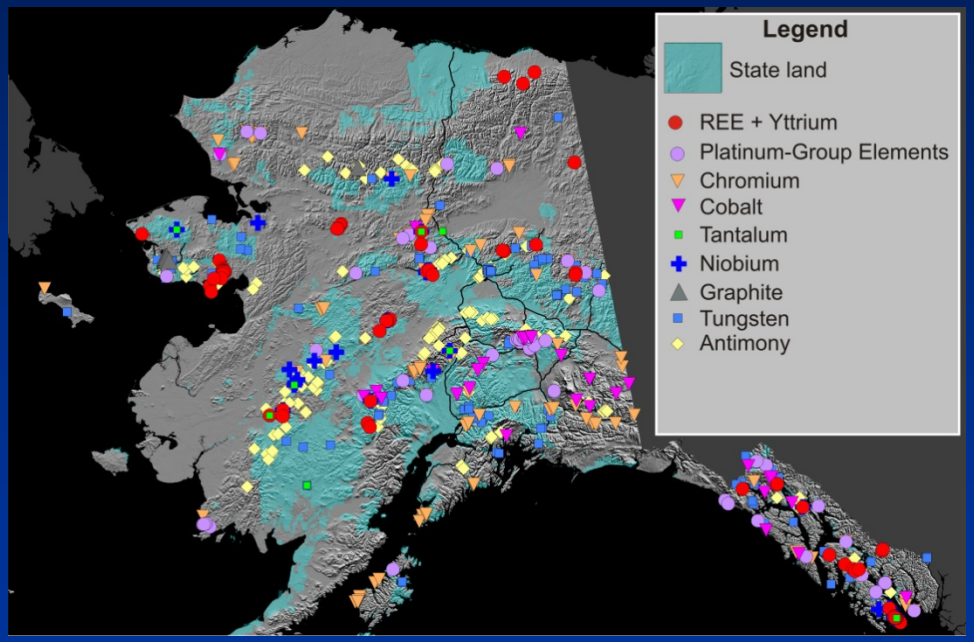
Department of Natural Resources
Division of Geological & Geophysical Surveys

Alaska Strategic & Critical Minerals Potential



Bob Swenson
State Geologist & Director
Alaska Division of Geological
& Geophysical Surveys

Strategic & Critical Minerals
Summit
Fairbanks, AK 09/30/2011

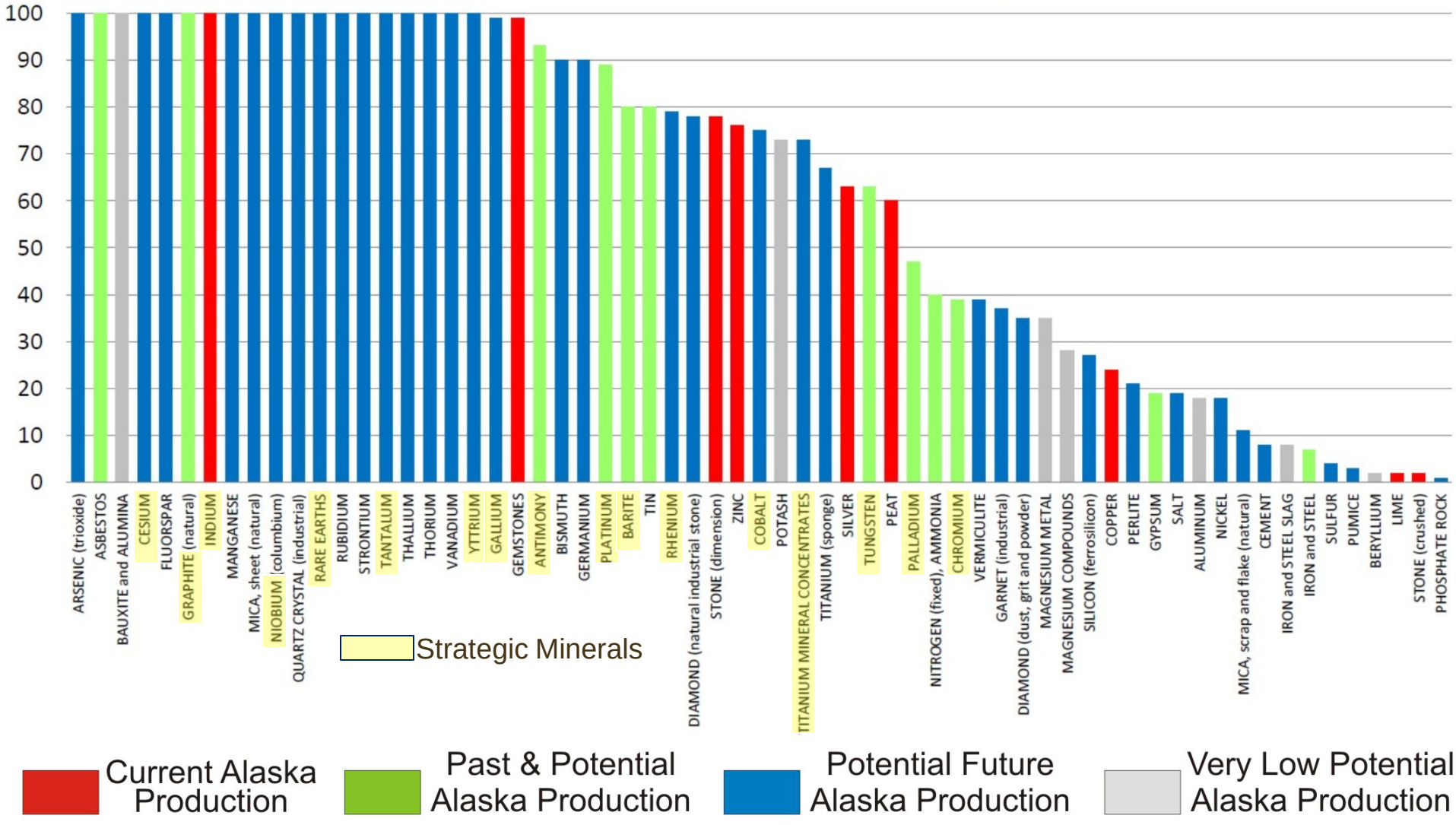
Current USGS List of Strategic & Critical Minerals

USGS (Long 2009; Long and others 2010)

- Antimony
- Barite
- Chromite
- Cobalt
- Fluorite
- Gallium
- Graphite
- Indium
- Niobium
- Platinum Group Elements (PGE)
- Rare Earth Elements (REE)
- Rhenium
- Tantalum
- Titanium
- Tungsten
- Yttrium

