

SB 69

Geothermal Resources

Senate Resources Committee



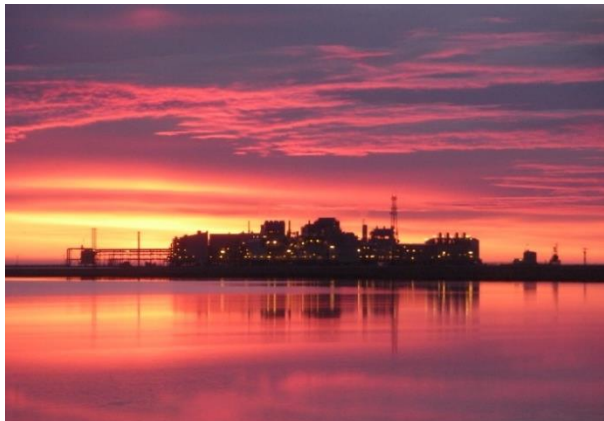
Presented by:

John Crowther, Deputy Commissioner

Dave LePain, Director, Division of Geological & Geophysical Surveys

Sean Clifton, Policy & Program Specialist, Division of Oil & Gas

April 12, 2023



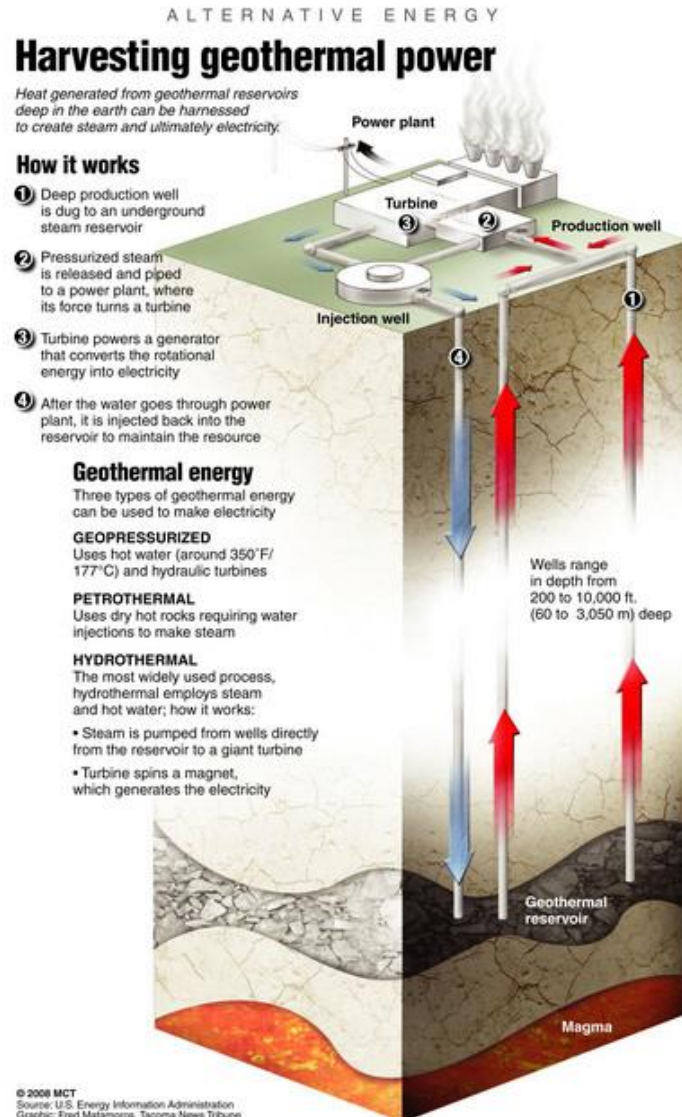


- **Division of Geological and Geophysical Surveys (DGGS):**
Introduction to geothermal energy
- **Division of Oil and Gas (DOG): Overview of SB 69**
 - Purpose of SB 69
 - DNR geothermal leasing history
 - Sectional analysis summary
 - Sectional analysis details
- **Supplemental**
 - **DGGS: Examples of geothermal systems in Alaska**
 - **Drilling regulations**

