

Geology, History, and Resources of Nevada

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(www.nbmng.unr.edu)

What mineral resources (broadly defined to include all geological resources – metals, industrial minerals, energy resources, water resources) do we have (or have we had or will we have) in Nevada?

Minerals of Nevada

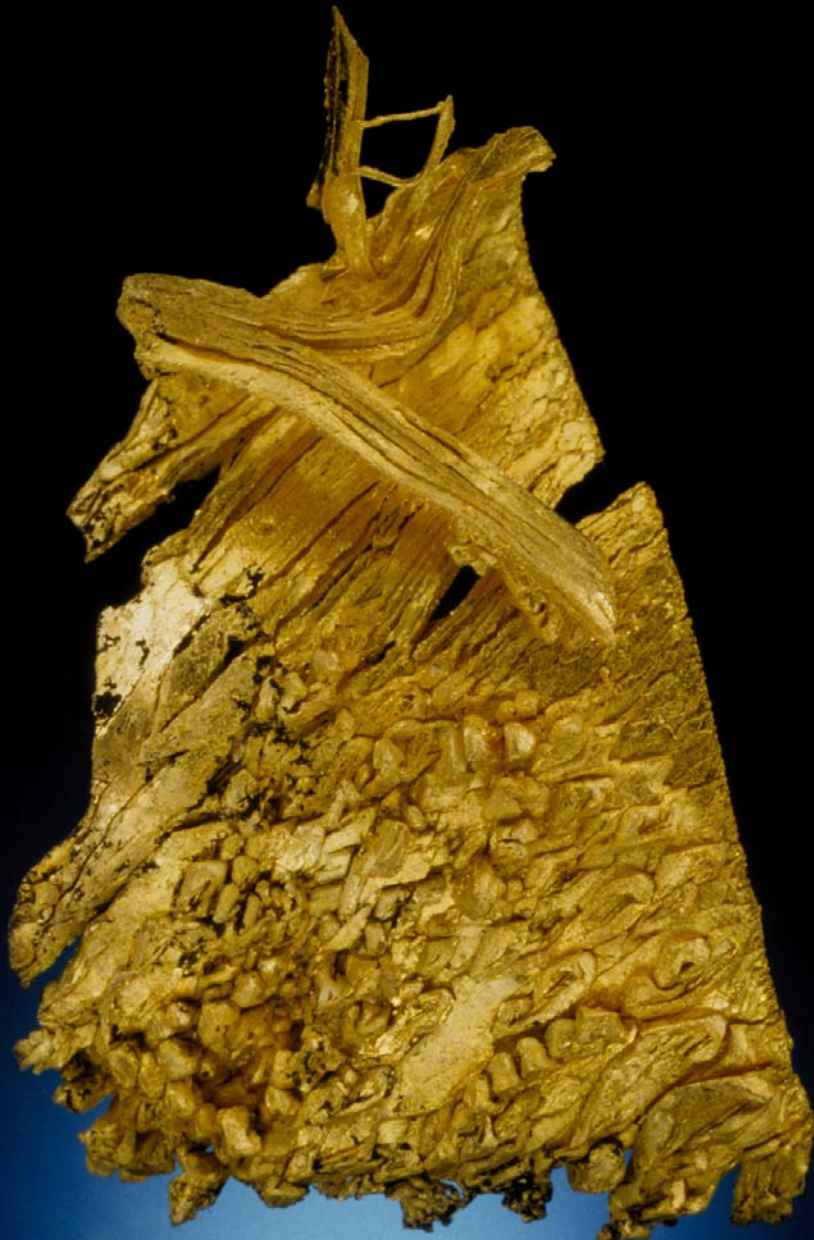
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(by December 31 –

www.nbmг.unr.edu)



Gold, Round Mountain



Opal, Virgin Valley

Metals in Nevada?

Metals in Nevada

Silver

Gold

Copper

Iron

Lead

Zinc

Tungsten

Arsenic

Antimony

Magnesium Manganese

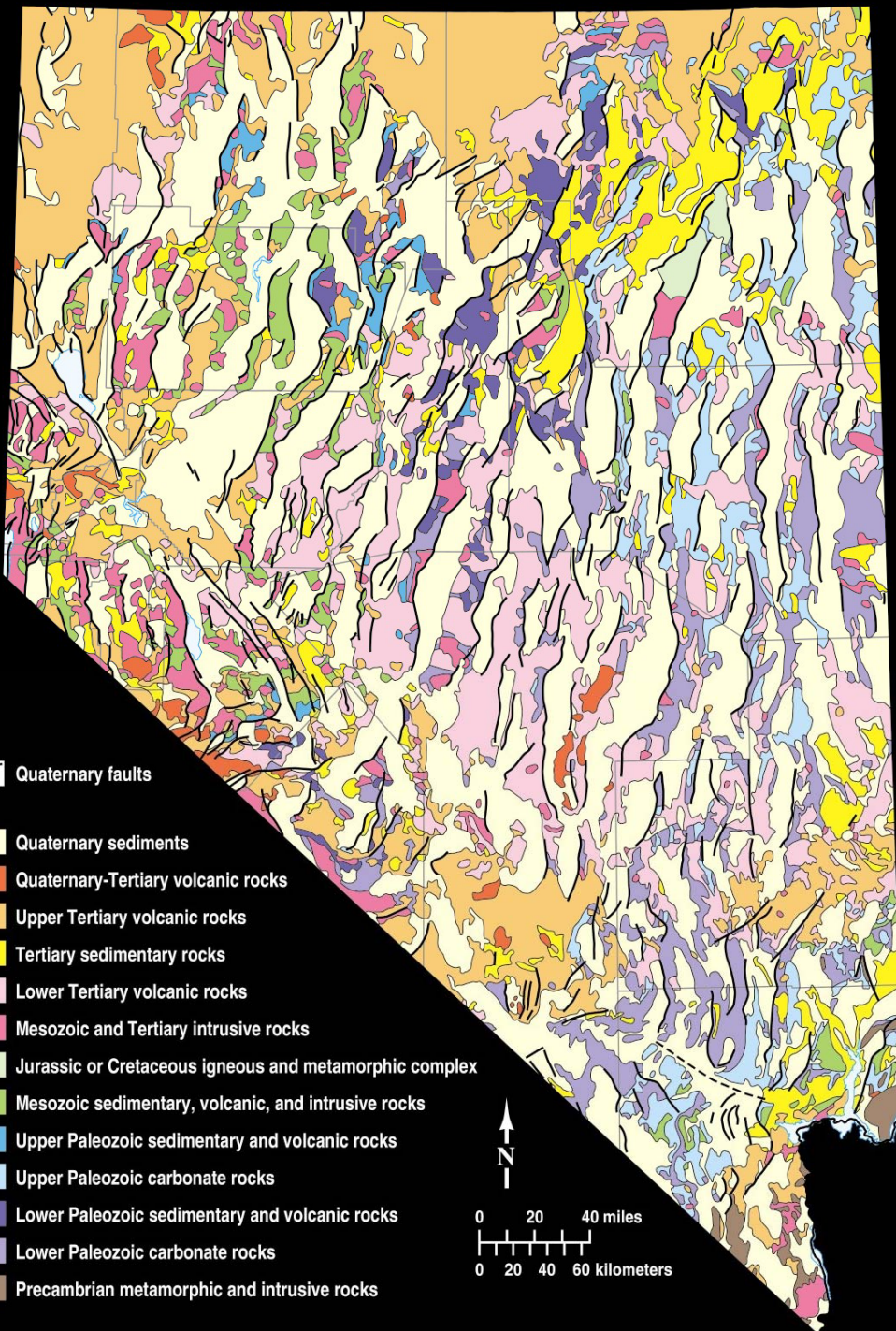
Who Cares?

Do you use:

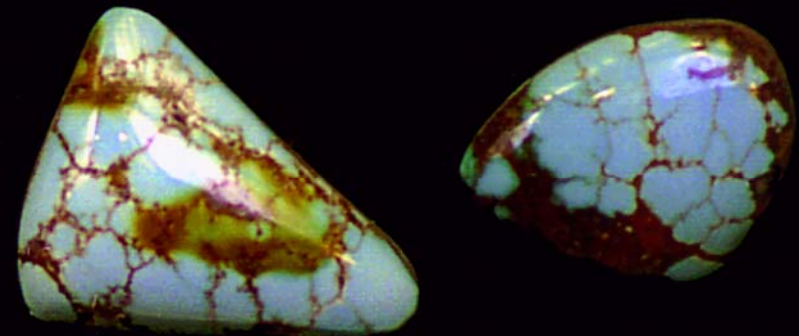
Iron?

Gold?

Copper?



Native American mining –
obsidian, opal, chert for tools
 salt for flavoring and
 preserving food
turquoise for ornaments

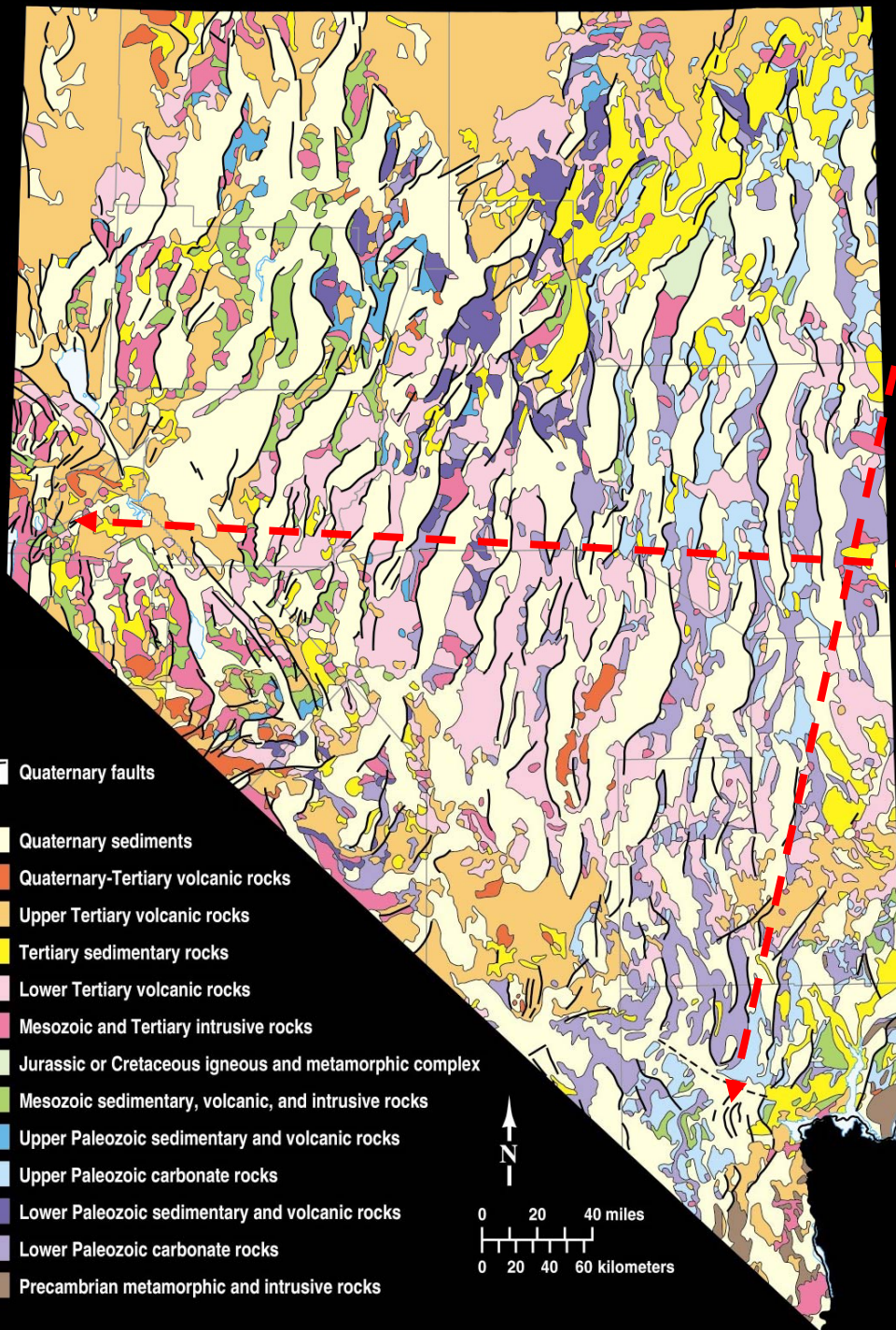


European/American History

1776: Francisco Carces –
Spanish monks in southern
Nevada – LA to Santa Fe

1848: Treaty with Mexico –
Nevada becomes part of USA

1849: Gold discovered near
Dayton by Mormon settlers



**Paleozoic carbonates thrust
over Mesozoic sandstones near
Las Vegas: not much ore where
there aren't any igneous rocks.**

European/American History

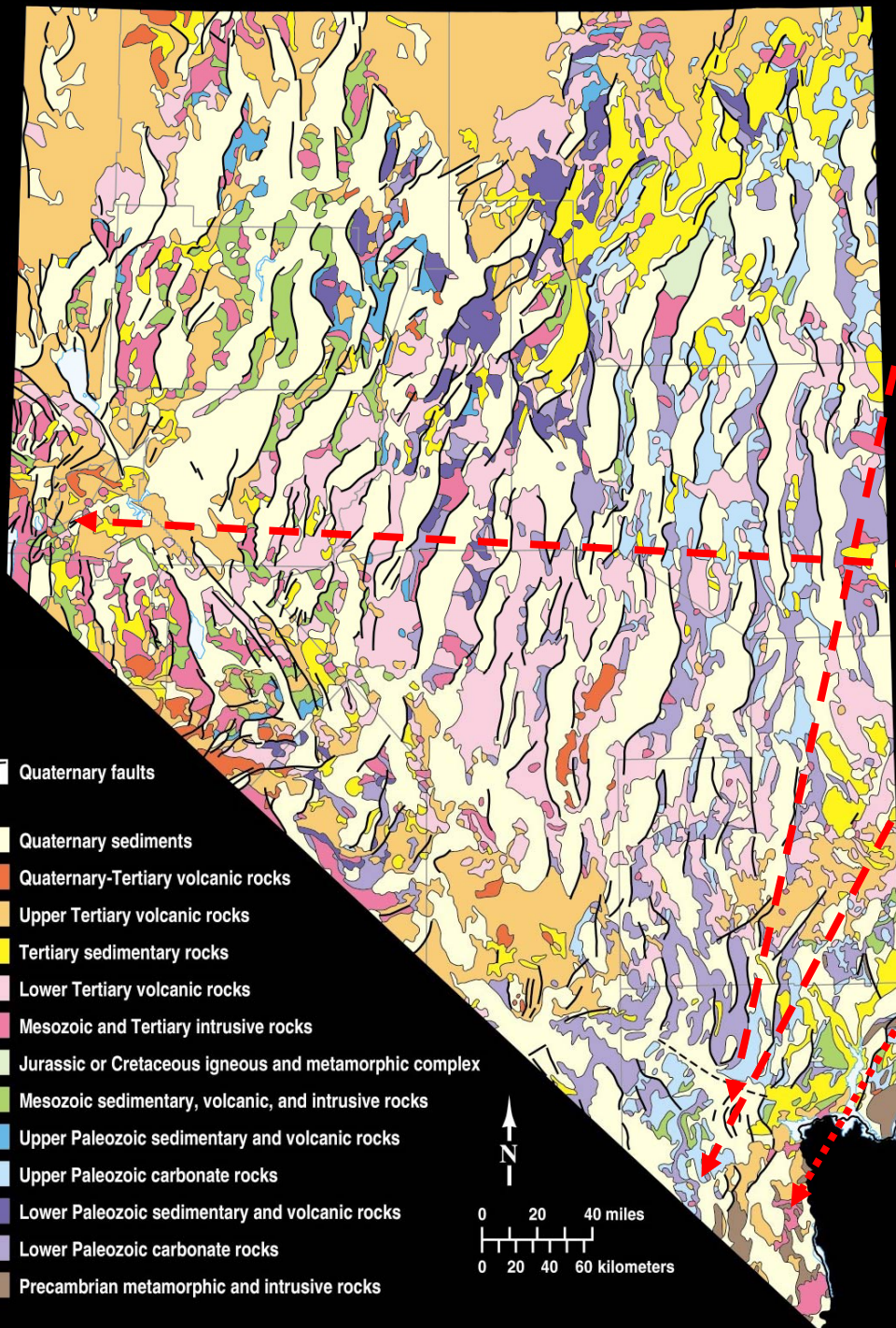
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1848: Treaty with Mexico –
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1849: Gold discovered near
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1855: Potosi Mine – Zn-Pb-Ag-
Au, Goodsprings district
discovered by Mormons

1857: Nelson – Ag-Au



European/American History

1776: Francisco Carces – Spanish monks in southern Nevada – LA to Santa Fe

1848: Treaty with Mexico – Nevada becomes part of USA

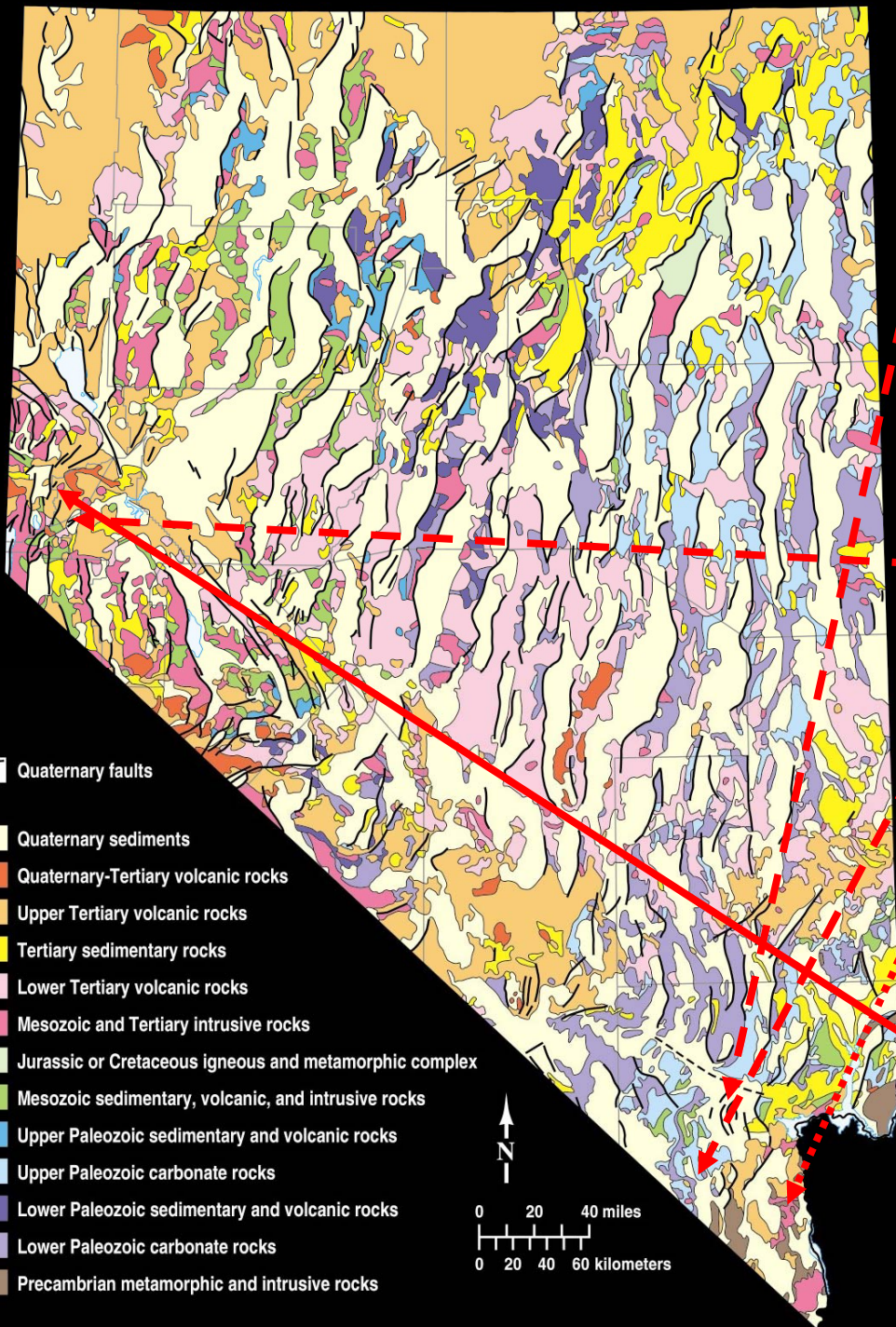
1849: Gold discovered near Dayton by Mormon settlers

