



HB 135 GEOTHERMAL RESOURCES

HOUSE FINANCE COMMITTEE

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AGENDA

- DOG: Overview of HB 135
 - Purpose of HB 135
 - DNR geothermal leasing history
 - Sectional analysis summary
 - Sectional analysis details
- Supplemental Information
 - DGGS: Introduction to geothermal energy
 - Fundamentals of geothermal systems
 - Geothermal systems of Alaska
 - Examples of geothermal systems
 - Drilling regulations

OVERVIEW OF HB 135

PURPOSE OF HB 135

- **Modernize Alaska's geothermal exploration program**
 - Greater potential for providing affordable, renewable energy to rural communities and remote natural resource extraction projects
 - Promote clean energy industry job creation
- **Align geothermal licensing with the oil and gas exploration license program, thereby increasing feasibility for companies to develop resources**
 - More time for a company to identify and prove resource to convert to leases
 - Conversion to leases based on completion of work commitment and submission of exploration plan instead of proving discovery of commercial resource
 - Doubles maximum acreage allowed for exploration
- **Reforms definitions for geothermal resources to focus on *Commercial Use***
 - Explicitly excludes domestic, noncommercial, or small-scale industrial use from the need for a geothermal license or lease

DNR GEOTHERMAL LEASING/PERMITTING HISTORY

Present

Mount Spurr Currently there are two geothermal exploration prospecting permits in the Mount Spurr area, both issued during 2021.

Augustine Island An application for a prospecting permit is under review for Augustine Island.

2013

Augustine Island 26 tracts were offered. Only one tract was leased to a private individual and no exploration work was conducted as a result of that lease sale.

2008

Mount Spurr 16 tracts leased to Ormat and one private individual. Ormat purchased 15 leases in the 2008 sale and drilled on southern flank of volcano. They didn't find adequate temperatures in wells to pursue the project. The state has the data available [on DO&G's website](#).

1986

Mount Spurr On June 24, 1986, DNR offered 2,640 acres in two tracts. Both tracts received bids. The lease for Tract 1 expired in 1996, and the lease for Tract 2 was terminated in 1990.

1983

Mount Spurr DNR held its first geothermal lease sale in the Mount Spurr area on May 17, 1983. 10,240 acres in 16 tracts were offered in Competitive Geothermal Lease Sale 1. One tract received a bid. The lease for that tract was terminated in 1992.

DNR LEASING/PERMITTING PROCESS

- **Application and Call for Competing Proposals**
- **If competing proposals ► competitive Lease Sale**
- **If no competing interest ► issue prospecting permit with two-year time limit**
 - This bill updates this, replace two-year permits with 5-year exploration licenses designed after our modern oil and gas exploration licensing program.
 - Only after the stipulations of a permit/license are met can the operator convert to a lease
- **Both processes require Best Interest Finding prior to disposal**

SECTIONAL SUMMARY

Section (Affected Org)	Summary
1 (AOGCC)	Removes unnecessary reference to AS 41.06 from AS 31.05.030(m) because of changes made by Section 14 (repeal of AS 41.06.005(b) and 41.06.030).
2 (DNR)	Changes <i>permits</i> to <i>licenses</i> . Explicit exemption for geothermal resources intended for domestic, noncommercial, or small-scale industrial use (See also Section 9). Removes preferential rights clause. This provision is not appropriate for commercial development of State resources.
3 (DNR)	Changes <i>permit</i> to <i>license</i> . Extends term of licenses (formerly <i>permits</i>) from two to five years. Replaces lease conversion requirement of <i>commercial discovery</i> and <i>development plan</i> with <i>work commitment</i> and <i>exploration plan</i> .
4 (DNR)	Changes <i>permit</i> to <i>license</i> .
5 (DNR)	Changes <i>permits</i> to <i>licenses</i> . Increases maximum acreage from 51,200 to 100,000. Adds provision for rental fees to be defined in regulation, rather than statute (easier to update).
6 (DNR)	Adds new subsections to AS 38.05.181 to modernize unitization statute for geothermal leases to match the model we use for oil & gas under AS 38.05.180.
7 (DNR)	Adds a new provision to AS 38.05.945(a) to require additional public notice for when a geothermal license, permit, or lease under AS 38.05.181 is issued or renewed.
8 (DNR)	Amends AS 38.05.945(e) to include an exception for the provision created by Section 7.
9 (DNR)	Replaces AS 38.05.965(6) definition of <i>geothermal resources</i> (Same as Section 13).
10 (AOGCC)	Amends AS 41.06.020(e), clarifies that AS 41.06 does not limit DNR's authority over geothermal resource management on state land.
11 (AOGCC)	Amends AS 41.06.020(f) to add explicit exemption for geothermal resources intended for domestic, noncommercial, or small-scale industrial use (See also Section 2).
12 (AOGCC)	Amends AS 41.06.060(4) definition of <i>geothermal fluid</i> to remove temperature references and better conform with other changes in this bill.
13 (AOGCC)	Replaces AS 41.06.060(5) definition of <i>geothermal resources</i> (Same as Section 9).
14 (AOGCC)	Repeals AS 41.06.005(b) and AS 41.06.030, since geothermal units are managed by DNR.
15–18	General provisions for applicability, authority to adopt regulations, and effective dates. Includes applicability provision for prospecting permits recently issued.

SECTIONAL ANALYSIS DETAILS

SECTION 2: PRIVATE USE EXEMPTION

- **New language added:**

A prospecting license or lease is not required under this section to explore for, develop, or use geothermal resources if the geothermal resource is intended for domestic, noncommercial, or small-scale industrial use.

- **This explicitly excludes private geothermal users from a requirement to apply for a license or lease.**

COMMERCIAL GEOTHERMAL POWER PLANTS VS NON-COMMERCIAL SYSTEMS

Harvesting geothermal power

Heat generated from geothermal reservoirs deep in the earth can be harnessed to create steam and ultimately electricity.

How it works

- 1 Deep production well is dug to an underground steam reservoir
- 2 Pressurized steam is released and piped to a power plant, where its force turns a turbine
- 3 Turbine powers a generator that converts the rotational energy into electricity
- 4 After the water goes through power plant, it is injected back into the reservoir to maintain the resource

Geothermal energy

Three types of geothermal energy can be used to make electricity

GEOPRESSURIZED

Uses hot water (around 350°F/ 177°C) and hydraulic turbines

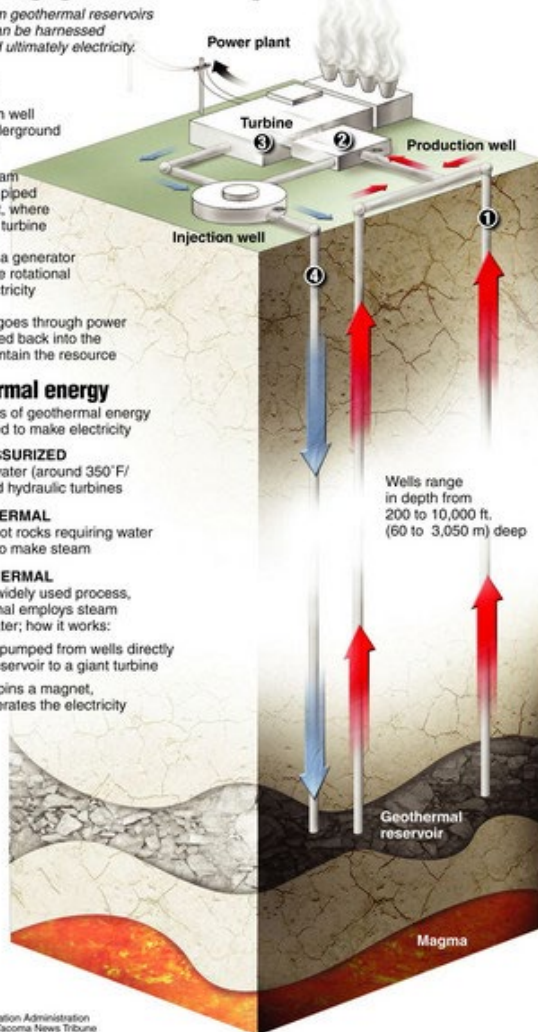
PETROTHERMAL

Uses dry hot rocks requiring water injections to make steam

HYDROTHERMAL

The most widely used process, hydrothermal employs steam and hot water; how it works:

