Geology, History, and Resources of Nevada

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(www.nbmg.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

NBMG Special Publication 31

(2003, 512 pages)

$75 for a signed copy
(by December 31 –
www.nbmg.unr.edu)

Gold, Round Mountain

Opal, Virgin Valley
Metals in Nevada?
<table>
<thead>
<tr>
<th>Metals in Nevada</th>
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<tbody>
<tr>
<td>Silver</td>
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<td>Gold</td>
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<tr>
<td>Copper</td>
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<td>Iron</td>
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<td>Lead</td>
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<td>Zinc</td>
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<td>Tungsten</td>
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<td>Arsenic</td>
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<tr>
<td>Antimony</td>
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<td>Magnesium</td>
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<td>Manganese</td>
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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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1855: Potosi Mine – Zn-Pb-Ag-Au, Goodsprings district discovered by Mormons

1857: Nelson – Ag-Au
European/American History

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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)
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- Cherry Creek district (1863)
- Silver Peak (1863)
- Pioche (1863)
- Union district – Ione (1863)
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- Eureka (1864)
- Candelaria (1864)
- White Pine district – Ely (1865)
- Belmont (1865)
- Round Mountain (1865)
- Yerington (1865)
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- 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.

- **Searchlight** (1897)
- **Tonopah** (1900)
- **Goldfield** (1902)
We are in the midst of the biggest gold boom in American history.

Mostly Carlin and other Nevada deposits = 186 M oz

‘49ers = 29 M oz
Nevada produced ~87% of U.S. and 9% of world gold in 2004.

6.942 million ounces in 2004; $410 per ounce average price
Trends of Mineral Deposits

Major Active Mines
- Metals (mostly Au, Cu, Ag)
- 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

Metals (mostly Au, Cu, Ag)
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
Ores on the Carlin trend: in Paleozoic sedimentary rocks, but related to Cenozoic igneous intrusions.
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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)
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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.
Magnesium in Nevada

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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
Clays
Diatomite
Obsidian/Chert/Flint
Fluorspar
Obsidian and opal arrowheads and flakes
We don’t know where all the resources are, and we don’t really know what will become resources in the future.
Nevada Population
(U.S. Census, 1850-2000; estimated for 2004; projected to 2020)
Aggregate in Nevada

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Selenite pit, Empire mine, Pershing County
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Barite in Nevada

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

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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

- Pink: Potential resource >100°C (212°F)
- Yellow: Potential resource <100°C (212°F)

Compiled by the Energy and Geoscience Institute, University of Utah
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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

Production, Millions of Megawatt-Hours

Average Price, Dollars per Megawatt-Hour


production

price
Major Mines, Oil Fields, and Geothermal Plants

- Precious Metals
- Copper
- Industrial Minerals
- Oil Field
- Geothermal Plant
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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
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