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GEOTHERMALLY PASTEURIZED MILK PROCESS

Elmer Belcastro

Medo-Bel Creamery Inc.
Klamath Falls, Oregon

"Medo-Bel Creamery, the only creamery we know of anywhere that uses geothermal heat in the milk pasteurization process." These are words that are used in each radio, television, and newspaper commercial and ad by Medo-Bel Creamery telling the story of geothermal uses by Medo-Bel.

The geothermal well located at the corner of Spring and Esplanade Streets in Klamath Falls, Oregon, was first drilled in 1945 by the Lost River Dairy to a depth of 750 feet. The well was designed by a New York engineering firm to insure maximum heat at the well head with a minimum of pumping time. This has been the only commercial well used in Klamath Falls.

The well is double-cased to 450 feet to insure a constant heat at the top of the well. With this double-cased method, the artesian water runs into the storm drain year around.

The water is pumped from the well with a new 7½ hp pump, with a capacity of pumping up to 100 gallons per minute to the milk plant into the short-time pasteurizer where it goes through a series of plates with the milk on opposite sides. The milk travels through the plates at a rate of 800 gallons per hour and is heated to 172 degrees F for 15 seconds. If the milk temperature should drop below 165 degrees F, the short-time pasteurizer automatically recirculates the milk and will not let it through the pasteurizer.

The milk then goes to the homogenizer at 172 degrees F back to the short-time pasteurizer to cool by chill water to 38 degrees F as the milk goes into the cartons with no chance of cook on. This insures both flavor and longer shelf life.

With this method of pasteurization, Medo-Bel Creamery has been a constant winner of awards for outstanding dairy products in the Oregon Dairy Industries competition each year. In 1977, Medo-Bel was awarded a total of five certificates including gold awards for homogenized and 2% milk.

The only energy used in this pasteurization process is the 7½ hp pump which costs approximately $120 per month to operate the pasteurizer and heat the 30,000 sq. ft. building.

In comparison to other creameries, the procedure is the same except a gas- or oil-fired boiler is used in place of the well. Steam is generated and mixed with domestic water and run through the pasteurizer but all at a much greater cost. The danger here is that if the steam gets into the short-time pasteurizer, the milk will cook on the plates. This will result in a cooked flavor to the finished product. The cost of this method is for the fossil fuel plus the electric energy to run the system and the domestic water used to operate it.

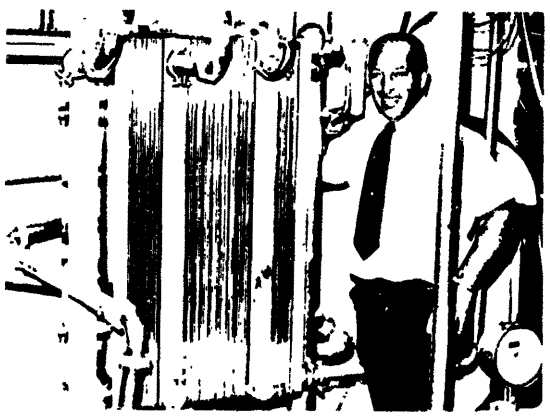
At Medo-Bel Creamery, all pipes are overhead from the pump to the main building. The reason for not putting the pipes underground is to eliminate corrosion of the pipes from sweating. The sweating in the pipes is due to heat emitted from the hot pipes into the ground. Pipe corrosion seems to be the only problem and expense that we cannot seem to eliminate. I am hoping that with all the geothermal studies now underway that someone will come up with a metal or treated metal to minimize the problem of corrosion.

Geothermal heat in our area for heavy commercial use is limited to the limited heat of the water thus far. To use geothermal heat for heavy commercial use, we must find the eye of the volcano which is supplying the heat. When tapped, it would serve an unlimited amount of heat to be used in abundance. So far, geothermal wells are mostly used for heating homes and heating of commercial buildings.

To try and get enough heat from the limited heated wells requires the pumping of too much water out of the ground, thus creating another problem of water shortages in existing wells. Water level drops and temperature drops came simultaneously in 1977 in the Klamath Basin and was felt by the operation of Medo-Bel Creamery.

Downhole heat systems are never a problem because no water is pumped out of the ground and this does not affect the water table, but to pump back into the ground could result in putting cool water into a hot vein of water thus cooling the water of other wells. This can especially occur in an area like Klamath Falls which has a great number of hot wells in a small area. I am convinced that some wells are cooling because of this method.

I feel that much study and research should be done before any large-scale commercial geothermal development is attempted. This will insure existing capacities and temperatures of current wells are not affected adversely. In the operation of Medo-Bel Creamery, this is vital to its continued existence and success. It has enjoyed being the only dairy that uses geothermal heat in the milk pasteurization process.



Owner, Elmer Belcastro, standing next to the plate heat exchanger (pasteurizer).