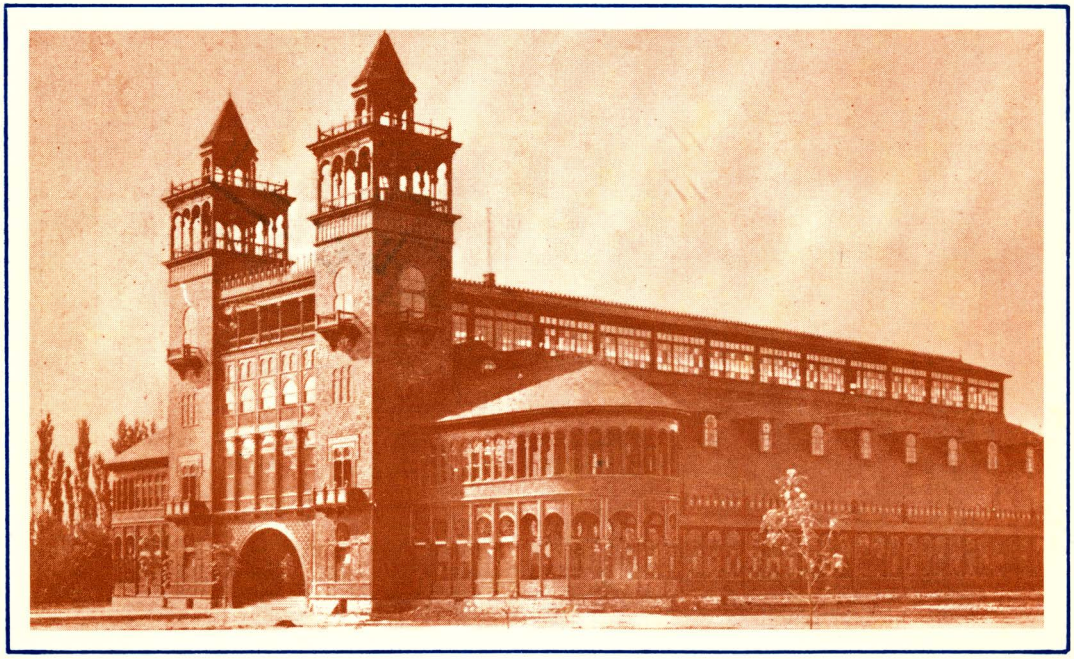
$2.91

glad to be in hot water

Geothermal Development in Boise, Idaho, 1890-1983



The Boise Natatorium, 1892-1934
(see page 4)

by
Dean Worbois

glad to be in hot water

Geothermal Development in Boise, Idaho, 1890-1983

by
Dean M. Worbois

The world's first community geothermal space heating came about as an offensive in an economic war. The standard-bearers were monopoly and competetion and the field was water service for a growing settlement called Boise in the Territory of Idaho.

Printed by Parker Printing Company

1809 N. 9th St., Boise, Idaho 83702

Cover photo courtesy of Idaho Historical Society

1890: Boise & The Water War

On June 1, 1890, the United States census was taken. On September 19th, the City's Board of Trade prepared a signed registry. During these 111 days, Boise had grown from 2,500 to 4,026 inhabitants. Settlers were attracted to Boise by stage coach manufacturing, major irrigation canal construction, homesteading, a substantial city building boom at the advent of becoming the new capitol city of a new state, and by Boise being a popular camping spot for large numbers of Oregon Trail emigration wagons.

Settlement had begun at this confluence of the gold mines of the Boise Basin and the Oregon Trail just 27 years before. Irrigation systems, electric power, telephone, telegraph, and the Union Pacific Railway were already serving the community by 1890. Preparation was underway for a trolley system. Yet the community was without a water system.

For some years the Overland Hotel had been offering a limited water service to their neighbors from springs in Hull's Gulch a mile north of the city. Having received city permission to lay pipeline in streets the year before, the owners of the hotel sank three wells in the spring of 1890 in Hull's Gulch. When these wells produced an artesian flow of 800,000 gallons of cold water a day from a depth of 20 feet, the Overland Hotel owners announced the development of a system that would serve the entire city. The announced rate of $3.00 per faucet per month was the same being charged the hotel's neighbors.

Another pioneer Boise merchant considered three dollars a month exorbitant and used his property in Hull's Gulch to persuade other prominent citizens to incorporate the Artesian Water and Land Improvement Company. This was accomplished on June 2, 1890. On June 23rd, the Overland Hotel proprietors incorporated the Boise Water Works. Within days, the Artesian Company brought in its first wells and the battle was on.

From the beginning, the Water Works had advocated monopoly as the best way to serve the city's needs. With two competing water companies, the streets were reopened as soon as they had been leveled by the first construction crew. Litigation over right-of-way and damage to opposition pipe and excavation ran rampant.

Looking at these inconveniences and expenses, one can well imagine that the forces of monopoly drew some sympathy. Sympathy was not the only object of the Water Works, however, and some customers were drawn as well. Free water was offered until 1892 to those good citizens who contracted for Boise Water Works service.