FUNDAMENTALS OF GEOTHERMAL SYSTEMS

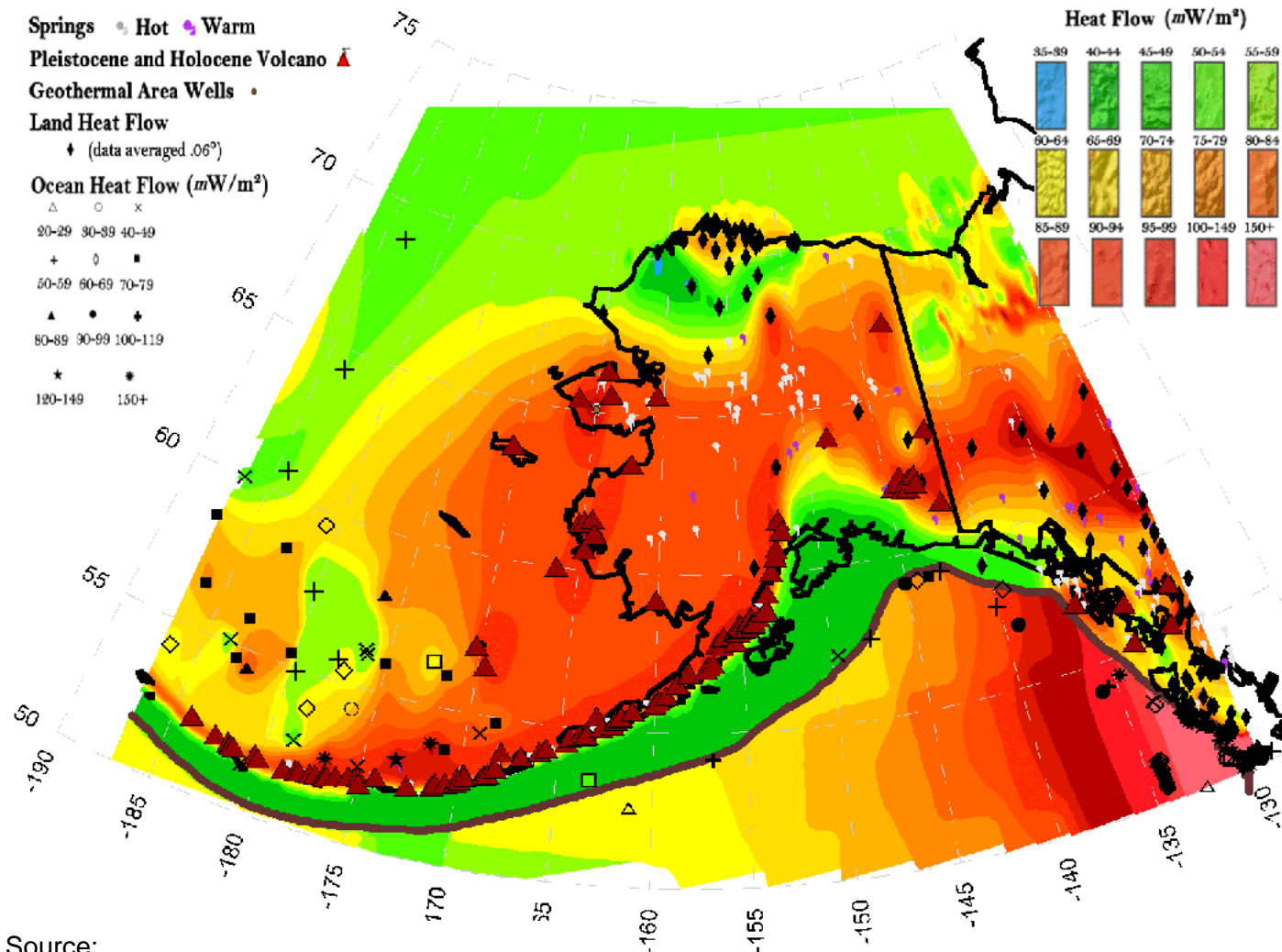
Dr. Dave LePain, Director
Division of Geological & Geophysical Surveys

FUNDAMENTAL INGREDIENTS OF USEABLE GEOTHERMAL ENERGY



- Elevated geothermal gradient
- Porosity and permeability for the migration of fluids
- Surface access
- Sufficiently large thermal system
- Customers for energy

