

Chapter H. Mineral Resource Potential of the Hidden Valley Area of Critical Environmental Concern, Clark County, Nevada

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Summary and Conclusions

The Hidden Valley Area of Critical Environmental Concern (ACEC) contains deposits of building stone that were mined in the past. However, the stone is of low quality, and the potential for the occurrence of locatable stone or silica sand deposits is low. There is no potential for the occurrence of other deposits of locatable or leasable minerals.

The Hidden Valley ACEC contains areas with both moderate and low potential for the occurrence of crushed stone aggregate deposits, as well as a tract with low potential for the occurrence of sand and gravel aggregate deposits.

Introduction

This report was prepared for the U.S. Bureau of Land Management (BLM) to provide information for land planning and management, and, specifically, to determine mineral resource potential in accordance with regulations at 43 CFR 2310, which governs the withdrawal of public lands. The Clark County Conservation of Public Land and Natural Resources Act of 2002 temporarily withdraws the lands described herein from mineral entry, pending final approval of an application for permanent withdrawal by the BLM. This report provides information about mineral resource potential on these lands.

The Hidden Valley ACEC was visited briefly to confirm descriptions of the geology that were gleaned from the scientific literature. Definitions of mineral resource potential and certainty levels are given in appendix 1, and are similar to those outlined by Goudarzi (1984).

Figure 1. Panoramic photograph of Hidden Valley, showing floor of Aztec Sandstone (pink) and surrounding hills of Paleozoic carbonate rocks (dark grey).



Lands Involved

The Hidden Valley ACEC is about 40 km northeast of the city of Las Vegas. It is about 15 km south of the townsite of Crystal (exit 75 on Interstate 15), and is reached by secondary roads from there. A legal description of these lands is included in appendix 2.

Physiographic Description

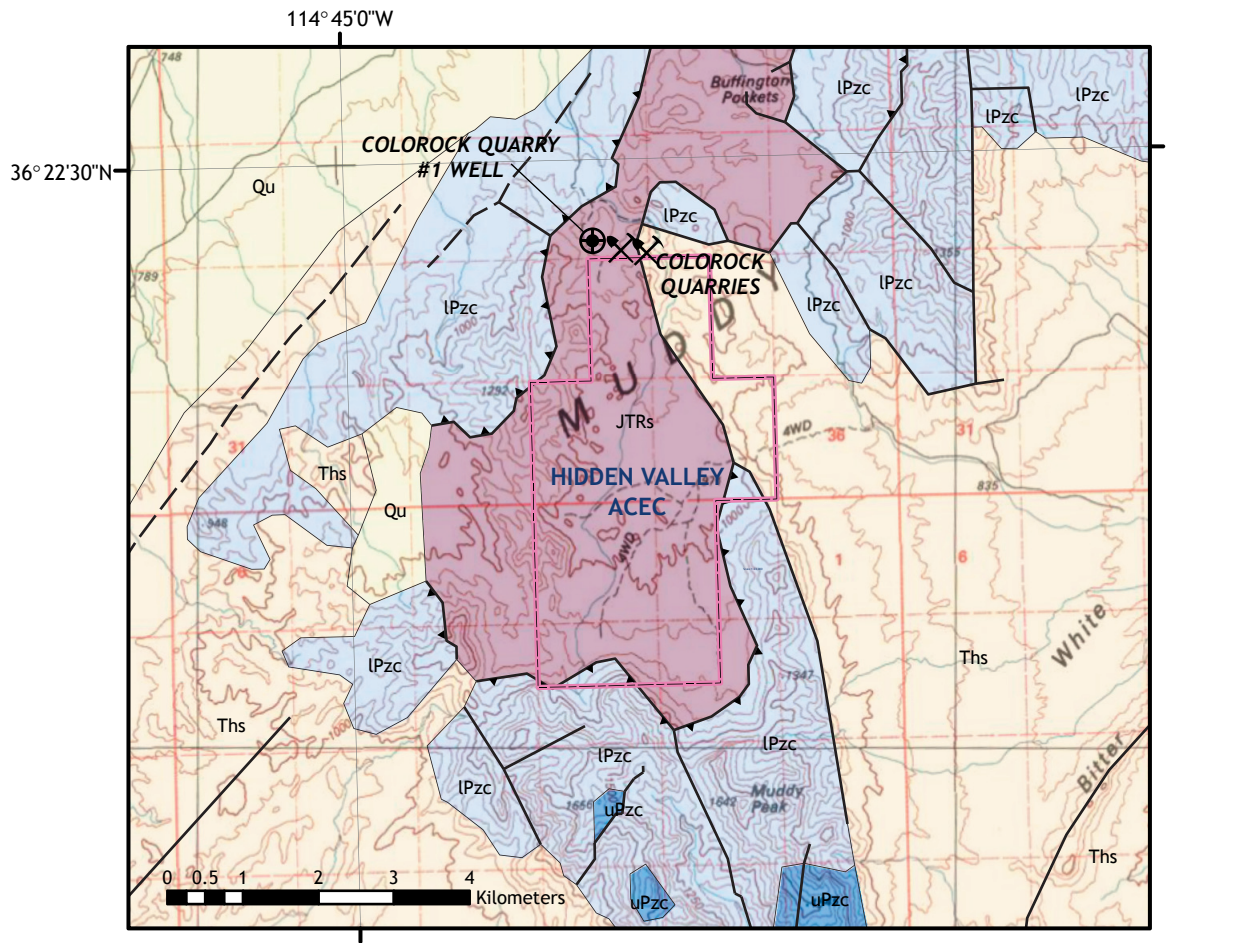
The Hidden Valley ACEC consists primarily of a flat valley at an elevation of about 1,000 m, surrounded by hills and mountains that reach elevations of more than 1,600 m. The area is drained to the north by a tributary of California Wash.

