DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MINERAL RESOURCE POTENTIAL

OIL AND GAS

There is no potential for oil and gas in the Hillsboro-San Lorenzo quadrangles. Numerous block faults in the relative thin Paleozoic sedimentary section have probably allowed the escape of any gas or petroleum that may have existed.

COAL

No coal deposits are known within the Hillsboro and San Lorenzo quadrangle.

GEOTHERMAL ENERGY

Hot springs in the Warm Spring Canyon area east of Hillsboro are along the extension of the Berrenda fault (NE 1/4, sec. 3, T. 6 S., R. 7 W.), but the heat potential in this area is low. Hot springs also occur just south of the San Lorenzo quadrangle boundary near Mimbres Hot Springs (sec. 13, T. 18 S., R. 10 W., Dwyer quadrangle) and the heat potential in this area is high (Elston, 1957, p. 74, 77).

RADIOACTIVE MINERALS

An occurrence of autunite was reported from tuff beds along Hot Springs Canyon and the maximum anomaly was about 0.07 eU_3O_8 (Tomas Yates, oral commun., 1973). The exact location of this anomaly was not found during subsequent field studies.

METALS

Silver

[illegible]

mines contain sphalerite, galena, chalcopyrite, acanthite, polybasite, cerargyrite, wire silver, and chalcocite.

Along Sawpit Canyon, 2 mi (3.2 km) north-northeast of Kingston, the Gypsy mine (no. 132) is localized along faults that have brought the Lake Valley Limestone into contact with the Fusselman Dolomite. About 190,000 oz (5.909 kg) of silver has been extracted from proustite-pyrargyrite-argenthite-bearing ores (Harley, 1934, p. 104).

Zinc, lead, copper with minor silver

Sphalerite-rich base deposits of middle Tertiary age (about 32-35 m.y. ago) are localized along faults that strike N. 10°-20° W. through the Carpenter (Swartz) mining district. Both fissure veins and bedding replacement bodies are also closely associated with a zone of thermal metamorphism that extends for at least 6 mi (9.7 km) along the strike of the faulted Paleozoic carbonate rocks. This thermal metamorphism was nearly concurrent with the mineralization and both can be attributed to the intrusion of rhyolite and quartz latite plugs, dikes, and sills into the Paleozoic strata. Tremolite and talc are found along the periphery of the thermal aureole, but diopside, wollastonite, grossular garnet, magnetite, helvite and fluorite are present in areas of higher grade metamorphism.

The chief producing mines of this district have been the Royal John (no. 153-154) (33,100 short tons (30,121 m.t.), Grandview (no. 165) (18,949 s.t.), (17,243 m.t.), Columbia (no. 162) (3,084 s.t.), (2,806 m.t.) Patsy (no. 159-160) (~500 s.t.) (455 m.t.), Acklin (no. 155) (~200 s.t.) (182 m.t.), Mineral Mountain (no. 169) (~50 s.t.) (455 m.t.) and McGee (no. 145) (~200 s.t.) (182 m.t.) (Hill, 1946; Soulé, 1950). The past production from the district has totaled an estimated 60,000 short tons (54,600 metric tons) of ore averaging about 8 percent zinc, 4 percent lead, 0.5 percent copper, and about 4 oz of silver per ton (124 g/t). The largest production has come from bedding replacement bodies in the upper part of the El Paso Limestone. Cherty limestone beds in the El Paso Limestone that are 20-70 ft (6-21 m) below the contact with the dolomite beds of the overlying Montoya Group have been especially favorable host rocks.

Copper

The Copper Flat porphyry copper deposit is a relatively nonweathered subvolcanic stock of quartz monzonite that has intruded andesite and andesite breccias of Late Cretaceous age. The quartz monzonite has been dated by the K-Ar method as 75.1±2.5 m.y. (R. F. Marvin, H. H. Mehnert, and Violet Merritt, written commun., 1974). The outcrop of quartz monzonite is small and measures about 0.4 mi^2 (1.04 km^2) and the known copper deposits are mainly confined to the central part of the intrusion (Kuellmer, 1955). Numerous fracture-fillings and disseminations of pyrite, chalcopyrite, bornite, tetrahedrite, molybdenite, and fluorite comprise the mineralized parts of the stock. The inner mineralized fracture zone or brecciated core of the stock has an outcrop area that measures about 1,500 by 700 ft (457 by 213 m) and is elongate west-northwest (Dunn, oral commun., 1975). The quartz monzonite of the fracture zone is sericitized and locally veined by a coarse second generation of biotite and by secondary quartz. The primary copper grade is erratic with as much as 1.2 percent copper in some intervals but generally the average grade is about 0.2 percent copper. In places the quartz veins contain molybdenite but the average molybdenum values are small (0.009-0.024 percent Mo).

Gold

Radial vein and dike systems about the porphyry copper type stock of Copper Flat are mineralized, and gold-bearing fissure veins have provided the source for both lode and gold placer deposits. The total gold production from the Hillsboro and Las Animas placer mining districts has been about 165,000 troy oz (5,132 kg) between 1877 and 1943 (Harley, 1934; U.S. Bur. of Mines, 1933-1943) and of this total about 113,200 troy oz (3,521 kg) can be attributed to placer production and about 51,800 troy oz (1,611 kg) to lode or vein mining.

There are about 26 major veins in the district and all the veins are younger than the quartz latite dikes that are roughly radial to the central quartz monzonite stock. The veins also have a radial distribution but are generally clustered in the southwest, east and northeast quadrants of the roughly circular Copper Flat volcano. The veins are as much as 5,000 ft (1,524 m) long, 3-8 ft (0.9-2.4 m) thick, and commonly have a marginal porpylitic type of alteration. The light greenish-gray porpylitized andesite contains chlorite, sericite, calcite, clinozoisite, secondary quartz, and disseminated sulfides. Anastomosing and an echelon quartz veins within the altered andesite contain pyrite, chalcopyrite, bornite, bismuthinite, tetradymite, sphalerite, galena, and free gold; some chalcocite, limonite, malachite and azurite are found in the oxidized zones to depths of 500 ft (152 m). Average assay values of gold for the various vein systems is difficult to determine as most of the gold occurs in pockets, en echelon fractures and breccia zones. Some sulfide concentrates from several veins contain as much as 300 ppm silver and have a trace element assemblage of nickel (30 ppm), cobalt (300 ppm) and bismuth (70 ppm).