1855: Potosi Mine – Zn-Pb-Ag-Au, Goodsprings district discovered by Mormons

1857: Nelson – Ag-Au

1859: Discovery of the Comstock Lode – Ag-Au, Virginia City

1864: Statehood – Battle Born and the Silver State

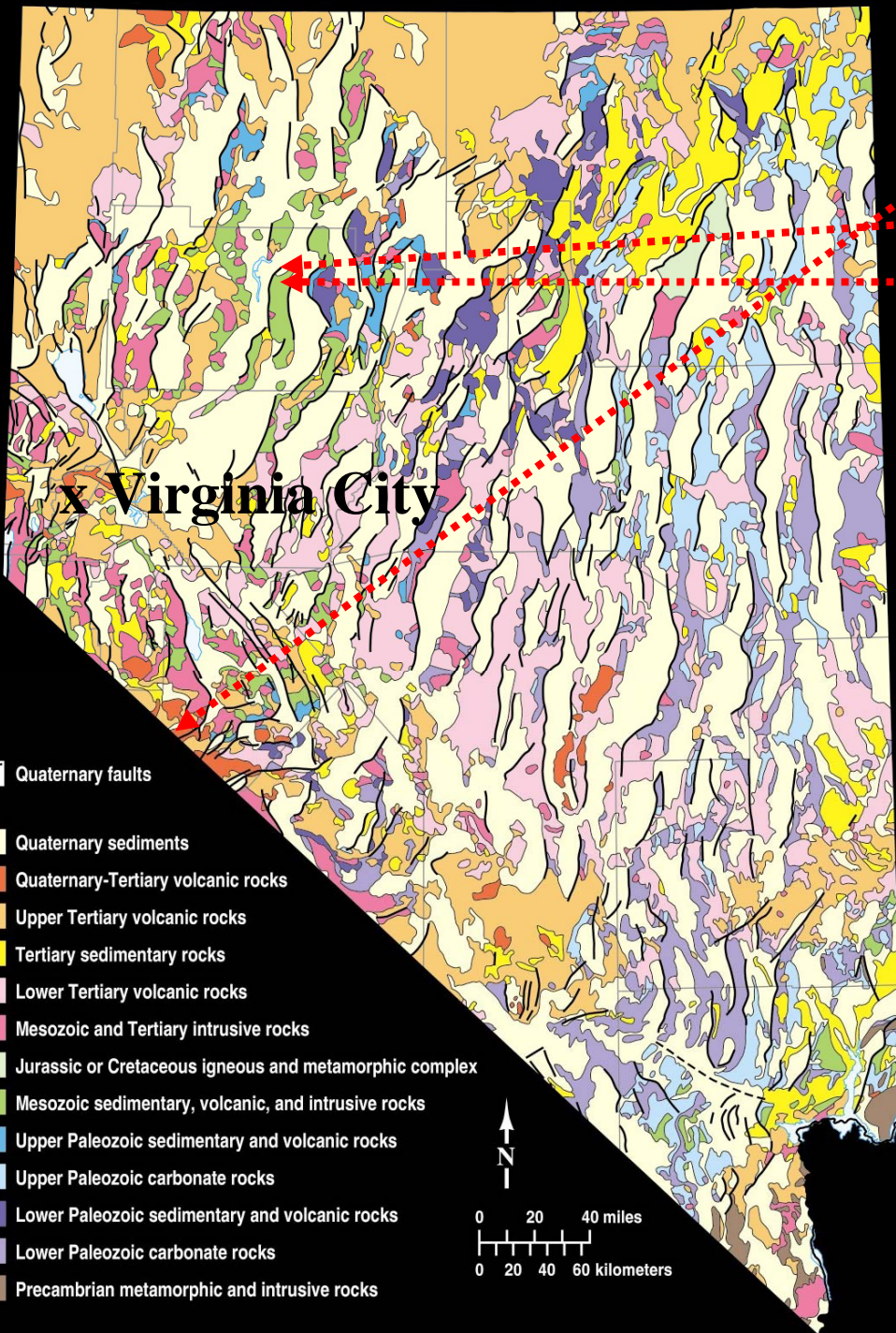


The '49ers spread out across the west:

Aurora (1860)

Humboldt district (1860)

Star and Buena Vista districts (1861)



x Virginia City

The '49ers spread out across the west:

Aurora (1860)

Humboldt district (1860)

Star and Buena Vista districts (1861)

Reese River district – Austin (1862)

Cortez (1863)

Cherry Creek district (1863)

Silver Peak (1863)

Pioche (1863)

Union district – Ione (1863)

Quaternary faults

Quaternary sediments

Quaternary-Tertiary volcanic rocks

Upper Tertiary volcanic rocks

Tertiary sedimentary rocks

Lower Tertiary volcanic rocks

Mesozoic and Tertiary intrusive rocks

Jurassic or Cretaceous igneous and metamorphic complex

Mesozoic sedimentary, volcanic, and intrusive rocks

Upper Paleozoic sedimentary and volcanic rocks

Upper Paleozoic carbonate rocks

Lower Paleozoic sedimentary and volcanic rocks

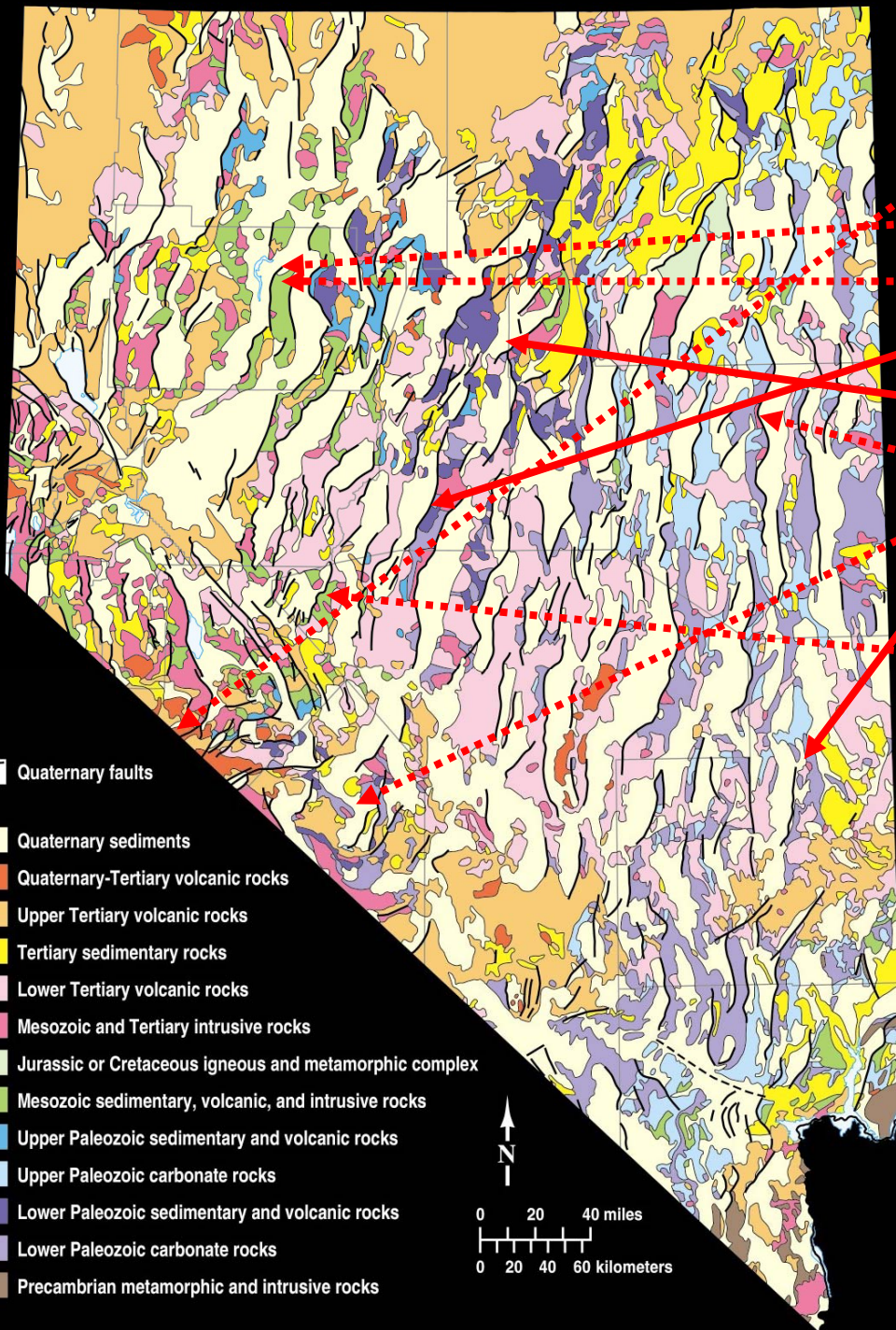
Lower Paleozoic carbonate rocks

Precambrian metamorphic and intrusive rocks

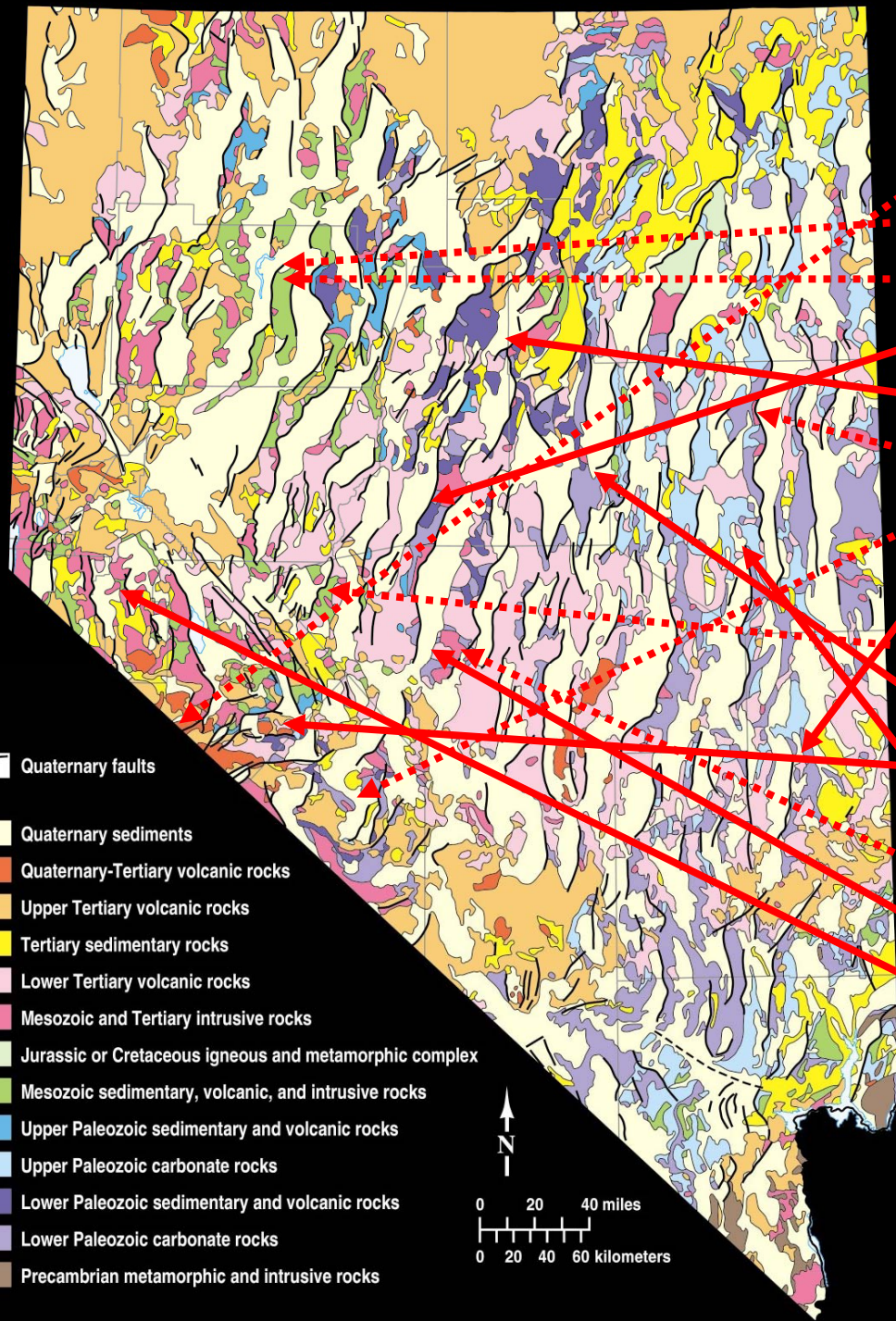


0 20 40 miles

0 20 40 60 kilometers



The '49ers spread out across the west:



Aurora (1860)

Humboldt district (1860)

Star and Buena Vista districts (1861)

Reese River district – Austin (1862)

Cortez (1863)

Cherry Creek district (1863)

Silver Peak (1863)

Pioche (1863)

Union district – Ione (1863)

Eureka (1864)

Candelaria (1864)

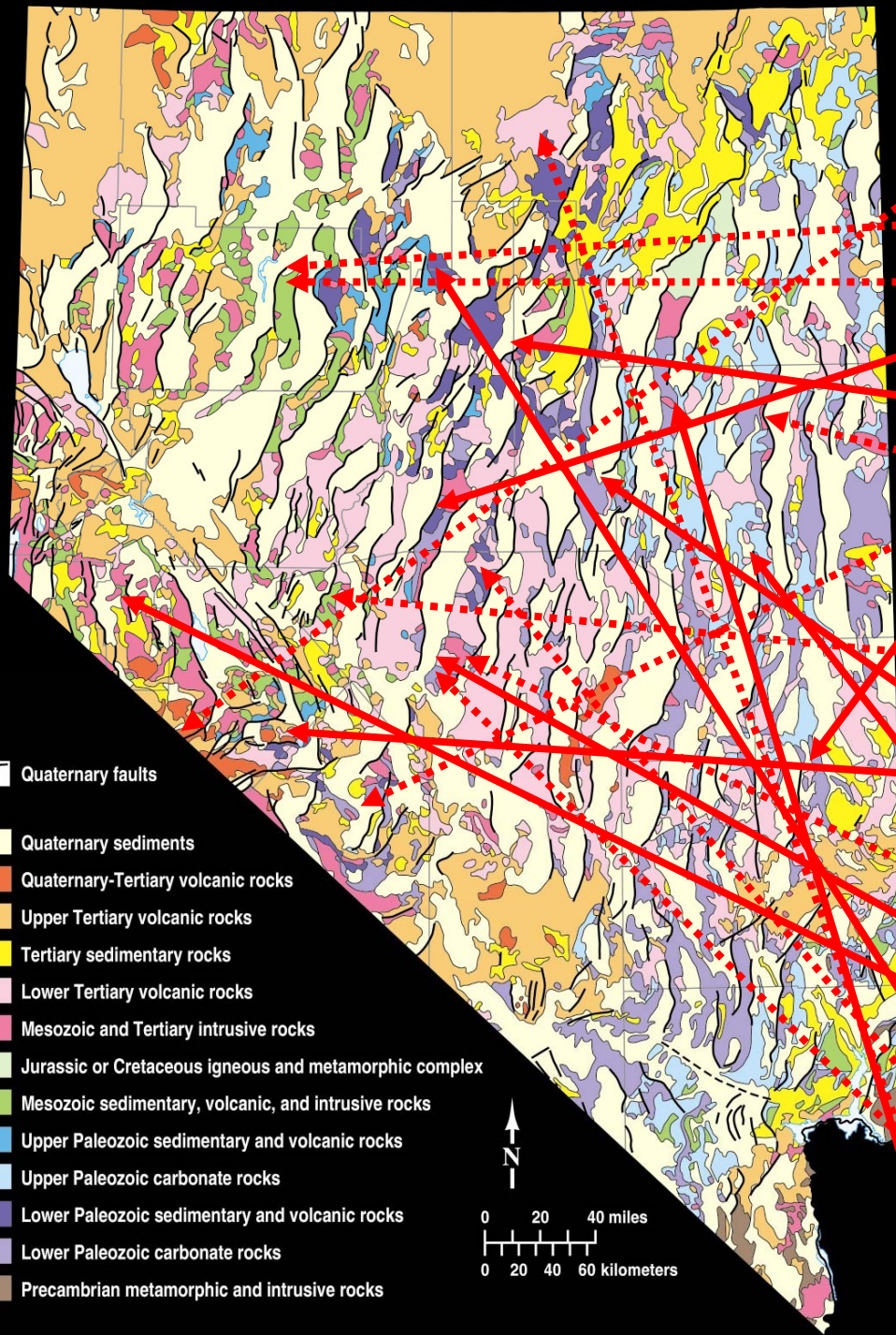
White Pine district – Ely (1865)

Belmont (1865)

Round Mountain (1865)

