

REACH, INC. JUNIPER PROCESSING PLANT KLAMATH FALLS, OREGON

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Geo-Heat Center



LOCATION

REACH (Rehabilitation, Employment and Community Housing) Inc. (in the building formerly occupied by Maywood, Inc.) is located just outside the Klamath Falls city limits. REACH is a non-profit organization which has found a niche in the specialty area of the selective and environmentally-friendly removal of juniper and also finding uses for the entire tree. They are currently planning on expanding operations in the building such as adding two drying kilns. The 110,000 sq ft building was constructed in 1976. REACH has been in the building since 1993 and incorporates vocational-rehabilitation programs with their workforce. About a third of their gross income is from mill work and a third from the juniper products.

RESOURCE

Klamath Falls is located on the western edge of the Basin and Range Physiographic province, and is situated in a graben structure. Geothermal waters upwell along faults to the northeast as high as 220°F and then flow down gradient to the southwest. REACH is located in this outflow zone where the water is cooler.

REACH is served by a single production well, 1520 ft deep, which had a temperature of 118°F when drilled. The well was pump tested at a flow of 320 gpm with a 115 ft drawdown. The maximum flow rate for the pump is 535 gpm. This is the lowest temperature well in Klamath Falls for direct-use. The well is currently producing at 105°F.

UTILIZATION

The well located adjacent to the building has a 75 hp motor running a lineshaft pump. The system is operated from approximately October to April, 24 hours a day. The original system was designed by Balzhiser and Colvin Engineering with nine air handling units (378,000 Btu/hr) and four make-up air handlers (1,856,000 Btu/hr). Because Maywood had a large number of machines with high air volume dust collectors, a large amount of make-up air was required. The nine air handling units have a four-pass coil system (106" x 27", 14 fins/in) and the four make-up air handlers have an eight-pass coil system (83" x 30", 14 fins/in). There have been two smaller HVAC systems installed for the office and a small fan coil unit installed in the shaver room that has been added to the building. The system was installed with pneumatic controls.

The geothermal water is run directly through the system. The system currently utilizes only four air handlers since REACH has fewer machines generating less dust; so, the make-up air heaters are not required. The two office units and the fan coil unit are being used at this time. The water enters the system at about 105°F and is then discharged to a drainage ditch at 95°F. The drainage ditch combines with the Klamath County Maintenance shop geothermal discharge water which will end up in Lake Ewana. The system has a parallel flow with supply and return lines.

OPERATING COSTS

There are several costs associated with operating the system: 1) city water used to cool the oil in the fluid coupling system, 2) maintenance of the pump and replacing of the coils in the system, and 3) electricity to run the pumps. The costs for the water and electricity are not separated out for the system, but an estimate can be made.

They use about 114,100 ft³ of water per heating season for cooling the oil in the fluid coupling system which has an annual cost of about \$970. They use approximately on average 1000 kWh/day of electricity more during the heating season, which could be attributed to the running of the pump. If the system is run for eight months out of the year, we can assume they use 240,000 kWh for the heating system for a cost of \$16,000. The cost of the electricity is approximately \$.07/kWh. The total operating cost for the system is, therefore, almost \$17,000.

They replace either one or two coils a year with cost of about \$6,000 per coil including labor. This would make a maintenance cost average of \$9,000 per year.

It has been estimated that the well pump has been pulled twice since it was first installed. The impellers were replaced at a cost of \$12,000, but there is no information about additional repairs at those times.

REGULATORY/ENVIRONMENTAL ISSUES

Since the system is located outside the city limits of Klamath Falls, REACH is not required to reinject the geothermal fluid after use. The geothermal is surface disposed of to a ditch which combines with the County Maintenance discharge, which then flows to Lake Ewana

They obtained an Industrial Geothermal Permit in January 2004 from the Department of Environmental Quality (DEQ). This permit authorizes them to discharge their spent geothermal fluids into the waters of the state while they are in compliance with all the requirements, limitations, and conditions set forth in the permit. The parameters and limitations they must meet are:

Flow	shall not exceed the natural geothermal source flow
Temperature	shall not exceed the geothermal source temperature
pH	shall be between 6.0 - 9.0
Other Pollutants	no biocides or water treatment chemicals shall be discharged

All of these measurements are to be taken monthly and a report submitted at the end of the calendar year to DEQ.

PROBLEMS AND SOLUTIONS

Since they are using the geothermal water directly in the system, this has been causing corrosion problems in the coils. They run the system at 20 psi for that is all the pressure the coils can handle without leaking. When REACH bought the building, there were replacement coils left in the building; thus, they have not bought any new coils since they started operation in the building. Due to the corrosion of the coils, they are only running 3 or 4 heaters at a time. They do not use the make-up air handlers as the coils will clog very rapidly. The pneumatic controls are also not working on the system.

Switching to a smaller variable-frequency pump (\$36,000) with DDC system controls (\$13,000) would greatly increase the efficiency of the system. The corrosion in the coils can be eliminated by placing a plate heat exchanger (\$7,500) in the system as the geothermal water enters the building. This would allow clean city water to be run through the coils instead of the more corrosive geothermal water. This would mean that all the coils (9) should be replaced at the time the heat exchanger is installed. This would extend the life of the coils. They are looking into to ways to make the heating system more efficient.

Since the well is only cased for the first 600 feet, it appears that some sloughing has occurred near the bottom, as the temperature has dropped from 118°F to 105°F.

CONCLUSIONS

The system seems to be supplying adequately heat to the building, as the workforce only needs about 60°F room temperature. However, an overhaul of the system including cleaning the well, appears to be necessary to make efficient use of the resource.

The present installed capacity is about 0.5 MWt, utilizing 8.2 billion Btu/yr at a savings of \$75,000/yr (compared to natural gas).

REFERENCES

Lienau, Paul, 1976. "Maywood Industries of Oregon uses 118°F Well for Heating," *Geo-Heat Center Quarterly Bulletin*, Vol. 2, No. 2, p 3-4.

