Mineral Resource Assessment of Selected Areas in Clark and Nye Counties, Nevada, Edited by Steve Ludington
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Prepared in cooperation with the Nevada Bureau of Mines and Geology and the University of Nevada, Las Vegas

Chapter A. Introduction

By Steve Ludington

Mining has been a part of the economy in southern Nevada since before Nevada became a state. Miners in the late 19th century found evidence that miners from New Spain and Mexico and perhaps Native Americans, had recovered gold and turquoise here for centuries. However, southern Nevada has not been as comprehensively studied by professional economic geologists as the northern part of the state. There are only a few important studies of mineral resources that describe the areas we assessed (Ransome, 1907; Hill, 1916; Hewett and others, 1936; Vanderburg, 1937; Callaghan, 1939; Hewett, 1956; Longwell and others, 1965), and no significant studies of the mineral deposits have been published for the past 40 years.

During 2004—2006, the U.S. Geological Survey (USGS) conducted a mineral resource assessment of selected areas administered by the Bureau of Land Management (BLM) in Clark and Nye Counties, Nevada. The purpose of this study is to provide the BLM with information for land planning and management and, specifically, to determine mineral resource potential in accordance with regulations in 43 CFR 2310, which governs the withdrawal of public lands. The Clark County Conservation of Public Land and Natural Resources Act of 2002 (Public Law 107-282) temporarily withdraws a group of areas designated as Areas of Critical Environmental Concern (ACECs) from mineral entry, pending final approval of an application for permanent withdrawal by the BLM. This study provides information about mineral resource potential of the ACECs.

Existing information was compiled about the ACECs, including geology, geophysics, geochemistry, and mineral-deposit information. Field examinations of selected areas and mineral occurrences were conducted to determine their geologic setting and mineral potential.

In February of 2004, USGS and BLM officials met in Las Vegas, Nevada, to determine the appropriate format of reports that would best meet the needs of BLM. It was determined that reports should be in a format similar to BLM's own mineral assessment reports and should use subjective assessment methods. In addition, all the reports have been technically reviewed by BLM staff.

Partners

The assessment was conducted in partnership with the Nevada Bureau of Mines and Geology (NBMG), a part of the University of Nevada, Reno (UNR), and the University of Nevada, Las Vegas (UNLV).

Dr. Stephen B. Castor of the NBMG provided expertise in the field of industrial mineral deposits, which account for the bulk of the mineral resources produced in Clark County. His wide experience, coupled with the results of his field and laboratory investigations, has made the completion of this study possible.

Two postdoctoral research scholars at the University of Nevada, Las Vegas contributed materially to this study. Dr. Brett T. McLaurin, supervised by Dr. Andrew D. Hanson, studied the composition and stratigraphy of alluvial fans to help constrain the timing of mineralizing events and to elucidate the geologic history of the area. This information contributed to the assessment of the ACECs for aggregate materials, and Dr. McLaurin conducted that part of the assessment. Dr. Haroldo L. Lledó, supervised by Dr. Jean S. Cline, is studying the interaction between magmatic and hydrothermal processes during the formation of the gold deposits of the Searchlight mining district. Although his tenure began too late to permit him to contribute to the writing of the reports, his insights in the field have contributed materially to our understanding of the area during the latter stages of the project.

Areas Studied

A total of 24 Areas of Critical Environmental Concern (ACECs) were identified by the BLM as the object of this study. They range in area from less than 1 km^2 to more than 1,000 km^2. The majority of these areas are not adjacent to or near known mineral deposits and required a minimum of extended study and field examination. What follows here is a brief description and summary of the assessment for each area. The locations of the study areas are shown on figure 1.

Piute-Eldorado Tortoise ACEC (Chap. B)

The Piute-Eldorado Tortoise ACEC is the largest in the study (about 1,330 km^2) and is an area where the complex geology and the unusual nature of the mineral deposits are still not well understood. The area consists primarily of Piute and Eldorado Valleys, which are both relatively thinly covered with surficial sediments; bedrock is less than 1,000 m below the surface in most of the ACEC. There are two large excluded

areas, one for the northern part of the Highland Range, and one that contains the town of Searchlight and much of the historic Searchlight mining district. An important question is whether the mineralized system at Searchlight extends beneath a thin veneer of surficial deposits into the surrounding Piute-Eldorado Tortoise ACEC. Other gold-bearing vein deposits occur throughout the area, particularly in the western part of the ACEC in the Crescent mining district. There is potential for undiscovered gold deposits within the ACEC, in both the Searchlight and Crescent mining districts.

