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MINERAL RESOURCES IN UNION COUNTY, NEW MEXICO

Virginia T. McLemore

New Mexico Bureau of Geology and Mineral Resources, New Mexico Institute of Mining and Technology, Socorro, NM 87801, virginia.mclemore@nmt.edu

Abstract — Mining played a minor role in Union County's history in the early- to mid-1900s, when four mining districts were developed: Black Mesa, Peacock Canyon, Northeastern Union County, and Folsom. More than 120 clastic plugs, many containing copper, silver, and uranium minerals, have been identified in the Black Mesa district of the Dry Cimarron Valley of New Mexico that extends into southeastern Colorado (Carrizo district) and western Oklahoma. Copper, silver, and minor gold were produced from deposits in the Black Mesa (New Mexico) and Carrizo (Colorado) districts. Sedimentary-copper deposits were first located in the Peacock Canyon district in 1900, but no production occurred. Known sandstone-hosted uranium deposits in the Morrison Formation in the Northeastern Union County uranium prospect area are small, low grade, and uneconomic. Three types of mineral deposits are found in the Folsom district (quartz with minor gold veinlets in basalt, placer gold, and scoria), but only the scoria deposits have been produced for railroad ballast, natural lightweight concrete aggregate, road surfacing aggregate, and cinder (or building) block manufacture. Around 2010-2012, Dumas Ventures LLC leased thousands of acres in the Clayton area for exploration for placer gold and received a mining permit from the New Mexico Mining and Minerals Division. No gold production has occurred and there is no resource potential for economic placer gold deposits anywhere in Union County with a high degree of certainty. In addition, aggregate (sand and gravel), clay, coal, and building stone have been developed in the county.

INTRODUCTION

Union County was organized in 1895 from portions of Colfax and Mora Counties where Clayton is the county seat. Ranching, farming, and tourism are the predominant industries today in the area, but mining played a minor role in the county's history in the early- to mid-1900s. Four mining districts are found in Union County (Fig. 1; McLemore and Chenoweth, 1989, 2017; McLemore, 2017): Black Mesa, Peacock Canyon, Northeastern Union County, and Folsom. In addition, aggregate (sand and gravel), clay, coal, and building stone have been developed in the county. The purposes of this report are to describe the mineral deposits in Union County and summarize future economic mineral-resource potential.

METHODS

Published and unpublished data on existing mines and mills within Union County were inventoried and compiled in the New Mexico Mines Database (McLemore and North, 1987; McLemore et al., 2002; McLemore, 2017) with the mining history summarized in Appendix 1. Locations of mines (Appendix 2) were obtained from published and unpublished reports, and patented mining claims files (see McLemore, 2018 for more details on specific procedures).

This report assesses the potential of surface and subsurface mineral resources within Union County, excluding oil, gas, helium, and carbon dioxide. Evaluation of mineral-resource potential involves a complex process using geologic analogies and probabilities associated with promising or favorable geologic environments determined by comparison with geologic settings (geologic models) that contain known economic deposits as described in Goudarzi (1984) and McLemore (1985, 2018). Such subjective assessments depend on available geologic information concerning the area, as well as current knowledge and understanding of known deposits. Classification of mineral-resource potential differs from classification of mineral resources and reserves (Fig. 2). Quantities of mineral resources are classified according to the availability of geologic data (assurance) and economic feasibility (identified or undiscovered), which is then defined as economic or uneconomic. Mineral-resource potential is a qualitative judgment of the probability of the existence of a commodity and is classified as high, moderate, low, or no potential according to the availability of geologic data and relative probability of occurrence (Goudarzi, 1984; McLemore, 1985, 2018).

PREVIOUS WORK

The geology of Union County has been studied by several geologists over the years, with numerous articles published in the New Mexico Geological Society's 38th Field Guidebook in 1987 and this guidebook (2019) that describe the geology of Union County and northeastern New Mexico, southeastern Colorado, northwest Texas, and western Oklahoma. The mineral resources of Union County have been studied by Harley (1940), Baldwin and Muehlberger (1959), McLemore and North (1987) and others. The best geological maps of the county are Baldwin and Muehlberger (1959) and the state geologic map (New Mexico Bureau of Geology and Mineral Resources, 2003).