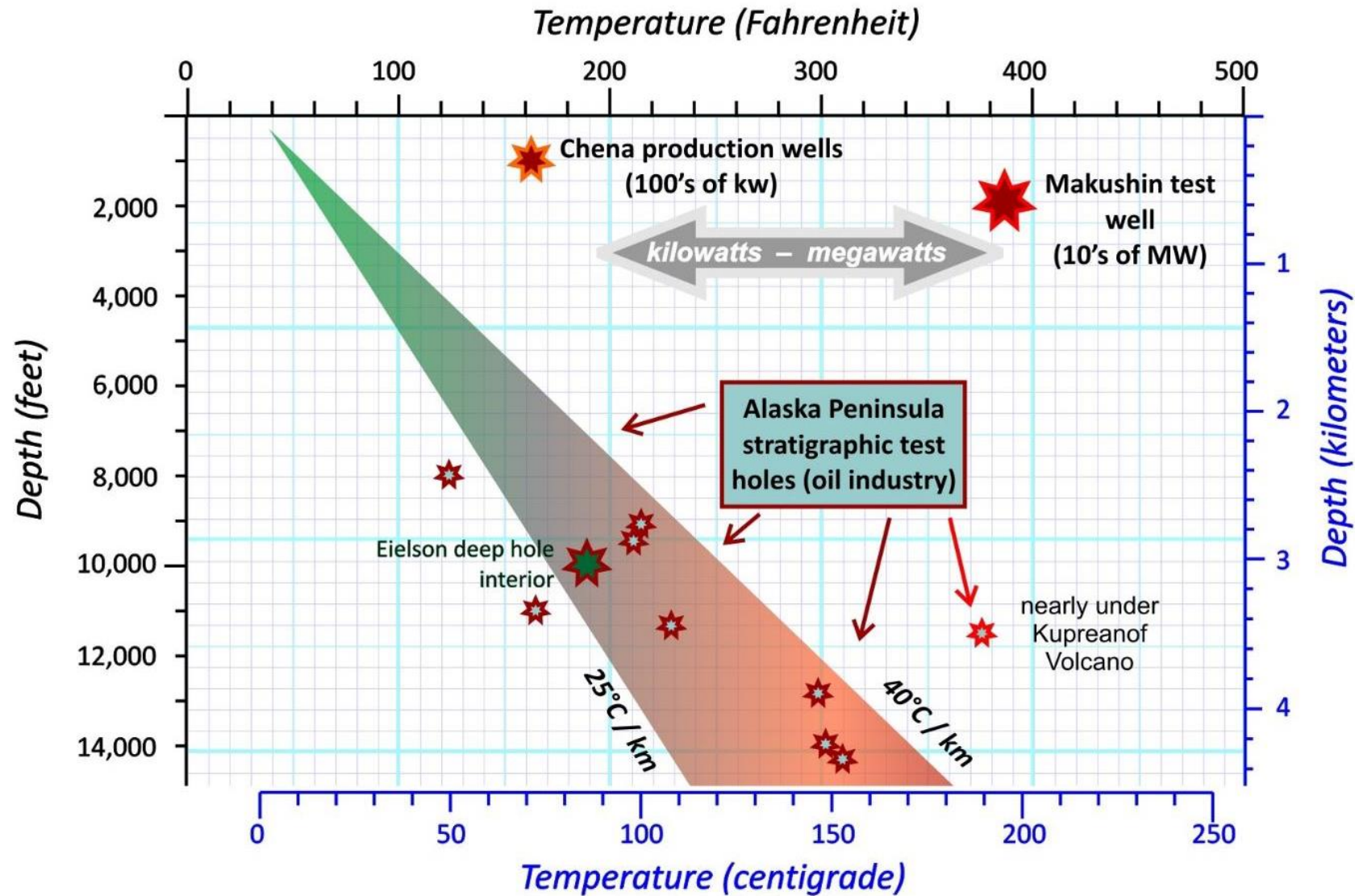
HEAT FLOW IN ALASKA



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

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...*

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

OVERVIEW OF SB 69

**Sean Clifton, Policy & Program Specialist
Division of Oil & Gas**

PURPOSE OF SB 69



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
- Repeals rental/royalty modification after 20 years of production, providing stability and predictability for investors in geothermal energy projects

Reform 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	<p>Mount Spurr Two prospecting permits in the Mount Spurr area, issued in 2021 (expire in 2023)</p> <p>Augustine Island One prospecting permit in the southern part of the volcanic island, issued in 2022 (expires in 2024)</p>
2013	<p>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.</p>
2008	<p>Mount Spurr 16 tracts were 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 the Division of Oil & Gas website.</p>
1986	<p>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.</p>
1983	<p>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.</p>

LEASING AND 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 replaces two-year permits with five-year licenses modelled after our modern oil and gas exploration licensing program.
 - Conversion to lease
 - Permit (current): “showing of a discovery of geothermal resources in commercial quantities”
 - License (bill): after work commitment is met

Both processes require Best Interest Finding prior to award of permit, license, or lease

SECTIONAL SUMMARY



Section (Agency)	Summary
1 (AOGCC)	Grants Alaska Oil & Gas Conservation Commission (AOGCC) authority to pursue primacy of Class V injections wells for geothermal energy
2 (AOGCC)	Removes unnecessary reference to AS 41.06 from AS 31.05.030(m) (see Section 10)
3 (DNR)	Changes <i>permits</i> to <i>licenses</i> ; adds exemption for geothermal resources intended for domestic, noncommercial, or small-scale industrial use (<i>same as</i> Section 11); removes preferential rights clause (inappropriate for commercial development of State resources)
4 (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>
5 (DNR)	Changes <i>permit</i> to <i>license</i>
6 (DNR)	Changes <i>permits</i> to <i>licenses</i> ; increases maximum acreage from 51,200 to 100,000; moves rental fees to be set by regulation
7 (DNR)	Amends AS 38.05.181(f) to grant leases for 10 years, with opportunity for a five-year extension, with standard indefinite extension by production Repeals opportunity for DNR commissioner to modify rent and royalty rates after 20 years of production
8 (DNR)	Adds three new subsections AS 38.05.181(<i>i-k</i>) to modernize unitization statute for geothermal leases to match the model used for oil & gas
9 (DNR)	Replaces AS 38.05.965(6) definition of <i>geothermal resources</i> (<i>same as</i> Section 14)
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)	New subsection AS 41.06.020(f) adds exemption for geothermal resources intended for domestic, noncommercial, or small-scale industrial use (see Section 3)
12 (AOGCC)	Adds new subsection AS 41.06.057 to provide for penalties for violations of geothermal statutes (like oil & gas AS 31.05.150)
13 (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
14 (AOGCC)	Replaces AS 41.06.060(5) definition of <i>geothermal resources</i> (<i>same as</i> Section 9)
15 (AOGCC)	Repeals AS 41.06.005(b) and AS 41.06.030, since geothermal units are managed by DNR
16–20 (AOGCC/DNR)	General provisions for applicability and effective dates, including applicability for prospecting permits issued or currently being processed

SECTIONAL ANALYSIS DETAILS

**Sean Clifton, Policy & Program Specialist
Division of Oil & Gas**

SECTION 1: CLASS V WELLS PRIMACY



- **Grants AOGCC authority to pursue primacy for permitting Class V injection wells for geothermal developments**
- **State agencies are quicker and have more expertise with permitting within their jurisdiction than US EPA**
- **Reduces project costs and permitting timelines**
- **AOGCC already has primacy for Class II injection wells used for enhanced oil recovery injection programs**

SECTIONS 2, 10, & 15: DNR MANAGES GEOTHERMAL UNITS ON STATE LAND



DNR manages Alaska's geothermal resources under unitization and operations provisions in AS 38.05.181

Section 2: Removes redundant reference to AS 41.06 from
AS 31.05.030(m)

Section 10: Related amendment to AS 41.06.020(e)

Section 15: Repeals AS 41.06.005(b) and AS 41.06.030 since
geothermal units are managed by DNR

SECTIONS 3–6: PERMITS TO LICENSES



- **Provisions in these sections replace “permit” with “license.”**
- **Within DOG, “permits” are for surface use authorizations. For subsurface, “licenses” and “leases” are issued.**
- **Adopting the exploration licensing program for geothermal resource management conforms with existing processes for oil and gas.**
- **Section 17 allows for conversion of existing permits to licenses.**