The first discovery of placer gold was in 1877 along Snake and Wicks Gulches. Subsequent discoveries were in Grayback, Warm Spring, Hunkidori and Greenhorn Gulches and on Slapjack hill along the east side of Copper Flat near Golddust Camp. The placer gold deposits are distributed broadly at shallow depths throughout the apron of coalescing and poorly sorted rubble that comprise the alluvial fans and are especially common in or near the recently formed gulches that dissect the fans (Segerstrom and Antweiler, 1974). The gold occurs in four gravel and fan units (Santa Fe Formation to surficial deposits) that range in the age from latest Miocene(?) to Holocene. Some of the gravel and fan debris is cemented by caliche which has made the extraction of gold difficult. A shortage of water has also hindered the development of the placer deposits, and wells have to be drilled to provide the necessary water.

Manganese

The manganese deposits are in the Kingston district, where manganese oxides occur in about 18 and small discontinuous replacement bodies parallel to veins and faults (Farnham, 1961). The manganese oxides have formed from the weathering of rhodochrosite, rhodonite, and alabandite which are gangue minerals associated with the silver-bearing base metal deposits. It is estimated that about 5,700 tons (5,690 m.t.) of manganese ore averaging about 30 percent manganese were extracted from the Kingston district between 1943 and 1958 (Farnham, 1961).

Vanadium

Vanadium was produced from several small mines in fractured and silicified dolomite in the early 20th century, south of New Mexico Highway 180 in the Hillsboro district (Anderson, 1957; Lindgren, Graton and Gordon, 1910). The principal mine is the Hall mine (no. 45) which lies south of Percha Creek and east of Hillsboro. Silver-bearing cerussite, vanadinite, cuprian descloizite, arsenician vanadinite (endlichite), wulfenite, and manganese oxides are the chief minerals. The vanadium production was small but the Hall mine is one of the few areas where vanadium was produced from lead-zinc vanadates (Fischer, 1975).

Iron

The magnetite-bearing skarn deposits in the Carpenter (Swartz) district are too small and scattered to be of any economic value. The oolitic hematite in sandstone beds within the lower part of the Bliss Sandstone are extensive but are of very low grade and are generally less than 2 m thick. Small prospects in the oolitic hematite beds along Pierce Canyon represent the only attempt to mine the hematite.

NON-METAL

Sand, gravel, perlite and limestone

Sand and gravel within the alluvial deposits of Middle Percha Creek have been quarried just west of Hillsboro along New Mexico State Highway 90. Other less accessible deposits of sand and gravel are found along parts of Tierra Blanca Creek and Trujillo Canyon and along terraces of the Mimbres River.

Despite the abundance of volcanic rocks perlitic vitrophyres are not common in the area. The most extensive and thickest vitrophyres crop out at the base of the Oligocene Mimbres Peak Rhyolite of Jicha, 1954 (Tmpv) near Sherman Mountain and Deer Hill. Generally a reddish-brown partly devitrified groundmass forms the matrix to the large perlitic vitric fiamme, and therefore it is doubtful that the vitrophyre could be profitably quarried as a light-weight aggregate.

There is an abundance of limestone and dolomite for use as cement, lime, or road aggregate, but the value depends largely on access to large urban population centers. Some of the limestone beds in the Mississippian Lake Valley Limestone are very pure and are locally converted to marble in the vicinity of the Mineral Mountain mine (no. 169). However, the presence of chert nodules in the marble destroys the value of the stone as a building material.

Fluorspar

The fluorspar is chiefly confined to thin fracture-fillings within the Oligocene Kneeling Nun Tuff along Berrenda Creek near Larkins Spring Mountain. The fluorspar is not present in economic quantity.

MINERAL DEPOSITS OF THE HILLSBORO-SAN LORENZO QUADRANGLES

[Numbers correspond with location of lode mineral deposits on map. Leaders (---) in reference column indicate deposits not described in the literature and are chiefly occurrences observed during recent geologic mapping. P, prospect pit; M/I, mine workings, inactive; M/A, mine workings, active; O, mineralized outcrops, no development]