MINING DISTRICTS

Black Mesa mining district

More than 120 clastic plugs, many containing copper, silver, and uranium minerals, have been identified in the Dry Cimarron Valley of New Mexico (Black Mesa district, Fig. 3; Appendix 2), southeastern Colorado (Carrizo district), and west-

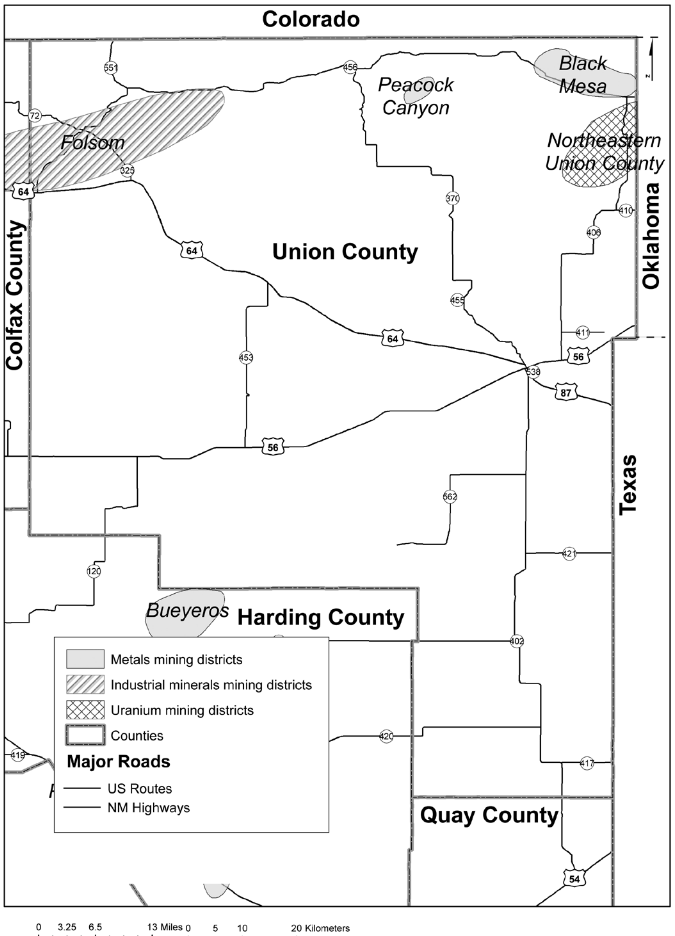

FIGURE 1. Map showing mining districts from Union and Harding counties in northeastern New Mexico

ern Oklahoma. Clastic plugs are in Triassic rocks, overlain by undisturbed Entrada (Exeter) Sandstone (Jurassic) or Morrison Formation (Jurassic), and are not associated with igneous activity (Gould, 1908, 1910; Rothrock, 1925; Henderson, 1926; Parker, 1933; Harley, 1940; Everett, 1953; Soulé, 1956; Baldwin and Muehlberger, 1959; Smith, 1975; Reynolds, 1979; Fay, 1983, 2009; McLemore and North, 1987; Lucas, 1987; Mulvany, 2011; Oh, 2012).

Native Americans and maybe even Spanish explorers likely collected copper from some deposits in the Black Mesa district (Fay, 1983, 2009), but the first reported activity in modern times occurred about 1887, when prospectors found the Independence mine (Carrizo district) in Baca County, Colorado. A mill was erected in Baca County from which ore was shipped to Pueblo, Colorado for smelting (Fay, 2009). By 1889, exploration expanded into the Black Mesa district, New Mexico. Mineral production from the Black Mesa district and Carrizo district is described in Table 1 and information on patented mining claims is included in Table 2. Numerous shafts, adits and pits were developed to <116 m (Appendix 2). Copper was reportedly produced from Oklahoma deposits (Fay, 1983; 2009), but exact amounts are unknown. A chronological synopsis of mining in the Dry Cimarron Valley area is summarized in Appendix 1 with mines briefly described in Appendix 2.

