Idaho Geothermal History

A Detailed History

Governor's Office of

Energy Resources

Detailed History

Pre-Historic Time to 1900

In many places throughout the United States, geothermal waters were used by Native Americans for bathing, cooking, warmth and medicinal purposes. Hot springs served as a neutral ground for warring tribes. Native Americans have a history at every major hot springs in the United States (U.S. Department of Energy, 2002). Some of the hot springs in Idaho were popular places for Native Americans to congregate as indicated by artifacts and petroglyphs on nearby rocks.

The development history at several Idaho hot springs dates back over 100 years. Burgdorf Hot Springs was used by trappers, etc., as long ago as 1862. Challis Hot Springs and Givens Hot Springs opened for business in the 1880s.

In 1890 and 1891, the Boise Water Works Company completed two geothermal wells in an area east of Boise. Within a couple years, the nation's first district heating system was birthed. Geothermal water was put to use along Warm Springs Avenue to heat over 200 buildings including homes, businesses, and the Boise Natatorium, a 65 by 125 foot enclosed swimming pool (Figure 1). Owners of this heating district over the next 100+ years have included the Artesian Hot and Cold Water Company, Natatorium Company, Boise Water Corporation, and, today, the Boise Warm Springs Water District (Worbois, 1982).

Near the end of the century, Heise, Red River and Green Canyon Hot Springs opened for recreation business. Dellinger et al. (1982) reported that Guyer Hot Springs near Ketchum was put to use for heating homes, businesses, and a commercial hot springs in the late 1800's.

1900 through the 1920s

Four commercial geothermal spas (Downata, Banbury, Lava and Desert) went into operation in Idaho in the early 20th century. The Hailey Hot Springs were used to heat the Hiawatha Hotel from about 1919 until 1979 when it was destroyed by fire (Eastlake and McClain, 1979; 1980).

1930s through the 1960s

Overall, these decades were a slower period for geothermal development in Idaho due to inexpensive energy costs. However, some advances were made in the greenhouse and recreation industries.

In 1930, Edward's Greenhouses became the first commercial greenhouse operation in the United States to use geothermal water for a heat source to grow plants (The 1,000+ foot well was actually drilled in 1926). Edwards continues to use geothermal water today as their main heating source. Milstead began greenhouse operations a short distance to the east of Edwards in the 1930's. The Milstead business has changed ownership several times and is currently owned by the Terteling Company, LLC.

By the 1930's, the district heating system in east Boise was delivering water to approximately 400 residences, and a number of businesses (Dansart et al., 1994). However, in 1934, a windstorm blew in part of the Natatorium's roof. The building was declared unsafe and tore down. The pool remains as a cold water swimming pool (Figure 2), and a trolley that was part of the Natatorium facilities still serves as a restaurant.

Figure 2 - The original geothermal pool for the Natatorium is now a popular swimming pool, maintained by the City of Boise Parks and Recreation Department. However, it is no longer filled or heated with geothermal water. ***Photo credit: Armstrong Architects***

Development of geothermal pools and spas continued with the addition of Sligar's Thousand Springs Resort in 1952.

1970s

Geothermal development in the 1970s picked up steam as energy prices rose sharply. New uses and expansions occurred in the areas of aquaculture, exploration for district heating and power generation, and greenhouse heating.

In 1973, Leo Ray became the first person to use geothermal water to raise catfish in Idaho on his farm in the Hagerman Valley near Buhl. In fact, Mr. Ray may have been the first person in Idaho to put geothermal resources to work for any type of fish farming. Mr. Ray also raises tilapia, sturgeon, and alligators with geothermal water. Several other geothermal aquaculture businesses were created in the following years, and these operations are currently raising tilapia, ornamental fish and reefs.

In 1974, the homeowners along Warm Springs Avenue purchased the district heating system that had begun operation in east Boise in 1892.

In the 1970s, the "energy crunch" prompted the initiation of three new renewable energy projects in Idaho:

1. Exploration began in the Raft River Known Geothermal Resource Area, Cassia County, in 1973, to determine the viability of using geothermal resources to generate power using a never-before-tried technique called the binary cycle. By 1980, seven wells had been drilled in the Raft River area.
2. In 1976, EGG/INEL drilled five test wells in the downtown Boise area with the goal of finding geothermal resources for district heating. At about the same time, the State of Idaho Capitol Mall complex was expanding. Governor Andrus requested a federal study to determine the feasibility of geothermal heat for the State's buildings in Boise. In 1977, the State Health Laboratory was retrofitted for geothermal heat as a pilot project.
3. In 1979, the College of Southern Idaho (CSI) in Twin Falls drilled its first geothermal well (Figure 3).