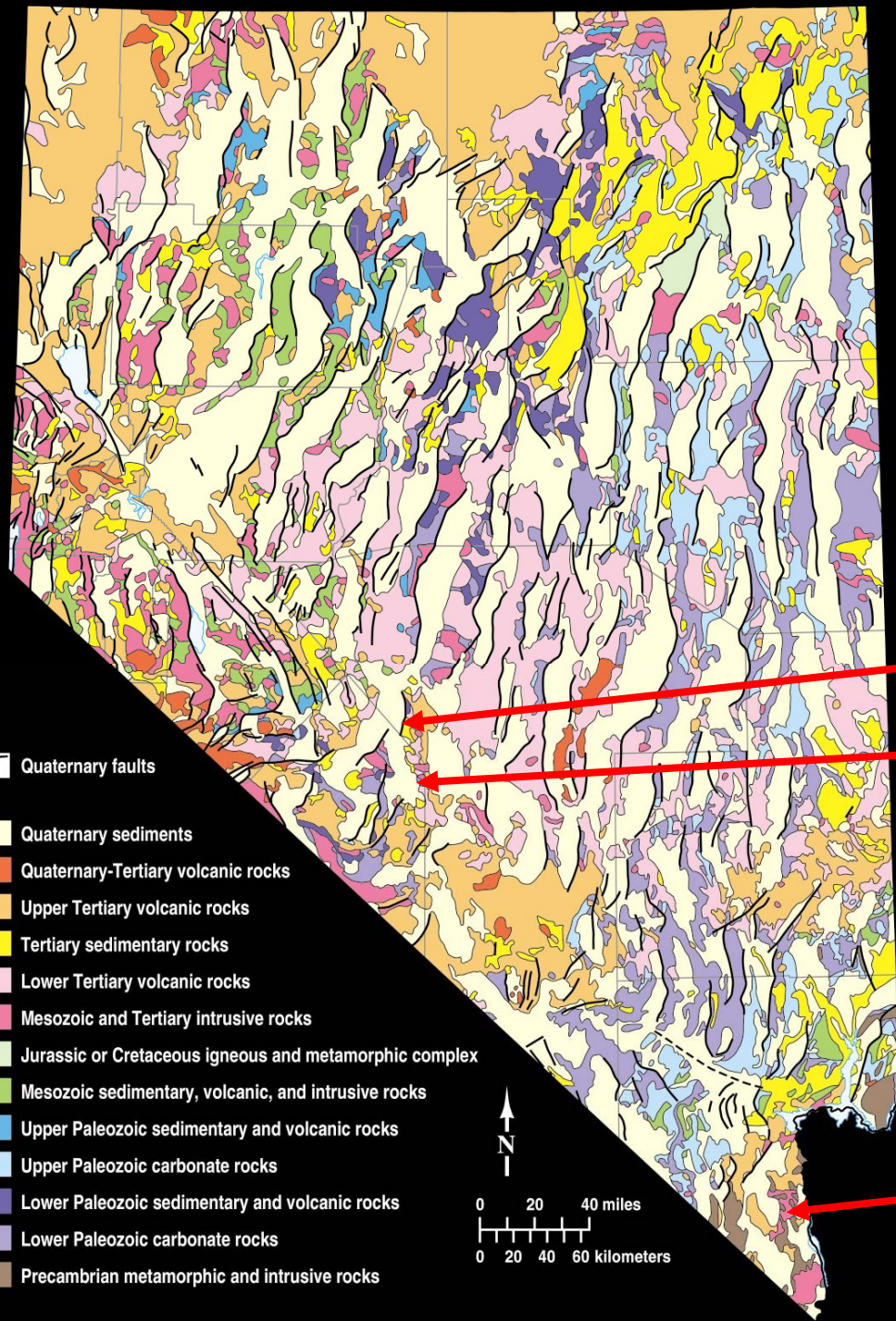
Yerington (1865)

The '49ers spread out across the west:



- Aurora (1860)
- Humboldt district (1860)
- Star and Buena Vista districts (1861)
- Reese River district – Austin (1862)
- Cortez (1863)
- Cherry Creek district (1863)
- Silver Peak (1863)
- Pioche (1863)
- Union district – Ione (1863)
- Eureka (1864)
- Candelaria (1864)
- White Pine district – Ely (1865)
- Belmont (1865)
- Round Mountain (1865)
- Yerington (1865)
- Battle Mountain (1866)**
- Northumberland (1866)**
- Manhattan (1866)**
- Tuscarora (1867)**
- Bald Mountain (1869)**

A few notable discoveries were made in a later wave of exploration.

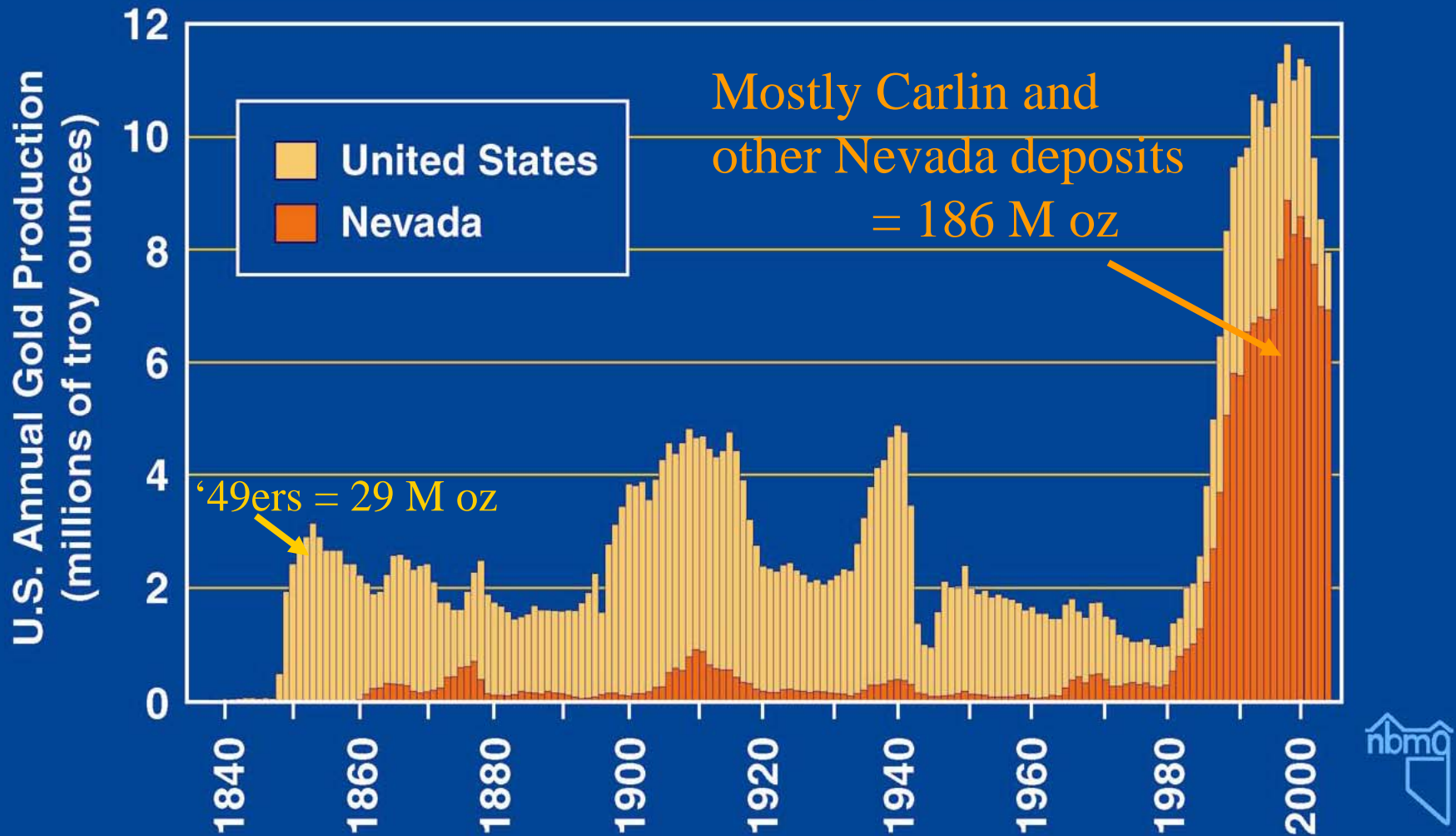


Tonopah (1900)

Goldfield (1902)

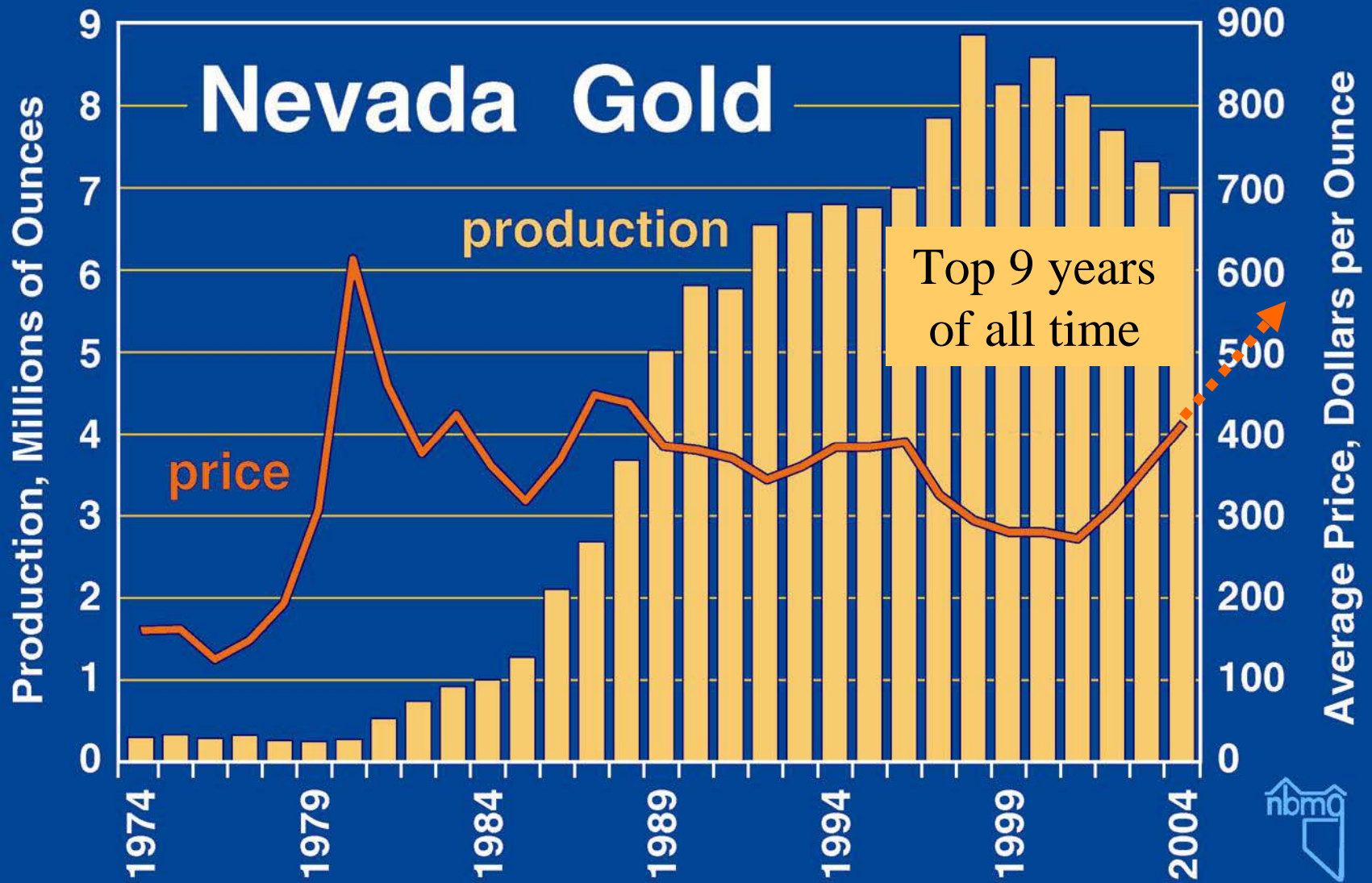
Searchlight (1897)

Gold Production, 1835–2004



We are in the midst of the biggest gold boom in American history.

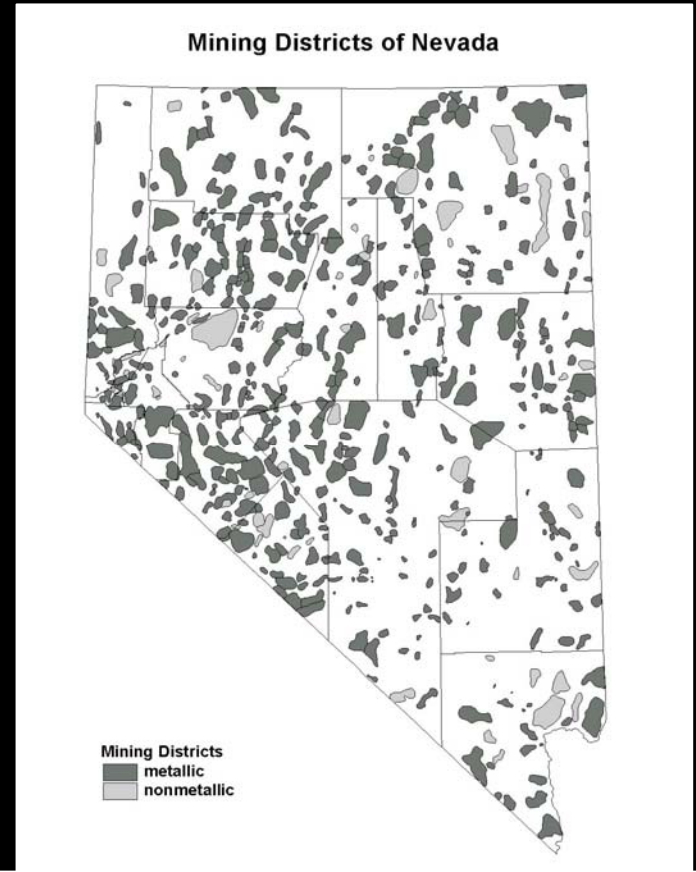
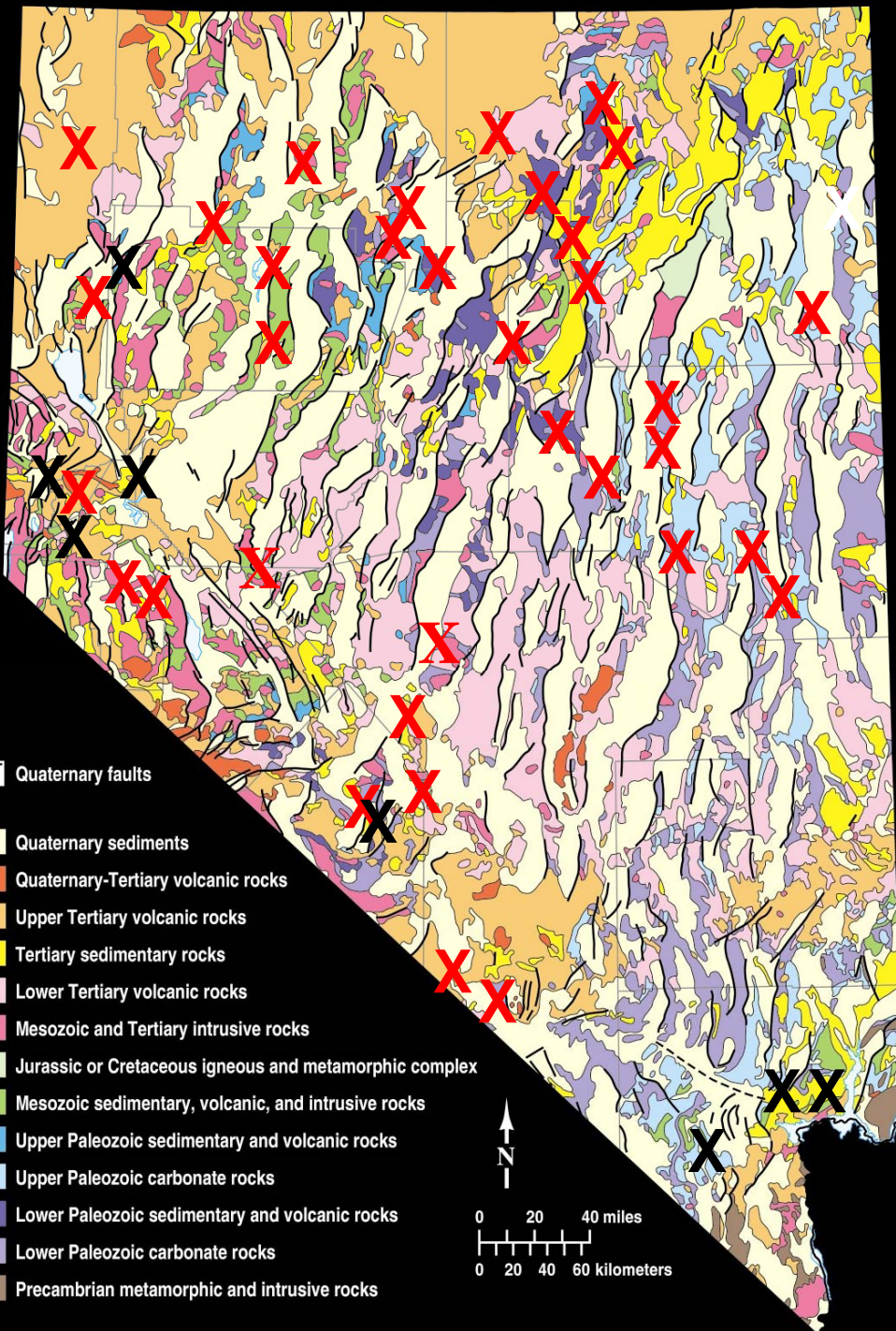
6.942 million ounces in 2004; \$410 per ounce average price



Nevada produced ~87% of U.S. and 9% of world gold in 2004.



