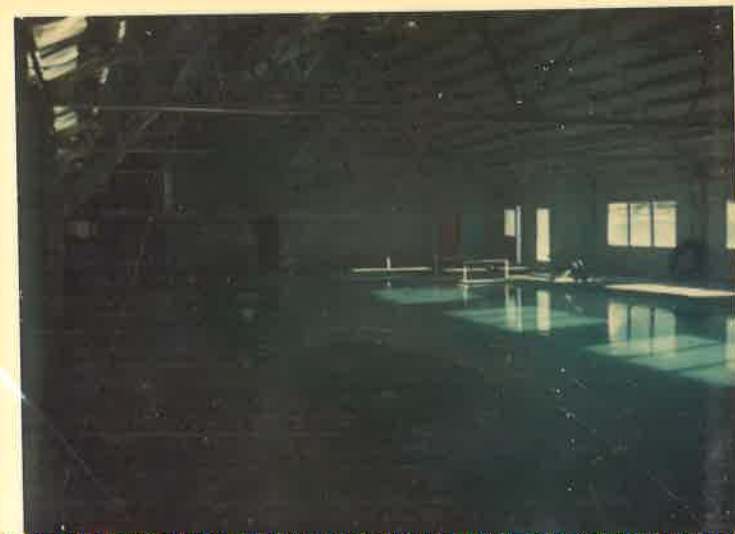
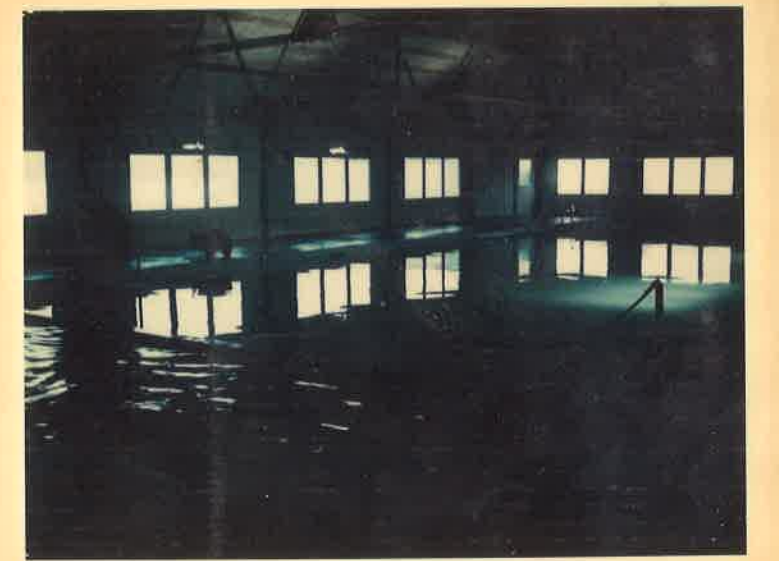


BIG BEAR







### Geothermal power plant at work

It looks like this at Pacific Gas & Electric Company's geothermal power plant in Mayacmas Mountains, 90 miles northeast of San Francisco. In foreground are steam pipes with expansion loops, which allow pipe to contract when plant has to

be shut down, and to expand on startup. Steam geysers which once spawned post 19th century health spa now turn turbines of computerized electric power plant.

—AP Wirephoto

### A Fuel That Truly Is Pollution-Free

Can steam from the earth be made to do useful work for us? Geothermal energy is being successfully utilized in Italy, Japan, Iceland and New Zealand. The Mexican Government is building a 75-megawatt power plant that will operate on natural steam. In Northern California the Magma-Thermal Power Co. has tapped steam fields and sells steam to the Pacific Gas & Electric Co. to produce electricity. PG&E pays only 2.5 mills per kilowatt-hour yet Magma-Thermal expects to recover its drilling costs within a year.

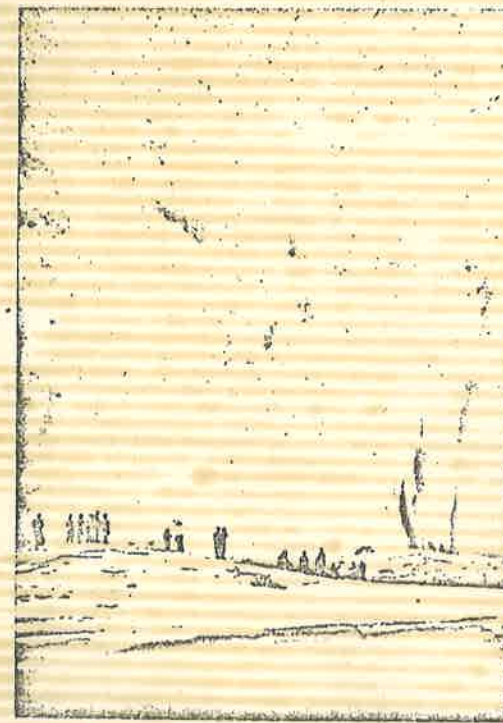
What no one explains, however, is why we had to wait so long before starting to exploit this energy that has been lying beneath our feet for millions of years. The answer is that little is known about prospecting for geothermal energy and less is known about predicting the output of a source once it is located.

