

Gold in New Mexico—2022

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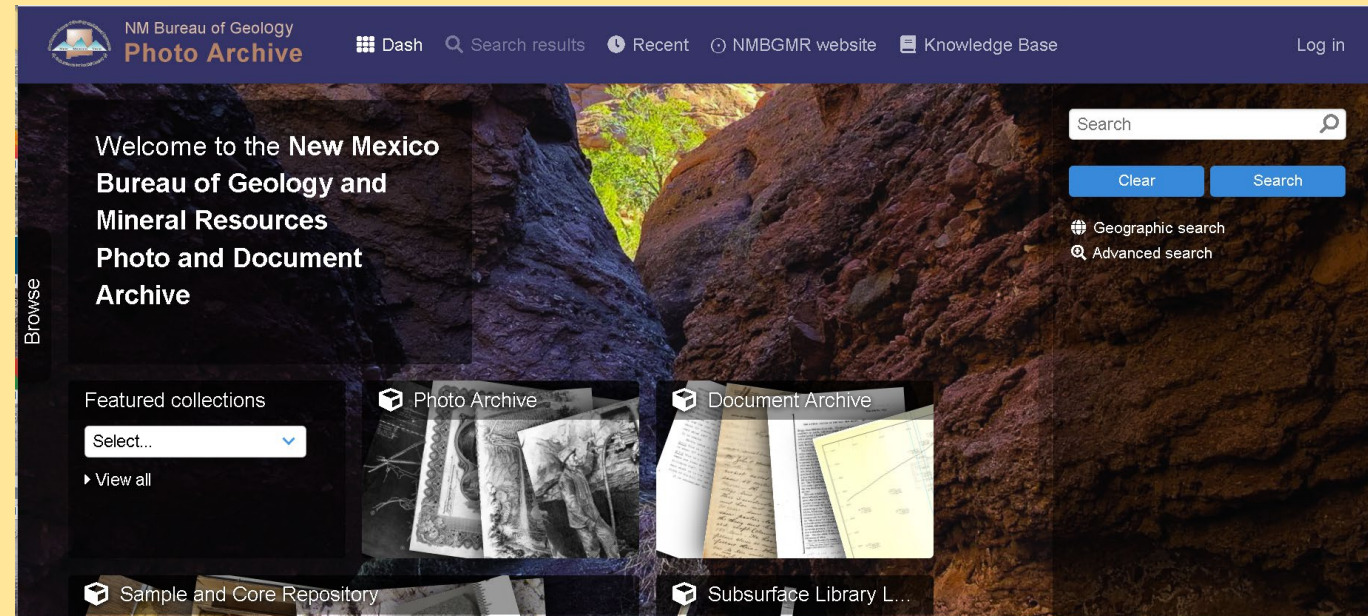


ACKNOWLEDGEMENTS

- New Mexico Energy, Minerals and Natural Resource Department
- Company annual reports
- Personal visits to mines
- Historical production statistics from U.S. Bureau of Mines, U.S. Geological Survey, N.M. Energy, Minerals and Natural Resource Department (NM MMD), company annual reports
- Students at NM Tech
- New Mexico Mining Association
- Virgil Lueth for photos of museum gold specimens

OUTLINE

- Introduction
- Production
- Types of deposits
- Placer gold deposits
- Volcanic-epithermal deposits
- Great Plain Margin deposits
- Potential for gold in NM
- Publications



New Mexico Bureau of Geology and Mineral Resources

- A non-regulatory governmental agency (the state's geological survey) that conducts scientific investigations leading to responsible economic development of the state's mineral, water, and energy resources.
- We are a research division of New Mexico Tech.
- Founded in 1927 through state legislation.
- Currently 66 full and part time staff with a range of expertise. We have a number of active emeritus staff and mentor and employ a total of around 60 graduate and undergraduate students.



Uses of Gold

- Currency (Coinage, Bullion, Backing)
- Jewelry
- Electronic products like computers, telephones, and home appliances, industries, medical field, etc.
- Glassmaking (red or purple colors in glass, thin film of gold in windows in tall buildings, airplanes, space craft, reflects much of the very intense solar radiation, mirrors)
- Dentistry
- Drug to treat a small number of medical conditions

INTRODUCTION

- NM has some of the oldest mining areas in the United States
- Native Americans mined turquoise from Cerrillos Hills district more than 500 yrs before the Spanish settled in the 1600s
- One of the earliest gold rushes in the West was in the Ortiz Mountains (Old Placers district) in 1828, 21 yrs before the California Gold Rush in 1849



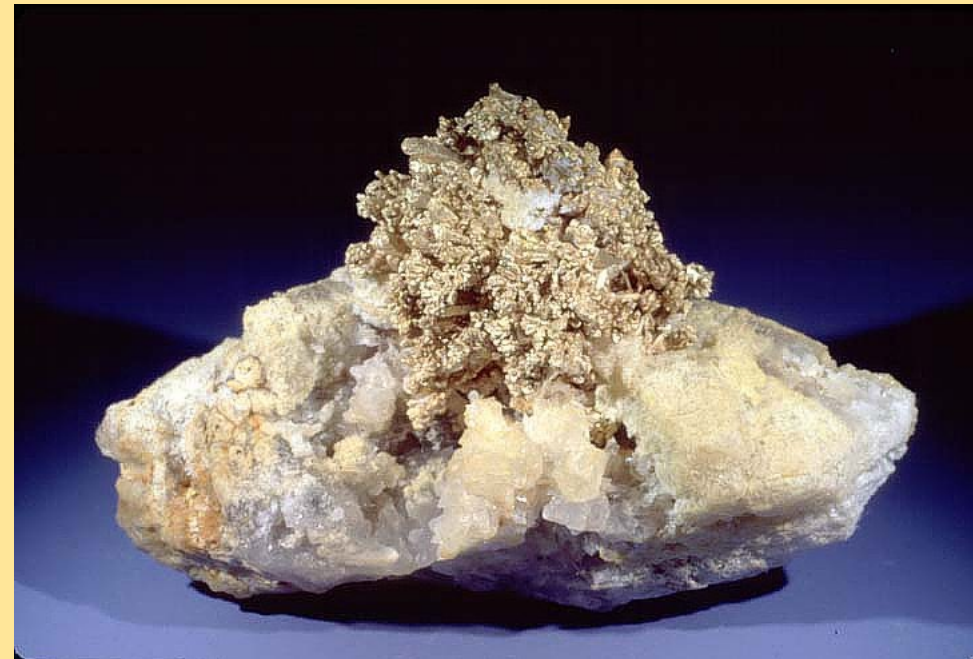
One of the turquoise mines in the Cerrillos Hills district

INTRODUCTION

- Spanish settled New Mexico in hopes of finding riches, in particular gold
- But New Mexico doesn't have the gold deposits that other western states have



11313B - Gold, San Pedro



11439A - Gold, Magdalena



Hydraulic mining at the Lynch Placer in Colfax County, New Mexico, about 1880 (NMBGMR #p-00565)

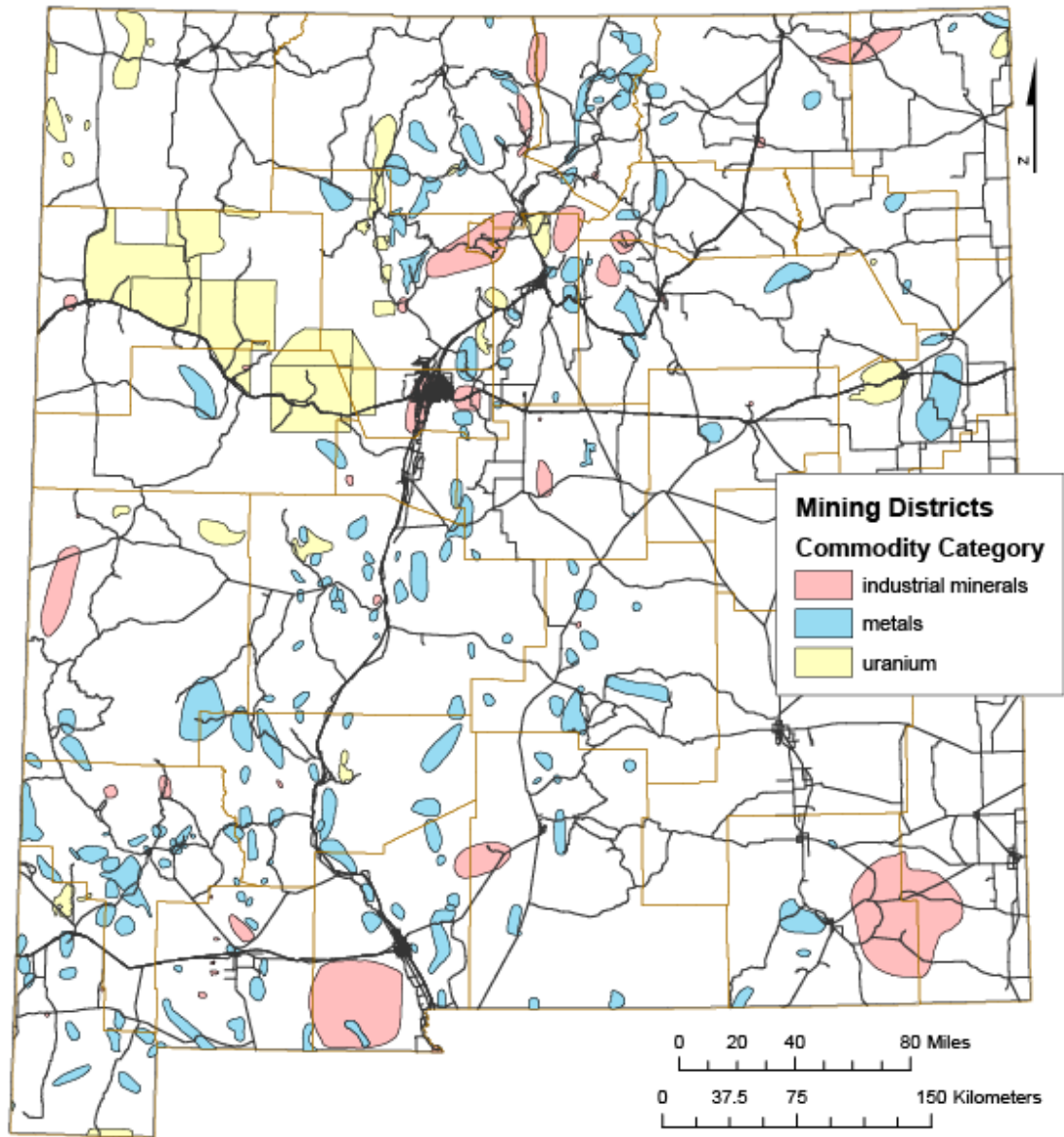
Arrastre in action with John and Jake Long at Piños Altos New Mexico, 1892



MINING DISTRICTS IN NEW MEXICO

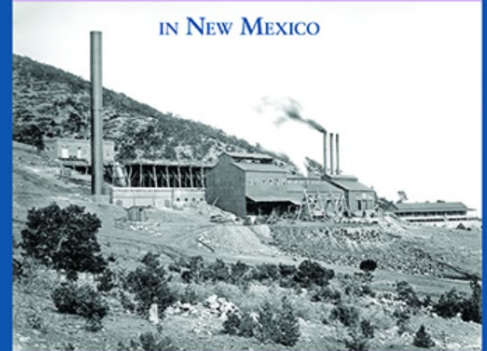
274 mining districts and
prospect areas

173 metals,
40 industrial minerals
33 uranium districts
28 coal fields



MINING DISTRICTS AND PROSPECT AREAS

IN NEW MEXICO



Virginia T. McLemore

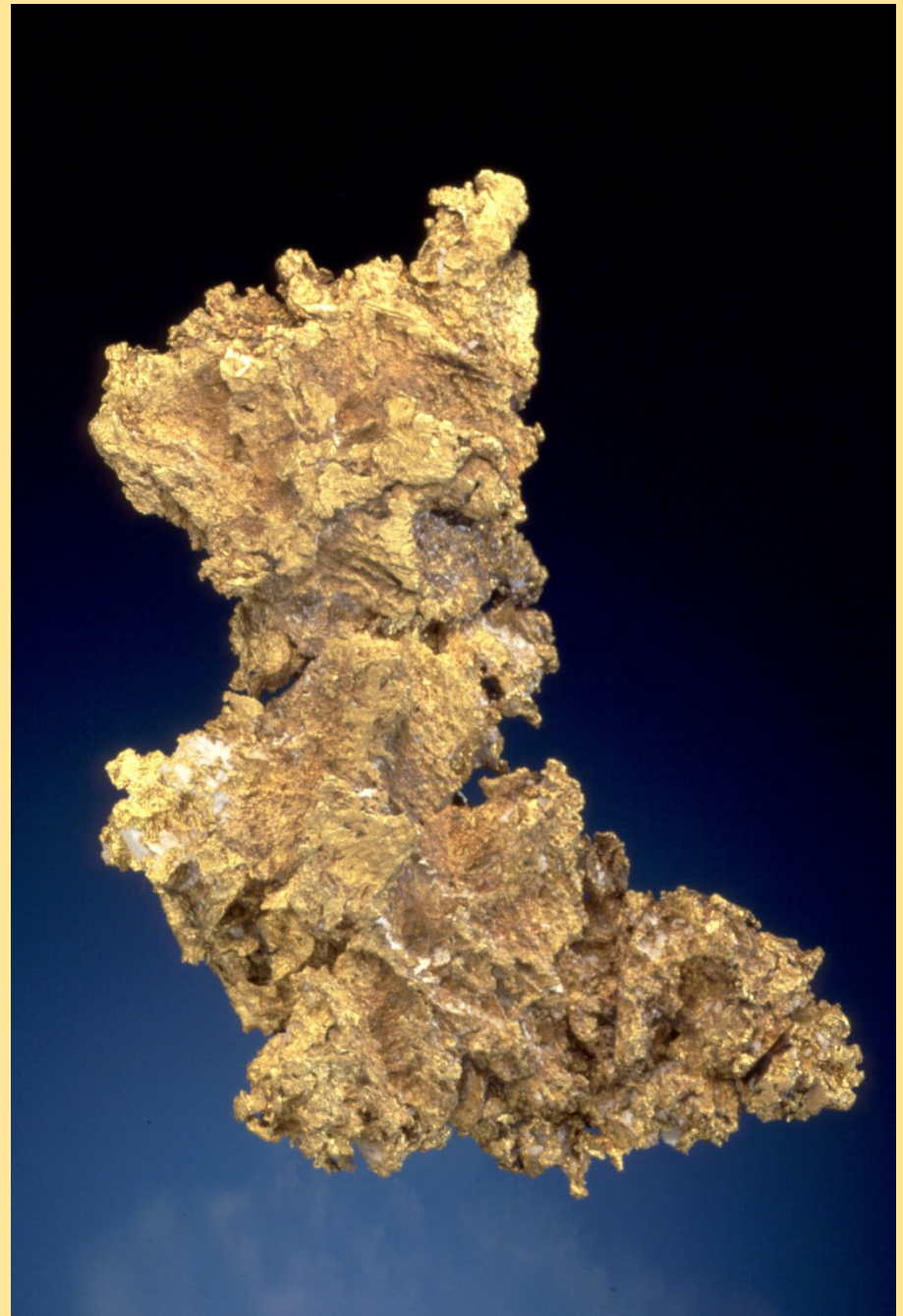
New Mexico Bureau Geology and Mineral Resources
A Division of New Mexico Institute of Mining and Technology

