Geothermal Energy in Alaska

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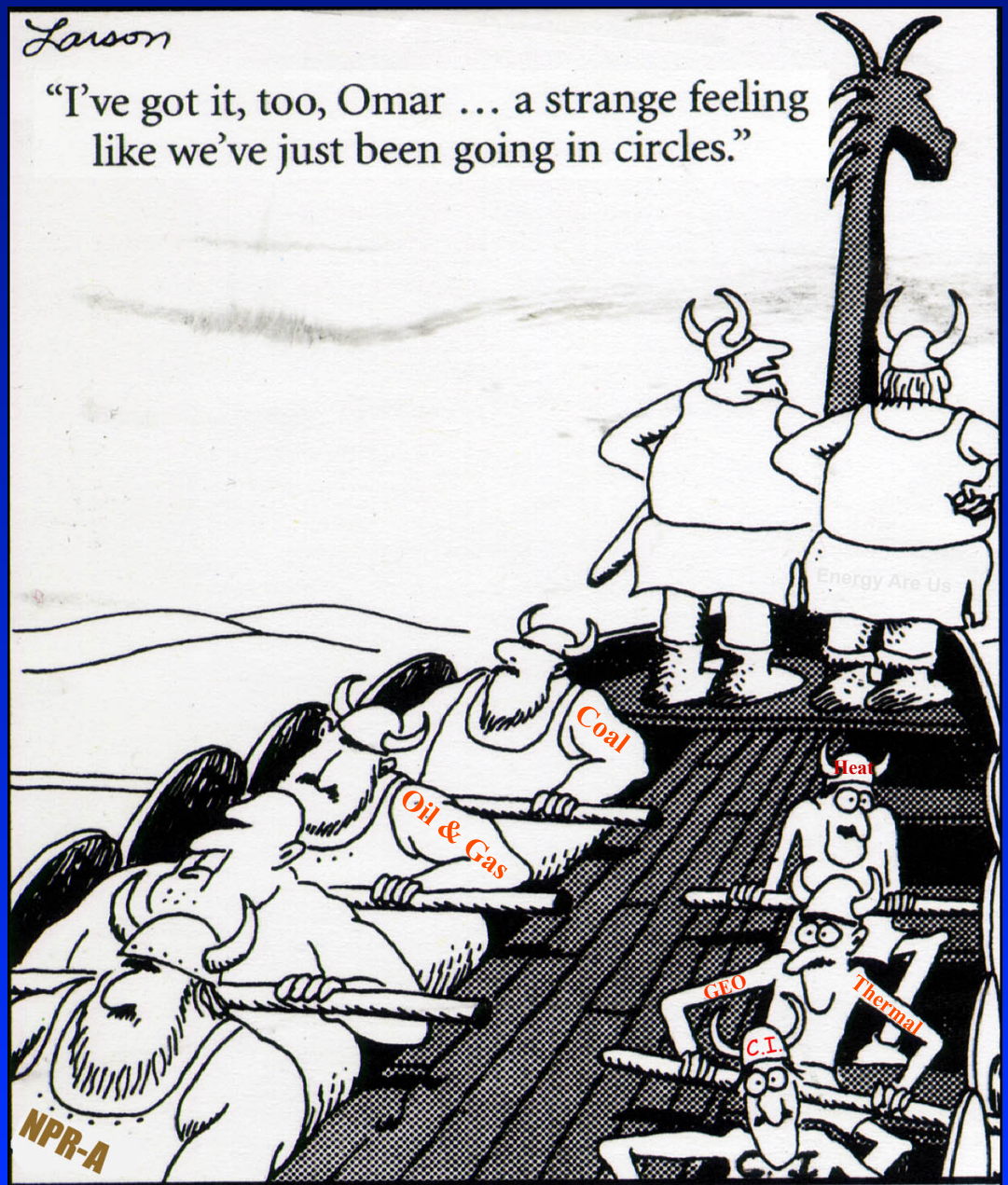
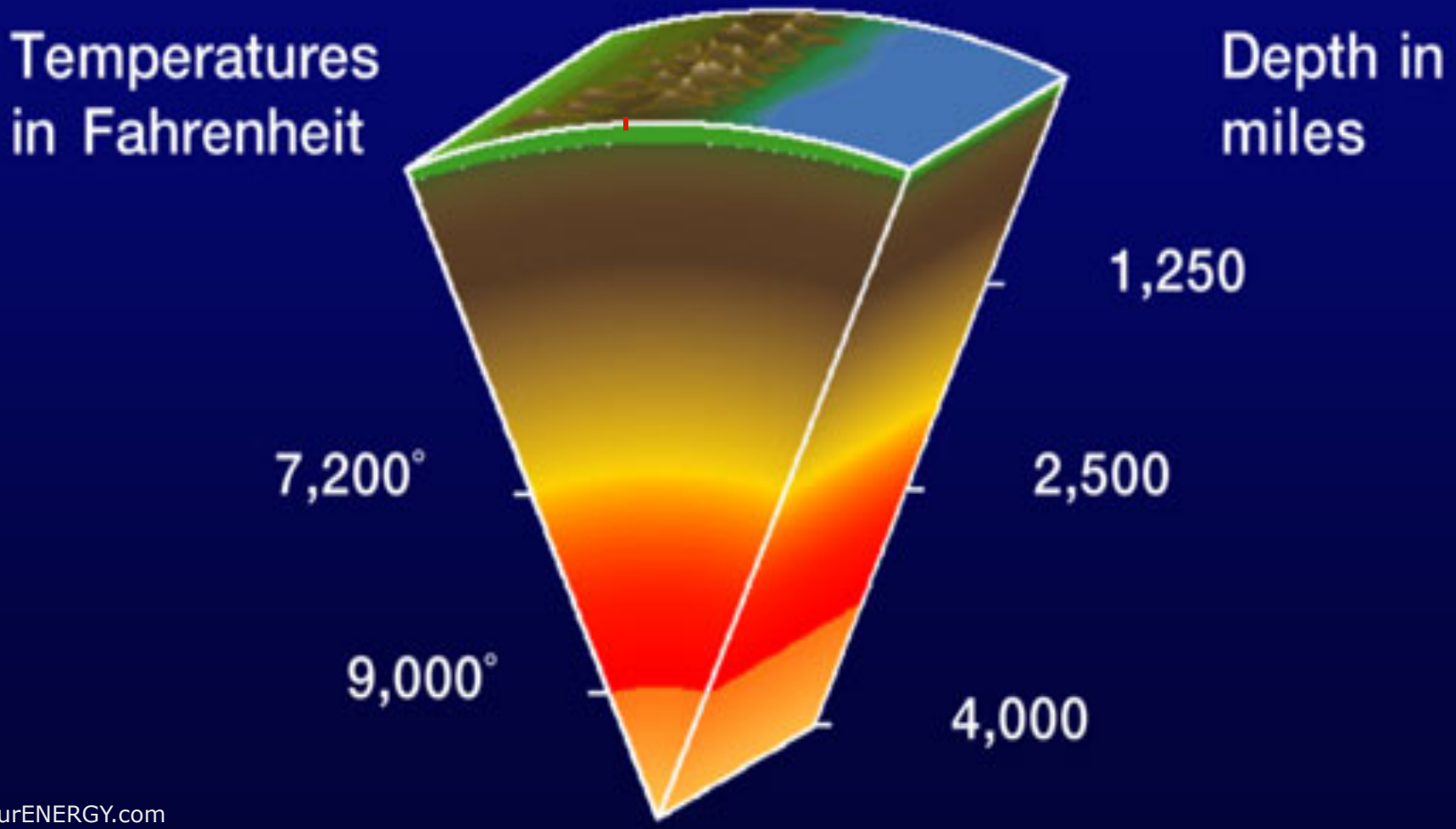
Working Geothermal in the US