We know that the core of the earth is made of molten magma but because of

differences in the composition and structure of our planet, the heat distribution throughout the old ball is uneven. On an average, the temperature climbs 45°C per mile from the surface toward the center of the earth. But in some areas the temperature rises as high as 400°C per mile. In the Imperial Valley temperature increases of 37° per hundred feet, or an equivalent of 2,000° per mile have been recorded.

In order to be economic, the energy must be available in a more readily-usable form, such as hot water or steam fairly close to the surface. Locating such heat sources has been the problem up to now. Geysers, hot springs and gushers of steam coming out of the ground serve as clues, although not dependable ones.

Heat from the molten core of the earth circulates like boiling water in a pot. The pot in this case being the hard crust of the earth which prevents the escape of the molten material. Where



OLD FAITHFUL is a great tourist site but a magnificent bust as an energy producer.



INSULATED pipes from natural steam wells supply power to generators in California.

ground above the crust is porous contains water, a natural boiler is created. When the heated water is pressed with a tight layer of clay, pressure builds up under the clay and a pool of geothermal energy is created.

If the clay layer cracks, hot water, steam or both can escape to the surface under pressure, producing hot springs and geysers. While they usually indicate geothermal activity, they may be at the edge of a pool too deep to tap. This is why Old Faithful may be great as a tourist attraction but a flop as an energy producer worth developing.

In the Imperial Valley the crust is relatively shallow, only 10 to 20 miles from the surface. Above the crust lies a thick layer of granite and above it a water-saturated layer of earth. The wet layer is over 20,000 ft. deep, filled with water that is constantly being heated from below. A dense layer of clay turns the whole valley into a huge pressure

cooker, keeping the water underneath at high pressure and temperature.

While much of this information was known before, development of geothermal resources was slow for the simple reason that no way existed for locating the best location to drill wells.

Using complex gear to check the specific gravity of rocks, the conductivity of the ground and making test drilling have given geologists a good picture of the valley's potential. Properly controlled, the energy beneath the valley can supply two-thirds of the state's power needs for years to come.

As an added bonus the steam that comes to the surface has only a 2 to 3 per cent mineral content. By desalting the water, the state can add some 5 to 7 million acre-feet of water per year to the water supply.

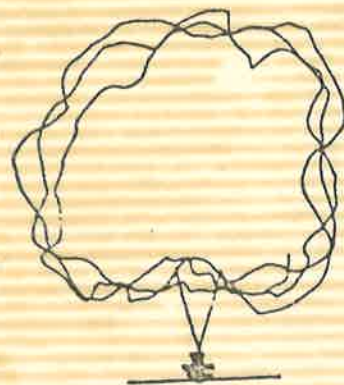
Whether the underground source of heat can be depended on for a long-range energy source is yet to be answered, but the tests look promising.

In the Imperial Valley water flows into the ground from rivers, springs and floods, replenishing the required water supply. In Northern California, however, the Magma-Thermal Power Co. draws steam from what it claims to be a limited, sealed reservoir that cannot be replenished. On the basis of this claim, a U.S. Tax Court last year determined that natural steam wells, like gas and oil wells, are entitled to a depletion allowance before taxes.

This, of course, makes investment in geothermal development an attractive prospect. Oil and power companies now are rushing into the field to explore and develop new natural-steam areas.

Steam from the Magma-Thermal wells produce 82 megawatts of electricity but expansion plans call for 600 megawatts by 1975, enough to power a city the size of San Francisco.

In Mexico, 17 steam wells were sunk about eight years ago. These wells have been spouting thousands of barrels of hot water and steam daily, at pressures reaching 1,000 lbs. per square inch and temperatures of 300° to 400°C with no drop in output. [Continued on page 145]



MAGMA POWER  
THERMAL POWER  
MAGMA ENERGY

LARGE power companies have been founded to use free steam for electricity.

March 1971

## Pollution Free Fuel

[Continued from page 65]

In Italy, geothermal energy has been producing electricity since 1904. The same wells have been used for the recovery of borax since 1777 and they're still going strong.

In areas without any subsurface water the possibility of even greater potential is predicted. To tap a dry heat source, a shaft is drilled down to the hot rock and an underground cavity is blasted with a nuclear device. Water is then pumped into the hole, which becomes a huge steam boiler.

The steam rises to the surface under its own pressure, drives turbines and flows back down the hole in an endless cycle.