Trends of Mineral Deposits

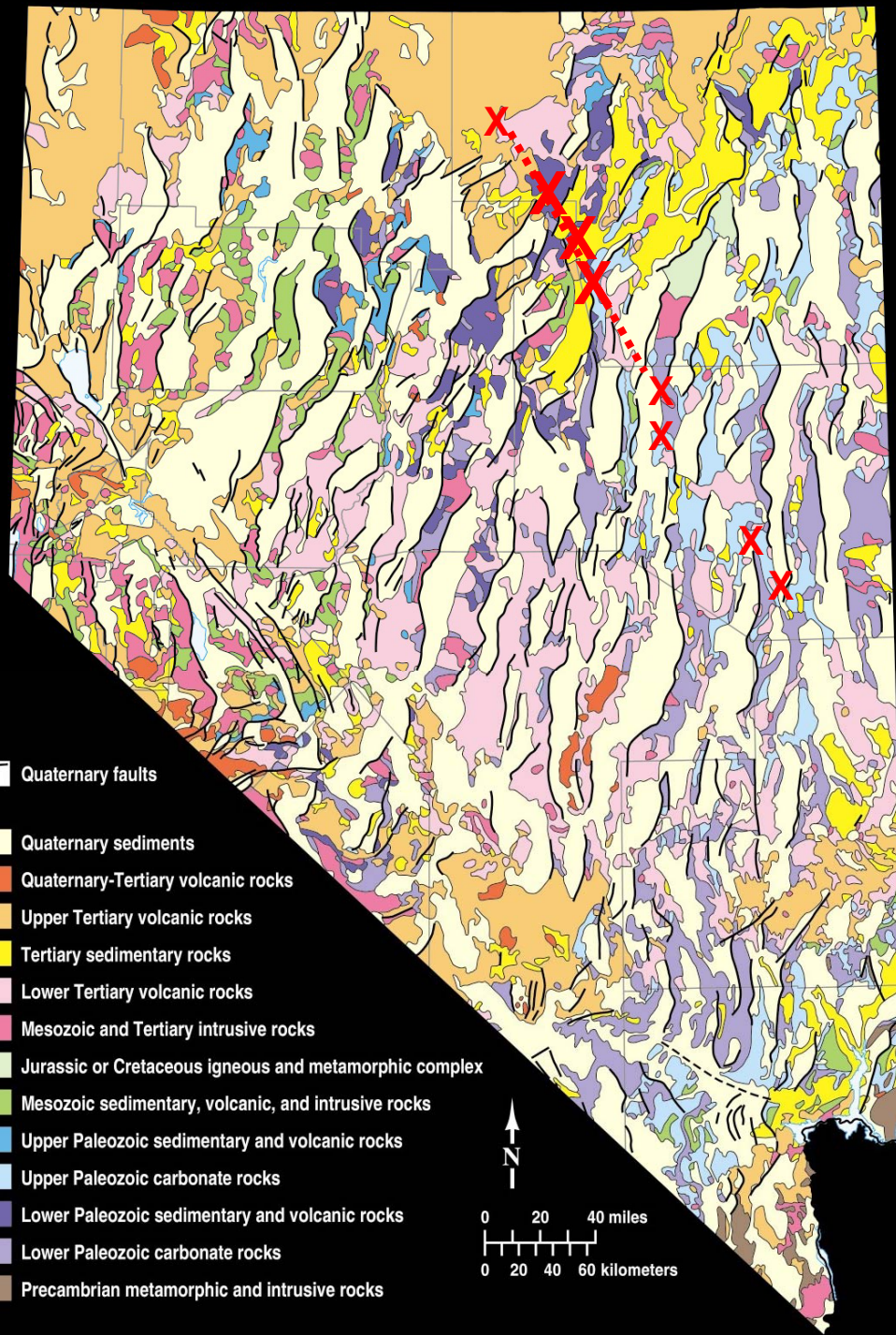


Major Active Mines

- X Metals (mostly Au, Cu, Ag)
- X Industrial minerals

Trends of Mineral Deposits

Carlin trend

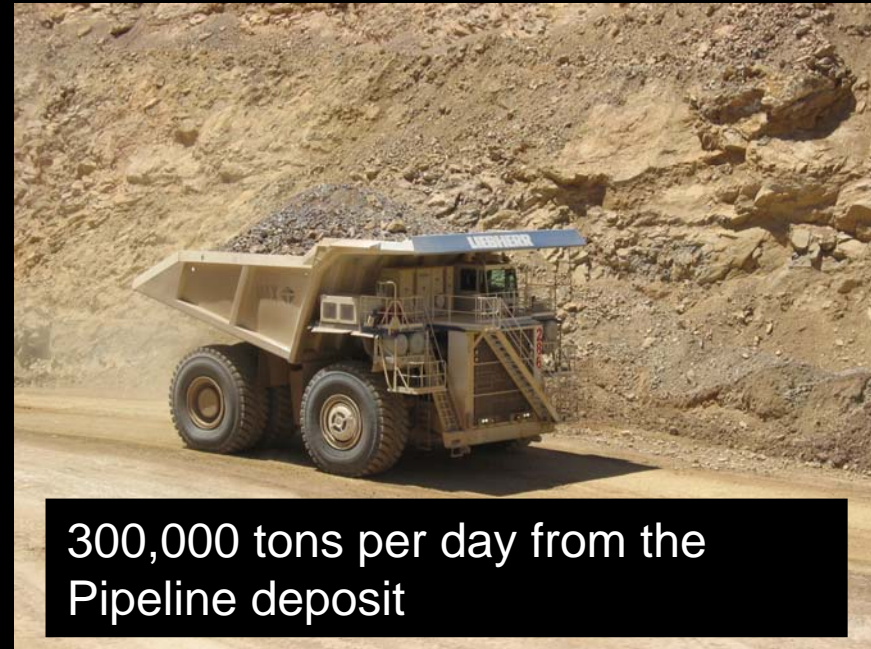
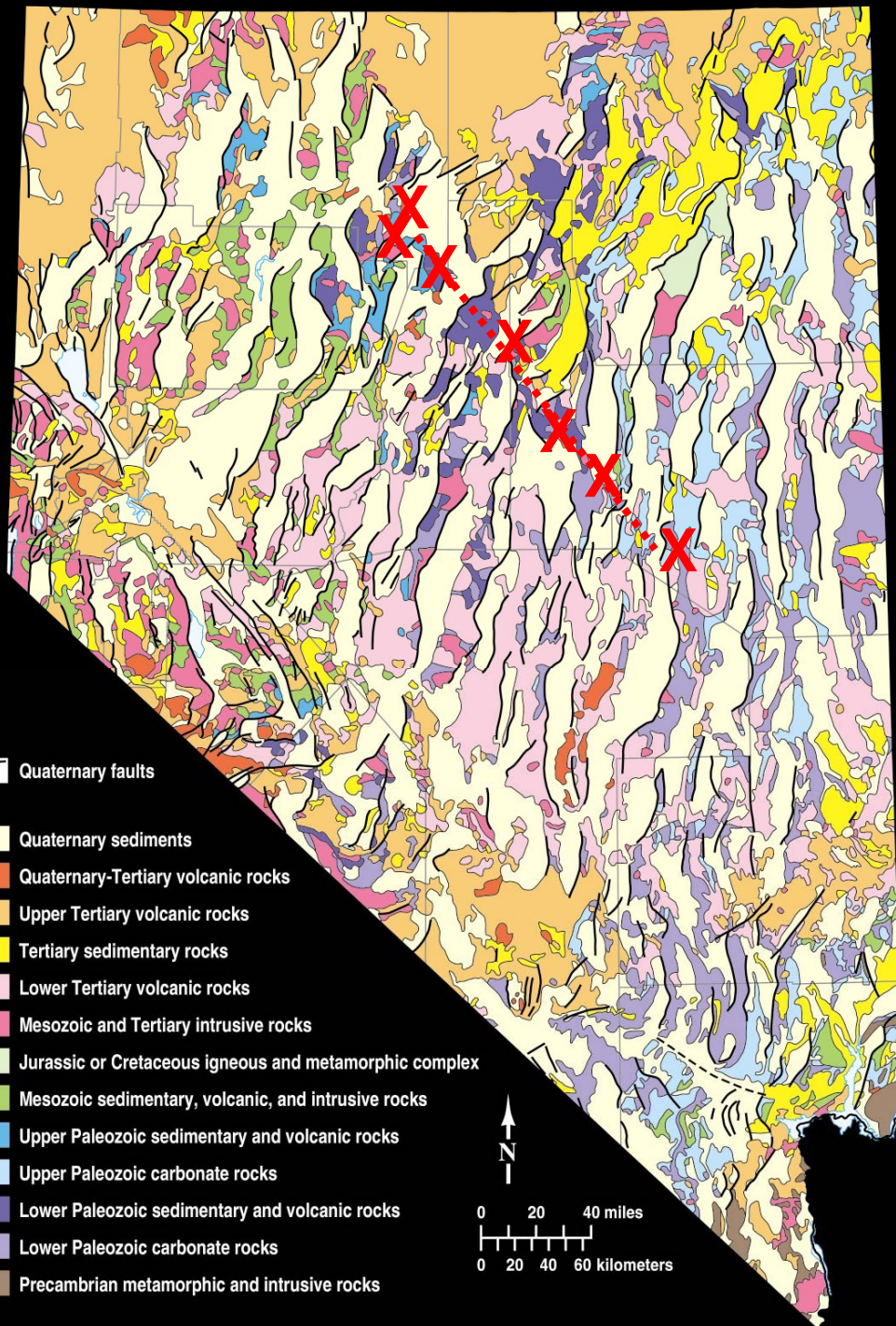


X Metals (mostly Au, Cu, Ag)

Trends of Mineral Deposits

Battle Mountain-Eureka trend

(aka Cortez trend and with Getchell and Twin Creeks included)

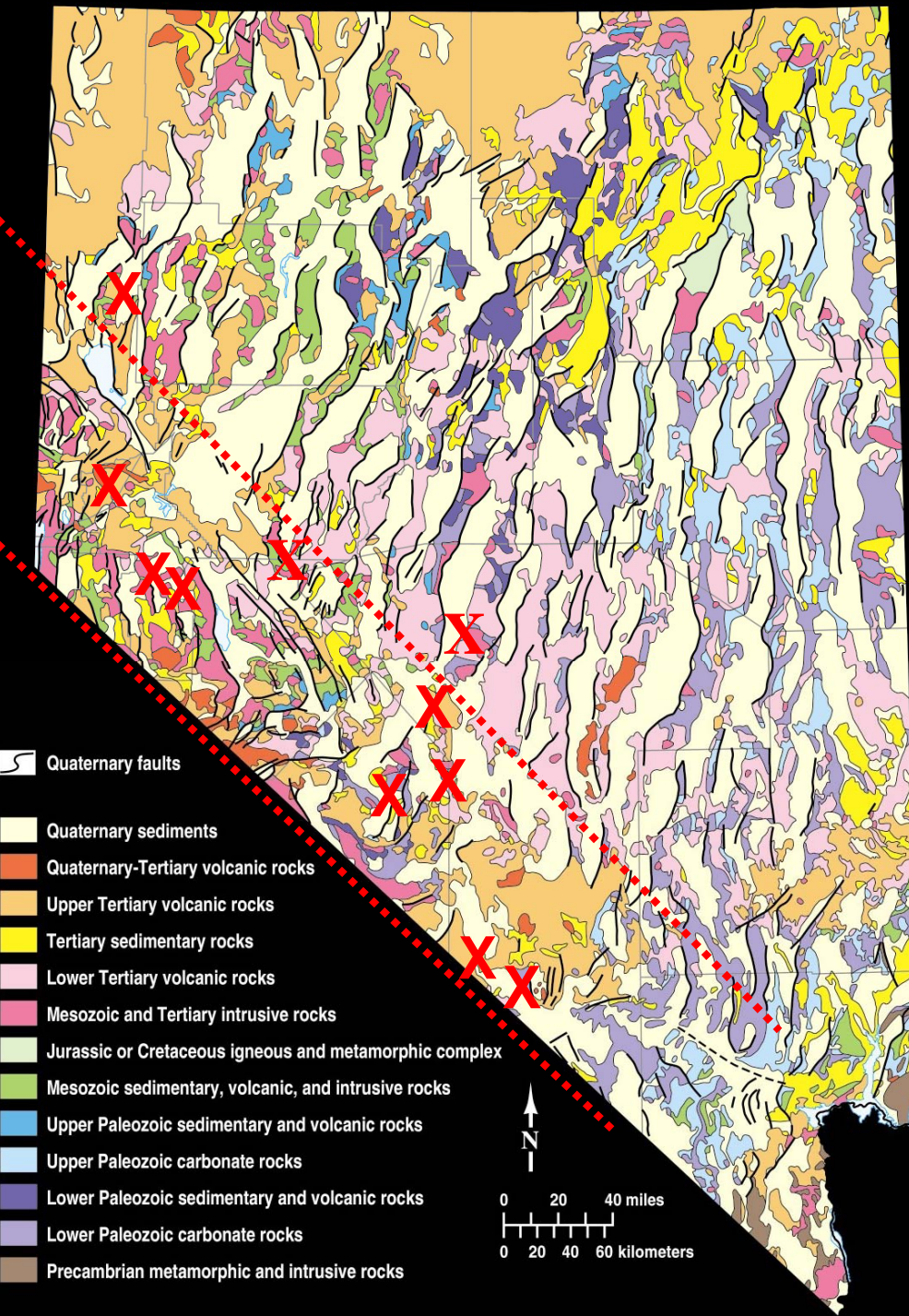


300,000 tons per day from the Pipeline deposit

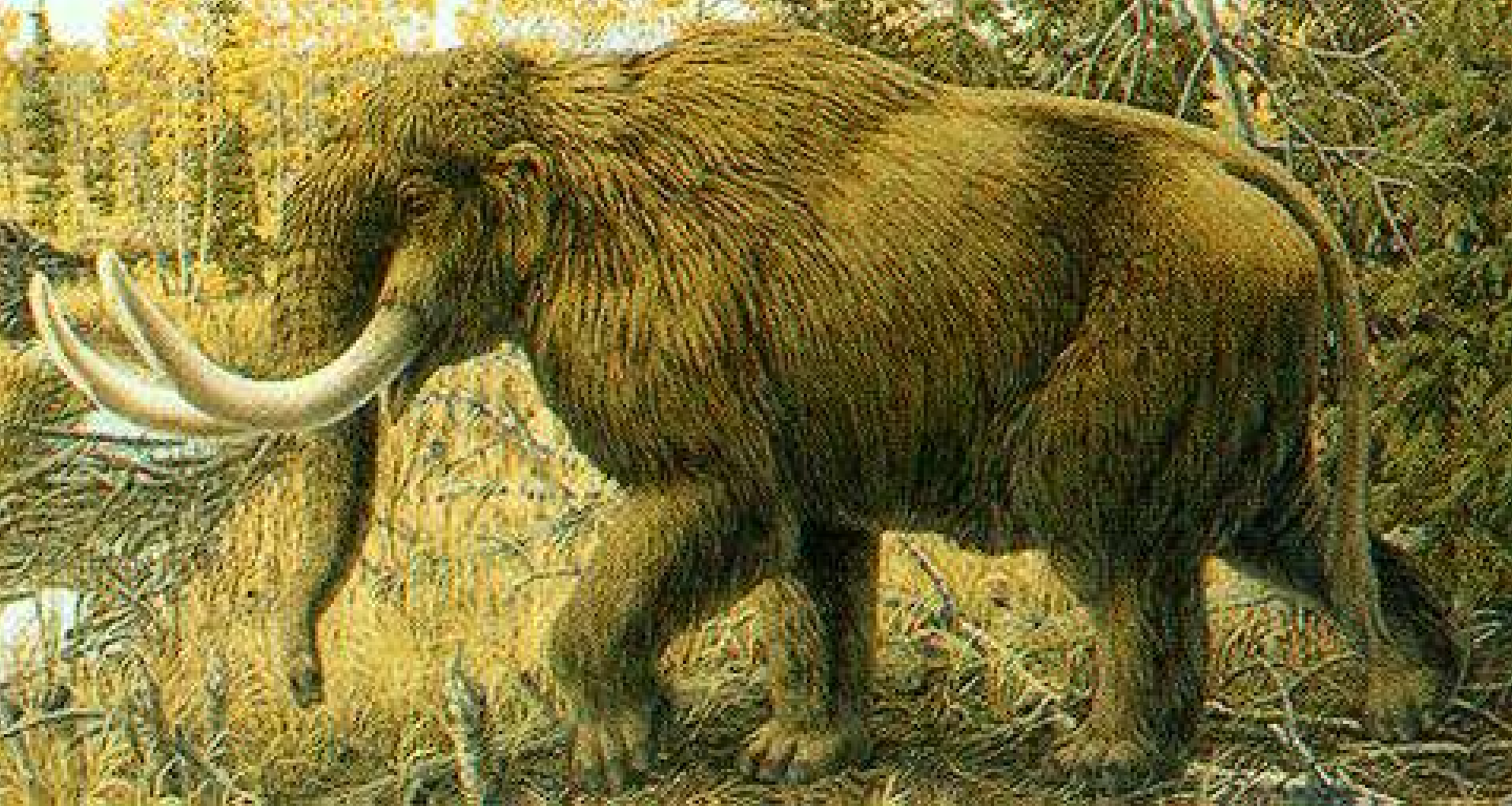
X Metals (mostly Au, Cu, Ag)

Trends of Mineral Deposits

Walker Lane



X Metals (mostly Au, Cu, Ag)



Nevada is a really great place in which to explore for and mine gold, silver, and other mineral commodities.

Gold and Silver in Nevada

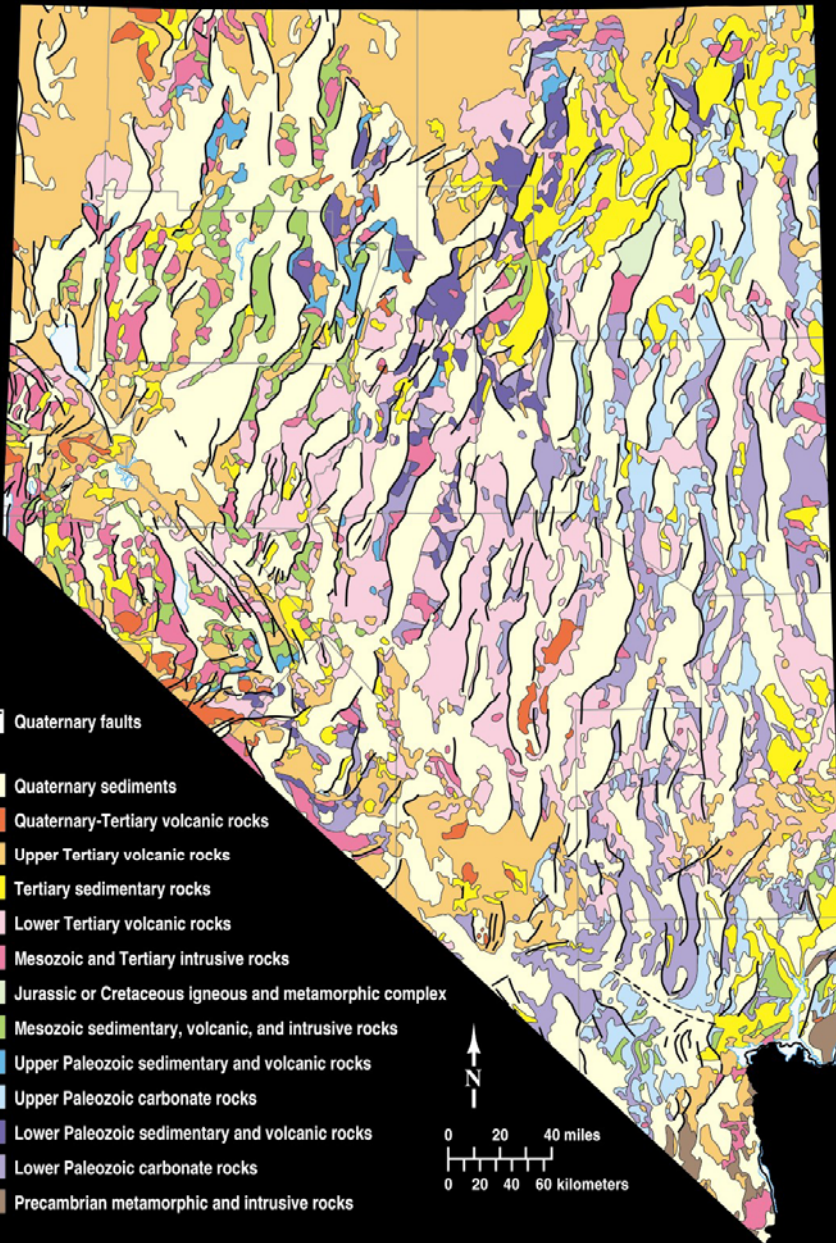
Quick Review of Nevada Geology

Precambrian events –
thrusting, folding,
metamorphism, intrusions,
sediments

Paleozoic thrusting, folding,
oceanic crust and **sediments**

Mesozoic thrusting, folding,
intrusion and volcanism

**Cenozoic volcanism and
intrusion**, compression
followed by crustal extension,
faulting, including right-
lateral strike-slip faulting



