UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Mineral resources of the Manzano Wilderness Study Area, Torrance County, New Mexico

By

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

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STUDIES RELATED TO WILDERNESS

Bureau of Land Management Wilderness Study Areas

The Federal Land Policy and Management Act (Public Law 94-579. October 21, 1976) requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine the mineral value, if any, that may be present. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral survey of the Manzano Wilderness Study Area (NM-010-092), Torrance County, New Mexico.

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Illustrations

ABSTRACT

The Manzano Wilderness Study Area (NM-010-092), about 20 mi south-southeast of Albuquerque, in Torrance County, New Mexico, has no identified mineral resources, and low potential for undiscovered metallic mineral resources and for oil and gas. This assessment is based on investigations conducted by the U.S. Bureau of Mines and U.S. Geological Survey in 1987, and on a study of the resource potential of the contiguous Manzano Wilderness.

SUMMARY

The Manzano Wilderness Study Area (NM-010-092) in Torrance County, New Mexico, has no identified mineral resources and has low potential for undiscovered metallic mineral resources and for oil and gas at certainty level C (fig. 1). This assessment is based on investigations conducted by the U.S. Bureau of Mines and the U.S. Geological Survey in 1987, and on a study of the resource potential of the contiguous U.S. Forest Service Manzano Wilderness (Maxwell and others, 1983).

The study area is about 20 mi south-southeast of Albuquerque, in Torrance County, New Mexico (fig. 2), and is contiguous with the U.S. Forest Service Manzano Wilderness. It consists of approximately 881 acres, straddling the boundary between the Rio Grande valley to the west and the Manzano Mountains to the east. The eastern half of the study area is underlain by granitic and metamorphic rocks, and the western half is underlain by valley fill gravel and sand.

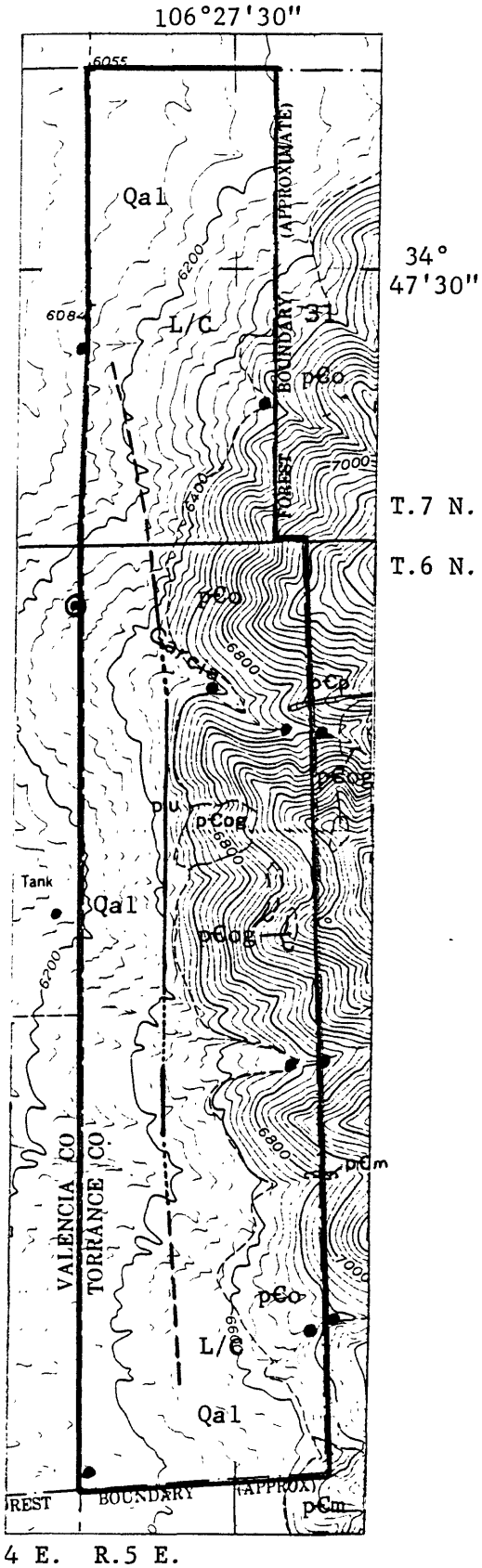
A comprehensive geochemical sampling survey of the Manzano Wilderness in the Cibola National Forest included the adjacent Manzano Wilderness Study Area (Maxwell and others, 1983; Light, 1982, 1986). Additional samples were taken during the current study (Brown, 1987). Analysis of stream-sediment and rock samples revealed only insignificant anomalous concentrations of any elements.

