



MINERALS FOR OUR FUTURE

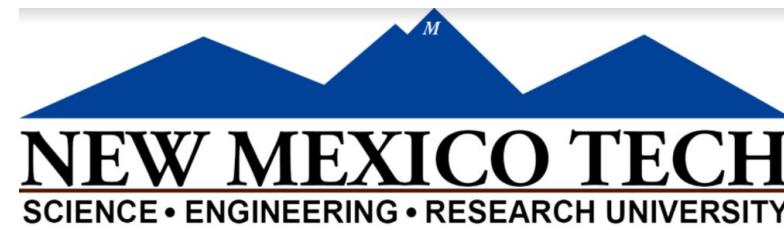
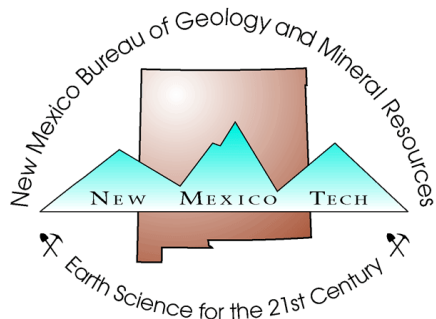
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Development of Data Systems to Support Critical Mineral Research in New Mexico

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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

Microsoft Access window titled "Access" showing the "Mine Entry" form. The form is titled "Mine Entry" and "NM Bureau of Geology and Mineral Resources". It contains fields for Mine ID (NMTO0089), Mine Name (aggregate pit), County (Torrance), District ID, Subdistrict id, and a "Known Aliases" section. There are checkboxes for "Active Location?", "Historic/Legacy Location?", and "Aggregate Mine?". A red warning message states: "STOP!! One of these fields MUST be entered before continuing on." Below this, there are fields for "Latest year of info.", "Type of claim", and "If patented, see below for more". The "LOCATION" section includes "Location Assurance" (topo) and "Point of location". The form is currently displaying record 1 of 1. The Microsoft Access ribbon is visible at the top, showing tabs like File, Home, Create, External Data, Database Tools, and Tell me what you want to do... The left sidebar shows a list of tables and forms, including District, Mines, District_form, Entry_Form, and FieldActivityForm.

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

The screenshot shows the Microsoft Access application window titled "Gallinas1_FE_ver06 : Database- \\agustin\Gallinas_Mountains\Gallinas1_FE_ver06.accdb (Access 2007 - 2016 file format) - ...". The ribbon includes "File", "Home", "Create", "External Data", and "Database Tools". The "Forms" task pane on the left lists several forms, with "Waypoint" selected. The main form, "Waypoint Entry", is displayed with the following fields and values:

- Waypoint id:** A27
- County:** Lincoln
- State:** New Mexi
- District id:** DIS092
- Mine id:** (empty)
- Date inspected:** 9/10/2010
- Geologist:** MRP

The form is divided into sections by orange headers:

- LOCATION**
 - Latitude:** 34.214307
 - Longitude:** -105.749893
 - Coor system:** NAD27
 - UTM easting:** 430921.09
 - UTM northing:** 3785977.44
 - UTM zone:** 13
 - Township:** 1S
 - Range:** 11E
 - Section:** 24
 - Elevation:** 7660
 - Location assurance:** HHGPSoff
 - USGS quadrangle:** Rough Mountain
 - Method of obtaining elevation:** topo
 - Were field photos taken:** (checkbox, unchecked)
 - Weather conditions:** (text box, empty)

At the bottom, there is a status bar with "Record: 1", "Unfiltered", and a search box. A footer note reads: "Primary key, Unique field identification number of waypoint or field station (Gal) or sample id (Gal, other) or drill hole location (DH)".