Clastic plugs are vertical or steeply dipping cylindrical features filled with brecciated, chaotic, nonstratified mixture of pieces of wall rocks, sand, silt, and clay. Plug margins are stratified, well-cemented sandstone. Some clastic plugs are bounded by ring fractures in Triassic rocks overlain by undisturbed Entrada (Exter) Sandstone or Morrison Formation, indicating formation prior to the Jurassic (Fay, 1983, 2009; McLemore and North, 1987; Mulvany, 2011; Oh, 2012; Zeigler et al., 2014). They generally define topographic highs because they are well cemented and resistant to weathering. Irregular, sheet-like unmineralized clastic dikes, less than 1 m wide, radiate out as much as 30 m from a few plugs. Petrographic analyses show subvertical uniaxial extension fabrics with vertical movement (Oh, 2012; Zeigler et al., 2014). Mineralization in these features consists of predominantly copper minerals (chalcocite, malachite, azurite) and minor barite as cement or thin seams along bedding planes or fractures, with some containing silver and uranium minerals. Reddish hematite alteration is prevalent. Chemically samples contain as much as 2.8-24.3% Cu, 20-200 ppm Ag, 20-66 ppm Mo, and 0004% U_3O_8 (Finch, 1972; Fay, 1983; McLemore and North, 1987). Locally, copper and uranium minerals replace fossil plant material.

Similarities between clastic plugs in the Dry Cimarron Valley area and collapse-breccia pipes in northwestern Arizona (Hilpert and Moench, 1960; Wenrich, 1985) suggest a similar solution-collapse origin (McLemore and North, 1987). Many features of the clas-

DEFINITIONS OF LEVEL OF RESOURCE POTENTIAL

N **No mineral-resource potential** is a category reserved for a specific type of resource in a well-defined area with no evidence of mineral resources.

L **Low mineral-resource potential** is assigned to areas where geologic, geochemical, and geophysical characteristics indicate geologic environment where the existence of economic mineral resources is unlikely and is assigned to areas of no or dispersed mineralized rocks.

M **Moderate mineral-resource potential** is assigned to areas where geologic, geochemical, and geophysical characteristics indicate a geologic environment favorable for mineral-resource occurrence.

H **High mineral-resource potential** is assigned to areas where geologic, geochemical, and geophysical characteristics indicate a geologic environment favorable for resource occurrence and development. Assignment of high mineral-resource potential to an area requires some positive knowledge that mineral-forming processes have been active in at least part of the area.

DEFINITIONS OF LEVEL OF CERTAINTY

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

<table>
<tr><td rowspan="5">↑
INCREASING LEVEL OF RESOURCE POTENTIAL</td><td rowspan="5">U/A
Unknown Potential</td><td>H/B
High Potential</td><td>H/C
High Potential</td><td>H/D
High Potential</td></tr>
<tr><td>M/B
Moderate Potential</td><td>M/C
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Moderate Potential</td></tr>
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Low Potential</td><td>L/C
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Low Potential</td><td>N/D
No Potential</td></tr>
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No Potential</td></tr>
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FIGURE 2. Diagram showing the classification of mineral-resource potential and certainty of assurance (from Goudarzi, 1984).