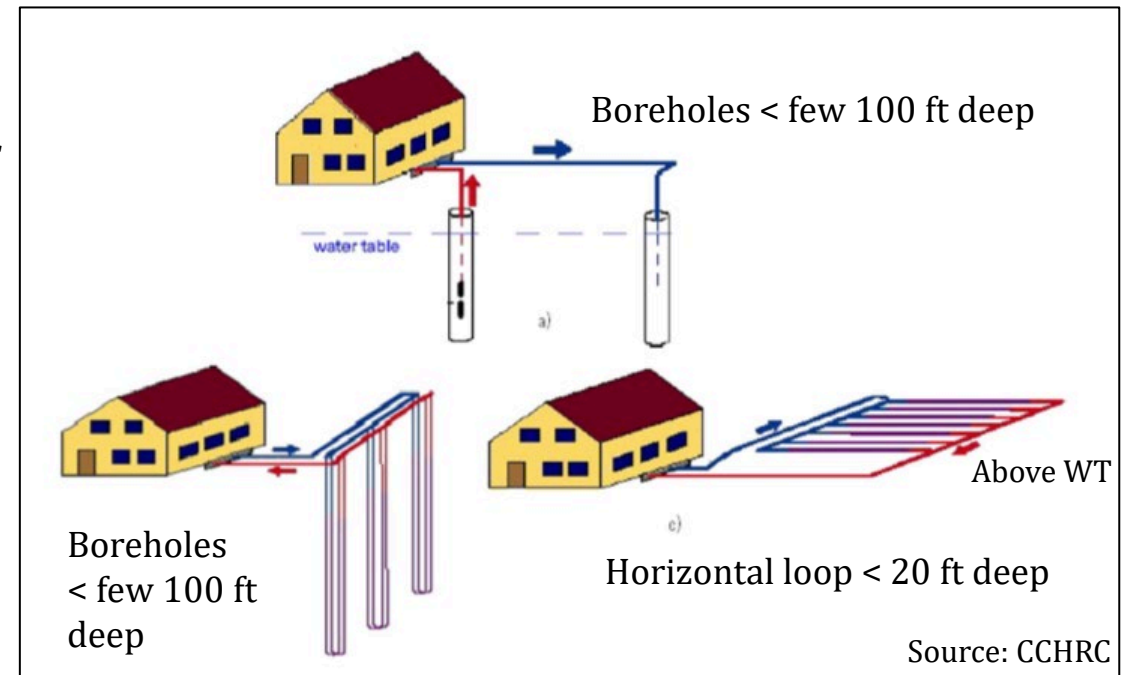
- Steam is pumped from wells directly from the reservoir to a giant turbine
- Turbine spins a magnet, which generates the electricity



- Commercial Power Plants – wells thousands of feet deep tapping hot, non-potable water.
- Non-Commercial systems – heat pumps/loops above water table or wells less than a few hundred feet deep.

- *Deep subsurface vs near-surface systems separated by 1000s of feet*

- *Vertical communication unlikely*



SECTION 2: PREFERENTIAL RIGHTS

- **Current statute grants preferential rights to a surface owner to apply for a geothermal prospecting permit once notice is received of existing application.**
 - Potentially discouraging to commercial development.
 - Private landowners usually don't have financial resources to develop a commercially-viable geothermal resource.
- **Surface owner rights are protected under AS 38.05.130.**
 - If conflict arises, DNR ensures private landowners would not be left without heat or power, or otherwise damaged by commercial development.
- **If a surface use agreement can't be reached, resolution process is in 11 AAC 86.145.**
 - DNR holds a hearing wherein the developer must prove there is no other alternative location for the well or data acquisition.
 - If the Commissioner concurs, developer posts a bond to compensate landowner for any impacts and work progresses.
- **Public notice is a part of the license issuance process, and surface owners can participate.**
- **Surface owner notification is part of surface-use authorizations.**

SECTION 3: WORK COMMITMENT

- **Changes prospecting *permit* to *license* and increases term from 2 to 5 years**
 - Creates greater opportunity for success of noncompetitive geothermal program
- **Conversion to noncompetitive lease through completion of agreed upon work commitment**
 - Current process for oil and gas exploration license
 - Commitment expressed in dollar figure
 - Annual reporting and performance objectives

SECTIONS 7 & 8: PUBLIC NOTICE

- **Additional requirement to post public notice when a license, permit or lease is issued or renewed under AS 38.05.181.**
- **Public notice would now be required when:**
 - A call for competing proposals is issued
 - The preliminary best interest finding is issued
 - The final best interest finding is issued
 - **NEW** The exploration license is issued
 - **NEW** The license is extended or converted to a lease
- **Geothermal licenses and leases are *not* surface use authorizations**
 - They only provide the exclusive right to explore for and develop the subsurface resources
 - Surface use authorizations require public notice *and* direct notice to any affected surface owners

SECTION 12: GEOTHERMAL FLUIDS

AS 41.06.060(4) is amended to read:

(4) “geothermal fluid” means liquids, brines, water, gases, or ~~and~~ steam at ~~temperatures greater than 120 degrees celsius or any commercial use of liquids and steam~~ naturally or artificially present in a geothermal system; “geothermal fluid” does not include oil, hydrocarbon gases, or other hydrocarbon substances ~~at temperatures less than 120 degrees celsius;~~”

- Aligns with modernized definition for geothermal resources.
- Not limited by temperature because current technology enables development of cooler geothermal systems.
- Distinguishes geothermal fluids from hydrocarbon resources.

SECTIONS 9 & 13: NEW DEFINITION

“Geothermal resources” means the natural heat of the earth; the energy, in whatever form, below the surface of the earth present in, resulting from, or created by, or which may be extracted from, such natural heat; and all minerals in solution or other products obtained from naturally heated fluids, brines, associated gases, and steam, in whatever form, found below the surface of the earth; but excluding oil, hydrocarbon gases, or other hydrocarbon substances.

- Modern definition for geothermal resources.
- Not limited by temperature because current technology enables development of cooler geothermal systems.
- Ensures all the State’s mineral estate resources are captured in definition.
- Same definition being applied to both DNR & AOGCC statutes.

FISCAL NOTE: NEW DGGS GEOLOGIST 3

- **This will enable DGGS to restart its geothermal program. The new geologist would:**
 - Coordinate with agencies and industry to publish new geologic data to further development of Alaska's geothermal energy resources
 - Maintain and update geologic data on Alaska's geothermal systems in a geothermal database
 - Attract federal funds to characterize Alaska's geothermal systems and resources
 - Monitor developments in geothermal systems technology
 - Conduct geologic investigations of Alaska's geothermal systems
 - Publish geologic maps, reports and data on Alaska geothermal systems
 - Advise DNR and other state agencies on the state's geothermal resources
 - Support the Department's geothermal leasing program
 - Support and supply information to explorers and developers of Alaska's geothermal resources
 - Support and advise DNR Commissioner's Office and Governor's Office on geothermal policy

QUESTIONS?