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

DBName	SchemaName	TableName	TabType	TabCreated	TabModified	ColID	ColName	ColType	ColMaxLen	ColPrecision	ColNullable	ColDefaultValue	PKName	PKType	PKDescr
db_REECool1_dev2	dbo	tbl_Waypoint	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	1	fld_Waypoint_ID	varchar	50	0	0	NULL	NULL	PK_Waypoint	PRIMARY_KEY_CONSTRAINT
db_REECool1_dev2	dbo	tbl_StateTerritory_ID	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	2	fld_StateTerritory_ID	char	2	0	0	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_County_FIPS	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	3	fld_County_FIPS	char	5	0	0	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_District_ID	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	4	fld_District_ID	varchar	10	0	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_MineralIdentifier	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	5	fld_MineralIdentifier	varchar	50	0	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_DistrictSpecified	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	6	fld_DistrictSpecified	date	3	10	0	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_Geologist_ID	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	7	fld_Geologist_ID	int	4	10	0	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_Latitude	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	8	fld_Latitude	float	8	53	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_Longitude	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	9	fld_Longitude	float	8	53	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_LocationAssurance_ID	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	10	fld_LocationAssurance_ID	int	4	10	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_Elevation_ft	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	11	fld_Elevation_ft	int	4	10	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_ElevationMethod_ID	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	12	fld_ElevationMethod_ID	int	4	10	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_CoordinateSystem_ID	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	13	fld_CoordinateSystem_ID	int	4	10	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_UTM_Easting	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	14	fld_UTM_Easting	float	8	53	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_UTM_Northing	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	15	fld_UTM_Northing	float	8	53	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_UTM_Zone	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	16	fld_UTM_Zone	int	4	10	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_Township	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	17	fld_Township	varchar	20	0	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_Range	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	18	fld_Range	varchar	20	0	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_Section	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	19	fld_Section	varchar	20	0	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_USGS_Quadrangle_MapCode	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	20	fld_USGS_Quadrangle_MapCode	varchar	10	0	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_MapUnit_ID	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	21	fld_MapUnit_ID	varchar	10	0	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_FieldPhotosTaken_flag	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	22	fld_FieldPhotosTaken_flag	bit	1	1	0	(0)	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_WeatherConditions	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	23	fld_WeatherConditions	varchar	50	0	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_Stratigraphy_ID	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	24	fld_Stratigraphy_ID	int	4	10	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_VisibleMinerals	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	25	fld_VisibleMinerals	varchar	100	0	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_SampleCollected_flag	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	26	fld_SampleCollected_flag	bit	1	1	0	(0)	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_SampleReason	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	27	fld_SampleReason	varchar	100	0	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_SampleLocation	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	28	fld_SampleLocation	varchar	100	0	1	NULL	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_WaypointLegacyData_flag	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	29	fld_WaypointLegacyData_flag	bit	1	1	0	(0)	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_FieldObservation_Brecciation	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	30	fld_FieldObservation_Brecciation	bit	1	1	0	(0)	NULL	NULL	NULL
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db_REECool1_dev2	dbo	tbl_FieldObservation_Alteration	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	32	fld_FieldObservation_Alteration	bit	1	1	0	(0)	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_FieldObservation_FluoritePre	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	33	fld_FieldObservation_FluoritePre	bit	1	1	0	(0)	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_FieldObservation_Hemite	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	34	fld_FieldObservation_Hemite	bit	1	1	0	(0)	NULL	NULL	NULL
db_REECool1_dev2	dbo	tbl_FieldObservation_Traverse	U	2022-04-08 15:45:52.520	2022-04-08 15:45:53.033	35	fld_FieldObservation_Traverse	bit	1	1	0	(0)	NULL	NULL	NULL