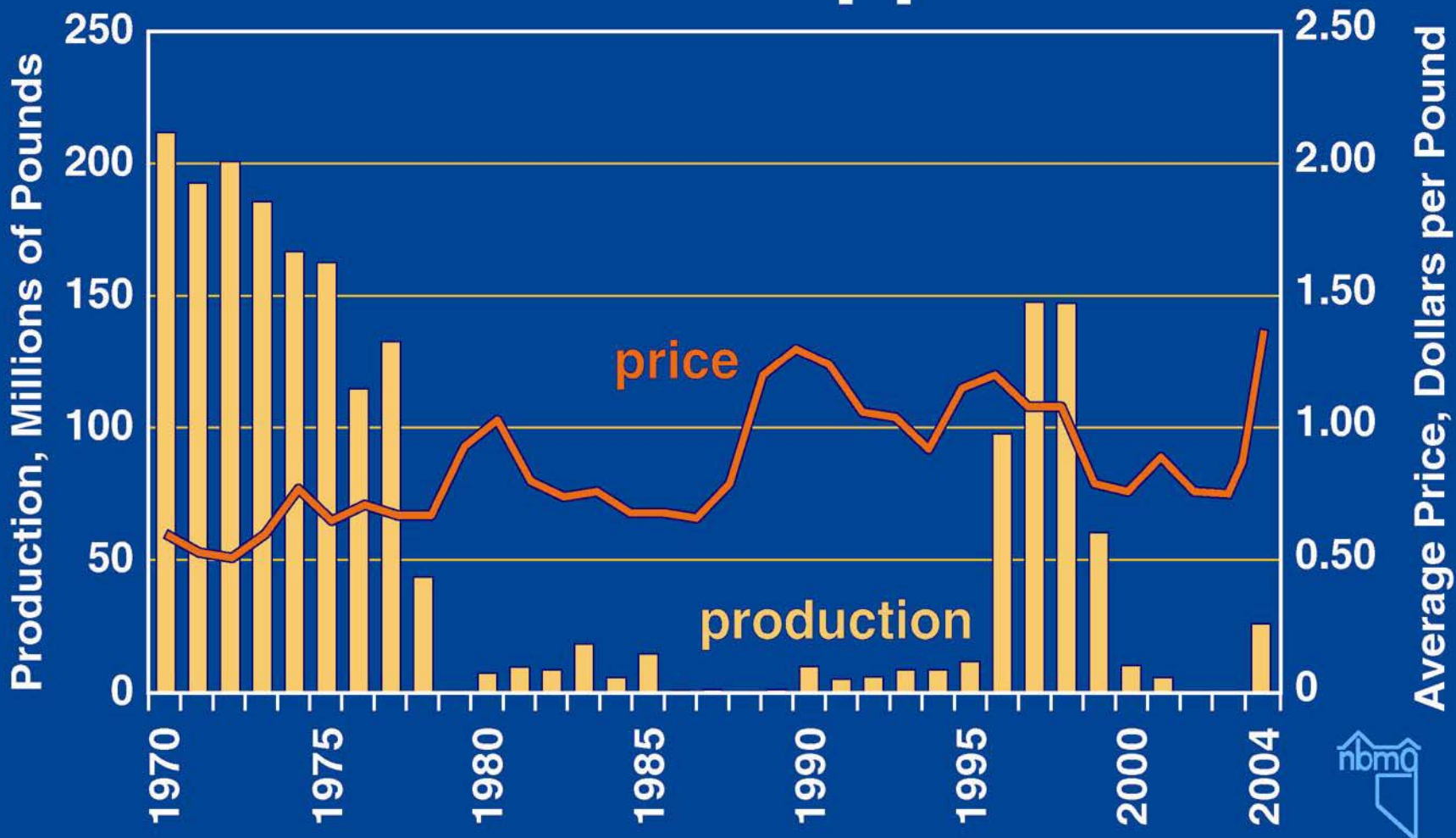
Generalized Geologic Map of Nevada



Ores on the Carlin trend: in Paleozoic sedimentary rocks, but related to Cenozoic igneous intrusions.



Nevada Copper



Copper in Nevada

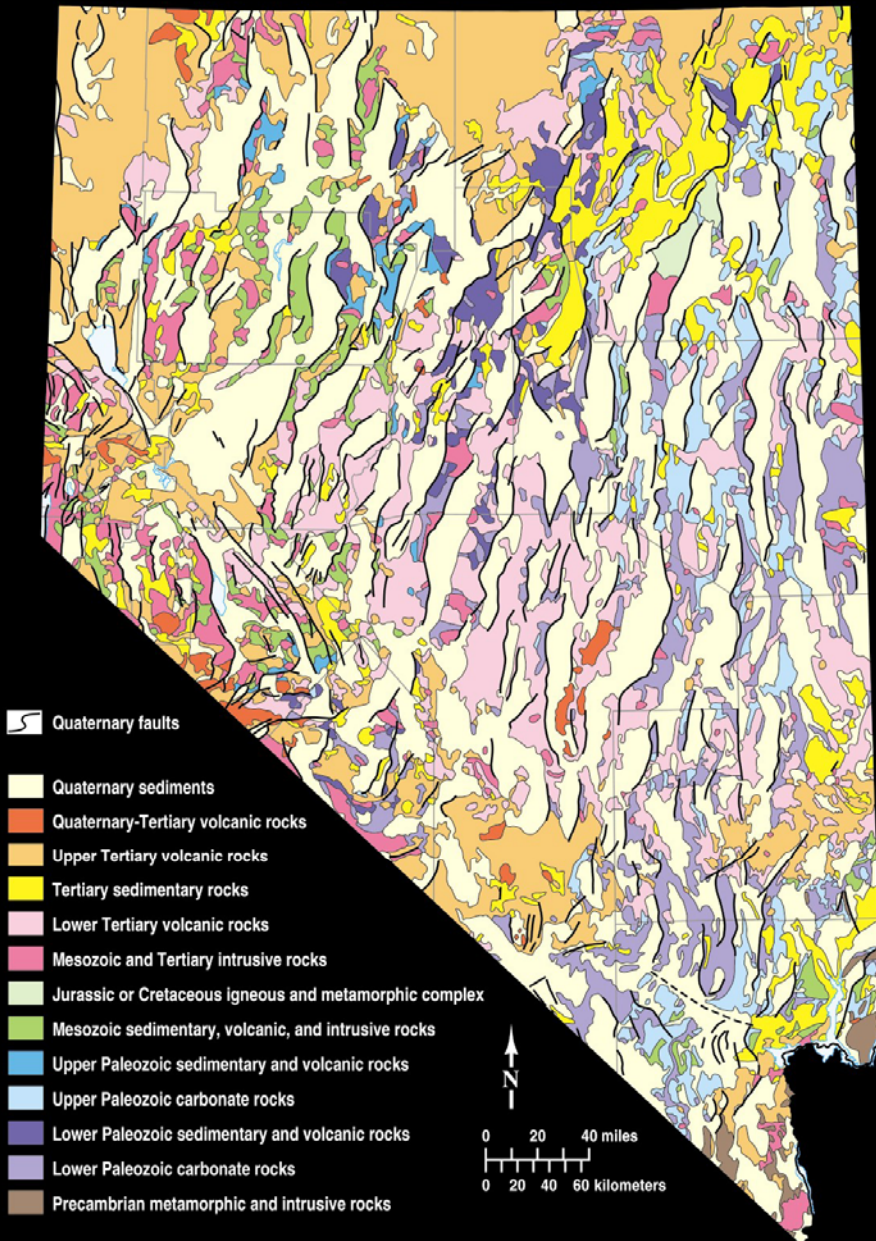
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Generalized Geologic Map of Nevada



heap

tailings pond

Mill under
construction,
May 2005

Phoenix Project

(Newmont)

6.0 million ounces of gold (reserve)

515 million pounds of copper (reserve)

Production began in 2005

400,000 to 450,000 ounces of Au/yr
and 18 to 20 million pounds of Cu/yr
(+ 2.2 million ounces of Ag/yr)

Tungsten in Nevada

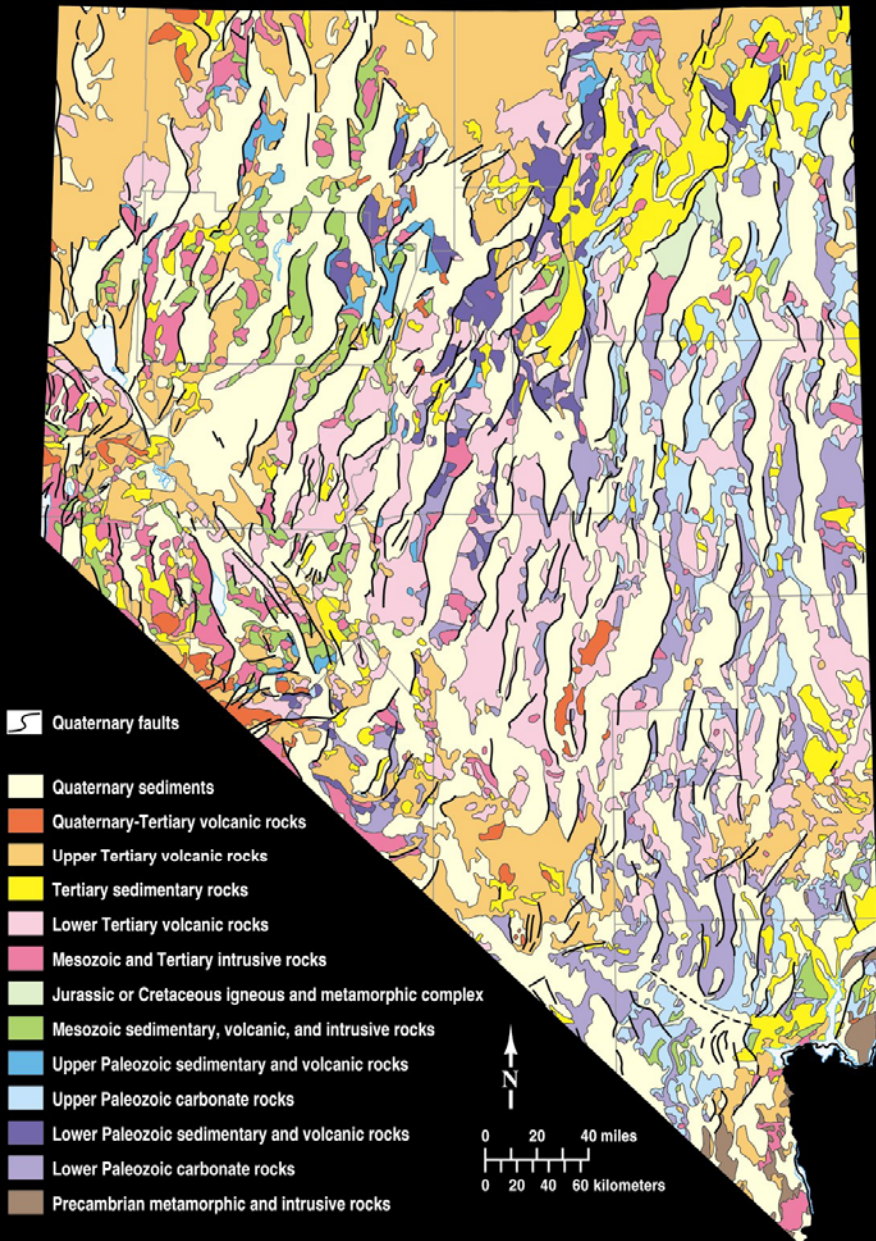
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Driven by high prices for many commodities, exploration is ongoing for other mineral resources, including Mo, W, U, Fe, Ti, Ga



**Springer tungsten mine,
Pershing County**



Magnesium in Nevada

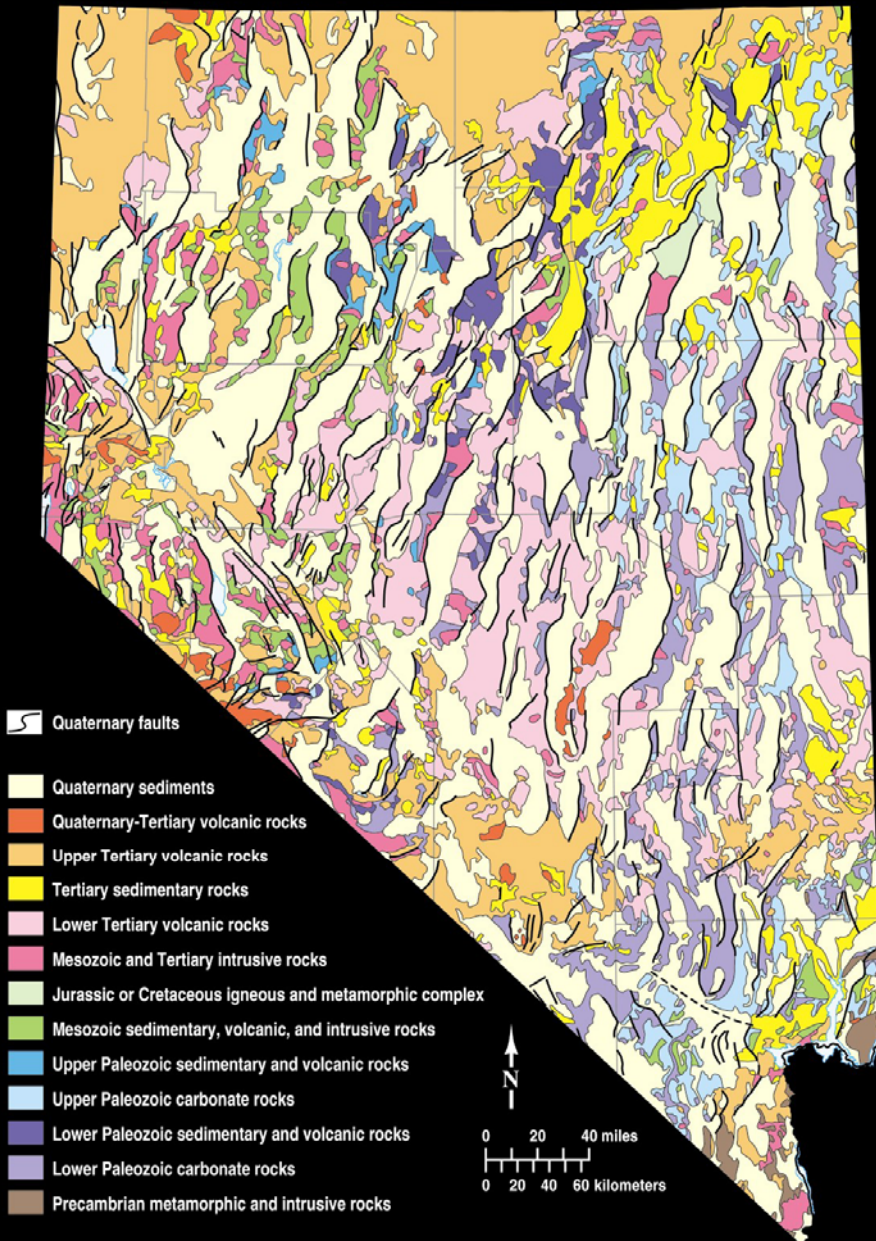
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Generalized Geologic Map of Nevada



Magnesite ore in
contact-
metamorphosed
sedimentary rocks
along contact with
Mesozoic
intrusion,
Gabbs, Nevada

Industrial Minerals in Nevada?

Industrial Minerals?

Aggregate (sand and gravel, crushed rock)

Cement raw materials (limestone, clay, iron, gypsum)

Gypsum (sheet rock, wallboard)

Barite (mostly for drilling gas and oil)

Silica sand (mostly for glass bottles)