SUPPLEMENTAL INFORMATION

FUNDAMENTALS OF GEOTHERMAL SYSTEMS

FUNDAMENTAL INGREDIENTS OF USEABLE GEOTHERMAL ENERGY

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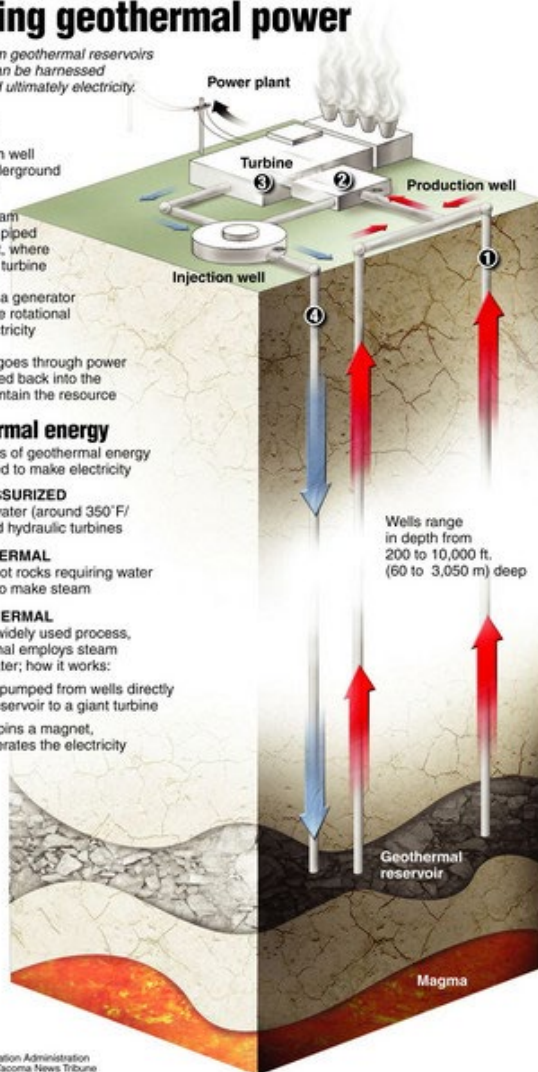
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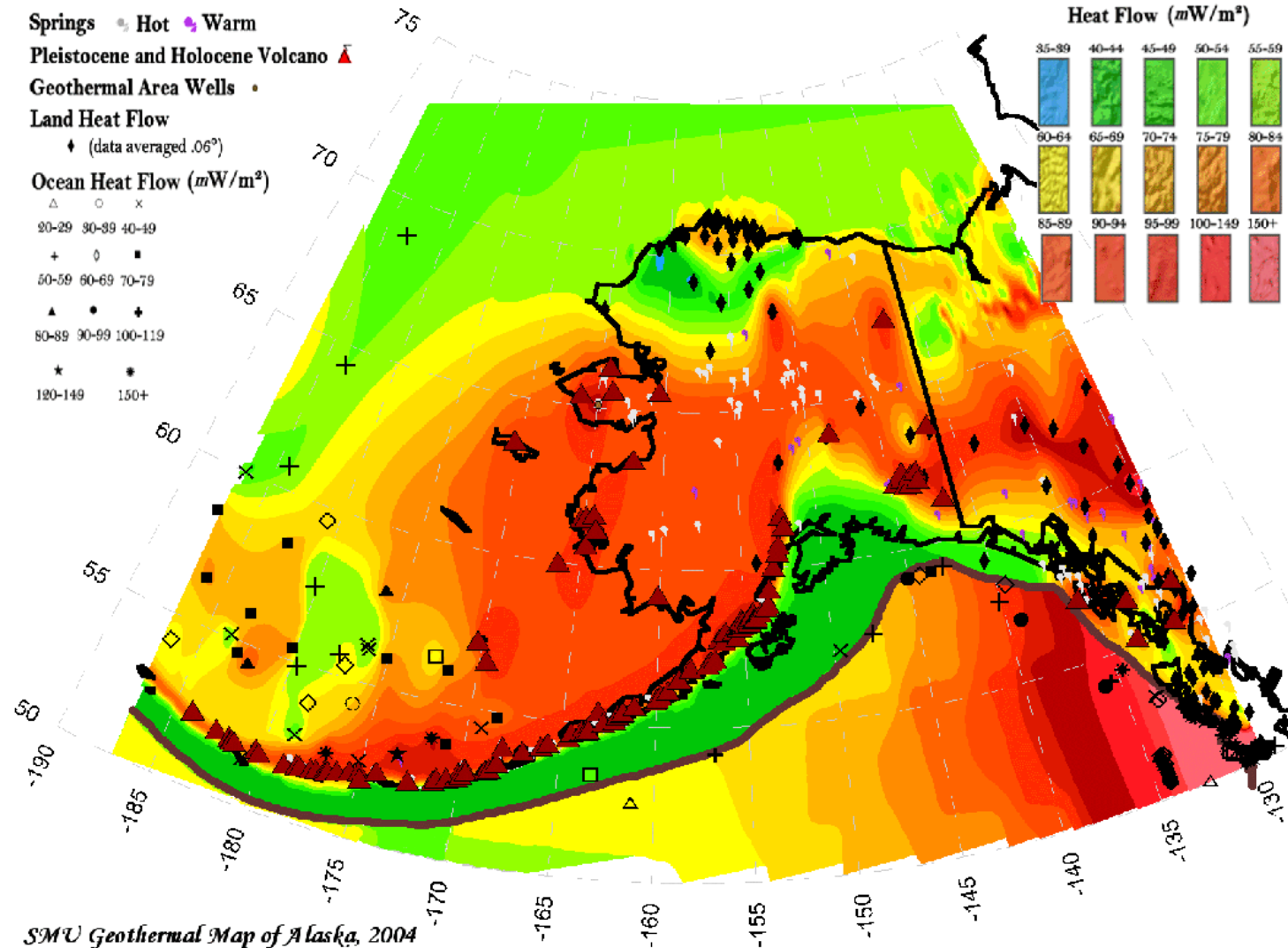
The most widely used process, hydrothermal employs steam and hot water; how it works:

- Steam is pumped from wells directly from the reservoir to a giant turbine
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- Elevated geothermal gradient
- Porosity and permeability for the migration of fluids
- Surface access
- Sufficiently large thermal System
- Customers for energy

