

AREA  
CA  
Lassen  
Wendell H.S.  
Hydroponic

UNIVERSITY OF UTAH  
RESEARCH INSTITUTE  
EARTH SCIENCE LAB.

## GEOTHERMAL AGRICULTURE APPLICATIONS —

### HOBO WELLS HYDROPONICS

**JIMMIE C. ROSENBRUCH AND  
ROBERT G. BOTTGE**

*U.S. Dept. of Interior Information Circular  
8692 "Geothermal Energy: Economic Potent-  
tial of Three Sites in Alaska". (Bureau of  
Mines)*

Geothermal water is currently being used for agricultural purposes in Iceland the U.S.S.R. In the United States, a successful hydroponic (agricultural) operation is located at Wendell Hot Springs, 30 miles east of Susanville, Calif., and 80 miles north of Reno, Nev. Hobo Wells Hydroponics, Inc., of Jonesville, Calif., pumps water from the adjacent hot springs to their group of four greenhouses at an average rate of 23 gpm for each greenhouse.

The 209°F. water is routed to modified cooling towers in the summer or through a heat exchanger in the winter to obtain an ideal water temperature of 180°F. Fans draw off the warmed air from radiators located at each end of the building and blow it through a 20-inch-diameter plastic tube suspended from the ceiling running the full length of the greenhouse. Two-inch holes along the length of the tube provide even heating of the greenhouse.

Hot water is pumped through pipes embedded in six concrete walkways between the rows of plant trays, providing radiant heating as well. Warm water is also used in the nutrient tank where a mixture is prepared for plant feeding. Plants actually grow in 9-inch-thick beds of sterilized 1/4-inch to 3/8-inch pea gravel and are fed precise amounts of the nutrient mixture at regular intervals from a 5,000-gallon holding tank. Chemical plant nutrients are mixed into the warm geothermal water and pumped from a holding tank to the plants four times daily. The

plant food water enters at one end of the plant growing box and percolates to the opposite end, then flows by gravity back into the holding tank for later repeating of the cycle. Approximately 1,000 pounds of plant food at 40 cents per pound is required per house each year.

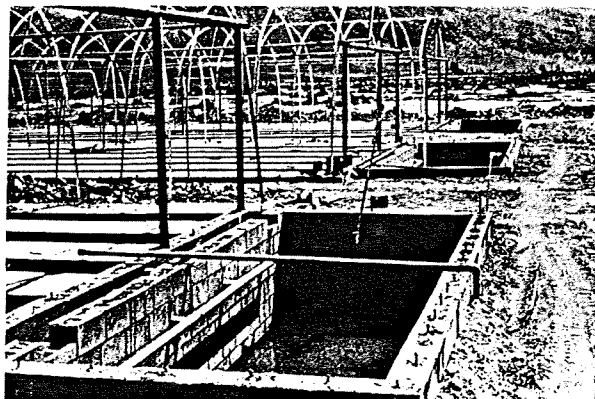
An average of 4 man-hours per day per house is required to prune, hand-pollinize, feed, and carry out general maintenance. Local labor averages \$6 to \$7 per hour, but ranges from \$2 to \$10 per hour.

Each of six 125-foot by 26-foot (3,250 sq. ft.) greenhouses is covered with 5,200 square feet of semitransparent fiberglass in the form of a quonset hut. Material costs for these buildings in May 1974, f.o.b. Wendell, were \$16,000. Once constructed, maintenance costs are minimal. Approximately \$50 per month is required for electricity for blowers, pumps, etc. The design is simple, but must be durable since 70- to 80-mile-per-hour winds and -25°F. weather have occurred.

Tomatoes are the only crop produced but the company plans to expand into cucumber production also. Tomato plants are viable for 5 months, which allows for two growing seasons per year. Current tomato production is 35,000 to 38,000 pounds per house per year, including both crops. Tomatoes are sold for an average price of 50 cents per pound. The company's goal is to produce 40,000 pounds of vine-ripened tomatoes per house per year.



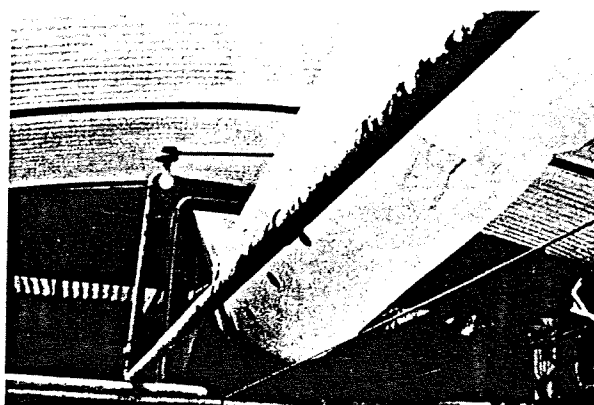
Withdrawal of geothermal water from a natural hot spring at Wendell, California.