No evidence of mines or prospects was seen in or near the wilderness study area, and no mineralized areas were identified during field investigations. An examination of U.S. Bureau of Land Management records disclosed no mining claims in the area, but the entire study area is covered by oil and gas lease applications.

Based on geological studies, geochemical analyses, and the absence of mineralization, the wilderness study area has low mineral resource potential for metals. The potential for the occurrence of oil and gas is also low because of unfavorable host rocks and structures.

INTRODUCTION

The Manzano Wilderness Study Area consists of approximately 881 acres, contiguous on the east and south sides to the U.S. Forest Service Manzano Wilderness of the Cibola National Forest (fig. 2). The study area is in Torrance County, approximately 20 air miles south-southeast of Albuquerque, New Mexico. Access to the area can be achieved from State Highway 47, turning east on State Road 263 to a private dirt track which leads to a watering tank about 1/4 mi east of the study area, or from State Highway 6 northeast on State Road 385, then north and east on private dirt tracks. There is no public access into the study area.



CORRELATION OF MAP UNITS

Qal	QUATERNARY
p€p, p€o, p€og, p€m	PRECAMBRIAN

DESCRIPTION OF MAP UNITS

(Quaternary)

Qal Alluvium--Unconsolidated silt, sand, and gravel, includes alluvial fans and pediment deposits

Precambrian

p€p Pegmatite dike--Composed of quartz, pink feldspar, and muscovite

p€o Ojito stock of Reiche (1949)--Granodiorite, with numerous inclusions of gabbro and metasedimentary rocks

p€og Gabbro--Hornblende diorite, diorite, quartz gabbro, and olivine gabbro

p€m Metasedimentary rocks--Phyllite, schist, argillite, and quartzite

——— CONTACT--Dashed where approximately located

U/D FAULT--Dashed where inferred, dotted where concealed. U, upthrown side; D, downthrown side

BOUNDARY OF WILDERNESS STUDY AREA

• O SAMPLE LOCALITY--Open circle is panned concentrate

L/C Geologic terrane having low mineral resource potential for metals and oil and gas with certainty level C--applies to entire area

Scale 1:24,000 (approx.)

0 1 mi

Contour interval 40 ft

Figure 1. Map showing geology and mineral resource potential of the Manzano Wilderness Study Area (NM-010-092), Torrance County, New Mexico (after Myers and McKay, 1971)