Resource Map 24

2017

MINERAL PRODUCTION

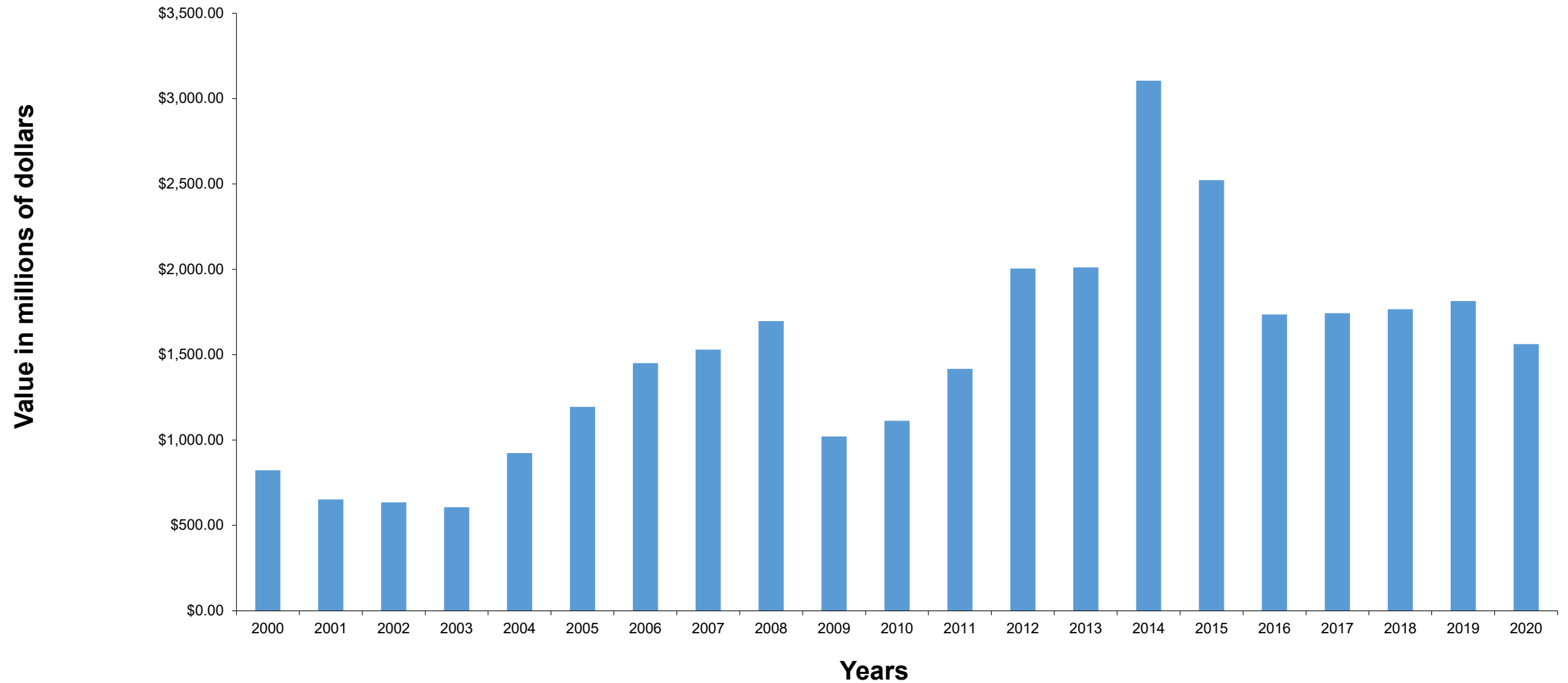
16136 - Gold - Nogal Canyon



Production Summary—2020

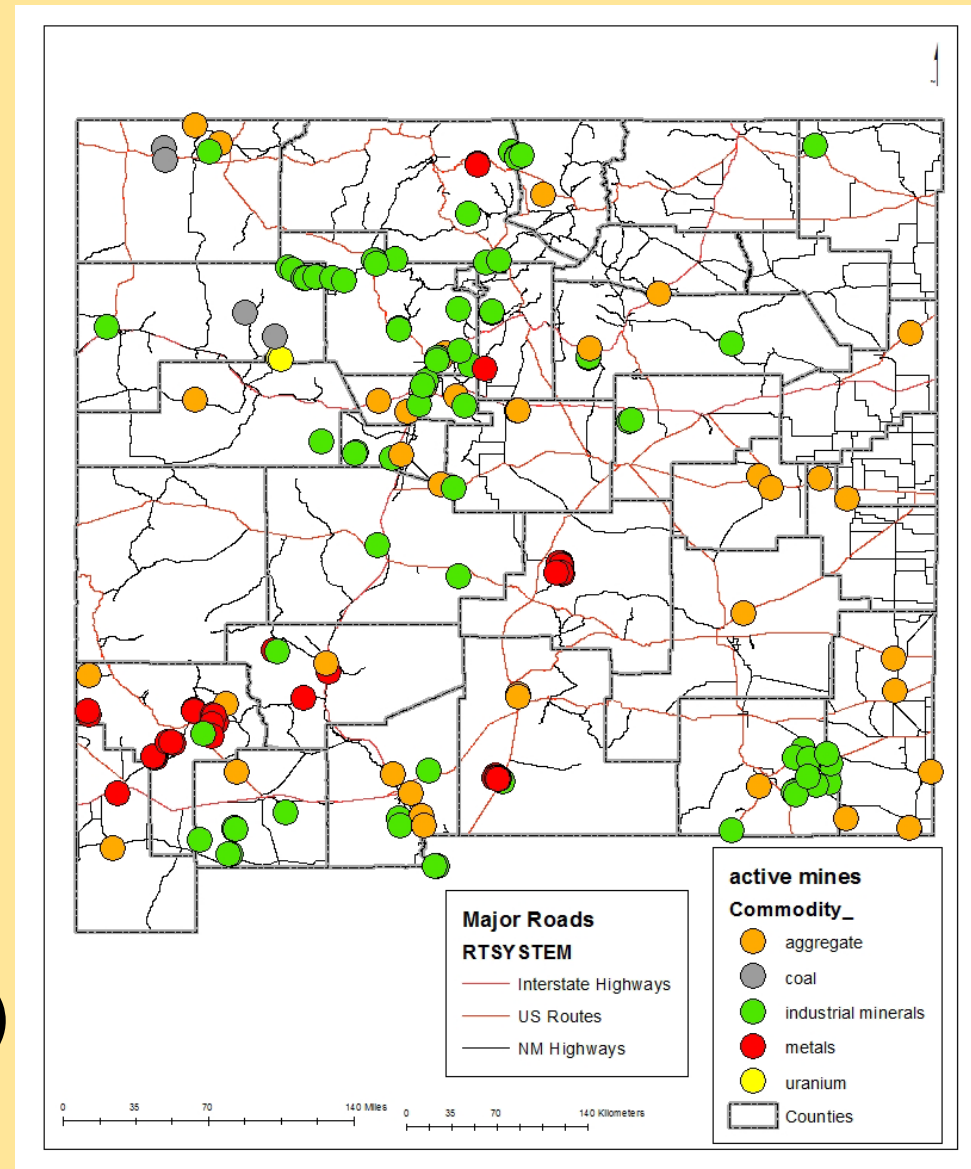
- Value of mineral production NM in in 2020 was \$1.56 billion (down from 2019) (does not include oil and gas)—ranked 23rd in the US (18th in 2017)
- Employment in the mining industry is 4,500
- Exploration for garnet, gypsum, limestone, nepheline syenite, agate, specimen fluorite, gold, silver, iron, beryllium, uranium, copper, potash, rare earth elements, humate, clays, lithium
- COVID closed at least one mine (reopened), but most of the industrial minerals and aggregate operations increased production
- ***MINERALS PRODUCTION IS DECREASING, ESPECIALLY COAL***

Value of mineral production in New Mexico 2000-2020



Active mines 2022

- ~355 active registered mines (NMMMD)
- 4 coal
- 3 potash, 4 potash plants
- 2 copper open pits, 1 concentrator (mill), 2 solvent/electro-winning (SX-EW) plants
 - 1 addition mines in permitting stage
 - Several exploration
- 2 gold mines and 1 mill (active but not producing)
- 1 iron mine
- 1 uranium mine (active but not producing)
- 31 industrial minerals mines, 18 mills
- ~302 aggregate/stone



Not all aggregate mines are shown

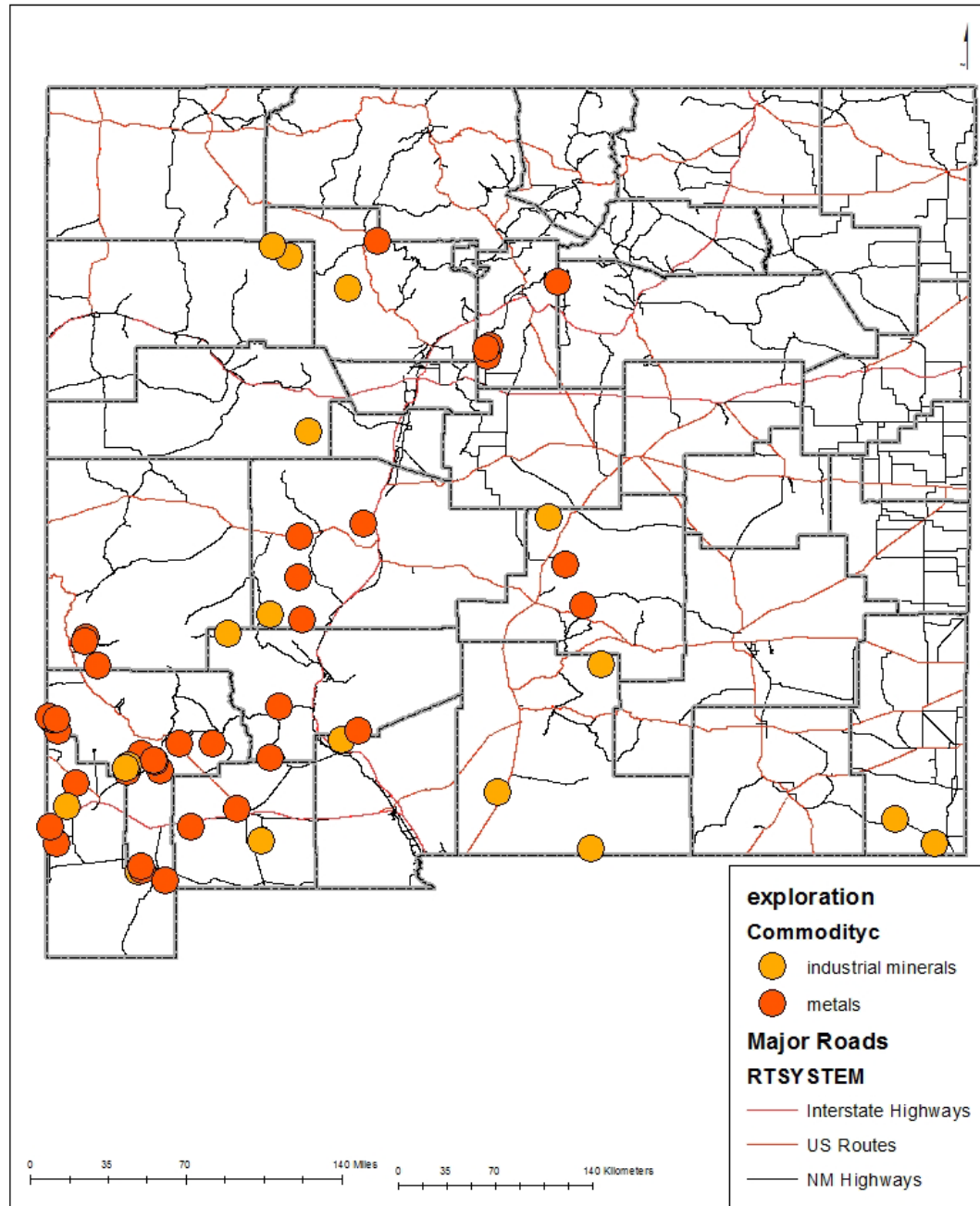
From NM Mining and Minerals Div. database

Selected active exploration sites in New Mexico 2019-2022 (excluding U)

Most of these exploration sites have been known for >20 yrs

Industrial minerals deposits sometimes can be permitted within a few yrs but not metal mines

From NM Mining and Minerals Div. and NMBGMR databases, company web sites

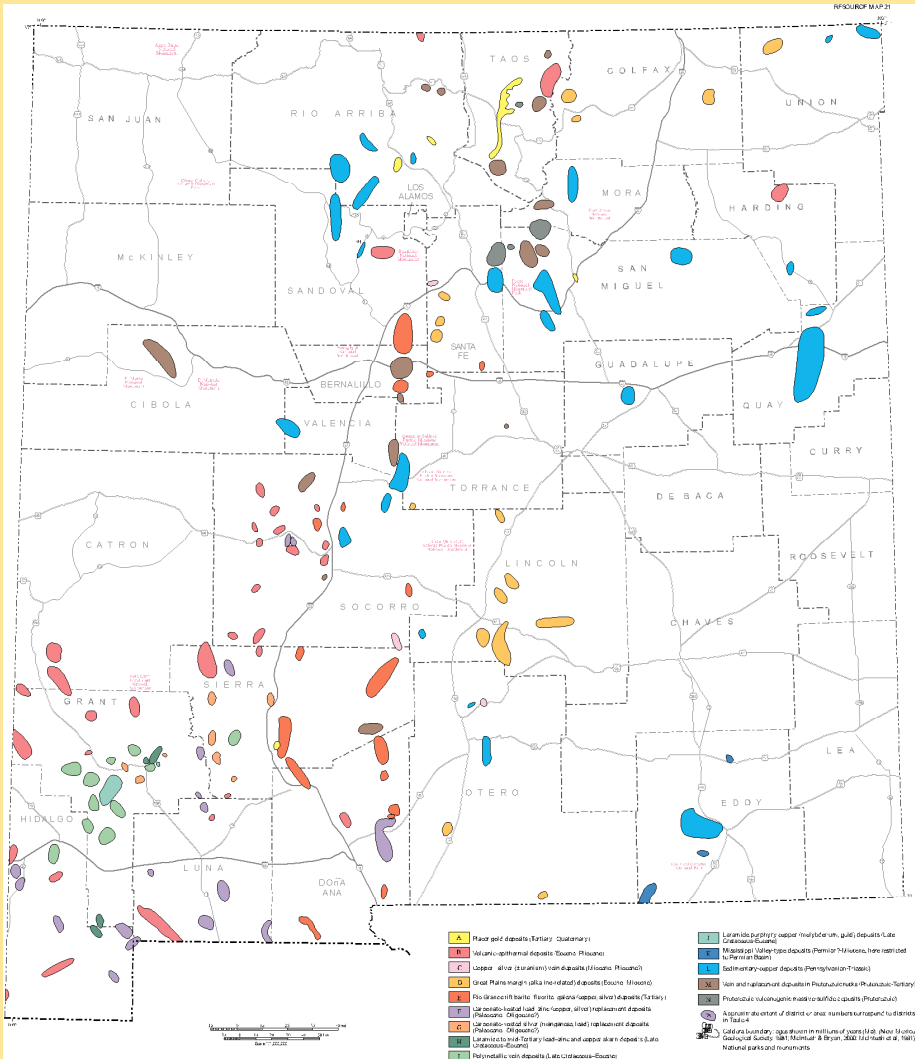


Gold Production 1804-2020

The chart displays two data series over time:

- Gold Production (Troy ounces):** Represented by yellow bars. The production shows significant fluctuations, with major peaks around 1804-1879, 1917, and 1997.
- Gold Value (in Dollars):** Represented by a blue line with diamond markers. The value shows a sharp increase starting around 1977, peaking around 1997, and then declining.

The X-axis represents Years, with labels every 10 years from 1804-1879 to 2017. The Y-axis for Troy ounces ranges from 0 to 160,000. The Y-axis for Value in Dollars ranges from \$0 to \$70,000,000.



Gold Mining districts in New Mexico

1804-2020 >3.4 million troy ounces Au worth >\$582 million

Gold and silver production in
1994-2008, 2011-2022 as a byproduct of
copper production from the Ivanhoe
concentrator (Freeport-McMoRan)

2009-2016 Summit mine

9th in gold production
10th in silver production

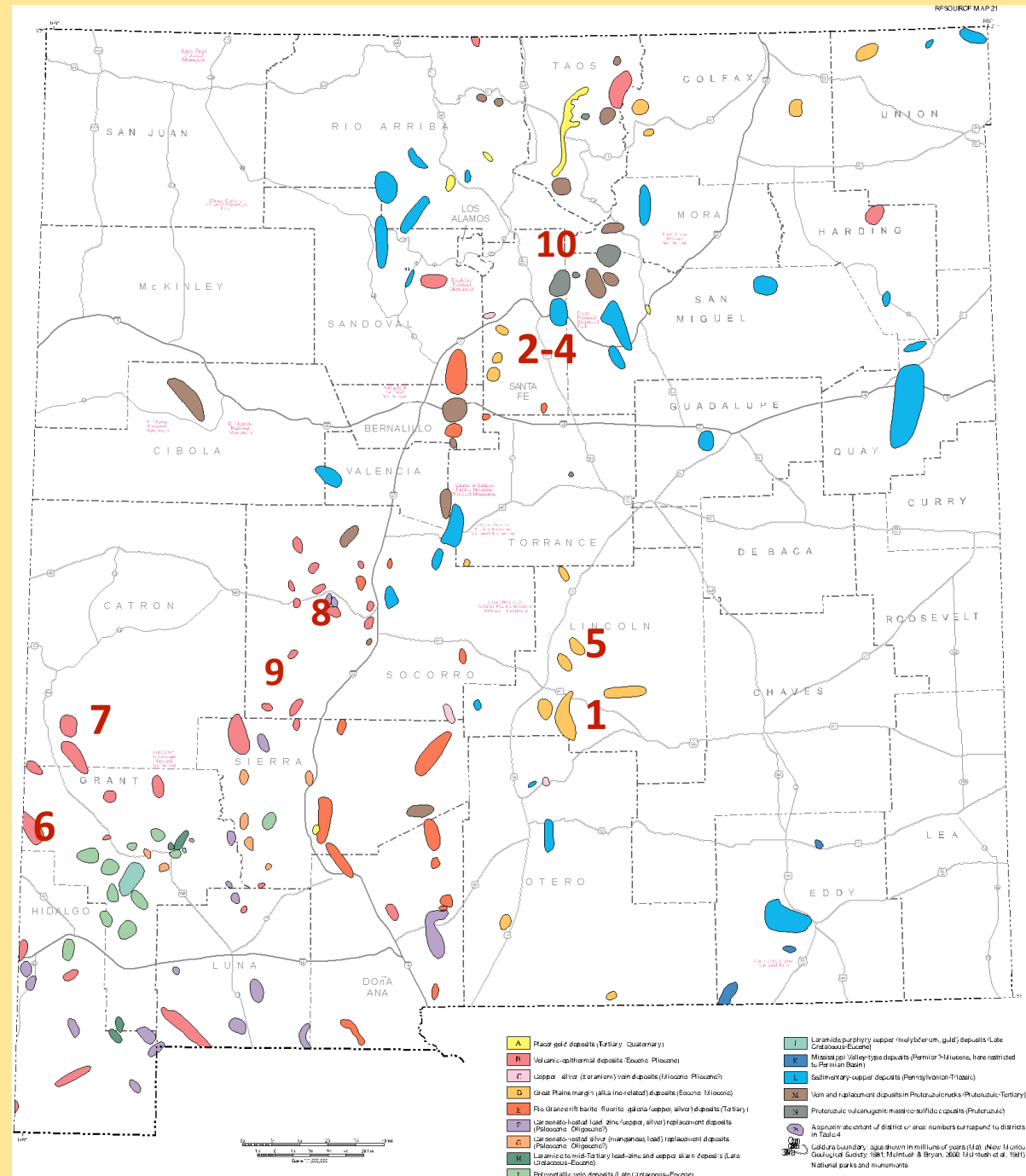
Chino mine

- In operation since 1910
- 36,000 metric ton-per-day concentrator and 150 million pound-per-year SX/EW plant
- Closed in April 2020 in response to COVID
- Reopened in January 2021
- Production was 92 million pounds in 2020, 175 million pounds in 2019
- Mine life is 2039
- Updating of permits for planned expansion underway



Gold and Silver

1. Vera Cruz, Lincoln Co
2. Carache Canyon, Santa Fe Co
3. Lukas Canyon, Santa Fe Co
4. San Lazarus, Santa Fe Co
5. Jicarilla Au placers
6. Steeple Rock district
7. Mogollon, Catron Co
8. Magdalena, Socorro Co
9. Rosedale, Socorro Co
10. Terrero, Santa Fe



Summit gold mine

In 2009, Santa Fe Gold opened the Summit mine in the Steeple Rock district, closed 2016

The ore was milled at Lordsburg and sold as silica flux



TABLE 3—Major gold-producing districts in New Mexico (updated from North and McLemore, 1986, 1988). *Major placer production (>50,000 oz), + no known placer deposits.

