The State of Mining in Nevada


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Outline

1. Introduction – Mining in Nevada
2. The Bureau of Mining Regulation and Reclamation
3. Regulation Branch
4. Closure Branch
5. Reclamation Branch
6. Mine Water Management Database
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1. Introduction – Mining in Nevada
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Introduction – *History* of Mining in Nevada
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- Mining has played a central role in Nevada’s economy since the discovery of gold and silver in the Comstock Lode in 1859, virtually ending the CA Gold Rush\(^2,3\)

- 1962, Newmont Mining discovered large Carlin deposit – 50 mile wide by 40 mile long belt of gold deposits\(^3\)

- Over 20 minerals mined in NV: gold, silver, copper, molybdenum, barite, gypsum, lithium, dolomite, turquoise, diatomaceous earth\(^6\)

- 72% of U.S. gold production, 26% of U.S. silver production (2017) \(^2\)
Introduction – *Future* of Mining in Nevada
Introduction – *Future* of Mining in Nevada

From Mid-2000s Recession Until Now...a growing hub for technological innovation

- Data centers – Switch
- Tesla Gigafactory
- Apple, Amazon

Major projects + overwhelming demands for technology means the Silver State and US are more reliant on mineral production than ever

- Plug-in cars use 3xs the amount of copper than a traditional vehicle
- Lithium-powered devices
- Silver is vital in renewable energies

Nevada mines produce 12% of the minerals consumed in the US
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2. Bureau of Mining Regulation and Reclamation (BMRR)

The Division includes:

- 10 Environmental Bureaus
- 1 Administrative Bureau
- BMRR was created in 1989
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- 1 Administrative Bureau
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"Preserve and enhance the environment of the State in order to protect public health, sustain healthy ecosystems, and contribute to a vibrant economy"
2. Bureau of Mining Regulation and Reclamation (BMRR)

J. Sawyer P.E., Bureau Chief

Regulation
R. Kuczynski, P.E.

Permitting
N. Zittel P.E., Prof. Engineer
S. Gooch, P.E., Prof. Engineer
M. Griffin, Staff II Engineer
M. Schulenberg, Staff II Engineer

Inspection and Compliance
R. Burnham, Env. Scientist III
P. Goldstrand, PhD Env. Scientist III
S. Fischenich, Env. Scientist III

D. Berger, Admin Assistant II
H. Guinn, Admin Assistant II

Closure
T. Gray

Permitting, Inspection and Compliance
K. McCrea, Env. Scientist III
L. Kreskey, Env. Scientist III
Christine Olson, PhD Env. Scientist III

BLM Bonding Liaison
Daniel Atkinson

Reclamation
T. Process

M. Donaldson, Env. Scientist III
S. Martin, Env. Scientist III
T. Suessmith, Env. Scientist III
S. Yang, PhD P.E., Prof. Engineer
E. Leavitt, PhD Env. Scientist III

J. Boomhower, Admin Assistant III

B. Graeser, Admin Assistant III
2. Bureau of Mining Regulation and Reclamation (BMRR)

- 256 Reclamation Projects
- 97 Operating Mines
- 31 Mines Not Yet Built
- 17 Mines in Temporary Closure
- 31 Mines in Permanent Closure
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3. Regulation Branch

- Prevent degradation to (ground and surface) waters of the State
- Administer mining regulations and State water pollution control law
- Govern site characterization, design, construction, and operation
3. Regulation Branch

Water Pollution Control Permit

- Leak Detection
- Monitoring Wells
- Sump Collection
- Concrete Secondary Containment
- 60-mil + 80-mil HDPE Liner
- Waste Rock & Ore Characterization
3. Regulation Branch

Quarterly WPCP Inspections
3. Regulation Branch

Quarterly WPCP Inspections

- Process Components
- Tanks, Piping, Solution Channels
- Solution Ponds
- Leach Pads
- Tailings Impoundments
- Truck shop
- Fuel/Wash Bays
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“Waters of the State” are not degraded and components are left chemically stable for the long term
Challenges For Final Closure

• Long-term active and/or passive treatment
• Process solution drain-down/disposal
• Pit lake water quality
• Acid rock drainage
• Groundwater contamination
• Long-term funding mechanisms
4. Closure Branch

Pumpback well system

Contaminated groundwater
4. Closure Branch

Groundwater, Pit Lake, Geochemical Modeling

- Guidance documents on BMRR webpage: https://ndep.nv.gov/land/mining/
- List of approved software
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5. Reclamation Branch

Ensures mining and exploration projects are returned to safe and stable post mining productive land use

• Issue reclamation permits
• Oversee financial assurance
• 256 active reclamation permits
5. Reclamation Branch

Suitable for productive post-mining use

- Wildlife Habitat
- Cattle Grazing
- Recreation
- Industrial Site/Business Park
- Future Mineral Exploration and Development
- Renewable Energy Creation and Storage
Can you spot the mine reclamation?
5. Reclamation Branch

NV Standardized Reclamation Cost Estimator (SRCE): Agency approved EXCEL workbook file with standardized cost data

- [https://nvbond.org/](https://nvbond.org/)
- Standardized Process Fluids Cost Estimator (PFCE)
- Heap Leach Drain down Estimator (HLDE)
## 5. Reclamation Branch

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<td>$1,617.8</td>
<td>$2,347.6</td>
<td>$2,662.9</td>
<td><strong>$2,781.5</strong></td>
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Problem:
• Avg. monitoring locations per mine site: 30 (range: 2-156)
• Individual geochemical data records collected on quarterly basis per mine site: 73,000-110,000
• Quantitative analysis and distribution to stakeholders difficult, inefficient, lack of analytical functionality
6. Mine Water Management Database

Solution:
- Electronic database and reporting
- Allows for advanced analysis including:
  - Determination of flow paths
  - Analysis of geochemical characteristics of surface and groundwater
  - Determination of regulatory compliance

Figure 3. Newman, 2017
6. Mine Water Management Database

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Figure 4. Newman, 2017
6. Mine Water Management Database

Design:
- SQL – Structured query language
- Allows for use across many operating and computer systems
- For more information see:
References

Literature Sources
1Sources: https://www.nevadamining.org/reclamation-bonding-mining-responsibly-in-nevada/
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3https://www.legendsofamerica.com/nv-comstocklode/
4https://investingnews.com/innspired/nevada-largest-gold-producer/

Photo Sources
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Slide 9: Literature Reference 5, Newman
Slide 18: https://www.waterloohydrogeologic.com/2012/06/22/what-is-modflow/
Thank you for your attention. Questions?

NDEP Website:
ndep.nv.gov/land/mining