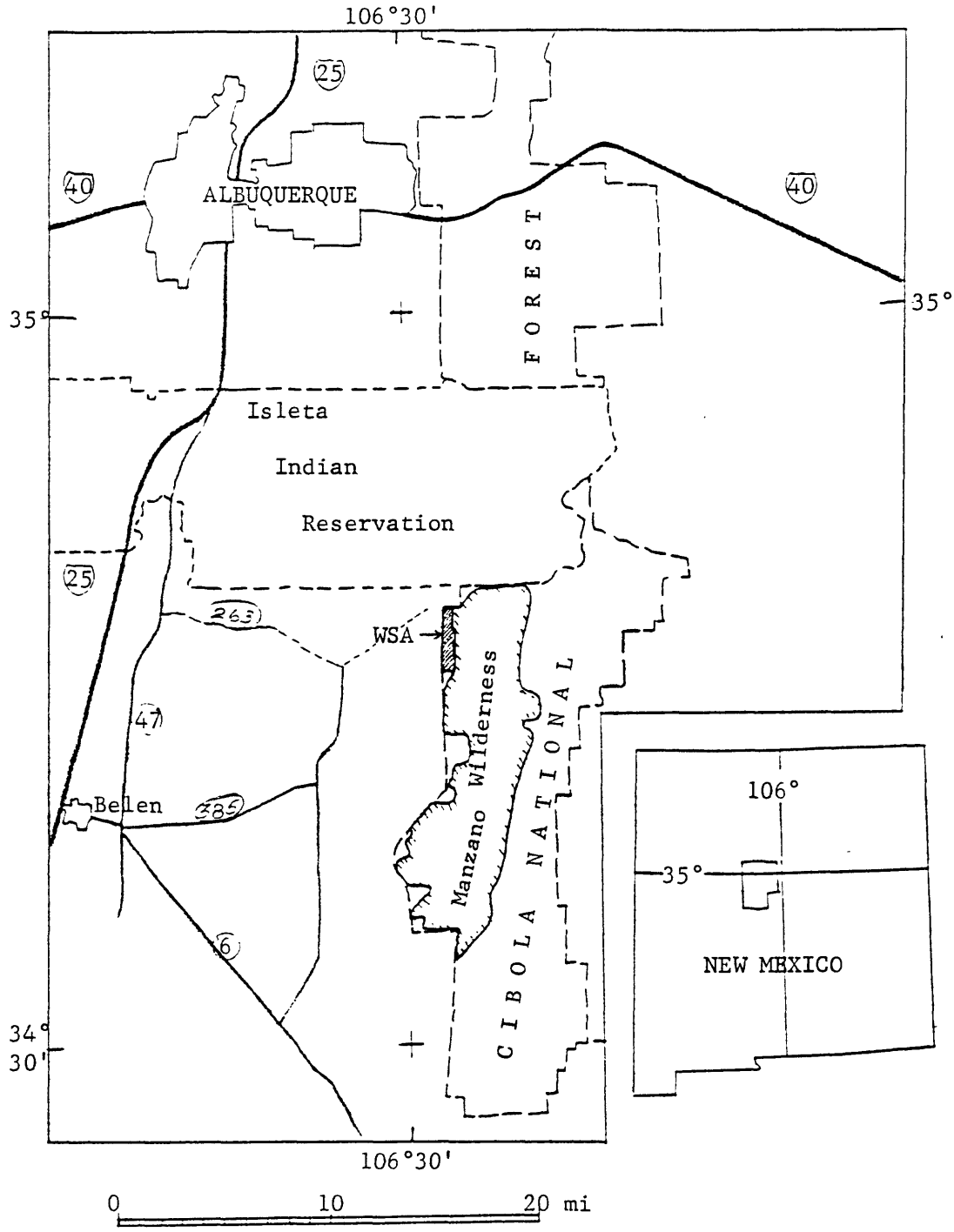


Figure 2. Index maps showing the location of the Manzano Wilderness Study Area, Torrance County, New Mexico

This report presents an evaluation of the mineral endowment (identified resources and mineral resource potential) of the study area and is the product of several separate studies by the U.S. Bureau of Mines (USBM) and the U.S. Geological Survey (USGS). Identified resources are classified according to the system of the USBM and USGS (1980) which is shown in the Appendix of this report. Identified resources are studied by the USBM. Mineral resource potential is the likelihood of occurrence of undiscovered metals and nonmetals, industrial rocks and minerals, and of undiscovered energy sources (coal, oil, gas, oil shale, and geothermal sources). It is classified according to the system of Goudarzi (1984) and is shown in the Appendix. Undiscovered resources are studied by the USGS.

Investigations by the U.S. Bureau of Mines

A mineral survey of the contiguous Manzano Wilderness was made in 1980-81 by the U.S. Bureau of Mines as part of a joint effort with the U.S. Geological Survey (Light, 1982, 1986). Some data from that study was used in this report. In 1987 a comprehensive literature search was made for information on mines and mineralized areas in and near the Manzano Wilderness Study Area. Bureau of Land Management records of mining claims and oil and gas leases were checked for any claims or leases in or near the study area. Eight stream-sediment samples and one panned-concentrate sample were taken from major canyons in or near the study area (Brown, 1987).

Investigations by the U.S. Geological Survey

A comprehensive geologic study and mineral survey of the contiguous Manzano Wilderness was made in 1979-81 by the U.S. Geological Survey and the U.S. Bureau of Mines. Part of this report was adapted from that study (Maxwell and Wobus, 1982a, 1982b; Maxwell and others, 1983; Light, 1986) and from Myers and McKay (1971), supplemented by additional field checking and geochemical sampling in 1987.