Lode No.	Name(s)	Resource	Type of deposit	Development category	Brief description	References
			Hillsboro district (I)			
1.	Unnamed------	Ag, Au	Vein--------	P	Quartz vein along north-striking fault contains pyrite.	---
2.	----do-------	Ag, Au, Pb, Zn	---do-------	P	Quartz vein along north-striking fault contains pyrite and galena.	---
3.	----do-------	Au, Ag, Pb, Zn, W	---do-------	P	Quartz vein along tactite zone parallel to fault that strikes N. 70° W.; minor sulfides.	---
4.	----do-------	Pb, Zn, Cu	---do-------	P	Quartz vein along tactite zone; sparse sulfide.	---
5.	El Oro mine--	Au, Cu, Pb, Zn	---do-------	M/I	Quartz vein within shear zone that strikes N. 50° E.; mined to a depth of 500 ft (152 m); pyrite, chalcopyrite and free gold.	Harley, 1934, p. 132, 141.
6.	Unnamed------	Au, Cu, Pb, Zn	---do-------	M/I	Quartz vein along pyritized shear zone in andesite strikes N. 60° E.	---
7.	Little Jewess mine.	Au, Cu, Pb, Zn	---do-------	M/I	Quartz veins along shear in andesite that is about 1 m thick; abundant pyrite.	Harley, 1934, p. 159.
8.	Unnamed------	Au, Cu, Pb, Zn	---do-------	P	Quartz vein along El Oro vein; vein strikes N. 40°-45° E. and contains minor pyrite.	---
9.	Sweetwater mine.	Au, Cu, Pb, Zn	---do-------	M/I	Quartz vein along shear that strikes N. 75° E.; vein contains abundant pyrite and sparse amounts of free gold.	Harley, 1934, p. 159.
10.	Unnamed------	Au, Cu, Pb, Zn	---do-------	P	Quartz vein along shear that strikes N. 80° W. Contains abundant pyrite.	---
11.	----do-------	Au, Cu, Pb, Zn	---do-------	P, M/I	Quartz vein along fault that strikes N. 85° W. Contains abundant pyrite.	---
12.	Homestake-Tripp mine.	Au, Cu, Pb, Zn	---do-------	P	Quartz veins along Homestake-Tripp vein; sparse amounts of sulfide.	Harley, 1934, p. 141.
13.	Unnamed------	Au, Cu, Pb, Zn	---do-------	P	Quartz veins along Homestake-Tripp vein; contains abundant pyrite.	---
14.	----do-------	Au	---do-------	P	Quartz veins along N. 25° W. striking fault; contains sparse amounts of sulfides.	---
15.	----do-------	Au	---do-------	P, M/I	Quartz vein along margin of sheared latite dike; contains sparse amounts of pyrite.	---
16.	Sternberg shaft.	Cu	Porphyry copper.	M/I	Highly fractured quartz monzonite contains chalcopyrite, pyrite and secondary malachite, azurite, chrysocolla, cuprite and limonite.	Harley, 1934, p. 130, 136.
17.	Copper King mine.	Cu	---do-------	M/I	Highly fractured quartz monzonite contains pyrite, chalcopyrite and secondary chrysocolla.	---
17-A.	Quintana Incline.	Cu	---do-------	M/A	Highly fractured and faulted quartz monzonite contains pyrite, chalcopyrite, bornite and secondary chrysocolla.	---
18.	Unnamed------	Au	Vein--------	M/I	Altered and pyritized andesite.	---
19.	----do-------	Au	---do-------	M/I	Propylitized and fractured andesite contains pyrite and chalcopyrite; vein strikes N. 40° E.	---
20.	----do-------	Cu	Porphyry copper.	P	Fractured quartz monzonite contains pyrite and chalcopyrite.	---
21.	----do-------	Au	Vein--------	M/I	Altered andesite contains pyrite along projected extension of the Sweetwater vein.	---
22.	----do-------	Au	---do-------	M/I	Sparse amounts of pyrite along shear zone in andesite.	---
23.	----do-------	Au	---do-------	M/I	Quartz vein in andesite strikes N. 70° E. Vein is reported to average 3 oz of gold per ton.	---
24.	----do-------	Au	---do------	M/I	Quartz vein in andesite strikes N. 70° W. and contains abundant pyrite.	---
25.	Chance mine--	Au	---do-------	M/I	Quartz veins in andesite strike N. 70° W. Ore minerals include pyrite, chalcopyrite, bornite and free gold.	Harley, 1934, p. 158-159.
26.	Unnamed------	Au	---do-------	M/I	Quartz veins in andesite strike N. 65° W. Abundant pyrite and some free gold.	---
27.	----do-------	Au	---do-------	P	Thin fracture-fillings of pyrite within andesite.	---
28.	----do-------	Au	---do-------	M/I	Thin anastomosing fractures in andesite strike N. 15° W. and contain pyrite and sparse amounts of free gold.	---
29.	Black Peak mine.	Au	---do-------	M/I	Faulted and altered andesite contains anastomosing fracture-fillings of pyrite, chalcopyrite and sparse amounts of free gold.	---
30.	Unnamed------	Au	---do-------	M/I	Quartz veins along fault in propylitized andesite strike N. 15° E. Sparse amounts of pyrite.	---
31.	----do-------	Au	---do-------	P	Quartz veins along fault in propylitized andesite strike N. 35° E. sparse amounts of pyrite and free gold.	---
32.	----do-------	Au	---do-------	P	Quartz veins along fault in andesite strike N. 35° E. Sparse amounts of pyrite.	---
33.	----do-------	Au	---do-------	M/I, P	Propylitized fracture zone in andesite strikes N. 3° E. Minor amounts of disseminated pyrite.	---
34.	----do-------	Au	---do-------	M/I	Propylitized andesite along fault contains disseminated pyrite. Fault strikes due north.	---
35.	----do-------	Au	---do-------	M/I, P	Abundant secondary manganese oxides along a fault that strikes N. 75° W. Contains pyrite, chalcopyrite, bornite and some free gold.	---
36.	Wicks mine---	Au	---do-------	M/I, P	Quartz veins along a fault that strikes N. 5° E. One vein 8-15 cm thick contains pyrite, chalcopyrite, bornite and free gold. Total production about 4,700 oz gold.	Harley, 1934, p. 157-158; Lindgren, Graton and Gordon, 1910, p. 276.
37.	Morning glory mine.	Au	---do-------	M/I, P	Quartz veins near the junction of of the Wicks vein strikes N. 35° E. Contains abundant pyrite and sparse amounts of free gold.	---
38.	Unnamed------	Au	---do-------	P	Probable extension of the Opportunity vein. Series of prospects along a fracture zone that strikes N. 5°-10° E. Contains sparse amounts of pyrite and free gold.	---
39.	Ready Pay mine.	Au	---do-------	M/I	Numerous quartz veins along fault in propylitized andesite strike N. 25° E. Veins contain pyrite, chalcopyrite, bornite, and free gold.	Harley, 1934, p. 157.
40.	Unnamed------	Au	---do-------	M/I	Faulted contact of andesite and limestone contains sparse pyrite.	---
41.	----do-------	Au	---do-------	P	Gossan along a N. 85° W.-striking fault contains pyrite casts.	---
42.	----do-------	Au	---do-------	M/I	Fault slice of ferruginous quartzite contains abundant manganese oxides.	---
43.	----do-------	Au	---do-------	P	Hematitic alteration of the El Paso Limestone along fault. Sparse amount of pyrite.	---
44.	Vanadinite mine.	Pb, Zn, V, Cu, Ag	Vein and bedding replacement.	M/I	Highly fractured dolomite near contact with Percha Shale contains abundant manganese oxides. Oxidized ore contains wulfenite, vanadinite, and cerussite.	Harley, 1934, p. 136-137.
45.	Hall mine----	Pb, Zn, V, Cu, Ag	---do-------	M/I	Bedding replacement lenses and fracture fillings in Fusselman Dolomite below contact with Percha Shale contain wulfenite, vanadinite, and cerussite.	Lindgren, Graton and Gordon, 1910, p. 276; Anderson, 1957, p. 123-124; Fischer, 1975, p. A6, A10.
46.	Unnamed------	Pb, Zn	Tactite-----		Tactite zone contains specularite, garnet, epidote and sparse amounts of galena and sphalerite.	---
47.	----do-------	Cu, Pb, Zn	---do-------	M/I	Tactite zone of garnet and epidote with sparse amounts of malachite, chrysocolla and azurite.	---
48.	Petroglyph mine.	Cu, Pb, Zn	Vein--------	M/I	Quartz vein along fault that strikes N. 30° W. Sparse amounts of pyrite, sphalerite and galena.	---
49.	Crescent Lode mine.	Cu, Pb, Zn	---do-------	P	Quartz veins along fault that strikes N. 30° E. Sparse amounts of pyrite, chalcopyrite, sphalerite and galena.	---
50.	Opportunity mine.	Au	---do-------	M/A	Quartz veins along fault in propylitized andesite strike N. 30° E. and N. 10° E. Total production about 21,000 oz gold. Mine tailings are currently being reworked for gold.	Harley, 1934, p. 155-156; Reeves, 1963, p. 1283.
51.	Sherman mine-	Au	---do-------	M/I	Upper adit is along a propylitized fault that strikes N. 30° E. Abundant pyrite and traces of free gold.	Harley, 1934, p. 156-157.
52.	Unnamed------	Au	---do-------	M/I	Propylitized and pyritized fault that strikes N. 40° E.	---
53.	Stowaway(?) mine.	Au	---do-------	P	Mineralized fault that strikes N. 40° E.; contains sparse amounts of pyrite.	---
54.	Snake or Rattlesnake mine.	Au	---do-------	M/I	Gold-quartz veins along fault that strike N. 25° E. Fault intersects quartz latite dike near millsite. Two branches of the vein have been intensively worked. The Snake, Bobtail and Eureka shafts have been produced about 47,000 oz gold.	Harley, 1934, p. 131, 151-154.
55.	Unnamed------	Au	---do-------	P	Extension of the Snake vein contains moderately abundant pyrite.	---
56.	Bonanza mine.	Au	---do-------	M/I	Vein system developed by 3 tunnels along a fault that strikes N. 37° E. Quartz veins contain abundant pyrite, chalcopyrite, galena and free gold. Total production about 21,900 oz gold.	Harley, 1934, p. 148-151.
57.	----do------	Au	---do-------	M/I	Lower tunnel along Bonanza vein trends N. 37° E. and vein contains abundant pyrite and traces of free gold.	Harley, 1934, p. 148-151.
58.	Bigelow mine.	Au	---do-------	M/I	Richmond vein strikes N. 40° E. along fault in propylitized andesite. Vein contains chalcopyrite, pyrite, bornite, sphalerite, and free gold. Assay values indicate about 2.32-3.91 oz gold per ton.	Harley, 1934, p. 144-145; Reeves, 1963, p. 1282-1283.
59.	Unnamed------	Au	---do-------	P	Contact of latite dike with andesite is weakly mineralized.	---
60.	----do-------	Au	---do-------	P	Weakly mineralized part of the Butler vein; sparse amounts of pyrite.	---
61.	Jackpot mine-	Au	---do-------	M/I	Quartz vein along a fault that strikes N. 50° E. Weakly mineralized with pyrite, free gold and secondary copper minerals. The Butler vein locally displaces a quartz latite dike.	Reeves, 1963, p. 1281.
62.	Richmond mine.	Au	---do-------	M/I	Quartz vein along the margins of a latite dike strikes N. 40°-47° E. Vein contains pyrite, chalcopyrite, galena, sphalerite and free gold.	Harley, 1934, p. 145-148.
63.	Empire mine--	Au	---do-------	M/I	Pyritized shear zone in andesite strikes N. 82° E.	---
64.	Unnamed------	Au	---do-------	P	Weakly mineralized fault that strikes N. 80° E.	---
65.	----do-------	Au	---do-------	P	Sparse amounts of manganese oxides associated with quartz veins that occur along a fault that strikes N. 5° W.	---

