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AN UPDATE ON THE UTAH ROSES GEOTHERMAL PROJECT

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ABSTRACT

Utah Roses is currently developing two geothermal greenhouse heating projects in the Salt Lake City area, one at Bluffdale, Utah, and one at Sandy, Utah.

The Bluffdale project is located next to the Utah State Prison and is utilizing the Crystal Hot Springs resource. This project is being developed entirely with private funds. Construction of a 70,000-square-foot greenhouse is underway, and planting of 50,000 rose plants will be completed during June of 1980. Production will commence in September.

The Sandy project is a cooperative demonstration with the Department of Energy of the use of geothermal heat for heating commercial greenhouses. A well has been drilled to a depth of 5,000 feet, and a temperature log of the hole indicates a temperature of 157° F. However, pump tests of the well indicate a restricted flow at a temperature of 122° F., indicating that the lower zones of the well, though warmer, are not productive.

INTRODUCTION

Utah Roses, Inc. is a commercial grower of fresh-cut roses, supplying the floral trade in several states, primarily in the midwest. Because of the highly competitive nature of the rose business, with roses being supplied from some 400 growers throughout the United States, and increasingly, from Israel and Columbia, Utah Roses has adopted a policy of emphasis on quality and on being a low-cost domestic producer. It is the company's expectation that this strategy will enable the company to expand its market in the face of a static market and increasing foreign low-cost production.

Greenhouse operators in the U.S. have, along with other fuel consumers, experienced dramatic increases in fuel costs in the years since 1973. In Utah Roses' case, the cost has increased at a compound rate of 25% per year. Fuel costs for heating the greenhouse were 15% of sales in 1979. In response to this, Utah Roses has investigated several methods of reducing heat use, including the use of double-wall polyethelene covered greenhouses, the use of extra polyethelene covers on existing structures, internal heat blankets which are pulled over the growing areas at night, secondary heat recovery from boiler flue gasses, boiler modifications to increase efficiency, solar heating systems and others. Some of these have been utilized, others have proved too costly to provide a payout.

THE SANDY GEOTHERMAL PROJECT

The company has actively been investigating the use of geothermal greenhouse heating since 1976. After looking at various locations and resources, the company made a proposal to the Department of Energy under the PON program in 1978. The proposal was for a cooperative program to drill a well at the company's existing location at Sandy, Utah, to explore the possibility of finding a resource based on the temperature gradient in the vicinity of the greenhouses. Wells in the area showed temperatures of 90° F. at 800 to 1,000 feet, and it was expected that the temperature gradient would provide enough additional temperature to make a greenhouse heating project feasible.

The well was drilled in November and December, 1979, to a depth of 5008 feet. The drilling was accomplished in 14 days, under the supervision of Energy Services, Inc. of Idaho Falls. The drilling contractor was Colorado Well Service Company of Rangely, Colorado.

Immediately upon completion of drilling, the drilling contractor was dismissed and a temperature log was run on the well. (Fig. 1.) The well developed an artesian flow of 10-15 gpm. Plans were made for a pump test of the well to determine flow capacity and temperature at maximum flow rate.

The pump test was scheduled for January

twenty-second, 1980. Just prior to the pump test, another temperature log was attempted, but the temperature probe was unable to go below 2800', indicating that bridging had taken place. The pump test was inconclusive because of the bridging, so plans were made to bring in a workover rig to clean the hole and to run casing to 4000' to keep the hole from caving, and also to case out the cooler water at the higher levels in the hole, thus increasing the temperature at the wellhead. At this point it was assumed that there were productive zones throughout the well and that casing out the cooler zones would allow more of the hotter water to reach the surface.

On March 4, the workover rig was erected and the bridge was removed and the well was cleaned to the bottom. A 5 1/2 OD casing was hung but not cemented. It extends to a depth of 3885 feet.

The second pump test on March 13 and 14 produced unexpected results. With a 500' drawdown, the well would produce only 180 gpm at 121° F. A subsequent pump test, with the pump set at 750', increased the flow to 235 gpm at 123° F. This indicates to us that although the bottom of the hole is hotter, there is no appreciable production from that area, and the primary production is probably coming down the outside of the casing and then up the inside.

At this writing, further temperature logs are being taken and all data is being analyzed to determine the next step on the well. We are considering some kind of stimulation of the area of 4500' where there is indication of production, and perforation of the casing at higher levels where there are production indications. Our goal is to maximize temperature and flow as much as possible in order to increase the amount of heat we can recover, and also to reduce the cost of the heat exchange equipment that will be required to transfer the heat into the greenhouse.

Preliminary estimates indicate that the well will be able to provide approximately 25% of the peak heat load for the greenhouse, which will amount to perhaps 50 to 60% of the annual heating cost. In 1979, this was $125,000, so the savings on heat may amount to $60,00 to $70,000 per year at today's fuel prices. However, the cost of the heat exchange equipment is not known at this time because of uncertainty as to flow and temperature. When this information is known, an economic analysis will determine the feasibility of using the well to partially heat the greenhouse.

Further data will be presented at the GRC meeting, reflecting further work on the project.

BLUFFDALE PROJECT

While the Sandy project was in the planning stages, Utah Roses was approached by the owner of a piece of property containing Crystal Hot Springs, and that property was offered for sale. Because of the economic necessity of getting control of our heating costs, management decided to hedge its bets on geothermal, and to acquire that property. The reasons were twofold. First, we wanted to assure that we would be able to utilize geothermal heating, and second, we needed to expand our production to meet what we perceived to be a demand for our roses. Since we had no added space at Sandy, we needed a new location anyway, and Bluffdale was near our existing location, and appeared to have a good geothermal potential.

After acquiring 25 acres of the property, we attempted two wells -- one for a source of higher quality water that would be suitable for irrigation of the rose plants, and a second for heating the greenhouses. There is a series of ponds on the property we acquired, which have hot water flowing into them at a temperature of 140° F. These ponds form a semi-circle, and appear to be at or near a fault. We selected a location within the semi-circle that would allow us to intersect the fault at a depth of about 200 to 400 feet. This well was drilled (again under the supervision and with the engineering and geological advice of Energy Services Inc. of Idaho Falls) to a depth of 410'.

The well produces 193° F. water at an artesian flow of 100 gpm and with a pumping rate of 500 to 700 gpm.

The second well was located across the fault, as far from the warm ponds as we could go and still stay on our property. This well produces 200 gpm of medium quality water at 60° F., which will be used for irrigation. It is 200 ft. deep.

Financing has been arranged through private sources, and construction has begun on 70,000 square feet of greenhouses which will be heated entirely by the geothermal well. It is estimated that this well has the capacity to heat 250,000 square feet, and the additional area will be developed after the market for the production of the first phase has been firmed up.

It is required by the Utah State Engineer that the used geothermal water be reinjected. In order to prevent recirculating the reinjected water into the production well (or wells), the reinjection well has been sited approximately 1,000 feet west of the present production well, which is believed to be the direction of flow of the

geothermal water through shallow aquifers. The hot water will be pumped out of the production well and directly into heating pipes throughout the greenhouse, then through a pressure control valve which will maintain pressure within the system, then to the reinjection well.

Water rights have been applied for for additional geothermal water, and it is expected that additional wells can be drilled. The development of the 25 acres will proceed in stages until it is limited by the availability of hot water or until all of the acreage is utilized. Uses other than greenhouse heating will be considered, and greenhouse crops other than roses will also be considered.

FIGURE 1