APPRAISAL OF IDENTIFIED RESOURCES

By S. Don Brown, U.S. Bureau of Mines

Mining claims and oil and gas leases

No evidence of mines or prospects was seen in or near the Manzano Wilderness Study Area during the field investigation and, as of April 1987, there were no mining claims in or near the study area on record with the Bureau of Land Management. Oil and gas leases border the western side of the study area and the entire study area was covered by oil and gas lease applications as of October 1986.

No mines, prospects, or mineral occurrences were identified within the study area, and no mineral occurrences were indicated in any of the reviewed literature pertaining to the area. Metal concentrations indicative of economic mineralization were not detected in any of the samples. The area is covered by oil and gas lease applications but there is no current exploration in or production from the area.

ASSESSMENT OF POTENTIAL FOR UNDISCOVERED RESOURCES

By C.H Maxwell, U.S. Geological Survey

Geology

The Manzano Wilderness Study Area straddles the boundary between the Rio Grande valley to the west and the Manzano Mountains to the east. The Manzano Mountains, part of the uplifted eastern margin of the Rio Grande trench, are an eastward-dipping fault-block mountain range with a core of complexly deformed Precambrian (see geologic time chart in appendix) metamorphic rocks overlain by Pennsylvanian sedimentary rocks. The edge of the Rio Grande trench is marked by a wide zone of faults, one of which is shown on figure 1. This fault is shown only where scarps or displacements are evident in the Quaternary alluvium or pediment deposits, other faults may be hidden by the alluvium. These faults have a total projected displacement of at least 10,000 ft (feet) down to the west, and there is as much additional displacement on other faults approximately 5 miles to the west of the study area.

The eastern half of the Manzano Wilderness Study Area is underlain predominantly by granodiorite of the Ojito stock of Reiche (1949) with numerous ovoid inclusions of gabbro, amphibolite, and argillaceous metasedimentary rocks, all of Precambrian age; some of the larger inclusions of gabbro and argillite are shown on the geologic map (fig. 1). The granodiorite is medium to dark gray, massive to thinly foliated, medium grained, locally slightly porphyritic, composed of feldspar, quartz, hornblende, biotite, and accessory magnetite. It has been dated at 1.57 b.y.(billion years) (Conde and Budding, 1979). The gabbroic inclusions are mottled dark-gray, massive to thinly layered, fine- to medium-grained, locally porphyritic quartz gabbro, diorite, and hornblende gabbro enclosing dike-like bodies of dark-green to black, massive, aphanitic to coarse grained olivine gabbro. The granodiorite and gabbroic rocks contain sparse thin lenses of hornblende-quartz gneiss. The metasedimentary rocks are gray to greenish-gray, fine-grained chlorite-quartz-sericite phyllite and schist, grading into gray and brown argillite and fine-grained quartzite. The granodiorite contains scattered small lenticular and anastomosing milky quartz veins and small aplite or pegmatite veins (less than 6 inches wide). The pegmatite dike (pЄp, fig. 1) is 2-5 ft thick, composed of quartz, pink feldspar, and muscovite.

The western half of the study area is underlain by pediment deposits of pebble- to boulder-sized fragments of Precambrian rocks in a silt, sand, and granule matrix, generally covered by soil and Quaternary alluvium, and overlain at the mouths of canyons by thick alluvial fans. Nearby outcrops to the south and west indicate that the pediment deposits are probably relatively thin and underlain by Permian and Triassic rocks.

Geochemistry

Geochemical samples collected within and adjacent to the study area include 12 stream sediments and one pan concentrate. Analyses show no anomalous values for most elements, and only slight anomalies for a few. Silver was detected in a stream sediment sample near the mouth of Garcia Canyon (0.4 oz/t (troy ounces per ton) or 15 ppm (parts per million)), and in pan concentrates 1/2 mi northeast of the study area (15 ppm), and 1/8 mi southeast (1.5 ppm). Silver was not detected in other samples. Tungsten was present in most stream sediment samples in amounts ranging from 2 to 10 ppm

and as much as 700 ppm in panned concentrates. Zirconium was anomalously high in the stream sediment samples and very highly anomalous in the panned concentrates, probably representing an alluvial concentration of detrital zircon during deposition of the Precambrian sediments, followed by further concentration in the Quaternary alluvium. None of the anomalies were considered to be an indication of significant deposits.