Enjoying the zeal with which Congress was adopting the Sherman Anti-Trust Act, the Artesian Company came out swinging. Lacking the resources of the Water Works, the Artesians wooed customers with the promise of long-term reasonable rates assured by competition. The City Council agreed to the extent of signing with both companies for the greatly desired fire contract. Realizing that the Water Works' low bid was a one-year offer to secure the fire contract, the City commissioned 30 hydrants from the Water Works for $8.00 each and 20 hydrants from Artesian Water for $25.00 each.

"Hatred and strife" were reported being rampant in *The Idaho Statesman* newspaper on March 29, 1891. Public displays of one system's or the other's ample quantity and pressure became weekend circuses for the townfolk. The need for a decisive victory became apparent to those promoting the sanity of monopoly.

1891:
Hot Water, Victory & Decisions

Near the Territorial Penitentiary two and a half miles to the east of Boise was a tract of land kept swampy by the seepage of hot water. In 1890 Boise Water Works investors W.H. Ridenbaugh, Hosea B. Eastman, Timothy Regan, and J.W. Cunningham saw a potential for mastery in the water race by expanding their service to include hot water delivery.

The Water Works began drilling before Christmas, 1890. By December 27, at 112 feet, the 112 degree Fahrenheit[1] artesian water was flowing at such a rate that it got in the way of drilling. On January 22, 1891, the artesian pressure caused the failure of the light drilling rig. A heavier rig pushed on to 400 feet, where, on January 24th, drilling was stopped at the discovery of a reported "tremendous flow."

ANALYSIS OF

Natural Hot Water

MADE BY C.F. CHANDLER, PH.D.,
C.E. PELLEW, E.M., OF NEW YORK

Chloride of Sodium	0.9567
Sulphate of Potassa	0.5938
Sulphate of Soda	1.5071
Bicarbonate of Ammonia	(Traces)
Bicarbonate of Lithia	0.0793
Bicarbonate of Soda	10.4109
Bicarbonate of Lime	0.4606
Bicarbonate of Magnesia	0.0383
Phosphate of Soda	(Traces)
Oxide of Iron and Alumina	0.0916
Silica	3.9248
Organic and Volatile Matter	1.6328
TOTAL	19.6959

Temperature at Wells: 172 Degrees Fah.

THE NATATORIUM COMPANY

By mid-March of 1891, a second well at a depth of 404 feet brought the total flow to exceed 800,000 gallons a day of 170 degree water. Careful chemical tests of the water by the United States Department of Agriculture proved the water to be suitable for domestic consumption[2]. With this pure and generous resource, the Water Works went forward with plans for a spa and a community hot water system.

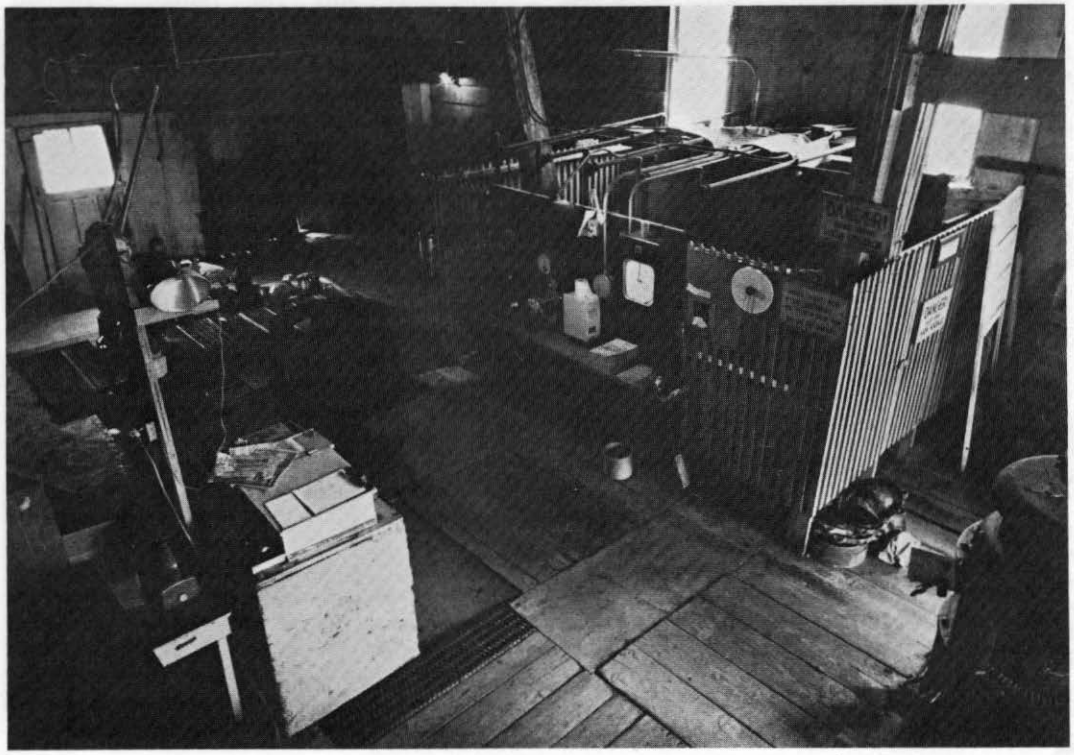
The benefit of monopoly was conceded and the Boise Water Works absorbed the Artesian Water and Land Improvement Company two shares to one on March 28, 1891. The new company, the Artesian Hot and Cold Water Company, began buying land on the end of Warm Springs Road for a spa two miles east of the city.