Crescent Townsite ACEC (Chap. B)

The Crescent Townsite ACEC covers less than 2 km^2. It is within the Crescent mining district, and has potential for undiscovered gold deposits.

Keyhole Canyon ACEC (Chap. B)

The Keyhole Canyon ACEC is small (less than 1 km^2) and is located in the Eldorado Mountains about 55 km

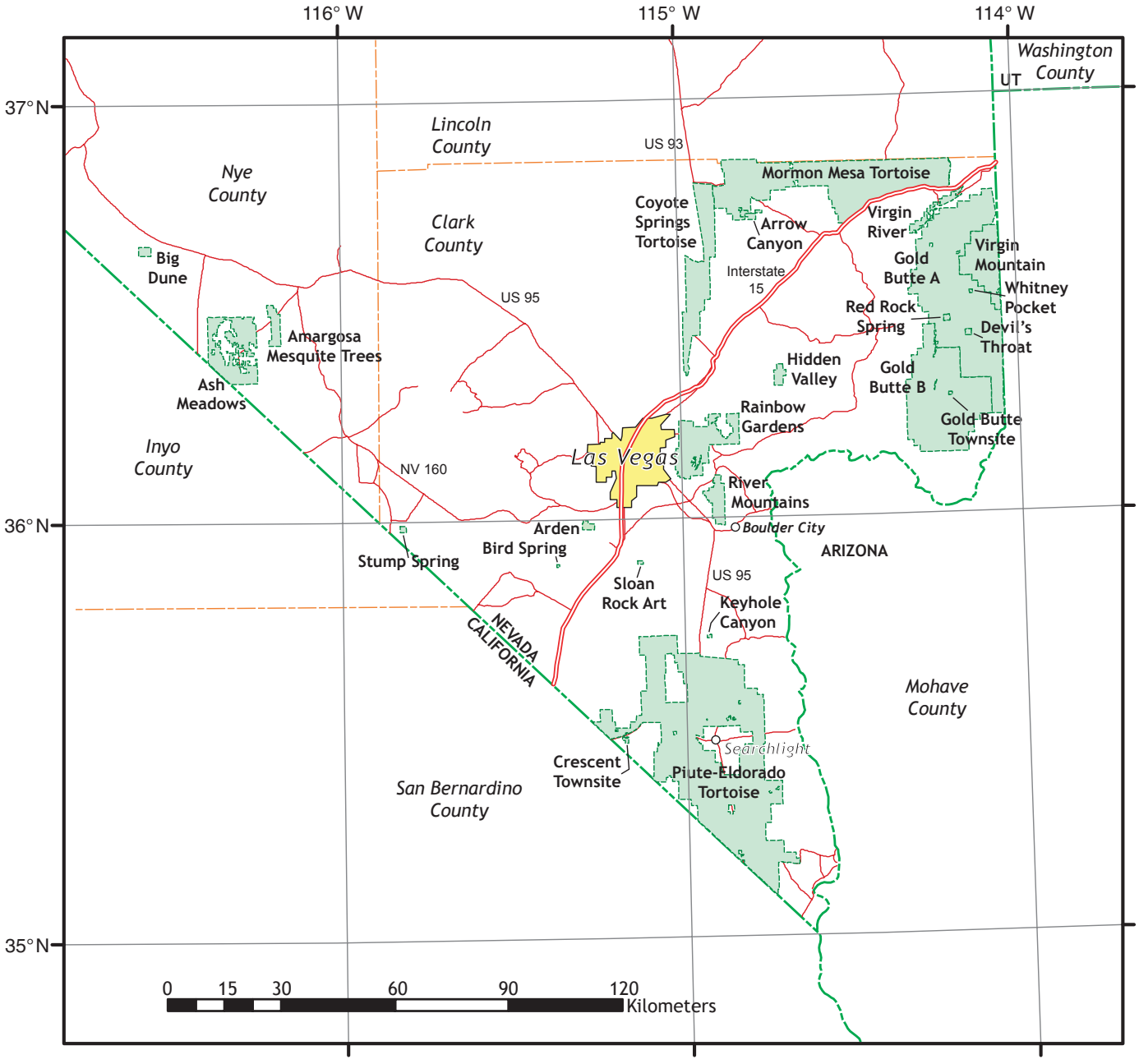

Figure 1. Locations of Areas of Critical Environmental Concern (ACECs; shaded in green), Clark and Nye Counties, Nevada.

