |
| McCREDIE HOT SPRINGS | 9 | 08-27-74 | 08-29-74 | 02-01-74 | 3,659 | 3,659 | 3,659 | 0 | 0 |
| MOUNT HOOD | 4 | 02-24-71 | 03-08-71 | 12-24-70 | 8,671 | 8,671 | 0 | 8,671 | 0 |

| ¹ NAME OF KGRA | MINUTES NO. | MINUTES DATE | DATE DEFINED | EFFECTIVE DATE | ² TOTAL ACRES DEFINED | ² APPROX. FEDERAL ACRES | ² FEDERAL COMPETITIVE INTEREST ACRES | ² FEDERAL NON-COMPETITIVE INTEREST ACRES | ² PRIVATE & STATE ACRES |
|----------------------------|-------------|--------------|--------------|----------------|----------------------------------|------------------------------------|---|---|------------------------------------|
| NEWBERRY CALDERA | 18 | 05-21-76 | 05-21-76 | 02-01-74 | 31,284 | 31,284 | 17,103 | 14,181 | 0 |
| SUMMER LAKE HOT SPRINGS | 15 | 06-13-75 | 06-13-75 | 02-01-74 | 13,631 | 9,752 | 9,752 | 0 | 3,878 |
| VALE HOT SPRINGS | 3 | 02-26-71 | 03-04-71 | 12-24-70 | 8,940 | 1,347 | 0 | 1,347 | 7,593 |
| " ADDITION | 8 | 09-25-74 | 09-27-74 | 08-01-74 | 11,535 | 10,894 | 7,694 | 3,200 | 641 |
| " ADDITION | 12 | 12-18-74 | 12-20-74 | 05-01-74 | 2,523 | 2,003 | 2,003 | 0 | 520 |
| " TOTAL | | | | | 22,998 | 14,244 | 9,697 | 4,547 | 8,754 |
| GRAND TOTAL | | | | | 410,865 | 241,252 | 96,934 | 144,318 | 169,612 |

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| NAME OF KGRA | LOCATION | | COUNTY | BLM DISTRICT OR NATIONAL FOREST (N.F.) | SURFACE EXPRESSION | SURFACE TEMP (°C) | AVERAGE ESTIMATED RESERVOIR TEMPERATURES (°C) | | |
|------------------------------|--------------------------|--|--------------------------|---|--------------------------|----------------------|---|------|----------------|
| | TOWNSHIP & RANGE | | | | | | MIN | MAX | MOST LIKELY |
| ALVORD | T. 32-37 S., R. 33-36 E. | | HARNEY | BURNS | HOT SPRINGS | 73-96 | 148 | 231 | 164-207 |
| BELKNAP-FOLEY HOT SPRINGS | T. 16 S., R. 6 E. | | LANE | WILLAMETTE N.F. | HOT SPRINGS | 71-79 | 81 | 148 | 108 |
| BREITENBUSH HOT SPRINGS | T. 8-9 S., R. 7 E. | | MARION | MT. HOOD N.F. | FUMARoles, HOT SPRING | 92 | 99 | 149 | 127 |
| [BURNS BUTTE] | T. 23 S., R. 30 E. | | HARNEY | BURNS | NONE | NONE | NONE | NONE | |
| CAREY HOT SPRINGS | T. 6 S., R. 6-7 E. | | CLACKAMAS | MT. HOOD N.F. | HOT SPRINGS | 86 | 87 | 126 | 98 |
| CRUMP GEYSER | T. 37-41 S., R. 23-25 E. | | LAKE | LAKEVIEW | HOT SPRINGS | 78 | 144 | 185 | 173 |
| KLAMATH FALLS | T. 38-41 S., R. 9-10 E. | | KLAMATH | LAKEVIEW | HOT SPRING, HOT WELLS | 74-99 | 99 | 138 | 104-131 |
| LAKEVIEW | T. 38-39 S., R. 20 E. | | LAKE | LAKEVIEW | HOT SPRINGS | 96 | 143 | 158 | 149 |
| McCREDIE HOT SPRINGS | T. 21-22 S., R. 4-5 E. | | LANE | WILLAMETTE N.F. | HOT SPRINGS | 73 | 81 | 96 | 96 |
| MT. HOOD | T. 2 S., R. 9 E. | | HOOD RIVER, CLACKAMAS | MT. HOOD N.F. | FUMARoles, HOT SPRING | 90 | 90 | 150 | 125 |
| NEWBERRY CALDERA | T. 21-22 S., R. 12-13 E. | | DESCHUTES | DESCHUTES N.F. | THERMAL SPRING | 62 | 180 | 280 | 230 |
| SUMMER LAKE HOT SPRINGS | T. 33 S., R., 17-18 E. | | LAKE | LAKEVIEW | HOT SPRING | 43 | 107 | 134 | 112 |
| VALE HOT SPRINGS | T. 18-20 S., R. 45-46 E. | | MALHEUR | VALE | HOT SPRING | 97 | 152 | 161 | 157 |

