MINERAL-RESOURCE POTENTIAL IN NEW MEXICO

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Purpose of evaluations of mineral-resource potential

• Estimating mineral-resource availability
  – Determine potential for critical minerals
• Delineate areas requiring more geologic investigation
• Required by government officials in order to make decisions regarding use, acquisition, and restriction of public and state lands
Definitions

- **Minerals** refer to any rock, mineral, or other naturally occurring material of economic value, including metals, industrial minerals, energy minerals, gemstones, and aggregates.

- **Mineral-resource potential** of an area is the probability or likelihood that a mineral will occur in sufficient quantities so that it can be extracted economically under current or future conditions, including the occurrence of undiscovered concentrations of metals, nonmetals, industrial materials, and energy resources.

- Mineral-resource potential is not a measure of the quantities of the mineral resources, but is a measure of the potential of occurrence.
DEFINITIONS OF LEVEL OF RESOURCE POTENTIAL

N  No mineral-resource potential is a category reserved for a specific type of resource in a well-defined area with no evidence of mineral resources.

L  Low mineral-resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics indicate geologic environment where the existence of economic mineral resources is unlikely and is assigned to areas of no or dispersed mineralized rocks.

M  Moderate mineral-resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics indicate a geologic environment favorable for mineral-resource occurrence.

H  High mineral-resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics indicate a geologic environment favorable for resource occurrence and development. Assignment of high mineral-resource potential to an area requires some positive knowledge that mineral-forming processes have been active in at least part of the area.

DEFINITIONS OF LEVEL OF CERTAINTY

A  Available information is not adequate for the determination of the level of mineral-resource potential.

B  Low, available information suggests the level of mineral-resource potential.

C  Moderate, available information gives a good indication of the level of mineral-resource potential.

D  High, available information clearly defines the level of mineral-resource potential.

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<tr>
<th>INCREASING LEVEL OF RESOURCE POTENTIAL</th>
<th>U/A Unknown Potential</th>
<th>H/B High Potential</th>
<th>H/C High Potential</th>
<th>H/D High Potential</th>
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<td>M/B Moderate Potential</td>
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<td>L/B Low Potential</td>
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INCREASING LEVEL OF CERTAINTY
Methods

- Evaluation of mineral-resource potential involves a complex process based on geologic analogy and probability of promising or favorable geologic environments with geologic settings (geologic models) that contain known economic deposits, as described in Goudarzi (1984) and McLemore (1985)
  - Mineral deposit models
  - Known mineral deposits

- Subjective assessments or judgments depend upon available information concerning the area, as well as current knowledge and understanding of known mineral deposits
Sources of data

- Mining districts
- Active and inactive mines
- Exploration areas
- Areas of mining claims
- Favorable geologic terrains for specific mineral deposit types
- Lithology, structure, alteration
- Geophysical and geochemical data
  - NURE data
Sources of data

- Geologic maps
- Mining district maps
- New Mexico Mines Database
- Other mineral occurrence databases
- Chemical analyses of host rocks, altered zones, and mineralized deposits
- National geochemical databases
- Geophysical data (magnetics, radiometrics, gravity, seismic, other)
Mining districts in New Mexico
Active mines and exploration sites in New Mexico 2010-2021
Drill data
Selected exploration sites of critical minerals in New Mexico 2016-2021

From NM Mining and Minerals Div. and NMBGMR databases, company web sites
Distribution of mineral deposits is highly dependent on the geological processes necessary for concentration of the commodity in question.

REE-Zr-Ti beach-placer sandstone deposits, San Juan Basin, NM

Volcanic-epithermal gold veins, Steeple Rock, NM
Types of deposits—Memoir 50 (Energy and mineral resources of New Mexico)
Types of deposits — USGS deposit models
Integrate datasets with ArcGis

Copper mines and copper mining districts
Mineral-potential maps

Copper potential
Reasonably foreseeable development (RFD)

• Reasonably foreseeable development (RFD) is defined as the potential for the occurrence and likelihood for future development (i.e. mining) of mineral resources.

• The evaluation of RFD involves the evaluation of the potential of the occurrence of the resource based on geologic factors (i.e. mineral resource classification described above) and the evaluation of the potential for future exploitation of that resource based upon economic factors.
Recent Projects requiring Mineral-Resource Assessments
Mineral-Resource Potential
Gold
Uranium production 1948–2014

Uranium
Tellurium
Rare earth elements
Lithium
Summary

• New Mexico has a wealth of mineral resources
• Using ArcGis, geologic and mineral deposit data, we can evaluate the mineral-resource potential of an area
• The evaluation process is complex and is based upon geologic analogy of promising or favorable geologic environments with geologic settings of known economic deposits
• Enables decision makers the ability to make decisions on land use and can be used to identify areas requiring additional study