District	County	Estimated gold production (oz)	Type of deposits
+ Santa Rita	Grant	>475,000	porphyry copper
*Elizabethtown-Baldy	Colfax	471,400	Great Plains Margin, placer
*Old Placers	Santa Fe	450,000	Great Plains Margin, placer
+ Mogollon	Catron	365,000	volcanic-epithermal
*Hillsboro	Sierra	270,000	Laramide vein, placer
Lordsburg	Hidalgo	266,600	Laramide vein, minor placer
Willow Creek	San Miguel	179,000	Proterozoic massive sulfide, minor placer
White Oaks	Lincoln	163,500	Great Plains Margin, placer
+ Steeple Rock	Grant	151,000	volcanic-epithermal
*Pinos Altos	Grant	150,000	Laramide vein, carbonate-hosted, placer

TYPES OF GOLD DEPOSITS IN NEW MEXICO



11443A - Gold, North Baldy, Magdalena



11314A - Gold and Pyrite, San Pedro

Types of Gold Deposits in New Mexico

- **Placer gold**
- **Volcanic-epithermal**
- Copper-silver (\pm uranium) vein
- **Great Plains Margin**
- Rio Grande Rift
- Carbonate-hosted lead-zinc (copper-silver) replacement
- Carbonate-hosted silver (manganese, lead) replacement
- Laramide copper and lead/zinc skarn
- Laramide vein
- Laramide porphyry-copper (molybdenum, gold)
- Sedimentary-copper
- Vein and replacement deposits in Proterozoic rocks
- Proterozoic massive-sulfide deposits

PLACER GOLD DEPOSITS IN NEW MEXICO



15811 - Gold, San Lazurus Gulch,
San Pedro

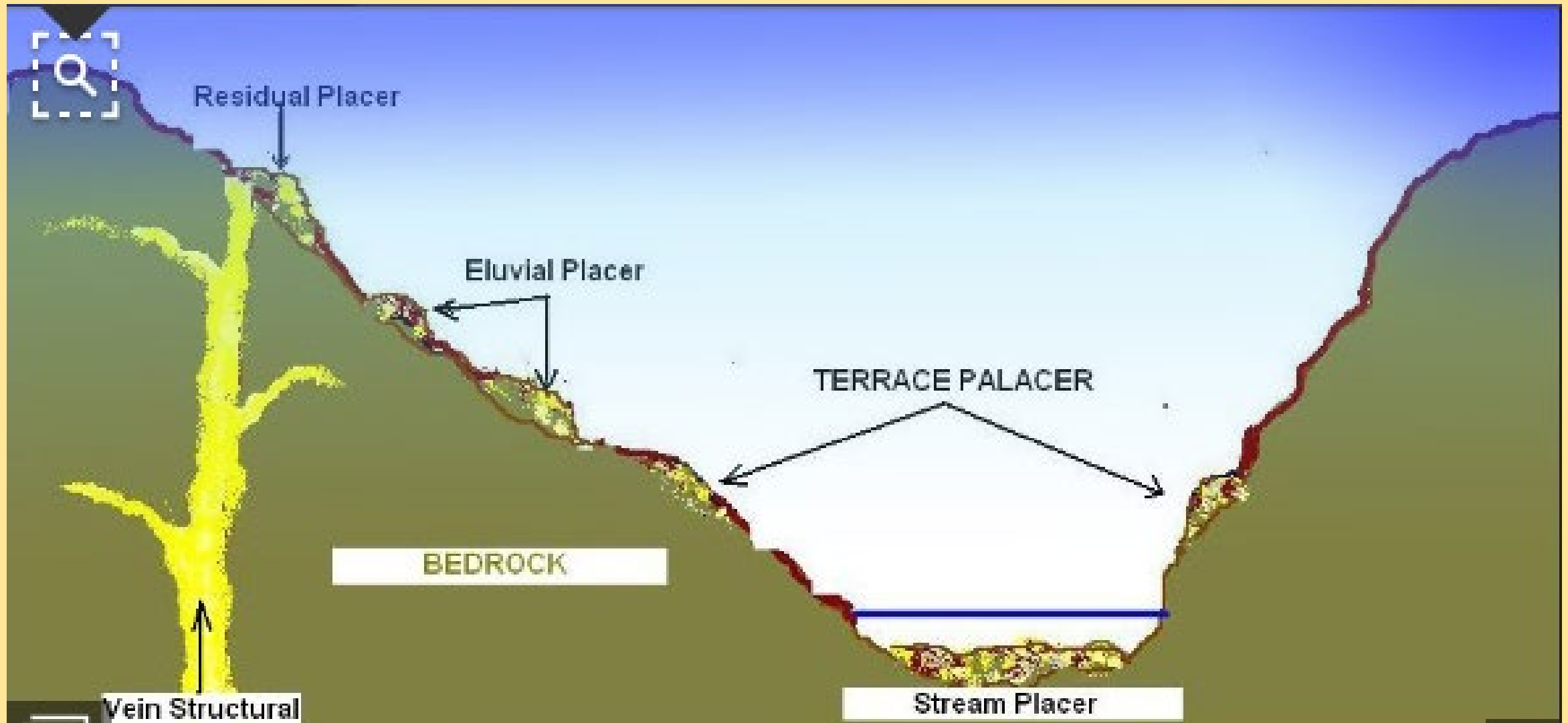


Placer Gold Deposits in New Mexico

- Important source of gold in NM prior to 1902
- Placer production in NM after 1902 has been minor
- Most placer gold deposits discovered in NM by 1900
- ~662,000 oz of gold produced 1828 to 1991
- No recorded placer production since 1991
- Placer is from Spanish meaning alluvial sand
- Any natural accumulation or concentration of a material in unconsolidated sediments of a stream, beach, or residual deposit
- Four conditions must occur
 - Source terrain must crop out
 - Source must be weathered
 - Gold is eroded, transported and concentrated
 - Deposit must be preserved from erosion

Types of placer deposits

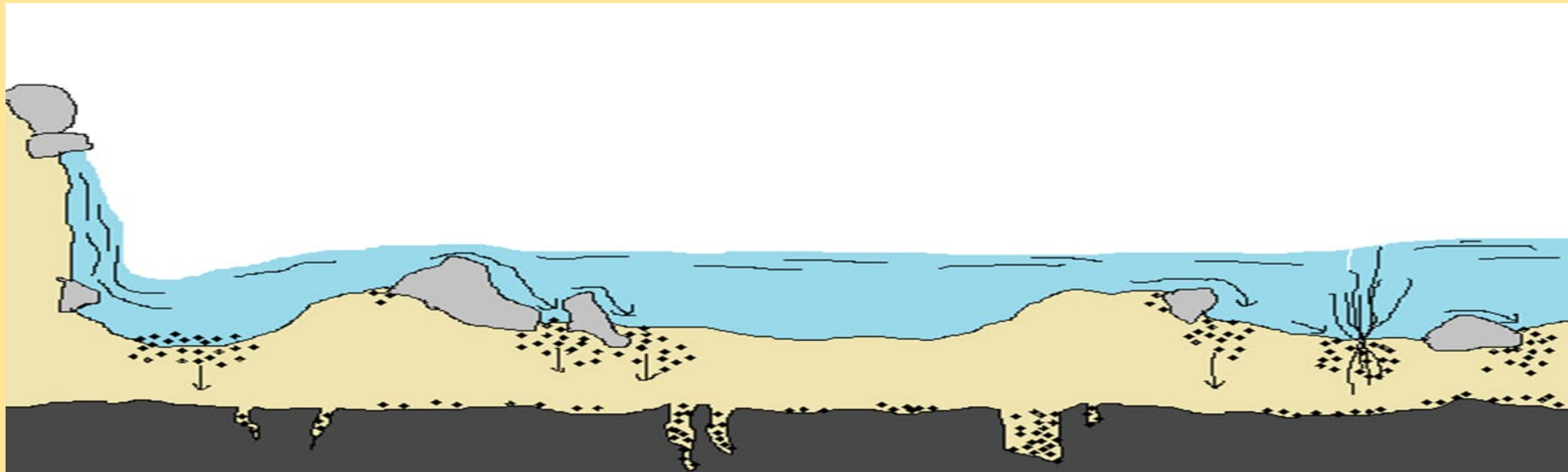
- Alluvial, including terrace placers
 - the sands and gravels of streams, rivers, beaches and deltas
- Aeolian
 - windblown sand deposits and are relatively minor
- Eluvial (hill-slope) or residual
 - weathered detritus directly over or near the outcrops of the lode deposits



https://www.bing.com/images/search?view=detailV2&ccid=gaBBdoA%2b&id=2C4F3AE3F979478731489D420C2DDA6ABA3B131A&thid=OIP.gaBBdoA-wDK4T72_euNcMQEsCa&q=placer+gold+deposits&simid=607986213416406559&selectedIndex=0&ajaxhist=0

Alluvial deposits

- Hill-side placers on valley slopes that are partly sorted by running water but not in distinct channels
- Gulch or creek placers that are shallow placers in or adjacent to the beds of small streams
- Bench or terrace placers, consisting of old stream gravels partly removed by later streams that have cut into the original bedrock

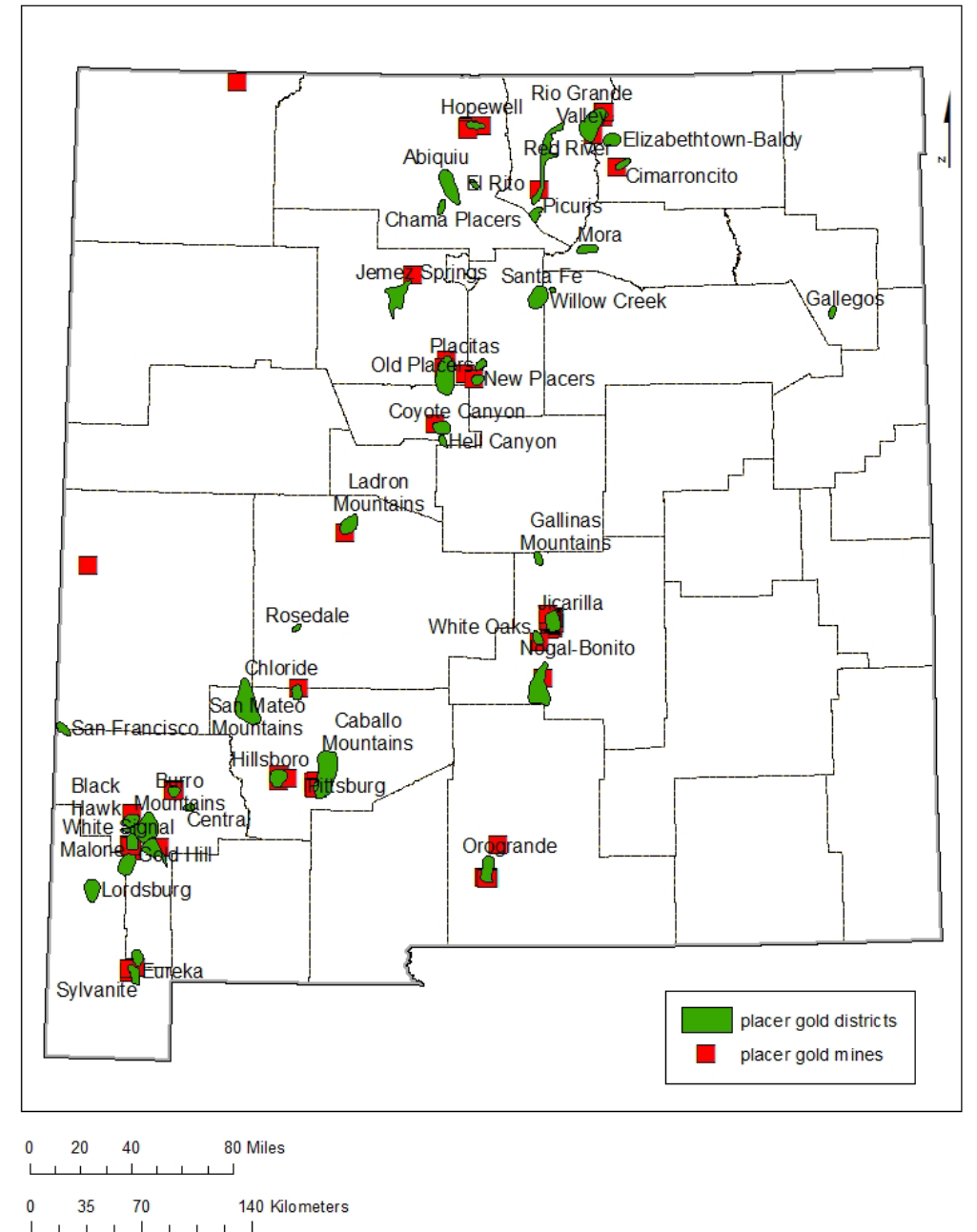


Alluvial deposits—cont

- River-bar placers that occur in river bars and in gravel flats adjacent to larger streams of small gradient
- Gravel-plain placers formed in flood plains, deltas and alluvial fans
- Buried placers that have been buried by a later accumulation of sediments or by surface flows of igneous rock
- Beach placer deposits

Major placer gold deposits in NM

- >100,000 oz gold
 - Elizabethtown/Baldy
 - Hillsboro
 - Old Placers
 - New Placers
- Generally occur in alluvial fan deposits, bench or terrace gravel deposits, river-bars, and stream deposits or as residual placers formed directly on top of lode deposits



Placer gold districts and selected placer gold mines

TABLE 1—Placer production from New Mexico (modified from Johnson, 1972; North and McLemore, 1988). Map Fig. 1.

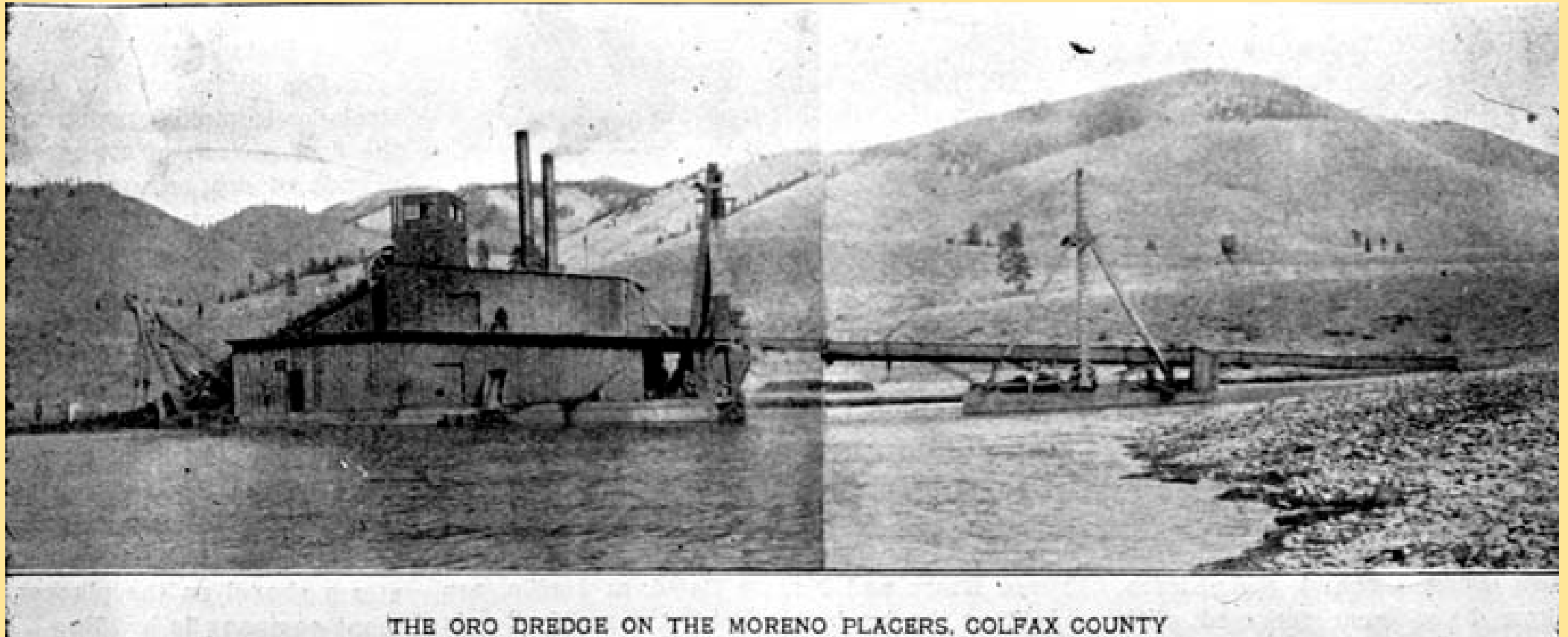
Map no.	District	County	Year of discovery	Estimated prior to 1902 (oz)	Recorded 1902–1991 (oz)	Total estimated placer production (oz)	Total estimated lode production (oz)
1	Elizabethtown-Baldy	Colfax	1866	225,000	25,167	251,000	220,400
2	Hillsboro	Sierra	1877	104,000	15,559	120,000	45,000
3	Old Placers	Santa Fe	1828	100,000	1,558	>102,000	98,000
4	New Placers	Santa Fe	1839	96,759	3,011	>100,000	17,000
5	Pinos Altos	Grant	1860	38,842	5,995	50,000	100,000
6	Hopewell	Rio Arriba	1880	15,000	121	16,000	8,000
7	Pittsburg	Sierra	1901	none	7,089	8,000	0
8	Jicarilla	Lincoln	1850	4,500	3,020	8,000	8,000
9	Orogrande	Otero	1899	400	1,546	>2,000	14,500
10	White Signal and Malone	Grant	1884	some	366	1,700	12,000
11	White Oaks	Lincoln	1879	unknown	885	1,000	162,000
12	Rio Grande valley	Taos	1600	unknown	16	<1,000	0
13	Cimarroncito	Colfax	1898	some	none	<1,000	0
14	Bayard	Grant	1900	some	128	<1,000	24,000
15	Red River (Rio Hondo)	Taos	1826	unknown	120	<500	365
16	Nogal	Lincoln	1865	some	134	200	14,800
17	Sylvanite	Hidalgo	1908	none	109	<200	2,400
18	Willow Creek	San Miguel	1883	unknown	none	100	179,000
19	Picuris	Taos	1908	unknown	65	100	15
20	Rio Chama	Rio Arriba	1848	unknown	some	<100	0

TABLE 2—Location of placer gold deposits in New Mexico (from Johnson, 1972, and other references listed in Table 1) and age of adjacent lode gold deposits (from North and McLemore, 1986, 1988; McLemore, in press).

District	Approximate location of placer gold deposits		Approximate age of lode gold deposits
Elizabethtown-Baldy	T27N R16-18E	Moreno River valley, flanks of Baldy Mountain, Ute and Ponil Creeks	Oligocene-Miocene
Hillsboro	T15-16S R6-7W	Animas Hills, Dutch Gulch, Rio Percha	Laramide
Old Placers	T12-13N R7-8E	Ortiz Mountains, Cunningham Canyon, Dolores Gulch, Arroyo Viejo	Oligocene-Miocene
New Placers	T12N R2E	San Pedro Mountains, Tuerto Creek	Oligocene-Miocene
Pinos Altos	T16-17S R13-14W	Bear Creek, Rich Gulch, Whiskey Gulch, Santo Domingo Gulch, near Mountain Keg mine	Laramide
Hopewell	T28-29N R6-7E	Tusas Mountains, Placer Creek (Eureka Creek)	Proterozoic
Pittsburg	T14,16,17S R4W	Trujillo Gulch, Apache Canyon, Union Gulch, Palomas Gap	Proterozoic
Jicarilla	T5S R12E	Ancho, Warner, Spring, and Rico Gulches	Oligocene-Miocene
Orogrande	T22S R8E	Jarilla Mountains	Laramide
White Signal, Malone	T20S R16, 14W	Gold Gulch, Gold Lake	Laramide
White Oaks	T6S R11E	Baxter and White Oaks Gulches	Oligocene-Miocene
Rio Grande valley	—	Red River to Cabresto Creek	unknown
Cimarroncito	T26N R18E	Urraca Creek	Oligocene-Miocene
Bayard	T17-18S R12-13W	drainages near Bayard	Laramide
Red River	T28-29N R14-15E, T26-27N R13E	Bitter Creek, Comanche Creek, Placer Creek, Red River, Gold Hill, Lucero Creek, Arroyo Hondo	Precambrian, mid-Tertiary



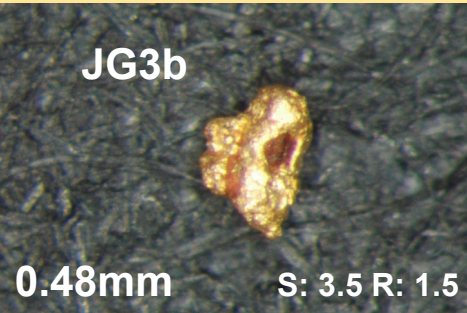
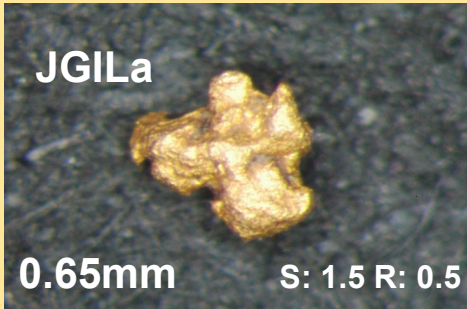
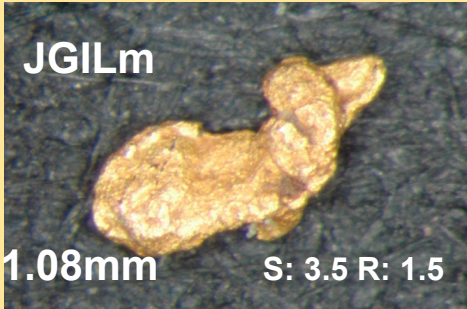
Placer mining with rockers and longtoms in mouth of Baxter Gulch near Baxter Mountain near White Oaks, New Mexico, ca 1900 (NMBGMR #p-01658)