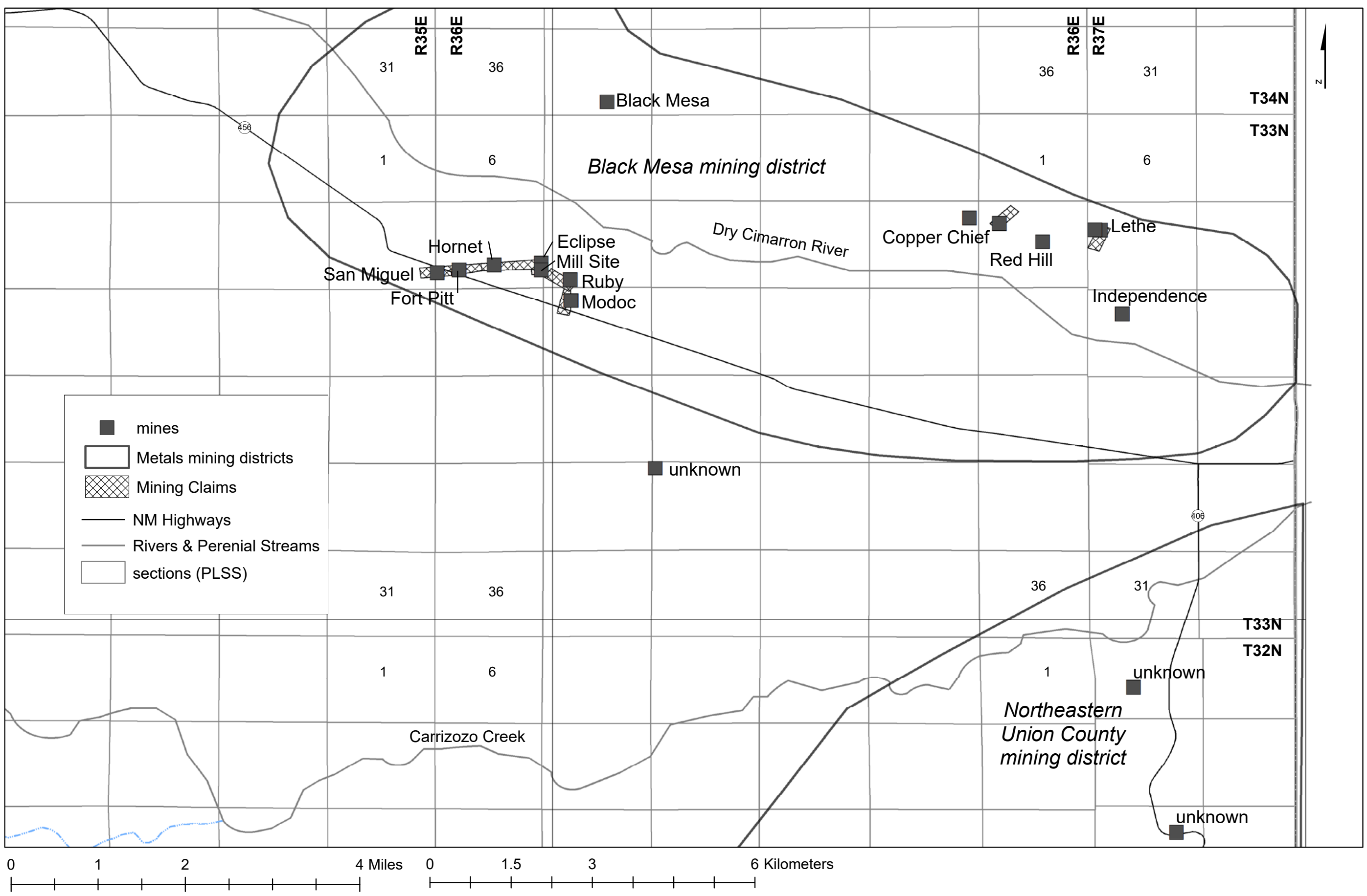

FIGURE 3. Map showing mines, prospects, and mining claims in the Black Mesa and northern Northeastern Union County districts, Union County, New Mexico. Legend indicates mine types and patterns differentiate between mining districts and mining claims.

TABLE 1. Metals production from the Black Mesa mining district, Union County, New Mexico and Carrizo mining district, Baca County, Colorado. Mining and production records are generally poor, particularly for the earliest times, and many early records are conflicting. These production figures are the best data available and were obtained from published and unpublished sources (from U.S. Geological Survey, 1902–1927, U.S. Bureau of Mines, 1927–1994; Henderson, 1926; McLemore, 2017; NMBGMR file data). Production figures are subject to change as new data are obtained.