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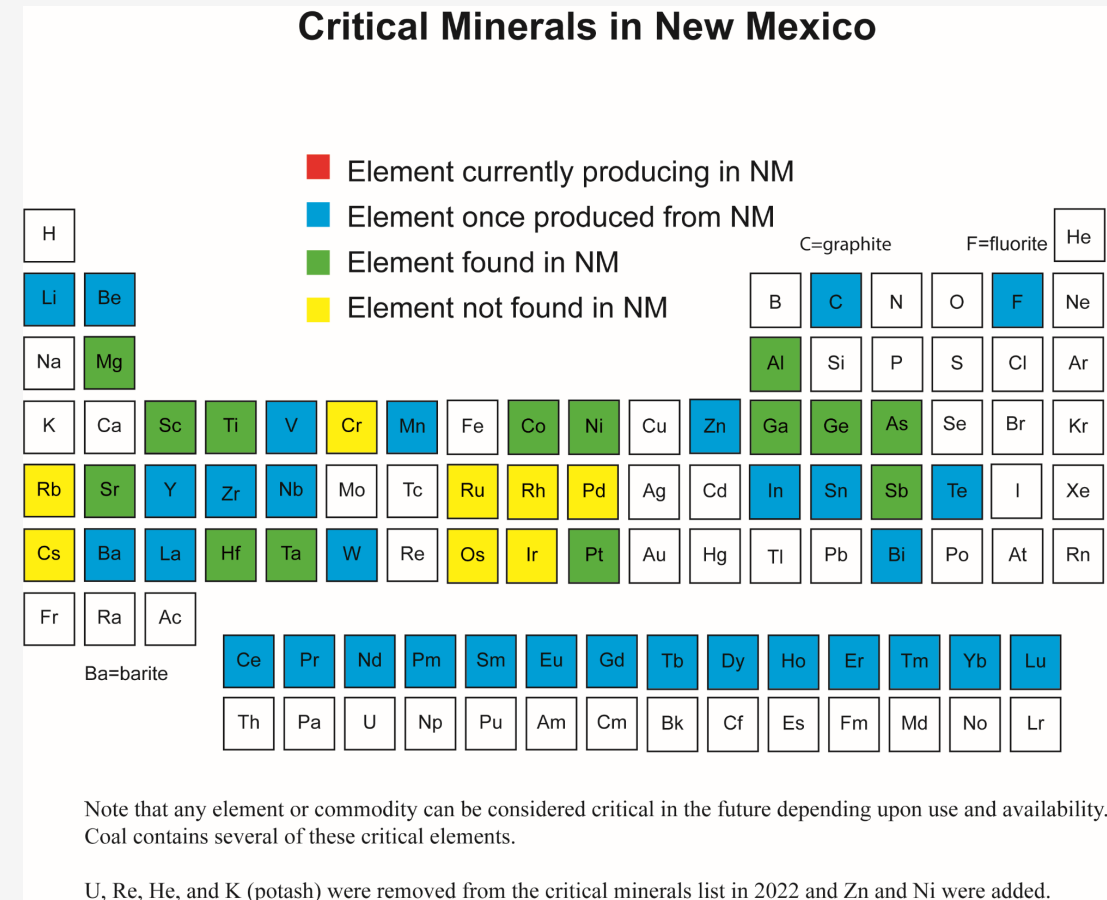
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Thank You!