This list will change over time, as supply and demand change

2009 U.S. Import Reliance For Minerals and Mineral Materials



Current Alaska Production

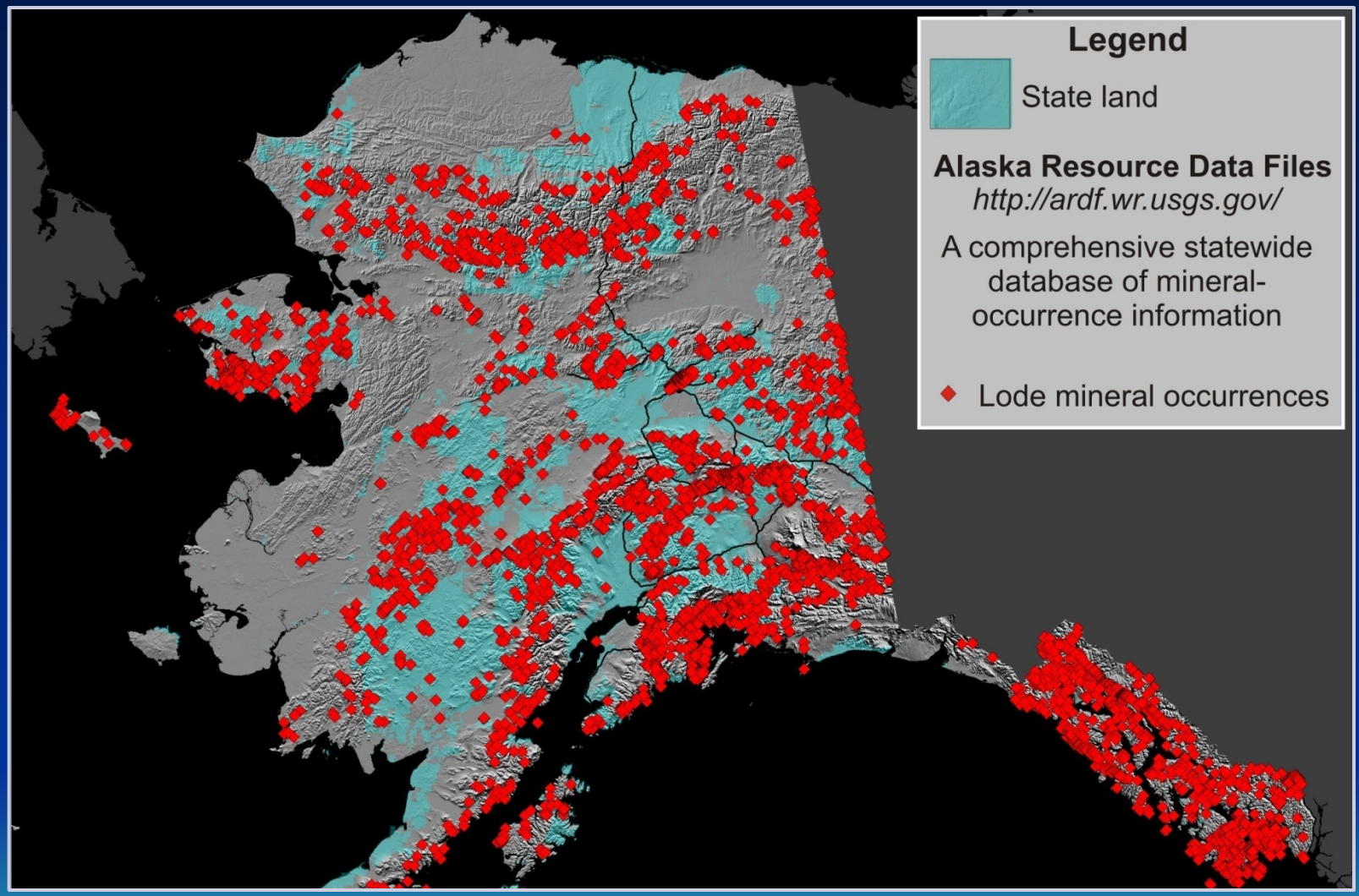
Past & Potential Alaska Production

Potential Future Alaska Production

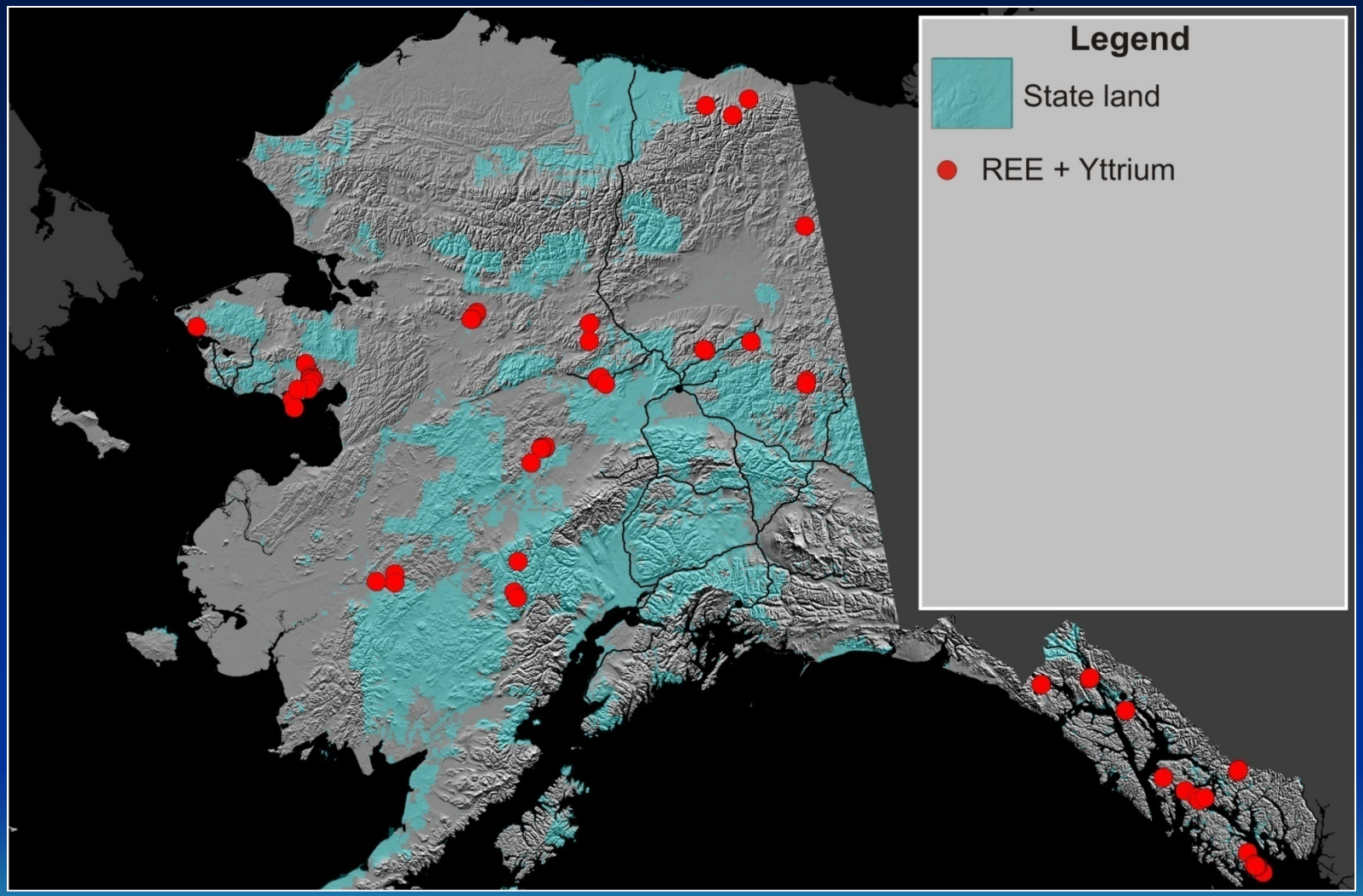
Very Low Potential Alaska Production