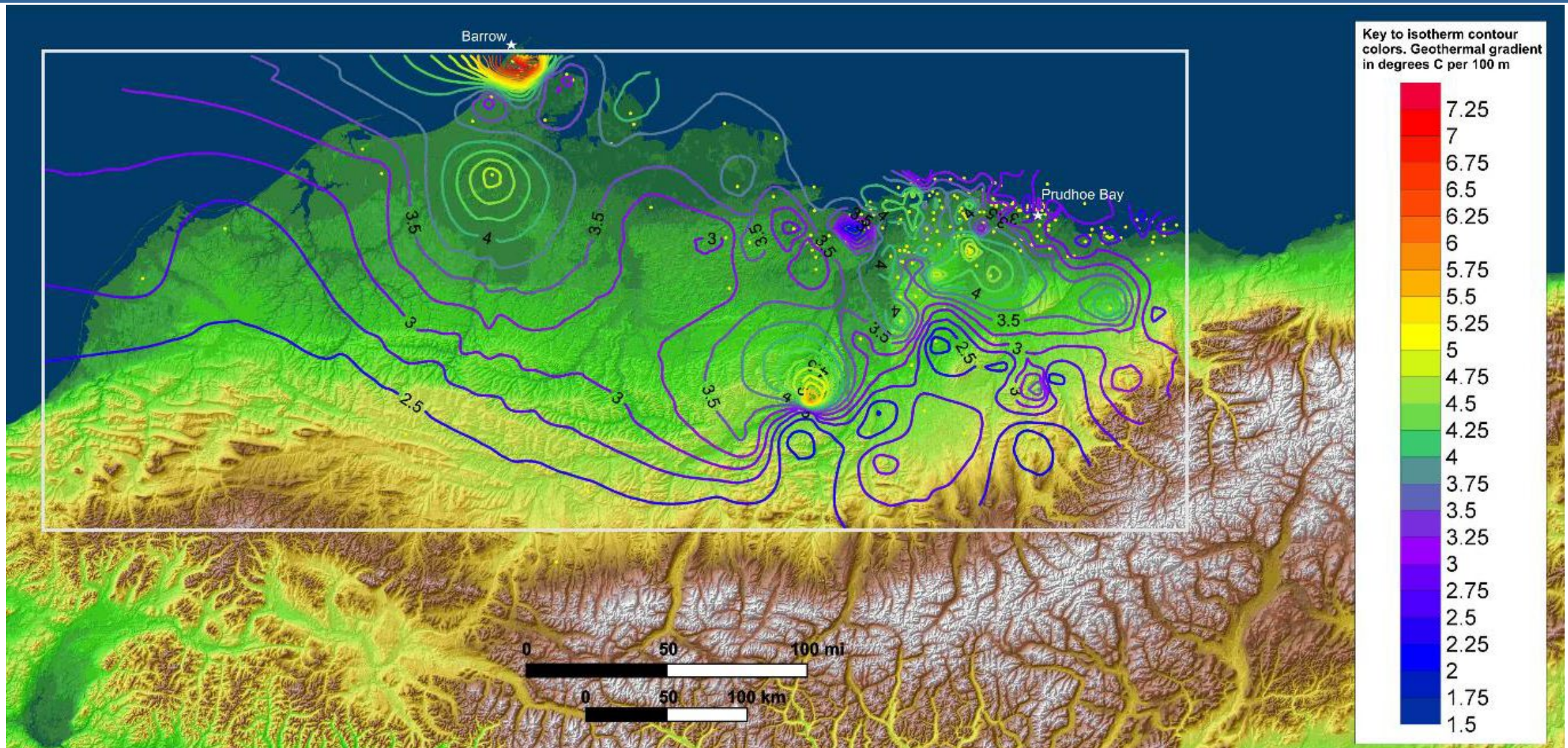
HEAT FLOW IN ALASKA



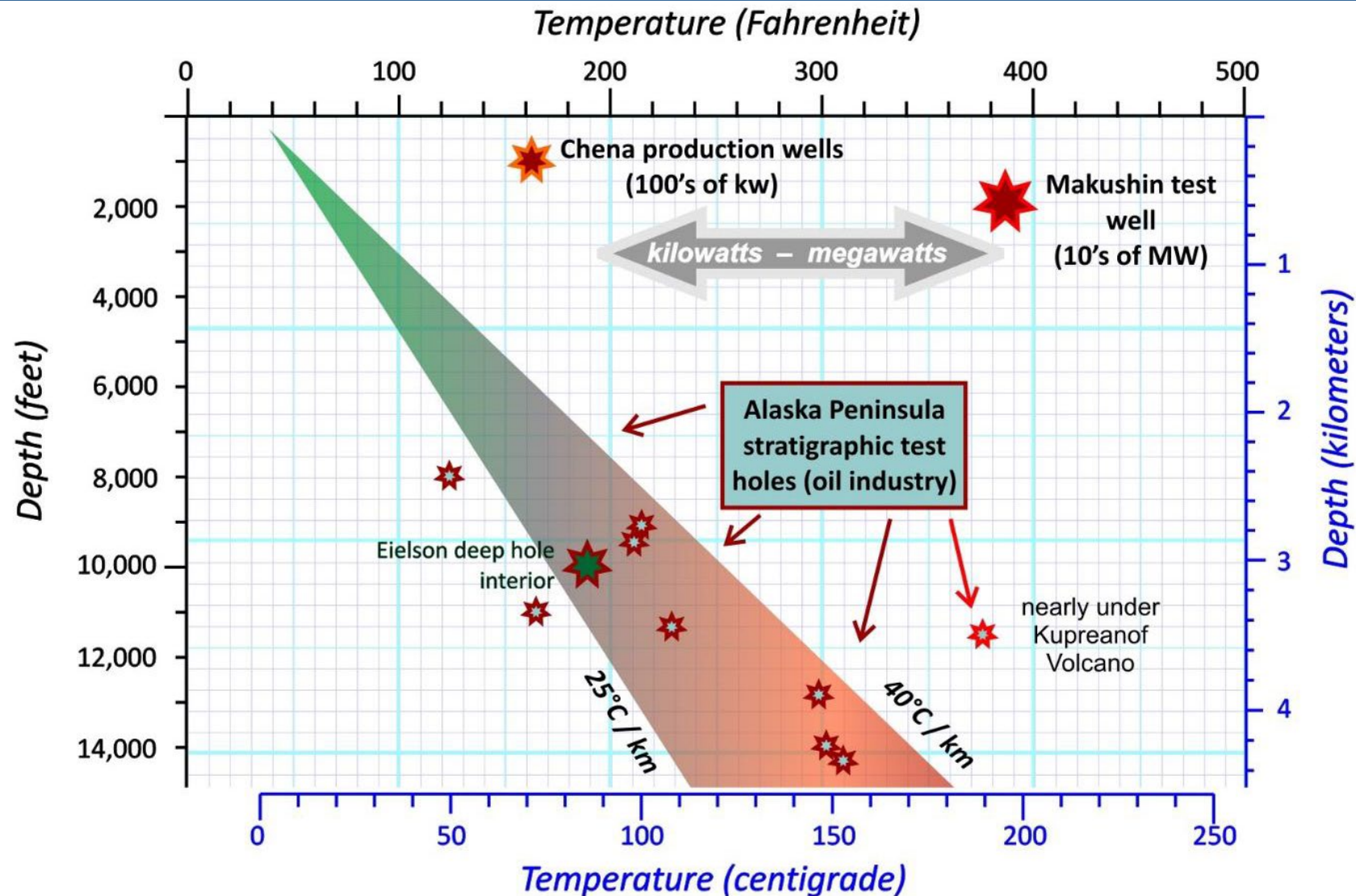
Most of Alaska is thought to have slightly elevated heat flow (red). However, only very localized areas will have all the ingredients for cost-effective geothermal energy use.

Source:
SMU Geothermal Map
of Alaska, 2004

NORTH SLOPE GEOTHERMAL GRADIENT



GEOHERMAL GRADIENTS



GEOHERMAL RESOURCE QUALITY

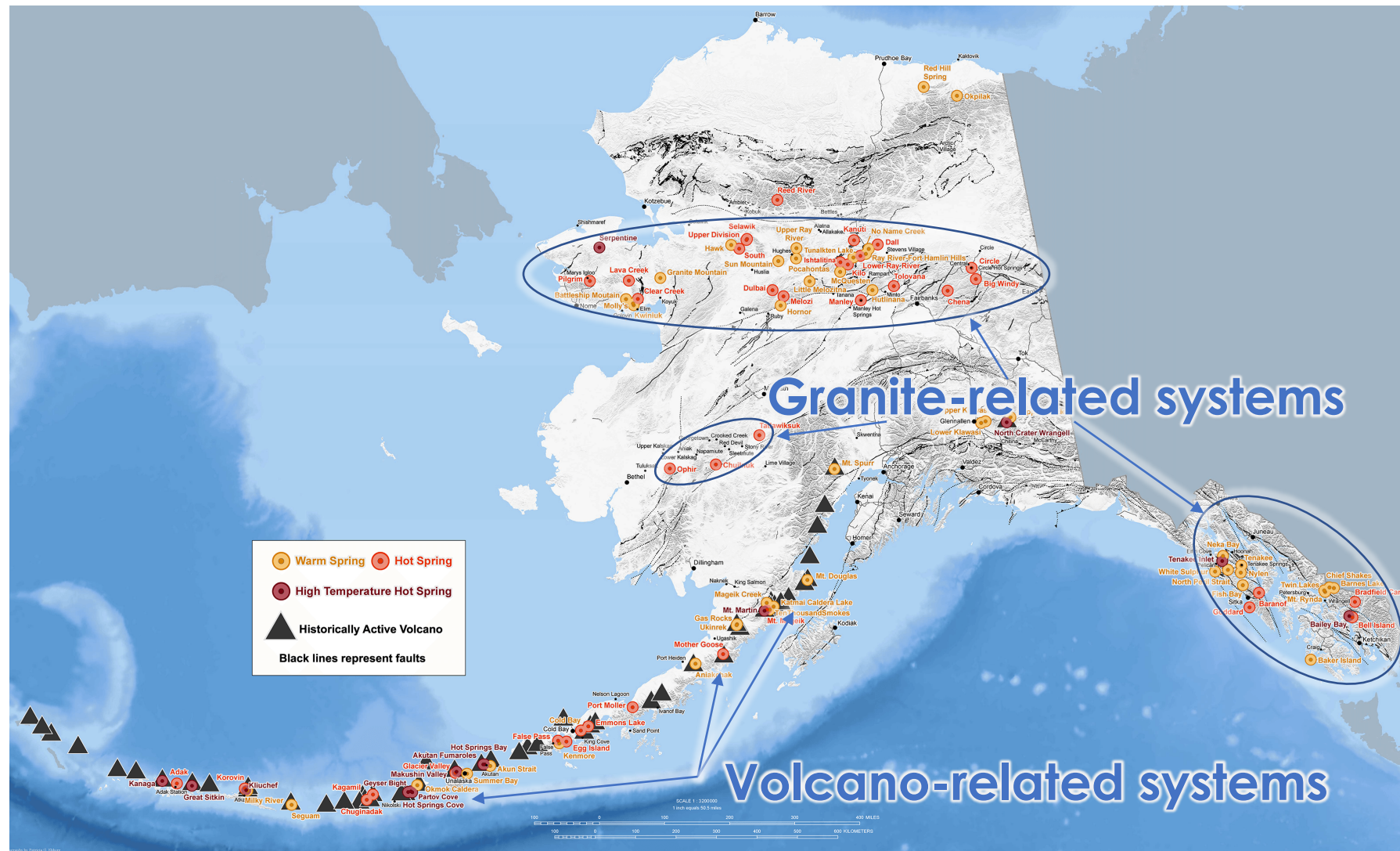
Generation capacity per unit cost depends on several geologic and economic factors:

