

STATE MAPS OF LOW-TEMPERATURE GEOTHERMAL RESOURCES

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INTRODUCTION

A series of geothermal energy resources maps for about 12 western states is being prepared by the National Geophysical and Solar-Terrestrial Data Center (NGSDC) for the Department of Energy. These maps will emphasize the occurrence of relatively low-temperature thermal resources that can be used in direct, nonelectric heat applications. The purpose in producing these maps is to promote the use of geothermal energy in the United States as an alternate energy resource. It is hoped that the maps will make potential users of this energy resource aware of its availability and will show them areas that are likely to yield such resources. Tentatively, two maps for each state are planned: a "planning" map and a "scientific" map. A special effort will be made to make the presentation of data on these maps clear and uncluttered. The states participating include: Alaska, Hawaii, Washington, Oregon, California, Idaho, Montana, Nevada, Colorado, Utah, Arizona, and New Mexico.

Many organizations will be involved directly, or indirectly, in the production of these maps. Included are the Department of Energy, the National Oceanic and Atmospheric Administration, the U.S. Geological Survey, numerous state agencies (in some cases, organizations affiliated with state agencies), the University of Utah Research Institute (UURI), the Los Alamos Scientific Laboratory and other organizations such as university groups. It is anticipated that some private firms also will participate, possibly in the compilation of certain types of data. UURI, as a coordinating group, will contribute significantly to this map-making effort, which will include arranging for data to be sent to both the USGS GEOTHERM file in Menlo Park, California, and to NGSDC for the production of the maps.

SCALE AND PROJECTION OF MAPS

Present plans call for the production of two maps (described below) for each state. The maps will be identical in scale and projection to existing U.S. Geological Survey state maps (scale

1:500,000, on a Lambert conformal conic projection). However, the states of Alaska and Hawaii probably will be treated differently with respect to scale and projection.

"SCIENTIFIC" AND "PLANNING" MAPS

Because of the great amount of geothermal and related data that are desirable to show on the maps, it tentatively has been decided to produce two maps for each state. Each map will have certain "core" geothermal data presented in the same manner. One map will be designed to appeal to scientific and exploration personnel; the other will be intended more for the use of the planner and the nonspecialist.

Although the types of data to be shown on the maps have not been finally selected, and it is likely that there will be some differences from state to state, preliminary decisions that have been made are outlined here. The "core" data to be shown on both maps are:

- Thermal springs and wells with temperatures
- Thermal spring and well geothermometer data
- Cities/towns
- Highways
- Rivers and streams
- Township/range
- Water bodies
- Known Geothermal Resources Areas
- Interpretations of resources (to replace "areas valuable prospectively")

The "scientific" map will include the above core data plus the following:

- Heat flow
- Earthquakes/microearthquakes
- Distribution of hot spring deposits
- Geochemical indicators
- Lava flow data (rhyolitic and nonrhyolitic)
- Age dates for volcanic deposits
- Volcanoes and volcanic cones
- Faults and lineaments
- Physiographic/structural province outlines

The "planning" map will include the core data listed above plus the following:

- Mean annual temperatures
- Spot elevations
- Indications of areas presently using geothermal energy
- Power transmission lines
- Oil and gas lines
- Power generating stations
- Land ownership
- Water quality

One of the most important of the above data types is the "interpretations of resources." These will indicate where the likelihood of finding geothermal resources (steam and thermal water) is greatest. The method of showing this interpretation has not been resolved, but in general it is expected to be a better guide to thermal resources than the presently defined "Areas Valuable Prospectively for Geothermal Resources." These interpretations will be made by geothermal experts for each state.

METHODOLOGY

Most of the geothermal data will be provided to NGSDC from the USGS GEOTHERM file. The data from this file will originate for the most part from compilations of state agencies, or organizations working closely with state agencies, but also from USGS scientists and others. Other geothermal data will come from university workers and UURI; much of the nongeothermal data will be compiled by the UURI and NGSDC.

To produce a plot and test its visual impact, all data (points, lines, outlines or areas) are digitized and a large flatbed plotter (7-ft by 4-ft plotting surface) is used to plot the data alone (i.e., for checking purposes) and in various combinations (using different colors, symbols, symbol sizes, etc.). Such plots can be made very rapidly from digital data. They not only will help to determine the method of data presentation, but also will be used to produce the final color-separate material (or plots that

will be used as a guide for manually drafting the final color separates) for the printer.

SCHEDULE OF PRODUCING MAPS

The first maps are the "planning" and "scientific" maps for the state of Idaho. It is anticipated that these will be printed in late 1978, and will be followed within several months by the Arizona maps. The experience gained in the production of maps for these two states should allow maps for other states to be completed at a rate of about five per year (10 maps per year). Most of the maps will show essentially the same type of data in the same format. However, it is likely that the method or type of data presentation for a few maps will be slightly different because of unique situations in some states.

USE OF MAPS

One of our main goals is for the maps (especially the "planning" map) to help the nonspecialist who is seeking an alternate source of energy. The map will not tell a potential user that he will find hot water at a certain location if he drills to a certain depth. Rather, the user of the map will be advised to consult about areas of interest with private firms or Federal or state personnel who have an expert knowledge of geothermal energy. A short text will be supplied with the map (as part of the map) and will be written in such a fashion that it can be understood by the general public.

AVAILABILITY OF MAPS

An important aspect of this endeavor is to insure that the maps for each state are widely advertised and circulated, especially at the local level. Efforts will be made to insure that all potential users of geothermal energy within a given state know of the existence of the maps and how to obtain them. It is anticipated that the maps will be sold to the general public at a nominal fee.