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2 From USGS Open-File Report 78-858 or estimated from geothermometry and (or) well temperatures.

| NAME OF KGRA | MINUTES NO. | MINUTES DATE | DATE DEFINED | EFFECTIVE DATE | 1 TOTAL ACRES DEFINED | 1 APPROX. FEDERAL ACRES | 1 FEDERAL COMPETITIVE INTEREST ACRES | 1 FEDERAL NON-COMPETITIVE INTEREST ACRES | 1 PRIVATE & STATE ACRES |
|--------------------|-------------|--------------|--------------|----------------|-----------------------|-------------------------|--------------------------------------|--|-------------------------|
| INDIAN HEAVEN | 4 | 06-11-75 | 06-12-75 | 03-01-75 | 2,547 | 2,547 | 2,547 | 0 | 0 |
| KENNEDY HOT SPRING | 2 | 11-26-74 | 11-27-74 | 02-01-74 | 3,311 | 3,311 | 3,311 | 0 | 0 |
| MOUNT ST. HELENS | 1 | 02-23-71 | 03-04-71 | 12-24-70 | 17,622 | 13,420 | 0 | 13,420 | 4,202 |
| " ADDITION | 3 | 04-09-75 | 04-09-75 | 02-01-74 | 12,133 | 9,700 | 9,700 | 0 | 2,433 |
| " TOTAL | | | | | 29,755 | 23,120 | 9,700 | 13,420 | 6,635 |
| GRAND TOTAL | | | 3 KGRAS | | 35,613 | 28,978 | 15,558 | 13,420 | 6,635 |

1 The acreages reported here have been retabulated since the definition of the KGRA. For any of a variety of reasons, including recent cadastral surveys, recalculations of lake and land grant areas, and accounting errors, they may not be identical to those acreages reported in the KGRA minutes or on the KGRA plats. Although discrepancies are generally minor (less than 1 percent), these acreages should not be considered accurate for legal purposes.

| NAME OF KGRA | LOCATION | | COUNTY | BLM DISTRICT OR NATIONAL FOREST (N.F.) | SURFACE EXPRESSION | SURFACE TEMP (°C) | 1-AVERAGE ESTIMATED RESERVOIR TEMPERATURES (°C) | | |
|--------------------|-----------------------|--|----------------------|---|---|----------------------|---|-----|----------------|
| | TOWNSHIP & RANGE | | | | | | MIN | MAX | MOST LIKELY |
| INDIAN HEAVEN | T. 6 N., R. 8-9 E. | | SKAMANIA | GIFFORD PINCHOT N.F. | LAVA FLOWS | NONE | | | NONE |
| KENNEDY HOT SPRING | T. 30-31 N., R. 12 E. | | SNOHOMISH | MT. BAKER N.F. | THERMAL SPRING | 32 | | | NONE |
| MOUNT ST. HELENS | T. 7-9 N., R. 4-6 E. | | SKAMANIA, COMLITZ | GIFFORD PINCHOT N.F. | ACTIVE VOLCANO, FUMARoles, HOT SPRING | 80 | | | NO DATA |

1 From USGS Open-File Report 78-858 or estimated from chemical geothermometry and (or) well temperatures.