- Temperature (hotter is better)
- Flow rate (higher flow rates are better)
- Reservoir Framework (uniform porosity better than fractures)
- Recharge (partially natural better than all artificial)
- Depth (shallower is less expensive, thus better)
- Location, location,... (relative to population, transmission system, development costs, etc.)

INTRODUCTION TO GEOTHERMAL RESOURCES

- 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
- Complex geologic parameters necessary for a viable geothermal resource, all present at one location, is rare
- Alaska contains several potential geothermal resources
- New technologies that will help expand geothermal development into less favorable geology are on the horizon

GEO THERMAL SYSTEMS OF ALASKA



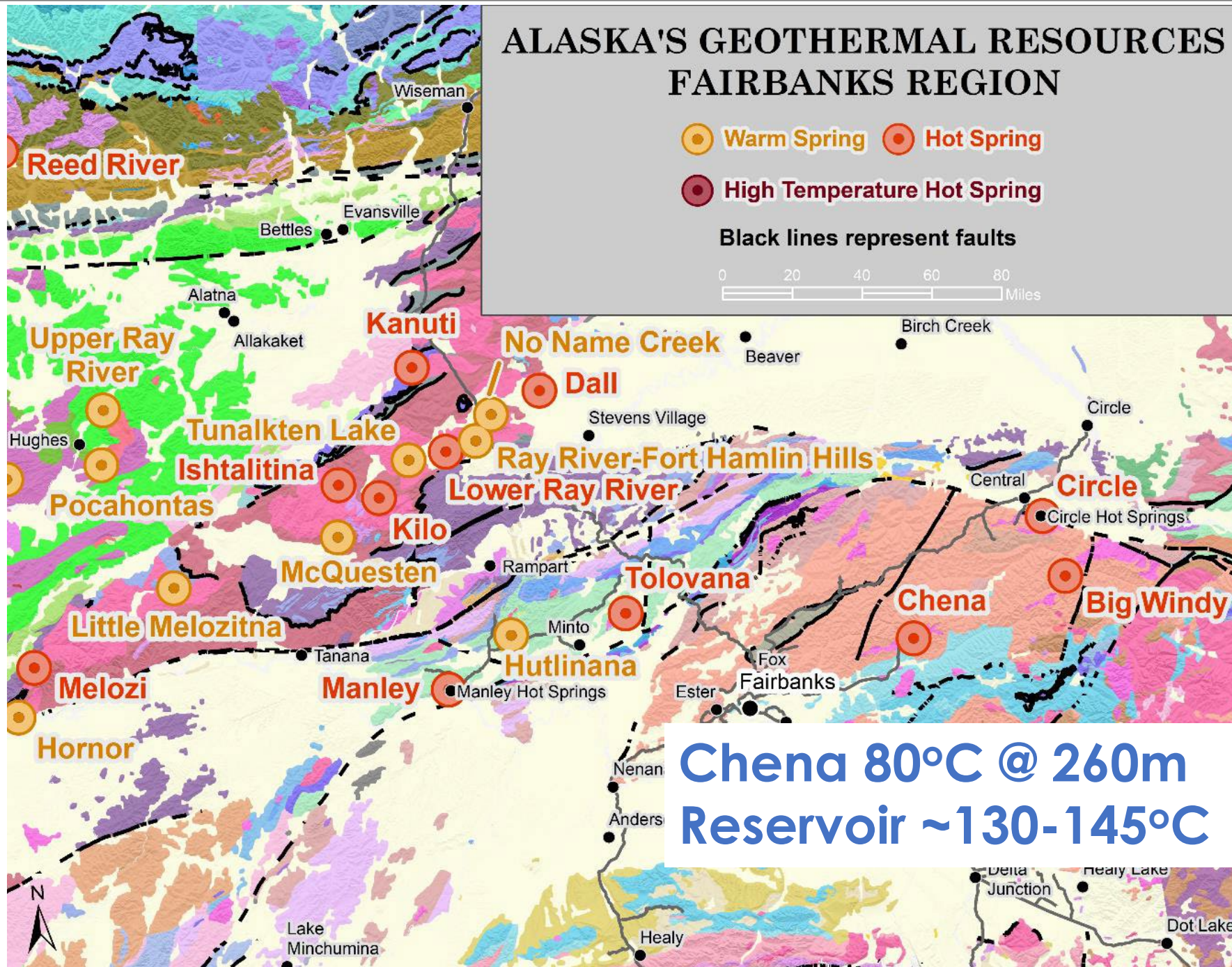
ALASKA'S GEOTHERMAL RESOURCES FAIRBANKS REGION

