September, 1979

GEOTHERMAL FOOD PROCESSORS, INC.
BRADY'S HOT SPRINGS, NEVADA

The first U. S. vegetable dehydration plant to utilize geothermal energy was dedicated November 3, 1978 at Brady's Hot Springs. Geothermal Food Processors, Inc. is the owner and operator of the plant. In 1979, Anderson Laboratories, Inc. of Bloomfield, Connecticut, purchased a 90 percent interest in Geothermal Food Processors. The facility was built under a $3.5 million U. S. Department of Energy Guaranteed Loan from Teachers Retirement System of Georgia. Bankers Trust Company acted as financial advisor in privately placing Guaranteed Notes and will act as Trustee. This is the first known placement of geothermal common equity with a public corporation.

The facility is designed to utilize geothermal energy in the drying and desiccation of vegetables. It incorporates the most modern engineering concepts in bulk vegetable processing. Gilroy Foods and McCormack & Company cooperated in its design. Gilroy Foods intends to supply 25-30 million pounds of raw onions annually for dehydration by the facility. Geothermal Food Processors expects that the use of geothermal energy will reduce the cost of vegetable dehydration, over the long term, by 8-10 percent as compared with conventional energy sources.

Geothermal Energy Corporation, a New York-based firm specializing in the financing and commercialization of geothermal energy projects, arranged financing for the project. Morrison and Knudsen Co. of Boise, Idaho, provide technical, operating and supervisory services for the plant, which has dehydrated onions in both the 1978 and 1979 summer seasons.

The plant is housed in a 40- by 600-foot building just east of the Hot Springs-Nightingale exit on Interstate Highway I-80, approximately 50 miles east of Reno. This area was explored for geothermal energy in the late 1950's and early 1960's by Magma Power Co. The plant utilizes 270°F (132°C) geothermal fluid from a well, the Magma Energy Co. SP-Brady No. 8, which is located about 1000 feet east of the plant. Up to 700 gallons per minute of the fluid are pumped from the well and supplied to the plant along an insulated pipeline. Testing of the well in 1978 was conducted by Thermal Power Co. (J. M. Rudisill, written commun., 1979). A back-up well has recently been drilled near the producing well. The plant has processed only onions until now, but could produce several other dehydrated vegetable products with a minimum amount of conversion effort.

The onions are transported to the plant from California in large trucks. They are then dumped into a large room at the east end of the plant where they are heated geothermally to about 85°F, withdrawing just enough moisture to make removal of the skins easier. A fork-lift then scoops up the warmed onions and loads them into hoppers which remove the skins. The vegetables then move down a conveyor belt where the onions are cored and dumped into the drier, which utilizes geothermal heat.

The thermal water from the well is piped to the plant, passed through heat exchangers and the heat is absorbed by a treated liquid system which warms large driers and removes the moisture from the onions. A 9,000-pound load of onions weighs only 1,400 pounds when it emerges from the drying process. By the time the dehydration process has been completed, 78 percent of the volume of the onions has been removed. The air temperature inside the drier is maintained at about 190°F and the onions remain inside the drier for several hours. After the geothermal fluid has been stripped of most of its heat, it is disposed of at the

surface in an area south of the plant. The water has a temperature of 270°F in the well and is about 130°F when it is released from the plant. After drying, the dehydrated onions are milled, packed into large barrels and shipped to California where they are packaged for consumption. At a full capacity, the plant can employ up to 85 workers, running three shifts a day.

In the spring of 1979, the Magma Power Co. Brady No. 5 blew out during an attempt to flow-test the well. Corrosion had apparently affected the well casing near the surface. This blowing well stimulated considerable surface geothermal activity along more than a mile of the Brady Thermal Fault. The activity is similar to that reported following the blow-out of a well during drilling in 1959. The Brady No. 5 well is near the SP-Brady No. 8 which produces geothermal fluid for the vegetable dehydration plant. Although the production well was affected, it is still capable of supplying the needs of the plant.

For the past several months steam has been venting at the surface along the trace of the Brady Thermal Fault, from the original Brady's Hot Springs area south of the blowing well to approximately 1000 feet northeast of old U. S. Highway 40. The thermal activity crosses the highway at the same place as it did in 1959. Numerous mud pots, some up to 10 feet across, have formed in the unconsolidated alluvium, and in many areas a considerable amount of steam is rising through the sediments and older spring deposits. The area is quite dangerous, and visitors should exercise extreme caution.

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TOUR OF PLANT

On this tour you are your own tour guide...sort of a follow the bouncing ball without the ball. The labels at each step outlined below correspond to signs on the equipment and the plant is virtually a straight line operation, so the tour is simple.

Start at the southeast fence corner. About 1000 feet off to the south (at the end of the insulated pipeline you can see from this vantage point is the well from which the geothermal fluid for the operation is pumped. The insulated pipeline is 1300 feet long and carries the fluid at 270 degrees F to the north side of the buildings where we will see it later on the tour.

1. CURING: Now turn 180 degrees and walk toward the east end of the 600 foot long building which house GFP. Directly in front of you in the open portion of the building is where the onions (for our example today) enter the plant. The raw onions are spread over a series of drying plenums where air, warmed by geothermal energy, is passed through them to provide initial drying and curing of the skins.

2. TOPPER: After drying, the onions are conveyed into this machine where brushes hold them in position and knives cut the tops off. The onions then pass on to a washer and undersized onions fall through the graded grate at the end.

3. CORING: From the washer the onions move to the coring line inside the building. This is the most labor intensive operation in the entire plant. Here there are 22 positions each with a water driven corer where the operator holds the onion against rotating knives which remove the cores. The onions then move to a second

4. WASHER: A large stainless steel drum located at the end of the coring line. Spirals can be seen on the inside of the drum carrying the onions which are washed by water jets. From the washer a conveyor carries the onions to the surge/bin which provides storage so that the coring line operating on two shifts can provide enough onions for the dryer to operate for three shifts, 24 hours a day. From the surge bin the onions go through the

5. SHUFFALO/FEEDER: across a weigh belt and via a small conveyor to the

6. DICER: where they are sliced and then conveyed to the dryer where they are spread evenly across the inlet end by a wiper feed.

7. The DRYER is in three stages totalling 190 feet in length and it is here that the geothermal heat gets its most important application. Stages A and C each have four sections. Desiccated air is blown up through the onion slices in the first and third section, down through them in the second and fourth. Between stage A and B there is a transfer conveyor and stage B has two sections, air up in one, down in the other. Another transfer conveyor connects stage B to C and these four sections accomplish final drying. From the end of the dryer the dried product is moved by an elevator auger into the mill room where it enters a four stage

8. SIZER: At each stage the oversized product goes across a screen as the size for that stage drops through into fiber barrels for shipment. At stage four of the sizer the oversized product is raised to a shaker on the platform overhead to your left. Three additional grades are sized by this device.

HEAT EXCHANGER AND DESICCATOR

If you wish to see the heat exchange equipment, walk out the rolling door on the north side of the building and turn to the right. You will see the geothermal fluid pipeline running along the ground just beyond the fence line and then turning into the lean-to addition to the main building. This lean-to houses the heat exchanger and air drying equipment.

QUESTION: Even though geothermal energy has replaced the natural gas normally used by the food processing industry for vegetable drying, aren't there a lot of electric motors used in the process?

ANSWER: True. The dryer line alone has 600 hp to 150 hp and the entire system requires almost 1000 hp with motors ranging from ¼ hp to 150 hp. A 3000 amp service is required for the plant.

We hope you enjoyed your tour.

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