City elections were held in July of 1891. The board members of the water and trolley companies, largely the same persons, had formed a new Citizen's Party to oppose the traditionally strong Republicans and minority Democrats. Outcries that uncontrolled water fees would be the result of having the same people running both the city's government and the city's monopolies were regularly published in the Republicans' *Statesman* newspaper. Before the election, the water fee was set at $1.00 per faucet, rather than $3.00, and the Citizen's Party was elected into every city office of the new capital of Idaho. One newcomer to the area on the Republican ticket for City Attorney was the only challenger getting near being elected and Borah High School in Boise now commemorates W.E. Borah's subsequent political success in the United States Senate.

Despite this initial landslide, the Citizen's Party proved not to be nearly as permanent a feature of Boise life as the geothermal system these men were building.

1. All temperatures are in degrees Fahrenheit. All other footnotes are on page 13.

The Boise Water Works Geothermal Well House (photographed in 1980) is now listed in the National Register of Historic Buildings. The well house was constructed by cutting off the original well derricks and nailing boards to the frame.

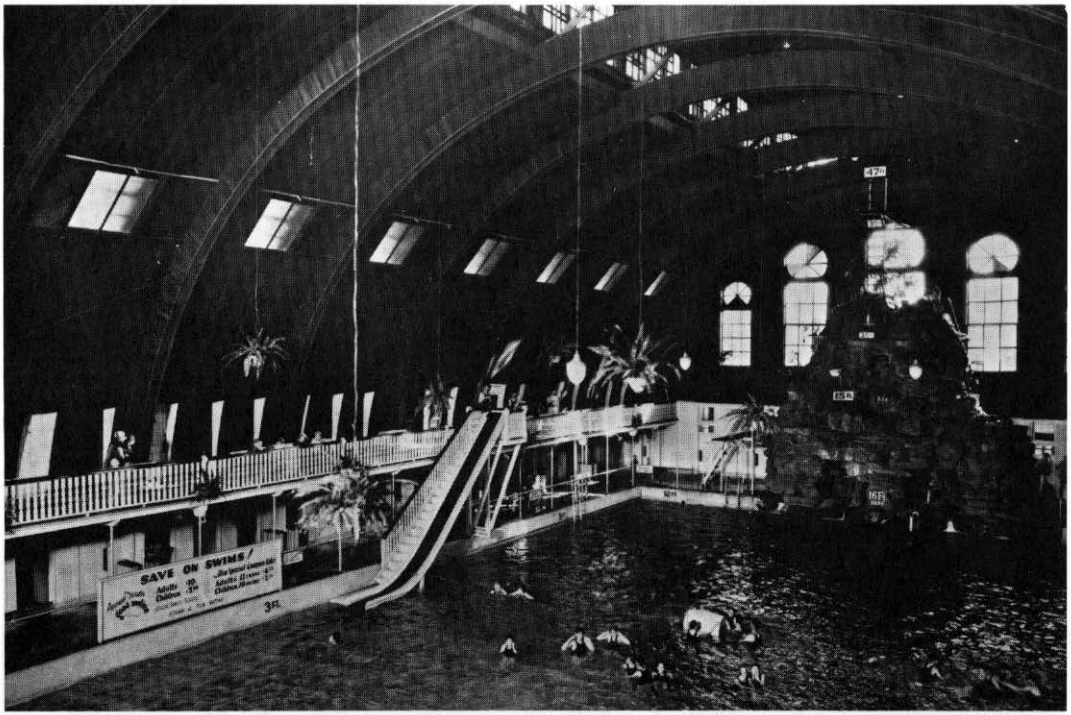


1892: The Natatorium

The original hot water line was wooden, chosen for its insulating properties. Resembling tubular barrels, wooden pipe was fairly common at the time and had previously been used by Helena architect John C. Paulsen at the Helena Natatorium in Montana. The wooden mainline was extended over two miles under Warm Springs Road, from the wells near the penitentiary into town.

The commercial success of spas using natural hot water had been proven at least since the Roman Empire. The Artesian Hot and Cold Water Company wasted no time hiring architect Paulson, who had designed mansions for several of the company's owners, to design the Boise Natatorium.

The "Nat" opened May 25, 1892, and established itself as a Northwest showpiece. Covering 15,000 square feet with Moorish towers and arches, the Natatorium's three floors offered fifty bath and dressing rooms, a dancing and roller skating balcony, various parlors, billiard and card rooms, a dining room and a café. The company's $100,000 investment assured the finest of fixings and accommodations, including electric ranges for those hosting a party. The 65 x 125 foot pool was one of the largest indoor pools in the United States. For such grand events as inaugurations, the pool was drained, supports were installed, and a portable floor converted the plunge into a ballroom.