The Oro Dredge on the Moreno
Placers, New Mexico, July 8, 1905
(NMBGMR #sh-00905)

Using Trace Element Analysis of Placer Gold to Determine Source and type of original deposit

METHODOLOGY



- Physical collection and organization
 - Sphericity & Roundness
 - Morphological studies
- Microprobe analysis
 - Backscattered electron (BSE) imaging
 - Quantitative Analysis

Orogrande GPEP1

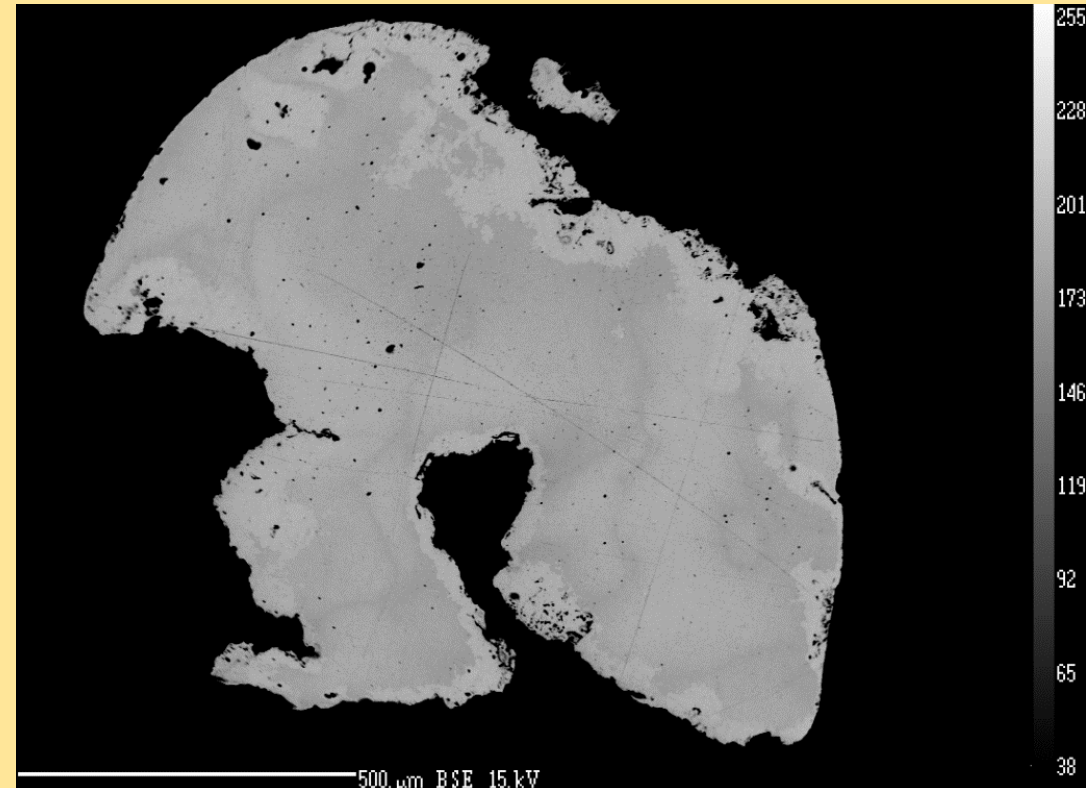
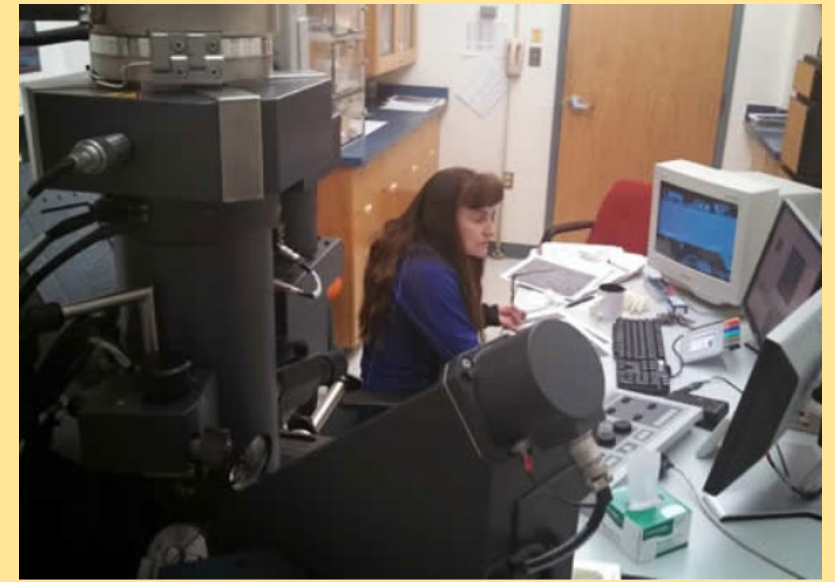
Lat: 32.399175 32° 23' 57.03" N

Long: -106.125924 106° 7' 33.33" W

Sample Name	Length (mm)	Size of Particles (d.)	Sphericity	Roundness
OROGPEP1a	1.24	4	3.5	0.5
OROGPEP1b	1.32	4	3.5	1.5
OROGPEP1c	0.86	3	2.5	2.5
OROGPEP1d	0.95	3	2.5	0.5
OROGPEP1e	0.8	3	3.5	1.5
OROGPEP1f	1.07	4	4.5	2.5
OROGPEP1g	0.45	3	4.5	4.5
OROGPEP1h	0.74	3	3.5	1.5
OROGPEP1i	0.59	3	1.5	4.5
OROGPEP1j	0.53	3	2.5	1.5
OROGPEP1k	0.49	2	4.5	0.5
OROGPEP1l	0.56	3	3.5	2.5
OROGPEP1m	0.46	2	2.5	2.5
OROGPEP1n	0.23	1	2.5	2.5
OROGPEP1o	0.32	2	3.5	2.5
OROGPEP1p	0.32	2	0.5	2.5
OROGPEP1q	0.41	2	4.5	3.5
OROGPEP1r	0.41	2	1.5	1.5

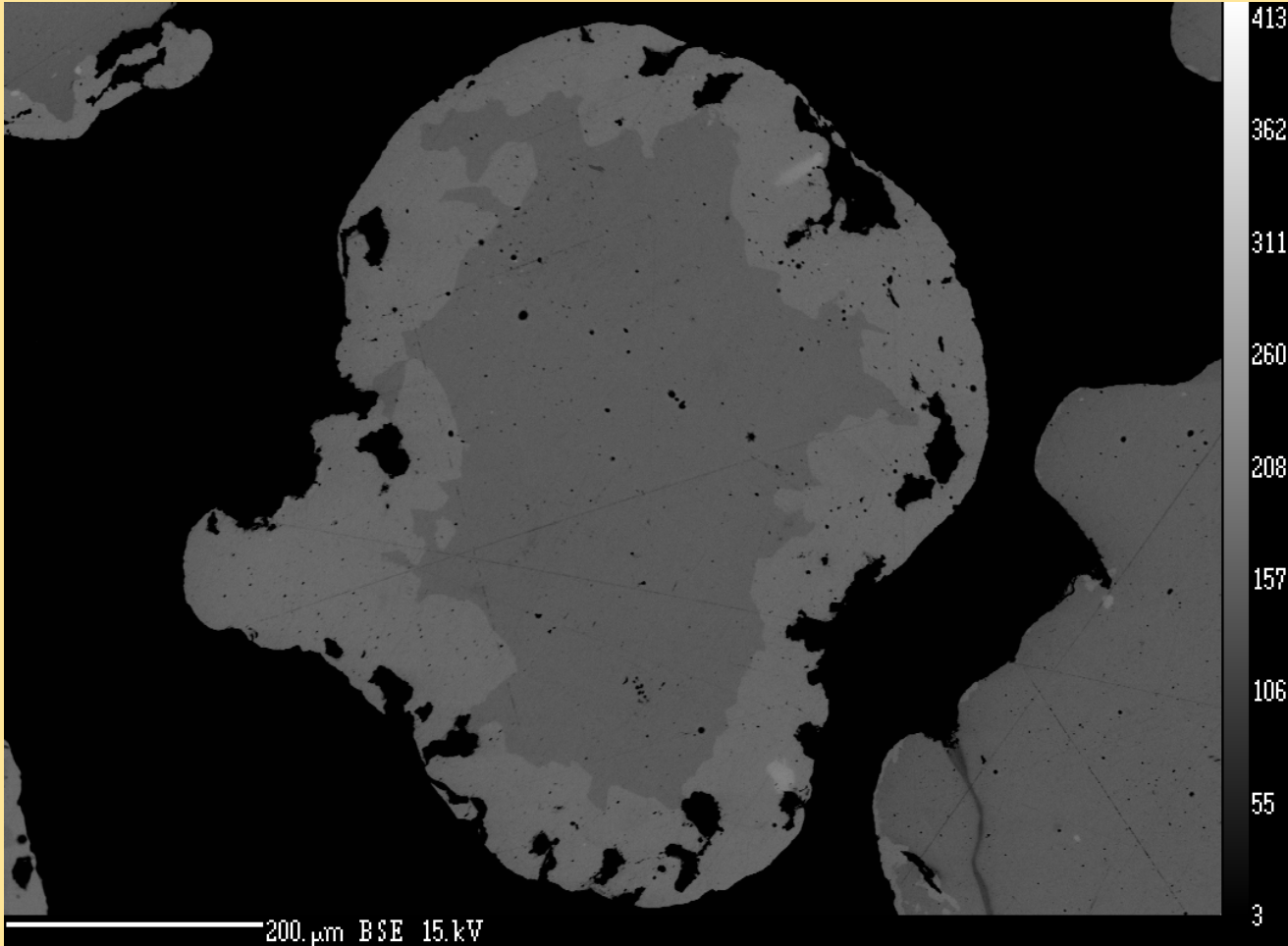
Backscattered Electron Imaging

- Analysis begins with backscattered electron (BSE) imaging using an electron microprobe to determine if chemical or weathering zonation was present in gold particles

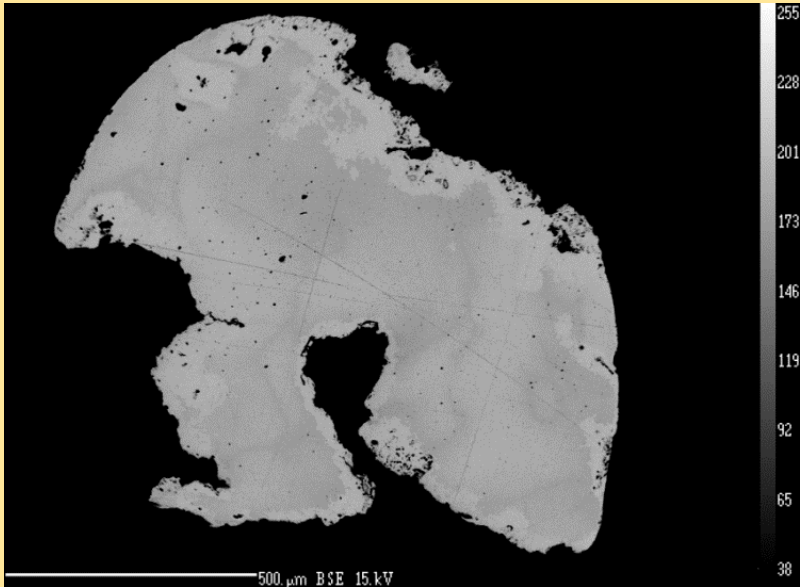


Source of placer gold deposits

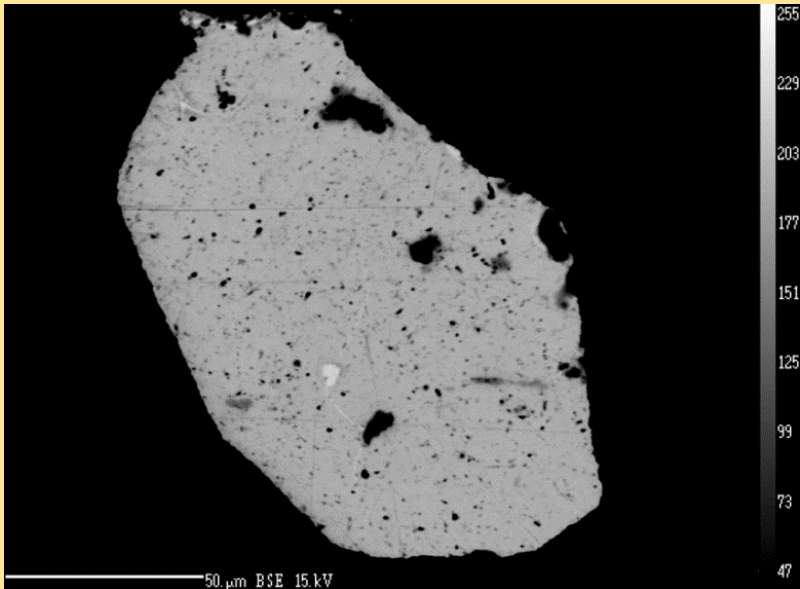
backscattered electron (BSE) imaging to determine chemical zonation in gold particles



Hillsboro grain



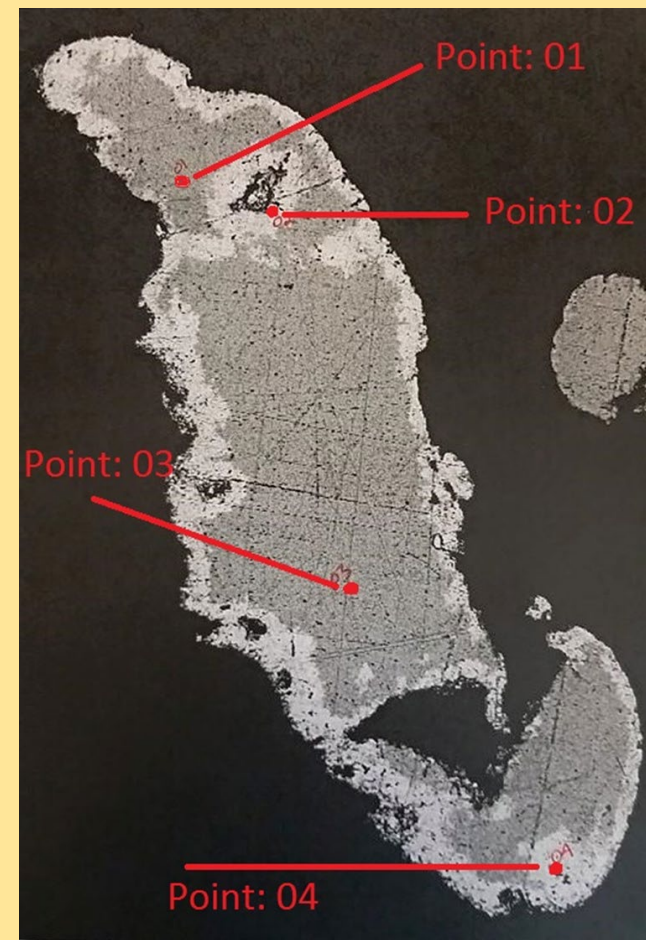
PA grain



JICS/Sally vein grain

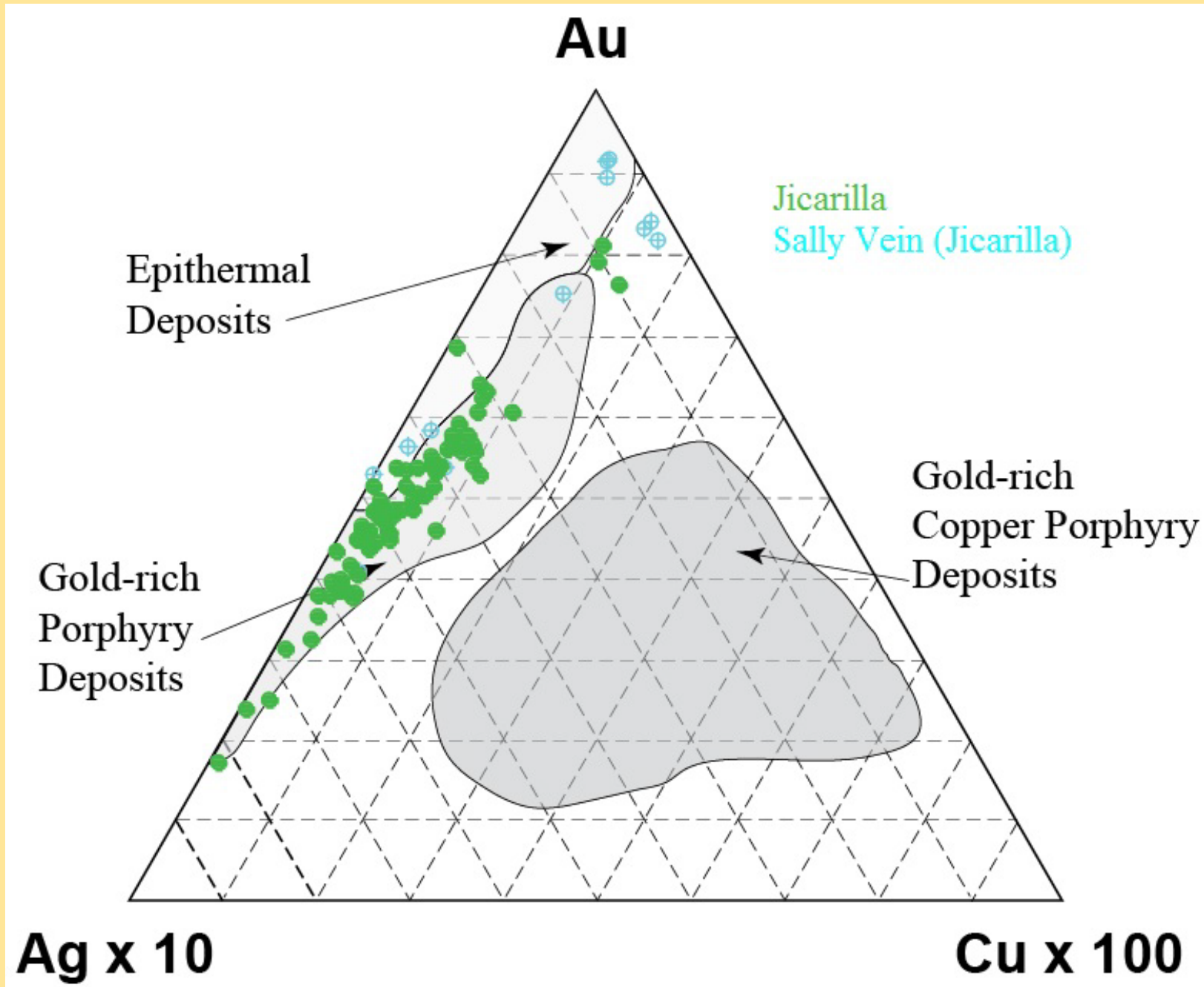
Quantitative Analysis

- Determine composition of different areas of a selected grain.
- Element selection
 - Ag, Au, Cu, As, Pb, Fe, S
- Analyses on:
 - Rims
 - Cores
 - Inclusions