SECTION 3: PRIVATE USE EXEMPTION

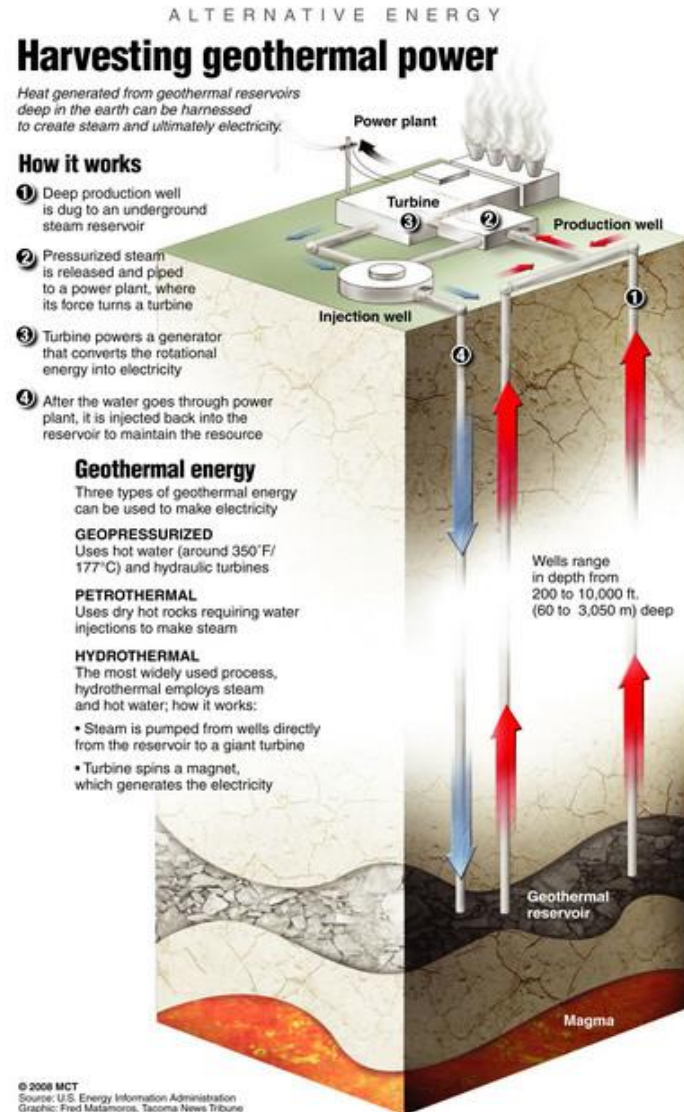


- **New language added:**

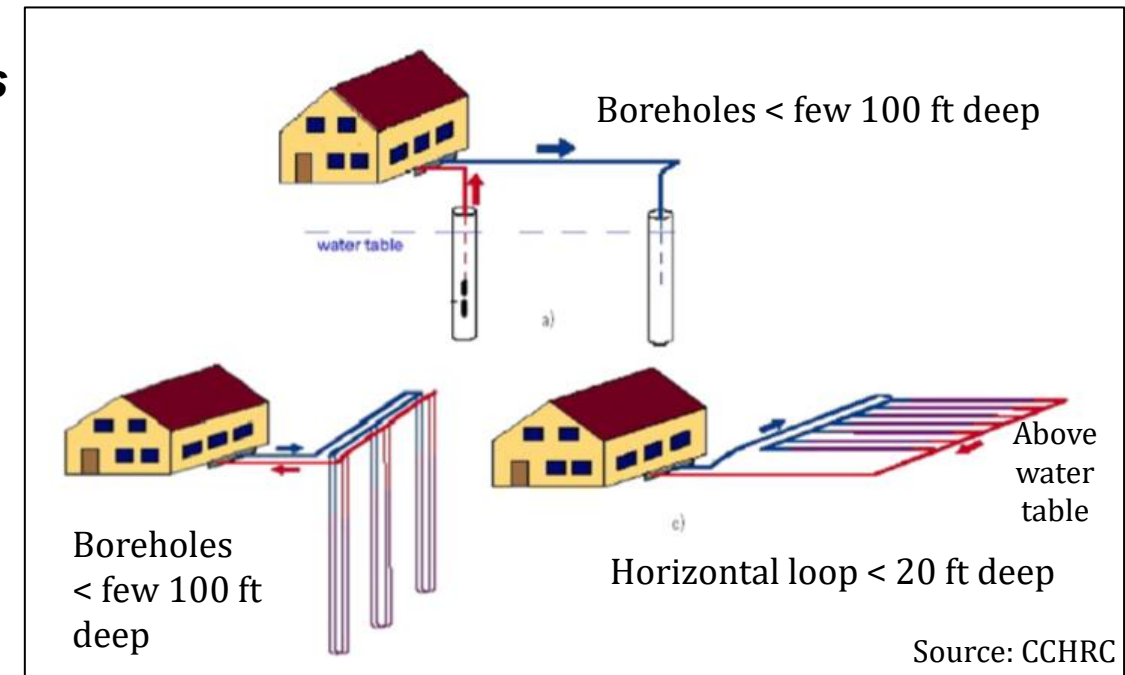
A prospecting license or lease is not required under this section to explore for, develop, or use geothermal resources if the geothermal resource is intended for domestic, noncommercial, or small-scale industrial use.