The Natatorium Swimming Pool in the 1920's. *Photo courtesy of Idaho Historical Society*

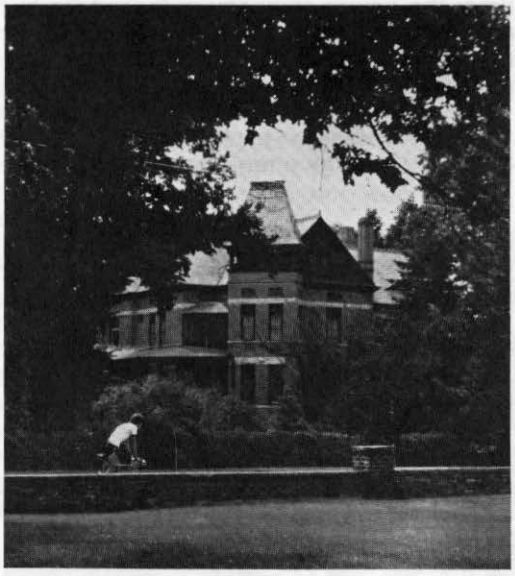
The Natatorium Dining Room, 1909.

Note: The cover photograph of the Natatorium was taken in 1895.

Photo courtesy of the Idaho Historical Society.

1892: Warm Springs Road

From the Natatorium into town the Artesian Company invested $20,000 in a system with no precedent. Construction setbacks and unexpected operational expenses pushed up the company's investment. The water supply, both in tempurature and volume, was untested. The project's detractors ridiculed a community hot water system even being attempted.



The C.W. Moore estate in 1982.

But attempted it was and in 1891 the immediate problem was selling the idea. The Artesian Hot and Cold Water Company needed a showplace, and what better showplace than the Company President's new mansion on Warm Springs Road?

C.W. Moore was a founder of the First National Bank of Idaho and President of the Artesian Company. His next-door neighbor was H.B. Eastman of the Overland Hotel. These two homes had the new heating system installed in January of 1892. Both were warm through February and March without the soot and shoveling of coal. Lavish social functions at these gentlemen's new homes spread their enthusiasm for geothermal heat throughout the city.

A flat rate of $2.00 a month was established as the cost for heating and providing domestic hot water to a smaller home of eight rooms or less. Larger homes were charged up to $3.00 a month while the rest of the city was paying $7.00 to $8.00 a ton for coal.

A trolley line was constructed from downtown to the Natatorium and Warm Springs Road became an Avenue. With easy access to the city on the west and to the community's playground on the east, and featuring inexpensive heat, this two-mile stretch of Boise's east end was well established as the city's most desired neighborhood.

1900-1970: Use & Decline

White City, an amusement park featuring a scenic railroad, a large roller coaster, a dancing and roller skating pavilion, and arcades, was constructed on the Natatorium's front lawn. Natatorium Coffee became a popular item at the neighborhood groceries about the valley.

Girl's and boy's swimsuits crept above the knee and the "Nat" survived parents' wondering if swimming was a sport for their decent daughters.

After 40 years, however, the pool's steam caused rotting of the structure's timbers that the Boise Natatorium could not survive. In 1934, a twenty-six mile an hour gust during a thunderstorm blew in part of the roof. The building was declared unsafe and the structure was dismantled.

Today, the pool serves as a municipal cold water plunge. Behind the plunge, a new, green-tubed water slide is proving popular. White City's grounds are now the site of a grade school and the Natatorium Trolley Terminal is a café.

Despite the Nat's demise, the Natatorium Company did keep the nine miles of steel distribution pipe it had acquired from the Artesian Hot and Cold Water Company. This system was subsequently acquired by the Boise Water Corporation and given to the Boise Warm Springs Water District. By 1958, this system was serving 244 customers at an average residential heating and tap hot water cost of $200 per year per home.[3]

The El Paso Natural Gas line brought natural gas service to Boise in 1956. During this time, Idaho Power Company was greatly increasing its generating capacity with the Hell's Canyon series of three hydroelectric dams. From the late 1950s through the 1960s, abundant and inexpensive gas and electrical energy were actively promoted for space heating with the noticeable effect of Boise's air clearing of coal smoke. Meanwhile, the geothermal system had not been expanded nor promoted and by 1970, geothermal space heating in Boise had decreased to 200 homes and a dozen businesses.

The energy crisis of the mid-seventies took care of that. Natural gas prices rose dramatically as the federal government tried to encourage exploration. At the same time, the power company outpaced its hydroelectric capacity and began passing on the cost of expensive coal-fired generating plants. And, at the same time, OPEC caused the federal government to make funds available for exploration and development of energy alternatives.

The Idaho State Health Laboratory on Penitentiary Road

1970-1983: The State System

As with any capital city, one of the largest space heaters in the City of Boise is state government. In the early 1970s, the State of Idaho was agressively expanding the downtown Capital Mall to a projected 500,000 square feet. Heating costs threatened the state's ability to maintain the mall. In March of 1974, Cecil Andrus, then Governor, requested a U.S. Energy and Development Administration study of Boise's geothermal resources. The final report in April of 1976 recommended a pilot project. The State Health Laboratory on Penitentiary Road near the existing Warm Springs wells was retrofited to geothermal heat by autumn of 1977.

