Blue Diamond Gypsum Mine, Central Spring Mountains, Clark County, Nevada

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https://www.academia.edu/121947841/Blue_Diamond_Gypsum_Mine_Spring_Mountains_Clark_County_Nevada

Acknowledgement and Disclaimer

The information in this paper is taken largely from published and public sources. I have reproduced this material and present it pretty much as we found it, not trying to harmonize discrepancies in mine or geologic descriptions. I have changed verb tenses for readability and have used some paraphrase. I have expanded abbreviations or special characters with full text (e.g. feet instead of ft., inches instead of ") Italics indicate quotations. Authors of the original information are indicated at the end of each paragraph. Paragraphs without a citation are our own materials. The maps in this report have been compiled and rectified from digital and paper copies of original sources that were made at different scales and in different geographic projections. Therefore, many of the maps had to be adjusted or stretched. They do not fit perfectly. Most are accurate to within 100 feet, but reproduction and projection errors can be as much as 300 feet for some maps. PLSS means Public Land Survey System. That survey data was obtained from the U.S. Bureau of Land Management website.

MRDS, 2011, Mineral Resources Data System, U.S. Geological Survey, https://mrdata.usgs.gov/mrds/. This database relies on records that, in many cases, are inaccurate or imprecise. For example, if a report describes a mine as being in "Section 9", with no other information, MRDS plots the mine location in the center of the section. If a mine is reported in "SW ¼" of a section, MRDS plots the mine in the center of that SW quarter-section. Where I could confidently adjust a MRDS location of a mineral deposit to features identifiable in aerial photographs or topographic maps, I did so.

Help me make this report better. If you have any photographs, memories or reports for this mine that you can share, please send them to yosoygeologo@gmail.com so that I can incorporate that information and material into this paper.

LOCATION (MRDS, 2011)

T.21S R.59E Sec 32 MDM	36.07693	-115.395	Blue Diamond Quarry
T.21S R.59E Sec 32 MDM	36.07919	-115.3994	Blue Diamond Pit and Mill
T.22S R.60E Sec 07 MDM	36.04919	-115.3008	(Arden Quarry)

PREVIOUS NAMES

Honey Comb (Arden Deposit)

HISTORY AND OWNERSHIP

The Blue Diamond mine is in the Ardan Gypsum District. Major gypsum producers in this district include the Arden, Bard, Blue Diamond, Honey Comb, Last Chance and Mateucci mines. Descriptions of them are found in Murphy (1954, Fig. 2), Longwell (1965:154-209), Hewett and others (1936:167, 169), USBOM, (1932, 1937, 1950), Minobras, (1973:10), and NDM (1991).

The Blue Diamond Mine is the primary current producer of gypsum in the Arden Gypsum District (Longwell and others, 1965:152).

The Ardan Mine Railroad was a spur line of the Los Angeles and Salt Lake (LA&SL) Railroad. A sister railroad to a new quarry was built in 1925 by the Blue Diamond company (Jones and Stone, 1920:155).

Gypsum for plaster was first mined in the Diamond Mountains in 1907 by the Ardan Plaster Company. Part of this operation involved construction of a 3 feet gauge railroad. It operated through 1930 (Myrick, 1963:760).

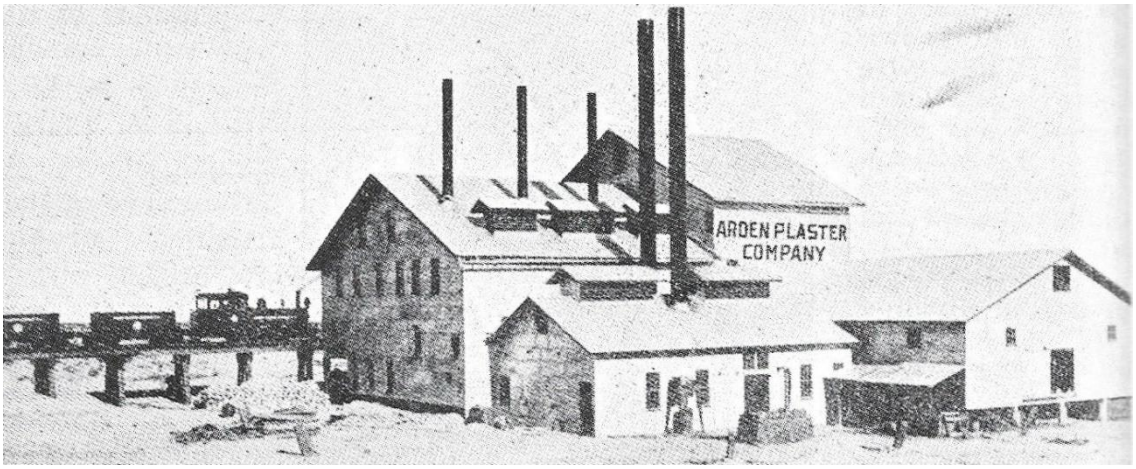


Figure 1. Ardan Plaster Company plant and railroad circa 1912. From Myrick (1963:860); Nevada Historical Society Collection. Open source for educational purposes, no copyright.