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

COMMERCIAL GEOTHERMAL POWER PLANTS VS NON-COMMERCIAL SYSTEMS



- **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 3: PREFERENTIAL RIGHTS



- **Current statute grants preferential rights to a surface owner to apply for a geothermal prospecting permit once notice is received of an existing application**
 - Inappropriate for a surface owner to have a preferential right to the *State's* mineral estate
 - Potentially discouraging to commercial development
 - Private landowners usually don't have financial resources to develop a commercially-viable geothermal resource
- **Surface owners may still pursue *domestic* geothermal developments for their own uses**
 - Need well permits from AOGCC
 - Need environmental review or permits from other agencies such as Department of Environmental Conservation, Department of Fish & Game, DNR Division of Mining Land & Water, possibly federal agencies
 - Examples of permitting requirements are detailed in a supplemental slide
- **Rights to access the mineral estate are reserved under AS 38.05.125, while surface owner rights are protected under AS 38.05.130**
 - Surface owners must provide reasonable access to resource developers
 - The same condition exists for oil & gas or mining
 - 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, a developer posts a bond to compensate landowner for any impacts and work progresses
- **Geothermal licenses and leases are *not* surface use authorizations**
 - They only provide the exclusive right to explore for and develop the subsurface resources
 - Public notice is a part of the license issuance process and surface owners can participate
 - Surface use authorizations require public notice *and* direct notice to any affected surface owners

SECTIONS 4 & 7: TERMS AND 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
- **Amends AS 38.05.181(f) for geothermal leases**
 - Geothermal leases last for 10 years, with opportunity for a five-year extension, and standard indefinite extension by production
 - Repeals opportunity for DNR commissioner to renegotiate rental and royalty rates for geothermal leases after 20 years of production

SECTION 6: ACREAGE LIMIT & RENT



- **Maximum acreage a lessee may hold increases from 51,200 to 100,000 acres**
 - Geothermal systems can underlie very large areas
 - Enables explorers to more effectively delineate resource
- **Rental fees to be set by regulation instead of statute**
 - Enables DOG to be nimbler in response to market changes

SECTION 8: UNITIZATION



- **Adds three new subsections AS 38.05.181(i–k) to modernize unitization statute for geothermal leases to match the model used for oil & gas**
 - (i) DNR commissioner may compel unitization
 - (j) Commissioner may establish, change, or revoke drilling, producing, and royalty requirements of leases as part of the unit agreement
 - (k) Leases and unit agreement are subject to current and future statutes and regulations

SECTIONS 9 & 14: GEOTHERMAL RESOURCES 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

SECTION 13: 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 celcius 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

SECTION 12: PENALTIES



- **Conforming language to AOGCC authority over gas and oil operations (AS 31.05.150)**
- **Without this provision, AOGCC may not have authority to assess penalties for violations related to operation of geothermal wells**

FISCAL NOTE: NEW DGGS GEOLOGIST 4



- **Enables 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 DNR'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

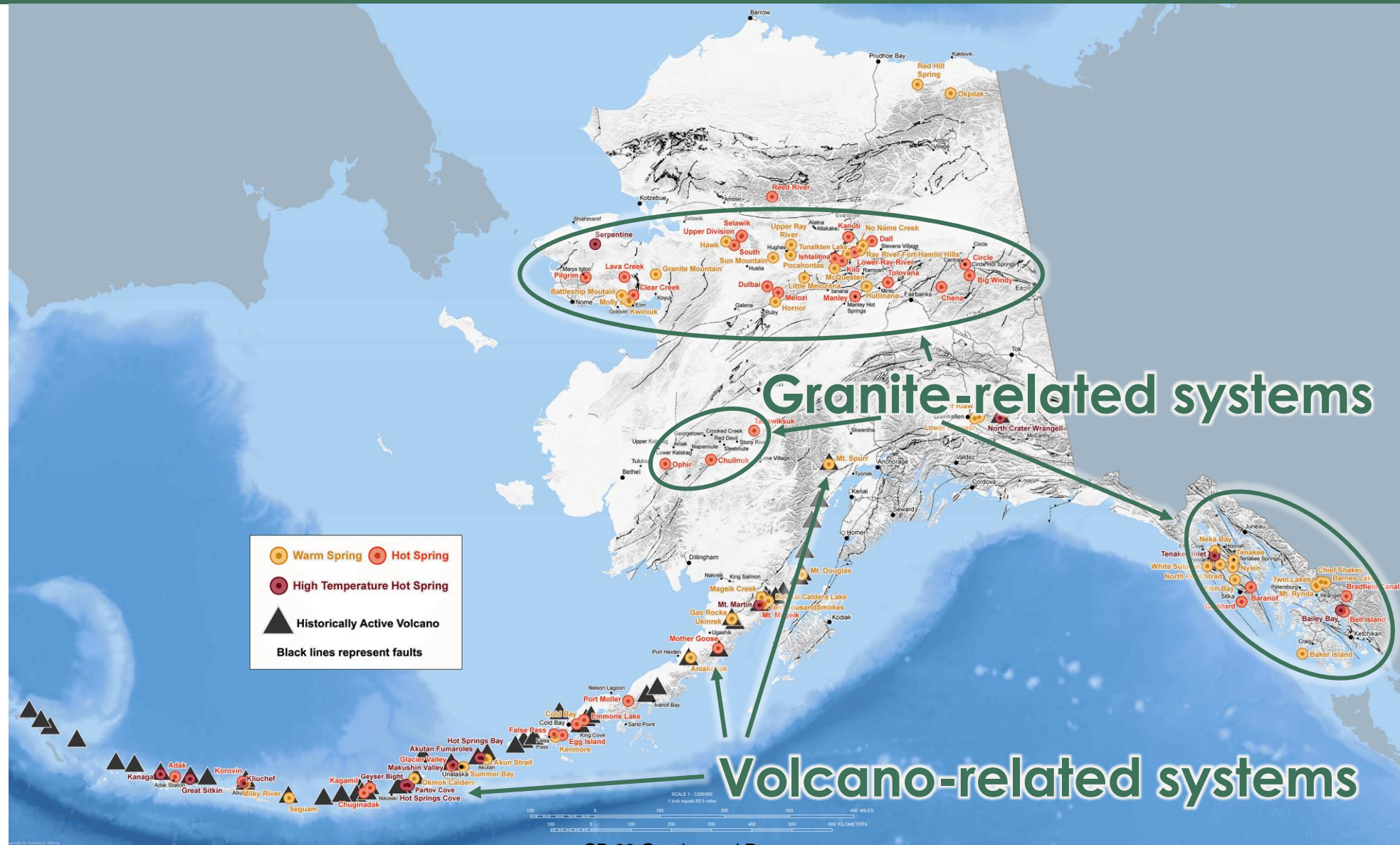
QUESTIONS?