The Health Laboratory

This 40,000 square foot biological laboratory requires 100 percent fresh air heated to a constant temperature of 70 degrees. A plate heat exchanger measuring 83 cubic feet extracts up to eight million btu per hour from the 165 degree geothermal water. From the heat exchanger, a closed-loop system using the laboratory's previous 900 cubic foot gas boiler as a back-up circulates the extracted heat through the building. The state's contract with the Boise Warm Springs Water District agrees to purchase hot water at 40 cents per 100 cubic feet.

Preliminary tests ran from January through April of 1978 and indicated a savings of over 60 percent on cost of fuel for the state health laboratory. Actual dollar figures were: 1977 gas system, January through April, $12,788.00; 1978 geothermal system, $3,366.00. 1978 was a slightly milder winter than 1977. A substantial reduction in maintenance and operational expenses associated with the gas boiler was also noted.

The Health Laboratory's retrofit was a $120,000 project, of which $80,200 were costs inherant in a pilot project (including a discharge system, cooling ponds, and long lead pipes) that would not be features of a concentrated system serving many buildings.

But no system is without its problems. About every month, the water meter was literally being cooked beyond use by the 170 degree water at Warm Springs' supply main. This problem has not recurred since September 22, 1980, when the meter was placed on the discharge side of the exchanger.

The other major problem with the Health Laboratory's geothermal heating system has been the State's interruptable contract with the Boise Warm Springs Water District. The District's shallow wells are susceptable to draw down during periods of extended cold. Because the laboratory has a back-up heating system, geothermal water is sent down line to the residences that rely solely on the water district for heat. During January and February of 1982, this interruptable service required the State to heat with gas for 17 days with a fuel bill of $6,336.46. The geothermal bill for the remaining 42 days of January and February was $2,761.50. On back-to-back single days of similar temperature, the State paid $480.00 for gas heat, and $80.00 for geothermal.

Adding more plates to the heat exchanger at $133.00 each and bringing on line a state well already in place at the penitentiary site are avenues being studied to ensure that all of the laboratory's heating needs are supplied by geothermal water.

Maintenance Department Superintendant, Wes Stucker, dismantled the laboratory's heat exchanger two years ago to check on how the stainless steel plates were holding up. A bit of sand was found and he intends to recheck the plates in the summer of 1982. Otherwise, the system has received no maintenance in its four years of service.[4]

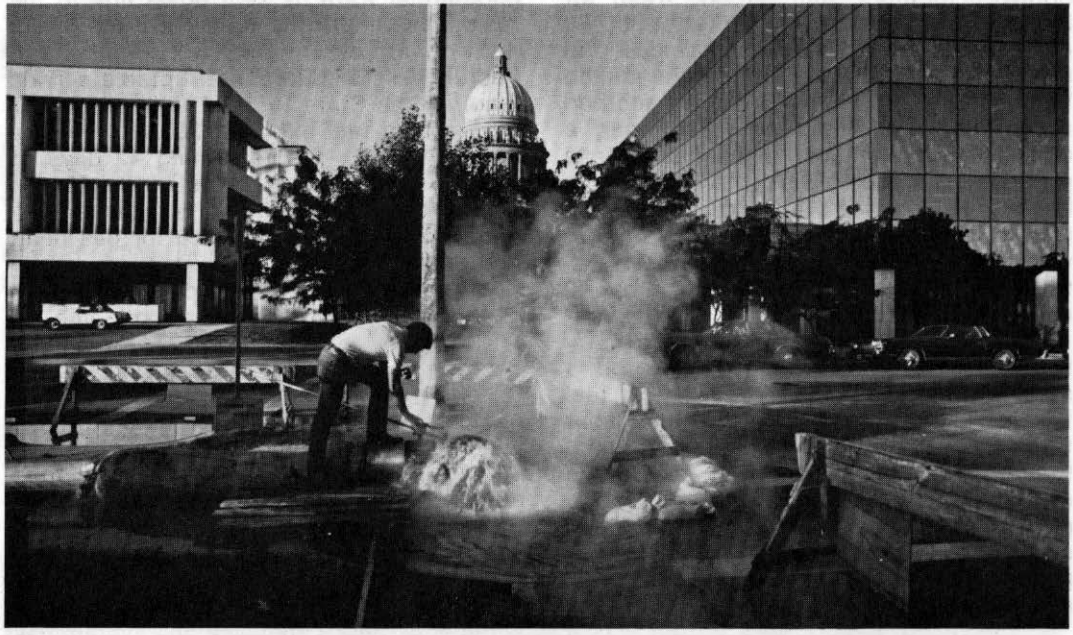
The Capitol Mall

With the success of geothermal heat at the Health Laboratory, the State of Idaho began implementing its plans to heat the Capitol Mall in 1979. With the help of Emery Hedlund, Chairman of the Permanent Building Fund, the envisioned project received financing from the Legislature. The Idaho Office of Energy, Division of Public Works and the Department of Administration.