Lode No.	Name(s)	Resource	Type of deposit	Development category	Brief description	References
			Lake Valley district			
66.	Unnamed------	Mn	Vein--------	P	Gossan along fault in limestone contains chiefly hematite and sparse amounts of pyrite.	---
			Unknown			
67.	Unnamed------	Cu	Vein--------	P	Chrysocolla along fault in andesite.	---
68.	Blue Bell No. 2.	Cu	----do-------	P	Chrysocolla along fault in andesite.	---
			Tierra Blanca district (VI)			
69.	Unnamed------	Cu	Vein--------	P	Quartz veins about 3 m long contain sparse amounts of pyrite and chalcopyrite.	---
70.	----do-------	Cu, Ag, Pb, Zn	Disseminated	P	Disseminated pyrite in rhyolite dike.	---
71.	----do-------	Cu, Ag, Pb, Zn	---do-------	P	Disseminated sulfides in rhyolite dike.	---
72.	----do-------	Cu, Ag, Pb, Zn	Vein--------	P	Sparse amounts of sulfide in silicified fault that strikes N. 52° W.	---
73.	----do-------	Cu	---do-------	P	Sparse amounts of pyrite along fault that strikes N. 85° W.	---
74.	Silvertail mine.	Cu, Ag, Pb, Zn	Vein and bedding replacement.	M/I	Sparse amounts of pyrite within a gangue of vuggy quartz and calcite. Bedding replacement lenses in the Fusselman Dolomite near the contact with the Percha Shale.	Harley, 1934, p. 108.
75.	Unnamed------	Cu, Ag, Pb, Zn	Vein--------	M/I	Sparse amounts of sulfides along fault contact with andesite dike.	---
76.	----do-------	Cu, Ag, Pb, Zn	---do-------	M/I	Quartz veins along faulted dolomite beds; veins contain minor amounts of sulfide.	
77.	----do-------	Cu, Ag, Pb, Zn	---do-------	M/I	Sparse amounts of pyrite along fractures in dolomite.	---
78.	----do-------	Cu, Ag, Pb, Zn	---do-------	M/I	Sparse amounts of pyrite along N. 55° W. striking fractures in dolomite.	---
79.	----do-------	Cu, Ag, Pb, Zn	---do-------	M/I	Minor amounts of pyrite, sphalerite, galena and acanthite along N. 5°-10° W.-striking fractures.	---
80.	Jayhawk Group.	Cu, Ag, Pb, Zn	Vein and bedding replacement.	M/I	Veins along N. 5°-10° W.-striking fractures in dolomite contain pyrite sphalerite, galena and acanthite. Some talc is present along altered zones.	---
81.	-----do------	Cu, Ag, Pb, Zn	---do-------	M/I	Veins along fractures in dolomite contain pyrite, sphalerite, galena and acanthite. Some talc associated with the mineralized dolomite.	---
82.	Unnamed------	Cu, Ag, Pb, Zn	Vein--------	M/I	Minor amounts of sulfides in quartz veins that strike N. 10° E.	---
83.	Toggery (?) mine.	Cu, Ag, Pb, Zn	---do-------	M/I	Mixed breccia of rhyolite and shale fragments contains moderate amounts of pyrite.	---
84.	Log Cabin mine.	Cu, Ag, Pb, Zn	---do-------	M/I	Talcose and silicified faults in dolomite contain pyrite, sphalerite, galena and acanthite. Past production of silver was about 75,000 oz.	Lindgren, Graton and Gordon, 1910, p. 271; Harley, 1934, p. 108-110.
85.	Hornet Group-	Cu, Ag, Pb, Zn	---do-------	M/I	Talcose and silicified faults in dolomite near the contact with the Percha Shale contain silver-bearing sulfides.	Harley, 1934, p. 108.
86.	Unnamed------	Cu, Ag, Pb, Zn	Vein(?)-----	P	Sparse sulfides, chiefly pyrite, in Fusselman Dolomite near contact with the Percha Shale.	---
87.	----do-------	Cu, Ag, Pb, Zn	Vein--------	P	Gossan along N. 5° E.-striking fault contains sparse amounts of pyrite.	---
88.	Gray Eagle mine.	Ag, Cu, Pb, Zn	---do-------	M/I	Quartz veins along N. 30°-35° W.-striking faults contain pyrite, sphalerite, chalcopyrite, galena and acanthite. Rhyolite dikes cut the El Paso Limestone in the mineralized areas. An estimated 2,855 tons of silver-bearing ore was mined between 1919 and 1945.	Harley, 1934, p. 103; Hill, 1946, p. 9-10.
89.	Unnamed------	Ag, Cu, Pb, Zn	---do-------	P	Mineralized fractures in Precambrian rock strike N. 10°-15° W.	---
90.	Lookout mine-	Ag, Cu, Pb, Zn	Vein and bedding replacement.	M/I	Tensional fractures in the Bliss Sandstone and El Paso Limestone are mineralized adjacent to rhyolite sill and dike. Some gold and silver tellurides are reported. Past production was about 95,000 oz silver.	Lindgren, Graton and Gordon, 1910, p. 271; Harley, 1934, p. 108-110.
91.	Big Jap mine-	Ag, Cu, Pb, Zn	---do-------	M/I	Fracture filling and bedding replacement deposits within the Bliss Sandstone and El Paso Limestone contain pyrite, chalcopyrite, sphalerite, galena and minor amounts of acanthite. Total ore shipped 140 tons.	Jack Upton (oral commun., 1973).
92.	Jap mine-----	Ag, Cu, Pb, Zn	---do-------	M/I	Sulfide fracture-fillings in the Bliss Sandstone.	---
93.	Beardog mine(?).	Ag, Cu, Pb, Zn	Vein--------	M/I	Quartz veins along fault contact of Precambrian granite with the Fusselman Dolomite contain minor amounts of sulfides.	---
94.	Unnamed------	Ag, Cu, Pb, Zn	---do-------	M/I	Quartz veins at contact of rhyolite sill with the Percha Shale contain minor amounts of sulfides.	---
95.	----do-------	Ag, Cu, Pb, Zn	---do-------	M/I	Quartz veins along fault contact of dolomite with limestones of the El Paso Limestone.	---
			Kingston district (III)			
96.	Unnamed------	Cu	Vein--------	P	Limonitic alteration along fault that strikes N. 15° W. Sparse amounts of pyrite and secondary copper minerals.	---