Modified From USGS

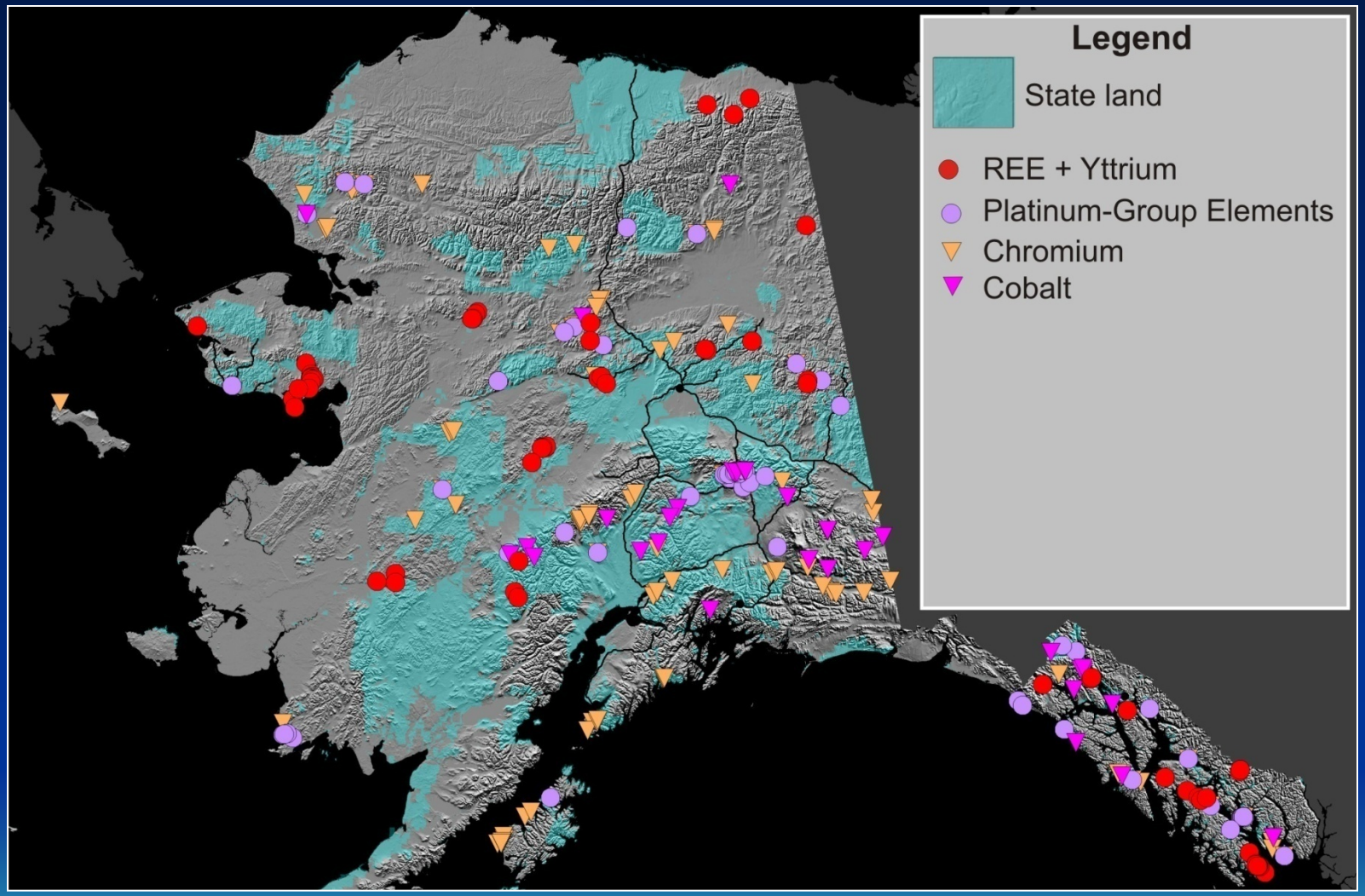
Alaska's Resource Data Files



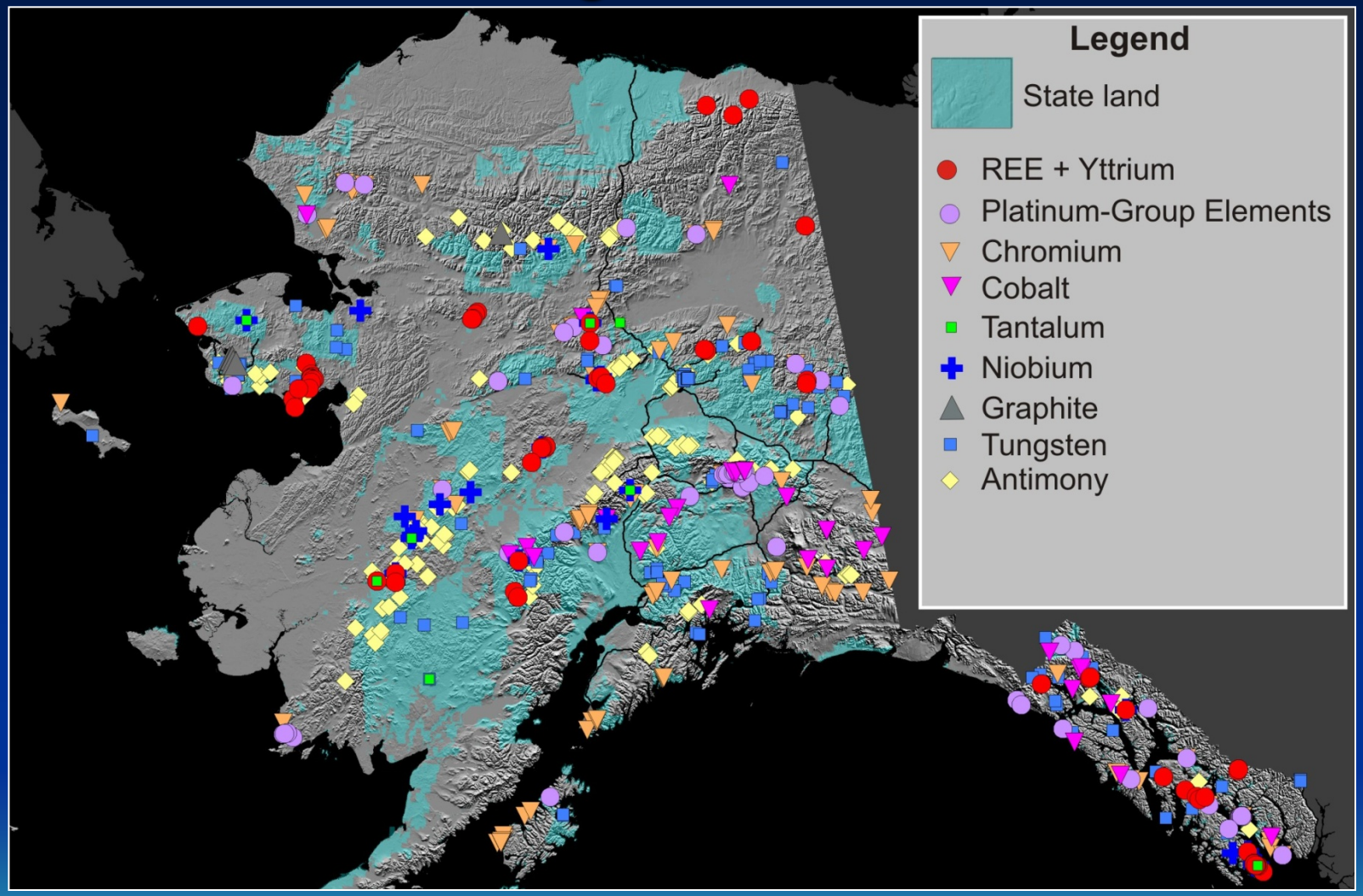
Alaska's Strategic & Critical Minerals



Alaska's Strategic & Critical Minerals



Alaska's Strategic & Critical Minerals



What is DGGS Doing to Encourage Mineral Exploration in Alaska?