An eight-inch diameter well was drilled in October, 1980, and completed in January, 1981, when 153 degree water with an artesian flow of 200 gallons per minute was tapped at 2,150 feet. Sustained pumping proved the well capable of producing 750 gallons per minute, sufficient to provide the mall's heating needs and representing a $170,000 annual savings for the state.

Something needed to be done with the used water and a reinjection well was decided to be the best answer. Drilling the second well began in June, 1981, some five blocks from the first well. Although local residents felt most unfortunate about the day-and-night drilling, a very fortunate property of this well was discovered at 3,030 feet. The artesian pressure was so great that a pump was not only unnecessary, but its fittings would have been damaged if the state had attempted to install one.

To test this new resource, the well was allowed to run freely. The 960 gallons per minute artesian flow gradually decreased during the first day. The 160 degree water flowing to city drains further inconvenienced residents by raising so much steam



The State of Idaho production well with the Capitol Building framed by two State office buildings. Tests in August, 1981, proved this resource to run 810 gallons per minute artesian flow at 160 degrees.

on the cool August mornings that no one could see to drive. By the second day, the artesian flow had fallen to 810 gallons per minute where it remained for 48 hours.

With this sustained flow from the second well, the State threw out its requisition for an expensive submersable lift pump as well as its expected electrical costs for lifting the geothermal water. The second well was established as the Capitol Mall's production well using the first well for reinjection. Because artesian pressure is dependent on atmospheric pressure, a small pump to regulate the 30 to 40 pounds pressure needed to control the mall's system is being installed at the production well head.

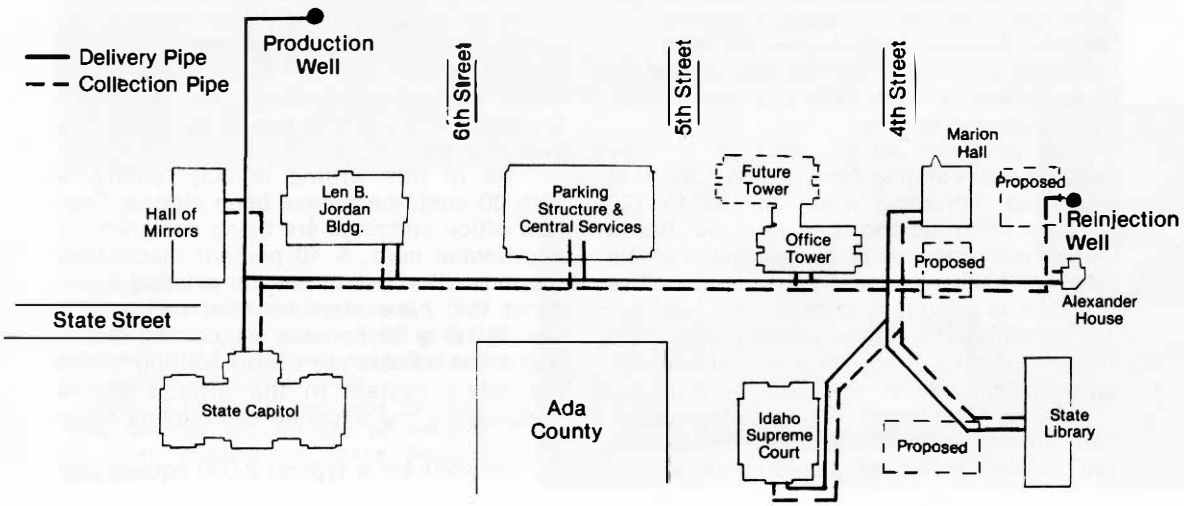
Dedication ceremonies for the wells and ground breaking for the State's piping system were presided over by Governor John Evans on March 10, 1982. One street is to be excavated, bringing the water to the State's utility tunnel for distribution to the mall buildings. Buildings included in the retrofit program include most of the 128,000 square foot Capitol, the State Supreme Court, the State library, and six office complexes with provisions for three proposed buildings.

About ten percent of the Capitol Mall's heat is provided by furnaces not economically accessable to geothermal retrofit. An example are the heaters mounted in the rotunda over the House and Senate chambers in the Capitol Building. Otherwise, the $1,925,000 system will provide all of the mall's heat. Fuel savings are expected to pay for the system in 9.1 years figuring a conservative 8.5 percent increase in gas rates and not taking into account maintenance savings.

Given geothermal's off-the-shelf technology, the State of Idaho expects to be heating its Capitol Mall with natural hot water in the winter of 1982-83.[5]

State of Idaho Capitol Mall Geothermal Piping Plan

(This diagram is not meant as a specific pipe map.)



1970-1983: Boise Geothermal

While the energy crunch of the seventies encouraged the State of Idaho to see in geothermal a potential for economically heating its Capitol Mall, Boise City saw in geothermal an economic advantage for its downtown regional shopping center project. The advantage to citizens would be twofold: indirectly in lower retail prices reflecting lower heating costs in the mall and downtown shops; and, directly in the form of lower heating costs for those citizens living along the distribution system and installing geothermal heat.