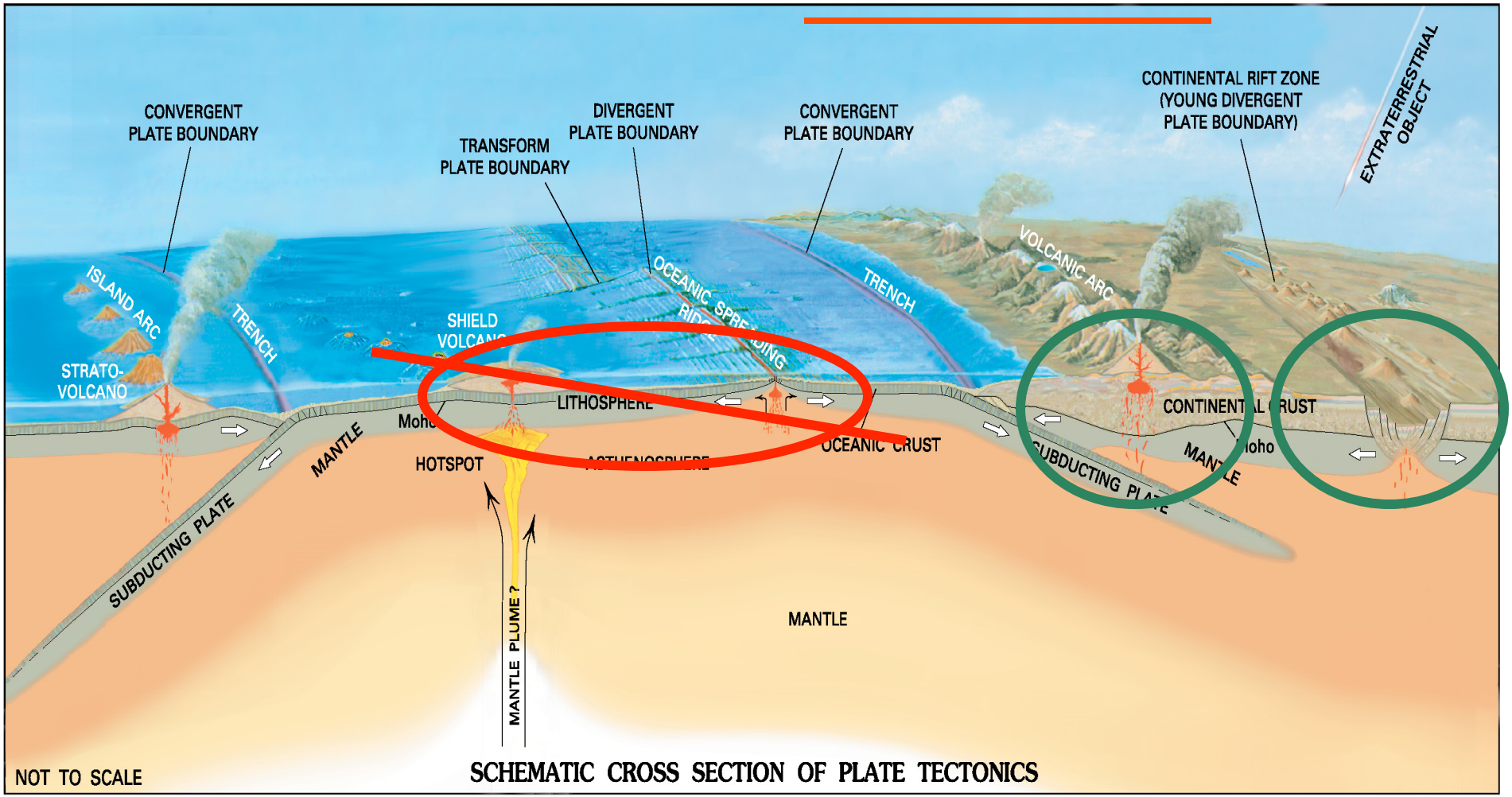


Temperatures in the Earth



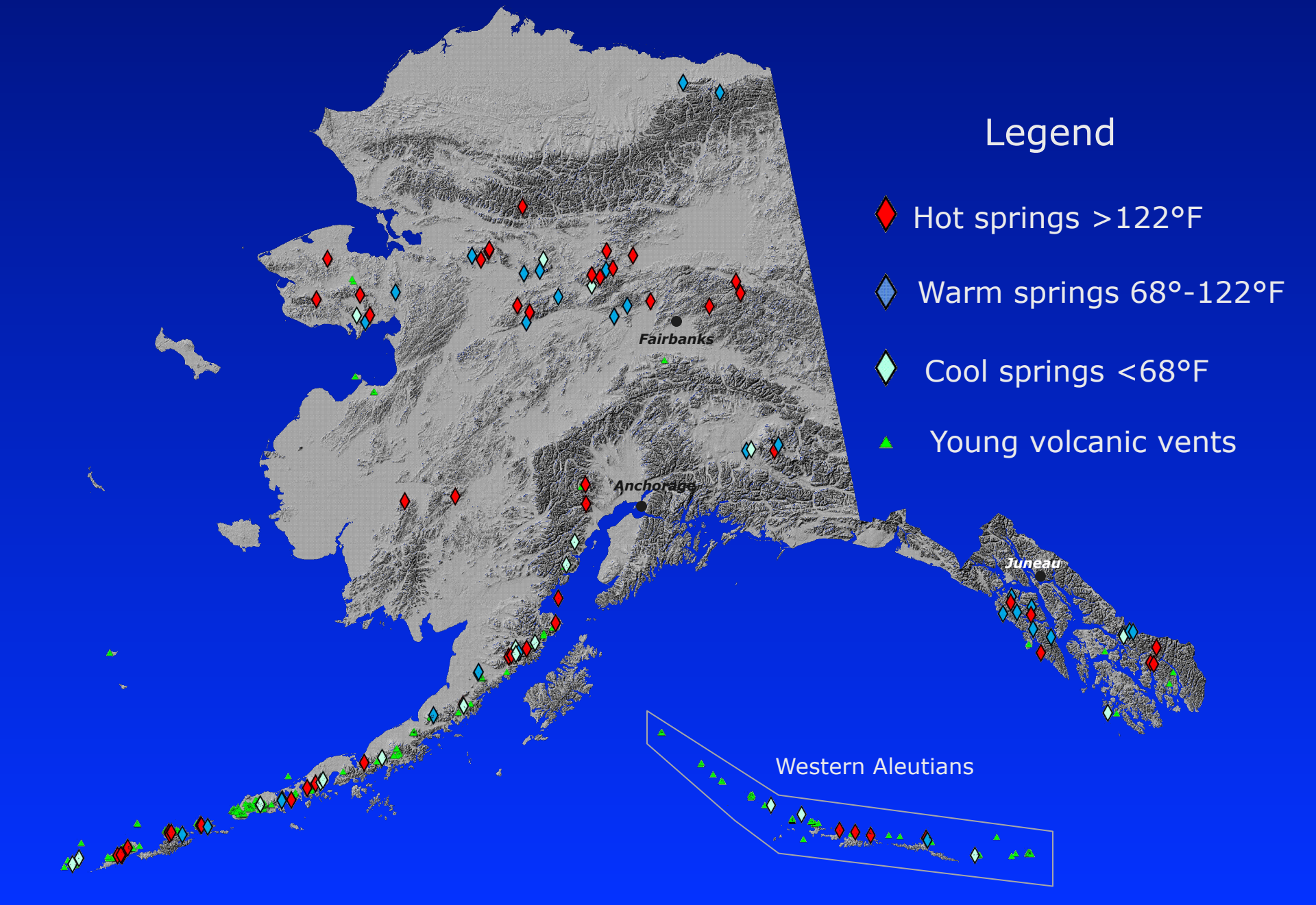
OurENERGY.com

Geothermal & Geologic Settings



José F. Vigil and Robert I. Tilling

