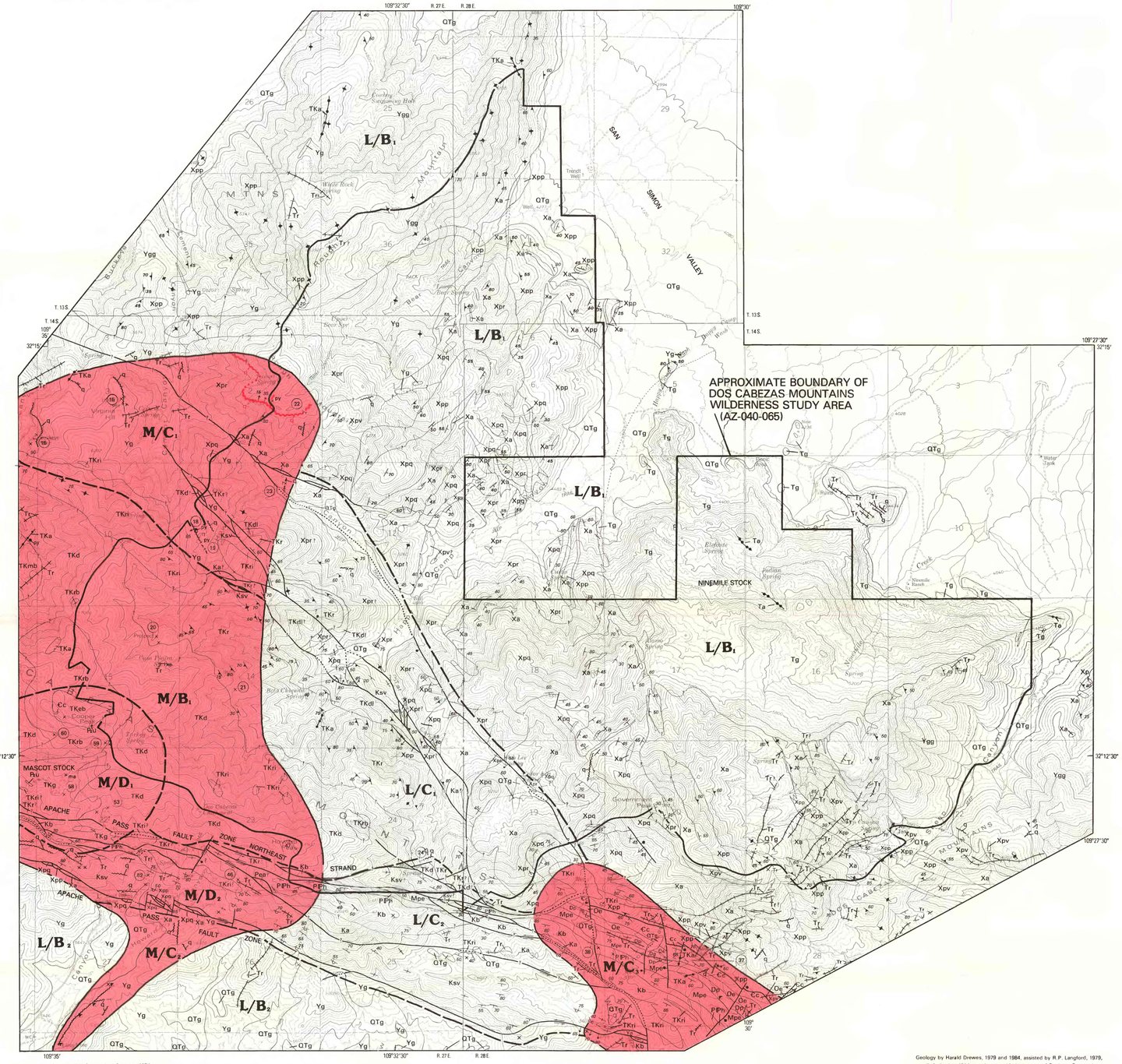
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