After preliminary attempts to interest private developers failed, the City's Energy Office accepted geothermal expansion as a primary function.

In 1974, the Boise Warm Springs Water District was franchised by the State to operate the Natatorium Company's aging system as a non-profit water district. In 1979, the Boise Warm Springs Water District and City of Boise created a new office called Boise Geothermal under a working relationship to develop geothermal energy for space heating.

The City System

Utilizing Federal Department of Energy Grants, several sites were analyzed for the City of Boise's system. Emphasis was placed on Camel's Back Park at Hull's Gulch a mile to the north of the city and at the federal Military Reserve Park on Cottonwood Creek a half-mile to the northeast of town.

The city's Park Department had reservations about allowing construction in Camel's Back Park. At the same time, the city, through assistance from the Federal Department of Energy and Senators Frank Church, D-Idaho, and James McClure, R-Idaho, had purchased drilling sites in Military Reserve Park. This site was chosen for operational drilling.

Today there are six wells at Military Reserve Park ranging from 800 to 2,300 feet deep and delivering water at 165 to 170 degrees. Production capacity is being tested, with one well flowing artesian at the rate of 1,300 gallons per minute. The resource is adequate to heat over two million square feet on all but the coldest days when large structures will use their existing systems for back-up.

Boise City began laying a four-and-a-half mile distribution system on July 6, 1982. Using insulated asbestos pipe, this dual supply-and-collection system runs $50.00 per foot to construct and is designed to service the entire downtown area.

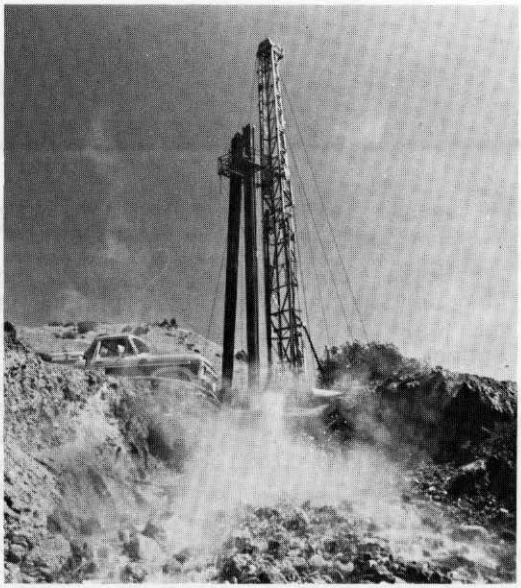
The city has contacted 140 buildings along the seven million dollar system. Of these, 110 are commercial and 30 are apartments, duplexes, schools, community centers, and individual homes. Ten buildings have been established as too costly to retrofit to geothermal heat.

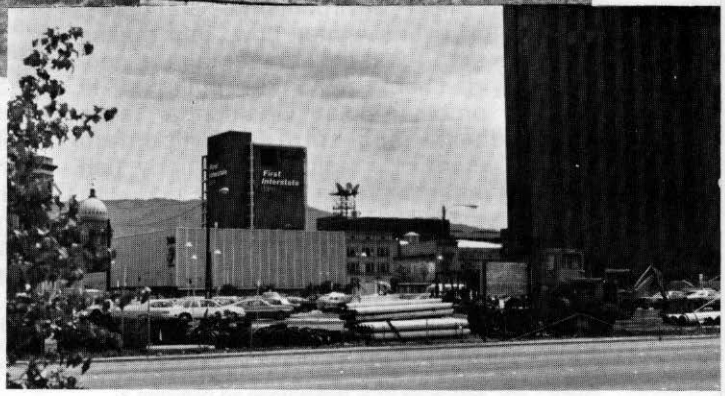
The tentative contract with the customers refers to per-therm costs discounted by 30 percent from the "price charged to commercial users by the largest supplier of natural gas in Idaho." Construction bids below projections indicate that the Boise Geothermal therm will run 30 to 40 percent less than gas.

As of this writing in July, contracts with 30 customers have been signed. Four new office buildings are being designed for geothermal heat. A 40 percent discounted therm is attractive to several existing structures that have been hesitant to invest in retrofit for a 30 percent discounted therm. And some owners are simply waiting to see the city's system in the ground before undertaking the expense of studying retrofit.

Retrofit for a typical 2,000 square foot

home costs $1,400.00. One jerry-rigged system using car radiators has cost its builder no more than a few hundred dollars. Discounting state and federal tax credits, a $1,400.00 conversion would cost the homeowner $735.00. Fuel savings on the 1,000 therms per year typically used for residential heating in Boise would save the homeowners enough to repay the $735.00 retrofit costs in 2.78 years at today's gas rates. Of course, the tendency to add a greenhouse may lengthen the repayment period some.





Top right: A City of Boise Well at Military Reserve Park being tested.

Above: Drilling at Military Reserve Park overlooking the downtown area that will be served by these four wells.

Right: Equipment and pipe in July, 1982, awaiting construction of the City of Boise geothermal space heating system.