Alaska Geothermal Anomalies

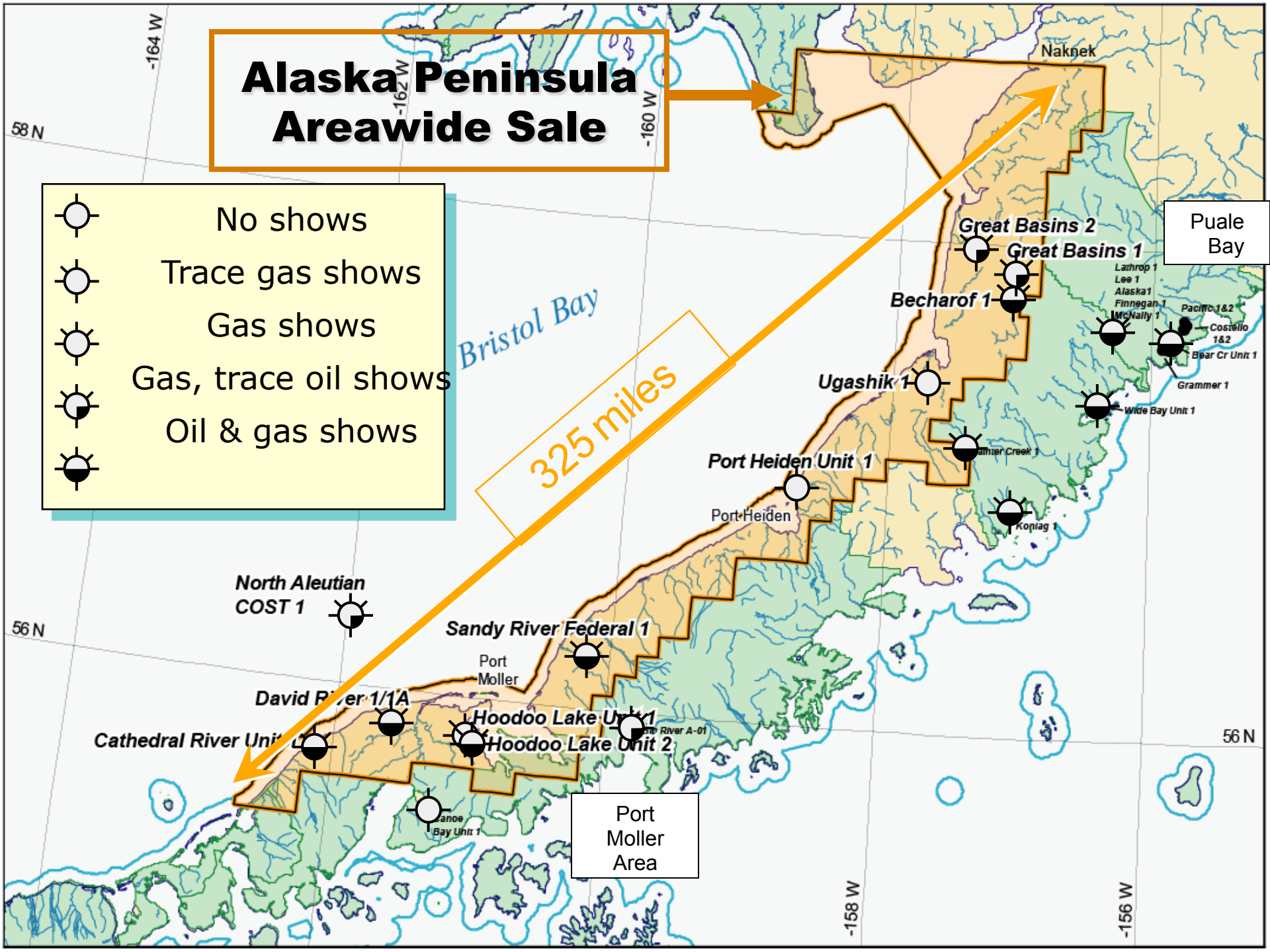


Alaska Geothermal

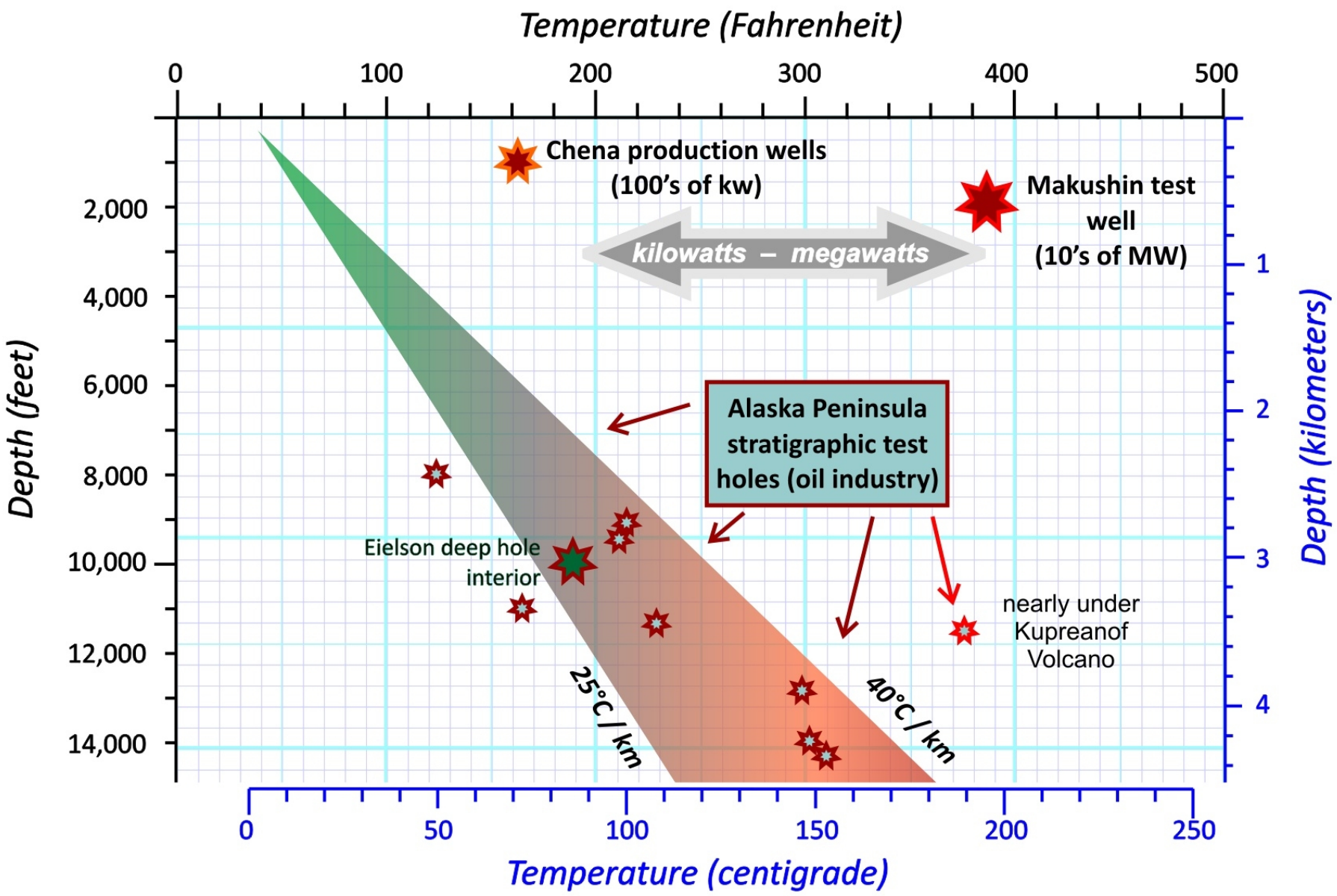
61 hot springs (hotter than 122°F)