Year	Ore (short tons)	Gold (ounces)	Silver (ounces)	Copper (pounds)	Value $	Comments
1900		5	102	8,900	1,643	Baca County mines, CO
1901		4	80	590	230	Baca County mines, CO
1902		5	59	1,929	369	Baca County mines, CO
1915			8	514	94	Baca County mines, CO
1916	5		50	2,772	715	Baca County mines, CO
1917	9	0.1	57	6,806	1,908	Baca County mines, CO
1956	4		10	800	349	San Miguel mine, Black Mesa district, NM
Total		***14.1***	***366***	***22,311***	***5,308***	

tic plugs in the Dry Cimarron Valley are similar to solution dissolution and collapse of underlying Paleozoic limestones, likely the San Andres Formation, which is related to similar, but unmineralized, solution-collapse features in the Santa Rosa area (Sweeting, 1972). Solution collapse results in brecciation of wall rocks above the dissolved limestone, which forms a cemented sandstone, sand, silt, and clay breccia in the resulting cavity. The depth to Proterozoic basement is relatively shallow, which resulted in smaller collapse features in the Dry Cimarron Valley area compared to northwestern Arizona (Hilpert and Moench, 1960; Wenrich, 1985).

In contrast, more recent work suggests these clastic plugs and associated clastic dikes result from upwards movement of groundwater along springs that eventually liquefies water-saturated sediments. The liquefied sediment injects upwards into the breccia formed by the upwards movement of groundwater. Earthquakes could have mobilized the sand, silt, and clay (Lucas, 1987). Solution collapse, as described above, could have

TABLE 2. Patented mining claims in the Black Mesa district, Union County, New Mexico and Carrizo district, Baca County, Colorado. Mine IDs are from the New Mexico Mines Database.

Mine ID	Patent Name	Mineral Survey No.	Patent No.	Date of Patent	Comments
NMUN0020 (NMUN0002, NMUN0019, NMUN0021, NMUN0022)	Eclipse (includes Mint, Iron King, Hornet, Mill Site)	1527A, B	488231	8/27/1915	Black Mesa district, NM
NMUN0025	Copper Chief	1528	475718	5/29/1915	Black Mesa district, NM
NMUN0024 (NMUN0023)	Modoc (includes Ruby)	1529	488232	8/27/1915	Black Mesa district, NM
NMUN0027	Lethe	1530	475719	5/29/1915	Black Mesa district, NM
na	Black Bear, Blue Bird, Paupers Dream	19097	256996	4/4/1912	Carrizo district, Baca County, CO
na	Silver Site, Jack Pot, Jack Pot No. 2	19096	256995	4/4/1912	Carrizo district, Baca County, CO

occurred to start the process. Zeigler et al. (2014) suggests that magnetic anisotropy measurements indicate viscous flow during the emplacement process. Lucas (1987) and Parker (1933) suggest that the sand, silt, and clay forming the clastic plugs were derived from the Baldy Hill Formation (Triassic) that lies in the subsurface of the Dry Cimarron Valley. Detailed mapping and petrographic studies indicate that lower sedimentary rocks were forced upwards, supporting upwards injection (Mulvany, 2011; Oh, 2012; Zeigler et al., 2014).

Once the clastic plugs formed, copper, silver and uranium minerals filled void spaces within the collapse structures before or during cementation. None of the mineralized clastic plugs are large enough or contain high metals or uranium grades to be economic, therefore the mineral-resource potential is low with a high degree of certainty.

Small placer gold deposits have been reported from the Dry Cimarron Valley and arroyos draining basalt flows by individual gold prospectors. These potential placer deposits are small in size, discontinuous, low grade and, therefore, uneconomic (i.e., no mineral resource potential with a high degree of certainty).

Peacock Canyon mining district

Mining claims were first located in the Peacock Canyon district in 1900 (Appendix 2; Soulé, 1956). The Rohr Geddes Mining Co. (headquartered in Raton) formed in August 1906 and began exploration in the district, which continued until 1908 (Appendix 1). Numerous shafts and pits were developed to <15 m (Appendix 2). No production occurred from any of the workings.