Alaska Airborne Geophysical/Geological Mineral Inventory Program

1993-Present

Goal: Evaluate over 40 million acres of State land with high mineral potential

$12.3 Million - airborne geophysical surveys & geologic mapping

10.7 Million acres of geophysical surveys flown

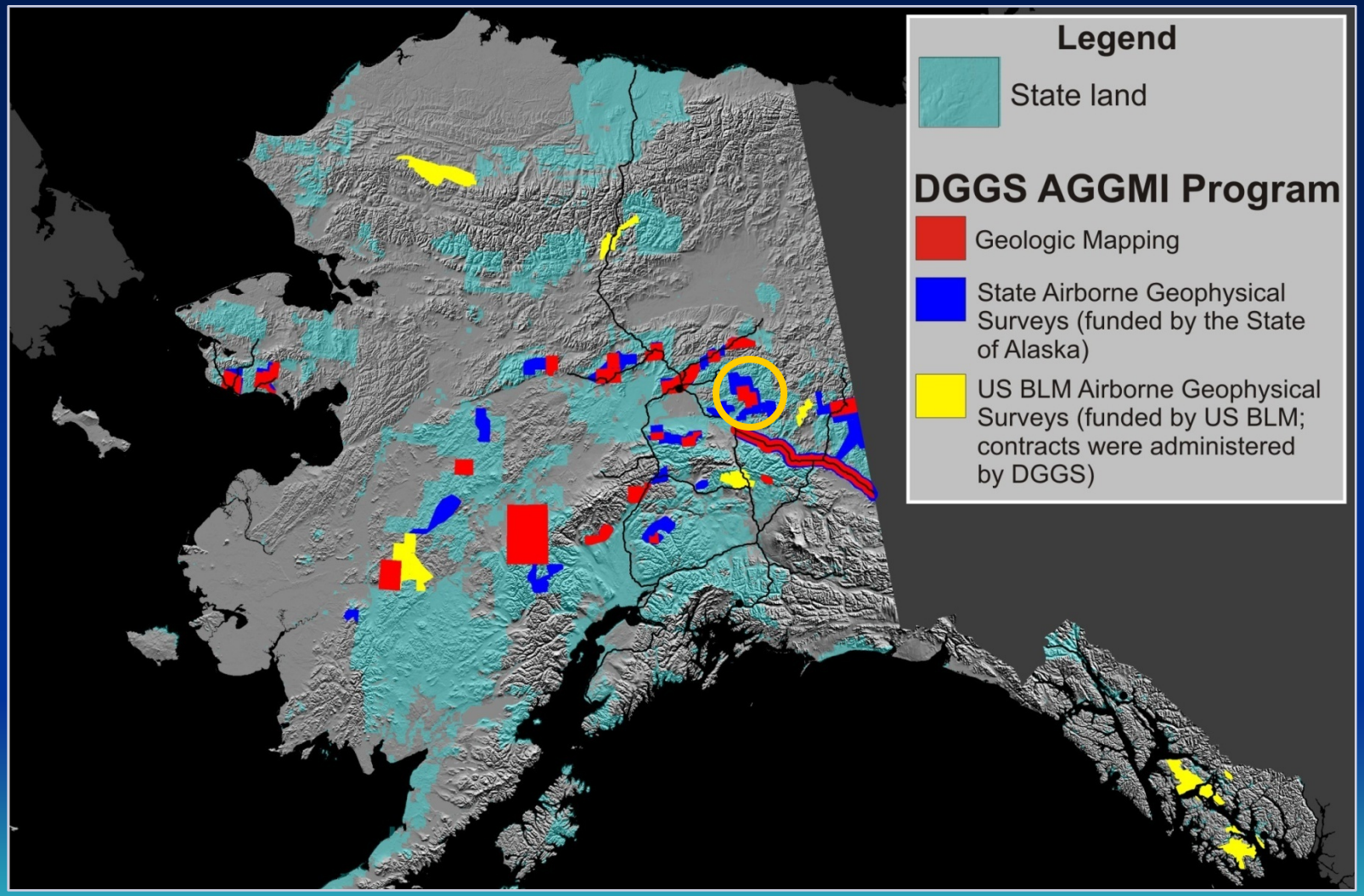
5.5 Million acres of geologic mapping conducted

Strategic & Critical Minerals Project

Initial Goal: Conduct a REE assessment for Alaska

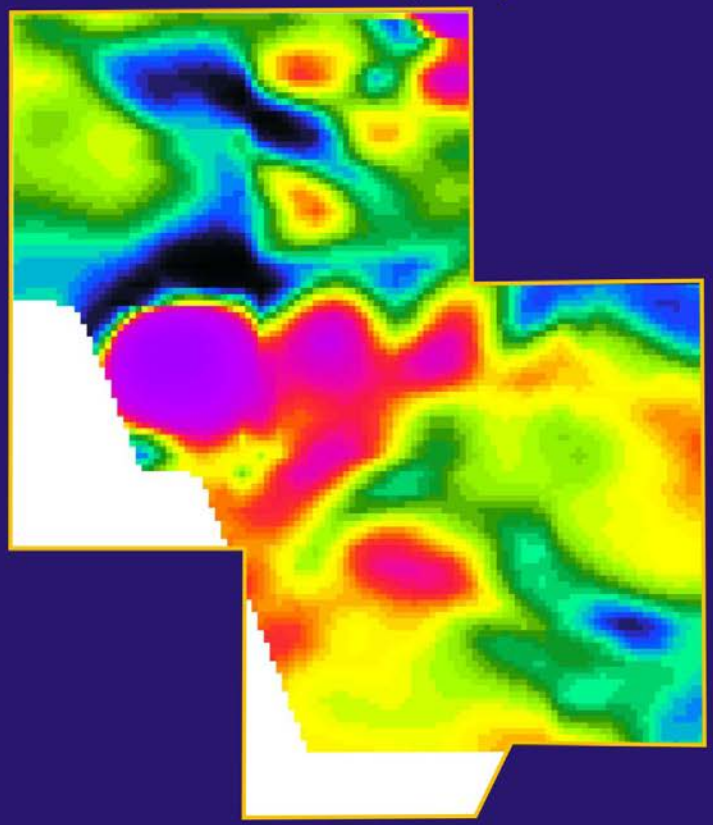
$498,000 Capital Improvement Project

DGGS Airborne Geophysical/Geological Mineral Inventory (AGGMI) Program:

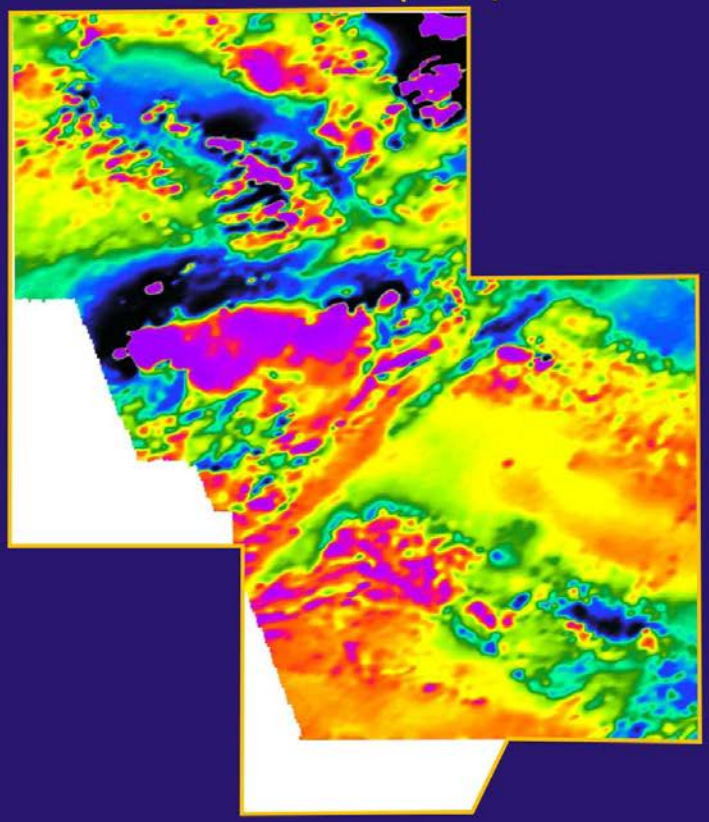


DGGS Airborne Geophysical Surveys

REGIONAL
AEROMAGNETIC MAP (1975)



DETAILED
AEROMAGNETIC MAP (2000)