The only problem is that it has not happened yet. But if present plans are carried out the Atomic Energy Commission will sink a test well by 1974. If this proves successful commercial electric production from dry-heat wells could start, in a big way, as early as 1975. •

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## Big Bear City Report

By Lori McNulty

Big Bear City Park had a preview of the busy summer ahead on Tuesday, June 25, when a group of youngsters from North Shore Elementary School celebrated the ending of the spring semester with a picnic and games at the facility.

The summer recreation program will start on Thursday, July 1 with supervised activities taking place each weekday from 10 a.m. to 4:30 p.m.

In addition to the usual events, there have been certain innovations this year. The well-rounded schedule includes arts and crafts, table games, outdoor sports, weekly movies, and tennis lessons. Sign-up dates for instruction in tennis, swimming, and sailing are Tuesday through Thursday, June 25-27 from 3 p.m. to 4:30 p.m.

+++

Personnel at Big Bear City Airport agreed that things have been comparatively quiet since all the excitement of the dedication ceremonies are a matter of memory, and they've all taken the opportunity to catch their collective breath.

However, word must have spread to other areas about our up-dated facility, because tie-downs were up to capacity this past weekend with the overflow being given space out in the field.

+++

A sure sign of summer is the reopening of Pan Hot Springs swimming pool. New owners of the pool, Alice and Dick Polhill, have made many changes in the perennially-popular fun spot with the addition of a full snack bar and paved dining patio.

Schedule changes include being open for night swimming on Monday, Wednesday, Friday, and Saturday, as well as more emphasis being placed on the availability of the pool for private parties.

Pan Hot Springs has become a family enterprise with the Polhills' three youngest offspring holding down summer jobs at the pool. College student Mark, 18, serves as lifeguard while daughters Debbie, 11, and Judy, 9, are in charge of the check room.

The Polhills' year-round home is in Long Beach and Dick's full-time employment as a teacher is in that area...The family began their weekend exodus to open the pool on Saturday and Sunday with the Memorial Day holiday.

Week-long operation began on June 15 and will continue until September 14 with a possible extension of a few weekends thereafter, weather permitting.

+++

## Mountain Farmers 4-H Club takes prizes at county fair

Big Bear Lake Mountain Farmers 4-H Club, in existence for less than three months, came back from the San Bernardino County Fair in Victorville with a handful of prizes last week.

Their exhibit booth, built entirely by the members with no adult help, took 6th place. Tammy McMahon and Jo Ellen Rockman took a

2nd in demonstration of their demonstration to plant a terrarium. Randazzo got 8th place in rabbit showmanship.

Six rabbits entered local 4-H member prizes. Ricky Carroll took 1st places with his Jody Randazzo took a 2nd, Debbie Pohill 1st, and Tammy McMahon took a 2nd with her

The Mountain Farmers meet the 1st Thursday each month at the Big Bear City Fire Hall at 7 p.m. Club officers are: Jody Randazzo, president; Jody Randazzo, vice president; Swigart, secretary; Jo Ellen Rockman, treasurer.

Club leaders are Mrs. Al Randazzo. For further information interested persons may call 585-2891.

## Ski club plans annual swim

Big Bear Ski Club will hold its annual swim party at Pan Hot Springs Friday, Aug. 9 from 5:30 p.m. to 9 p.m.

Members who were not notified by mail are being advised to bring their own table services, meat, drink, and a salad or pot of beans.

Admission for the event will be 75 cents for adults and 25 cents for children.

The club will also have an old fashioned family picnic at Big Bear City Park on Monday, Sept. 9 from 1 p.m. to 5 p.m. Those planning to attend should bring their own family's dinner, and games and contests will be held.

Prospective members of the club are also welcome to attend their social functions, a club spokesman said.

Tickets on the ski club side of beef are still available from members who will be stationed in front of the local markets at various times.

Big Bear City Alice Polhill became a casualty of the parade when she mounted a horse before the daughter, Debbie, and fell off the route and was injured.

Her injuries were not serious but nonetheless. Prompt first aid was administered by two local Lake firemen present at the scene and by members of the Red Cross mobile unit.

+++



# PAN HOT SPRINGS

*Swimming*

Natural Warm Mineral Water  
2 large pools, indoor outdoor

Admission:  
Child (under 12) -- 75c  
Adults -- \$1.25

**SAT. & SUN. thru Oct. 27**  
**11:00 to 4:00**

4 blks. East of Airport North Shore Drive

Thursday, Sept. 19, 1974

## Pan Hot Springs to open weekends through October

Serrano pools at Pan Hot Springs will remain open on weekends this fall through Sunday, Oct. 27, according to Richard and Alice Polhill who bought the swimming area this spring.