○ Warm Spring ● Hot Spring

● High Temperature Hot Spring

Black lines represent faults

0 20 40 60 80 Miles



GEOHERMAL SYSTEMS: FAIRBANKS REGION

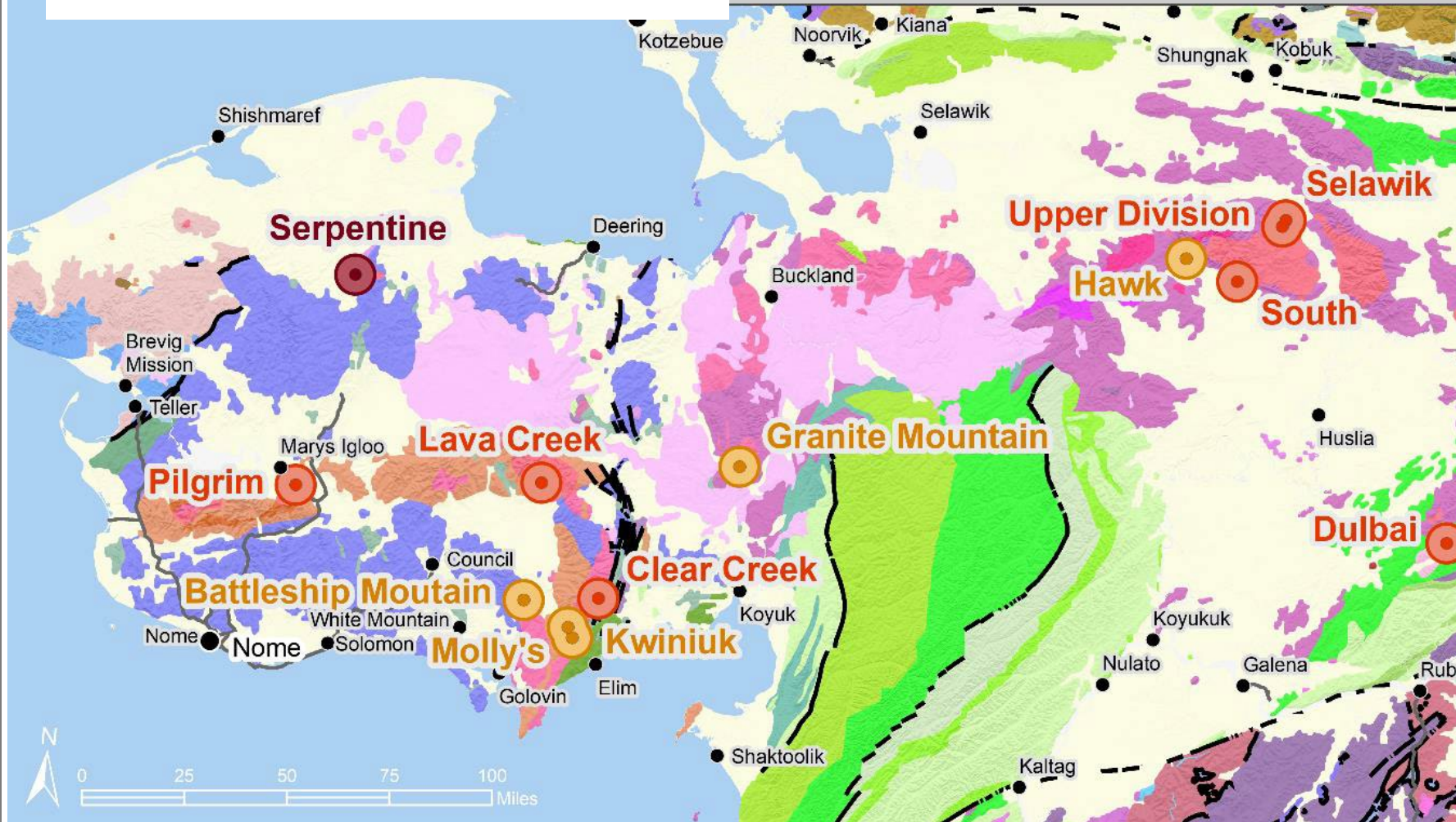
Pilgrim – 92°C @ 120m
Reservoir ~ 150°C

ALASKA'S GEOTHERMAL RESOURCES SEWARD PENINSULA

Warm Spring Hot Spring

High Temperature Hot Spring

Black lines represent faults



GEOHERMAL SYSTEMS: SEWARD PENINSULA REGION

ALASKA'S GEOTHERMAL RESOURCES ALASKA PENINSULA