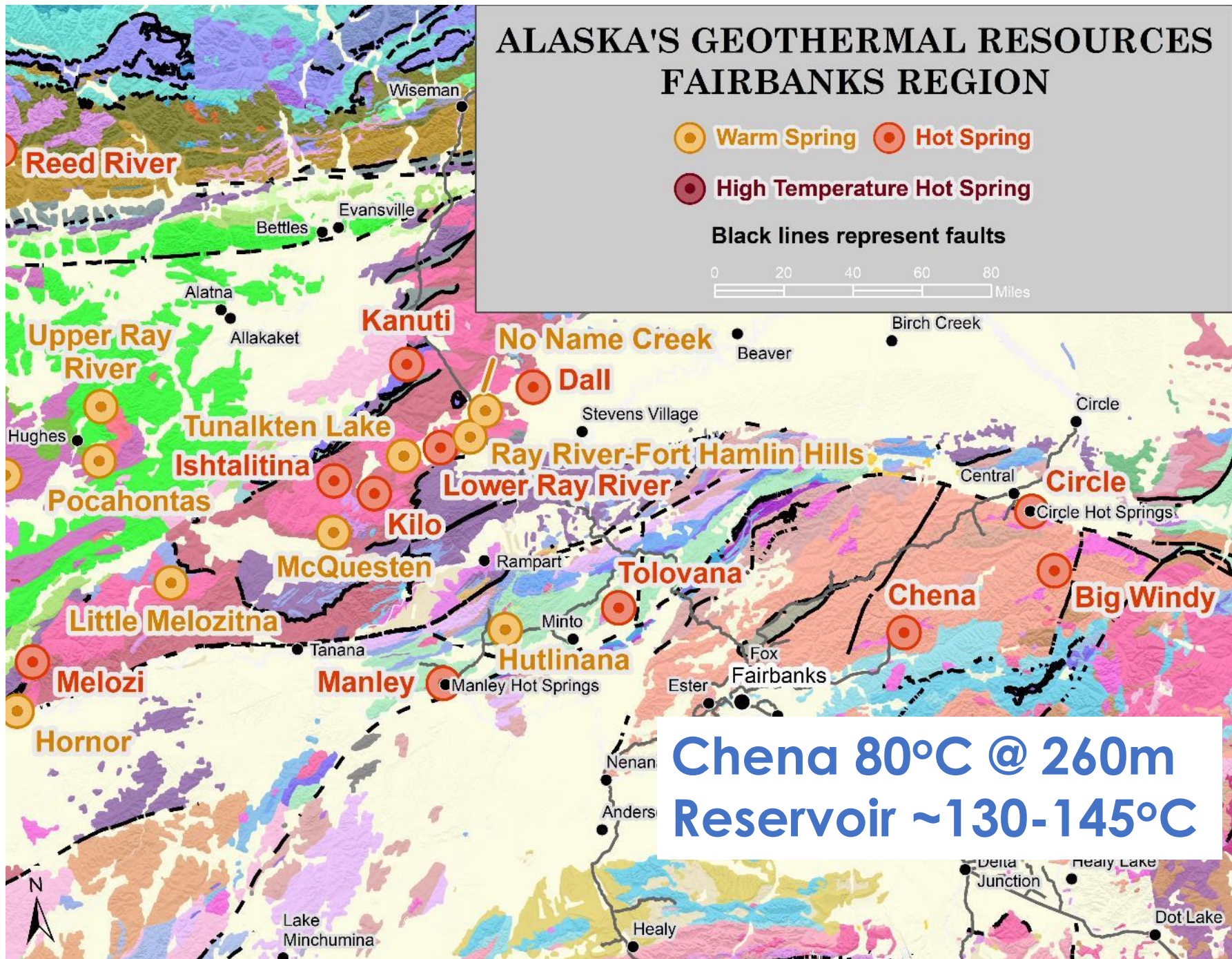


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SUPPLEMENTAL INFORMATION

The logo of the Alaska Department of Natural Resources is a circular emblem. It depicts a landscape with a large evergreen tree on the left, a winding river in the foreground, and a mountain range in the background. A red sun is positioned on the right side of the mountain. The text "ALASKA DEPARTMENT OF NATURAL RESOURCES" is written in a circular border around the central image.