Geologic Setting

The Hidden Valley ACEC is in the Basin and Range Physiographic Province, an area characterized by late Cenozoic tectonic extension, including numerous thrust faults. It lies on the western margin of the Grand Canyon region of the Colorado Plateaus Province. Proterozoic gneiss and schist are exposed in the Virgin Mountains, less than 40 km to the east. On the west, nonextended Pennsylvanian and Permian limestone and dolomite are exposed less than 10 km away.

Geology

The valley floor of Hidden Valley and part of its flanks are composed of Jurassic Aztec Sandstone (fig. 1). The Aztec Sandstone consists of brick-red to pink, fine- to medium-



EXPLANATION

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| <p>Qu Undivided surficial deposits (Pleistocene and Holocene)—alluvium, colluvium, lake, playa, landslide, terrace, and eolian sand deposits</p> <p>Ths Horse Spring Formation (Upper Oligocene and Miocene)—tuffaceous sedimentary rocks; includes some volcanic rocks, sandstone, limestone, and gypsum</p> <p>JTRs Sedimentary rocks (Triassic and Jurassic)—mostly sandstone and shale. Includes Lower Jurassic Aztec Sandstone and Chinle and Moenkopi Formations</p> <p>uPzc Carbonate rocks (Mississippian to Permian)—limestone, dolomite, and some shale. May include Kaibab, Callville, Temple Butte, Monte Cristo, and Redwall Limestones, Toroweap Formation, Coconino Sandstone, and Bird Spring Formation</p> <p>lPzc Dolomite and Limestone (Cambrian to Devonian)—dolomite, limestone, and minor amounts of sandstone, shale, and siltstone. May include Temple Butte, Muddy Peak, and Guilmette Limestone; Nopah, Muav, and Bonanza King Formations; Pioche Shale; and Eureka Quartzite</p> | <p>— contact, certain</p> <p>— fault, certain</p> <p>- - - fault, approximate</p> <p>... fault, concealed</p> <p>— thrust fault</p> <p>⛏ mine or prospect</p> <p>⊕ oil exploration drill hole</p> |
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Figure 2. Generalized geology of the Hidden Valley Area of Critical Environmental Concern (ACEC; outlined in pink). Geology modified from Stewart and Carlson (1978)

grained, well-sorted, quartz-rich sandstone. It is characterized by large cross beds generally considered to be of eolian (wind-blown) origin (Stewart, 1980) and typically weathers to form high cliffs and distinctive knobby outcrops. The Aztec Sandstone is correlative with the Navajo Sandstone of the Colorado Plateaus, and it is the formation that forms distinctive red cliffs at Valley of Fire State Park and Red Rock Canyon in Nevada and at Zion National Park in Utah.

The hills and valleys surrounding Hidden Valley consist of Cambrian and Ordovician carbonate rocks. These rocks are massive to well bedded, light- to dark-gray dolomite and limestone that represent a variety of different marine carbonate depositional environments (Longwell and others, 1965).

These carbonate rocks were thrust westward over the Aztec Sandstone on the North Buffington back-thrust fault system related to the Sevier orogeny in Late Cretaceous time (Carpenter and Carpenter, 1994). This fault was later deformed and, in places, overturned by the eastward-moving Muddy Mountains thrust system in earliest Tertiary time (Bohannon, 1983). Fine-grained lacustrine and fluvial deposits of the Miocene Horse Springs Formation crop out in the eastern part of the area. Figure 2 is a geologic map of the ACEC and surrounding area. No igneous rocks occur in or near the area.