Warm Spring Hot Spring

High Temperature Hot Spring

Historically Active Volcano

Black lines represent faults

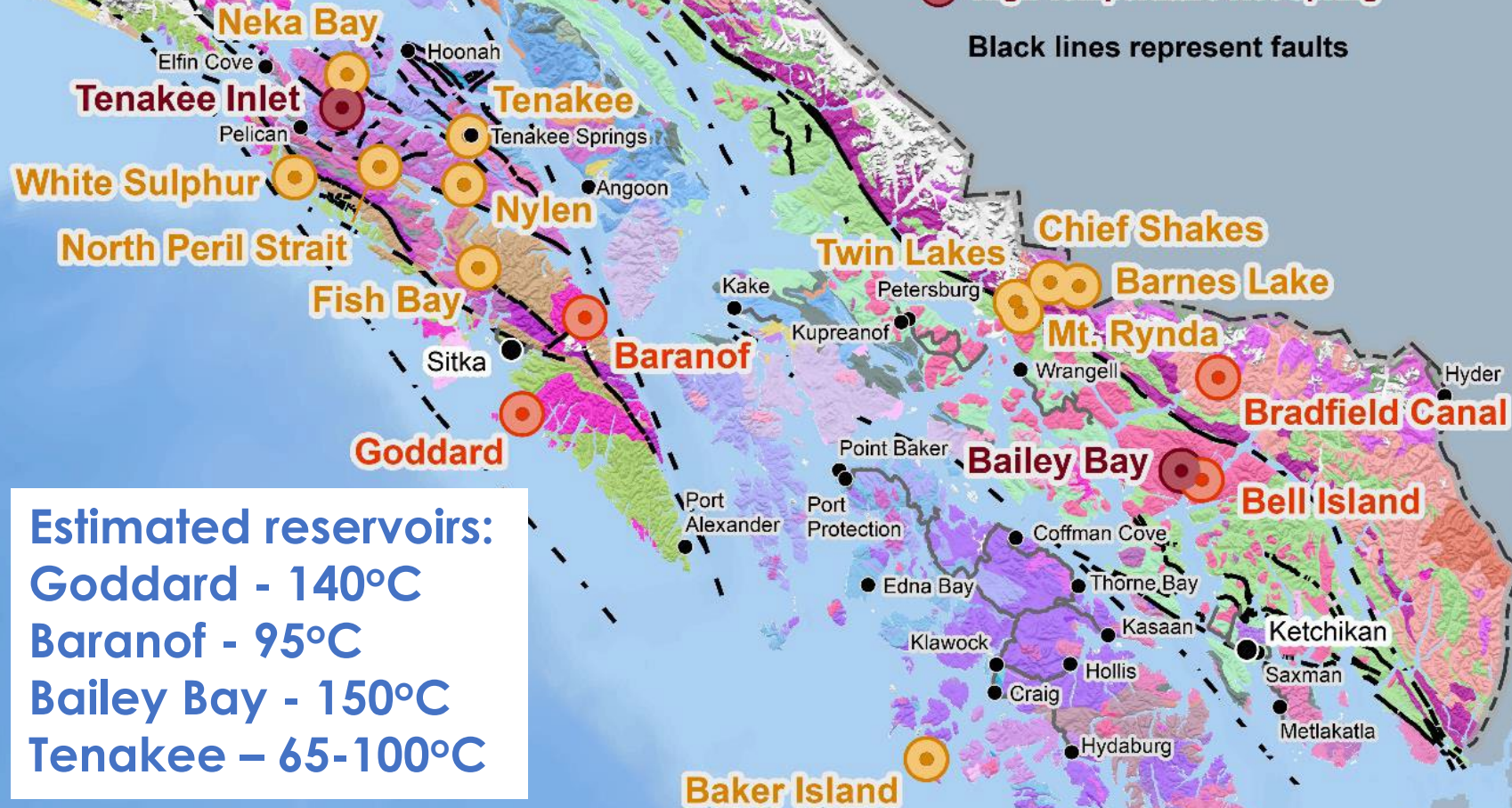


GEOHERMAL SYSTEMS: ALASKA PENINSULA REGION

ALASKA'S GEOTHERMAL RESOURCES SOUTHEAST REGION

- Warm Spring
- Hot Spring
- High Temperature Hot Spring

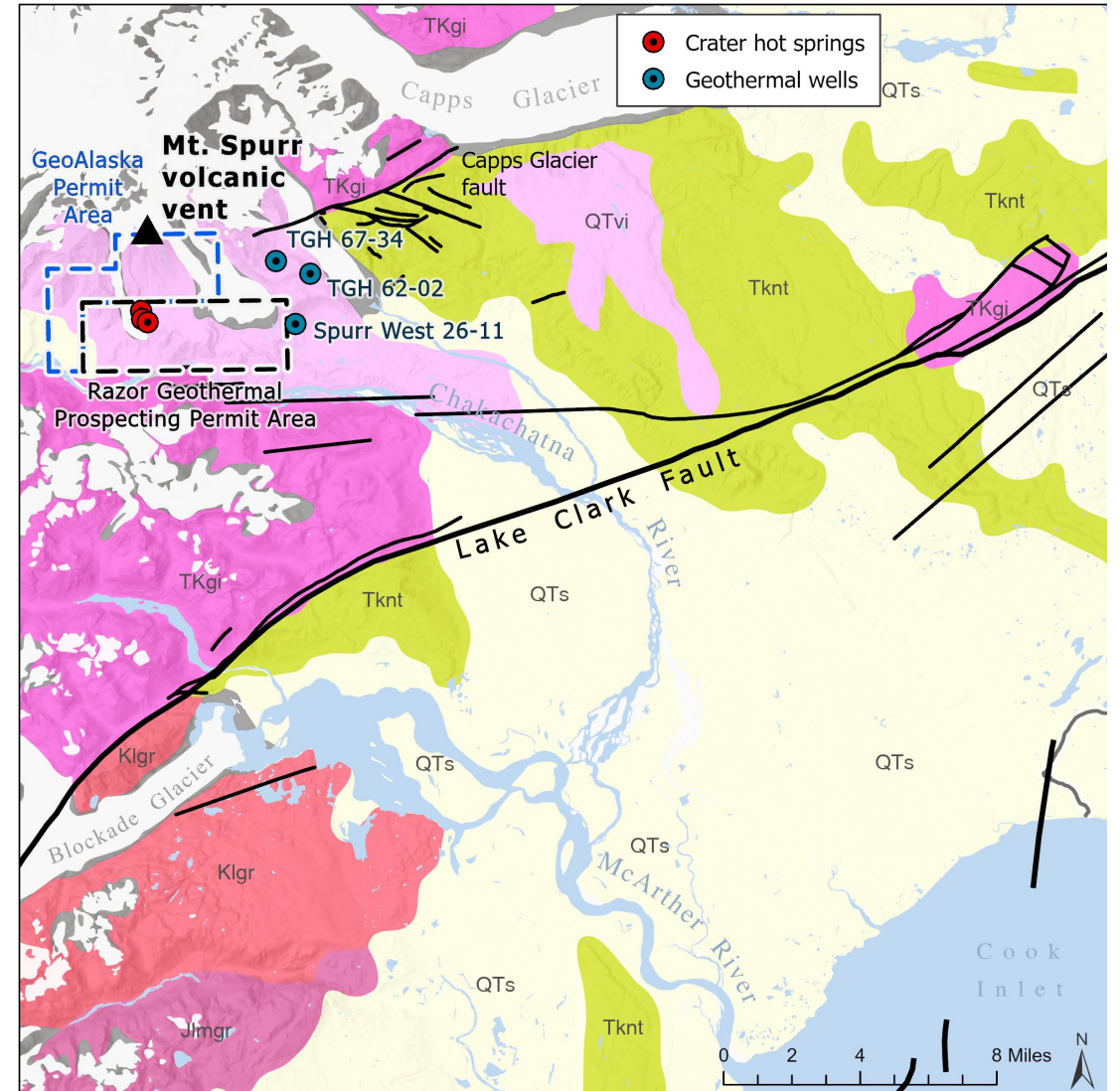
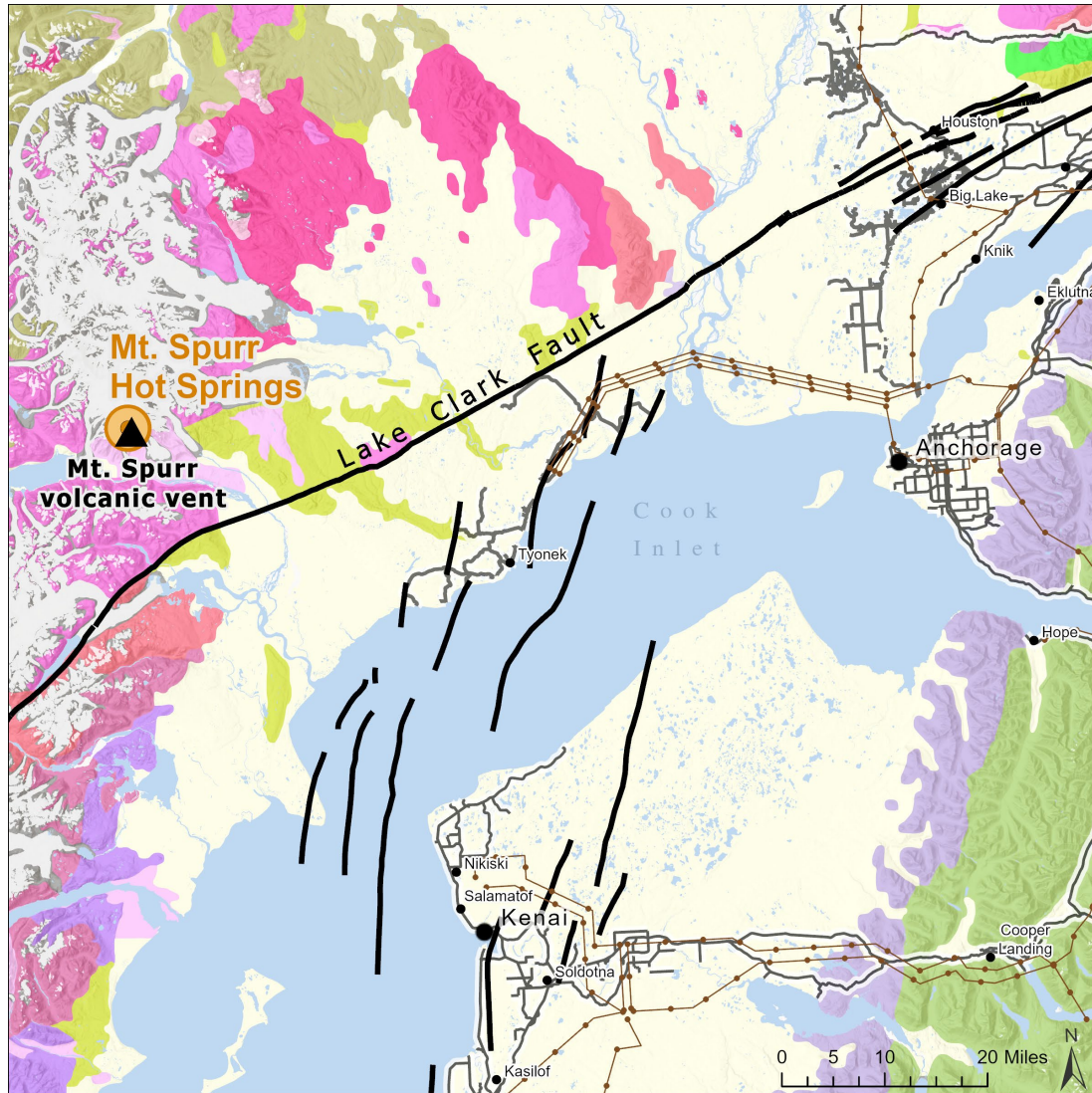
Black lines represent faults