97.	----do-------	Mn	---do-------	P	Abundant manganese oxides along N. 75° W.-striking fractures in dolomite. Fractures contain sparse amounts of pyrite.	---
98.	----do-------	Cu	---do-------	M/I	Fault along contact of limestone beds with the Abo Formation is weakly mineralized.	---
99.	Samoa 992-B mine.	Cu, Mn, Ag, Pb, Zn	---do-------	M/I	Abundant manganese oxides in silicified limestone breccia along fault that strikes N. 25° W. Contains moderate amounts of pyrite, chalcopyrite, galena and sphalerite.	---
100.	United States and Illinois mines.	Ag, Cu, Pb, Zn	Vein and bedding replacement.	M/I	Quartz veins, breccias and highly oxidized bedding replacement deposits in dolomite beds underlying the Percha Shale. Ladrone fault strikes N. 25°-30° W. through mine area. Abundant cerargyrite, sphalerite, galena, pyrite and chalcopyrite.	---
101.	Andy Johnson and Brush Heap mines.	Ag, Cu, Pb, Zn	---do-------	M/I	Highly oxidized, near-surface quartz vein, breccia, and bedding replacement deposits in the Fusselman Dolomite near the contact with the Percha Shale. Abundant cerargyrite, sphalerite, galena, pyrite and chalcopyrite. Mines may have produced as much as 500,000 oz silver.	---
101-A.	Pride of the Camp and Black Eyed Susan.	Ag, Cu, Pb, Zn	---do-------	M/I	Quartz veins and fault breccias along the Ladrone fault. Most workings are in the Lake Valley Limestone near fault contact with the the Fusselman Dolomite. Past production probably small.	---
102.	New York Group.	Ag, Cu, Pb, Zn	---do-------	M/I	Oxidized silver-bearing base metal deposits along N. 5°-30° W.-striking fractures in the Fusselman Dolomite.	---
103.	Enterprise mine.	Ag, Cu, Pb, Zn	---do-------	M/I	Oxidized silver-bearing base metal deposits along N. 85° E.-striking fractures in dolomite.	---
104.	Sally B. No. 1 mine.	Ag, Cu, Pb, Zn, Mn	Vein--------	M/I	Abundant manganese oxides along a N. N. 35° W.-striking fault and along an older fracture system that strikes N. 55° E. Vein contains minor amounts of sulfides.	---
105.	Unnamed------	Ag, Cu, Pb, Zn, Mn	---do-------	M/I	Abundant sulfides and manganese oxides along a N. 35° W.-striking fault.	---
106.	----do-------	Ag, Cu, Pb, Zn, Mn	Vein and bedding replacements deposits.	M/I	Abundant manganese oxides along strong fractures that strike N. 60°-70° W. in the Fusselman Dolomite.	---
107.	----do-------	Ag, Cu, Pb, Zn	Vein--------	M/I	Sparse sulfides along fractures that strike N. 30°-35° W. near the base of the Alamogordo Member of Lake Valley Limestone.	---
108.	Cruise shaft-	Ag, Cu, Pb, Zn	Vein and bedding replacement.	M/I	Abundant oxidized sulfides and manganese oxides along the Bullion fault which strikes N. 35° W.	---
109.	Unnamed------	Cu	Disseminations.	P	Disseminated pyrite and chalcopyrite(?) in rhyolite dike.	---
110.	----do-------	Cu	Vein--------	M/I	Silicified and brecciated Bliss Sandstone contains sparse amounts of pyrite.	---
111.	Bullion mine-	Ag, Cu, Pb, Zn	Vein and bedding replacement.	M/I	Oxidized ores in silicified and brecciated dolomite contain cerargyrite, sphalerite, pyrite, galena, alabandite and acanthite.	Harley, 1934, p. 103.
112.	Savage Tunnel.	Ag, Cu, Pb, Zn	---do-------	M/I	Oxidized silver-bearing base metal ores in silicified and brecciated dolomite are localized along fractures and faults that strike N. 30° W.	Farnham, 1961, p. 105.
113.	Mine No. 77 and Superior group of mines.	Ag, Cu, Pb, Zn, Mn	---do-------	M/I	Abundant manganese oxides and oxidized base metal sulfides along faults and fractures that strike N. 35° W. and N. 50°-55° E. within dolomite.	---
114.	Yorin-Superior tunnel workings.	Ag, Cu, Pb, Zn, Mn	---do-------	M/I	Abundant manganese oxides and oxidized silver-bearing base metal sulfides along N. 20°-25° W. striking faults and fractures in dolomite.	Farnham, 1961, p. 103.
115.	Unnamed------	Ag, Cu, Pb, Zn, Mn	---do-------	M/I	Abundant manganese oxides and oxidized silver-bearing base metal sulfides along fractures that strike N. 20°-25° W.	---
116.	Canfield and McGowan tunnels.	Ag, Cu, Pb, Zn, Mn	---do-------	M/I	Tunnels trend south-southeast and southeast near contact of Fusselman Dolomite and Percha Shale; bedding replacement bodies within the dolomite.	Farnham, 1961, p. 104-105.
117.	Lady Franklin mine.	Ag, Cu, Pb, Zn, Mn	---do-------	M/I	Mostly silver-rich oxidized ore along fractures that strike N. 55°-80° E. within the Fusselman Dolomite. A major producer.	Harley, 1934, p. 104.
118.	Black Colt mine.	Ag, Cu, Pb, Zn, Mn	---do-------	M/A	Mostly silver-rich oxidized ore along faults and fractures that strike N. 30° W. and N. 75° E.	Farnham, 1961, p. 100-101.
119.	----do-------	Mn	---do-------	M/I	Abundant manganese oxides along fractures in dolomite that strike N. 70° W. As much as 765 tons of manganese ore averaging 37-38 percent manganese mined 1952-1953.	Farnham, 1961, p. 100-101.
120.	Unnamed------	Mn	---do-------	M/I	Abundant manganese oxides along fractures that strike N. 65° E.	---
121.	Iron King and Miner's Dream mines.	Ag, Cu, Pb, Zn, Mn	---do------	M/I	Abundant oxidized silver-bearing base metal deposits along the Iron King fault and along N. 70° E. striking fractures. Rhodochrosite and rhodonite gangue minerals are commonly present.	Harley, 1934, p. 104. Farnham, 1961, p. 98-100.