southeast of Las Vegas. This ACEC contains no known mineral deposits.

Gold Butte ACEC (parts A and B) and Virgin Mountain ACEC (Chap. C)

These three ACECs are contiguous and have a combined area about as large as the Piute-Eldorado Tortoise ACEC. Gold Butte part A is about 750 km^2 in area; Gold Butte part B is about 490 km^2; and Virgin Mountain is about 145 km^2. The northern part of the area, in Gold Butte part A, includes some unusual Proterozoic mineral deposits that contain substantial amounts of platinum group elements (PGE). Nearby, a group of beryllium-bearing pegmatites is found within the Virgin Mountain ACEC. In the southern part of the area, in both Gold Butte parts A and B, a series of copper deposits hosted in Paleozoic carbonate rocks are classified as Kipushi type and resemble much larger deposits elsewhere in the world. These deposits may contain important amounts of the strategic metals gallium and germanium. In Gold Butte part B, low-sulfide gold-quartz vein deposits that have not been previously studied thoroughly occur over a wide area. Also in Gold Butte part B, vermiculite was mined in the past, and a major mining company is evaluating these deposits for renewed production. These ACECs may contain undiscovered Ni-Cu-Au-PGE deposits, beryllium-bearing pegmatite deposits, Kipushi-type copper deposits, low-sulfide gold-quartz vein deposits, and vermiculite deposits.

Red Rock Springs ACEC, Whitney Pocket ACEC, and Devil's Throat ACEC (Chap. C)

These three very small ACECs (each is less than 3 km^2) are all surrounded by Gold Butte part A. In the Devil's Throat ACEC, a remarkable vertically walled sinkhole in the alluvium poses a natural hazard. None of the three areas contains important mineral deposits.

Gold Butte Townsite ACEC (Chap. C)

This very small area (less than 1 km^2) is entirely surrounded by Gold Butte part B. It contains low-sulfide gold-quartz veins similar to those found in Gold Butte part B.

Mormon Mesa Tortoise ACEC, Coyote Springs Tortoise ACEC, and Arrow Canyon ACEC (Chap. D)

These three areas are contiguous, and are located in the northeast part of Clark County, north of Interstate 15. Mormon Mesa Tortoise is about 610 km^2 in area; Coyote Springs Tortoise is about 210 km^2; and Arrow Canyon is about 8 km^2. The three areas are underlain primarily by Paleozoic limestones, and limestone is the most important mineral commodity.

Arden ACEC (Chap. E)

The Arden ACEC, about 6 km^2 in extent, is on the southern edge of Las Vegas. Silica was mined in the ACEC in the past and there may be undiscovered silica deposits.

Bird Spring ACEC (Chap. E)

The Bird Spring ACEC, a small area of less than one km^2, is southwest of Las Vegas. The ACEC contains no known mineral deposits.

Sloan Rock Art ACEC (Chap. E)

A small area of less than 2 km^2, this ACEC is within the North McCulloch Wilderness area, and is underlain by Miocene volcanic rocks. The ACEC contains no known mineral deposits.

Ash Meadows ACEC and Amargosa Mesquite ACEC (Chap. F)

These two areas in Nye County contain unique biological habitats that support rare fish, bird, and plant species. Ash Meadows ACEC is about 150 km^2 in area, and Amargosa Mesquite ACEC is about 27 km^2. Clays and zeolite minerals been mined there in the past, and additional deposits of this type may exist.