BULLETIN 1703-D
PLATE 1



Base from U.S. Geological Survey Dos Cabezas, 1974; Bowie Mtn. North, 1979; and Luzena, 1979

Geology by Harald Drewes, 1979 and 1984, assisted by R.P. Langford, 1979, and R.C. Davies, 1984; supplemented in lower part of Buckeye Canyon by R.C. Erickson, 1969

20°
TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1985

SCALE 1:24 000
1 0 ½ 1 MILE
1 0 .5 1 KILOMETER
CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ARIZONA

MINERAL RESOURCE POTENTIAL MAP OF THE DOS CABEZAS MOUNTAINS WILDERNESS STUDY AREA AND VICINITY, COCHISE COUNTY, ARIZONA

EXPLANATION OF IDENTIFIED RESOURCES AND MINERAL RESOURCE POTENTIAL

[No terrane having high mineral resource potential for any commodity was identified by this study]

Identified resource—Quartz vein

Geologic terrane having moderate mineral resource potential—Dashed line indicates subterrane boundaries. Subscript numbers are keyed to usage in text
- **M/D_1**—Copper, lead, zinc, molybdenum, tungsten, and silver in skarns, stockworks, veins, and breccia pipes. Certainty level D
- **M/D_2**—Copper, lead, and silver in veins. Certainty level D
- **M/C_1**—Copper, lead, molybdenum, tungsten, and silver in veins. Certainty level C
- **M/C_2**—Copper, lead, and silver in veins. Certainty level C
- **M/C_3**—Copper, lead, zinc, molybdenum, tungsten, and silver in stratabound, vein, or skarn deposits. Certainty level C
- **M/B_1**—Copper, molybdenum, lead, and zinc in stockworks, replacements, and veins. Certainty level B

Geologic terrane having low mineral resource potential for metals, nonmetals, and energy sources—Dashed line indicates subterrane boundaries. Subscript numbers are keyed to usage in text
- L/C_1—Certainty level C
- L/C_2—Certainty level C
- L/B_1—Certainty level B
- L/B_2—Certainty, level B

CORRELATION OF MAP UNITS

QTg		Holocene to Pliocene; Miocene and Oligocene(?)	QUATERNARY TO TERTIARY
Ta	Tr		
Tg		Oligocene	TERTIARY
TKg	TKri TKa		
TKrb	TKmb TKeb		
TKd		Paleocene and Upper Cretaceous	TERTIARY OR CRETACEOUS
TKr			
TKdl			
Ka		Upper Cretaceous	CRETACEOUS
Ksv			
Kb		Lower Cretaceous	
PEu	Pea	Lower Permian	PERMIAN
	PPh	Lower Permian and Pennsylvanian	PENNSYLVANIAN
	Mpe		MISSISSIPPIAN
	Dp	Upper Devonian	DEVONIAN
	Oe	Lower Ordovician	ORDOVICIAN
	Cc	Upper Cambrian	CAMBRIAN
Yg		Middle Proterozoic	PRECAMBRIAN
Ygg			
Xa		Early Proterozoic	
Xpp Xpq Xpr Xpv			
q		Unknown age	

DESCRIPTION OF MAP UNITS

QTg **Gravel (Holocene to Pliocene)**—Alluvial deposits, mainly bouldery to sandy

Young intrusive rocks

Ta **Andesite (Miocene and Oligocene?)**—Medium-gray dikes

Tr **Rhyolite (Miocene and Oligocene)**—Pale-yellowish-brown, sparsely porphyritic dikes and plugs

Tg **Granite or quartz monzonite (Oligocene)**—Light-pinkish-gray, moderately coarse grained rock. Forms Ninemile stock

Moderately old intrusive rocks (Paleocene and Upper Cretaceous)—Probably formed partly as shallow intrusives associated with eruptive centers

TKg **Granodiorite or quartz monzonite**—Pale-brownish-gray, moderately coarse grained rock. Contains large included block of altered Paleozoic sedimentary rock (PEu). Forms, among others, the Mascot stock