34 “warm to cool springs” (cooler than 122°F)

- 37 in the Aleutian Arc into Southcentral Alaska region
- 37 are mostly in the Central interior belt that extends from the Seward Peninsula to Circle Hot Springs
- 4 in the Wrangell Mountains
- 17 in Southeast Alaska

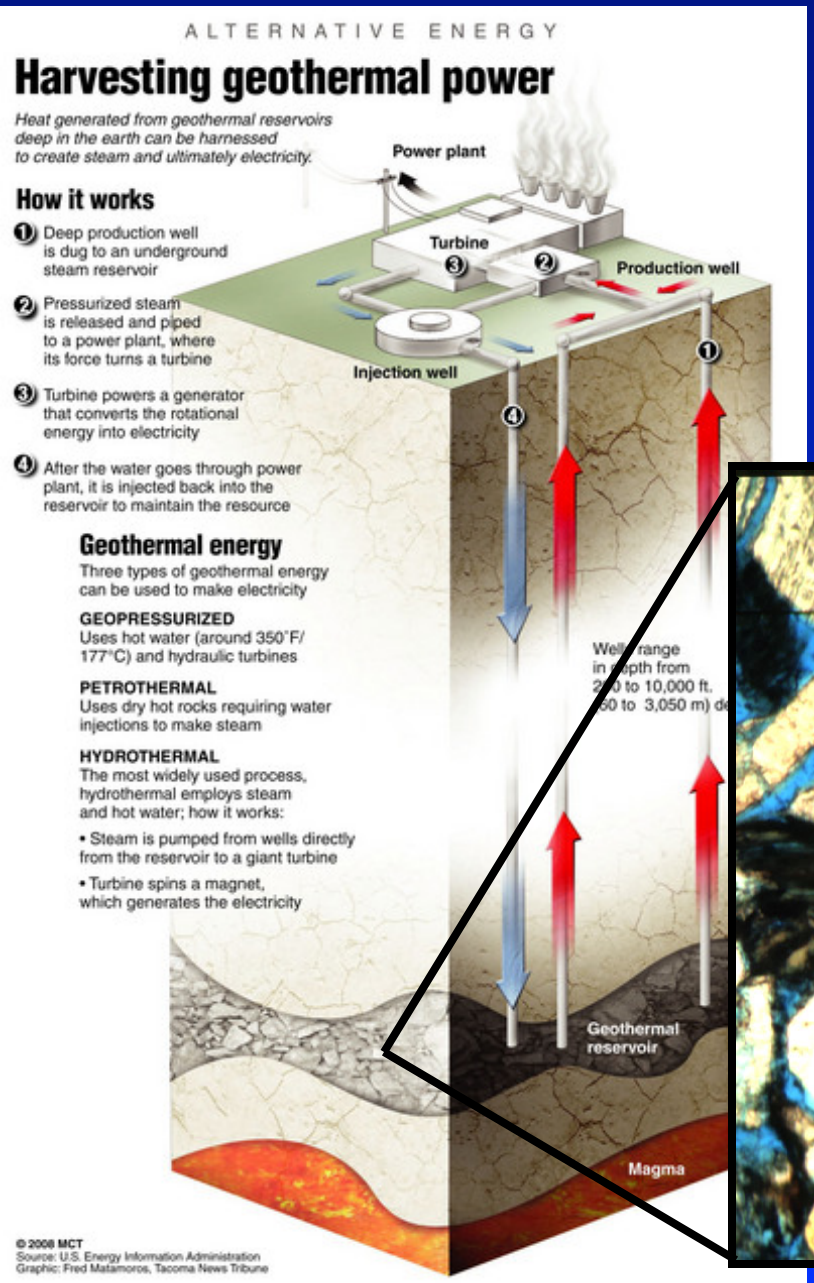

Alaska Peninsula
Areawide Sale
No shows
Trace gas shows
Gas shows
Gas, trace oil shows
Oil & gas shows
325 miles
Bristol Bay
Naknek
Puale Bay
Great Basins 2
Great Basins 1
Becharof 1
Ugashik 1
Port Heiden Unit 1
Port Heiden
North Aleutian
COST 1
Sandy River Federal 1
Port Moller
Hoodoo Lake Unit 1
Hoodoo Lake Unit 2
Cathedral River Unit
Port Moller Area
-164 W
-162 W
-160 W
-158 W
-156 W
58 N
56 N

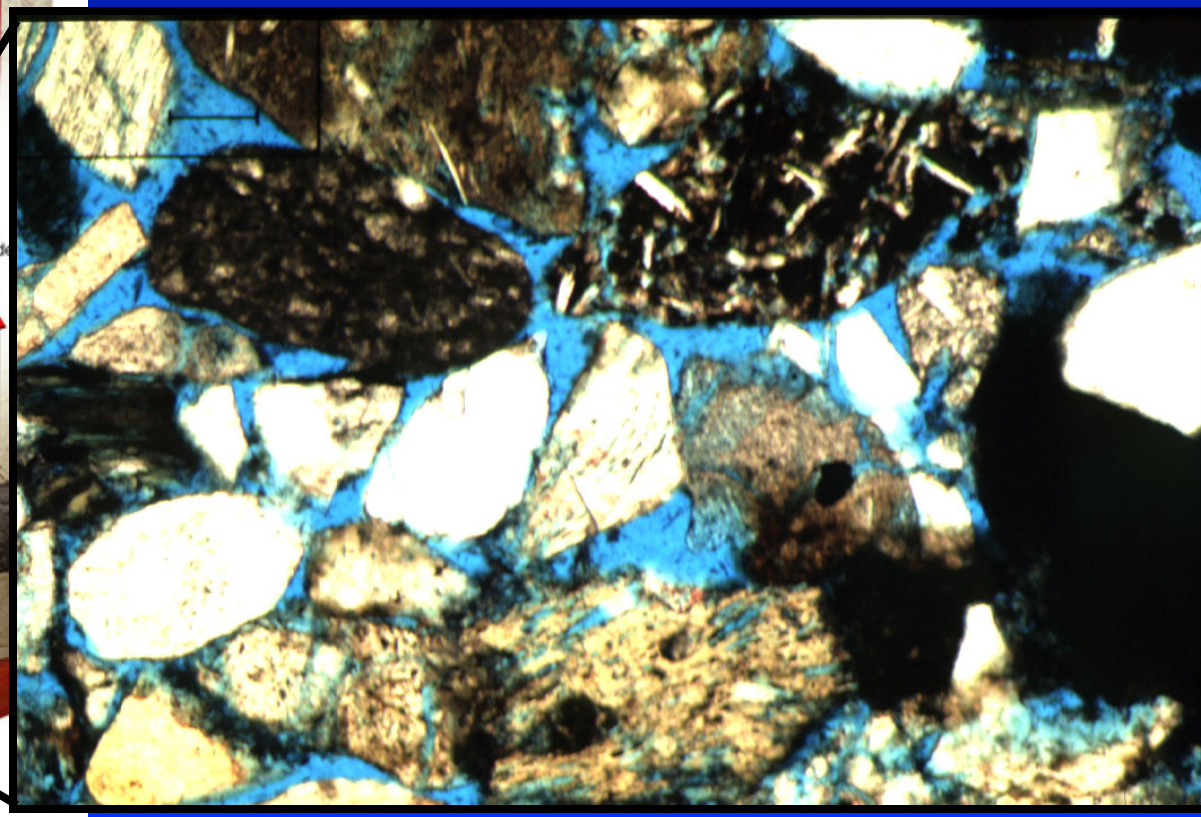
Comparison of known geothermal resource sites to normal geothermal gradient