Lode No.	Name(s)	Resource	Type of deposit	Development category	Brief description	References
			Kingston district (III)--Continued			
122.	Blackie and Tall Pine mines.	Ag, Cu, Pb, Zn, Mn	---do-------	M/I	Abundant manganese oxides as replacement bodies along N. 15° W. and N. 60°-65° E. fractures and faults.	Farnham, 1961, p. 97, 101-102.
123.	Unnamed------	Mn	---do-------	M/I	Minor amounts of manganese oxides along a fault that strikes N. 50°-55° W.	---
124.	----do-------	Mn	---do-------	M/I	Abundant manganese oxides along a N. 65° W. striking fault.	---
125.	Comstock tunnel.	Ag, Cu, Pb, Zn	---do-------	M/I	Oxidized silver-bearing base metal deposits along a N. 45°-55° E. striking fault.	Harley, 1934, p. 104; Farnham, 1961, p. 102-103.
126.	Unnamed------	Ag, Cu, Pb, Zn	Vein--------		Thin gossan along fault.	---
127.	----do-------	Ag, Cu, Pb, Zn	---do-------	M/I	Weakly mineralized fractures within dolomite near the contact with Percha Shale.	---
128.	Gypsy IV group.	Ag, Cu, Pb, Zn	---do-------	M/I	Highly brecciated dolomite with secondary vein filling of quartz, calcite and minor sulfides.	---
129.	Unnamed------	Ag, Cu, Pb, Zn	Vein and bedding replacement.	M/I	Minor amounts of silver-bearing sulfides at contact of Fusselman Dolomite with the Percha Shale.	---
130.	----do-------	Ag, Cu, Pb, Zn	Vein--------	M/I	Minor amounts of base metal sulfides at contact of El Paso Limestone with Bliss Sandstone.	---
131.	----do-------	Ag, Cu, Pb, Zn	---do-------	P	Minor amounts of sulfide at contact of Fusselman Dolomite with the Percha Shale.	---
132.	Gypsy mine---	Ag, Cu, Pb, Zn	Vein and bedding replacement.	M/I	Abundant oxidized silver-bearing base metal sulfides along a fault that strikes N. 10° W. Past production was about 200,000 oz silver.	Harley, 1934, p. 104.
133.	Unnamed------	Ag, Cu, Pb, Zn	Vein--------	M/I	Minor amounts of sulfide along N. 70° E. striking fault in Precambrian granite.	---
134.	Fabian mine--	Ag, Cu, Pb, Zn	---do-------	M/I	Quartz vein along fault contact of Precambrian granite with limestone of the Magdalena Group.	---
135.	Unnamed------	Ag, Cu, Pb, Zn	---do-------	M/I	Mineralized fractures in the Lake Valley Limestone strike N. 10° W.	---
136.	----do-------	Ag, Cu, Pb, Zn	---do-------	P	Minor amounts of base metal sulfide along fault that strikes N. 10° W.	---
137.	----do-------	Ag, Cu, Pb, Zn	---do-------	M/I	Mineralized fault contact between Precambrian granite and the Fusselman Dolomite.	---
138.	----do-------	Ag, Cu, Pb, Zn	---do-------	P	Mineralized shear fractures in Precambrian granite strike N. 0°-30°E. Minor amounts of pyrite present.	---
139.	Virginia mine.	Ag, Cu, Pb, Zn	---do-------	M/I	Mineralized vein in Precambrian granite strikes due north. Oxidized surface ores contain cerargyrite and past production figures indicate as much as 60 oz silver per ton.	Harley, 1934, p. 104.
140.	----do-------	Ag, Cu, Pb, Zn	---do-------	M/I	Highly pyritic ores along faults that strike N. 5°-10° W. The granite marginal to the veins is highly sericitized.	---
141.	Ingersoll mine.	Ag, Cu, Pb, Zn	---do-------	M/I	Fissure vein in Precambrian granite as much as 20 cm thick strikes N. 80°-85° W. Some of the silver-rich base metal ores contain as much as 17 oz of silver per ton (0.55 kg/t). Vein contains pyrite, sphalerite, galena, chalcopyrite, acanthite, polybasite, cerargyrite, wire silver and chalcocite.	---
142.	Barite Hill No. 1	Ag, Cu, Pb, Zn	---do-------	P	Numerous thin quartz veins that strike N. 65°-80° W. contain minor amounts of sulfide.	---
143.	Unnamed------	Cu	---do-------	O	Siltstone of the Abo Formation adjacent to rhyolite sill contains minor amounts of pyrite and chalcopyrite.	---
144.	SO Mine No. 1.	Ag, Cu, Pn, Zn	---do-------	M/I	Limestone of the Magdalena Group is mineralized near the contact with a rhyolite sill. Ore minerals include pyrite, galena, sphalerite, chalcopyrite and manganese oxides. Grossular garnet present in the limestone.	---
			Carpenter (Swartz) district (IV)			
145.	McGee mine---	Ag, Zn, Pb, Cu	Vein--------	M/I	Quartz veins containing base metal sulfides are alined along a strong fracture zone that strikes N. 70° E.	Harley, 1934, p. 112.
146.	Unnamed------	Zn, Pb, Cu, Ag	Vein and bedding replacement.	M/I, P	Tactite controlled base metal deposits form bedding replacement lenses and some base metal ores are along N. 60° E.-striking fractures in the El Paso Limestone.	---
147.	----do-------	Zn, Pb, Cu, Ag	---do-------	M/I, P	Minor amounts of sulfide at fault contact of the Fusselman Dolomite with limestone of the Magdalena Group.	---
148.	Sunshine adit.	Zn, Pb, Cu, Ag	---do-------	M/I	Bedding replacement bodies of sphalerite-rich ore within tactite zones in the El Paso Limestone.	Hill, 1946, p. 9; Soule, 1950, p. 6.
149.	Mill adit----	Zn, Pb, Cu, Ag	---do-------	M/I	Bedding replacement lenses of sphalerite-rich ore within the upper part of the El Paso Limestone. Some lenses are as much as 1.5 m thick and are closely associated with tactite.	---
150.	Unnamed------	Zn, Pb, Cu, Ag	Bedding replacement, tactite.	M/I	Bedding replacement bodies of sphalerite-rich ore within the El Paso Limestone.	---
151.	----do-------	Zn, Pb, Cu, Ag	---do-------	M/I	Bedding replacement bodies of sphalerite-rich ore; about 3 m below contact with dolomite of the Montoya Group.	---
152.	West Cut of Royal John mine.	Zn, Pb, Cu, Ag	---do-------	M/I	Bedding replacement lenses of sphalerite-rich ore in cherty limestone about 12 m below contact with dolomite. Tremolite, diopside, talc and epidote replace the cherty limestone.	Soule, 1950, p. 1-8.
153.	New Cut and Wilson Cut of Royal John mine.	Zn, Pb, Cu, Ag	----do------	M/I	Bedding replacement lenses of sphalerite-rich ore in chert limestone beds of the El Paso Limestone. Sulfides follow intergrain boundaries of the skarn minerals.	Harley, 1934, p. 112-113; Hill, 1946, p. 9.
154.	North Cut, Royal John mine.	Zn, Pb, Cu, Ag	---do-------	M/I	Bedding replacement lenses of sphalerite-rich ore in cherty limestone beds. Discovery fault is post-mineral and has displaced the mineralized tactite downward on the east.	---
155.	Acklin mine--	Zn, Pb, Cu, Ag	---do-------	M/I	Bedding replacement lenses of base metal ore in cherty limestone of the El Paso Limestone.	---
156.	Unnamed------	Zn, Pb, Cu, Ag	---do-------	P	Abundant manganese oxides on weathered outcrop. Bedding replacement bodies within cherty limestone beds that contain skarn minerals.	---
157.	----do-------	Zn, Pb, Cu, Ag	---do-------	P	Sulfide minerals are in close association with specular hematite, diopside, magnetite, epidote and garnet in cherty limestones.	---
158.	----do-------	Zn, Pb, Cu, Ag	---do-------	P	Sulfide minerals in close association with diopside, epidote and magnetite skarn. Some ore minerals along fault that strikes N. 5° W.	---
159.	Patsy mine---	Zn, Pb, Cu, Ag	---do-------	M/I	Base metal sulfides form bedding replacement lenses in the upper part of the El Paso Limestone. Tactite minerals include diopside, magnetite, garnet and epidote. Past production was about 500 tons of ore.	---
160.	Lower Patsy mine.	Zn, Pb, Cu, Ag	---do-------	M/I	Bedding replacement sulfide deposits in lower part of the El Paso Limestone near contact with Bliss Sandstone.	---
161.	Unnamed------	Zn, Pb, Cu, Ag	Vein--------	P	Minor amounts of sulfide at fault contact of andesite with dolomitic beds of the Montoya Group.	---
162.	Columbia mine.	Zn, Pb, Cu, Ag	Bedding replacement, tactite, vein.	M/I	Sulfides closely associated with tactite in the El Paso Limestone. Oligocene rhyolite dike 105 ft (32 m) thick cuts the limestone and was the probable thermal source for the skarn minerals. Production of ore 1924-1944 was about 3,084 tons.	Hill, 1946, p. 5.
163.	Unnamed------	Zn, Pb, Cu, Ag	Bedding replacement, tactite.	P	Abundant manganese oxides and sparse amounts of sulfide form bedding replacement zones in the El Paso Limestone.	---
164.	----do-------	Zn, Pb, Cu, Ag	Vein, tactite.	P	Sparse amounts of sulfide but abundant tremolite and talc in cherty dolomite along fault that strikes N. 10° E.	---
165.	Grandview mine.	Zn, Pb, Cu, Ag	Bedding replacement, tactite, vein.	M/I	Sulfides in bedding replacement deposits within the El Paso Limestone. Associated skarn minerals include diopside, epidote, garnet, helvite, fluorite and phlogopite. Past production of zinc-rich ore was about 24,000 tons.	Harley, 1934, p. 111; Hill, 1946, p. 5, 8-9.
166.	Unnamed------	Zn, Pb, Cu, Ag	[illegible]	[illegible]	Quartz vein contains sparse amounts of pyrite; vein strikes N. 45° W. in Precambrian granite.	---
167.	----do-------	Zn, Pb, Cu, Ag	[illegible]	[illegible]	Brecciated silicified dolomite contains minor amounts of sulfide.	---
168.	----do-------	Zn, Pb, Cu, Ag	[illegible]	[illegible]	Sparse amounts of sulfide along a N. 40° W.-striking fault.	---
169.	Mineral Mountain Group.	Zn, Pb, Cu, Ag	[illegible]	[illegible]	Sphalerite-rich base metal deposits in thermally metamorphosed limestone beds of the Magdalena Group. Past production of about 50 tons.	---
170.	----do-------	Zn, Pb, Cu, Ag	[illegible]	[illegible]	Bedding replacement lenses of sulfide in cherty limestone.	---
171.	----do-------	Zn, Pb, Cu, Ag	[illegible]	[illegible]	Limestone beds in contact with andesite breccia contain minor amounts of sulfide.	---
172.	----do-------	Zn, Pb, Cu, Ag	[illegible]	[illegible]	Shale at contact with rhyolite sill is weakly mineralized with sphalerite, pyrite, galena and chalcopyrite.	---
173.	----do-------	Zn, Pb, Cu, Ag	[illegible]	[illegible]	Sparse amounts of sulfide in sandstone and chert pebble conglomerate.	---
174.	----do-------	Zn, Pb, Cu, Ag	[illegible]	[illegible]	Very sparse amounts of sulfide in sandstone.	---
175.	----do-------	Zn, Pb, Cu, Ag	[illegible]	[illegible]	Sparse amounts of sulfide in silicated Lake Valley Limestone.	---
176.	----do-------	Zn, Pb, Cu, Ag	[illegible]	[illegible]	Sulfide along intrusive contact of rhyolite prophyry with andesite.	---