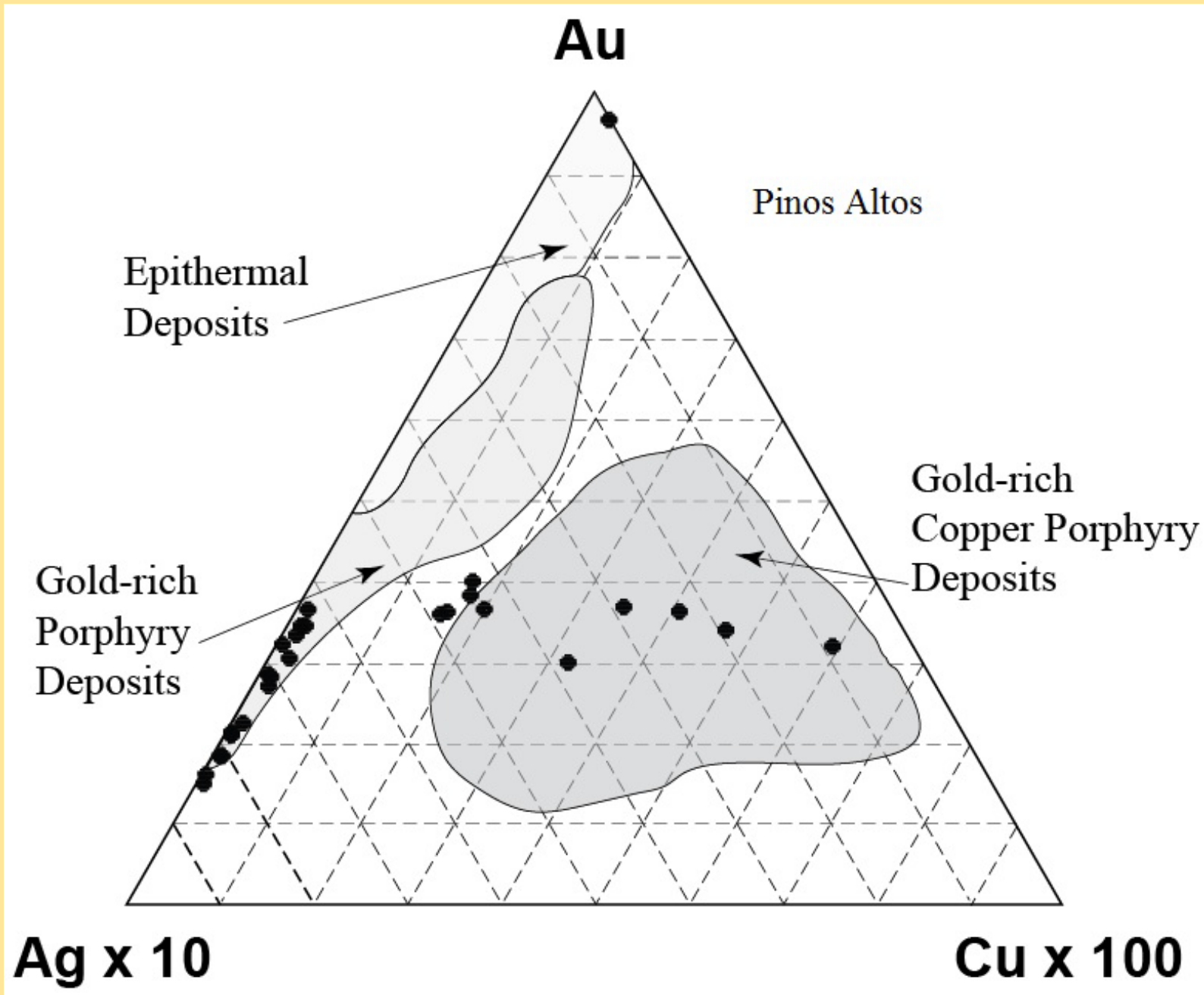


			Ag	Au	Cu	As	Pb	Fe	S	Total
38	37 / 1.	DeadwoodGulch-01	24.55	72.77	0.02	0	0	0.01	0.02	97.38
39	38 / 1.	DeadwoodGulch-02	0.87	96.34	0.06	0	0	0.01	0.03	97.31
40	39 / 1.	DeadwoodGulch-03	24.62	72.95	0.02	0	0	0	0.02	97.6
41	40 / 1.	DeadwoodGulch-04	1.32	95.48	0.05	0.01	0	0	0.03	96.88

Jicarilla



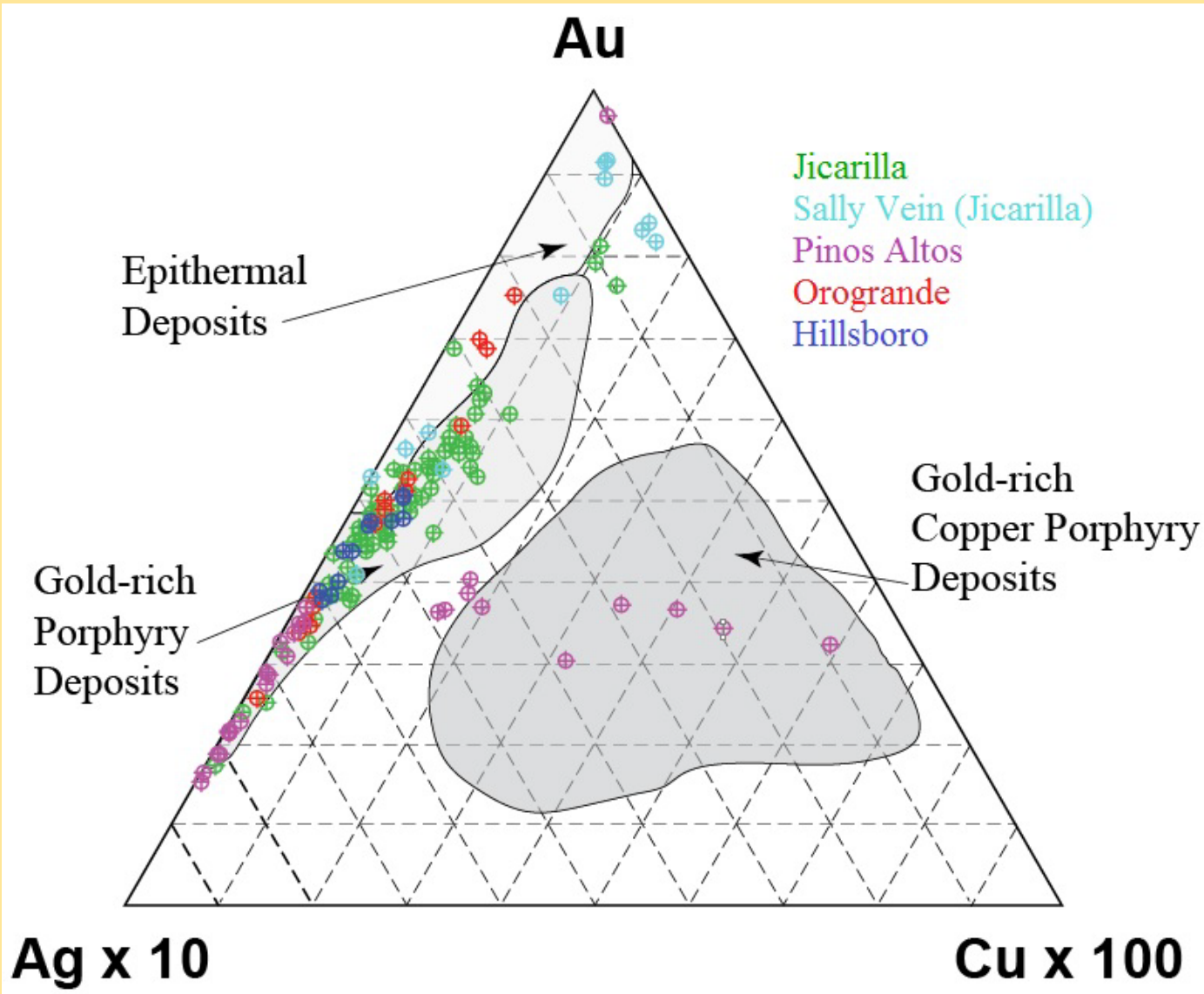
Piños Altos



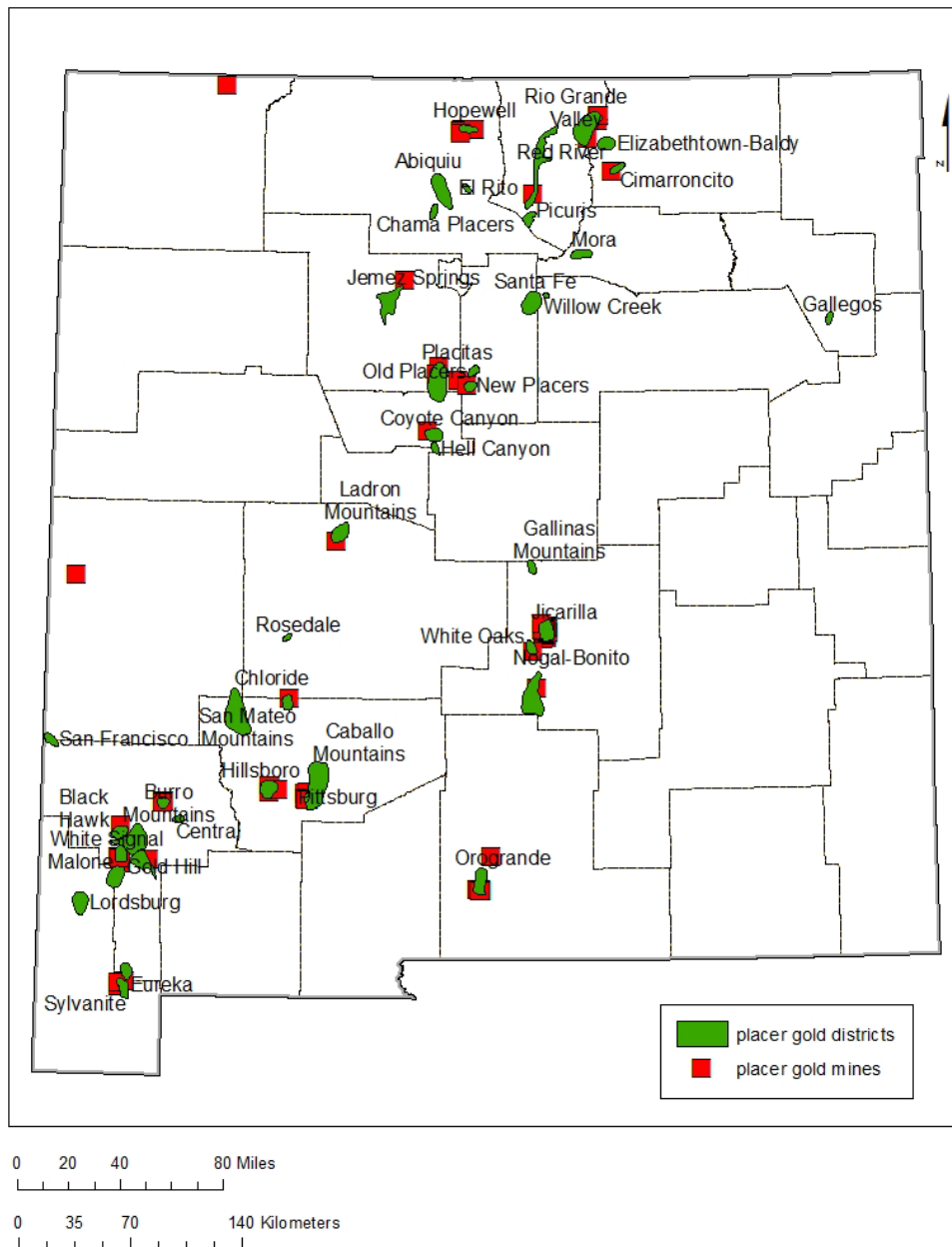
2 sources

- Au-rich Cu porphyry
- Pb-Zn and Cu skarns and polymetallic veins

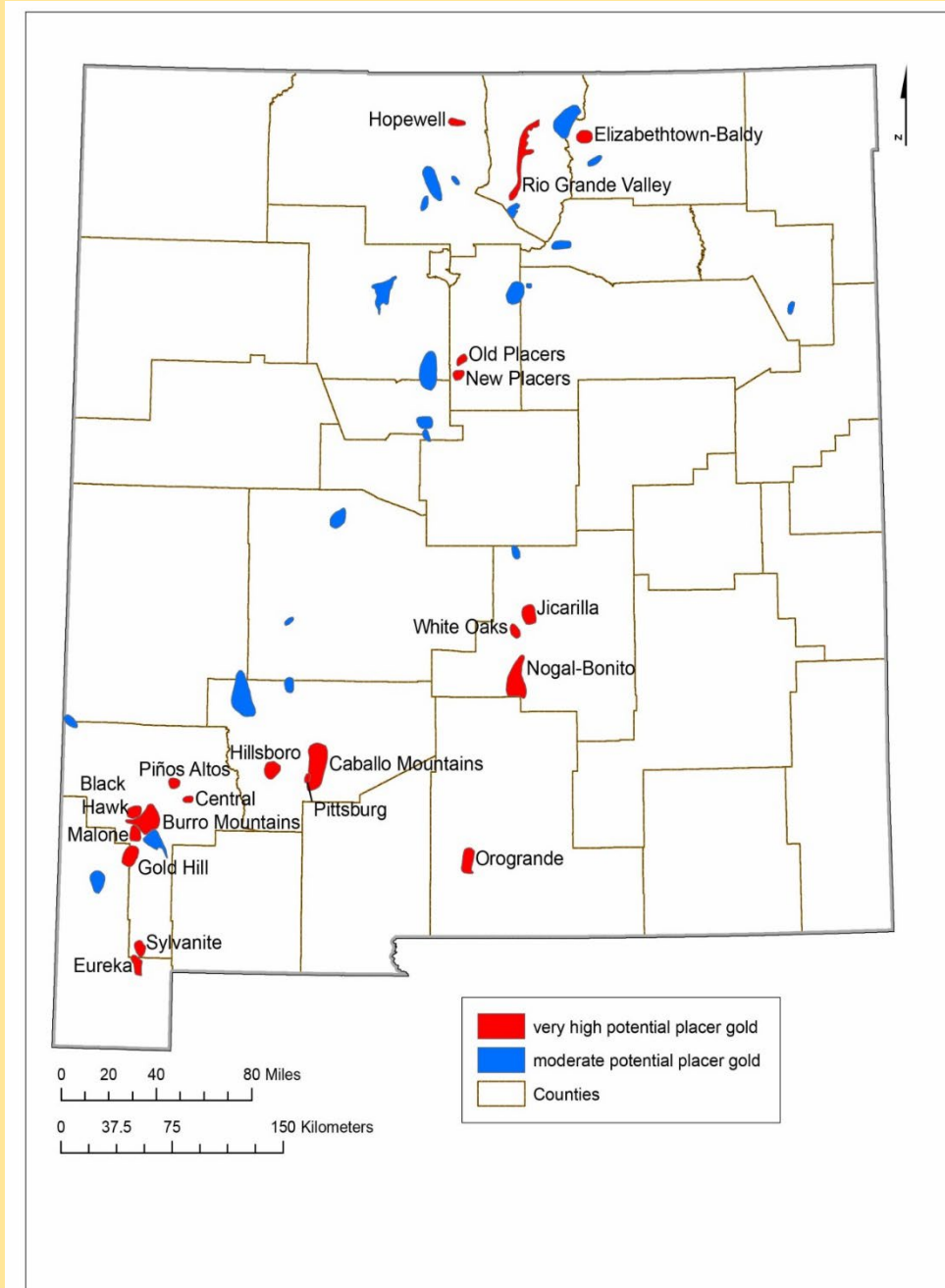
New Mexico placer gold districts



- New Mexico's placer gold didn't travel far from source
- Chemical compositions of placer gold samples can be correlated with specific



Best
places
to pan
for gold
in New
Mexico



VOLCANIC-EPITHERMAL VEIN DEPOSITS

Summit gold mine, Steeple Rock district

In 2009, Santa Fe Gold opened the Summit mine in the Steeple Rock district, closed in 2016

The ore was milled at Lordsburg









Mineralium Deposita
SGA
Society for Geology
Applied to Mineral Deposits

Breccia ore



GREAT PLAINS MARGIN (ALKALIC-RELATED) GOLD DEPOSITS or NORTH AMERICAN ALKALINE GOLD BELT



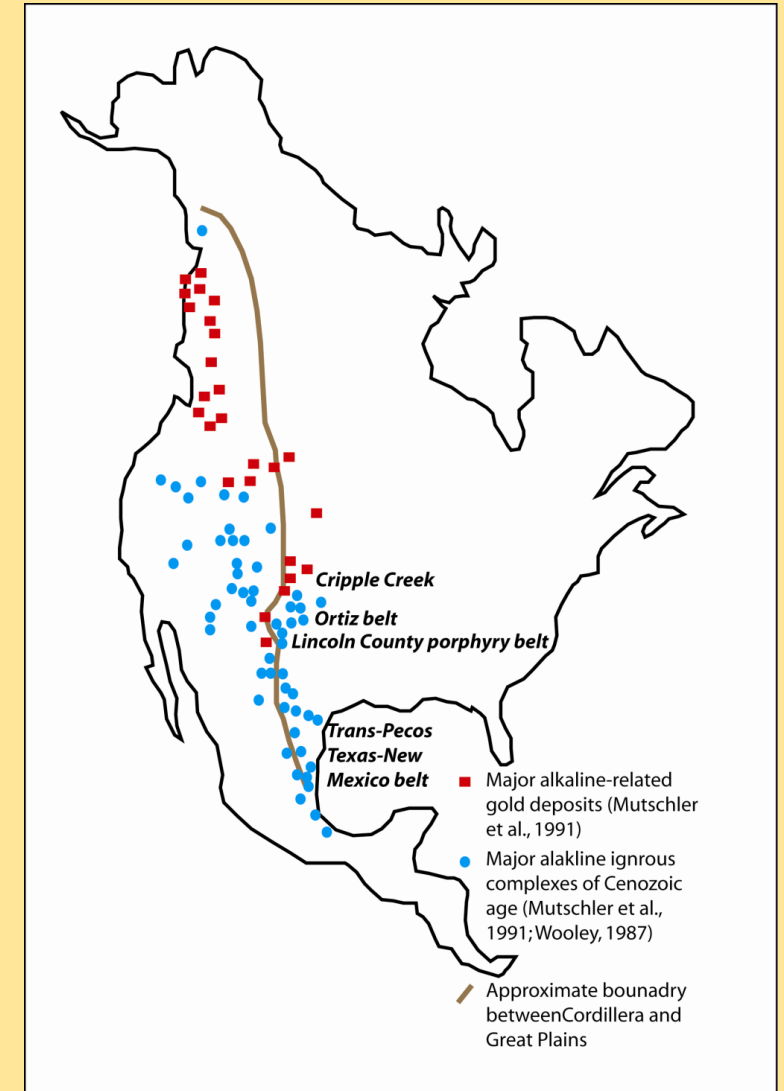
16295 - Gold,
Helen Rae mine,
Nogal Canyon