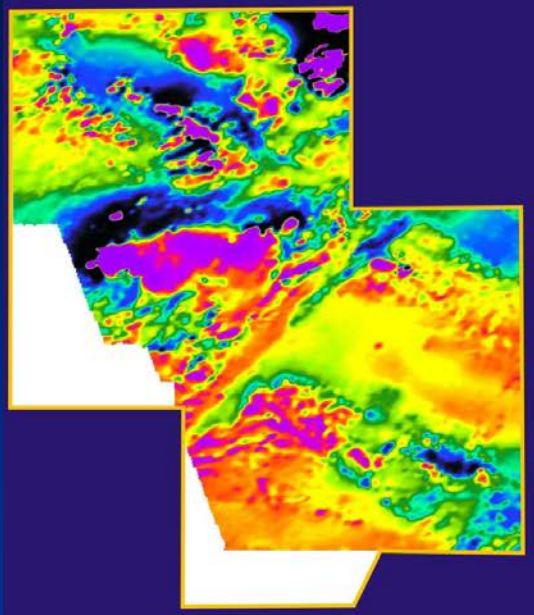


Total Field Magnetic Data

Purple & Reds = High Magnetic Values

Black & Dark Blue = Low Magnetic Values

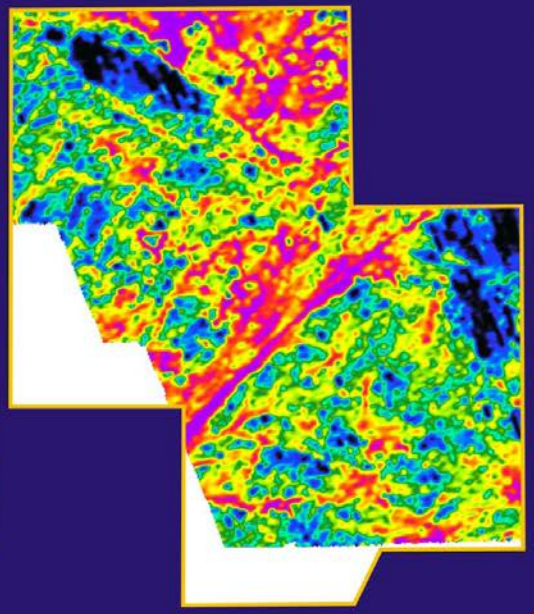
DGGS Airborne Geophysical Surveys



Total Field Magnetic Data

Purple & Reds =
High magnetic values

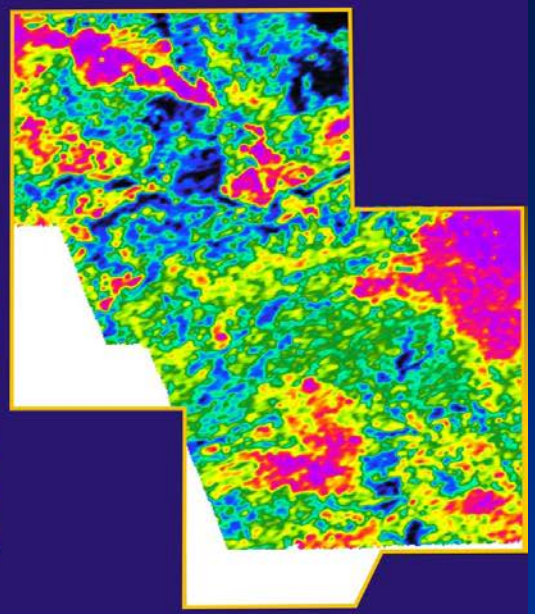
Black & Dark Blue =
Low magnetic values



Electromagnetic data
(7200 Hz apparent resistivity shown)

Purple & Reds =
Conductive

Black & Dark Blue =
Not Conductive



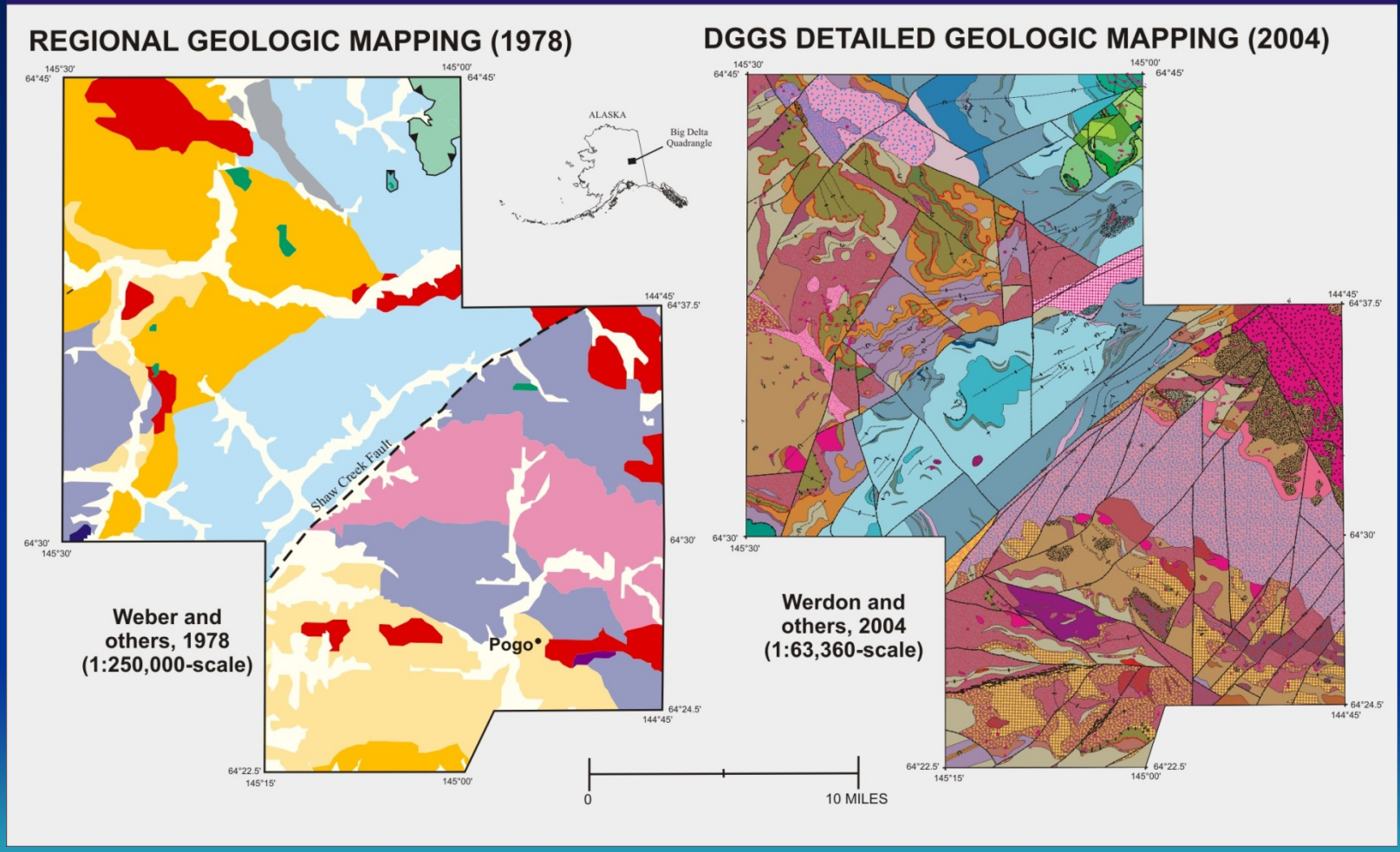
±Radiometric data
(Potassium shown)

Purple & Reds =
High Potassium Values

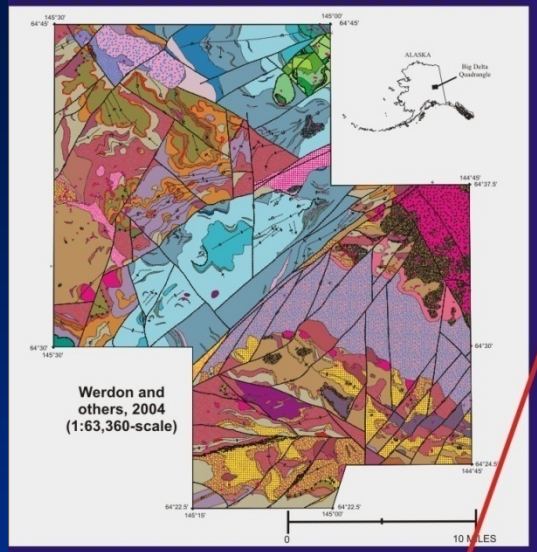
Black & Dark Blue =
Low Potassium Values