The Water District System

Boise Geothermal has not been so busy building the Boise City system that it has forgotten to improve the Boise Warm Springs Water District system. This spring, the district's aging and patched main lines have been replaced with insulated asbestos pipe. The new line is projected to save the leaking system 200,000 to 400,000 gallons of hot water each day while the insulated pipe will serve to keep the water at a higher temperature. It is estimated that 75 to 100 homes can be added to the original Natatorium system with this new line.[6]

Insulated asbestos pipe replaces the original geothermal line beneath Warm Springs Avenue, which was changed from wooden to steel pipe in the early 1900's.

The Problem: Discharge

At peak use, the Boise Geothermal systems will be discharging 4,000 gallons of 100 degree water per minute. These peak demands fall at the same time of the year that the Boise River is running at its lowest. Although chemically very pure, the geothermal water's flouride content requires a mixture of one part geothermal to 22 parts river water to meet environmental standards. During the river's winter flow, this means no more than 2,700 gallons per minute geothermal discharge. Thermal pollution is another problem Boise Geothermal faces when discharging into this mountain stream where city residents regularly fish for trout in the center of the city.

Boise Geothermal is looking at many desirable uses for the 100-degree spent geothermal water from its systems. One is to heat animal cages in the Boise zoo in Julia Davis Park. Others include heating an arboretum in the yet-to-be developed Albertson Park, a systems display with fountains and ponds at the same sight, and such commercial uses as greenhouses and aquatic farms.

For the winter of 1982-83, the Boise Canal, which runs under the city, will be used to hold overflow and to carry the water to the Boise River at the Americana Bridge.[7]

Boise Geothermal and the State of Idaho are negotiating to combine their systems. The advantage would be to provide Boise Geothermal with an expanded system and to let the State out of the utility business. With these systems becoming interconnected, Boise Geothermal will use the State's two wells for reinjection.

And Beyond 1983...

The Boise Warm Springs Water District, the State of Idaho, and the City of Boise have cooperated to run draw-down tests on Boise's geothermal resource. A minute drop of water level at some wells showed up over a period of three days with no flow or temperature variation being noted. These flow and temperature results indicate a much larger resource than acknowledged by skeptics of the original Boise Water Works project who ninety years earlier had predicted lowered temperatures by the time the Natatorium pool had been filled.

John Austin, Department Manager for Geothermal Projects for the Engineering firm of CH2M Hill, Inc., has served as project manager for Boise Geothermal. His present capacity is project manager for the State's Capitol Mall project. Mr. Austin sees no apparent limit to the hot water reservoir beneath Boise.

Construction of the State of Idaho and Boise Geothermal systems is now underway and the current geothermal expansion in Boise has reached a new plateau. Phil Hanson, Director of Boise Geothermal, explains that future expansion is waiting for revenues from the operation of the present systems. Wells at Camel's Back Park to heat Boise's north end are the next most likely project.

From the original artesian wells that delivered 800,000 gallons of cold water a day, the Boise water system has grown to delivering six billion gallons daily. The business battle that those 800,000 gallons of cold water prompted has led to the development of three community hot water systems designed to provide clean and inexpensive heat to governmental, commercial, and residential buildings in Boise.

In addition to these three community systems, Boiseans enjoy approximately 150 private geothermal wells. These are used to heat greenhouses, buildings, swimming pools, and domestic water.

These community and private projects combine to keep Boise a pioneer in the use of geothermal energy for space heating.[8]

Footnotes

2. The analysis was as shown on page two in lower left.
3. For the historical overview, I am greatly indebted to MERLE W. WELLS, Archivist, Idaho State Historical Society. For a more detailed history, see Mr. Well's article, "Heat from the Earth's Surface: Early Development of Western Geothermal Resources," *Journal of the West,* Volume 10, no. 1, January 1971, pages 53-71.
4. Thanks to WES STUCKER for the Idaho State Health Laboratory Information.
5. Thanks to LEA STREET-MARTIN of the State of Idaho Department of Water Resources, Division of Energy Resources; and to JOHN AUSTIN, Manager of Geothermal Projects, CH2M Hill, Inc., for their help with specifics and overviews of the State system.
6. Thanks to Buck Jones, Board Member of the Boise Warm Springs Water District and of Boise Geothermal, for his courtesy regarding the Water District's photos and specifics.

   Funding for the Boise Geothermal systems has been provided by: a grant from the U.S. Department of Energy, $4.2 million; financing the Military Reserve wells by a private partnership, $2.1 million; the U.S. Economic Development Administration, $500,000; City of Boise tax revenues, $147,000; the Boise Warm Springs Water District, $100,000.
7. A special thanks to PHIL HANSON, Director, and to LEE POST, Informational Director, of Boise Geothermal. Their specific help with Boise Geothermal's projects, their help with understanding geothermal development in Boise generally, and their patience with my incessant questions provided great help.
8. Iceland began geothermal space heating in 1928. After having sent engineers to examine the Boise system, Iceland constructed a major expansion of their system in 1942 and has since agressively pursued geothermal development to minimize oil imports. Today approximately half of Iceland's space heating is provided by geothermal with Reykjavik, the Capitol, being 90% dependent on geothermal heat.

Community Geothermal Space Heating Systems in Boise, Idaho