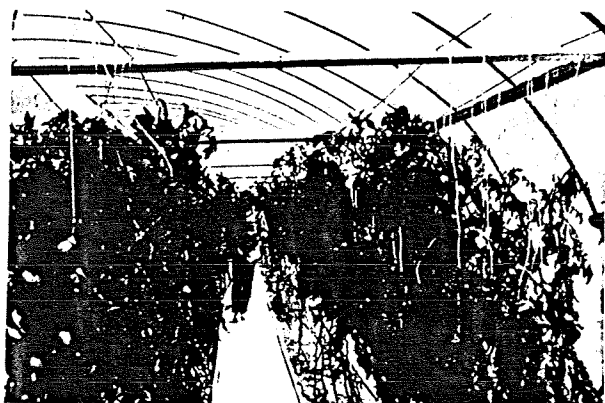
Plant-food holding tanks and greenhouses under construction, Wendell, California.



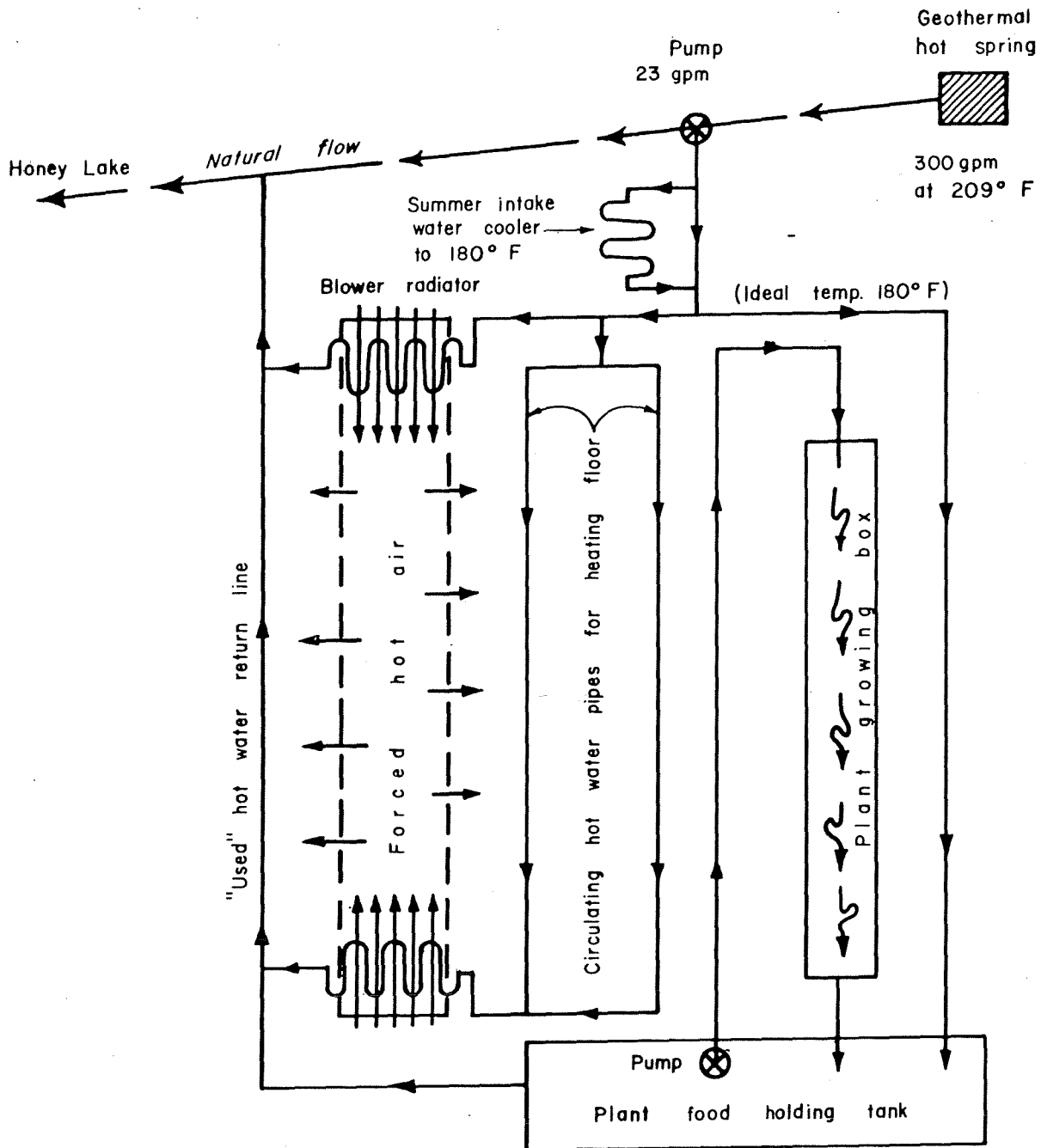
Completed greenhouse ready for planting, Wendell, California.



Hot air from heat exchanger is forced through perforated plastic tube, Wendell, California.



Interior of greenhouse at Wendell, Calif., showing heat-distribution system and finished product—vine-ripened tomatoes.



Schematic diagram of a greenhouse heated by geothermal water, Hobo Hot Springs, Wendell, California.