The Blue Diamond Mine and mill was initially owned by a Los Angeles company known as Blue Diamond. This company commenced mining in 1925 after an 11-mile long rail line to Arden on the LA&SL railroad was re-constructed to standard guage. An on-site processing plant was added in 1941, followed a year later by the construction of a nearby company town, known as Blue Diamond, Nevada. The mine was eventually sold to James Hardie Gypsum, which expanded operations in 1998. BPB took over the

gypsum factory a few years later, and developer Jim Rhodes purchased 2,400 acres in 2003 (Wickipedia, 2023; Myrick,1963, p. 761).

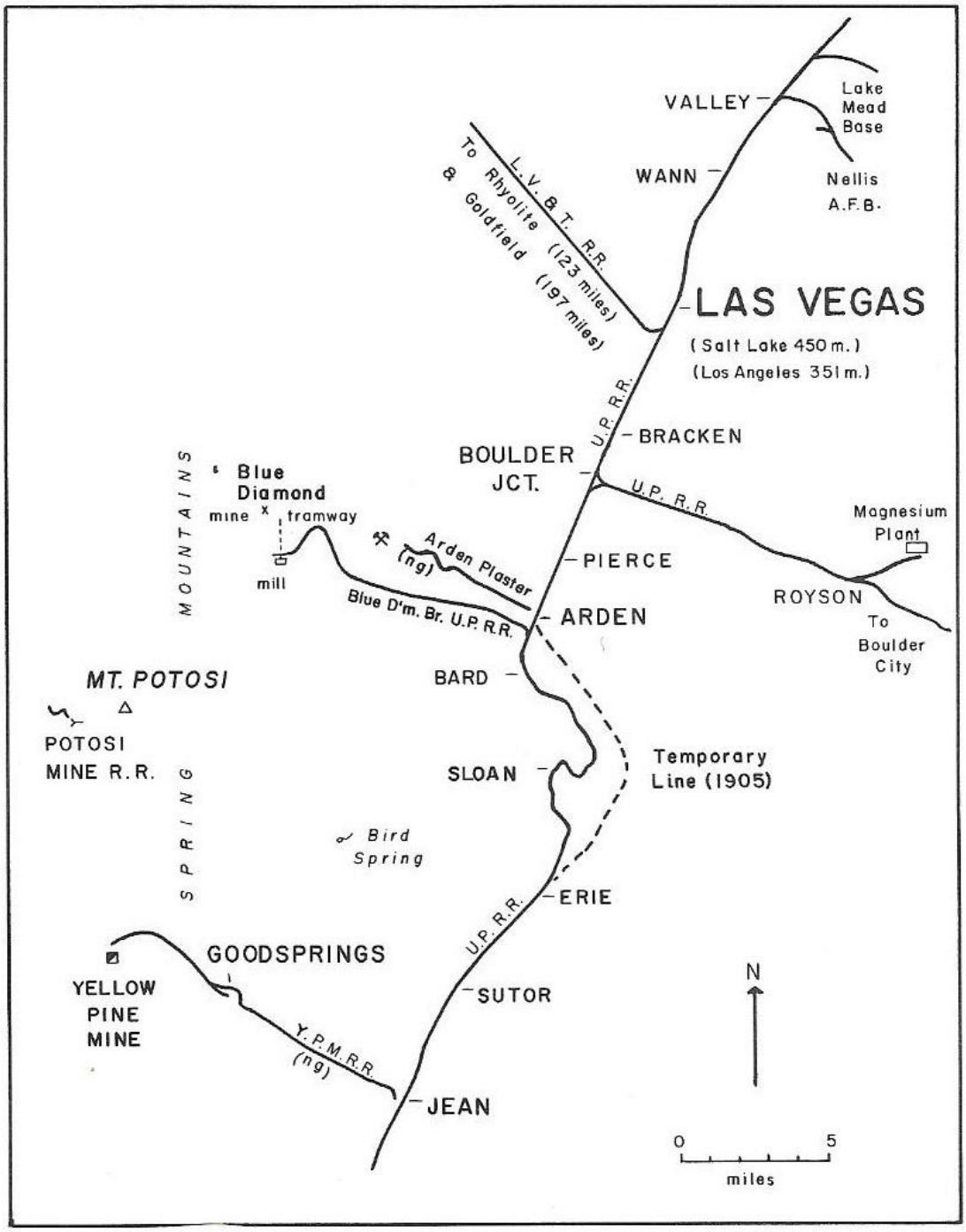


Figure 2. Las Vegas Area railroads. From Myrick, 1963, p. 761. Open source for educational purposes, no copyright.