Figure 3 - The College of Southern Idaho had two geothermal wells drilled on campus. *Photo courtesy of Don Buetner, College of Southern Idaho.*

In other news during this time period, the Hiawatha Hotel, which had been heated by the Hailey Hot Springs, burned down in 1979 (Eastlake and McClain, 1979; 1980). Sifford (1984) reported that geothermal water from Guyer Hot Springs was being used in the Ketchum area for a district heating system that included approximately 60 homes and businesses. Bliss Valley Growers, also known as White Arrow Ranch, had a greenhouse business in operation prior to 1975; during their operational history, which lasted until the 1990's, they grew tomatoes and mushrooms.

1980s

In the 1980s, geothermal development raced forward in Idaho because of the exploration efforts in the 1970's and the lingering concerns over energy prices. District heating projects were put in place by federal, state and city entities. A number of private homeowners chose to use geothermal water for heating instead of hydroelectric and hydrocarbon sources. The state's first geothermal power plant operated for a short time. The increased withdrawals led to declining water levels in some places, which prompted the Idaho Department of Water Resources to restrict additional geothermal developments in stressed areas.

During this decade, district heating operations were put in place in Twin Falls and Ada Counties. The CSI drilled a second geothermal well in 1981. Throughout the 1980's, the CSI converted a large portion of the campus to a geothermal heating system by laying the underground supply and return lines, retrofitting the existing buildings and installing geothermal heating systems in the new buildings (Figure 4).

Figure 4 - The College of Southern Idaho converted much of the campus' heating system to geothermal in the 1980s. ***Photo credit - Don Buetner, College of Southern Idaho.***

In the early 1980s the State of Idaho drilled two wells in the vicinity of the Capitol Building (Figure 5). By 1982, the State of Idaho geothermal system was supplying heat from 165 degree Fahrenheit water to nine buildings in the Capitol Mall complex, including the State Capitol (Neely, 1994). Currently, the system is used to heat about 1,500,000 square feet.

Figure 5 - Idaho has the only state capitol building in the U.S. that is heated by geothermal water.

In 1981, Boise Geothermal Limited (BGL) drilled four wells in an area northeast of downtown Boise and along the edge of the Boise Front Foothills (Figure 6). By 1983, BGL was supplying geothermal heat to customers in downtown Boise. In 1988, the City of Boise purchased the geothermal system from BGL. The current City

system has over 50 customers. The system is used to heat about 1.8 million square feet. Some of the customers are the City Hall, Ada County Courthouse, Idaho Water Center, Boise High School and YMCA.

Figure 6 - Wellhouse for one of the City of Boise's geothermal production wells.

The Veterans Administration (VA) in Boise drilled two geothermal wells in 1983 and another one in 1986. The geothermal heating system began servicing the VA buildings in 1988. The system is currently used to heat about 400,000 square feet in 22 buildings on the VA grounds.

On the domestic front, two areas stand out with respect to significant geothermal developments in the 1980s, and 1990s. In Boise County, the Castle Mountain Creek subdivision northwest of Crouch saw a rapid growth in the use of geothermal resources for home heating. In a small area covering approximately two square miles, about 50 permanent-resident homes and weekend cabins are now being kept warm with geothermal water. Most of the homes and cabins use a method where the thermal energy is transferred from the water in the well bore to a water-filled, closed-looping piping system. Thus, there is no extraction of water from the well using this technology, only heat.

The Givens Hot Springs area in northwestern Owyhee County is another region that has seen rapid growth in the use of geothermal water for home heating. Like the Castle Mountain Creek subdivision, geothermal water is used for radiant heating in the Givens Hot Springs area. Geothermal resources are also being used for greenhouse and aquaculture applications in the region.

In the fall of 1981, a five megawatt power plant in southern Cassia County began producing electricity using geothermal resources. The project was located within the Raft River Known Geothermal Resources Area. The first-ever binary plant produced electricity until June, 1982. Because the operation was not economic, the plant was shut down and parts of it were sold and moved to another state.

New geothermal production caused some water management problems in the 1980s. Declining water levels forced the state to create, in rapid succession, three Ground Water Management Areas (GWMA) (Figure 7)

and a Ground Water District in Ada County. Further restrictions were issued in the form of moratoriums in the Boise and Twin Falls areas.

