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Hawthorne Geothermal District Heating System

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HAWTHORNE

GEOHERMAL DISTRICT HEATING SYSTEM

By Mark Dellinger*

Hawthorne, Nevada is the site of a 99°C (210°F) geothermal resource which could be used for district heating in the near future. The town of Hawthorne, located about 96 kilometers (km) [60 miles (mi)] southeast of Reno, is just east of the Sierra Nevadas. This community originated as a mining town for the people who searched for gold in the mountains to the west.

Now Hawthorne has a population in excess of 4,000 and is a favorite stop for tourists traveling between Reno and Las Vegas. The El Capitan is a popular casino for visitors. It was El Capitan Inc. who developed the geothermal production well. Since that time, a great deal of interest in utilizing the resource has resulted. Nearly 600 man hours have been spent on reports evaluating the engineering and economic feasibility of space heating a number of public and commercial buildings. A discussion of the resource, system design, and the future of geothermal district heating in Hawthorne follows.

The El Capitan well is 2.4 km (1.5 mi) southwest of the city at a depth of

305 meters (m) [1,000 feet (ft)]. Pump tests indicate the well will more than satisfy the requirements for the district heating system as it is now designed. The heating district will serve county buildings (courthouse, public safety building), school buildings (high school complex/elementary schools 1 and 2/administration building), and the El Capitan Lodge and Club. A total of $15,019.6 \times 10^6$ Btu per year of fuel oil and propane would be displaced by the heating district. A 20.3-centimeter (cm) [8-inch (in.)] pipeline will supply geothermal water to the system. Because the water may present scaling problems, plate heat exchangers will be used. In addition, the distribution system has been designed to accommodate future expansion of the district. Present plans for disposal consist of a 6-hectare (ha) [15-acre (a.)] percolation/evaporation pond at the north end of the system (see Figure 1 on the following page for pipeline layout).

The total project cost varies from \$1.3 million to \$1.9 million depending upon how much work can be performed by Mineral County employees and whether insulated or uninsulated piping is used. The two largest components of the total cost are distribution lines and retrofit costs. In some instances, retrofit will be quite expensive because entire heating systems will require replacement. However, many of these systems are beyond their expected life and need replacing immediately. In the majority of cases, retrofit will be relatively inexpensive.

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Currently this project appears to be marginal based on its economic viability. This is primarily a result of the size of displaced fuel use in comparison to system capital costs. The economics would improve if the residential users could hook-up to the system. Furthermore, the El Capitan has planned a 256-unit condominium complex which would increase the heating load. Conventional fuel costs have not as yet increased to a point where geothermal energy, in this case, is more competitive. Also, high interest rates inhibit new

construction and the ability to finance municipal projects.

It is easy to say that conventional energy costs will rise, yet difficult to accurately predict the rate of the increase because of the many factors involved. Therefore, it is difficult to predict when we will see a geothermal district heating system in Hawthorne. However, by the time the economic situation has improved the groundwork will be completed.

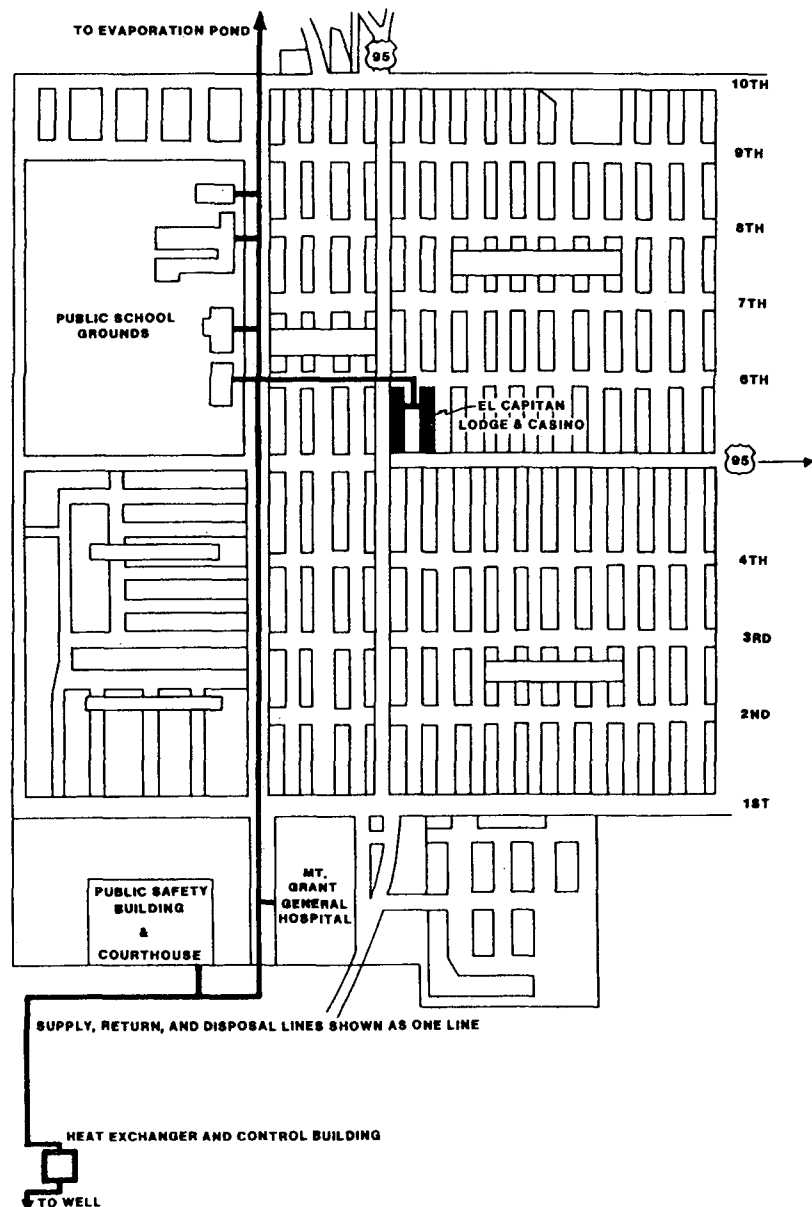


Figure 1. Proposed Hawthorne Heating District.