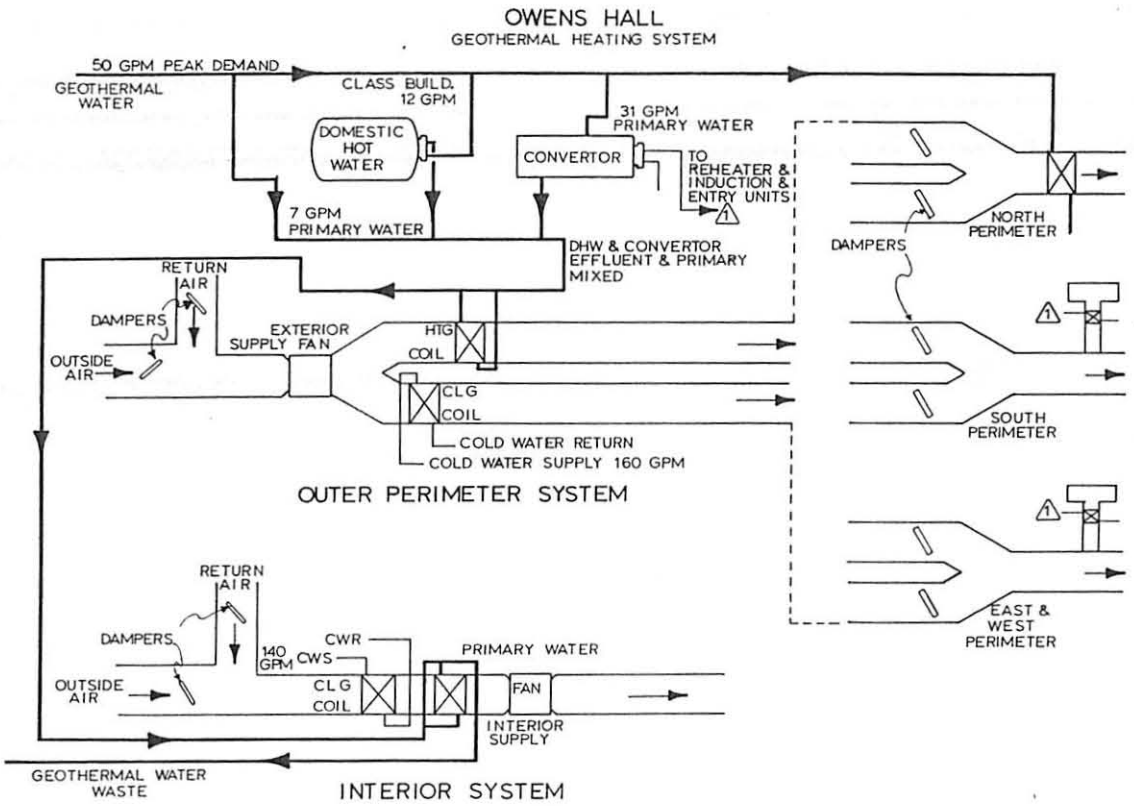


reheaters, entry heaters and baseboard radiators located under windows. Reheaters are used to control the temperature of individual rooms.

For the entire campus the temperature of the effluent water varies between 57° and 60°C, 121,000 J/kg (52 BTU/lb) of heat on the average has been extracted from the geothermal fluid. This rather high effluent temperature is primarily due to the large domestic hot water demands by the campus during the academic year. If the geothermal fluids were used for space heating only, it is estimated that 209,000 J/kg (90 BTU/lb) could be extracted by the existing heating system.

This heating system has operated successfully for 14 years with no fouling problems even though geothermal fluids flowed directly through the heating units.

Geothermal Use in Vale, Oregon
by John W. Lund

A sign on the banks of the Malheu River in Vale, Oregon states:

OREGON TRAIL
MALHEUR CROSSING

Near this spot was the crossing of the Malheur by the Old Oregon Trail. Here passed the ill-fated Whitman party in 1836, the weary travelers of the Great Migration in 1843 and in that year Captain Fremont in his explorations. The nearby hot springs offered a resting place where baths could be taken and clothing washed.

Thus, it appears that the eastern Oregon community of Vale (population 1,500) made an early use of geothermal hot water. Today there are approximately ten hot water wells used for space heating, ranging in temperature from 140° to over 210°F. All of these wells are located on the east bank of the river.

The vale hot springs, recorded as 207°F and flowing at 20 gallons per minute still can be seen steaming on the east bank of the river.