Lithium

Obsidian/Chert/Flint

Clays

Diatomite

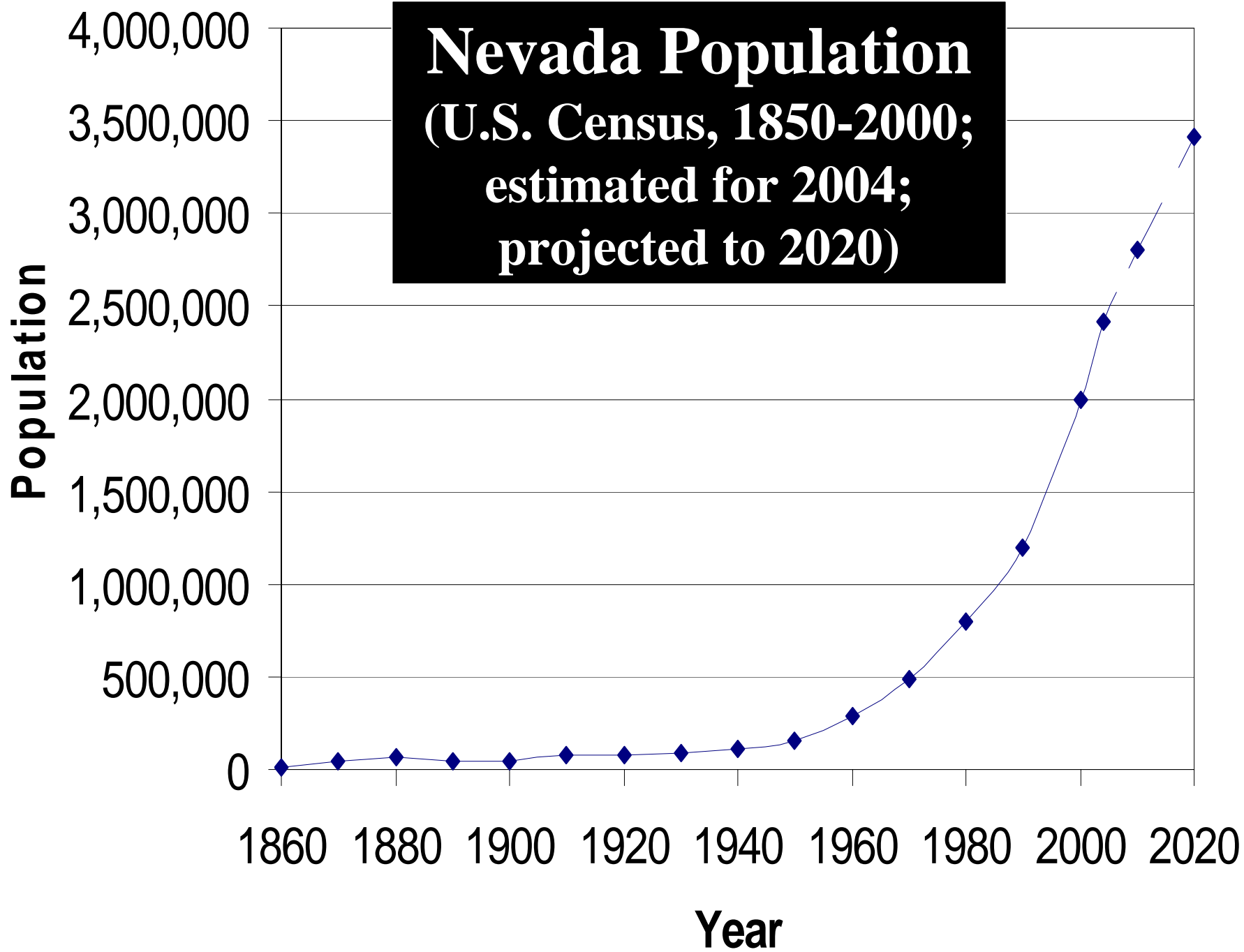
Fluorspar

Obsidian and opal
arrowheads and flakes

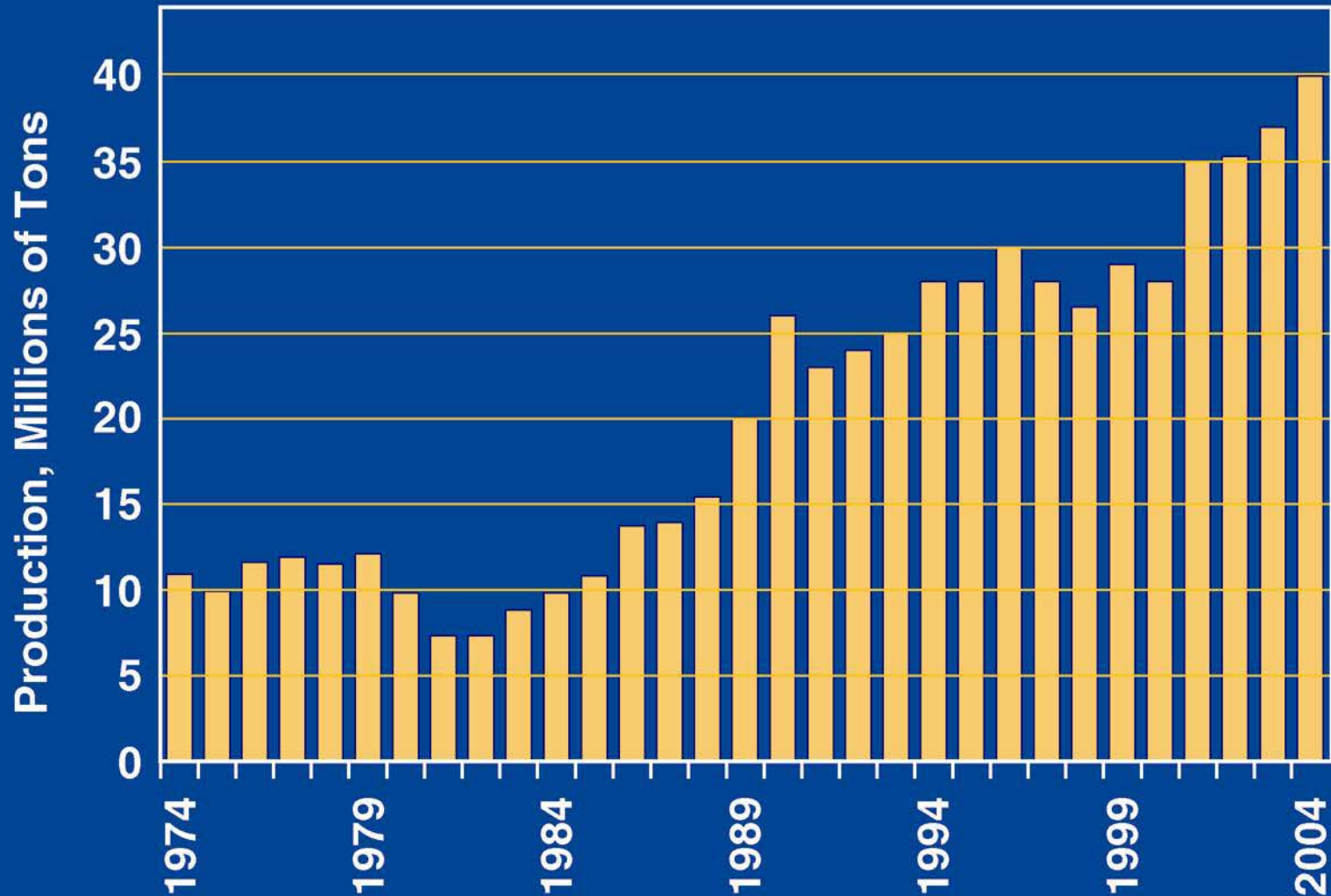


The background is a dark brown wooden surface with a vertical grain. Scattered across the surface are several pieces of material. At the top and middle, there are four irregular, dark, almost black pieces that appear to be charred or burnt, with some reflective highlights. At the bottom, there are two irregular, light-colored pieces, possibly white or cream, that look like they might be made of a different material or are the reverse side of the dark pieces.

**We don't know where all the resources are, and
we don't really know what will
become resources in the future.**



Nevada Aggregate



Aggregate in Nevada

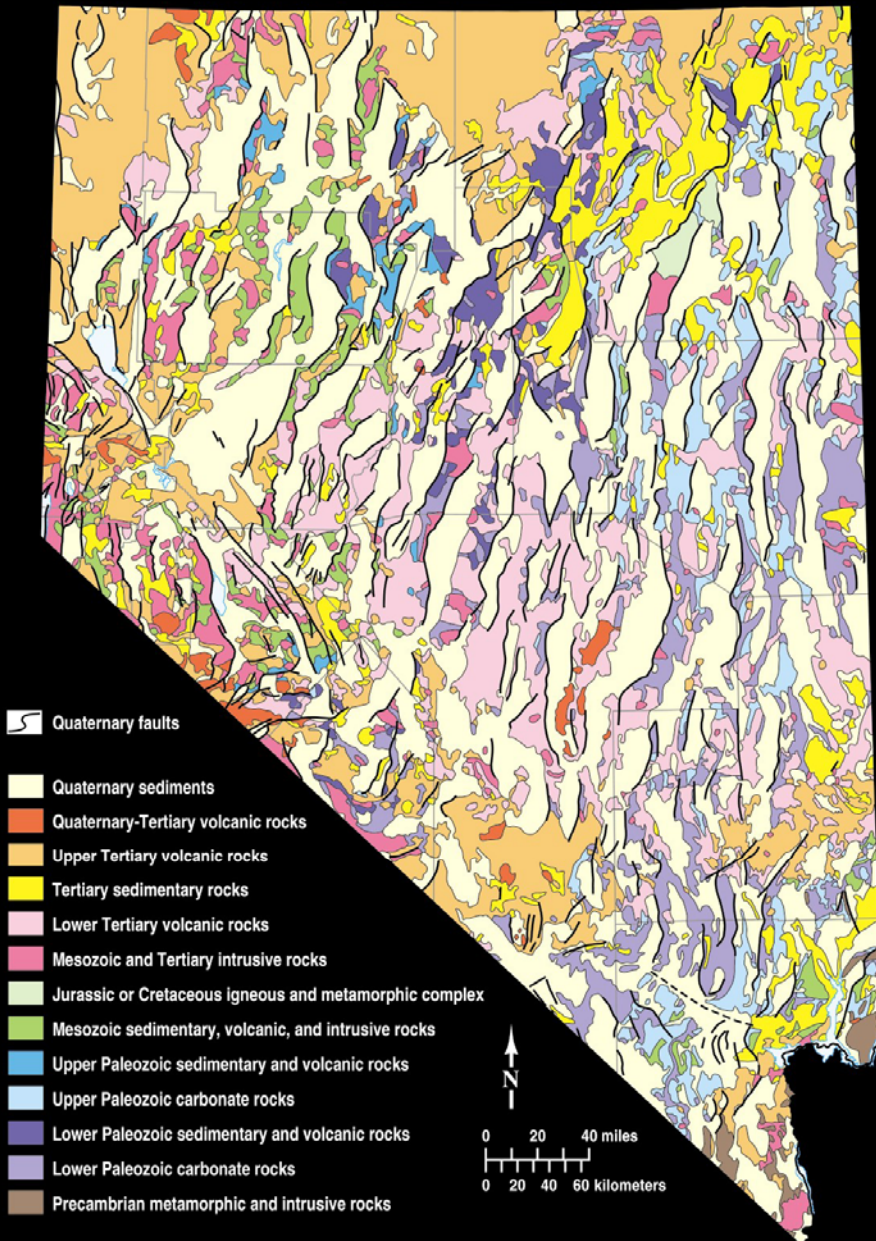
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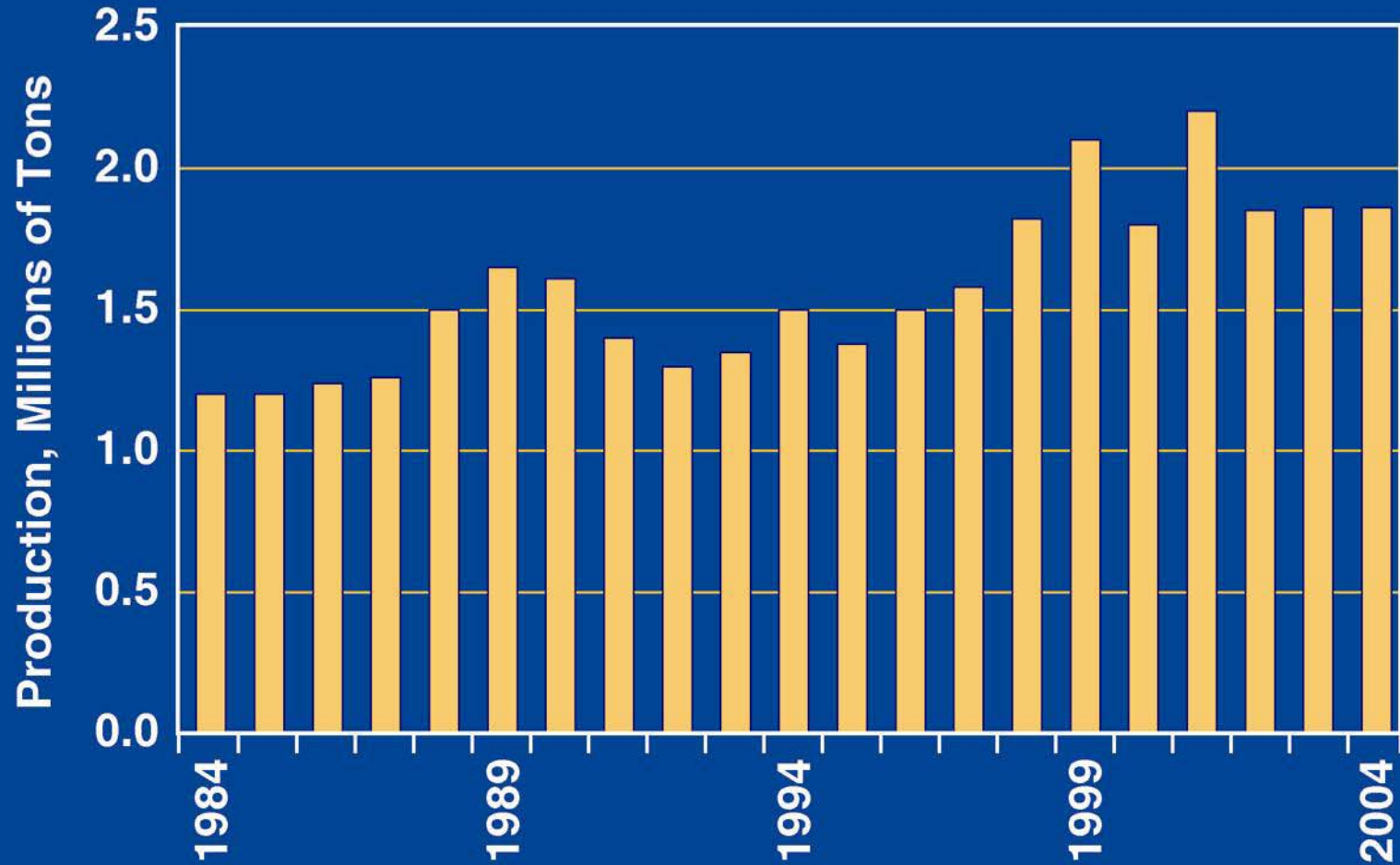
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Generalized Geologic Map of Nevada

Nevada Gypsum





Selenite pit, Empire mine, Pershing County

Gypsum in Nevada

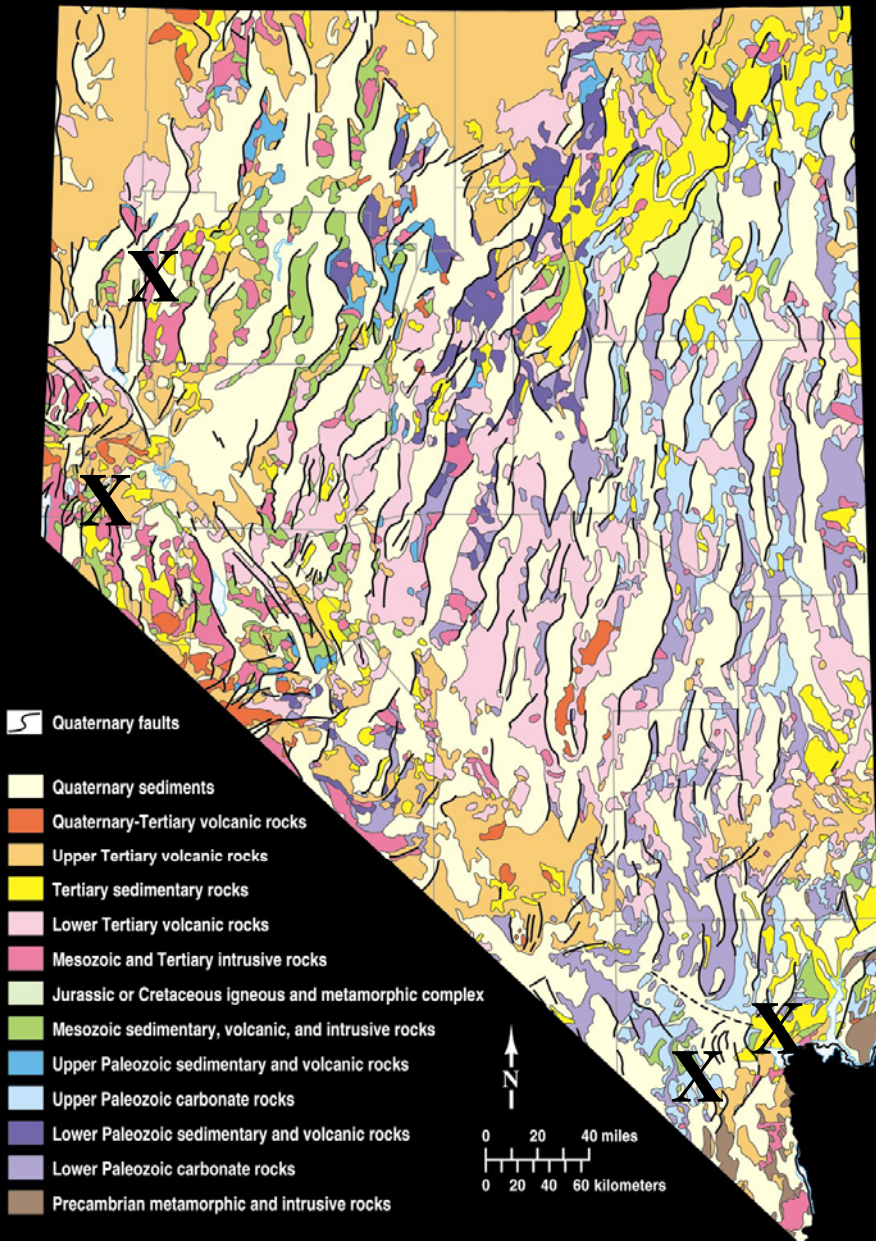
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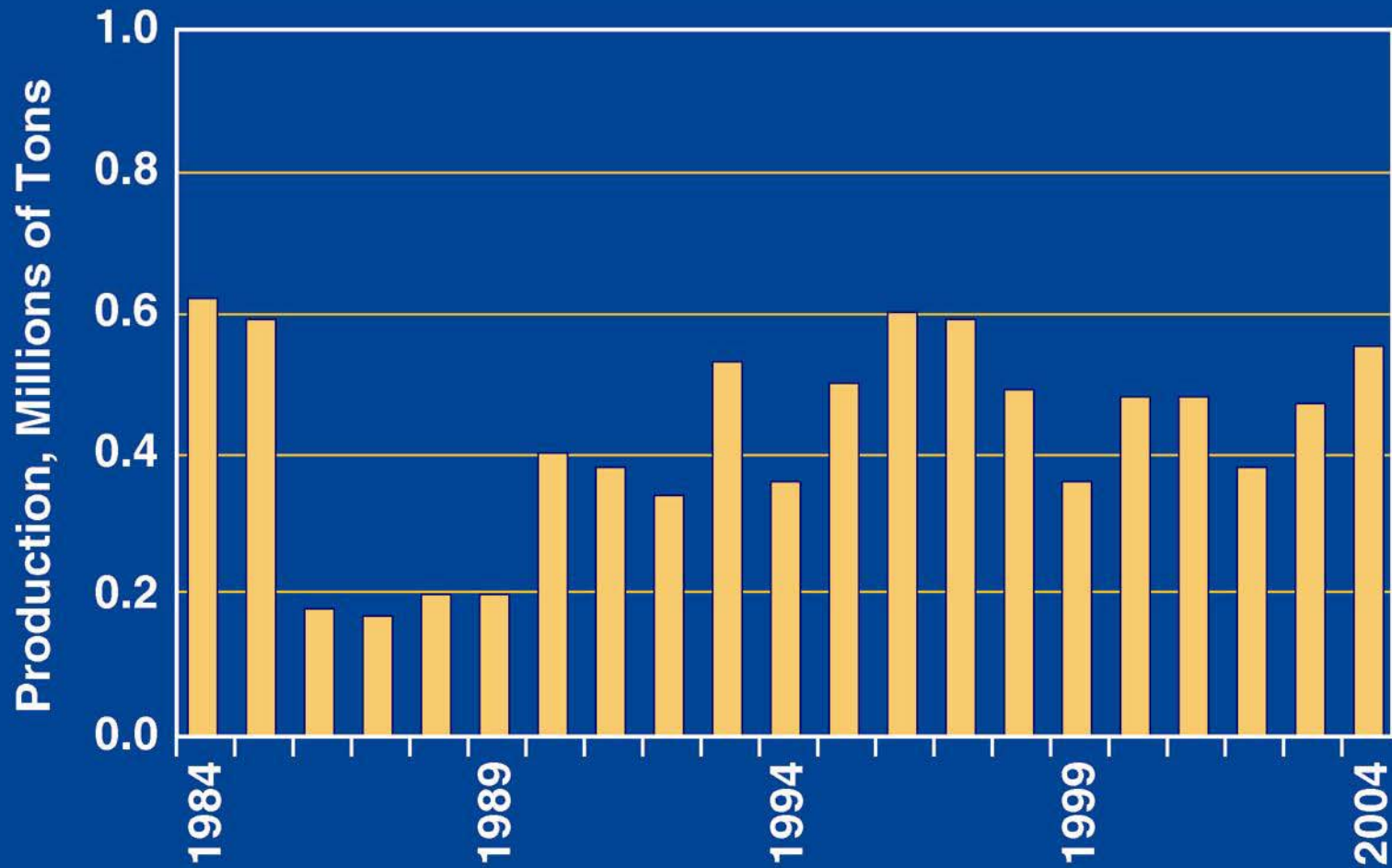
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Nevada Barite