Mining History

Two stone quarries were developed at the northern edge of the Hidden Valley ACEC at an unknown date. Longwell and others (1965) reported that the Colorock Quarry in this area had small recorded production. During our reconnaissance of the area, two other small quarries were found about 200 m out-

side of the northern boundary of the ACEC. Both sites showed some evidence of drilling and stone splitting. Other activity within 20 km of the area has been restricted to small-scale mining of industrial minerals (silica, clay, and borates).

Mineral Deposits

The Hidden Valley ACEC contains outcrops of Aztec Sandstone that is variegated pale red, pale orange-pink, and light reddish-brown to white (fig. 3). Quarries in this rock have furnished small amounts of building stone. The largest quarry in the area is a cut about 30 m long, 10 m wide, and 2 to 3 m deep (fig. 4). It and two other quarries are within about 200 m of the northern boundary of the ACEC. The Wyatt silica mine, located about 2 km northeast of the ACEC, produced three or four carloads of silica sand from the Aztec Sandstone.

Other nearby mineral deposits and prospects are: the Vanderbilt bedded clay deposit, 10 km southwest; the Anniversary lacustrine borate deposit, 11 km south; the Ore Car Mine (gem beryl), 11 km south; the Bauer-Dollery and Virgin River manganese deposits, 25 km southeast; the White Basin lacustrine borate deposit, 10 km east; and the Overton bedded magnesite deposit, 25 km northeast.

Mineral Exploration and Development

There has been no known modern mineral exploration or development in this ACEC. Past development activity was restricted to limited quarrying of building stone at two sites



Figure 3. Banded pale-red and white Aztec Sandstone from a quarry near the northern boundary of the Hidden Valley ACEC. GPS instrument (15 cm long) for scale.



Figure 4. Aztec Sandstone at a small quarry near the Hidden Valley ACEC. Note the drill hole to the left of the rock hammer.

near the north edge of the ACEC, including the Colorock Quarry. A small stone building in the area was likely constructed at that time.

In the past, there has been a small amount of petroleum exploration activity in Clark County, particularly in the 1950s and 1980s, and a number of deep wells have been drilled. However, no discoveries of exploitable petroleum have resulted. In 1983, Colorock Quarry # 1 well was drilled in the Colorock Quarry area by Chevron U.S.A. Inc. and Michel T. Halbouty Energy Co. (Garside and others, 1988). Another oil well, Frank #1, was drilled by Hall Co. in the area, but its exact location is not available (Garside and others, 1988).

Mineral Resource Potential

Locatable Minerals

The Hidden Valley ACEC has only low potential for the development of low-quality stone deposits. The Aztec Sandstone in the ACEC has been the source of a limited amount of stone production that was likely sold in the Las Vegas area as rough-hewn flagstone and ashlar. In the judgment of the authors, the Hidden Valley stone is of relatively poor quality and the area is difficult to access. The stone is too friable for the production of cut dimension stone. Existing producers of rough-hewn stone in the Las Vegas area exploit less friable parts of the Aztec Sandstone and other units, and there are large reserves of such material outside the ACEC. On the basis of analyses of Aztec Sandstone from other deposits in Clark County (Ludington and others, 2005), the Hidden Valley ACEC is not considered to be a good source of high-quality industrial sand.

There are no other known deposits of locatable minerals in the ACEC.

Leasable Minerals

The entire Hidden Valley ACEC is within the region considered by the BLM to be moderately favorable for oil and gas (Smith and Gere, 1983). No oil or gas shows were reported by Garside and others (1988) in the Colorock Quarry # 1 well, which was collared about 125 m north of the ACEC. It was drilled to a depth of 10,030 feet (3,058 m) through the Aztec Sandstone and underlying Mesozoic rock units. On the basis of the lithologic log (Nevada Bureau of Mines and Geology Information Office file), it probably also penetrated the Permian Kaibab and Toroweap Formations, and bottomed in red Permian sandstone. No data are available for the vaguely located Frank #1 well, other than a total depth of 1,005 feet (306 m).

There is no indication of potential for brine or evaporite deposits of sodium or potassium.

The Hidden Valley ACEC contains no known deposits of other leasable minerals, and the potential for their occurrence is low.