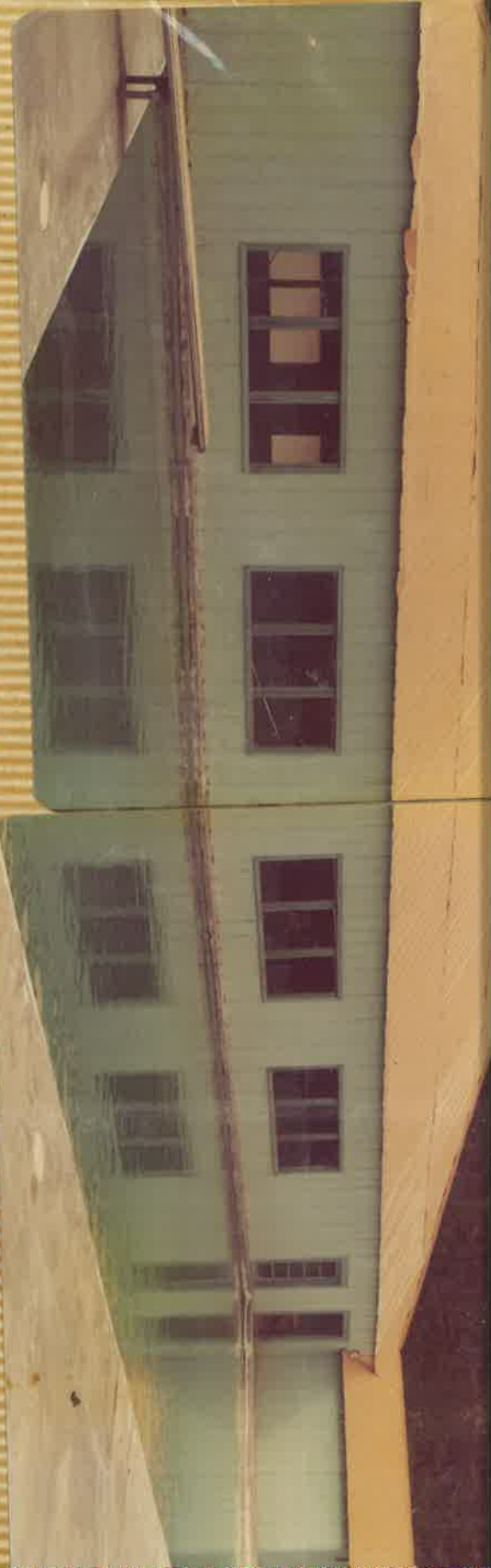
Pan Hot Springs, which is north of Big Bear City on Highway 18, features two swimming pools. The indoor pool is maintained at a temperature of about 80 degrees. It is filled by the warm springs in the nearby meadow.

The outdoor pool is filled by overflow from the indoor pool and is usually around 70 degrees.

The name of the area, Pan Hot Springs, dates back to an old resort and hotel that once stood there. The pools are named for the Serrano Indians who used the warm springs for centuries before civilization came to the Valley.

Chamber board













## PAN HOT SPRINGS

Have a Swim in Natural Warm  
Mineral Water  
**Family Fun**



40x80 Outdoor Pool  
30x80 Indoor Pool

**Hot Mineral Tubspa**

Open 7 days a week, 10 to 4  
(Private parties & group rates)  
4 blks. E. of Airport, North Shore Dr.  
Phone: 585-2757

### Pan Hot Springs offers swimming, life saving lessons

American Red Cross  
Junior Life Saving classes  
will be offered at Pan Hot  
Springs swimming pool in  
Big Bear City beginning on  
Monday, July 14.

Registrations for the  
course are now being taken  
at 585-2757.

Free swimming lessons  
are also offered daily with  
admission between 10 a.m.  
and 11 a.m., according to a  
pool spokesman. Those  
wishing to obtain the free  
lessons are also urged to call

## PAN HOT SPRINGS

4 BLOCKS EAST OF GREENWAY - BIG BEAR CITY

25¢



Discount

natural mineral springs

Featuring...

NEW HOT TUBSPA 105      30 X 80 INDOOR POOL

40 X 80 OUTDOOR POOL      LARGE SUN DECKS

SNACK BAR

PRICES...

tubspa (Includes use of pools)      \$2.00

adults      \$1.25

children 12 & under      75¢

**585-2757**

Please present this ad at  
time of entry, for discount



## PAN HOT SPRINGS

Family Fun



Have a swim in natural  
warm mineral water!

40 x 80 Outdoor Pool  
30 x 80 Indoor Pool  
Hot Mineral Tubspa  
Snacks — Sundecks

Open 7 Days A Week 10  
Fri. & Sat. Nights 7 To

### COUPON

PER PERSON

**25¢ OFF**

North Shore Drive —  
4 Blocks East Of Greenway  
(Highway 18 Towards Lucerne)  
Phone 585-2757