Barite in Nevada

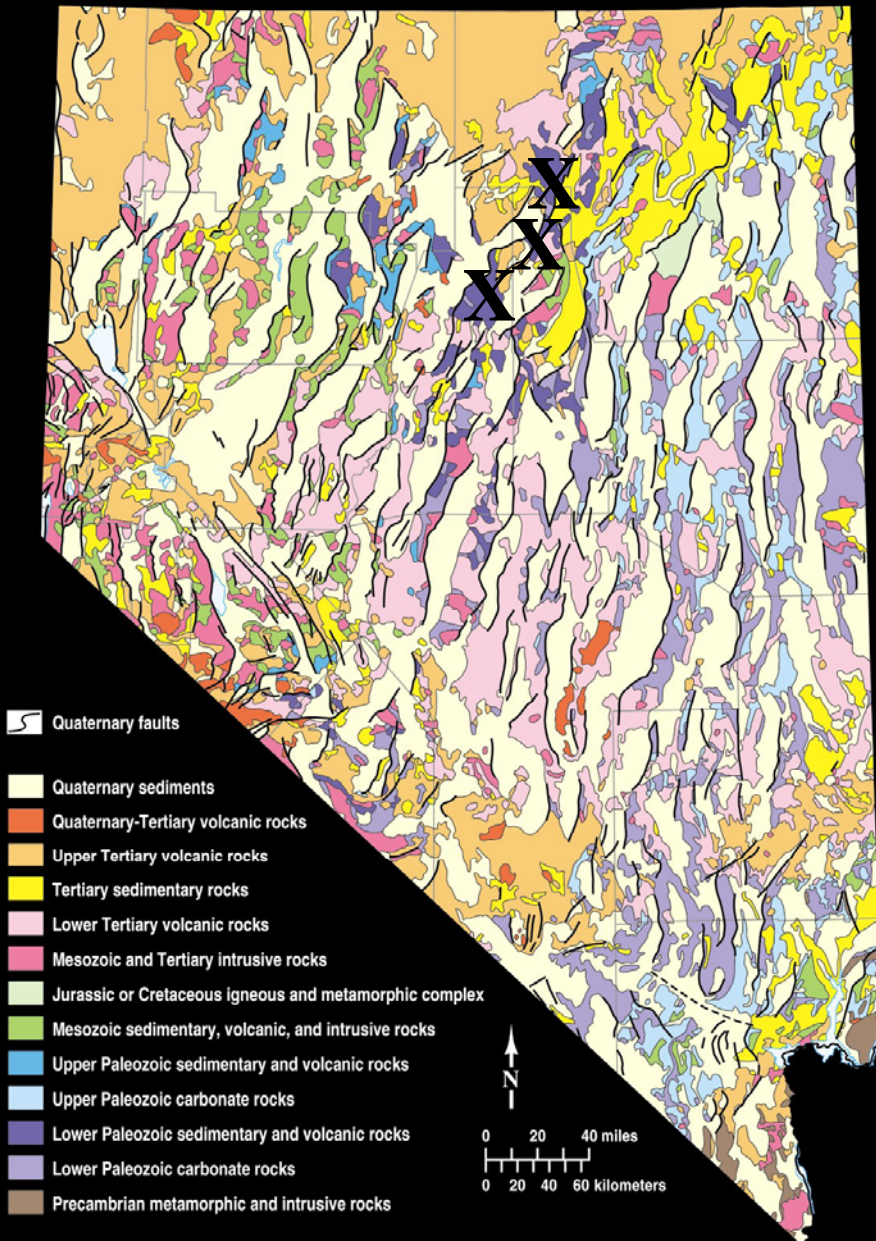
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Diatomite in Nevada

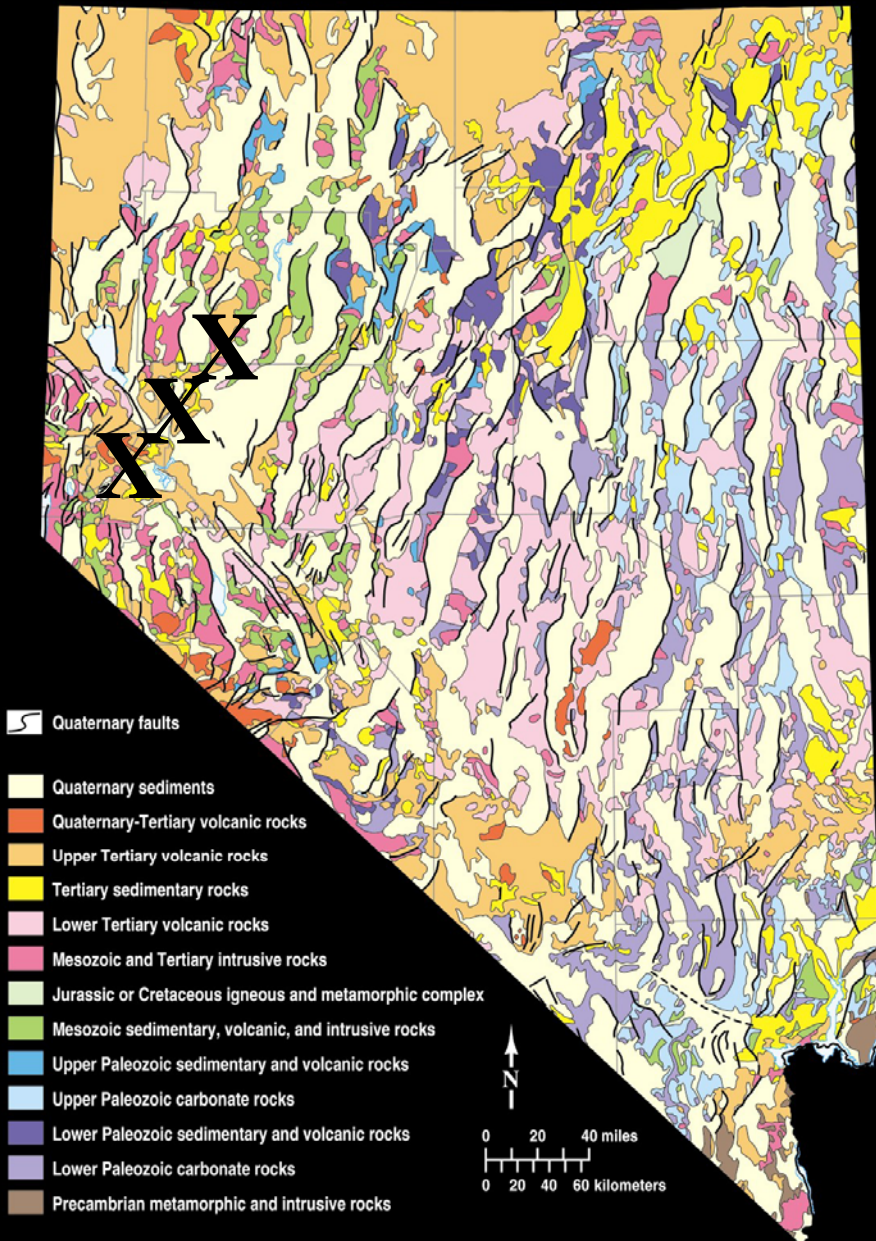
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Lithium brine pool, with cinder cone in background, Clayton Valley



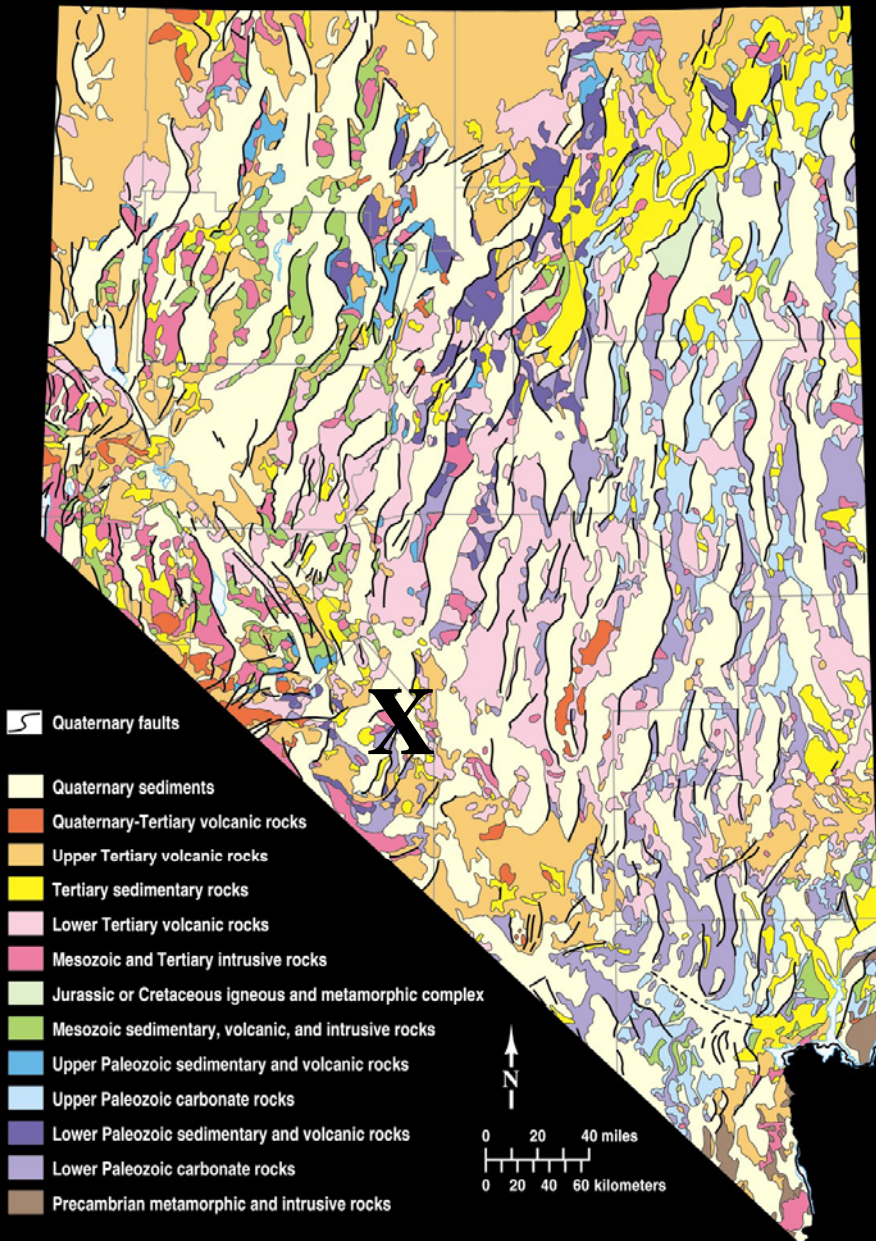
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Energy Resources in Nevada?

From what source does Nevada (and the USA) get most of its electricity?

Energy Resources?

Geothermal Energy

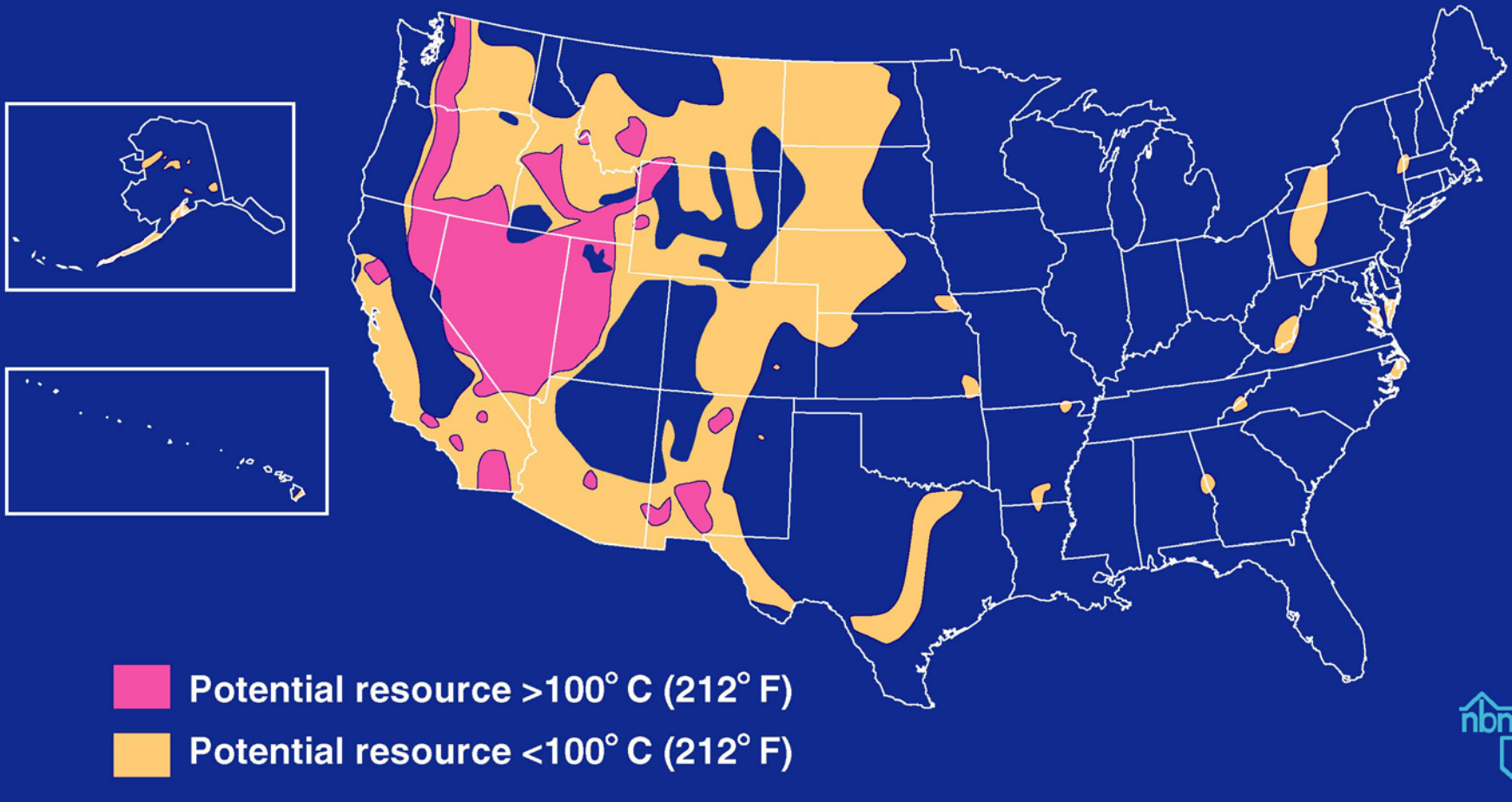
Oil (but little gas – wrong geology)

Uranium (not much that is economic today)

Coal – hardly any (wrong geology)