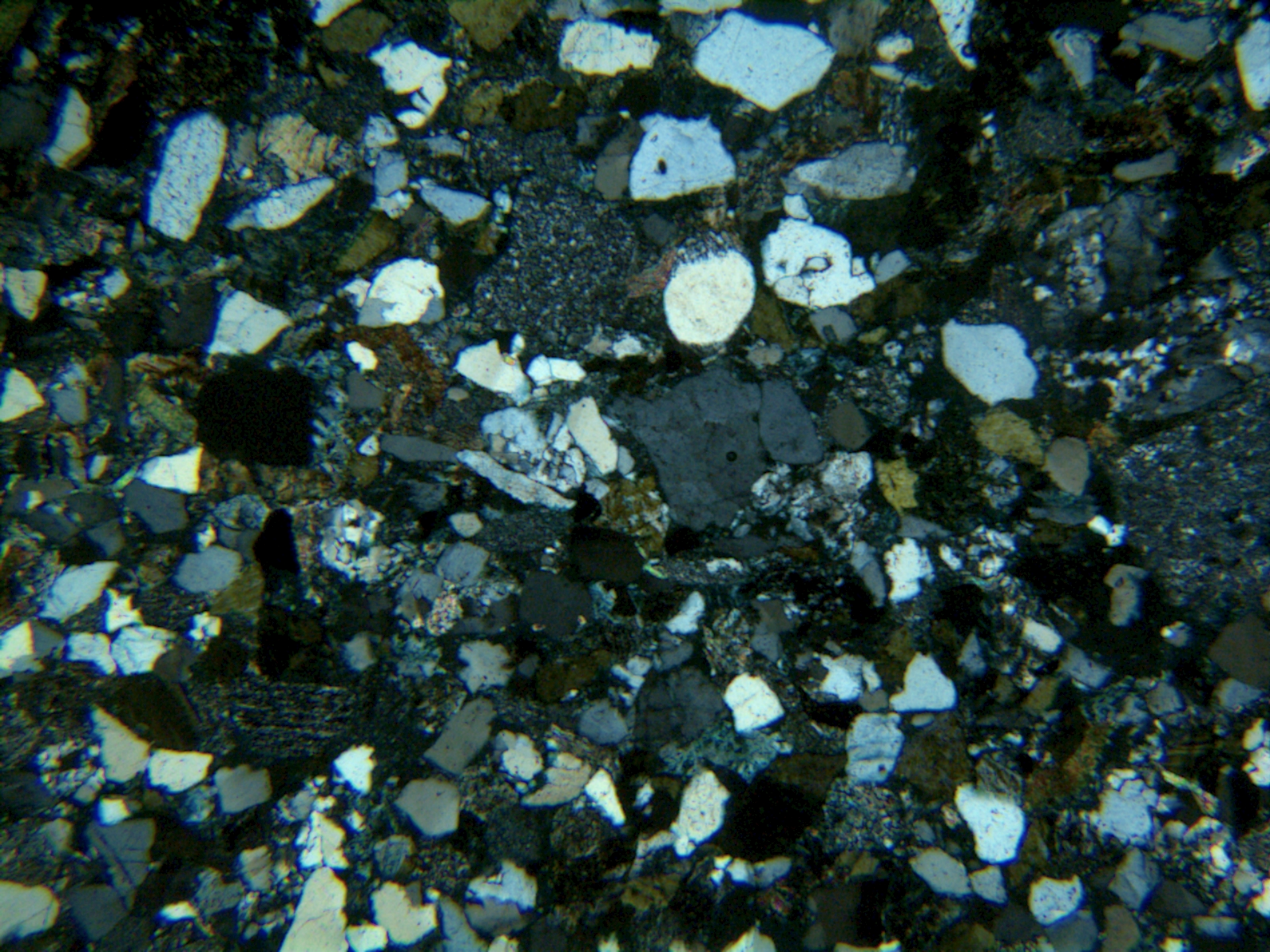


Fundamental Ingredients of Useable Geothermal Energy

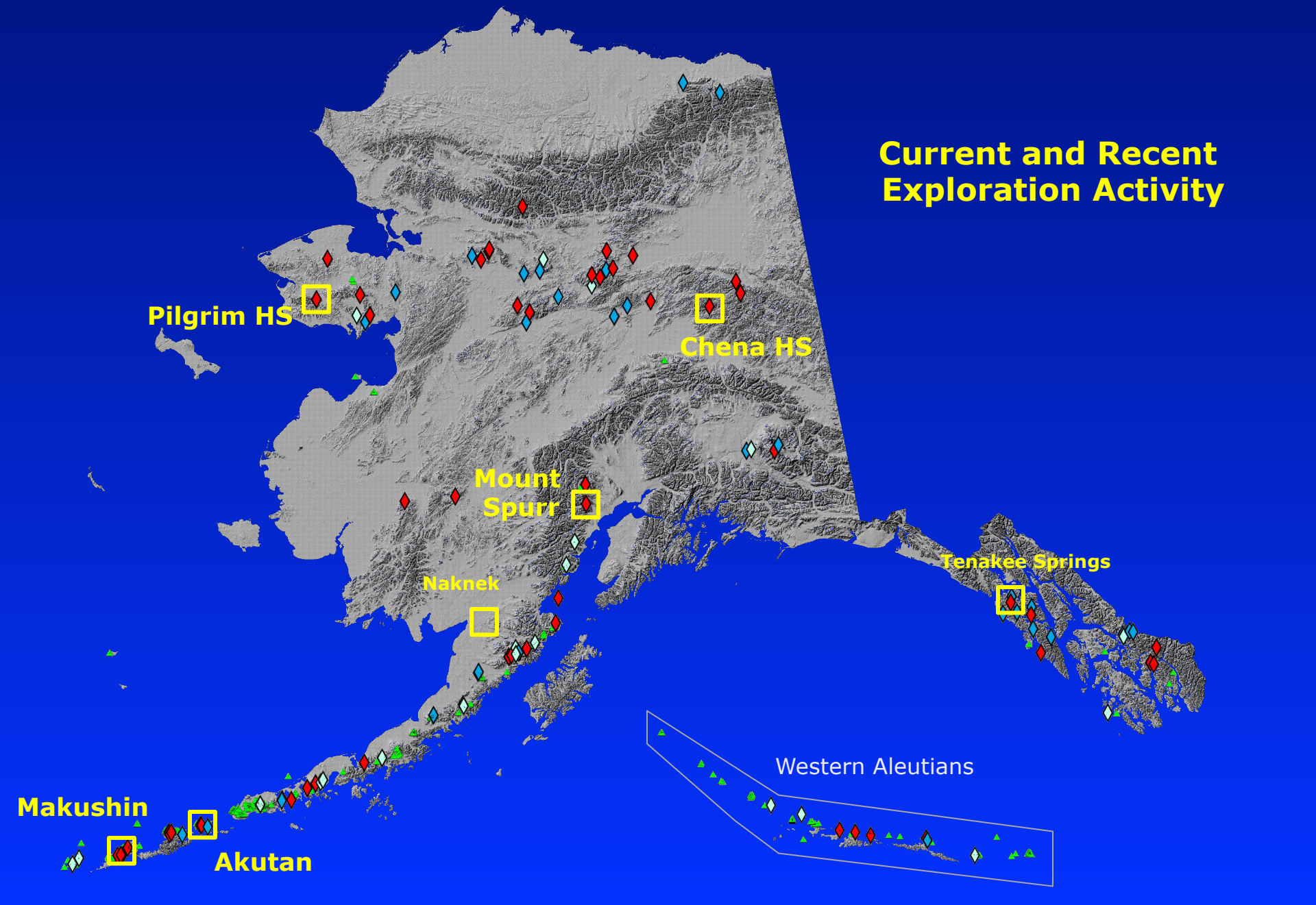
- Porosity and permeability for the migration of fluids







Alaska Geothermal



Pilgrim Hot Springs

The Alaska Center for Energy and Power (ACEP) at the University of Alaska Fairbanks is conducting an evaluation of the Pilgrim Hot Springs area 60 miles north of Nome. This study has involved thermal imaging, geophysics and drilling. Hottest temperature in a well is 174°F.