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

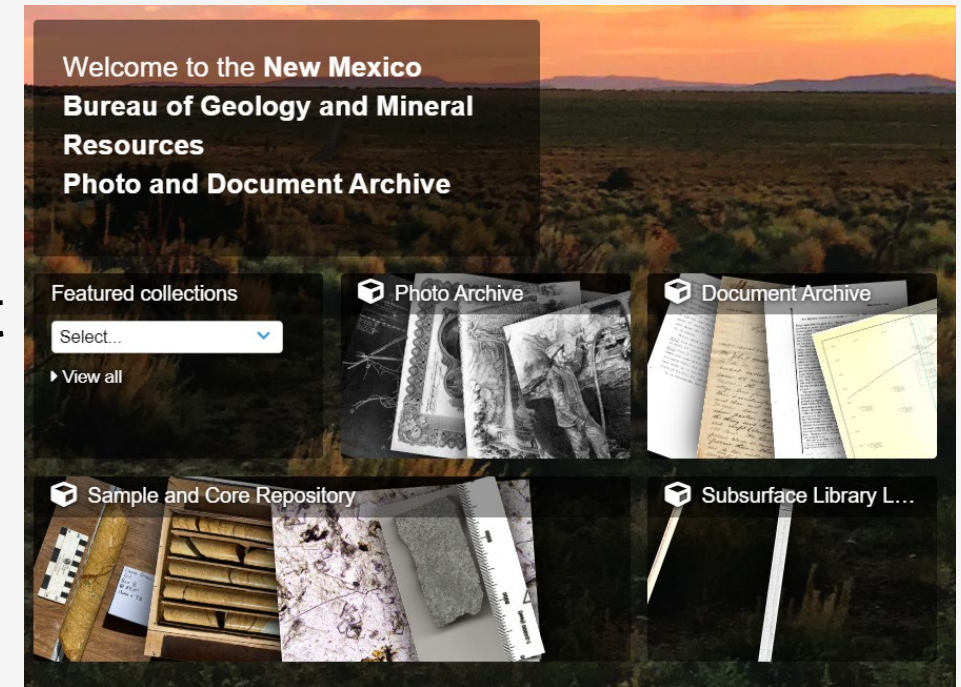


Purpose

- 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

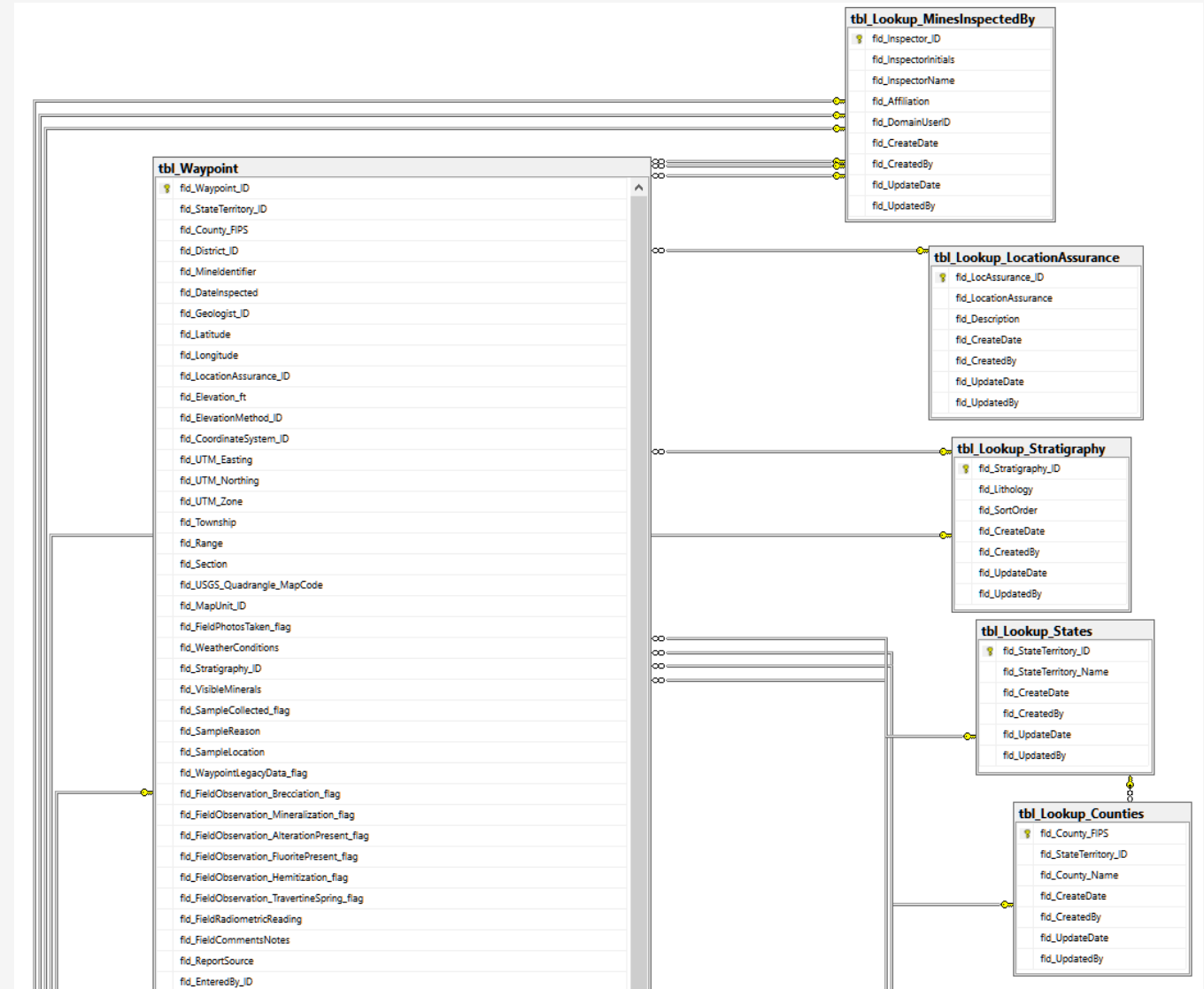
- Online access to photographs, maps, and other documents can be found at geoinfo.nmt.edu or photoarchive.nmt.edu
- NMBGMR's photo archive is powered by ResourceSpace and allows for more information to be added about each document for searching purposes.
- Searches for historical documents and photos 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.



ResourceSpace

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

REECoal

Home

Privacy

Waypoints

Samples

Maintenance

Hello, mleo!

