FAIRMONT HOT SPRINGS RESORT
FAIRMONT, MONTANA

Fairmont Hot Spring Resort as seen from the air.

LOCATION

Fairmont Hot Springs Resort, formerly Gregson Hot Springs, is located in western Montana along I-90 between Butte and Anaconda. The resort sits in a valley at the base of Pintler Wilderness area and is near the Continental Divide. The resort consists of two Olympic-sized swimming pools and two mineral soaking pools, one of each located indoors and outdoors; two three-story guest room buildings with 158 rooms; a 130-seat main dining room; 60-seat coffee shop; 90-seat cocktail lounge along with several shops; and a 7,000-square foot conference center. All of the approximately 106,000 square foot area and pools are geothermally heated. There are plans to expand the conventional center. The resort and geothermal use dates back to 1869, with the current resort rebuilt in 1972 after collapse of walls and closure in 1971.

RESOURCE

Several springs discharge about 760 gpm at 143EF from Tertiary volcanics associated with the Boulder batholith into ponds near the resort. Total dissolved solids are 559 ppm and the pH of the water is 8.41. A well, drilled in 1985 by the Montana Bureau of Mines to a depth of 600 feet provides a flow rate of 180 gpm of 170EF water. At times, the water temperature will vary from 165 to 175EF. During the summer months, the flow is reduced to 120 gpm.

UTILIZATION

The geothermal water is pumped from the well with a 50-hp lineshaft pump that has 22 bowls set at 420 feet. The flow rate is controlled by restricting the flow into the pipeline with a valve. The water flow through a 2,500-foot long fiberglass pipeline into two 1500-gallon collection pits. From the pits, the water is piped to a central boiler room; where, a forced air system supplies heat to individual rooms. Plate heat exchangers are used to transfer the heat with the secondary closed-loop water going out at 160E and returning at 150EF. In addition, copper pipes in the ponds are used to preheat the domestic hot water. Normally, this is adequate to keep the domestic hot water at around 120 EF; however, during colder periods the water is peaked with a fuel oil-fired boiler.

The geothermal water is also used directly to heat the two Olympic-sized swimming pools, each 85 by 212 feet in size, and two mineral soaking pools. Two 100 by 100 pyramid buildings and two three-stories lodging buildings are also heated. In the winter the space heating water is circulated by one 10-hp and two 7.5-hp pumps, and the pools used four 7.5-hp, three 5-hp and two 2.5-hp circulating pumps. The water enters the pools at about 110EF and exits about 98EF.

The water is then discharged to a drainage channel adjacent to the resort. The water goes into a collection pond and then is used by the Peterson Ranch for irrigation of crops (hay and alfalfa). Any chlorine in the water has dissipated by this time. Excess water, not used by the resort is bypassed directly into the local sewer line serving a nearby residential area, and ends up in a sewage lagoon adjacent to the property.

The estimated energy use is 6.48 million Btu/hr (1.90 MWt) and the annual energy use is 43.8 billion Btu. The estimated gross savings is around $500,000 per year (assuming fuel oil at $1.30 per gallon and 80% efficiency).

OPERATING COSTS

Annual operating cost consist of two items: 1) electricity costs to run the various pumps, and 2) maintenance costs. The annual electricity cost for the pumps consist of $21,100 for the well pump, $2,700 for the 10 hp pump, $3,500 for the two 5-hp pumps, $12,000 for the pool pumps, $24,000 for the pool building heating system pumps, and $14,400 for the lobby and rooms three-speed motor blower fans, giving a total of $77,700. However, the only cost directly attributed to the geothermal system is the well pump and the 10-hp and two 5-hp pumps for a total of $27,300. The annual maintenance cost is for preventative maintenance amounting to about $3,500. Thus, the total annual operating cost due to the geothermal system is around $30,800. All other operating costs would be the same, regardless of the type of fuel used for heating.

REGULATORY/ENVIRONMENTAL ISSUES

The only potential problem would be the disposal of the used water onto private land for crop irrigation and stock watering. Excess hot water that is not used goes directly into the local sewer line and is disposed into a sewage lagoon adjacent to the property. However, since the dissolved solids are under 600 ppm and the chlorine used to treat the pools water has dissipated by the time it reaches the ranchers property, there are no environmental impacts. The temperature of the disposed water has not been considered a problem. No permits are needed for the disposal of the water; since, both the source and disposal site are on private land. The local sewer district needs an EPA permit when it pumps down the sewage lagoon for disposal of the sludge. There was a well drilling permit required for the original drilling of the well.