This project is funded through a grant from the Alaska Energy Authority. During the summer of 2012, 3350 feet of exploration drilling was conducted, with the deepest well to 1296 ft. A magnetometer survey was also conducted.

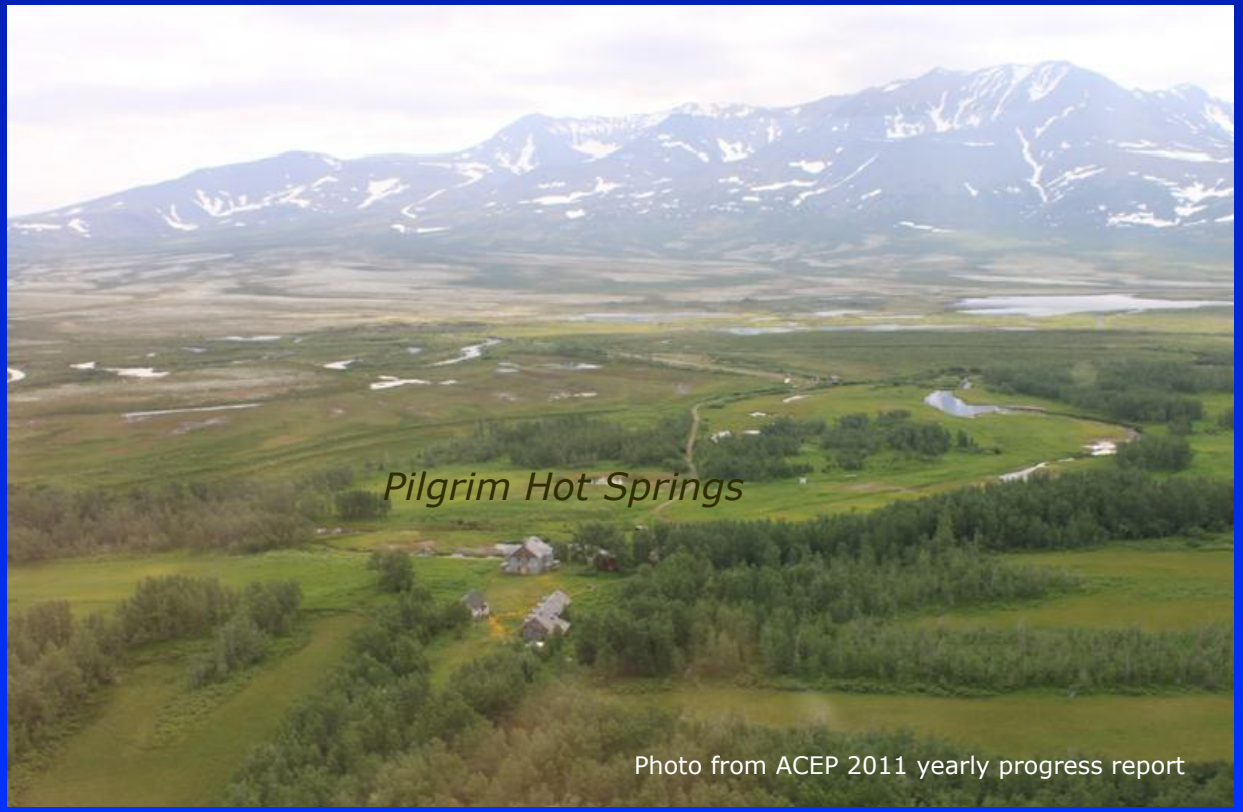


Photo from ACEP 2011 yearly progress report

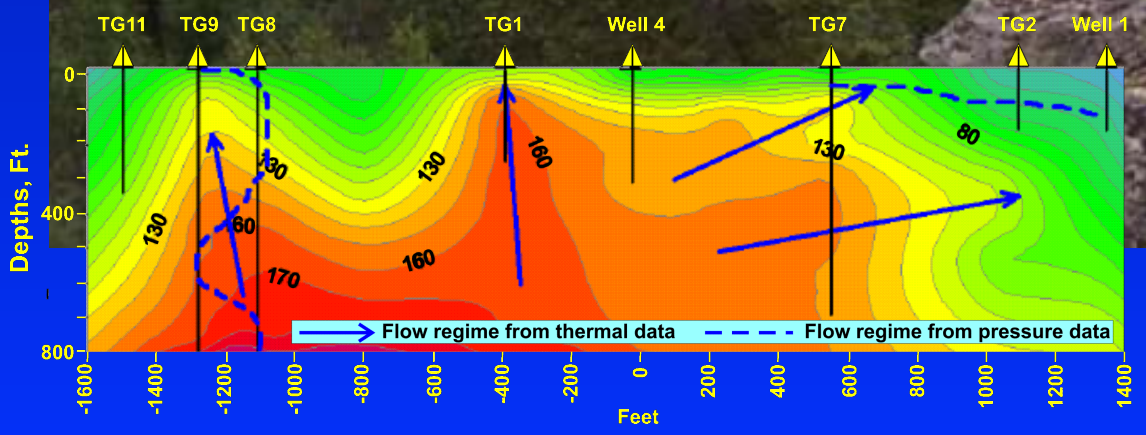
ACEP is currently analyzing the results of their 2012 studies.

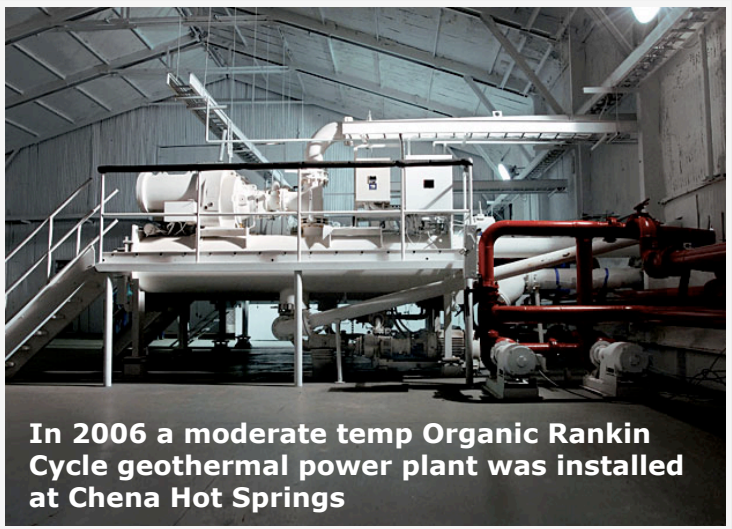
Figure from P. Crimp (AEA) presentation at 2011 BCEA conf.

Chena Hot Springs

From 2004 to 2007 under a USDOE grant, Chena Hot Springs conducted geothermal exploration that included drilling and pressure testing.