Welcome to the REECoal app

This is a web app for data entry and review in the rare earth and environmental coal database. The app supports forms for adding, editing, deleting, and reviewing data from key tables in the REECoal database.

This app uses Microsoft integrated authentication as a form of access control. Each page authorizes users based on active directory roles for fine grain access control. For more information, see the privacy page.

REECoal

Home

Privacy

Waypoints

Samples

Maintenance

Hello, mleo!

Waypoint

Create New

Find by Waypoint ID:

Waypoint ID	County	District	Geologist	Project	State Territory	
111222	Bernalillo	Albuquerque	Anna B. Wilson	NGGDPP	Alaska	Samples Edit Details Delete
121212	Bernalillo	Albuquerque	Anna B. Wilson	NGGDPP	Alaska	Samples Edit Details Delete
123	Bernalillo	Albuquerque	Anna B. Wilson	NGGDPP	Alaska	Samples Edit Details Delete
123123	Bernalillo	Marquez subdistrict (Grants district)	Edward W. Smith	NGGDPP	New Mexico	Samples Edit Details Delete
123321	Catron		Bon Durica	NGGDPP	New Mexico	Samples Edit Details Delete
readfa	Bernalillo		Alex P. Gysi	NGGDPP	New Mexico	Samples Edit Details Delete
test	Catron		Alex P. Gysi	NGGDPP	New Mexico	Samples Edit Details Delete
test1	Catron		Brian Alers	NGGDPP	New Mexico	Samples Edit Details Delete