Virgin River ACEC (Chap. G)

The Virgin River ACEC is about 30 km^2 in area, is located along the Virgin River, south of Interstate 15 in northeastern Clark County, and exposes primarily recent sedimentary deposits. Sand and gravel aggregate is the most important commodity found in the ACEC.

Hidden Valley ACEC (Chap. H)

The Hidden Valley ACEC is in the Muddy Mountains, about 40 km northeast of Las Vegas, and has an area of about 14 km^2. Small amounts of building stone were mined from this ACEC in the past, but undiscovered high-quality stone deposits are unlikely.

Rainbow Gardens ACEC (Chap. I)

Rainbow Gardens ACEC is an area of about 160 km^2 and is located immediately east of the city of Las Vegas. A very

large gypsum mine is adjacent to the area, and gypsum has been mined within the ACEC in the past. Some areas within the ACEC may contain undiscovered gypsum deposits.

River Mountains ACEC (Chap. J)

River Mountains ACEC is an area of about 45 km^2 on the southeast edge of the Las Vegas urban area, near Boulder City. The area is underlain by Miocene volcanic rocks. In the past, manganese was mined adjacent to the north end of the ACEC, but there is little potential for undiscovered manganese deposits. There may be undiscovered perlite deposits in the ACEC.

Stump Spring ACEC (Chap. K)

Stump Spring is a small area (less than 3 km^2) near the California border, west of Las Vegas. The ACEC contains no known mineral deposits.

Big Dune ACEC (Chap. L)

The sand dunes in this area of about 8 km^2 in Nye County do not host any important mineral deposits.

Assessment Methods

At the request of the BLM, an assessment methodology is used in this report that relies on subjective assessment. Areas are assigned high, medium, and low mineral resource potential according to the degree of likelihood that geologic processes operated in an area in such a way as to permit accumulation of resources. The definitions of these levels of resource potential are given in Goudarzi (1984). A useful way to interpret the levels might be that most mining companies would be willing to risk exploration dollars in an area with high potential, whereas very few would be willing to take a risk on a low potential area, even though a deposit might possibly exist. An area of medium potential might be attractive to some optimistic investors, but not to more conservative ones.

For most locatable and leasable minerals, the designation of an area as having high potential does not necessarily imply that deposits that might be discovered there could be developed and operated successfully. When information is available about resource quality that might bear on the economic viability of deposits, it is presented separately from the potential designation. However, for some industrial commodities, most notably crushed rock and sand and gravel aggregate, resource quality and location are essential parts of the definition of a deposit. For aggregate deposits, and for some other industrial mineral deposits, we therefore took resource quality and potential exploitation costs into account in designation of levels of mineral resource potential. In most cases, we also assigned a high, moderate, or low level of certainty to the designations of mineral resource potential, using the terminology defined in Goudarzi (1984).

Acknowledgments

Any geologic study rests on the shoulders of those who have gone before. In the present study, we have been fortunate enough to have personal interactions with some of the most important experts in Clark County geology. Special thanks for teaching us the geology of the region go to Dr. Calvin Miller of Vanderbilt University, Dr. Jonathan Miller of San José State University, Dr. James Faulds of the Nevada Bureau of Mines and Geology, and L. Sue Beard, Tracey J. Felger, and Keith A. Howard of the U.S. Geological Survey. Drs. Jean S. Cline, Andrew D. Hanson, and Eugene I. Smith, of the University of Nevada, Las Vegas, gave valuable advice in the field and in the office. Joe Tingley of the Nevada Bureau of Mines and Geology offered his vast experience with Nevada mineral deposits and helped us collect information on active mining claims. Gary Johnson, information systems specialist at the Nevada Bureau of Mines and Geology, helped with digital cartography. Joyce Lum, of the Water Resources office of the U.S. Geological Survey in Henderson, Nevada, and Mary Hinson, Assistant Superintendent of Lake Mead National Recreation Area, provided extra administrative support. Melanie J. Hopkins, now of the University of Chicago, gave important support in the field and office in the early stages of the project.

Various parts of the reports have been reviewed and improved by Ted McKee, Alan Wallace, Peter Vikre, and Keith Howard, of the U.S. Geological Survey, by Dr. Calvin F. Miller of Vanderbilt University, and by Haroldo Lledó of the University of Nevada, Las Vegas.

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