16136 - Gold -
Nogal Canyon



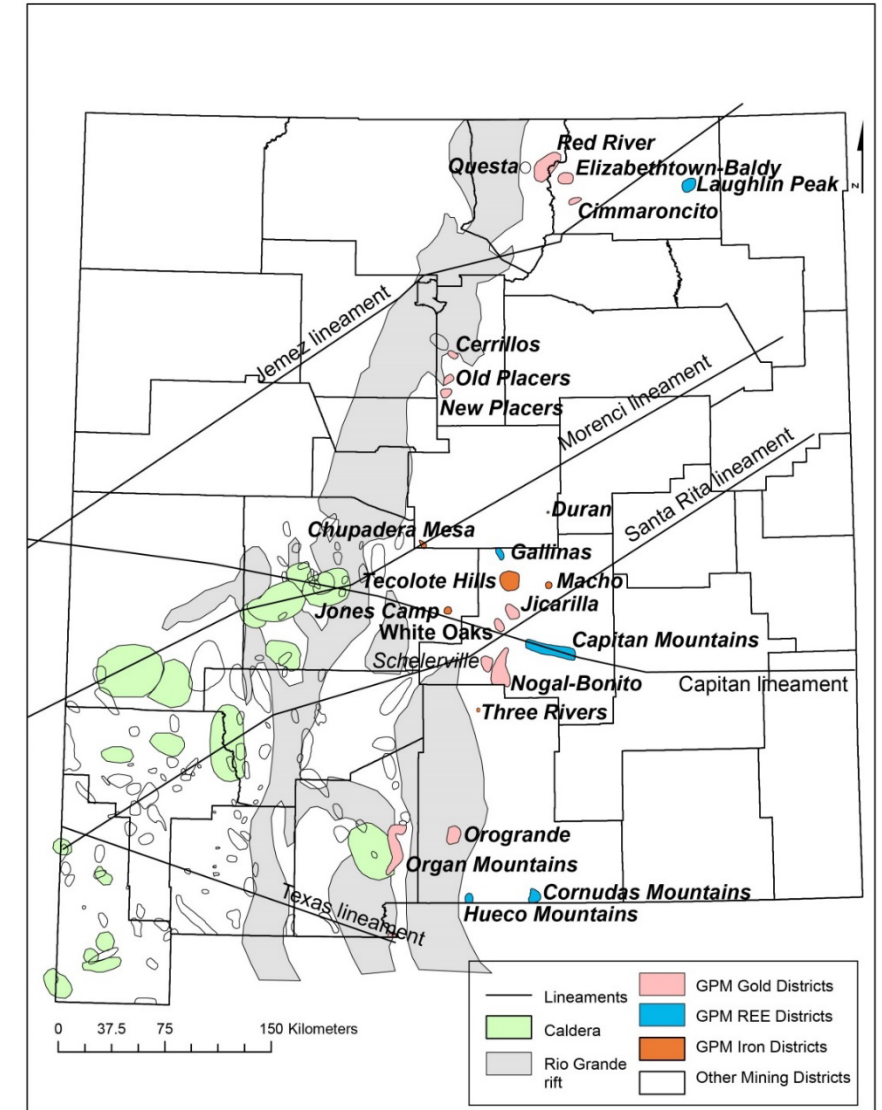
Great Plains Margin (Alkaline-related) Gold Deposits

- Part of a regional belt of similar deposits that extends northward into Canada and southward into Mexico
- Gold vein, skarn, breccia pipe, porphyry, placer that are associated with alkaline rocks
- Associated with Fe, Mo, F, W, U, Th, REE (rare earth elements), Nb



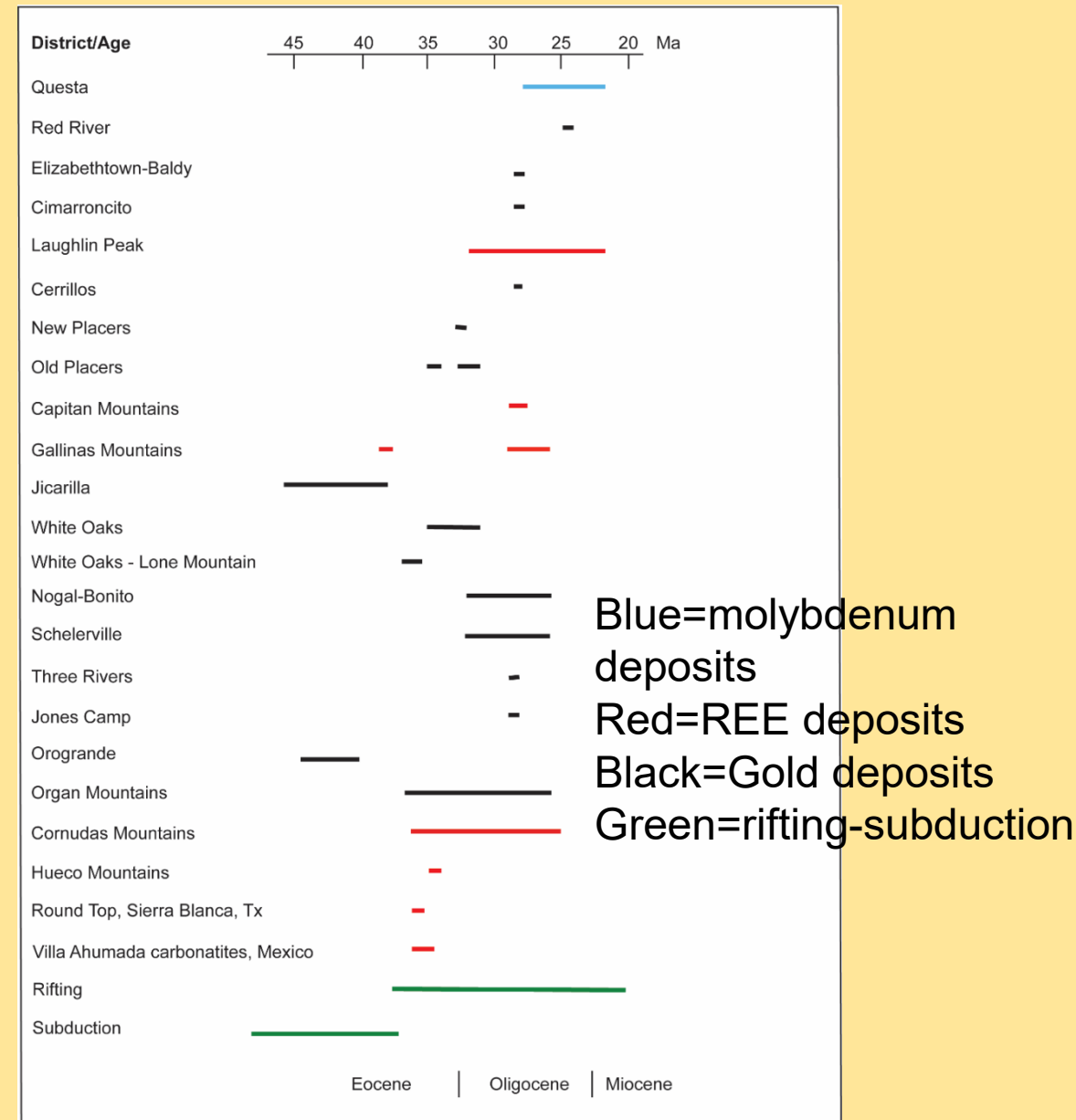
General characteristics of GPM mineral deposits

- Gold/silver ratios in GPM deposits are generally higher than other deposits in New Mexico
- Low silver, lead, and zinc concentrations
- REE deposits in Laughlin Peak and Gallinas, Capitan, and Cornudas Mountains, but are typically not found with significant gold deposits, although trace amounts of gold are locally present



Age and geochemistry

- Eocene to Oligocene
- Igneous rocks are typically subalkaline to alkaline, predominantly metaluminous to peraluminous intrusions
- Many intrusions are porphyritic and texturally and compositionally zoned



Ages of igneous rocks associated with GPM districts in New Mexico, arranged from north to south.

TABLE 3—Major gold-producing districts in New Mexico (updated from North and McLemore, 1986, 1988). *Major placer production (>50,000 oz), + no known placer deposits.

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+ Mogollon	Catron	365,000	volcanic-epithermal
*Hillsboro	Sierra	270,000	Laramide vein, placer
Lordsburg	Hidalgo	266,600	Laramide vein, minor placer
Willow Creek	San Miguel	179,000	Proterozoic massive sulfide, minor placer
White Oaks	Lincoln	163,500	Great Plains Margin, placer
+ Steeple Rock	Grant	151,000	volcanic-epithermal
*Pinos Altos	Grant	150,000	Laramide vein, carbonate-hosted, placer

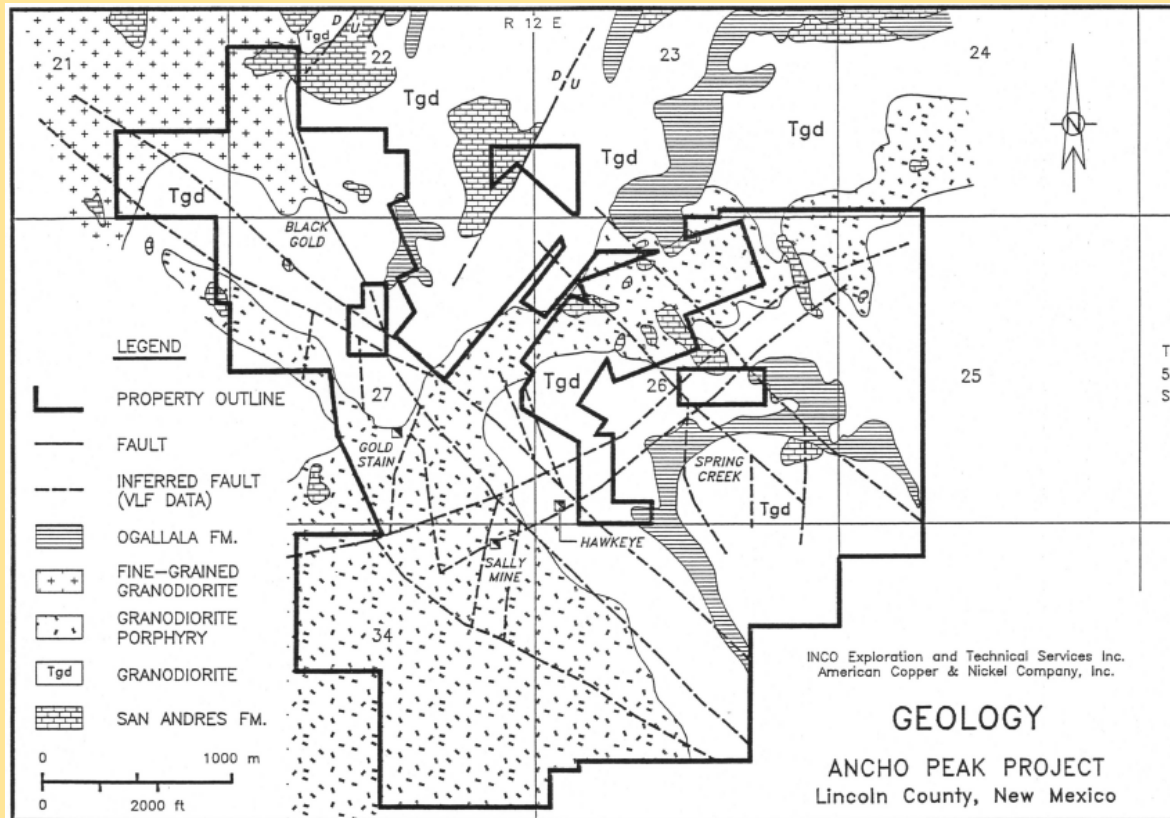
New Mexico GPM Deposits

- Elizabethtown-Baldy district
 - 471,400 oz Au produced
- Old Placers district
 - 450,000 oz produced
- New Placers district
- **Jicarilla district**
- **White Oaks district**
- Nogal-Bonito district
- Orogrande district
 - 305,000 metric tons of ore grading 1.7 ppm Au
- Great Western deposit – 3.275 million metric tons of ore containing less than 2 ppm Au
- Vera Cruz deposit – 188,590 metric tons of ore grading 4.8 ppm Au
- Carache Canyon breccia deposit—4.5 million metric tons of ore grading 3.2 ppm Au
- Lukas Canyon—5.4 million metric tons of ore grading 1 ppm Au

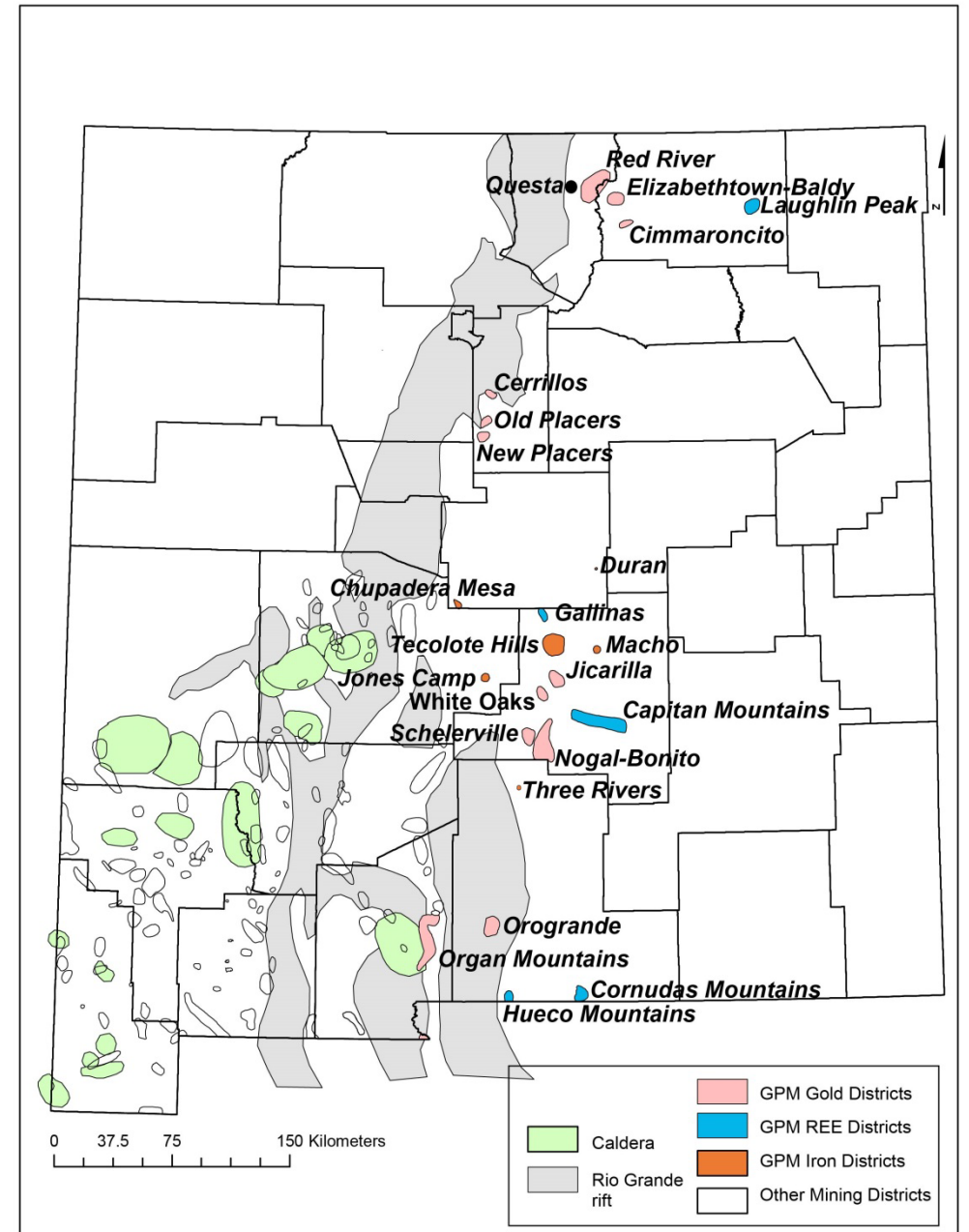
Types of GPM deposits

- Polymetallic epithermal to mesothermal veins
- Gold-bearing breccia deposits and quartz veins
- Copper-gold and/or gold porphyries
- Iron skarns and replacements
- Copper, lead-zinc, and gold skarns or carbonate-hosted replacements,
- Gold placers
- Th-u-ree-fluorite epithermal veins and breccias

Jicarilla district

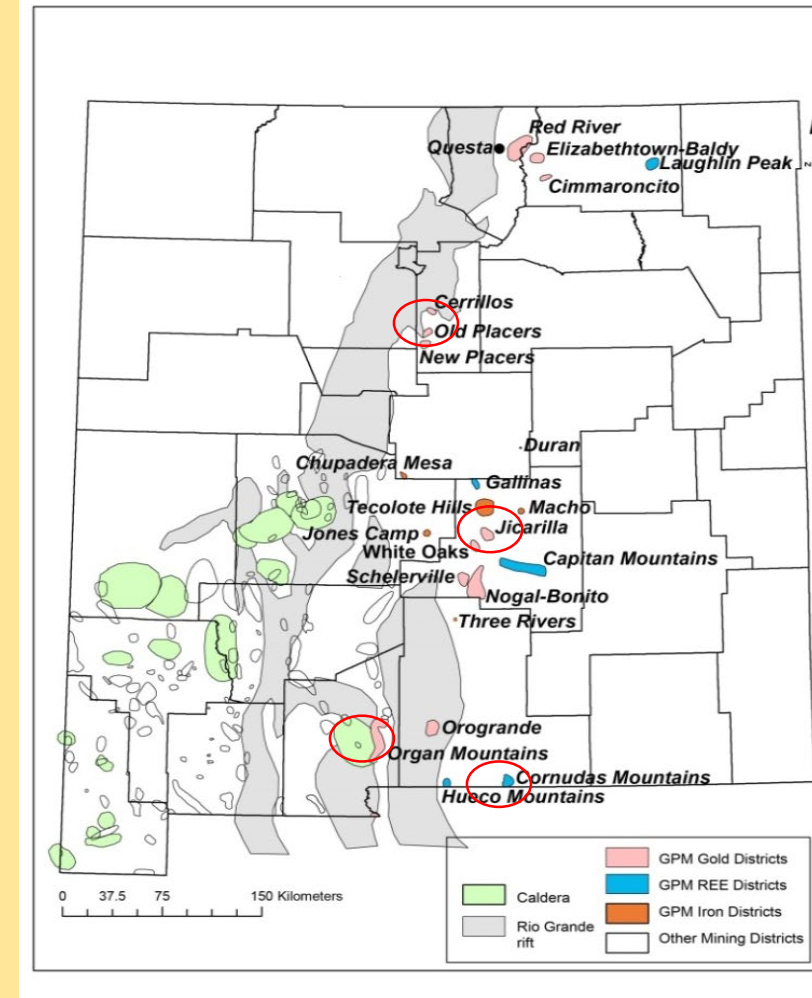
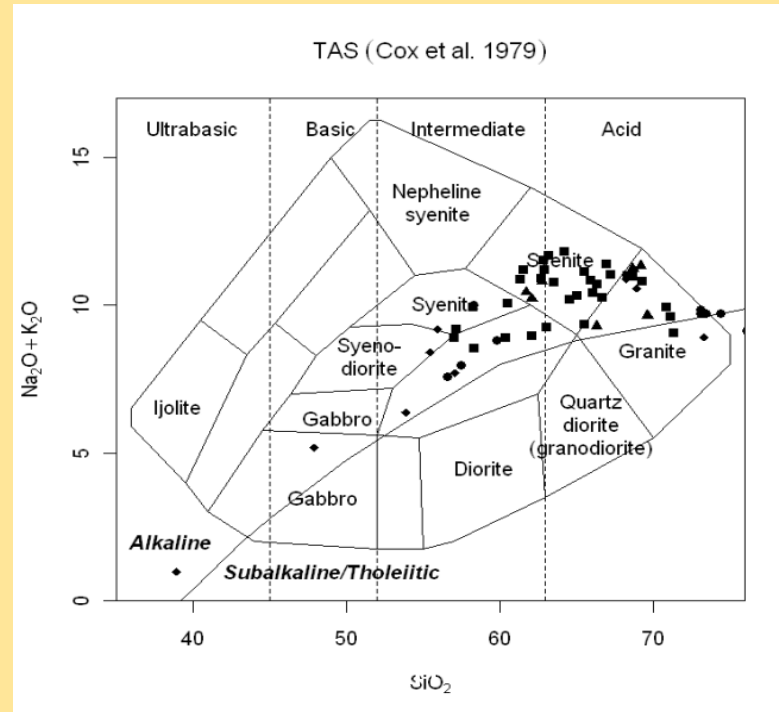
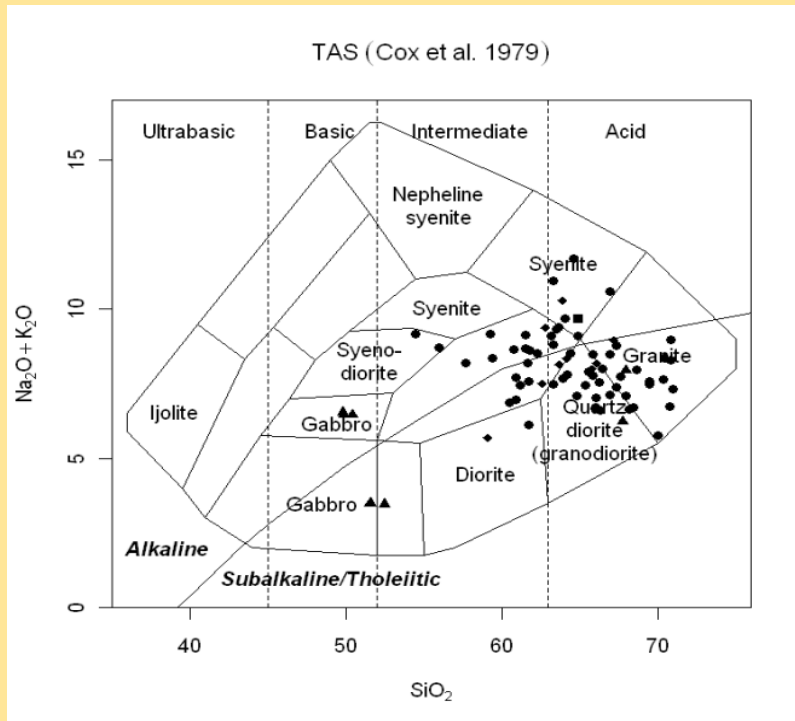