Regional mapping versus DGGS's detailed geologic mapping

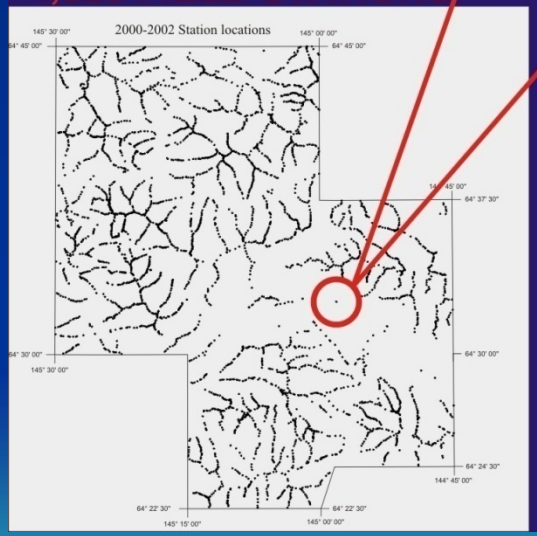
Incorporates DGGS's airborne magnetic, resistivity, and radiometric data



DGGS DETAILED GEOLOGIC MAP



4,828 FIELD STATIONS



Data Recorded in Field Notes

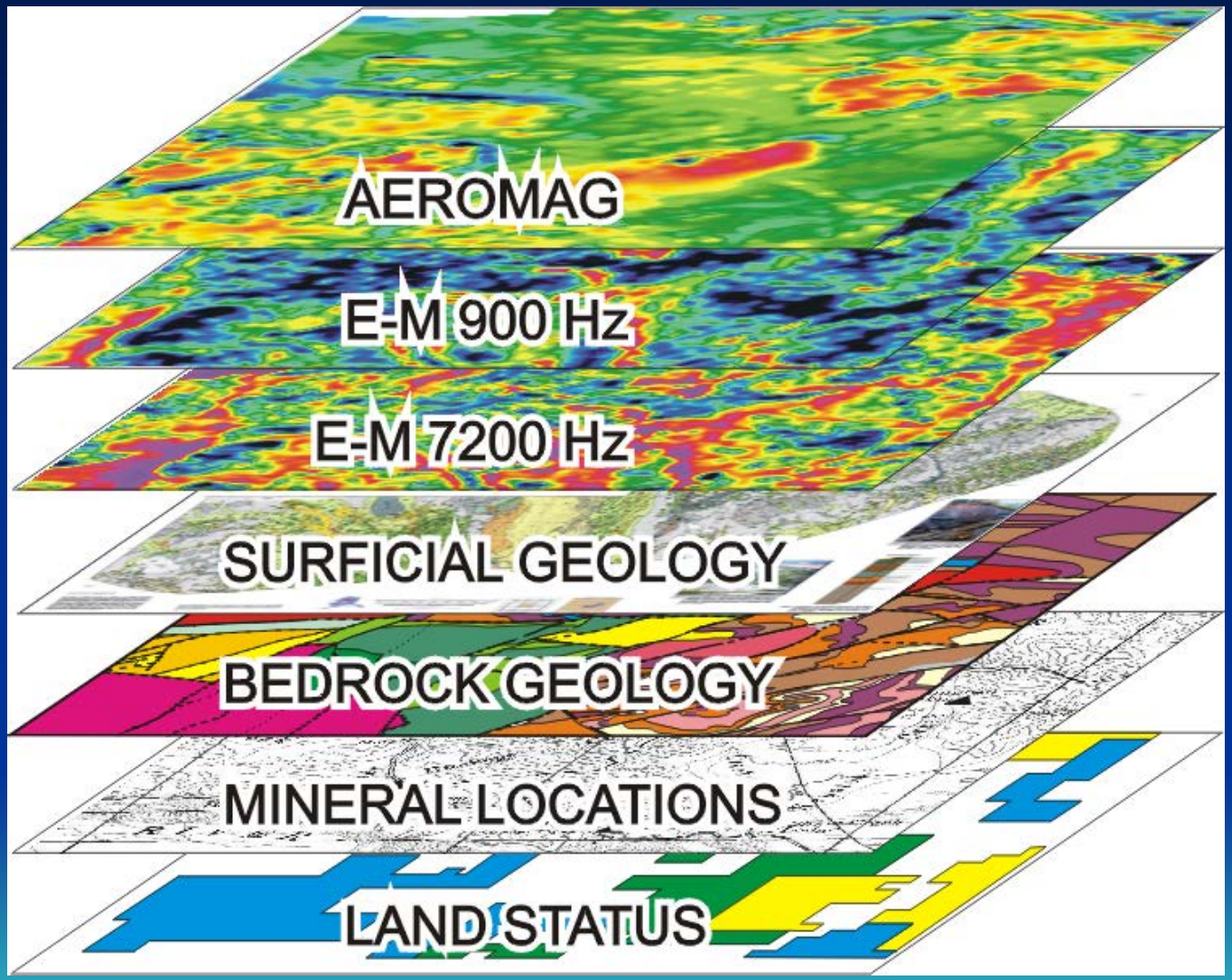
- Unique station name
- Location
- Date
- Exposure type
- Sample(s) collected
- Lithology name(s)
- Lithology description(s)
- Magnetic susceptibility
- Structural measurements
- Photo # & description
- Field sketches
- Geologic interpretations

Follow-up Analytical Work

- Geophysical analysis
- Ore geochemistry
- Whole rock geochemistry
- Trace-element geochemistry
- REE geochemistry
- X-ray fluorescence
- X-ray diffraction
- Petrography
- Electron microprobe
- Geochronology (Ar, U/Pb)
- Structural analysis
- Other techniques as needed