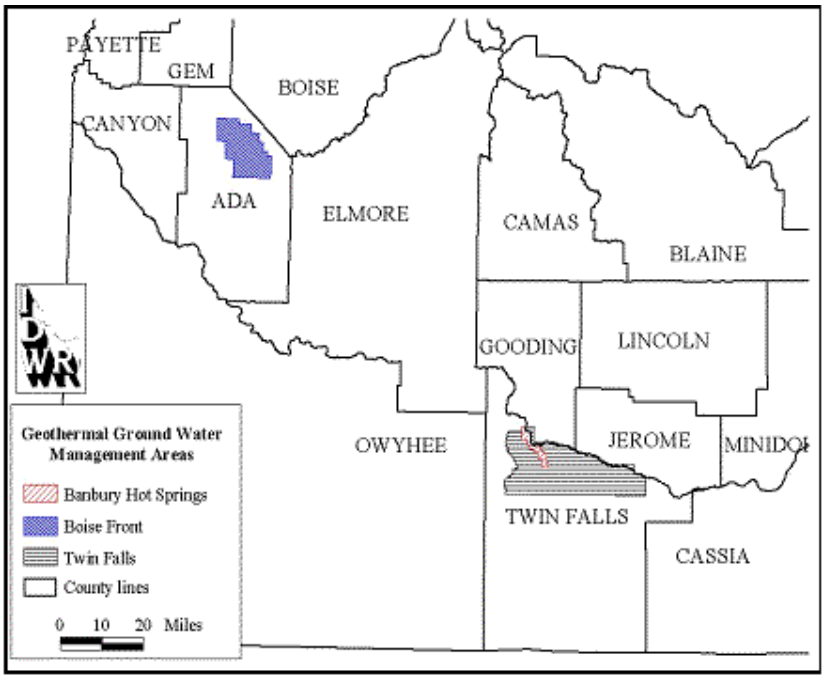

Figure 7 - Geothermal Ground Water Management Areas as established by the Idaho Department of Water Resources.

The Twin Falls GWMA (northern Twin Falls County) was established in 1983. The Banbury Hot Springs GWMA (western Twin Falls County) was established in 1984. The Boise Front Low Temperature Geothermal Resource GWMA (north central Ada County) was established in 1987. The Stewart Gulch Ground Water District was created in 1989 by the state to manage geothermal ground water supplies in a portion of the Boise Front Low Temperature Geothermal Resource GWMA. Moratoriums were put in place to further limit geothermal developments in the Twin Falls and Boise areas in 1987 and 1988, respectively. The original term of each moratorium was five years. The Twin Falls moratorium was extended in 1992, 1997, 2002 and 2007. The Boise moratorium was also extended in 1993, 1998 and 2003, and is scheduled for review in 2008.

1990s to Present

Geothermal interest in Idaho was renewed in the 1990s and continues to increase to the present time (2008). Developments during this time occurred both on the small scale (such as domestic uses) and the large scale (such as district heating and power generation).

In the mid 1990s, a computer modeling study was conducted for the Boise geothermal system in an effort to predict how water levels and water temperatures might be affected by different production/injection scenarios. In 1999, the City of Boise began re-injecting their used geothermal water into the aquifer through a newly completed injection well (Figure 8). Since 1999, water levels in nearby wells have risen significantly and in a manner similar to the modeling predictions. In 2001, the City of Boise requested an increase in their production ceiling of 200 million gallons per year. Although this request was protested by several of the

Boise geothermal users and the dispute went to a hearing, in 2002, the City of Boise was granted a 15% increase to 230 million gallons per year.

Figure 8 - In 1998, the City of Boise drilled a well to re-inject spent geothermal fluids into the aquifer.

In May, 2001, Senator Larry Craig sponsored a workshop in Boise for Idaho's geothermal stakeholders. A team called the Idaho Geothermal Energy Working Group was formed as a result of the workshop. With financial support from the U.S. Department of Energy's GeoPowering the West Program, the Geothermal Energy Working Group developed plans and guidelines to help with geothermal resource developments in Idaho. The highlights of these efforts include geothermal strategic plans for the communities of Cascade and Lava Hot Springs, and 17 technical studies (engineering, economic and geothermal resource investigations) completed and documented in written reports.

Figure 9 - U.S. Geothermal Inc. began generating electricity at its Raft River binary power plant in January of 2008
Photograph from the U.S. Geothermal Inc. website.

An offshoot of the "energy crunch" in 2007 and 2008 has been the surge in geothermal power generation projects throughout the western U.S. In Idaho, the Raft River location became the focus of the state's geothermal power efforts when U.S. Geothermal, Inc., acquired this area in 2002. After several years of leasing, well rehabilitation and drilling, and site modifications, a 10 Megawatt plant went "on line" in January 2008 (Figure 9). The company hopes to add more power units to the facility in the near future.

In other power generation developments, the BLM held a lease sale for Idaho and Utah in June 2007. Five parcels in Idaho (four in the Raft River and one in Washington County) were sold for a total bonus of $5.7 million. The winner of four of the leases was Aqua Caliente from Colorado; the fifth lease went to U.S. Geothermal. Elsewhere in the state, IdaTherm LLC went public with the Willow Springs and China Cap prospects in southeastern Idaho in the mid 2000s.