TKri **Rhyolitic rock**—Light-colored, porphyritic, altered dikes, plugs, and possible ring-fracture intrusive bodies

TKa **Andesite, dacite, and diorite**—Brownish- to greenish-gray, porphyritic, propylitized plugs and dikes

Moderately old intrusive to extrusive breccia (Paleocene and Upper Cretaceous)—Probably formed in volcanic throats

TKrb **Rhyolitic breccia**—Finely fragmental, quartz-bearing, strongly propylitized rock

TKmb **Mixed breccia**—Finely fragmental, strongly propylitized, rhyolitic (quartz-bearing) and dacitic or andesitic (quartz-free and commonly greenish-gray) rock

TKeb **Exotic breccia**—Coarsely fragmental, propylitized rock of rhyolitic, dacitic or andesitic, and Mesozoic and Paleozoic sedimentary blocks

Moderately old volcanic rocks (Paleocene and Upper Cretaceous)—Probably formed near volcanic vents and partly in a volcanic collapse basin or cauldron

TKd **Dacitic to andesitic breccia**—Greenish-gray, finely porphyritic (plagioclase and amphibole), propylitized flow and pyroclastic breccia and welded tuff. May be more than 2,300 ft thick

TKr **Rhyolite**—Mainly pale-yellowish-gray, laminated, shardy-textured, porphyritic (quartz, feldspar, and biotite), moderately altered, crystal-lithic welded tuff. Includes some unwelded tuff breccia, sedimentary rocks, and dacitic units interbedded near top of unit. Thickness 1,500–2,500 ft

TKdl **Dacite or latite**—Light-brownish-gray to greenish-gray, porphyritic (plagioclase, amphibole, and biotite) lava flows and flow breccia, and some sedimentary rocks. As much as 800 ft thick

Ka **Andesite (Upper Cretaceous)**—Dark-greenish-gray, strongly propylitized lava flows, flow breccia, and some interbedded volcaniclastic sedimentary rocks. At least 600 ft thick

Ksv **Sedimentary and volcanic rocks (Upper Cretaceous)**—Olive-gray to brown shale, sandstone, and conglomerate containing clasts of andesite, rhyolite, and sedimentary rocks. At least 2,500 ft thick

Kb **Bisbee Group (Lower Cretaceous)**—Shale, siltstone, sandstone, limestone-cobble conglomerate, and limestone; Metamorphosed west of Howard Peak. Normally more than 5,000 ft thick but local thickness unknown

PEu **Sedimentary rocks (Paleozoic)**—Undivided carbonate rocks and hornfels occurring as large inclusions in intrusive rocks, such as in units TKg and TKeb

Pea **Earp Formation (Lower Permian)**—Light-colored marlstone, shale, and limestone. About 500 ft thick

PPh **Horquilla Limestone (Lower Permian and Pennsylvanian)**—Light-gray cherty limestone and pale-reddish-gray shale. Usually about 2,000 ft thick but locally thinner because of erosion and faulting

Mpe **Paradise Formation and Escabrosa Limestone, undivided (Mississippian)**—Paradise Formation: light-brownish-gray limestone and pale-yellowish-brown shale; as much as 30 ft thick. Underlain by Escabrosa Limestone: very light gray to medium-gray, medium-bedded to massive limestone; about 450 ft thick

Dp **Portal Formation of Sabins (1975b) (Upper Devonian)**—Light-gray limestone and dark-gray shale. About 330 ft thick

Oe **El Paso Formation (Lower Ordovician)**—Light-brownish-gray dolomitic limestone and dolomite; some interbedded sandstone and siltstone. About 600 ft thick

Cc **Coronado Sandstone (Upper Cambrian)**—Brownish-gray quartzite, sandstone, and siltstone; some shale, limestone, and dolomite in upper part. About 330 ft thick. Equivalent to the Bolsa Quartzite as used by Sabins (1957b)

Old intrusive rocks

Yg **Granite and granodiorite (Middle Proterozoic)**—Light-gray, very coarse grained quartz monzonite, granodiorite porphyry, and small bodies of aplite, pegmatite, and lamprophyre

