Development of Data Systems to Support Critical Mineral Research in New Mexico

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Introduction

• New Mexico Bureau of Geology and Mineral Resources (NMBGMR) has accumulated data on mines and minerals resources, including critical minerals, in New Mexico since 1927 and new data are being acquired

• Relational databases and images are available on the NMBGMR website with more content being added

• The purpose of these databases are to provide information that will aid in:
  • Evaluating critical minerals and other mineral-resource potential
  • Identifying their development and production
  • Identifying possible environmental concerns
  • 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
Data collections and databases

- Mines (NM Mines Database)
- Water wells
- Oil/gas wells
- Geothermal
- QA/QC data
- Project specific databases (location, description of samples, petrography)
- GIS data (geologic, other)
- Patented mining claims (NM Mines Database and GIS)
  - Unpatented mining claims
- Geophysical data
- Photographs
- Historic Reports
- Samples
- Production data
- Resource/reserve data
- Project reports
  - Papers
  - Thesis
  - Abstracts
- Project presentations
- Project data
  - Chemistry
  - Production
  - Drill data (sample logs, drillers logs, geophysical logs)
New Mexico Mines database

- In Microsoft Access with plans to move to SQL Server
- Information on mining districts
- Information on mines (legacy, active, prospects, deposits)
  - Location data
  - Information on the mine
  - Ties the mine to other agency mine numbers
  - Includes occurrences of critical minerals
  - Ties the mine/occurrence to other data in other databases
Gallinas database

- SQL Server back-end with Access front-end.
- Data migrated from Access to SQLS last year
- Web forms and reports currently under development

- Sample information
  - Location data (Waypoints)
  - Sample Information
  - Sample prep & analysis
  - Analyses Data generated on the sample
  - Archival information
REE in Coal database

- Being developed in SQLS as an enhanced version of the Gallinas DB
  - Improved DB design practices: normalized structure, data constraints, proper foreign key relationships, data types, naming conventions, etc.
  - Follows our existing “hierarchy”
    - Locations (Waypoints)
    - Samples
    - Sample Analyses
      - Petrographic analysis
      - Thin section descriptions
      - Geochemical data
      - XRD/XRF data
Thank You!
Critical minerals

- Minerals needed for military, industrial or commercial purposes that are essential to renewable energy, national defense equipment, medical devices, electronics, agricultural production and common household items
- Minerals that are essential for use but subject to potential supply disruptions
- Minerals that perform an essential function for which few or no satisfactory substitutes exist
- The absence of which would cause economic or social consequences
- 33-50% minerals are classified as such

Note that any element or commodity can be considered critical in the future depending upon use and availability. Coal contains several of these critical elements.

U, Re, He, and K (potash) were removed from the critical minerals list in 2022 and Zn and Ni were added.
Purpose

• Creating database of CM and other mines and occurrences in the state (https://geoinfo.nmt.edu/staff/mclemore/MinesinNewMexico.html)

• Creating a database of existing chemical analyses, available drill core and other subsurface information stored at NMBGMR (https://geoinfo.nmt.edu/staff/mclemore/projects/mining/REE/McLemoreMasterChem_v5.xlsx)

• Data required in order to delineate favorable geologic terranes and priority areas containing potential CM for the USGS mandate and NMBGMR needs

• Mineral resources must be identified before land exchanges, withdrawals or other land use decisions are made by government officials

• Future mining of potential economic CM will directly benefit the economy of NM

• Training of our future workforce since students at NM Tech will be hired to work on these projects
Online record access

- Online access to photographs, maps, and other documents can be found at geoinfo.nmt.edu or photoarchive.nmt.edu

- NMBGMR’s photo archive is powered by ResourceSpace and allows for more information to be added about each document for searching purposes.

- Searches for historical documents and photos can be done geographically, by description, or name of mine.

- Protocols have been developed to cross reference data to home databases for multiple access points to data through either ResourceSpace powered searches or through dynamic webpages.
REE in Coal database (cont’d)

- Many open-ended fields converted to pre-defined values from associated “Lookup tables”
  - These used to populate drop-down or select lists on web forms.
  - This database is evolving over time. Many of the future requirements will be accommodated by adding applicable values in the lookup tables without the need to modify the DB structure or schema.

- Here is a portion of the Locations table (Waypoints) and some of its associated Lookup tables.
REE in Coal database (cont’d)

- Currently developing web-based data entry forms and reports
NMBGMR web sites

https://geoinfo.nmt.edu/repository/index.cfm

DATA REPOSITORY

Find a Repository Dataset (You can also browse listings by Author or Year/Number)

Repository ID: ANY — or enter any of these search parameters:

Year: ANY Title: ANY Author: ANY

Search Reset

Data in this repository supplements published papers in our publications. Please refer to both the published material and the repository documentation before using this data. Please cite repository data as shown in each repository listing.

Please direct comments or requests regarding these datasets to either the author(s) or the Webmaster.

BIBLIOGRAPHY OF NEW MEXICO GEOLOGIC PUBLICATIONS

The Geologic Information Center at the New Mexico Bureau of Geology and Mineral Resources (NMBGMR) maintains a bibliography of New Mexico geology, which contains all the information in the 12 published bibliographies of New Mexico through to 1987. Bibliographic data from 1988 onwards has been compiled directly into this database and indexed by Keywords, County, Formation, and Time Period. You can also search the bibliography specifically for M.S. Theses and Ph.D. Dissertations.

Inquiries about geologic literature as well as suggestions for additions to the bibliography may be directed to:
Amy Trivitt-Kracke, Geological Archives Coordinator
(575) 835-5362

Title: ANY Author: ANY Publisher: ANY

County: ANY Formation: ANY Keyword: ANY

Specific Year: OR From Year: To Year:

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NMBGMR web sites

https://geoinfo.nmt.edu/staff/mclemore/projects/mining/REE/REEinNM.html

Earth MRI databases REE and Critical Minerals

- Map Earth MRI—Map of REE deposits in NM showing mining districts and mines with REE in New Mexico pdf
- Table of Earth MRI—REE mining districts in New Mexico pdf
- Table of Earth MRI—Database of REE deposits in NM (including mines, occurrences, and deposits) pdf
- Table of Earth MRI—Database of chemical analyses of REE and other Critical Minerals deposits in NM
- Table of Earth MRI—New Mexico Mines Database Mines and Districts with Alunite occurrences (6/4/2021)
- Table of Earth MRI—New Mexico Mines Database Mines and Districts with Asbestos occurrences (2/14/2021)
- Table of Earth MRI—New Mexico Mines Database Mines and Districts with Gallium occurrences (7/11/2021)
- Table of Earth MRI—New Mexico Mines Database Mines and Districts with Indium occurrences (6/18/2022)
- Table of Earth MRI—New Mexico Mines Database Mines and Districts with Lithium occurrences (4/16/2021)
- Table of Earth MRI—New Mexico Mines Database Mines and Districts with Potash mines, reserves, and production, Carlsbad potash district (2/16/2021)
- Table of Earth MRI—New Mexico Mines Database Mines and Districts with Tin occurrences (5/29/2021)
- Table of Earth MRI—New Mexico Mines Database Mines and Districts with Tungsten mines and occurrences (9/20/21)

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Rare Earth Elements (REE) in New Mexico

REE in Gallinas Mountains, NM

REE in Cornudas Mountains, NM

REE in NM