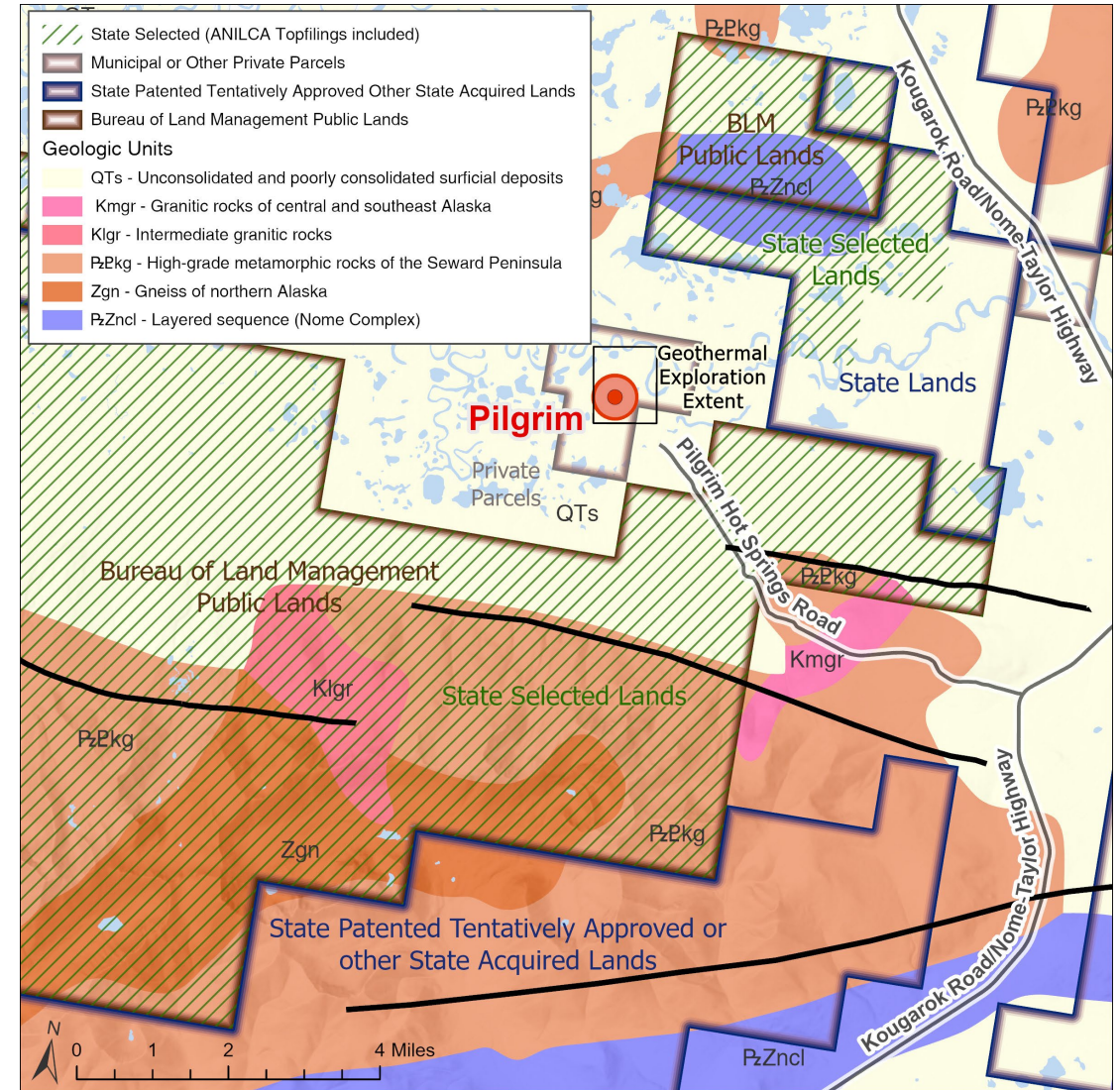
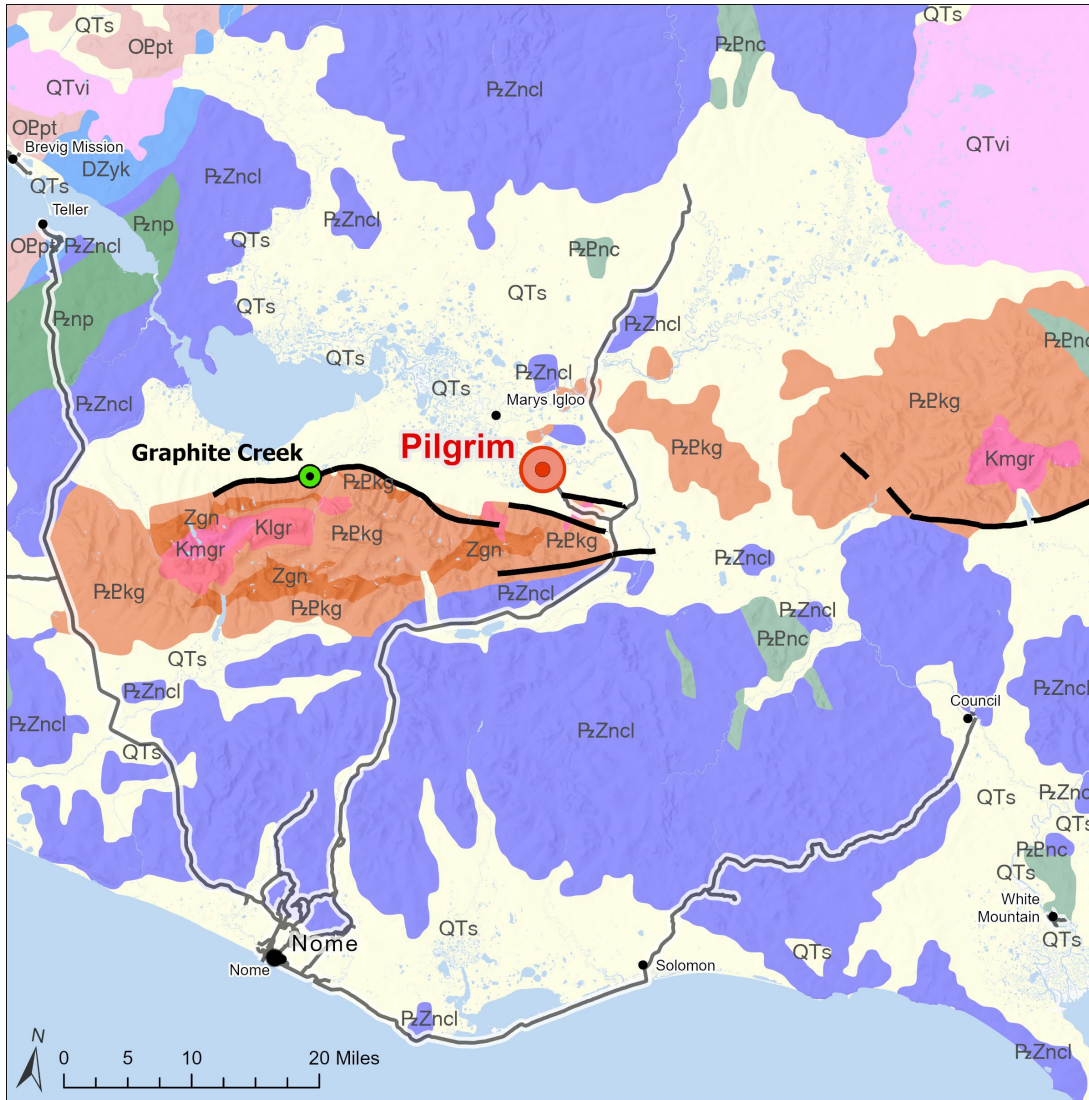
GEOHERMAL SYSTEMS: SOUTHEAST REGION

EXAMPLES OF GEOTHERMAL SYSTEMS

MT SPURR



PILGRIM HOT SPRINGS



DRILLING REGULATIONS

Division of Oil & Gas (DO&G)

- Licenses or leases access to the resource (subsurface use).
- Surface permitting (pads, facilities, and infrastructure) in support of exploration and development.

Alaska Oil & Gas Conservation Commission (AOGCC)

- Ensures prevention of waste, protects correlative rights, improves ultimate recovery, and protects underground freshwater.
- Issues of permits to drill wells is AOGCC's jurisdiction.
- Jurisdiction over geothermal triggered by temperature ($>120^{\circ}\text{C}$) or commerciality. *New definition ignores temperature.*
- Domestic, noncommercial, or small-scale industrial geothermal well not under AOGCC authority.
- Exception: if well *may encounter geothermal resources, fluid, or water of enough heat/pressure to threaten life/health.*

Department of Environmental Conservation (DEC)

- If the incidental discharge enters surface water, need Alaska Pollutant Discharge Elimination System (APDES) permit.
- DEC Division of Water has permitted geothermal discharges using Plan Review in Lieu of Permit.
- Engineering Support and Plan Review (ESPR) conducts plan reviews for smaller systems in municipality (heating or cooling pumps at UAA, U-med district, hatchery, etc.).
- DEC issues permits for *hydrostatic testing, including flushing and aquifer pump testing.*
 - General permit AKG003000 provides for coverage of land disposal or discharge to surface water.
 - One geothermal-related authorization, issued in 2015 for the Akutan Geothermal Project.