Result = High-Quality, Detailed, DGGS Geologic Maps/Reports

DGGS Integrated Mapping Program

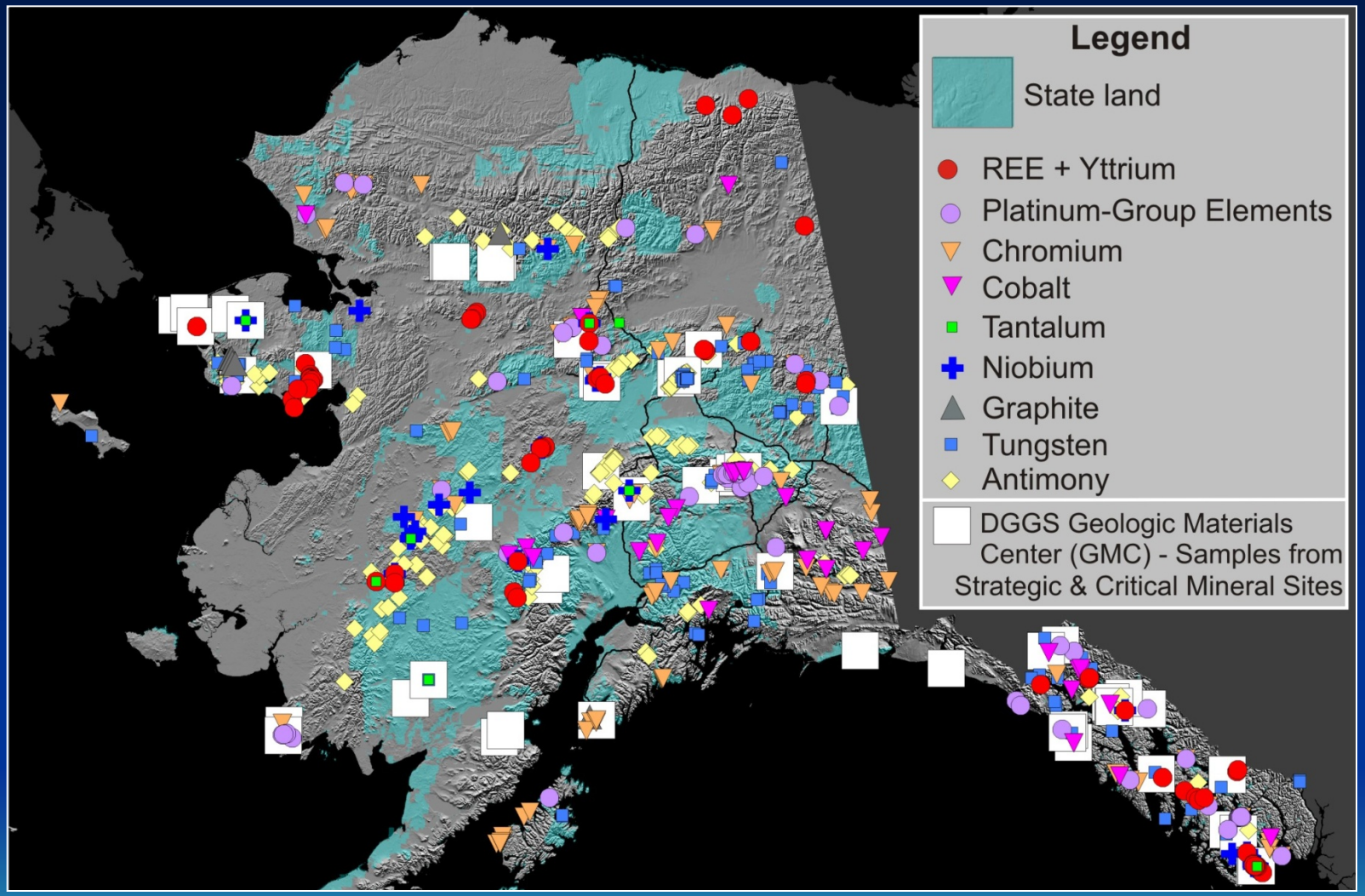


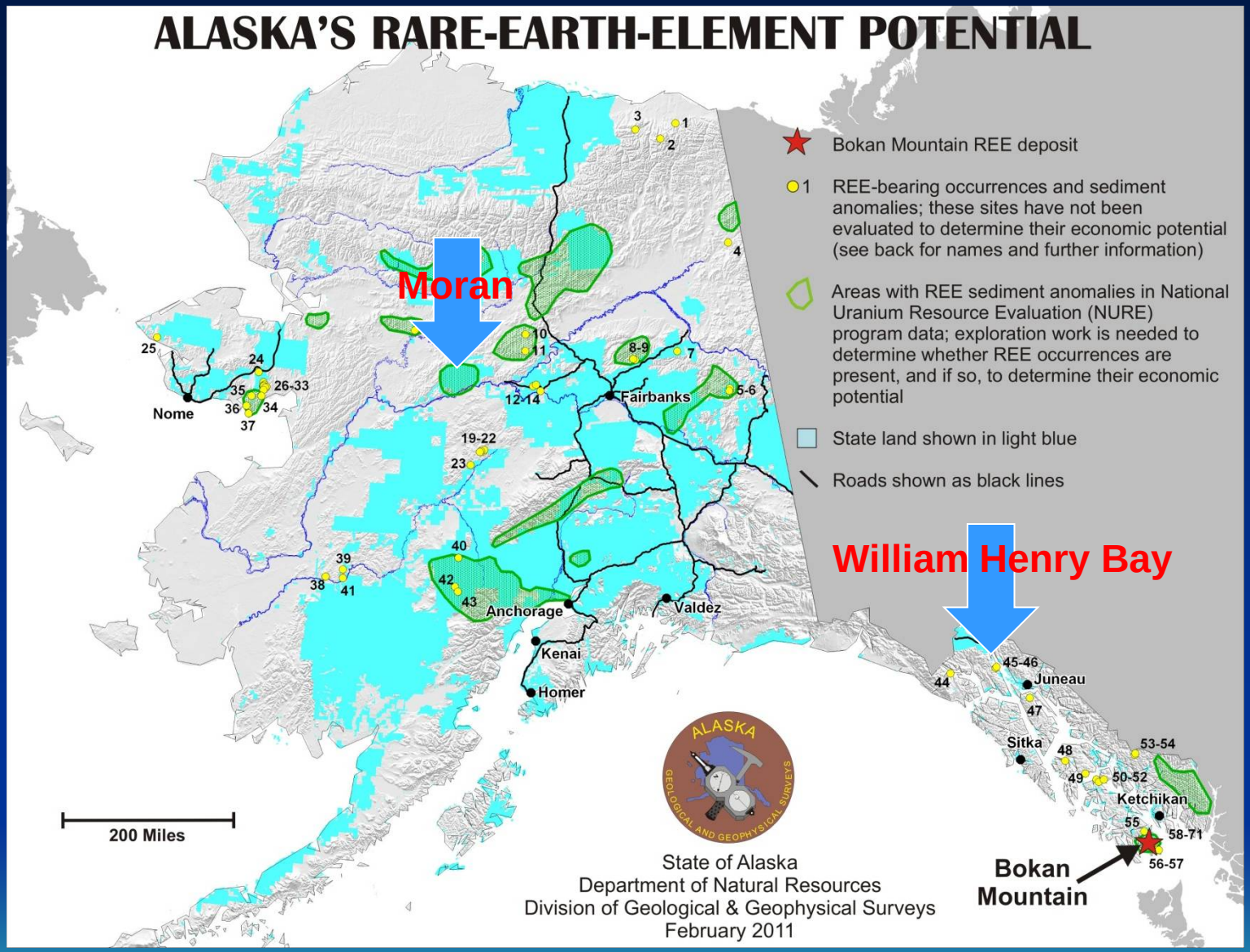
REE Assessment and Strategic Minerals Project

Work Plan

- ✓ Compiling a digital database of all available published and unpublished data on REE occurrences in Alaska
- ✓ Obtaining modern geochemical analyses on archived samples stored at the Geological Materials Center for areas throughout Alaska with high REE potential
- ✓ Systematically collecting high-resolution geophysics in areas of known REE potential (e.g., Moran)
- ✓ Conducting fieldwork on select REE known occurrences and prospective areas
- ✓ Publishing the results and making all data available on the web

Alaska's Strategic & Critical Minerals




ALASKA'S RARE-EARTH-ELEMENT POTENTIAL
Bokan Mountain REE deposit
1 REE-bearing occurrences and sediment anomalies; these sites have not been evaluated to determine their economic potential (see back for names and further information)
Areas with REE sediment anomalies in National Uranium Resource Evaluation (NURE) program data; exploration work is needed to determine whether REE occurrences are present, and if so, to determine their economic potential
State land shown in light blue
Roads shown as black lines
Moran
William Henry Bay
Bokan Mountain
Nome
Fairbanks
Anchorage
Valdez
Kenai
Homer
Juneau
Sitka
Ketchikan
200 Miles
State of Alaska
Department of Natural Resources
Division of Geological & Geophysical Surveys
February 2011

REE Assessment
Geologic Mapping
Geophysical Surveys
Moran area, Interior Alaska

Stream-Sediment Sampling

Geologic mapping

Helicopter-supported geologic fieldwork

REE Assessment - William Henry Bay, Southeast Alaska

Malachite-Chalcopyrite
±Uranium±Thorium±REE?
in Quartz Vein

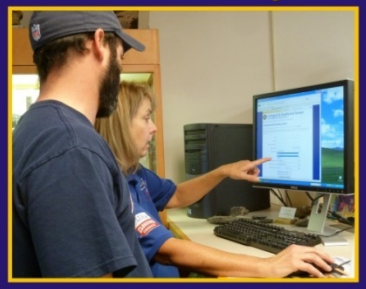
Sampling Quartz Veins

DGGS Stream-Sediment Sampling

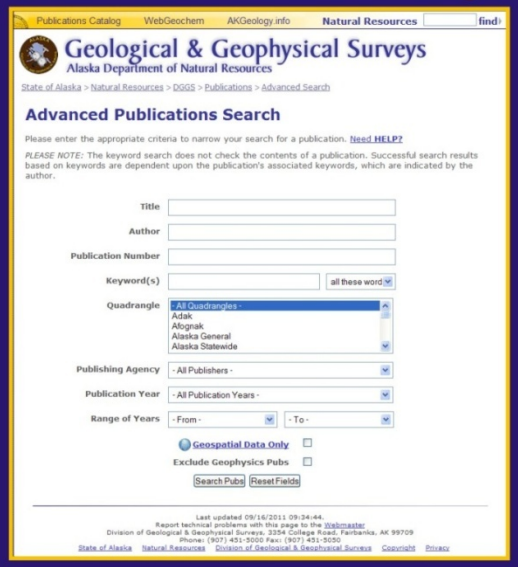
REE-Carbonate-Mica Syenite
with Disseminated Sulfides