Lode No.	Name(s)	Resource	Type of deposit	Development category	Brief description	References
			Santa Rita (San Juan) district (VII)			
177.	Unnamed------	Zn, Pb, Cu, Ag	Vein--------	P	Sparse amounts of sulfide within Fusselman Dolomite near fault contact with Percha Shale.	---
178.	Rose mine----	Cu, Zn, Pb, Ag	---do-------	M/I	Quartz veins along fault contact of of the Lake Valley Limestone with limestones of the Magdalena Group. Fault strikes N. 85° E. and is brecciated. Abundant chrysocolla.	---
179.	Unnamed------	Cu, Zn, Pb, Ag	---do-------	P	Small gossan over a series of veins that strike N. 5° W. Sparse amounts of sulfide present.	---
180.	----do-------	Cu, Zn, Pb, Ag	---do-------	*M/I	Shaft in Percha Shale cuts weakly mineralized Fusselman Dolomite at depth.	---
181.	----do-------	Cu, Zn, Pb, Ag	---do-------	P	Weakly mineralized Fusselman Dolomite near contact with Percha Shale. Some sulfides in quartz veins along N. 30° E.-striking faults.	---
182.	----do-------	Cu, Zn, Pb, Ag	---do-------	P	Quartz veins along N. 30° E. striking fractures in dolomite contain sparse amounts of sulfide.	---
183.	----do-------	Cu, Zn, Pb, Ag	---do-------	M/I	Minor amounts of sulfide fill fractures and faults that strike N. 10° W.	---
184.	----do-------	Cu, Zn, Pb, Ag	---do-------	P	Mineralized breccias at junction of two intersecting faults that strike N. 15° W. and N. 60° W.	---
185.	----do-------	Cu, Zn, Pb, Ag	---do-------	P	Small gossan along fault that strikes N. 20° W. Sparse amounts of pyrite and sphalerite are present.	---
186.	----do-------	Cu, Zn, Pb, Ag	---do-------	P	Shaft in Percha Shale cuts mineralized Fusselman Dolomite at depth.	---