Chena Hot Springs has an avg. water temp. of 163°F





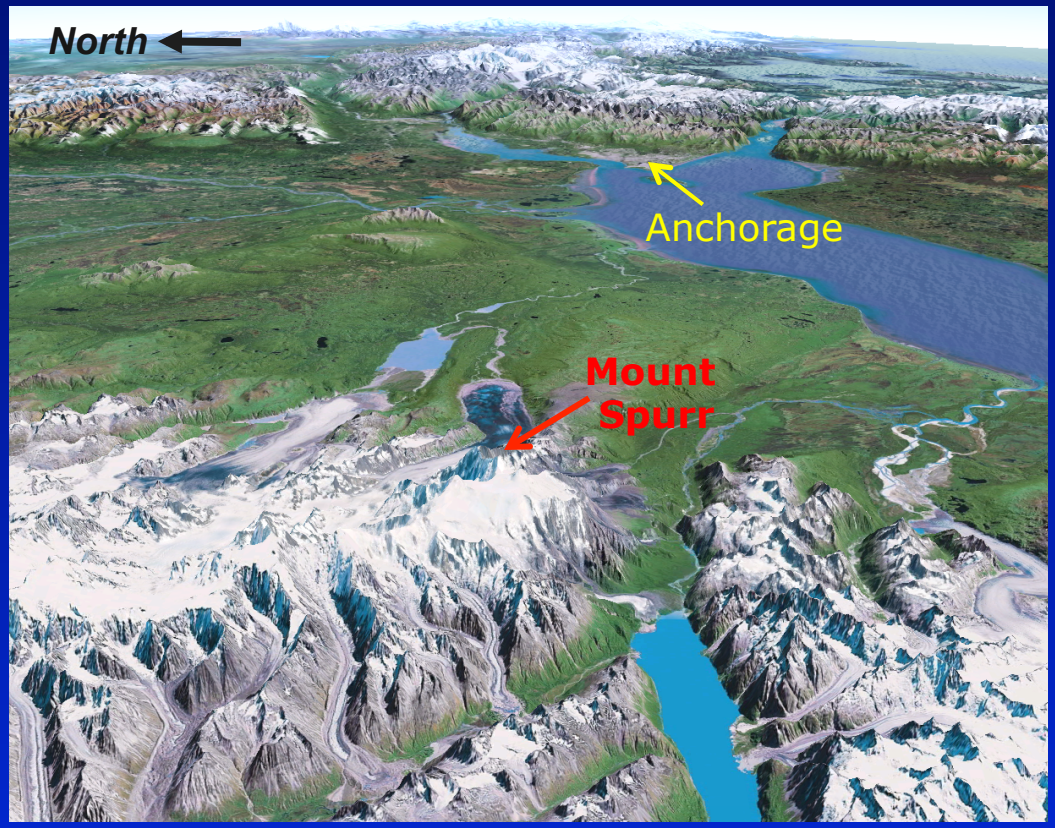
In 2006 a moderate temp Organic Rankin Cycle geothermal power plant was installed at Chena Hot Springs

Figure and top photo from Holdmann and others (2007). Photo at right from Chena Hot Springs Resort website

Mount Spurr

During the fall of 2010, Ormat drilled a 4000 ft deep test well on the side of Mount Spurr, west of Anchorage. This project was funded in part by the AIDEA-Alaska Energy Authority.

The hottest springs on Mount Spurr are 104°F at Crater Peak.



Fumarole gas chemistry suggests much higher hydrothermal temperatures at depth (>400°F).

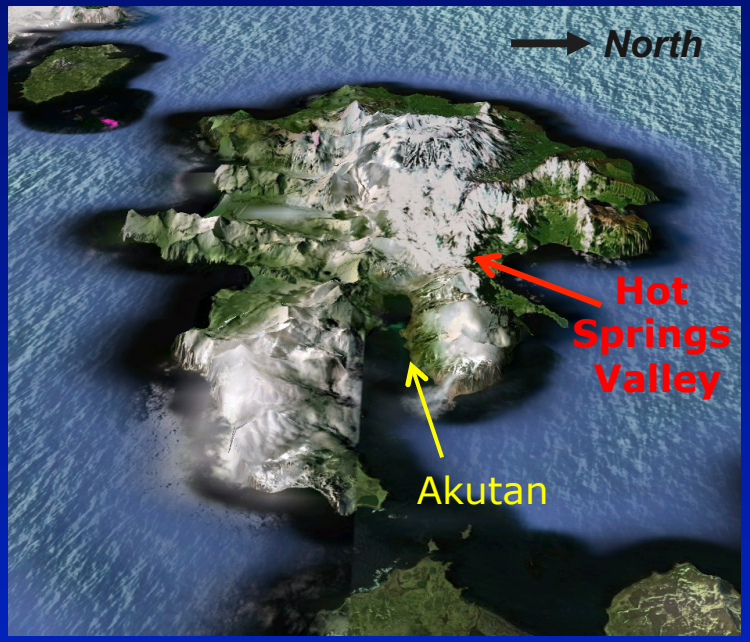
The results of the 2010 drilling were disappointing and Ormat is currently evaluating drilling a much deeper .hole with a larger drill rig.

Photo of drilling site on the side of Mount Spurr. Photo from Ormat's July 24, 2011 presentation to Alaska House and Senate Resource Committees.

Akutan

Beginning in 2009, AIDEA-Alaska Energy Authority has funded exploration of Hot Springs Valley on Akutan island to evaluate the potential for geothermal development to provide energy to both the City of Akutan and nearby Trident food processing plant.

The hottest springs on Akutan are 184°F.



2009-2010 geothermal exploration included geophysical field studies and core drilling to evaluate the geothermal potential of Hot Springs Valley. In 2012, geophysics and field mapping were conducted.

Makushin – Dutch Harbor

In the 1980's the State of Alaska conducted a number of studies of the geothermal potential of the Makushin Volcano region, including nearby Geyser Bight.

This area is one of the most prospective for geothermal electrical power generation.