PROBLEMS AND SOLUTIONS

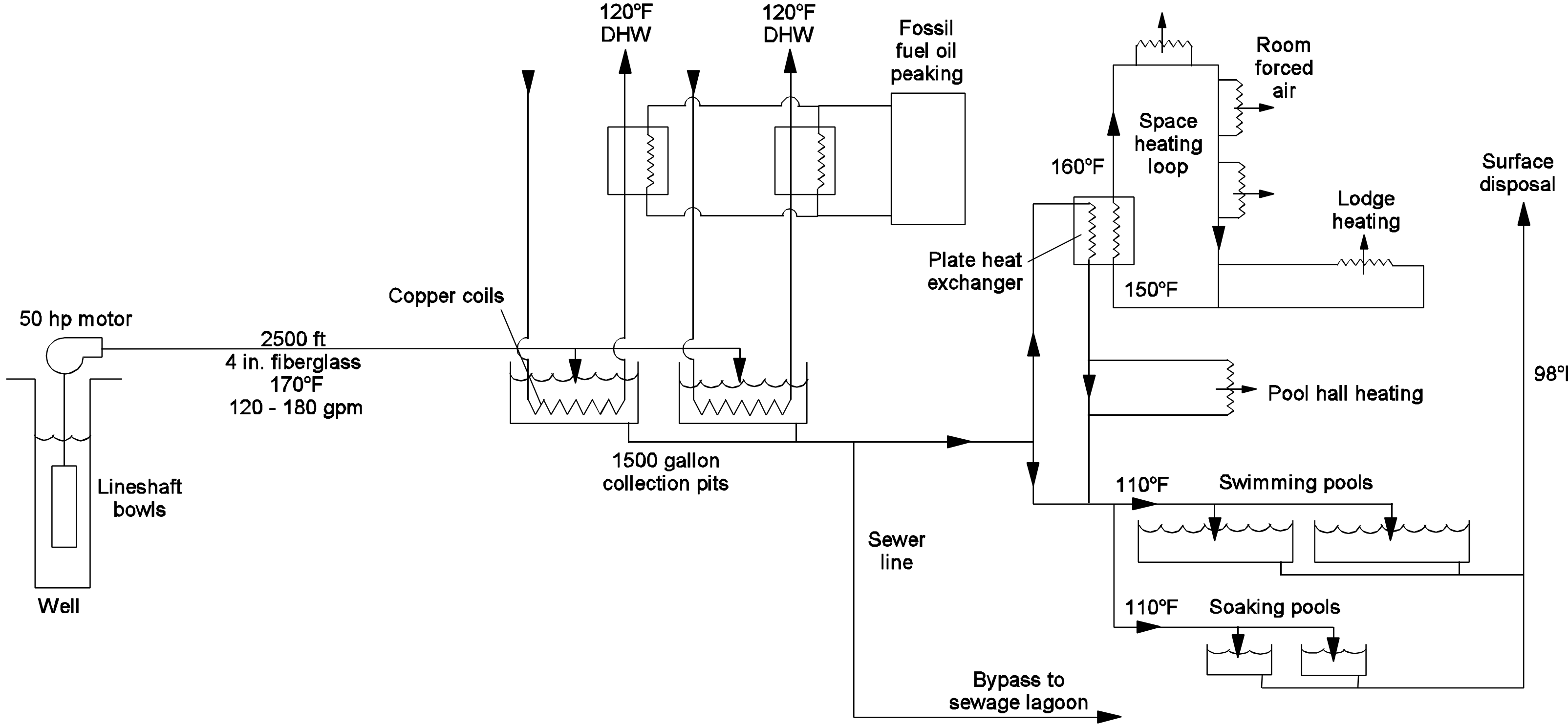
There has been some problems with scaling and corrosion; thus; they have used an acid type cleaner to try to control the deposits.

CONCLUSIONS

The system appears to be operating with minimal problems, both in utilization and in disposal of the fluids. The system cannot meet peak load in certain cases; thus, diesel fuel heat is needed to backup the system. Annual savings are large, and maintenance cost small. Using the geothermal water directly in the pools is a popular attraction for tourists. There are plans to expand the convention center.

REFERENCES

Lienau, Paul J., 1993. Fairmont Hot Springs Resort, *Geo-Heat Center Quarterly Bulletin*, Vol. 14, No. 4, (March), Klamath Falls, OR, pp. 22-23.



Fairmont Hot Springs Resort Geothermal Schematic