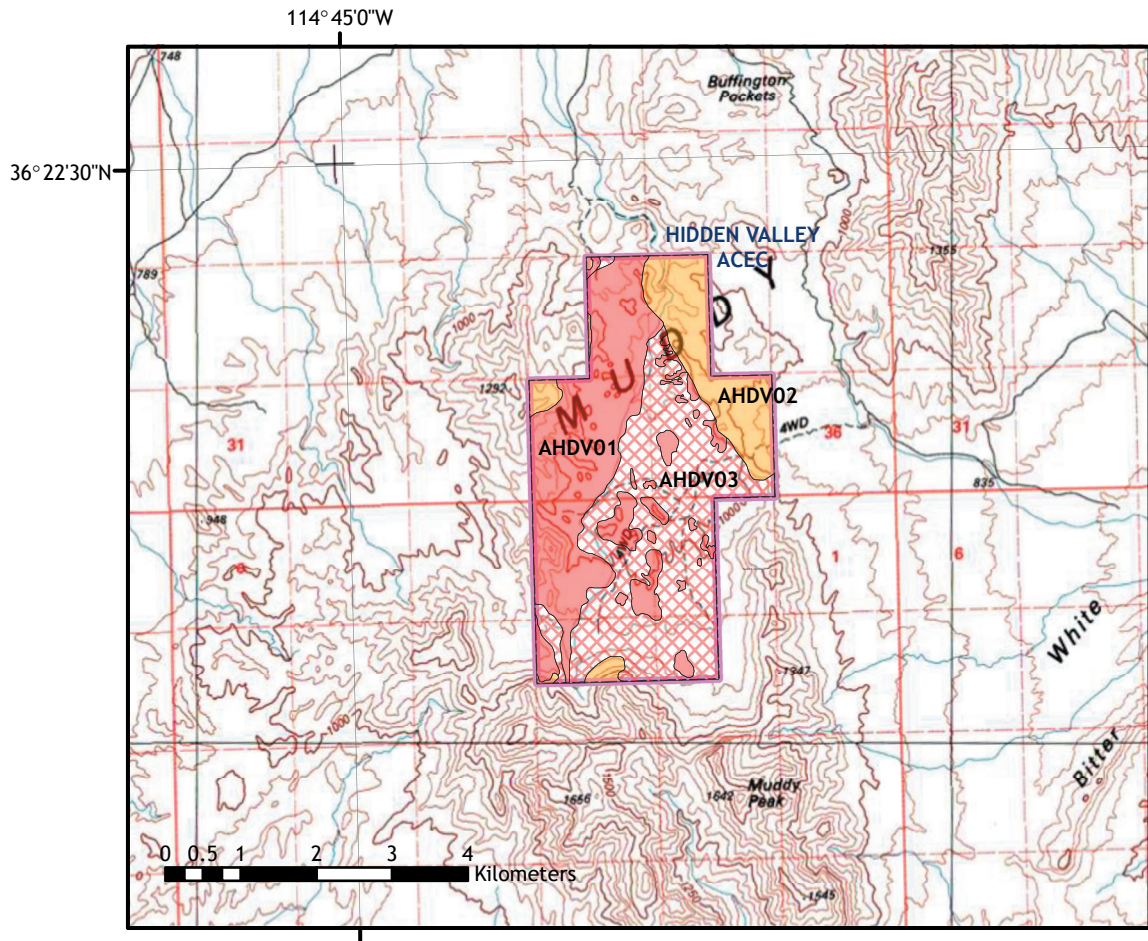
Salable Minerals

Crushed Stone.—Because they contain moderate amounts of chert, the carbonate rocks above the thrust fault are judged to have moderate potential for crushed-stone aggregate deposits, with a low certainty level (tract AHDV01, fig. 5). The areas underlain by friable Aztec Sandstone have low crushed-stone aggregate potential, with a moderate level of certainty (tract AHDV02, fig. 5).

Sand and Gravel.—Alluvial deposits fill the valley east of the Aztec Sandstone outcrop area and are primarily fine-grained sand. Although some coarse material from the carbonate rocks is present, the sand and gravel potential in this area is low, with a moderate level of certainty (tract AHDV03, fig. 5).

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EXPLANATION

- Moderate potential for crushed stone aggregate
- Low potential for crushed stone aggregate
- Low potential for sand and gravel aggregate

Aggregate Assessment Tracts

Tract ID	Commodity Type	Potential Level	Certainty Level
AHDV01	Crushed Stone	Low	Moderate
AHDV02	Crushed Stone	Moderate	Low
AHDV03	Sand and gravel	Low	Moderate

Figure 5. Mineral resource potential tracts for aggregate resources in the Hidden Valley Area of Critical Environmental Concern (ACEC; outlined in pink).