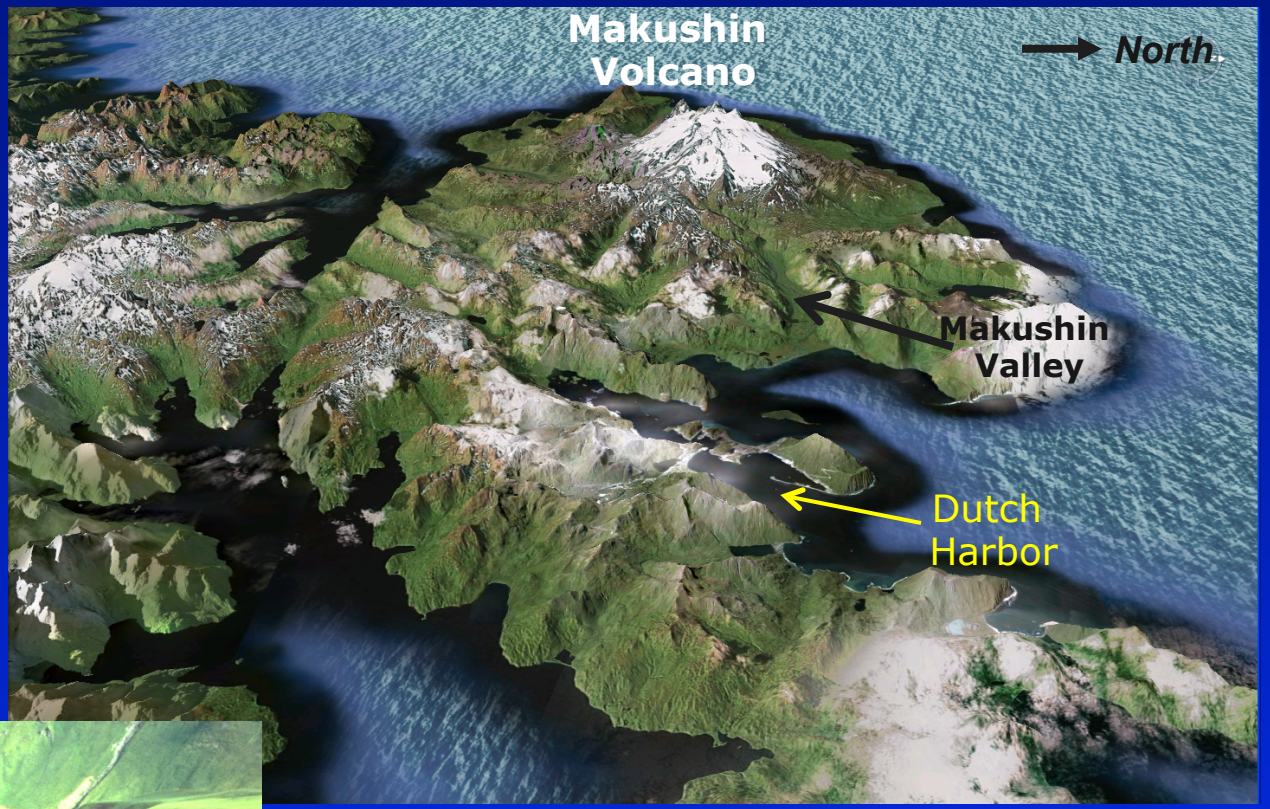
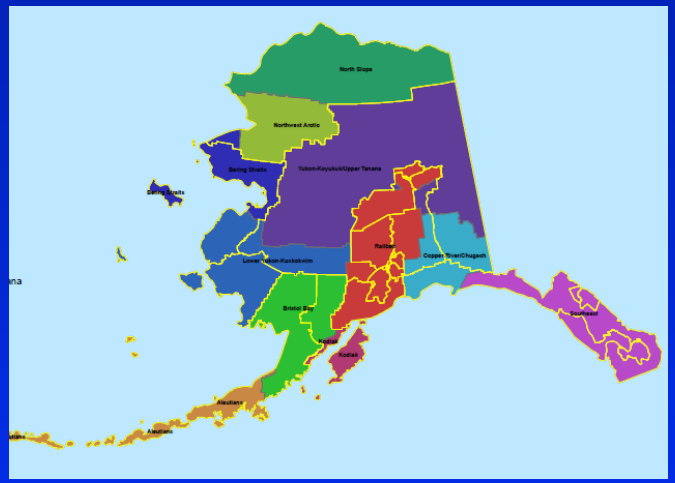



Photo by R. Motyka, DGGS.

The area is still under consideration as a potential energy source for Dutch Harbor. The hottest temperature is 298°F in a test well.

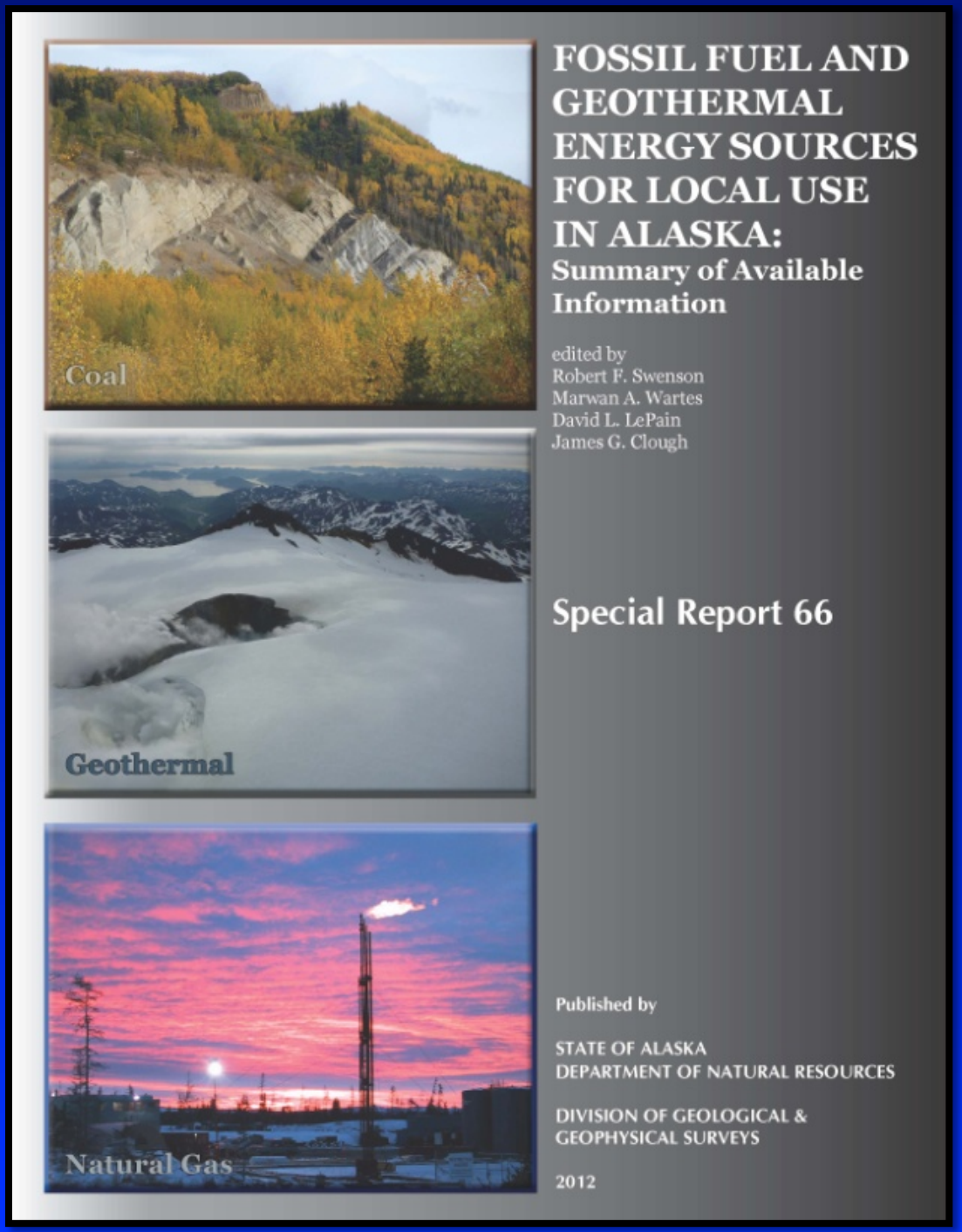
Photo at left from the 1983 Makushin Valley geothermal test drilling.

Summary of available information on fossil fuel and geothermal energy in Alaska



Available for Download

www.dggs.alaska.gov



STATE GEOTHERMAL DATA

http://www.stategeothermaldata.org

AASG Association of American State Geologists

U.S. DEPARTMENT OF ENERGY

AZGS Arizona Geological Survey

The American Association of State Geologists (AASG) created a Geothermal Data archiving and preservation project that is underway in all 50 states. This data will be archived into the National Geothermal Data System and accessible from this website.

Alaska is participating in this project that is sponsored by the U.S. Dept. of Energy under a grant award to the Arizona Geological Survey acting on behalf of the AASG

We are compiling and digitizing at-risk, legacy geothermal-relevant data and this data will be placed into the NGDS for access online. We are also creating a new geothermal map of Alaska.

Key Points

- Geothermal heat, where technically and economically accessible, is an excellent form of sustainable energy
- Hydrothermal systems are the most common form of energy extraction from geothermal heat
- Having the complex geologic parameters necessary for a viable geothermal resource, all present at one location, is unique and relatively rare in nature
- Certain geologic settings are much more conducive to geothermal resource occurrence than others
- Alaska contains a number of potential and developable geothermal resources, but there are many physical technical, and economic hurdles that must be addressed
- New technologies that will help expand geothermal development into less favorable geology are on the horizon, and need extensive research, but significant hurdles remain