Ygg **Gneissic granite and granodiorite (Middle Proterozoic)**—Resembles unit Yg, except that it has a secondary foliation

Xa **Amphibolite (Early Proterozoic)**—Dark-greenish-gray, foliated, hornblende-rich rock

Pinal Schist (Early Proterozoic)—Foliated metasedimentary and metavolcanic rocks

Xpp **Phyllite and schist member**—Includes meta-argillite, meta-arkose, metagraywacke, and some bodies of metavolcanic rocks; dark colored

Xpq **Metaquartzite member**—Includes some arkosic metaquartzite and pebble conglomerate; very light gray to light brownish gray and strongly indurated

Xpr **Metarhyolite member**—Light-colored porphyritic rock. Rock has weak foliation and resembles unit TKri

Xpv **Metavolcanic member**—Medium-gray, strongly propylitized porphyritic dacite, andesite, and some rhyolite. Includes metasedimentary rocks and may include small intrusive bodies

q **Quartz veins (unknown age)**—Typically white tabular masses of bull quartz, some bearing metal minerals. Includes veins as old as Precambrian and others as young as Miocene

Contact—Dotted where concealed; queried where uncertain

Fault—Showing dip. Dotted where concealed; queried where uncertain

Normal fault—Ball and bar on downthrown side

Strike-slip fault—Arrow-couple shows relative movement

Strike and dip of beds

Inclined

Vertical

Overturned

Strike and dip of foliation

Inclined

Vertical

Mineral occurrences

Numbered site—See mineral occurrences table on this plate

Unnumbered site—ma, malachite or similar green copper oxide; py, pyrite

Mines and prospects

Prospect—Some prospects are unsampled because they are in barren rock or are near other workings

Adit

Shaft

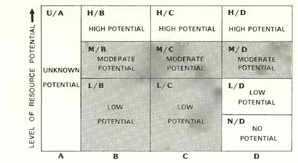
Outcrop site without workings

Quartz vein—Showing dip

Selected mineral occurrences in and near the Dos Cabezas Wilderness Study Area

(Chalcopyrite, galena, malachite, and pyrite were determined on site; other elements were determined analytically. Site numbers keyed to Drewes and others (in press))

Section	Site no.	Mineral or element
		T. 14 S., R. 28 E.
29	37	Copper, lead, molybdenum, silver, zinc
30	38	Copper, lead, molybdenum, silver, zinc
		T. 14 S., R. 27 E.
2	22	Bismuth, copper, lead, molybdenum, silver, zinc
3	15	Bismuth, copper, molybdenum, silver, tungsten
4	16	Lead, silver
11	18	Bismuth, gold, lead, moybdenum, pyrite, silver
	19	Lead, silver
	23	Bismuth, chalcopyrite, copper, galena, lead, molybdenum, silver, zinc
14	21	Bismuth, copper, lead, silver
15	20	Bismuth, copper, galena, lead, malachite or similar green copper oxide
	59	Copper, silver
	60	Copper, molybdenum, silver, zinc
22	52	Copper, lead, silver, zinc
	53	Copper, silver
	58	Copper, lead, molybdenum, silver
23	46	Copper, molybdenum, silver, zinc
	47	Lead, molybdenum, silver
24	24	Arsenic, copper, silver



LEVELS OF RESOURCE POTENTIAL
- H High mineral resource potential
- M Moderate mineral resource potential
- L Low mineral resource potential
- U Unknown mineral resource potential
- N No known mineral resource potential

LEVELS OF CERTAINTY
- A Available data not adequate
- B Data indicate geologic environment and suggest level of resource potential
- C Data indicate geologic environment, give good indication of level of resource potential, but do not establish activity of resource-forming processes
- D Data clearly define geologic environment and level of resource potential and indicate activity of resource-forming processes in all or part of the area

Diagram showing relationships between levels of mineral resource potential and levels of certainty. Shading shows levels that apply to this study area