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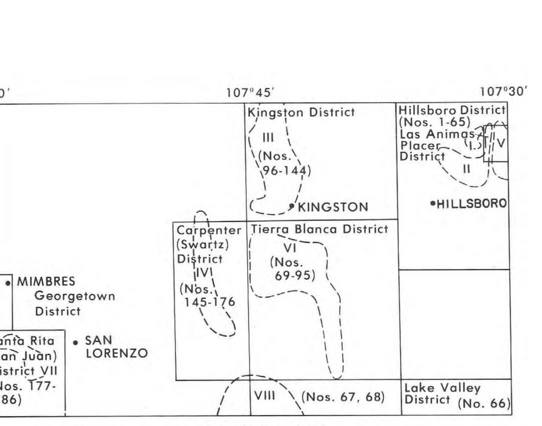

Index map showing the boundaries of mineral districts (solid lines) within the Hillsboro and San Lorenzo quadrangles, Sierra and Grant Counties, New Mexico. Dashed lines enclose and roman numeral identify potentially favorable mineral resource areas within the various districts, which are described in explanation. Arabic numbers identify mineral deposits found on table.

POTENTIALLY FAVORABLE MINERAL RESOURCE AREAS--Listed in apparent order of decreasing potential

- I Porphyry copper
- II Vein gold
- III Vein and bedding replacement silver and base metal deposits
- IV Bedding replacement, vein and tactite-associated silver and base metal deposits
- V Placer gold deposit
- VI Vein and bedding replacement silver and base metal deposits
- VII Vein and bedding replacement silver and base metal deposits
- VIII Vein fluorite

MINERAL RESOURCES MAP OF THE HILLSBORO AND SAN LORENZO QUADRANGLES, SIERRA AND GRANT COUNTIES, NEW MEXICO

By
D. C. Hedlund

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