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## SITE SPECIFIC DEVELOPMENT PLANS

David McClain

Idaho Office of Energy

A Site Specific Development Analysis is a qualitative and quantitative analysis of technical, economic, environmental and institutional factors which influence the scale and timing of geothermal development. A Site Specific Development Analysis describes the institutional, logistical, geological and economic parameters which effect geothermal development. Locations selected for Site Specific Development Plans during the 1979 contract period were Weiser Hot Springs, the cities of Hailey, Fairfield and Stanley. These sites were selected based on resource potential and local development interest. Copies of detailed site specific development reports are available from the Idaho Office of Energy and the U. S. Department of Energy, Idaho Falls Operations Office.

The following are abstracts of these reports:

### Fairfield

The Fairfield area was selected for a site development analysis because: the State Water Resources Department has classified the area as a Geothermal Resource Area, the City has requested assistance from the Idaho Office of Energy regarding potential for space heating public buildings; and Camas County, through the Wood River Resource Council, requested assistance from the Office of Energy regarding an evaluation of potential resource locations for industrial applications.

Fairfield, Idaho is a small agricultural community located on the Camas Prairie in central Idaho. The community is located at an elevation of 1544 meters (5,065 ft.) and has 8,575 heating degree days.

Camas County is interested in developing the area's geothermal resources for space heating public buildings and for locating a new industrial park. Other potential applications include controlled breeding conditions for

livestock and greenhouses. The following section describes the estimated cost of exploration at several potential sites in Camas County.

Three areas near Fairfield appear to offer excellent to good chances for geothermal exploration. Resource development costs were estimated for five potential drilling locations within the potential resource fields. Four wellhead sites were evaluated as potential industrial park locations. In each of the four industrial cases the wellhead cost of geothermal energy was very low compared to alternative fuel costs. Even though these costs do not include a disposal system, they are so low as to suggest that any commercial or industrial establishment able to locate at the heat source would derive huge benefits in terms of fuel savings from use of geothermal fluids. For Site #5, space heating of Fairfield, it also appears that even with the possible inclusion of additional costs for possible disposal or management fees, geothermal space heating would be a tremendously attractive proposition.

Based on a city population estimate of 450 by the Idaho State Division of Budget, Policy, Planning, and Coordination and an average family size of just over three persons, the projected number of households in Fairfield is 150. Assuming an average home uses about  $0.2 \times 10^9$  BTU's per year, total heating demand for Fairfield is about  $3 \times 10^{10}$  BTU's per year. The annual heat load translates into a design heat load of  $1.17 \times 10^7$  BTU's per hour, the peak heat load any heating system must satisfy.

With an expected water temperature of  $100^{\circ}\text{C}$  ( $212^{\circ}\text{F}$ ), the temperature drop to be expected is  $14^{\circ}\text{C}$  ( $57^{\circ}\text{F}$ ). With that temperature drop and the expected flow of 500 gallons per minute, the heat delivered by the water is  $1.43 \times 10^7$  BTU's per hour or  $1.25 \times 10^{11}$  BTU's per year. Thus, available heat from the geothermal water is expected to be sufficient to meet the Fairfield space heating demand.

#### Hailey

The Hailey site was selected for site specific development analysis because there has been a historical use of the thermal water for space heating the Hiawatha Hotel in Hailey for over forty years. The feasibility

analysis evaluated major factors having a direct bearing on the potential for expanding the use of geothermal space heating in the City of Hailey. Hailey, which has 8,070 heating degree days, has a total heat demand of  $4.12 \times 10^7$  BTU's per hour.

Annual savings in operating costs for geothermal heating versus natural gas heating amount to \$317,115 in the first year and rise over time with natural gas prices. The internal rate of return, which equates a 20-year stream of savings to capital costs for a geothermal system, is a favorable 13.33% for a public system, versus a low -3.36% for a private system.

The major constraints to developing a Hailey district heating system which utilizes Hailey Hot Springs are the questions of water rights and resource ownership at the Hot Spring. It is apparent from the available public information that there are no major constraints to groundwater development in Democrat Gulch. The question of current water claims, implied or recorded, is confined to diversion of surface waters for irrigation. To what extent the surface diversion of Hailey Hot Springs will restrict the development of ground water resources is unknown. This is because the question of surface water rights to Hailey Hot Springs is unclear.

It is apparent from this analysis that the city owned district heating system has the highest potential for successful economic development.

### Stanley

At the request of the City of Stanley, Idaho, the Idaho Office of Energy conducted a Site Specific Analysis of the potential for developing the geothermal resources at Stanley into a district heating system.

Stanley, an isolated mountain community which has 10,739 heating degree days, has significant hot springs with surface temperature of  $41^{\circ}\text{C}$  ( $105^{\circ}\text{F}$ ) located within 1 km (.6 mi). The analysis considered resource evaluation, site specific application, and the development process. Annual savings in operating cost of a geothermal system versus the alternative fuel, propane, would be \$78,796 in the first year, and increasing thereafter. This represents an extraordinary 67% internal rate of return over a 20-year life of the system. Major barriers to development are institutional.

The mineral entry withdrawal of all federal lands within the Sawtooth National Recreation Area will restrict exploration to private lands. The Geothermal Steam Act of 1970 (CFR 43-3201.1-6) specifically forbids the development of geothermal resources on federal lands within National Parks, National Recreation Areas and National Wildlife Refuges.

### Weiser

The Weiser Hot Springs site was selected for site specific development analysis because the site has a number of geographical aspects which are critical locational criteria for industrial development. The geothermal prospect is located close to the state's major east-west railroad, a natural gas pipeline, major power transmission lines and the interstate freeway. These support facilities are necessary for industrial development and with the unique combination of a nearby geothermal energy source, the Weiser site is a logical location for a new geothermal-industrial park.

The Weiser State Specific Development Plan describes the institutional, logistical and economic parameters which will affect the development of a new industrial park based on geothermal energy. The development concept involves locating one or more industrial facilities at the railroad located 4,877 meters (16,000 ft.) south of the proposed wellfield.

The resource temperatures are expected to range from a minimum of 90°C (194°F) to a maximum of 140°C (284°F) based on the geochemistry of the water. The types of processes considered for the industrial park were based on local and regional raw products. The types of processing envisioned are: potato starch, ethanol distillation, corn canning and processing, and onion dehydration.

A well program was developed for three possible depths to obtain a realistic range of drilling cost. Three possible distribution systems to deliver the resource to the point of use and the pump and power requirements necessary to deliver the resource were also developed to obtain an estimated deliverable energy cost. For all cases considered, geothermal energy was found to be competitive with other deliverable energy sources.

The Weiser site has considerable potential for developing a geothermal industrial park. The Weiser Hot Springs geothermal area has excellent

location with respect to transportation and utility corridors. The area has abundant agricultural production and could supply the raw product needs of the types of processes outlined in this report. Development interests who are working without federal assistance are currently studying the feasibility of a geothermal-ethanol plant at this location.

Better funding mechanisms are needed for direct application projects to obtain risk capital for exploration. Also, a loan guarantee program is needed for construction of a hybrid geothermal-ethanol plant. A prototype plant is needed to demonstrate the feasibility of geothermal-ethanol production.