DGGS Data Delivery to the Public

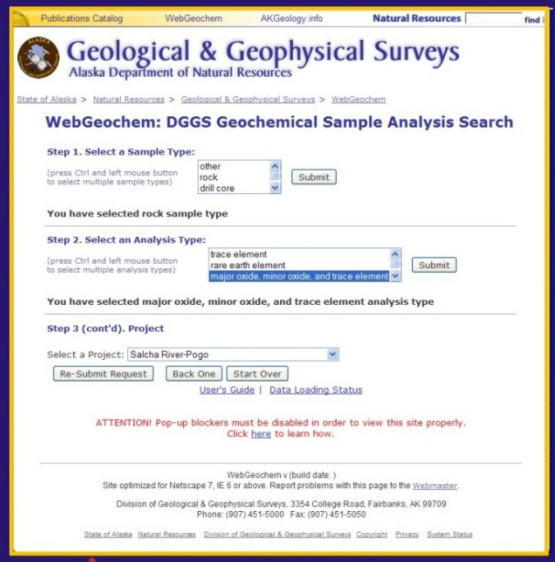
Public Library



Publications Search Web Page



WebGeochem Search Page

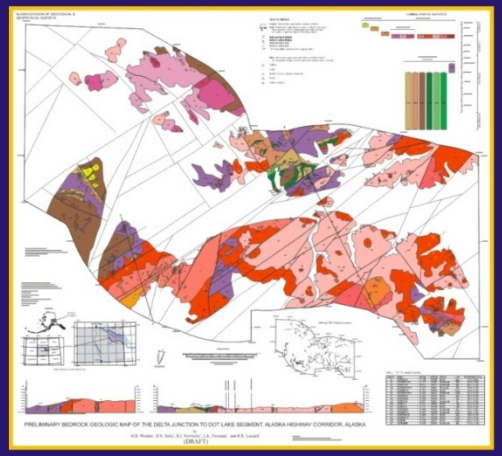


Geologic Reports

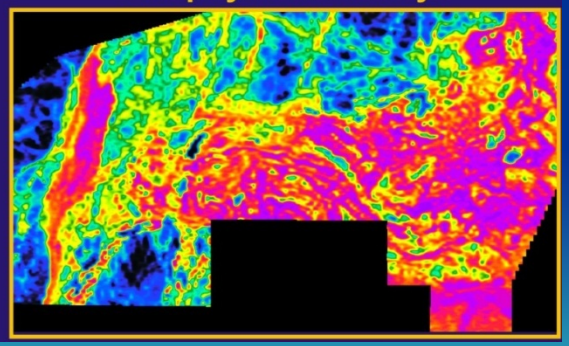
Geochemistry

Geologic Materials Center

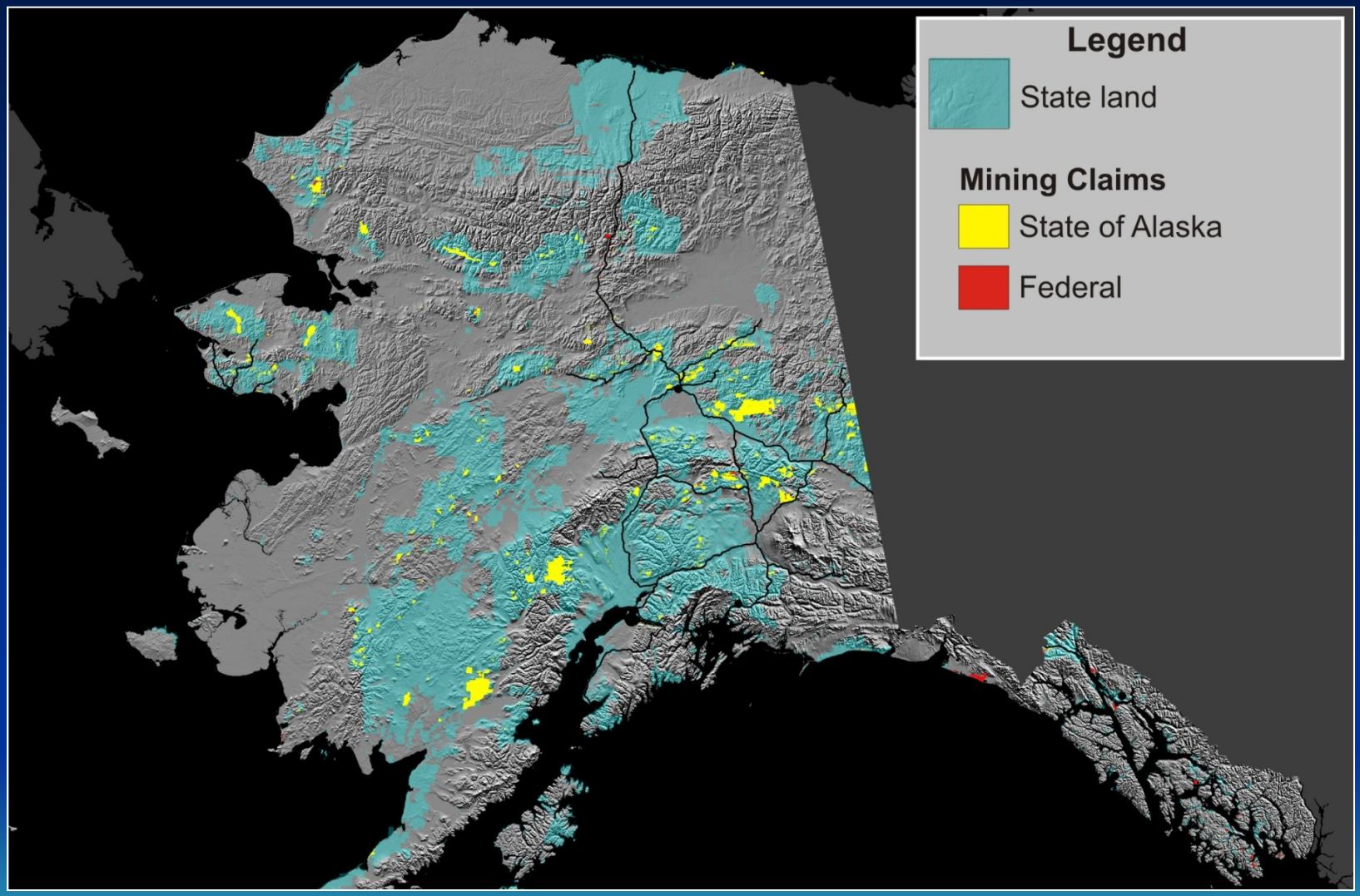
Geologic Maps



Geophysical Surveys



Active State & Federal Mining Claims



Summary

- Alaska is richly endowed with mineral resource potential
- Alaska's diverse geology provides the potential for a wide variety of mineral deposit types, including REE and other Strategic Minerals
- DGGS is providing essential framework data on Alaska mineral resources for use in policy decisions and mineral exploration
- DNR is working with our Federal colleagues to ensure Alaska mineral resource potential is recognized, and developed in a prudent and responsible manner