GEO THERMAL SYSTEMS: FAIRBANKS REGION

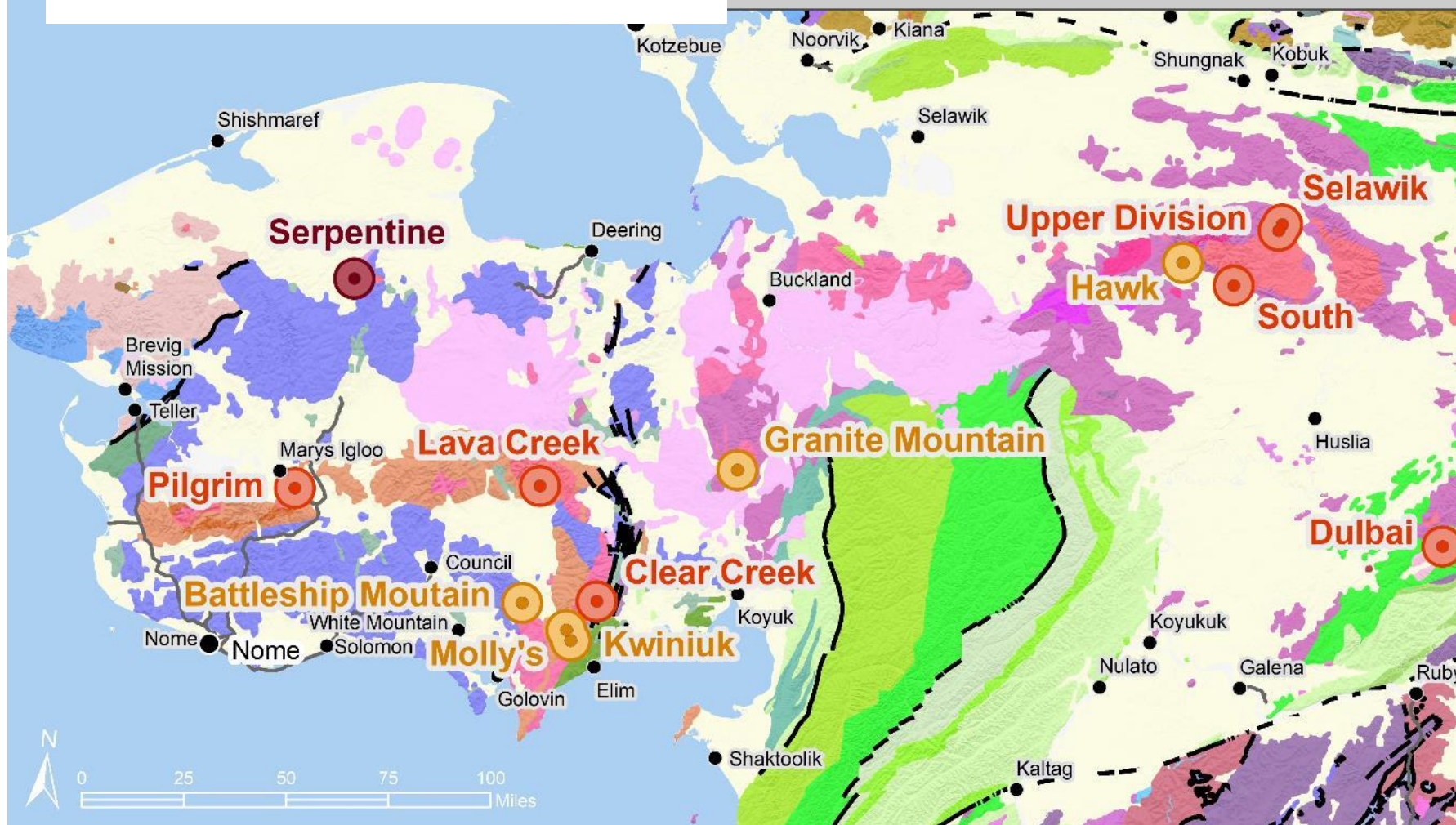
Pilgrim – 92°C @ 120m
Reservoir ~ 150°C

ALASKA'S GEOTHERMAL RESOURCES SEWARD PENINSULA

Warm Spring Hot Spring

High Temperature Hot Spring

Black lines represent faults

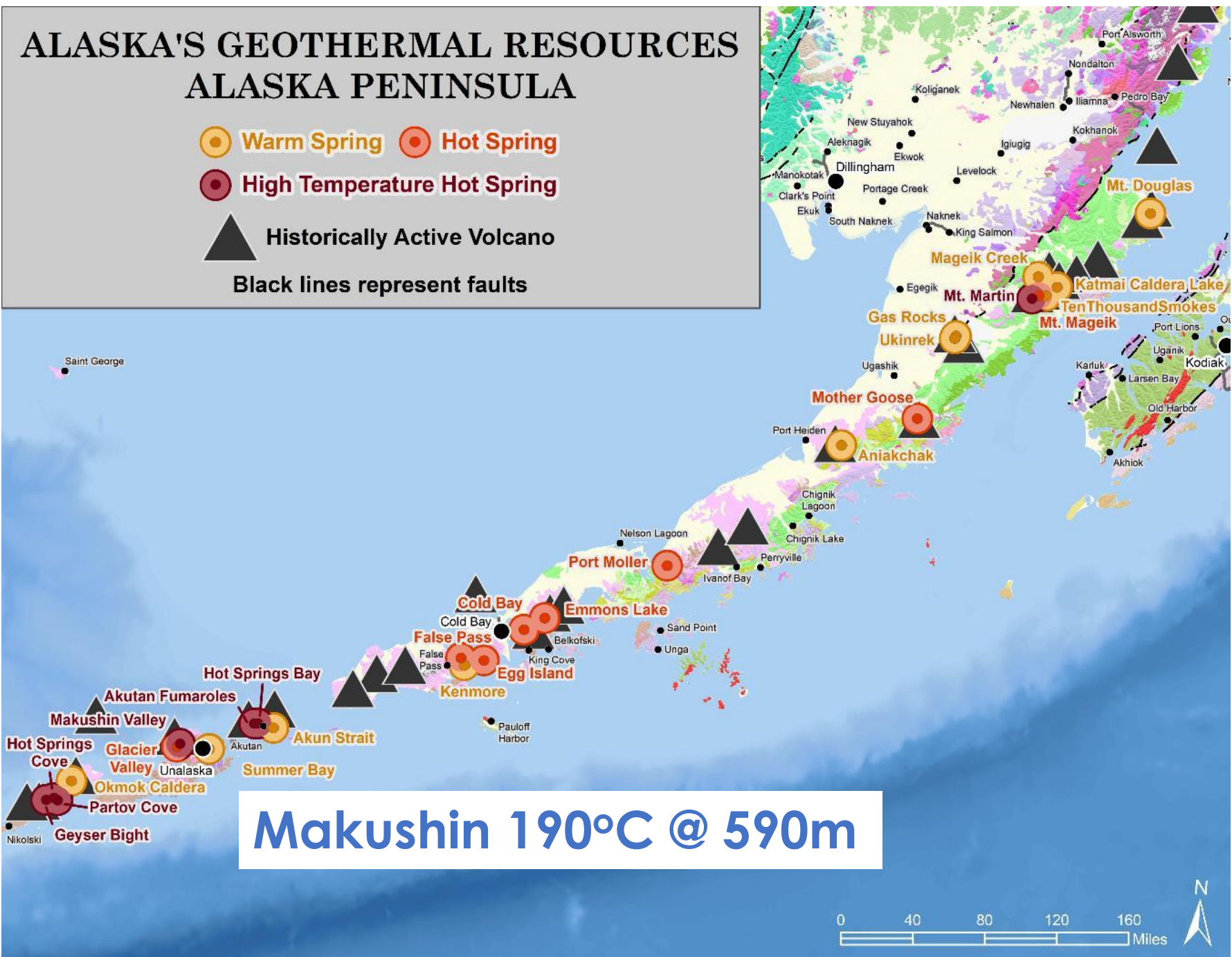


GEOHERMAL SYSTEMS: SEWARD PENINSULA REGION

ALASKA'S GEOTHERMAL RESOURCES
ALASKA PENINSULA

- Warm Spring
- Hot Spring
- High Temperature Hot Spring
- Historically Active Volcano