Ray and Alpers (1993)



Oldest igneous rocks (Old Placers, Jicarilla Mountains, Orogrande, Organ, Conrudas Mountains)

- Older than 36 Ma
- Magnesian, alkali-calcic to alkalic
- Gold districts

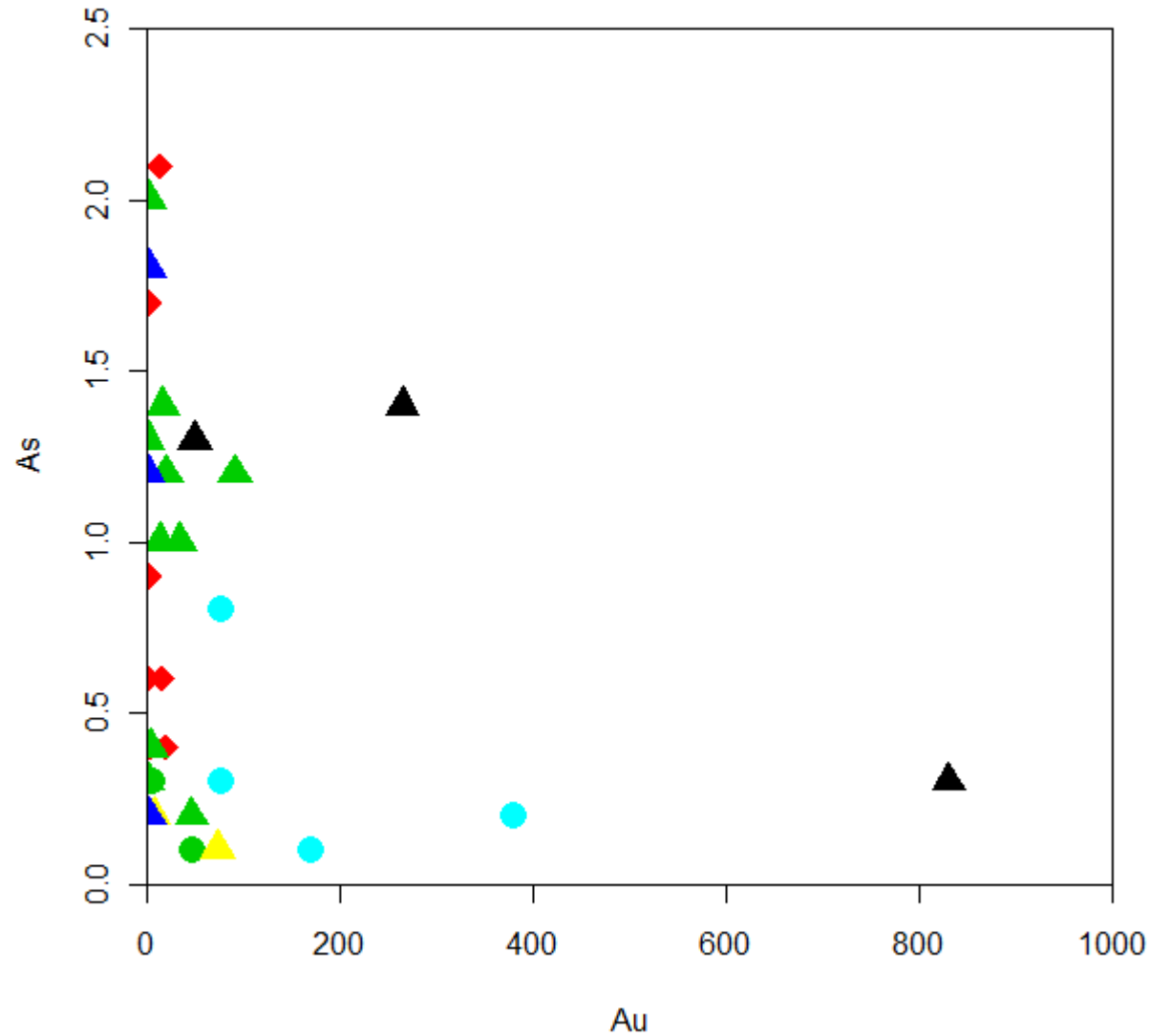


Production, Jicarilla district

- 800 oz placer Au
- 800 oz lode Au
- 38,000 oz Ag
- 8000 tons Fe ore
- Possible Spanish production

Types of Deposits

- Placer
- Au-bearing quartz veins
- Fe skarn/replacement and vein deposits
- Low sulfur, little silver, copper, lead, zinc



Au in veins
and
mineralized
rocks

As=ppm
Au=ppb

A large, irregular, brownish-gold mineral specimen, likely a gold nugget or ore, set against a dark background. The specimen has a rough, crystalline texture with various shades of brown and gold. It is positioned diagonally, with the larger portion on the right and a smaller, more angular fragment on the left. The background is a solid, dark color, possibly black or dark blue, which makes the mineral stand out.

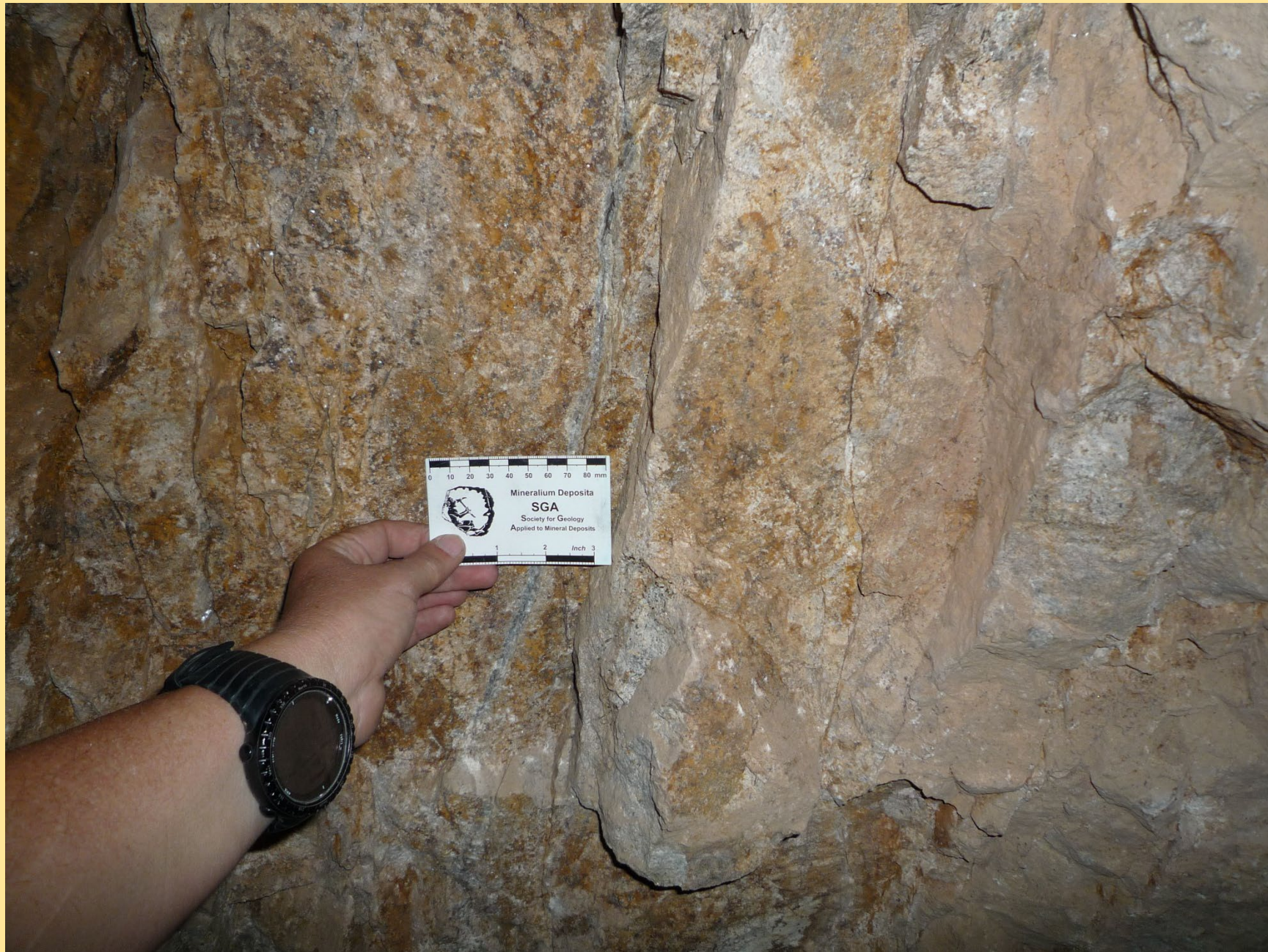
Legend:

- A** Fluvial gold deposits (Tertiary, Quaternary)
- B** Volcanic-epithermal deposits (Eocene-Pliocene)
- C** Copper-silver (uranium) vein deposits (Missouri-Pliocene)
- D** Great Plains margin (alluvial-related) deposits (Eocene-Miocene)
- E** Rio Grande rift basalt, fluorite, galena (copper, silver) deposits (Tertiary)
- F** Caracoles-Island lead, zinc (copper, silver) replacement deposits (Pliocene-Oligocene)
- G** Caracoles-Island silver (manganese, lead) replacement deposits (Pliocene-Oligocene)
- H** Laramide to mid-Tertiary lead-zinc and copper-silver deposits (Late Cretaceous-Eocene)
- I** Poly-metallic vein deposits (Late Cretaceous-Eocene)
- J** Laramide porphyry copper-molybdenum-gold deposits (Late Cretaceous-Eocene)
- K** Mesozoic-Paleogene deposits (Permian-Triassic, here restricted to Permian Basin)
- L** Sedimentary copper deposits (Permian-Triassic)
- M** Vein and replacement deposits in Proterozoic rocks (Proterozoic-Tertiary)
- N** Proterozoic volcanogenic massive-sulfide deposits (Proterozoic)
- O** Aquatic alteration of district or areas numbers correspond to districts in Table 4
- P** California boundary, ages shown in millions of years (d.b. New Mexico Geological Society 1981, McIntire & Bryan, 2000, U.S. Geological Survey, 1991)

Scale: 0 to 100 miles, 0 to 160 kilometers. Scale = 1:1,000,000.

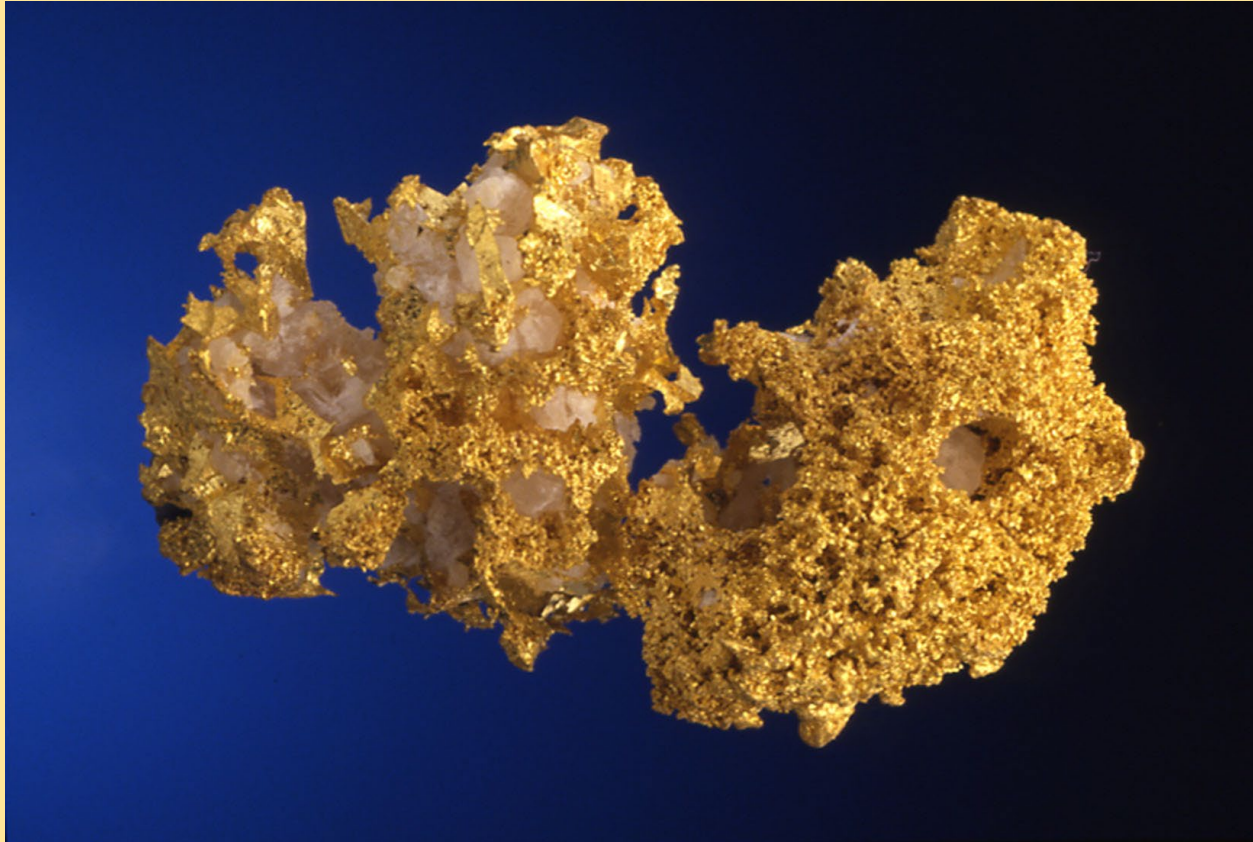








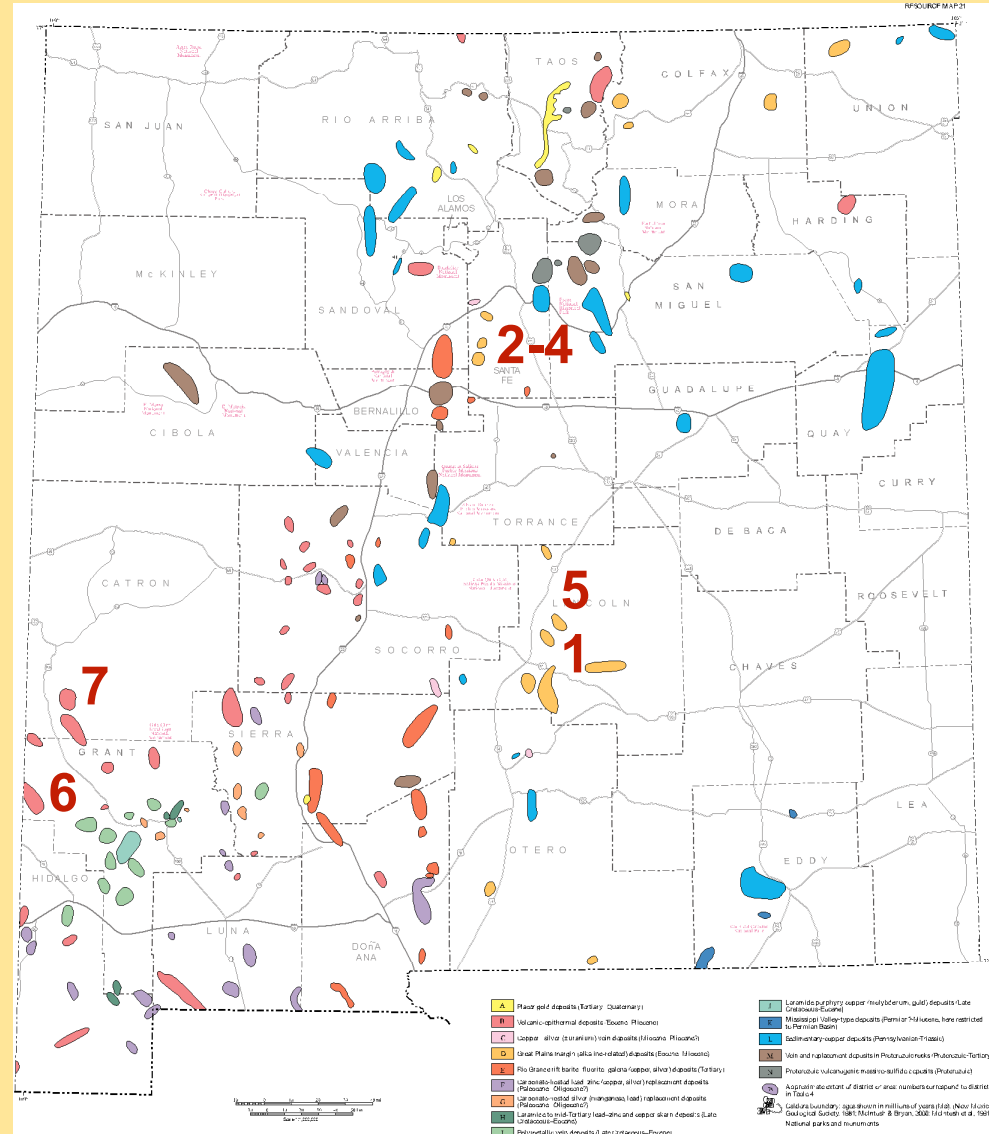
POTENTIAL FOR GOLD IN NEW MEXICO



17 - Gold, Boot Heel Claim

Gold and Silver

1. Vera Cruz, Lincoln Co
2. Carache Canyon, Santa Fe Co
3. Lukas Canyon, Santa Fe Co
4. San Lazarus, Santa Fe Co
5. Jicarilla Au placers
6. Steeple Rock district
7. Mogollon



Mining Issues Facing New Mexico

- Some current mines are reaching the end of their life and will close over the next decade=decreasing minerals production
- There are not many new mines to replace them
- Mining requires water and their environmental effects must not impact water supplies
- Results in unemployment and decrease in revenues
 - Affects rural economies
 - Affects state revenues
- Legacy issues of past mining activities form negative public perceptions of mining
 - Abandoned or legacy mines, especially Grants uranium district and Questa mine
 - Gold King spill
 - Not in my backyard!!!!!!