Geophysics

An aeromagnetic survey of an area east of Albuquerque, New Mexico, was flown in 1974 and an aeromagnetic map was published by the U.S. Geological Survey (1975) at a scale of 1:125,000. The Manzano Mountains section of the map, and a small inset map of the complete Bouger gravity prepared by Lindrith Cordell (USGS) for the area, were presented in the study of the Manzano Wilderness (Maxwell and Wobus, 1982b). The Manzano Wilderness Study Area was included in that study and no further work was deemed necessary.

No anomalies in either aeromagnetics or gravity are indicated for the study area, other than the normal gradient from basement rock to valley fill gravels.

Mineral and energy resources

No mineralized areas or occurrences of metallic minerals were found in the wilderness study area. No significantly high anomalies were found in the stream-sediment samples; the minor silver anomalies were not substantiated by later sampling, nor by the presence of commonly associated elements. Tungsten minerals are common accessory minerals widely disseminated in many metamorphic and some igneous rocks and should be expected to concentrate in drainages. The wilderness study area is considered to have a low potential for the occurrence of metallic mineral resources, with a certainty level of C.

The potential for the occurrence of oil and gas resources is also considered to be low with certainty level C because of the unfavorable geologic terrane. The presence of Precambrian metamorphic rocks in the study area and the complex fault zone through the area seems to preclude oil and gas occurrences. The study area is covered by oil and gas leases (Brown, 1987), but it lacks the host rocks and structures favorable for the accumulation of oil and gas.

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DEFINITION OF LEVELS OF MINERAL RESOURCE POTENTIAL AND CERTAINTY OF ASSESSMENT

Definitions of Mineral Resource Potential

LOW mineral resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics define a geologic environment in which the existence of resources is unlikely. This broad category embraces areas with dispersed but insignificantly mineralized rock as well as areas with few or no indications of having been mineralized.

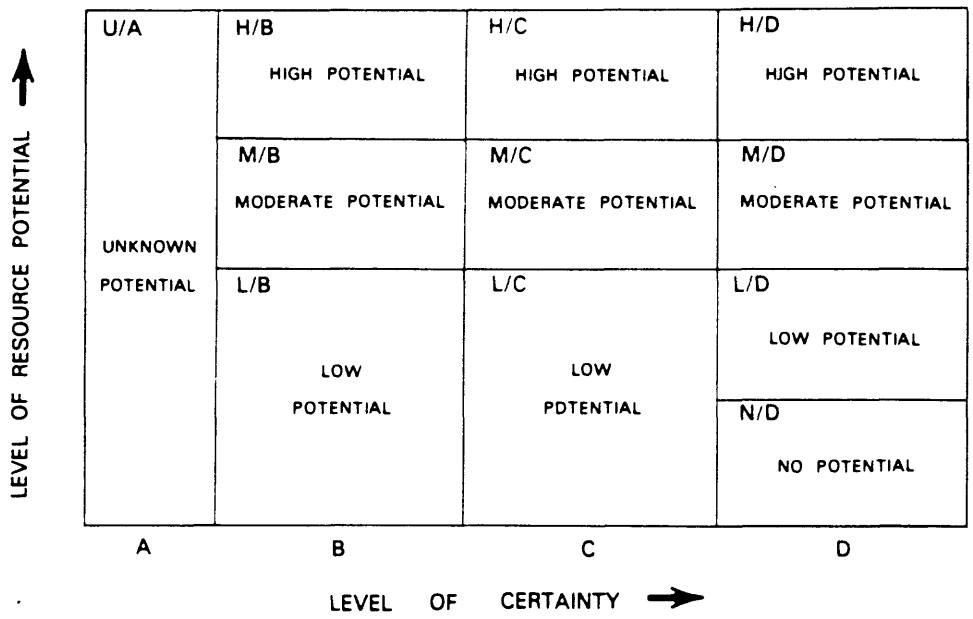
MODERATE mineral resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics indicate a geologic environment favorable for resource occurrence, where interpretations of data indicate a reasonable likelihood of resource accumulation, and (or) where an application of mineral-deposit models indicates favorable ground for the specified type(s) of deposits.

HIGH mineral resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics indicate a geologic environment favorable for resource occurrence, where interpretations of data indicate a high degree of likelihood for resource accumulation, where data support mineral-deposit models indicating presence of resources, and where evidence indicates that mineral concentration has taken place. Assignment of high resource potential to an area requires some positive knowledge that mineral-forming processes have been active in at least part of the area.