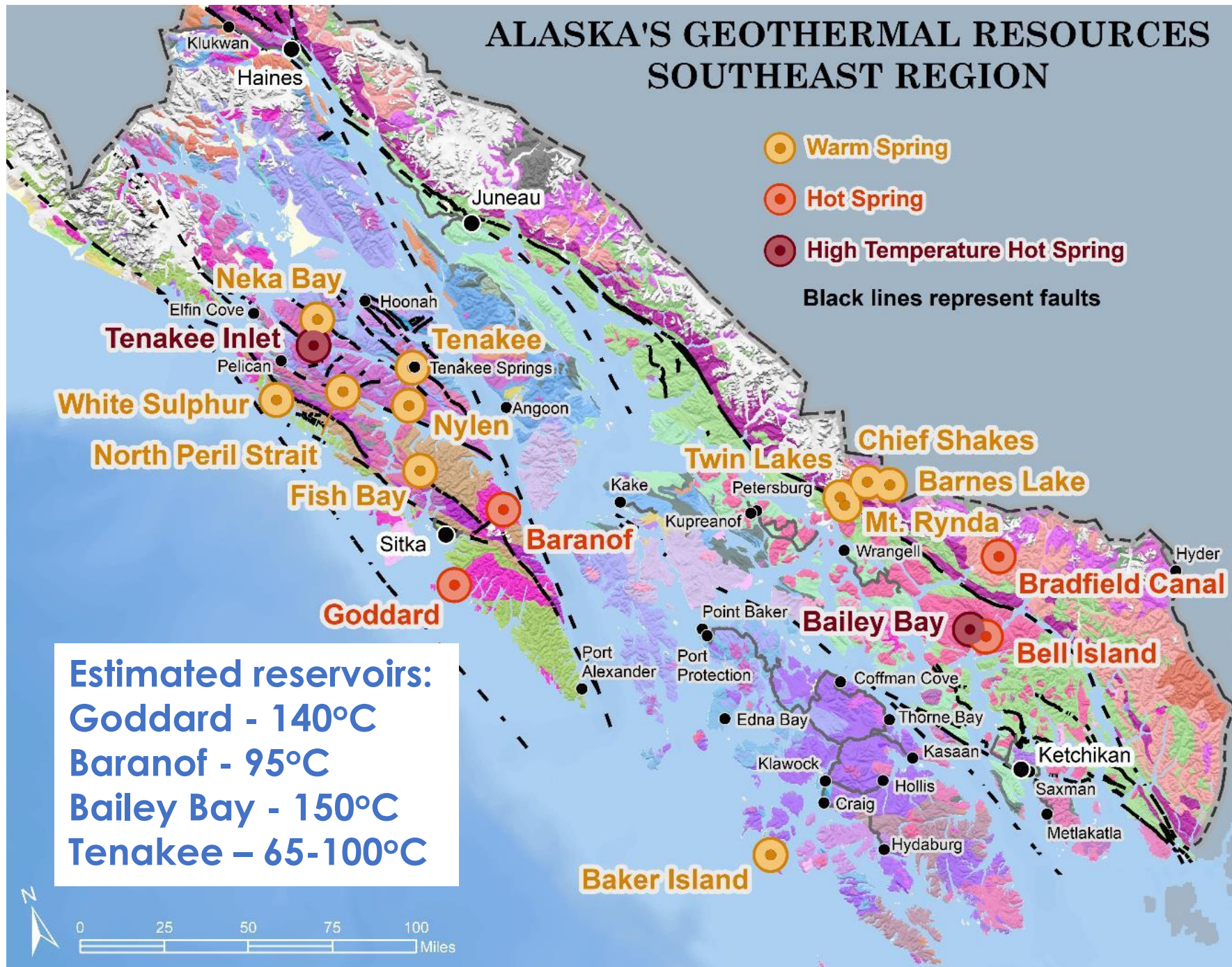
Black lines represent faults



Makushin 190°C @ 590m

GEOTHERMAL
SYSTEMS:
ALASKA
PENINSULA
REGION

ALASKA'S GEOTHERMAL RESOURCES SOUTHEAST REGION



GEOHERMAL SYSTEMS: SOUTHEAST REGION

DRILLING REGULATIONS

Division of Oil & Gas (DOG)

- Licenses or leases for access to the resource (subsurface use)
- Surface-use 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 aquifers
- 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