Copper deposits containing malachite and azurite, with local small nodules of chalcocite, are found in bleached white sandstones of the Dockum Group (Triassic) near local faults (Soulé, 1956). These deposits have also been called *red-bed* or *sandstone* copper deposits by previous workers (Soulé, 1956; Phillips, 1960; Cox and Singer, 1986), and are best described as sedimentary-copper deposits because some deposits are found in shales adjacent to mineralized sandstones (McLemore and Lueth, 2017). Copper minerals are locally associated with organic material. One dump sample from the Peacock Canyon district assayed 1.17% Cu, 0.3 oz/short ton (0.9 ppm) Ag, with a trace of gold (Soulé, 1956).

Copper and other metals were probably transported in low-temperature brine solutions through permeable sediments, along bedding planes, and faults shortly after burial. Replacement textures and diagenetic features of the organic material indicate mineralization occurred during or after diagenesis. Oxidizing waters could have leached copper and other metals from 1) Proterozoic rocks enriched in these metals, 2) Proterozoic base-metal deposits, and 3) clay minerals and detrital grains within red-bed sequences (La Point, 1976, 1979, 1989). Transport of metal-bearing waters occurred laterally through aquifers from Proterozoic highlands or, in some cases, by circulating, ascending fluids. Geologic, mineralogic, and isotopic studies of similar deposits elsewhere in the United States suggest that these waters are generally in chemical equilibrium with quartz, feldspar, hematite, and mica at temperatures less than 75°C. Precipitation occurred at favorable oxidation-reduction interfaces in the presence of organic material or H_2S-rich waters. In general, sedimentary-copper deposits in the district are small, low grade and not economic, with the mineral-resource potential being low with a high degree of certainty.

Northeast Union County uranium district

Uranium is found in scattered locations in sandstones and marls of the Morrison Formation in eastern Union County (Figs. 1, 3; Appendix 2), which form the Northeastern Union County uranium district. During a period of nearly three decades (1951-1980), the Grants uranium district in Cibola and McKinley Counties in northwestern New Mexico yielded more uranium from sandstones than any other uranium district in the United States (McLemore and Chenoweth, 2017). The primary host was sandstones in the Morrison Formation, which extends into northeastern New Mexico, including into Union County (McLemore and Chenoweth, 1989, 2017).

In Union County, the Morrison Formation was deposited on alluvial plains. Morrison sandstones in northeastern New Mexico were derived from volcanic, granitic and sedimentary rocks (Abbott, 1975) similar to the source of Morrison sandstones in the San Juan Basin (McLemore, 2011). Uranium is found closely associated with organic material in isolated sandstone occurrences in the upper Morrison Formation (Abbott, 1975). Uranium is also found in marlstone and limey shales in the Morrison Formation, interbedded with the sandstones. The marlstone is dense, fine-grained micrite and less than 1.2 m thick (Consulting Professionals. Inc., 1982). Numerous groundwater samples, many from the National Uranium Resource Evaluation (NURE) program, are consistently high in uranium (Landis, 1960; Morgan, 1980; McLemore and North, 1987) suggesting that additional uranium could be present in the subsurface in Morrison Formation. A small amount of uranium (1 short ton containing 1 lb of U_3O_8) was produced in 1955 from the Morrison Formation at the Polita No. 2 mine in Harding County (McLemore, 1983; McLemore and North, 1987).

Known sandstone-hosted uranium deposits in the Morrison Formation in Union County are small, low grade, and uneconomic. Therefore, the mineral-resource potential for uranium in the Morrison Formation is low with a moderate degree of certainty.

Folsom mining district

Three types of mineral deposits are found in the Folsom district: quartz with minor gold veinlets in basalt, placer gold, and scoria. Mines and prospects are summarized in Appendix 2. Quartz-gold stringers have been reported since the late 1800s in a few, scattered areas in the basalt flows in the Folsom district. Exact locations of these stringers are unknown, but they are described as thin and discontinuous (Harley, 1940). The largest known stringer occupied a crevice within the basalt and was 15-46 cm wide. Gold was spotty, but assays as much as 1 oz/short ton (34 ppm) Au were reported (Harley, 1940).