UNKNOWN mineral resource potential is assigned to areas where information is inadequate to assign low, moderate, or high levels of resource potential.

NO mineral resource potential is a category reserved for a specific type of resource in a well-defined area.

Levels of Certainty



A. Available information is not adequate for determination of the level of mineral resource potential.
B. Available information suggests the level of mineral resource potential.
C. Available information gives a good indication of the level of mineral resource potential.
D. Available information clearly defines the level of mineral resource potential.

Abstracted with minor modifications from:

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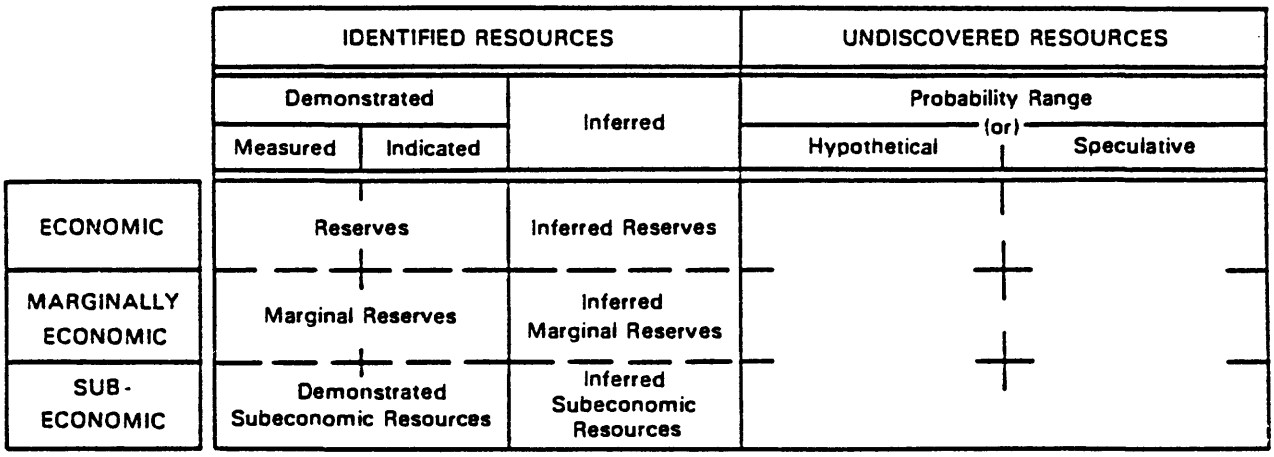
RESOURCE/RESERVE CLASSIFICATION



Major elements of mineral resource classification, excluding reserve base and inferred reserve base. Modified from U. S. Bureau of Mines and U. S. Geological Survey, 1980, Principles of a resource/reserve classification for minerals: U. S. Geological Survey Circular 831, p. 5.

GEOLOGIC TIME CHART

Terms and boundary ages used by the U.S. Geological Survey, 1986

Eon	Era	Period		Epoch	Boundary age in million years
Phanerozoic	Cenozoic	Quaternary		Holocene	0.010
				Pleistocene	1.7
		Tertiary	Neogene Subperiod	Pliocene	5
				Miocene	24
			Paleogene Subperiod	Oligocene	38
				Eocene	55
				Paleocene	66
	Mesozoic	Cretaceous		Late	96
				Early	138
		Jurassic		Late Middle Early	205
		Triassic		Late Middle Early	~240
	Paleozoic	Permian		Late	290
				Early	
		Carboniferous Periods	Pennsylvanian	Late Middle Early	~330
			Mississippian	Late	360
				Early	
		Devonian		Late Middle Early	410
		Silurian		Late Middle Early	435
		Ordovician		Late Middle Early	500
		Cambrian		Late Middle Early	~570[1]
Proterozoic	Late Proterozoic				900
	Middle Proterozoic				600
	Early Proterozoic				2500
Archean	Late Archean				3000
	Middle Archean				3400
	Early Archean				
pre-Archean[2]					(3800?)
					4550

[1]Rocks older than 570 m.y. also called Precambrian, a time term without specific rank.

[2]Informal time term without specific rank.

04/01/86 (MIS) GeolChart