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1

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Version 1.1.1

REECoal

Home

Privacy

Waypoints

Samples

Maintenance

Edit

Waypoint

State/Territory *

Alaska

County *

Bernalillo

Date Inspected *

03 / 24 / 2022

Geologist *

Anna B. Wilson

Project ID *

NGGDPP

District ID

Albuquerque

Mine Identifier

Latitude

Longitude

Location Assurance

DCGPS

Elevation Ft

Elevation Method

altimeter

Coordinate System

mine coordinates

REECoal

Home

Privacy

Waypoints

Samples

Maintenance

Edit

TblSample

Waypoint ID *

111222

Date Entered *

06 / 06 / 2022

Geologist *

Gabriel K. Arechederra

Sample Media *

biological-water

Sample Type *

roots

Sample Collection Method *

other

Sample Quantity *

11

HazMat ID *

Compressed Gas

Rock Type *

sedimentary

Project ID *

NGGDPP

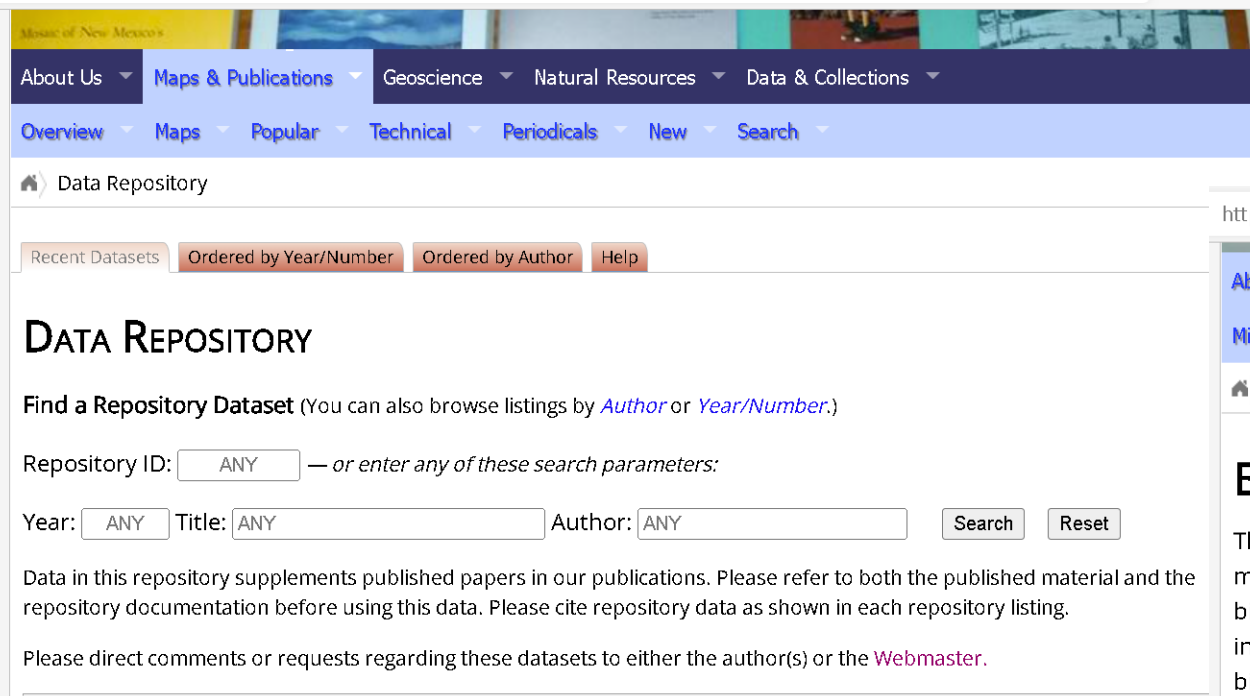
Sample Source

Depth Start

Depth End

NMBGMR web sites

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



Mosaic of New Mexico's

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🏠 Data Repository

Recent Datasets Ordered by Year/Number Ordered by Author Help

DATA REPOSITORY

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

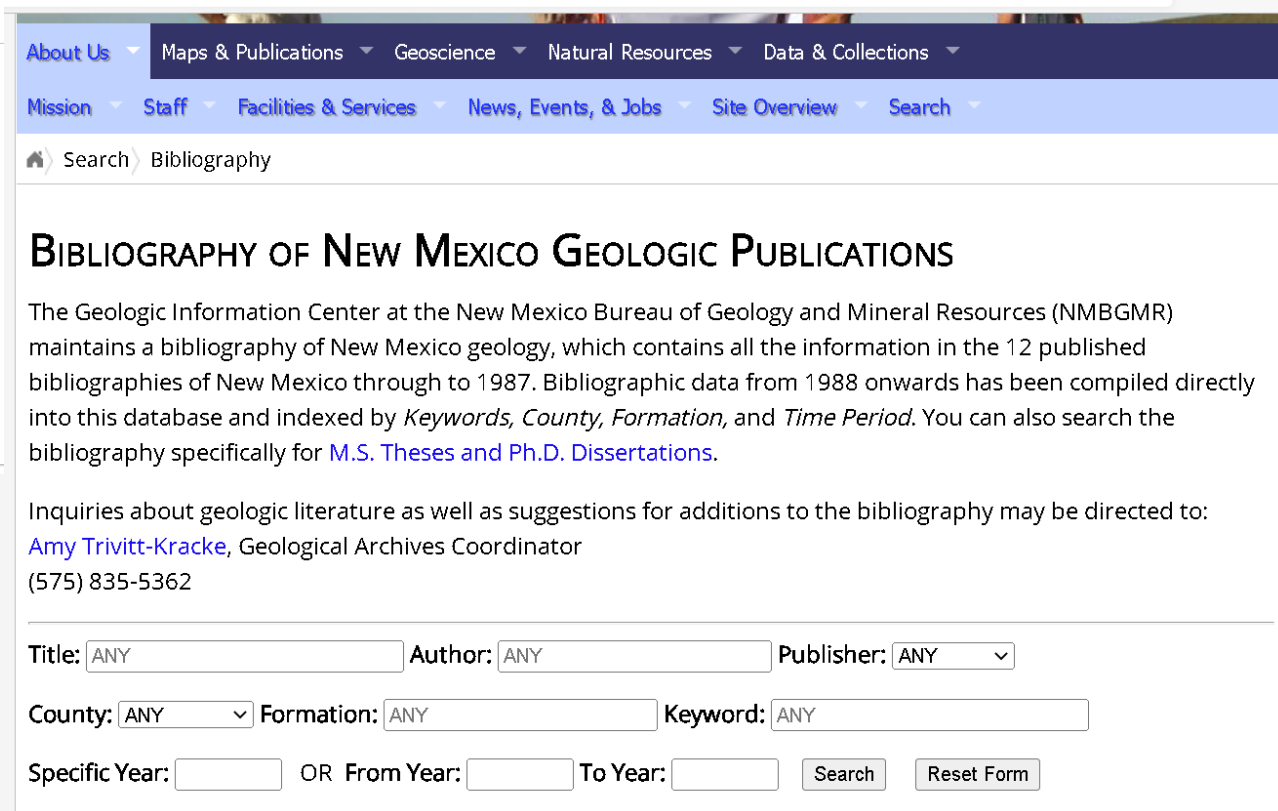
Repository ID: — or enter any of these search parameters:

Year: Title: Author:

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

https://geoinfo.nmt.edu/search/bibliography/home.cfm



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🏠 Search Bibliography

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: Author: Publisher:

County: Formation: Keyword:

Specific Year: OR From Year: To Year:

NMBGMR web sites

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

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Staff ▾ Virginia T. McLemore ▾ Projects ▾ REE in NM

Earth MRI databases REE and Critical Minerals

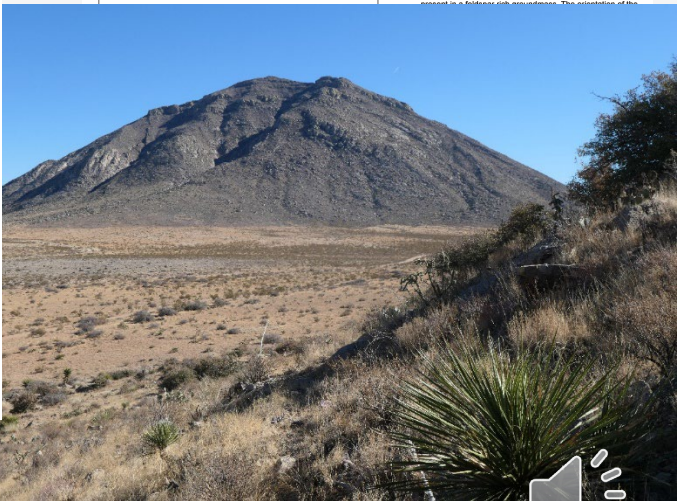
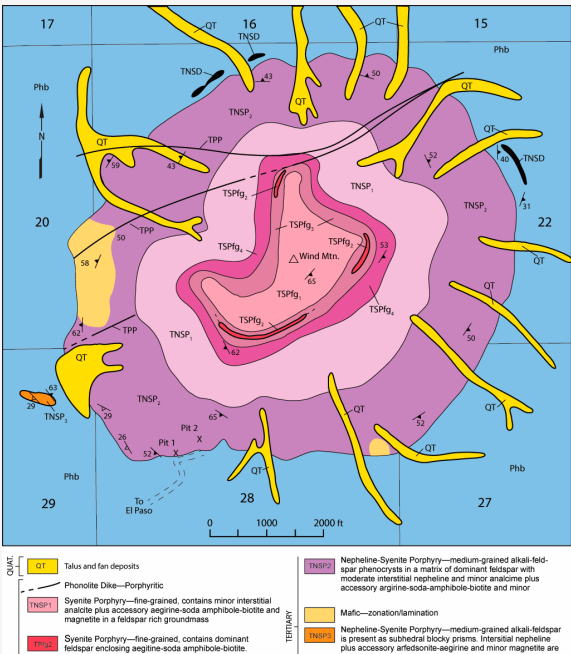
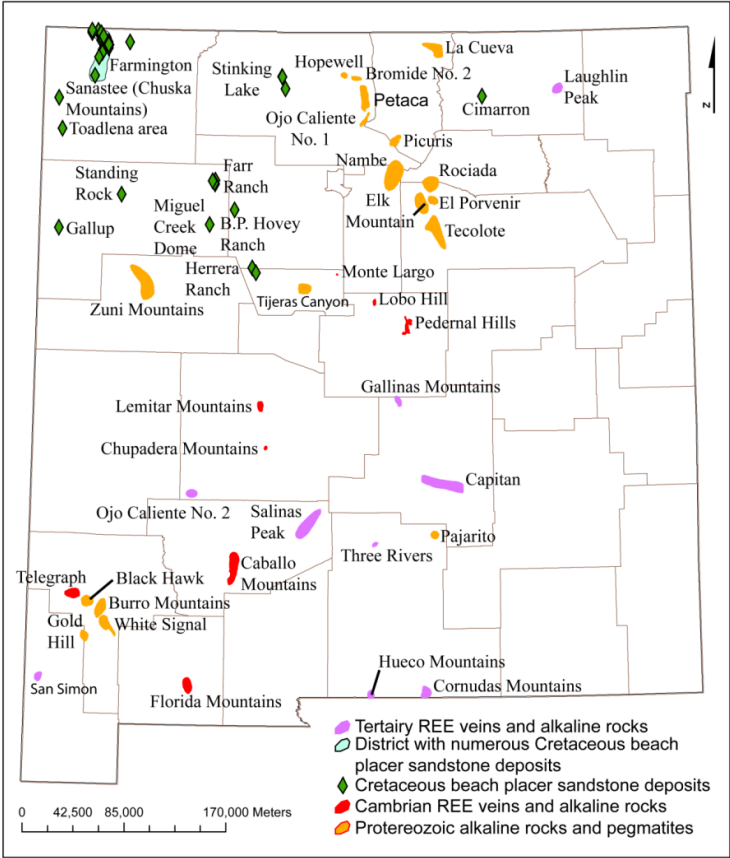
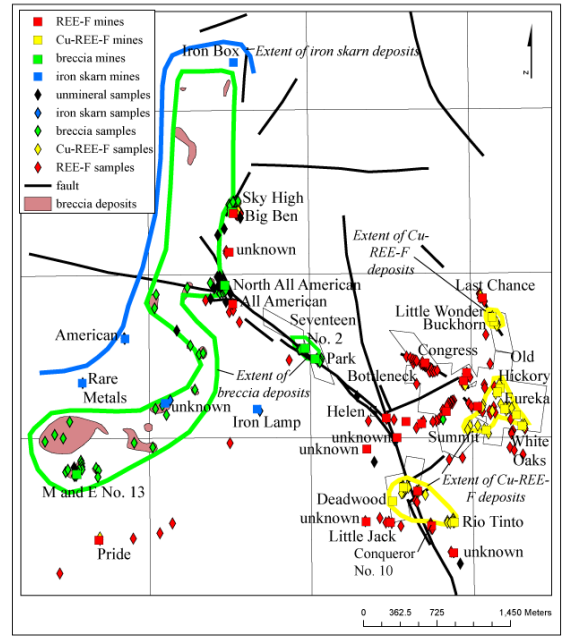
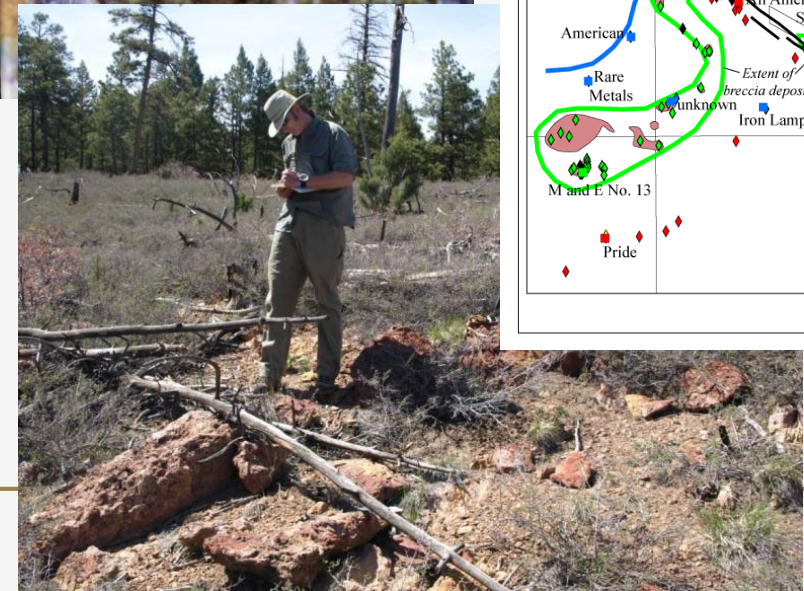
- [Map](#) Earth MRI—Map of REE deposits in NM showing mining districts and mines with REE in New Mexico [pdf](#)
- [Table](#) of Earth MRI—REE mining districts in New Mexico [pdf](#)
- [Table](#) of Earth MRI—Database of REE deposits in NM (including mines, occurrences, and deposits) [pdf](#)
- [Table](#) 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 [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)

This material is based upon work partially supported by the U.S. Geological Survey under Earth MRI contracts G19AP00098 G20AS00008, and G21AP10434. The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the U.S. Geological Survey.

Rare Earth Elements (REE) in New Mexico

REE in Gallinas Mountains, NM

REE in Cornudas Mountains, NM



REE in NM