Mining Issues Facing New Mexico—continued

- Global competition is closing some of our mines
- Exploration for new deposits often results in drill targets based upon regulatory minimal impact regulations rather than optimum geological criteria
- Permitting for exploration can take longer than exploration funds are available
- Lower prices=closed mines, little exploration
- In some areas conflicts arise between mining and other activities
 - Grants uranium district
 - Otero Mesa
 - Pecos/Tererro mine
 - **Water, don't want a mine in their backyard**
- Shortage of young geologists and engineers to explore for, develop, mine, permit these commodities and evaluate their effect on the environment—math, science skills critical

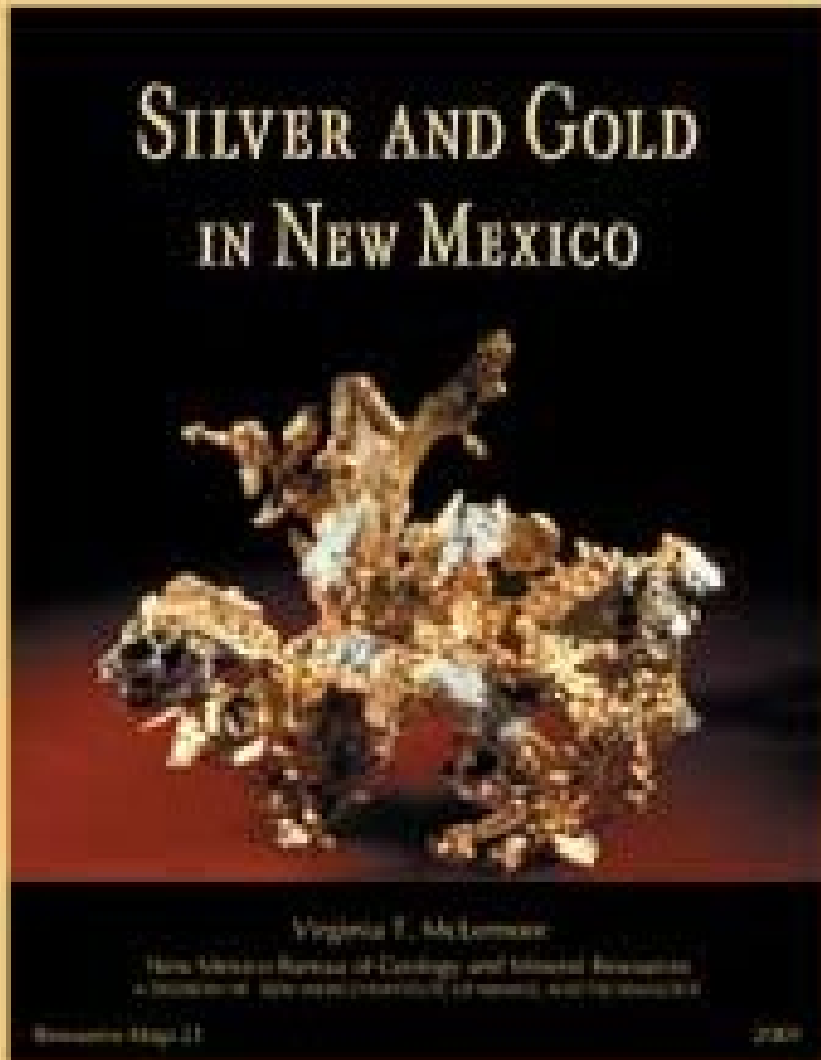
SUMMARY

- New Mexico has a wealth of mineral resources
- The New Mexico Bureau of Geology and Mineral Resources has a long history in minerals research
 - We have a number of ongoing research projects in the broad field of minerals, especially critical minerals, with strong field and laboratory components
- Exploration and permitting takes many years before a deposit can be mined in NM, >10 yrs
- Legacy issues are being addressed
- Negative public perceptions are major issue as is funding
- Global competition is a major challenge
- NMBG/NMT research is addressing some of these issues, as well as actively training future geologists and engineers

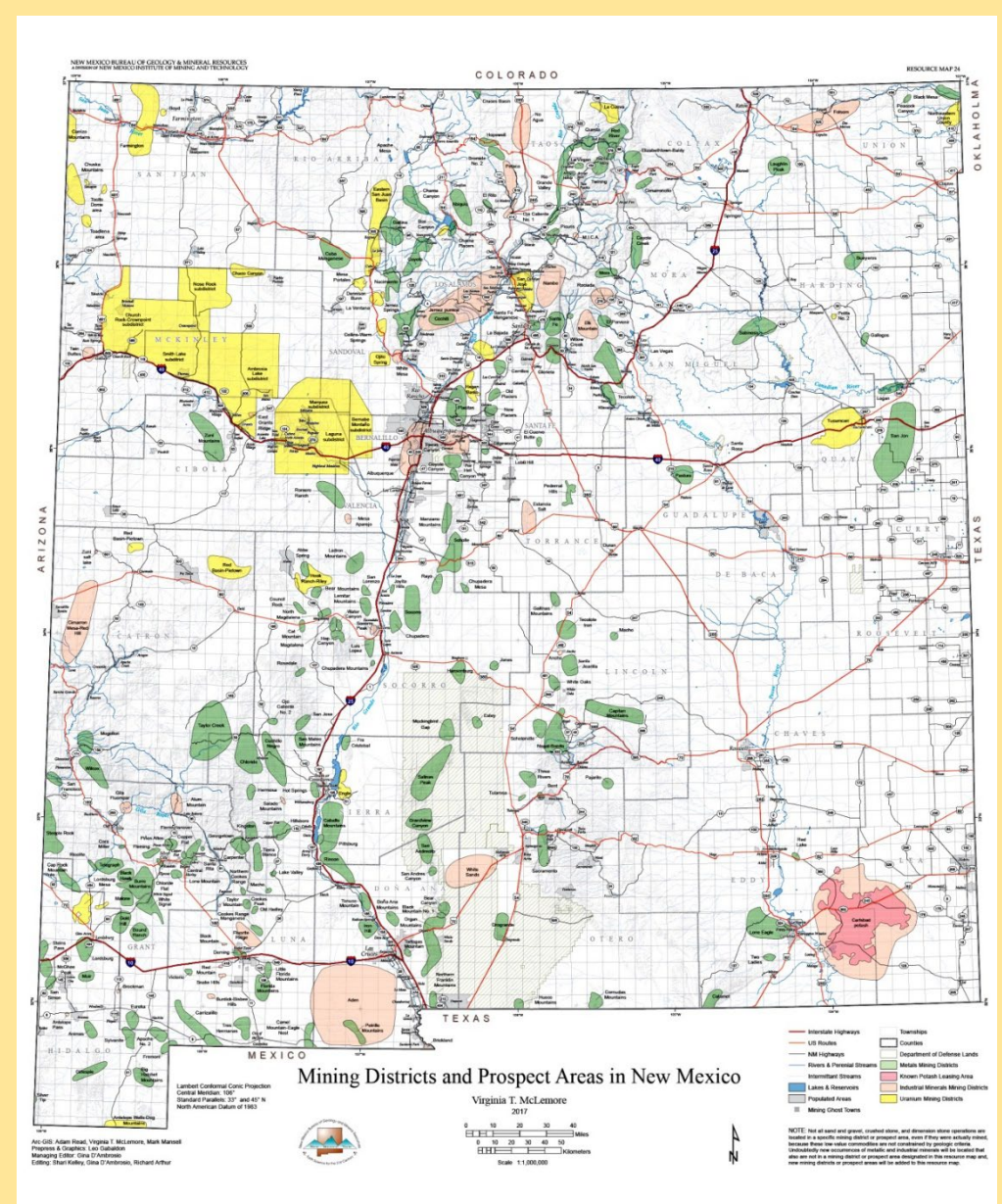
PUBLICATIONS



Gold, Nogal Canyon



RM-21—Silver and Gold in New Mexico, reprinted in 2010



Resource Map 24-Mining Districts and Prospect Areas in New Mexico



Placer gold deposits in New Mexico

by Virginia T. McLemore, New Mexico Bureau of Mines and Mineral Resources, Socorro, New Mexico 87801

Abstract

Thirty-six mining districts in New Mexico contain placer gold deposits. Production from these deposits began as early as 1828, resulting in the first gold rush in the western United States; however, minor production by Pueblo Indians and Spaniards probably occurred 200 or more years earlier. Most placer deposits were discovered by 1900, and almost all placer production occurred before 1902. It is estimated that 662,000 oz of gold were produced from New Mexico placer deposits between 1828 and 1991. The deposits typically are found in late Tertiary to Recent alluvial or eluvial deposits; alluvial fan deposits, bench or terrace deposits, river bars, stream concentrations, and residual placers that formed directly on top of lode deposits are known. New Mexico placer gold deposits are derived from Oligocene-Miocene Great Plains Margin deposits, Laramide vein deposits, and Proterozoic vein and replacement deposits in highly weathered and eroded terrains. The future potential will depend on discovery of large-volume, low-grade deposits. Also, new technologies minimizing water may stimulate activity because lack

of deposits (Boyle, 1979, 1987): eluvial, alluvial, and aeolian. Eluvial deposits occur in weathered detritus at or near the outcrop of gold-bearing lode deposits. Alluvial deposits occur in the sands and gravels of streams, rivers, beaches, and deltas. Alluvial deposits are further subdivided into classes by Wells and Wootton (1932): hillside (valley slopes not in discrete channels), gulch or creek, bench or terrace, river-bar, gravel-plain, and buried placers. The aeolian deposits accumulate in windblown sand deposits and are relatively minor and unimportant. Most of the gold deposits in New Mexico are alluvial deposits, but some eluvial deposits are found in many districts. There are no known aeolian gold placer deposits in New Mexico.

This report presents a summary of continuing research on placer gold deposits in New Mexico. Johnson (1972) published one of the most comprehensive compilations of information on placer gold deposits in the state. This study updates the work by Johnson (1972) and North and McLemore (1986, 1988) and incorporates additional field observations and other data

deposits in New Mexico were discovered by 1900. Early production from placer deposits is poorly documented, and total production can only be estimated. It is estimated that 662,000 oz of gold have been produced from placer deposits throughout New Mexico from 1828 to 1991 (updated from Johnson, 1972). This production is insignificant compared to larger placers found in Alaska, California, New Zealand, and South America that contain millions of ounces of gold. Only four districts here have yielded more than 100,000 oz of placer gold production: Elizabethtown-Baldy, Hillsboro, Old Placers, and New Placers. Currently only one district is yielding some minor production (White Oaks) although small exploration activities and recreational gold panning are occurring in most areas of the state. □

Also in this issue

Oso Ridge Member (new),
Abo Formation,
Zuni Mountains

p. 26

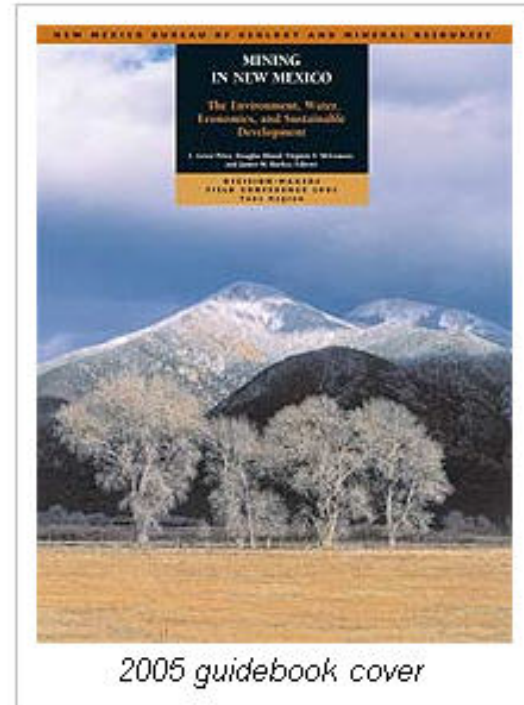
Decision Makers Field Guides

The New Mexico Bureau of Geology and Mineral Resources is joining with several state and local governmental agencies and organizations in conducting a series of field conferences for influential New Mexico decision makers. The purpose of these conferences is to present decision makers with the opportunity to learn first-hand about geological problems, opportunities, and potential solutions from some of the state's top experts, and to hear impartial (or at least balanced) opinions regarding current scientific knowledge about these matters.

Mining in New Mexico—The Environment, Water, Economics, and Sustainable Development *Decision-Makers Field Guide 2005*

**Edited by L. Greer Price, Douglas Bland, Virginia T. McLemore, and
James M. Barker**

Mining has played a significant role in the history and development of New Mexico and continues to play an important role in the state's economic prosperity. The future of this industry will depend upon achieving a balance between our needs and desires, the changing economy, and our growing concern over environmental and social issues. This anthology of 30 articles is a timely look at some of those science and policy issues. 176 pages with tables, diagrams, maps, and color photographs throughout.





Memoir 50—Energy and Mineral Resources of New Mexico

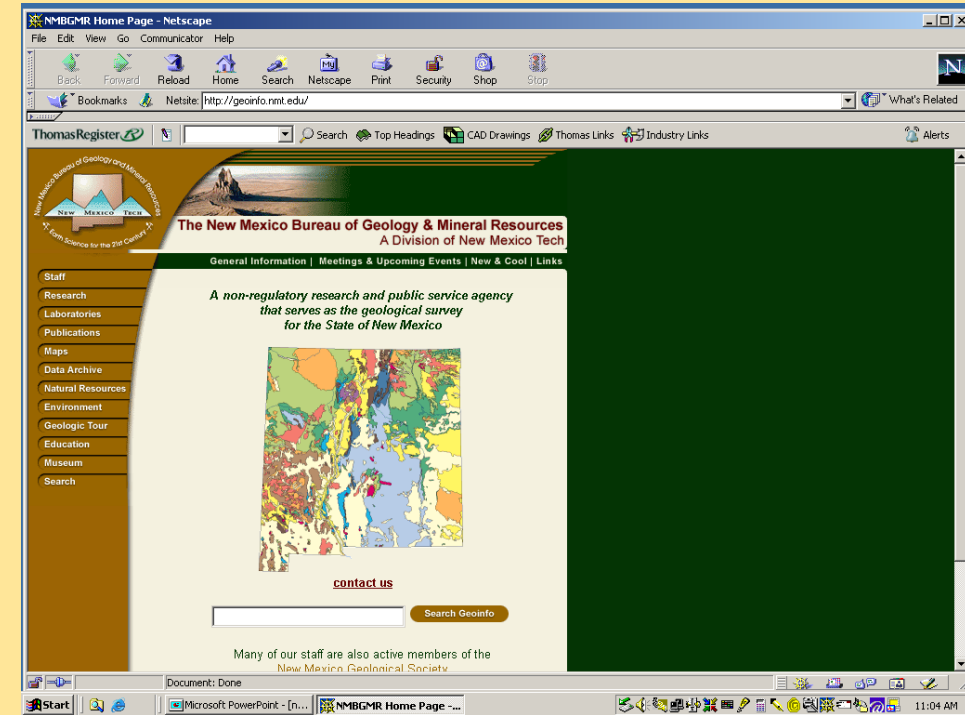
More Information

- NM Mines and Minerals Division
<http://www.emnrd.state.nm.us/MMD/>

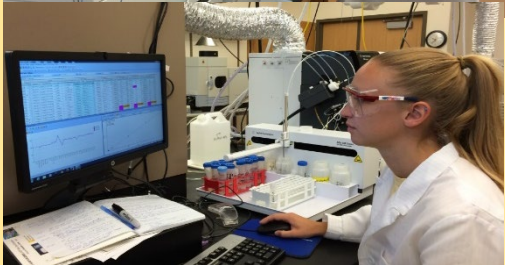
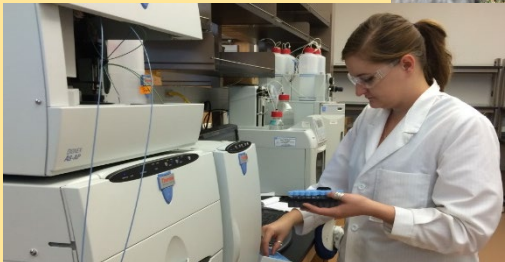
Virginia McLemore web page

<http://geoinfo.nmt.edu/staff/mclemore/home.html>

- New Mexico Bureau of Geology and Mineral Resources
<http://geoinfo.nmt.edu/>



Research



NEW MEXICO SCHOOL OF MINES

STATE BUREAU OF MINES AND
MINERAL RESOURCES

E. H. WELLS, PRESIDENT AND DIRECTOR

BULLETIN NO. 4

Fluorspar In New Mexico

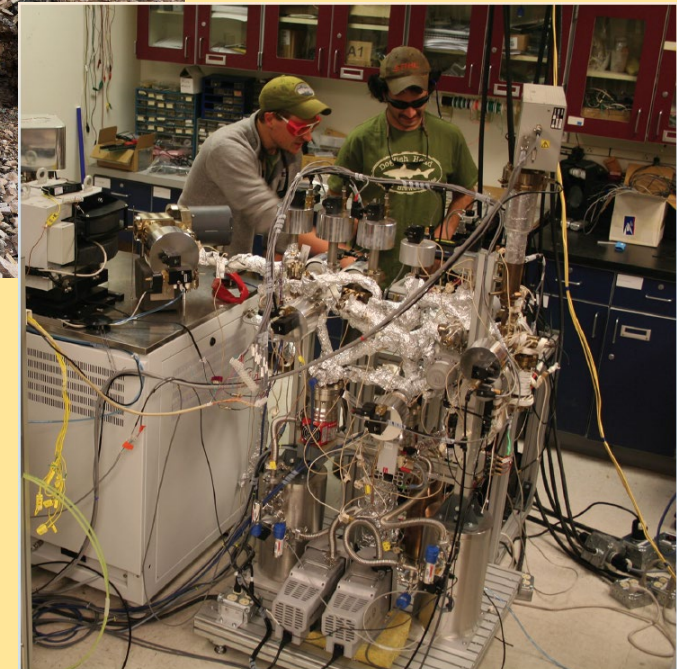
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WILLIAM DRUMM JOHNSTON, JR.



SOCORRO, N. M.

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QUESTIONS?