Solar, Water (hydropower), Wind

Known and Potential Geothermal Resources



Compiled by the Energy and Geoscience Institute, University of Utah

Geothermal in Nevada

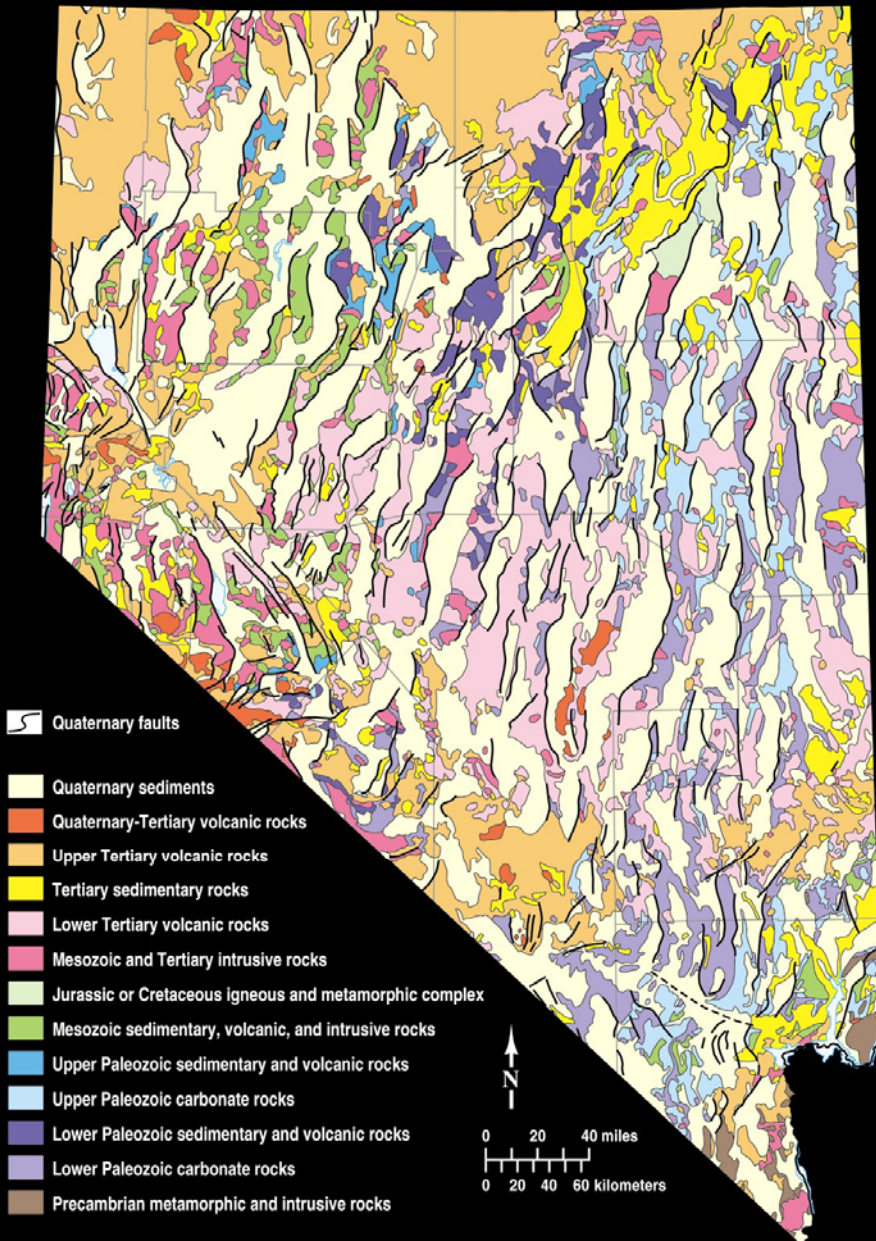
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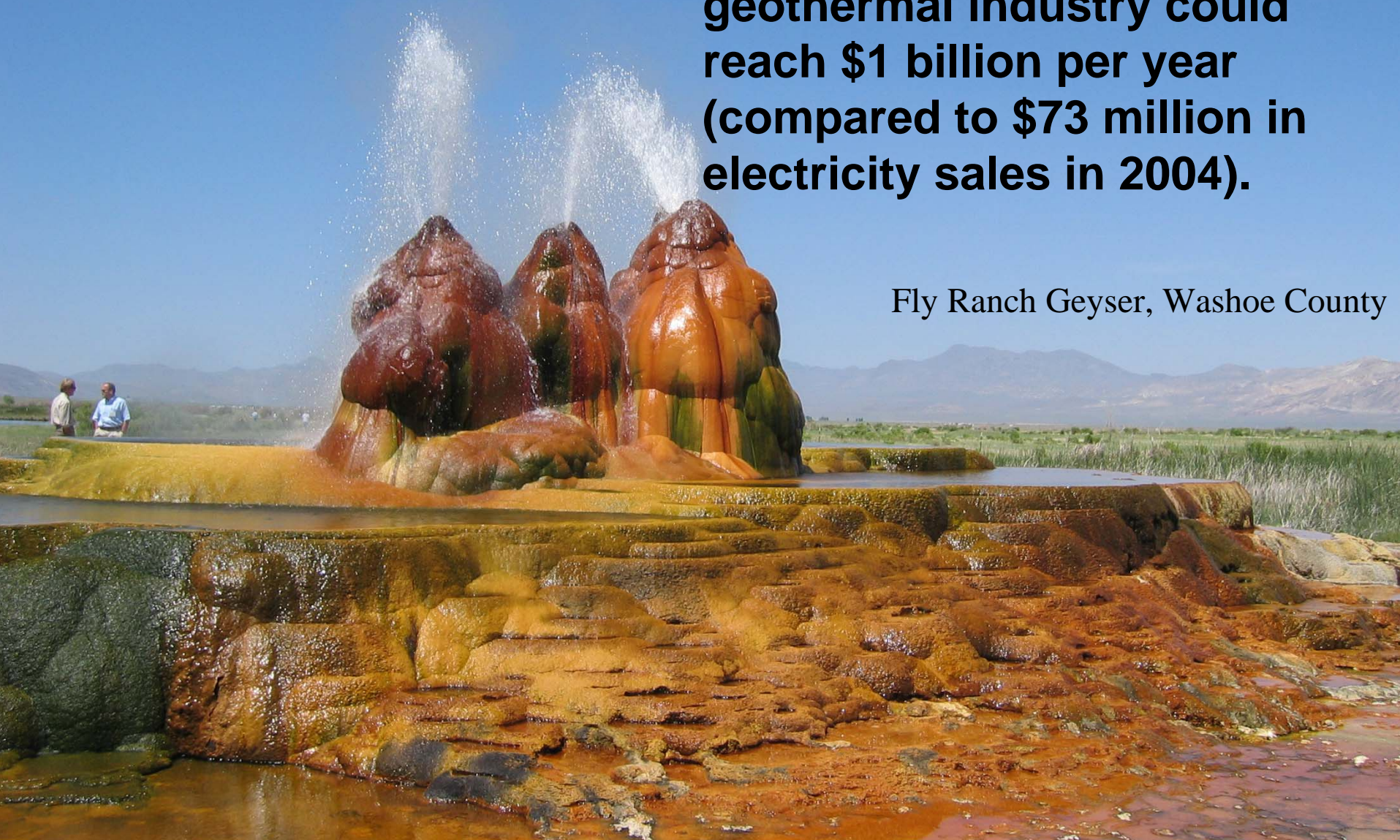
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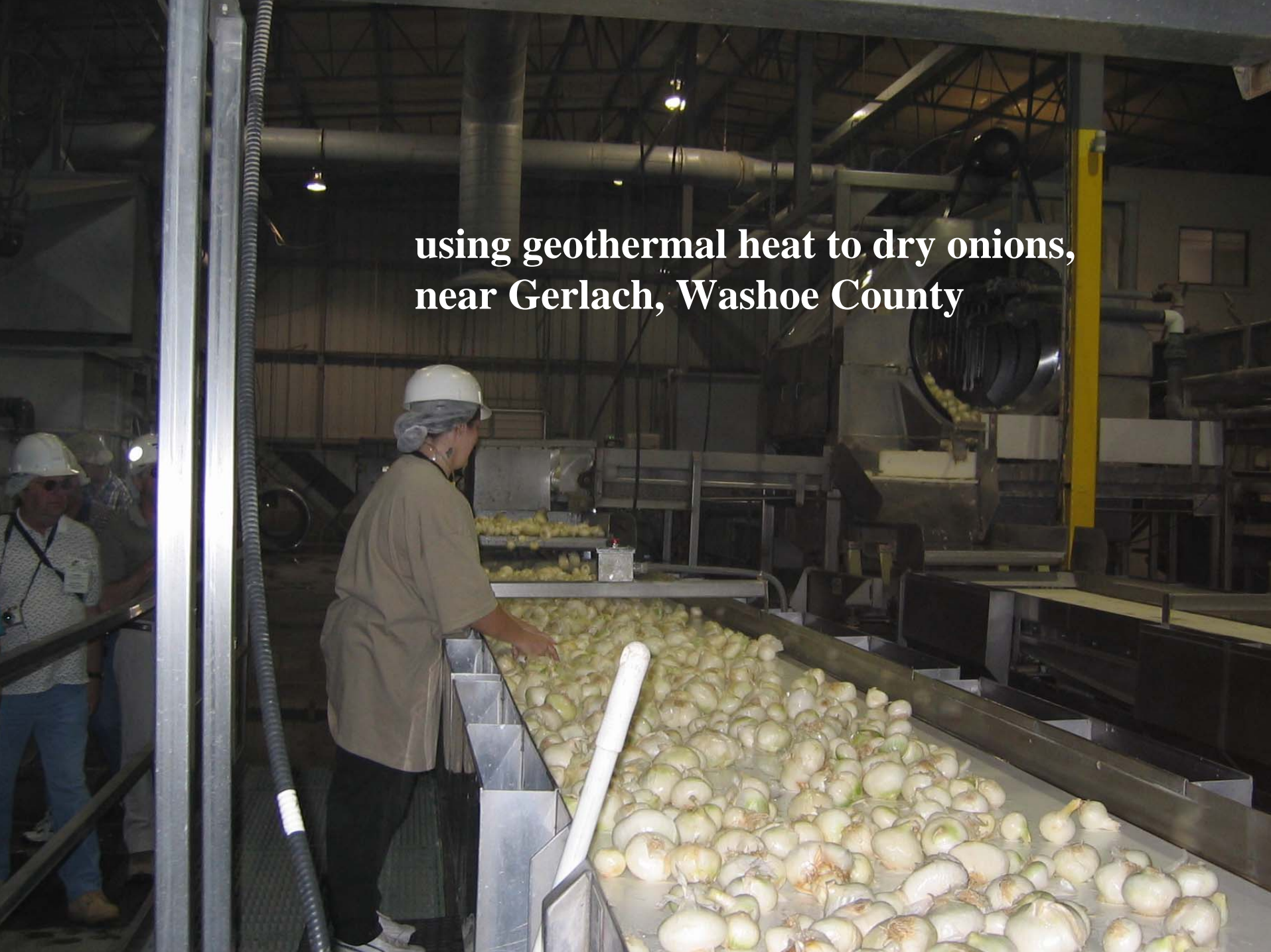
Generalized Geologic Map of Nevada

Given the resource potential and likely rise in energy prices in coming decades, Nevada's geothermal industry could reach \$1 billion per year (compared to \$73 million in electricity sales in 2004).

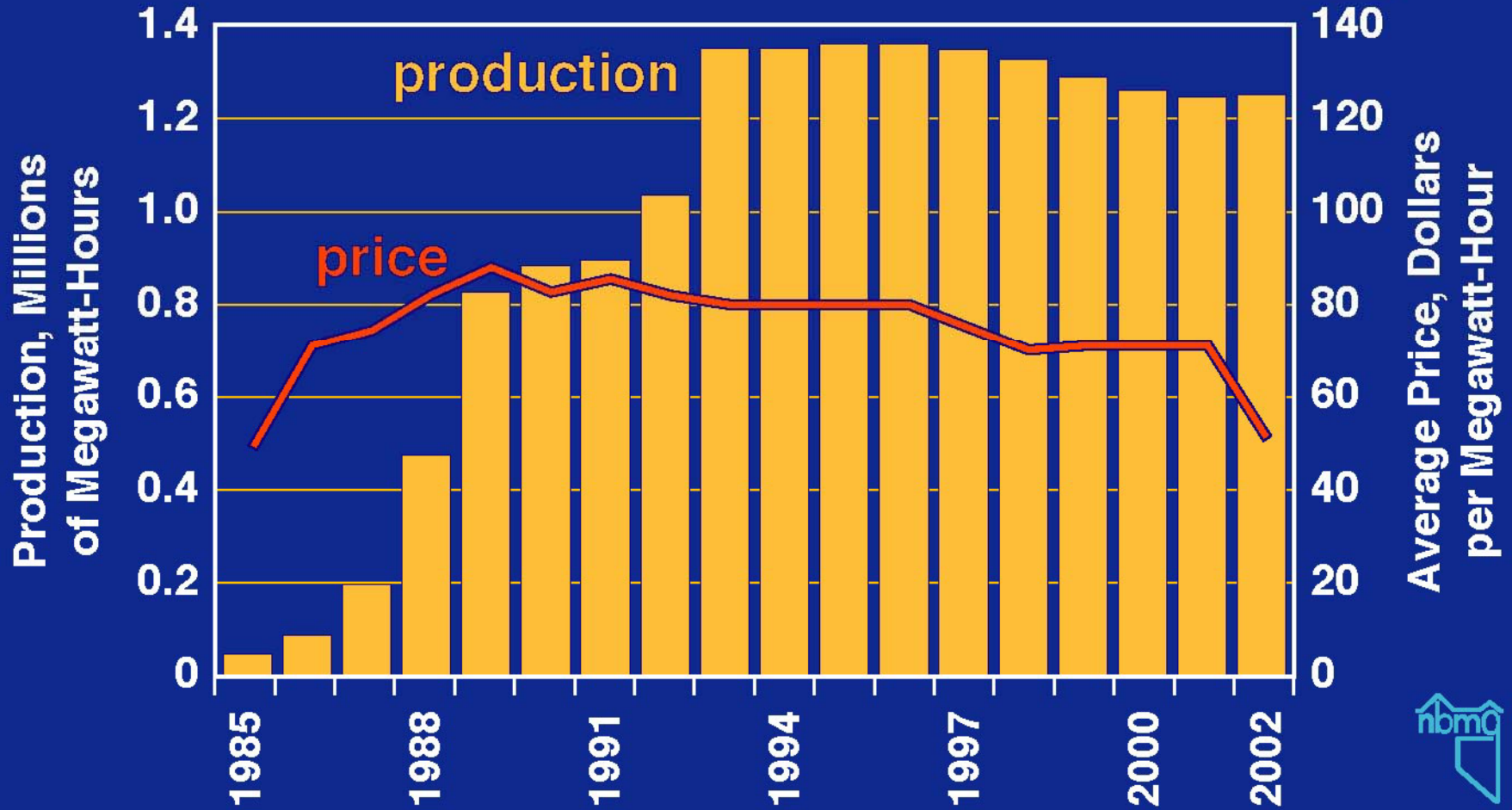
Fly Ranch Geyser, Washoe County



**using geothermal heat to dry onions,
near Gerlach, Washoe County**

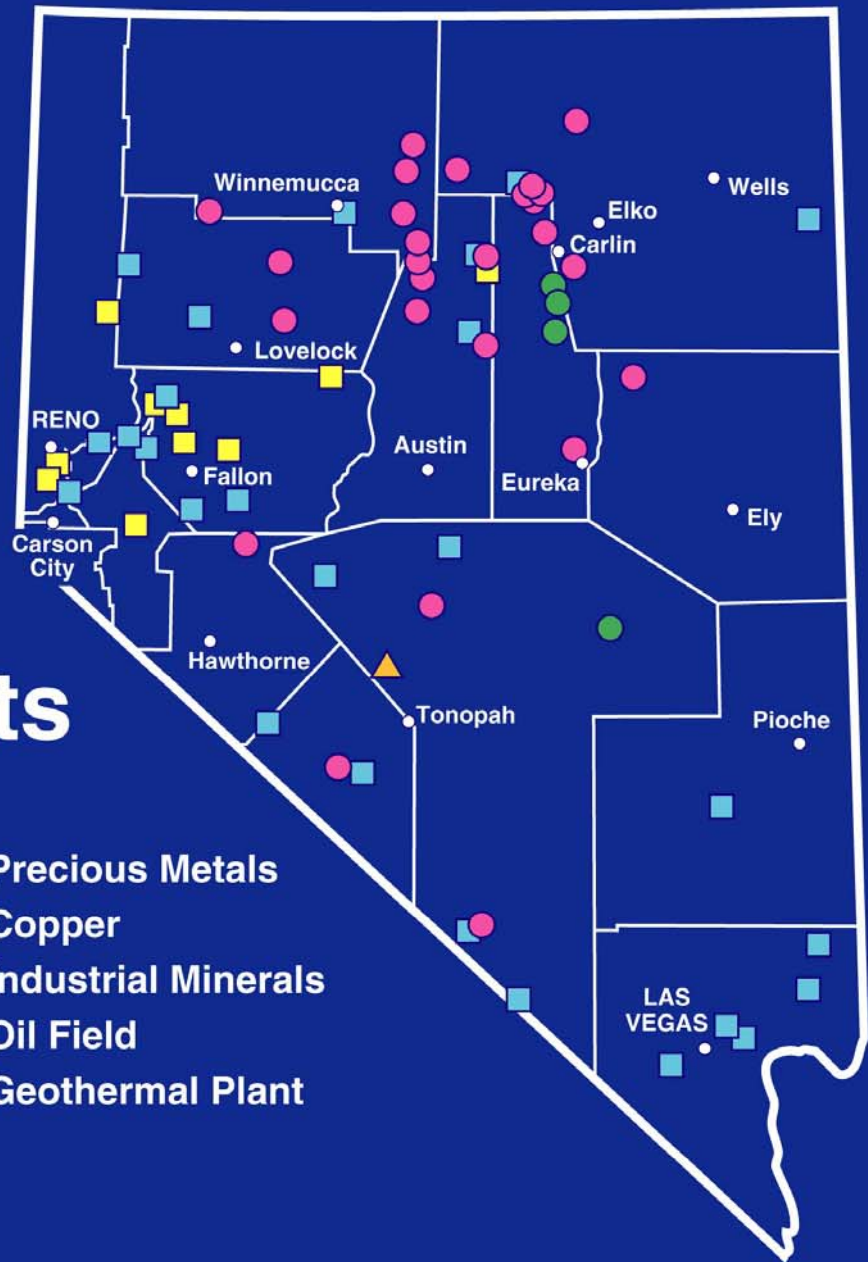


Nevada Geothermal Energy





Major Mines, Oil Fields, and Geothermal Plants



Oil in Nevada

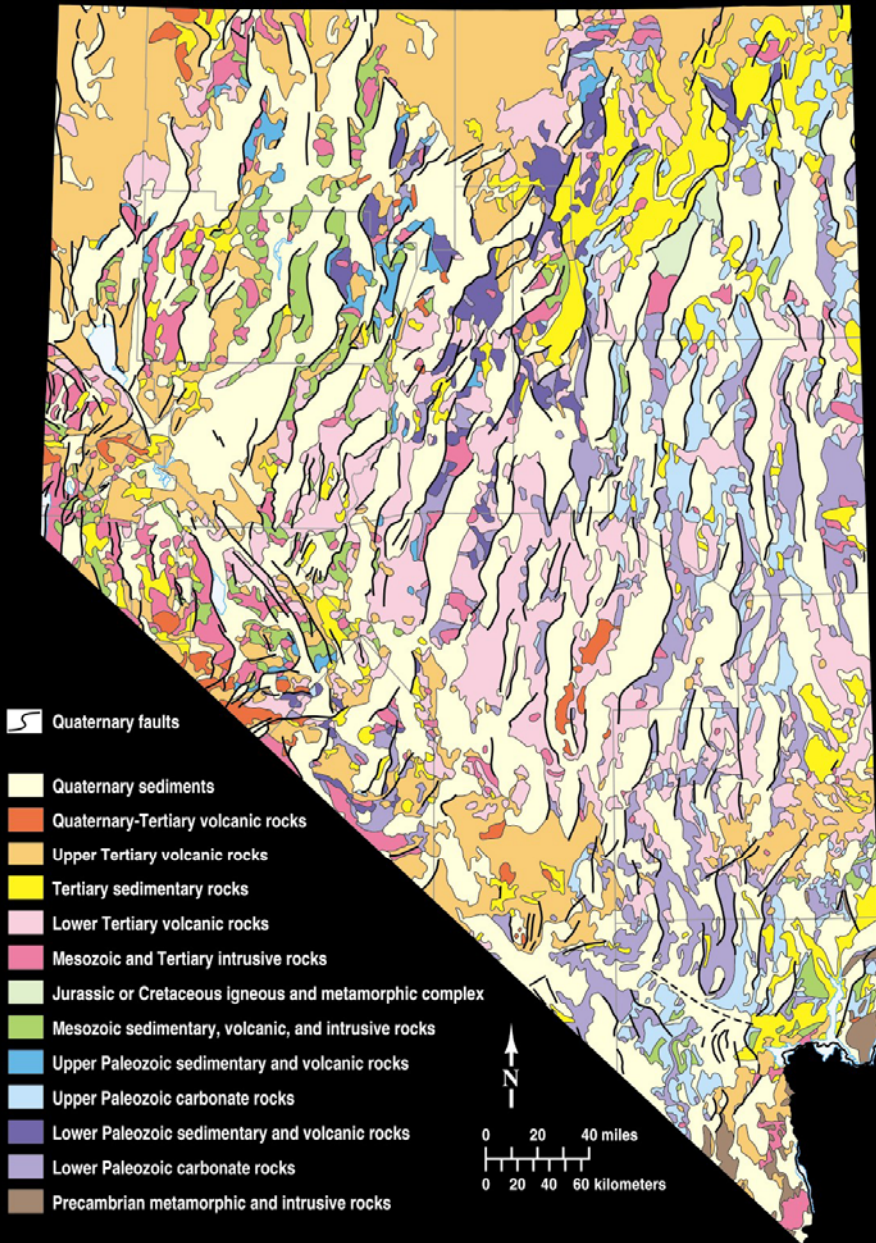
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Water Resources in Nevada?

From what sources does Nevada get most of its water resources?

Water Resources in Nevada?

Surface water

Ground water

Nevada Bureau of Mines and Geology
(www.nbmg.unr.edu)