Small placer gold deposits were reported about 1897 in the Folsom district, but there was no production. The placer gold was described as small flattened grains, indicating a local source (Harley, 1940; Johnson, 1972). This gold was likely derived from erosion of small gold-bearing quartz veinlets found in the local basalts. There is no placer gold mineral-resource potential in the Folsom district with a high degree of certainty.

Scoria is a cellular, dark-colored volcanic rock of mafic composition (commonly basalt or basaltic andesite) that has been mined from Union County since about 1922. In industrial usage, scoria is also known as volcanic cinders and production statistics are generally combined with those of pumice or crushed stone. In addition to compositional differences, scoria differs from pumice in its darker color, higher density, coarser vesicles, more crystalline texture, and generally higher strength. Railroad ballast was a major use of scoria in the 1920-1950s, but uses today also includes natural lightweight concrete aggregate, road surfacing aggregate, and cinder (or building) block manufacture. Scoria deposits, found throughout New Mexico, are mostly associated with Quaternary cinder cones (Osburn, 1980, 1982). Scoria resources in Union County are large because there are numerous cinder cones within the Folsom district and scattered throughout Union County (Appendix 2; Baldwin and Muelhberger, 1959). Twin Mountain, one of the largest scoria mines in Union County, operating since 1956, erupted from a fissure vent to form an elongate cone. The northern ridge of Twin Mountain has been nearly completely excavated (photographs can be found in KellerLynn, 2015). The friable, fragmental nature of scoria results in much lower production costs than from nonvesicular rock that must be crushed. The mineral-resource potential for scoria in the Folsom district and additional known cinder cones in Union County is high with a high degree of certainty.

Reported placer gold deposits near Clayton

About 2010-2012, Dumas Ventures LLC leased thousands of acres in the Clayton area for exploration for placer gold deposits (Appendix 2) and received a mining permit from the New Mexico Mining and Minerals Division (Long Ranch mine, NMUN0034; Tipton, 2011). However, no gold production has occurred and the mine was not developed. Three lithologic units are suggested by Dumas Ventures, LLC for hosting placer gold deposits in the Clayton area in Union County: 1) Dakota Group sandstones, 2) Ogallala Formation, and 3) Holocene to Recent playa lakes and streams. Known vein deposits in the Elizabethtown-Baldy and Cimarroncito districts, west of Union County, are Tertiary in age and too young to contribute gold to placers in the Dakota and Ogallala sandstones. Although gold veins are known in the Sangre de Cristo Mountains, they are small, discontinuous, low grade, and scattered sporadically throughout Proterozoic rocks (McLemore, 2001) and are not a likely source for placer gold deposits in northeastern New Mexico. Trace amounts of gold are found in the clastic plugs hosted in Triassic rocks in the Black Mesa district and other areas of the Dry Cimarron Valley (see above), but there is not enough gold in these deposits to form placer deposits. Production from clastic plugs in the Dry Cimarron Valley amounted to only 14.1 oz Au (Table 1). Therefore, the clastic plugs are not a significant source of gold for placer deposits. Deposits of carbonatites, gold-bearing breccia pipes, and Th-REE hydrothermal veins in the Laughlin Peak area also are low in gold (<1 ppm Au; McLemore and North, 1987; Schreiner, 1991; McLemore, 2015) and do not drain into the Clayton area. In addition, the Dakota Group and Ogallala Formation are not known for hosting gold deposits.

Playa lakes and streams in the Clayton area were examined in 2012 (McLemore, unpublished). Most of the alluvial material consists of fine sand and silt with boulders of mostly sandstone and basalt. Locally, Proterozoic granite and schist grains and cobbles were identified. Drill cuttings from holes drilled by Dumas Ventures LLC also were examined using a binocular microscope and consist of sand- and silt-sized grains of quartz, feldspar, and trace biotite and magnetite. No pyrite or native gold were identified in any drill cuttings or stream sediments.