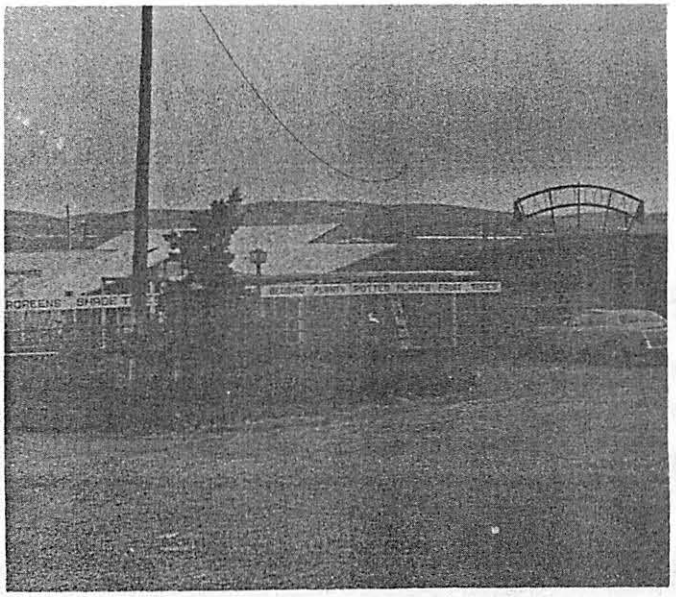
Vale Hot Springs

Around 1915, a health spa and natatorium was constructed by the Hope brothers. This was used extensively by area residents. The health spa burned down later on, but the natatorium (or "Nat") was used until 1961, when it was closed down by the owner, Mr. Ross Butler. The original well was fairly shallow (less than 50 feet); however, after the original natatorium building was torn down in 1952, two additional wells were drilled to 200 feet. During a test pumping of these wells, a water-steam temperature of 230°F was reported. Since cold water was not available, the geothermal water was first run into cooling tanks, and then into the swimming pool. Due to chemical deposition, the wells had to be drilled out about once a week and the artesian flow restarted.

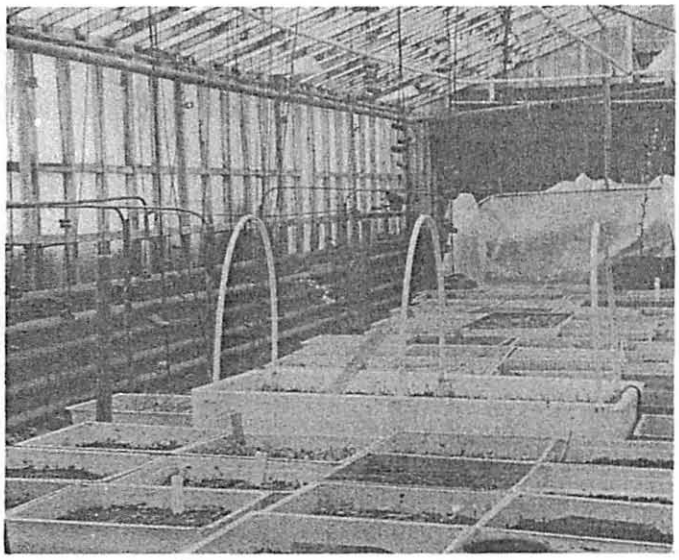
A slaughterhouse was constructed north of the natatorium in the late 1940s. A 35-foot deep well producing 140°-150°F water was drilled and the geothermal water was circulated in pipes buried in the concrete floor for heating. Today all of the water use in the building comes from geothermal water, the drinking water being cooled in the chiller room. Some repair work is required every five years, mainly caused by air-water interface problems.

In 1955, a greenhouse was started in the same area, mainly to combine a hobby and business of orchid growing. The Vale Floral and Greenhouses, owned by the Fuhrimans, use two shallow wells (45 feet deep) to heat four buildings of 45,000 ft^2. 170°F water is used, being circulated by 1-hp pumps around the perimeters of the buildings and under the benches through $2\frac{1}{2}$-inch diameter pipes. In the shop building, the pipes are in the floor.

In addition to the orchids, the Fuhrimans grew snap dragons, carnations, chrysanthemums, asters, gladiolas, lilies, poinsettas, bedding plants, and tomatoes and cabbage plants. They shipped flowers to Portland, Spokane, Salt Lake City, and California.



Vale Floral and Greenhouses



Interior of Greenhouse Showing Heating System

In the same vicinity about six houses are heated with 165°-185°F water from wells around 20 to 30 feet deep.

Information for this article was supplied by The Malheur Enterprise, Mr. Fuhriman, Mr. Butler, Mr. Anthony, and Mr. Humphrey.

Multi-Purpose Use of Geothermal Energy

Copies of the book, "Multi-Purpose Use of Geothermal Energy" consisting of a selection of papers dealing with the nonelectric use of geothermal energy in Hungary, Iceland, New Zealand, USSR and USA are still available from the Campus Bookstore for $9.50 postpaid.

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