There is no mineral-resource potential for economic placer gold deposits in the Clayton area in Union County with a high degree of certainty. Supporting evidence includes an absence of 1) geologic environments known to have economic placer gold deposits in the area, 2) visible pyrite, 3) source of gold to form placer deposits, and 4) historical production of placer gold from the area (Johnson, 1972; McLemore, 1994, 2017). Therefore, this area is not included as a potential mining district or prospect area (McLemore, 2017).

OTHER POTENTIAL MINERAL DEPOSITS

Clay

Several, scattered clay deposits are found in Union County (Appendix 2; Baldwin and Muelhberger, 1959). The Amistad (NMUN0036) and Clayton High School (NMUN0041) deposits were used by the Clayton High School for making ceramics, although total production is unknown. The Amistad clay deposit is in the Dakota Formation, was first explored by Fitrol Corp. in 1954, and consists of halloysite, gibbsite and kaolinite (Baldwin and Muelhberger, 1959). The deposit was estimated to contain less than 5,000 short tons of clay (Baldwin and Muelhberger, 1959). Several small clay deposits also are found in the Granerous Shale (Apache Canyon, NMUN0039). The mineral-resource potential for clay in Union County is unknown.

AGGREGATES AND DIMENSION STONE

Aggregate is defined as 1) a mass or body of rock particles, mineral grains, or a mixture of both, or 2) any of several hard, inert materials, such as sand, gravel, slag, or crushed stone, used for mixing with a cementing material to form concrete, mortar, or plaster, or used alone, as in railroad ballast or graded fill. In this report, aggregate is used for construction purposes. There are three types: 1) construction sand and gravel, 2) crushed stone, and 3) lightweight aggregate (McLemore and Austin, 2017). Aggregates are some of the most abundant natural resources and are a major basic raw material used in construction, agriculture, and industries employing complex chemical and metallurgical processes. The largest demand for aggregates in Union County is highway construction, railroad ballast, and building construction. Scoria is technically an aggregate and described separately above. Additional scoria deposits are found outside of the Folsom district in Union County (Appendix 2).

Aggregate resources for highway construction are readily available in Union County (Lovelace, 1972). Caliche, a calcareous hardpan that forms in arid climates, is mined and crushed for highway construction throughout eastern New Mexico, including in Union County. Caliche occurs as zones up to a few meters thick in the upper Ogallala Formation, as well as coatings and layers on the Dakota Group and basalt flows (Baldwin and Muelhberger, 1959). Sand and gravel resources are limited in Union County but are available along some tributaries and rivers. Basalt is abundant in Union County, but must be crushed for most uses, which is costly. The mineral-resource potential is high in much of the county for basalt, caliche and for aggregate (sand and gravel) along local tributaries draining the Sangre de Cristo Mountains.

In addition, sandstone near Clayton has been quarried for use in buildings in Clayton (Everett, 1953). The mineral-resource potential for sandstone for building stone in Union County is unknown.

COAL

Thin beds of coal are found scattered in the Dakota and Glencairn Formations in Union County (NMUN0086, NMUN0087, NMUN0088, Appendix 2) and undoubtedly used for local heating (Baldwin and Muehlberger, 1959). However, these beds are thin, small tonnage and have no mineral-resource potential as economic coal deposits.

SUMMARY

Mining played a minor role in Union County's history in the early- to mid-1900s, when four mining districts were developed: Black Mesa, Peacock Canyon, Northeastern Union County, and Folsom. In addition, aggregate (sand and gravel), clay, coal, and building stone have been developed in the county. About 2010-2012, Dumas Ventures LLC leased thousands of acres in the Clayton area for exploration for placer gold and received a mining permit from the New Mexico Mining and Minerals Division. No gold production has occurred.

The mineral-resource potential is high for aggregate (basalt, caliche, sand and gravel) and scoria in parts of Union County, low for copper, silver, and uranium in the Black Mesa, Folsom, and Peacock Canyon districts, and low for uranium in the Northeastern Union County district. The mineral-resource potential for clay and building stone in Union County is unknown. There is no mineral-resource potential for gold or coal anywhere in Union County with a high degree of certainty.

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Supplemental data can be found at http://nmgs.nmt.edu/repository/index.cfml?rid=2019002