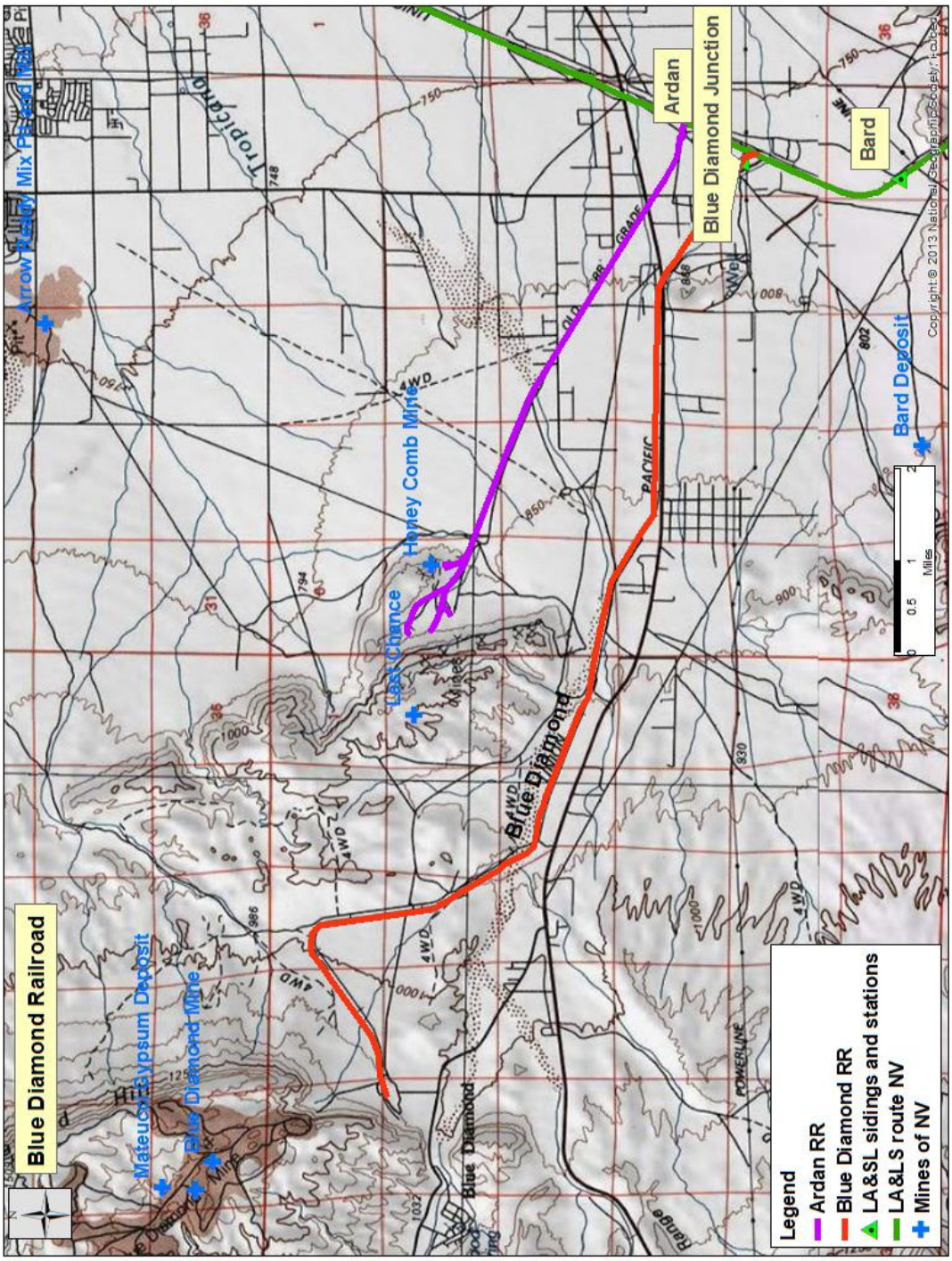


Figure 3. Arden and Blue Diamond railroads,

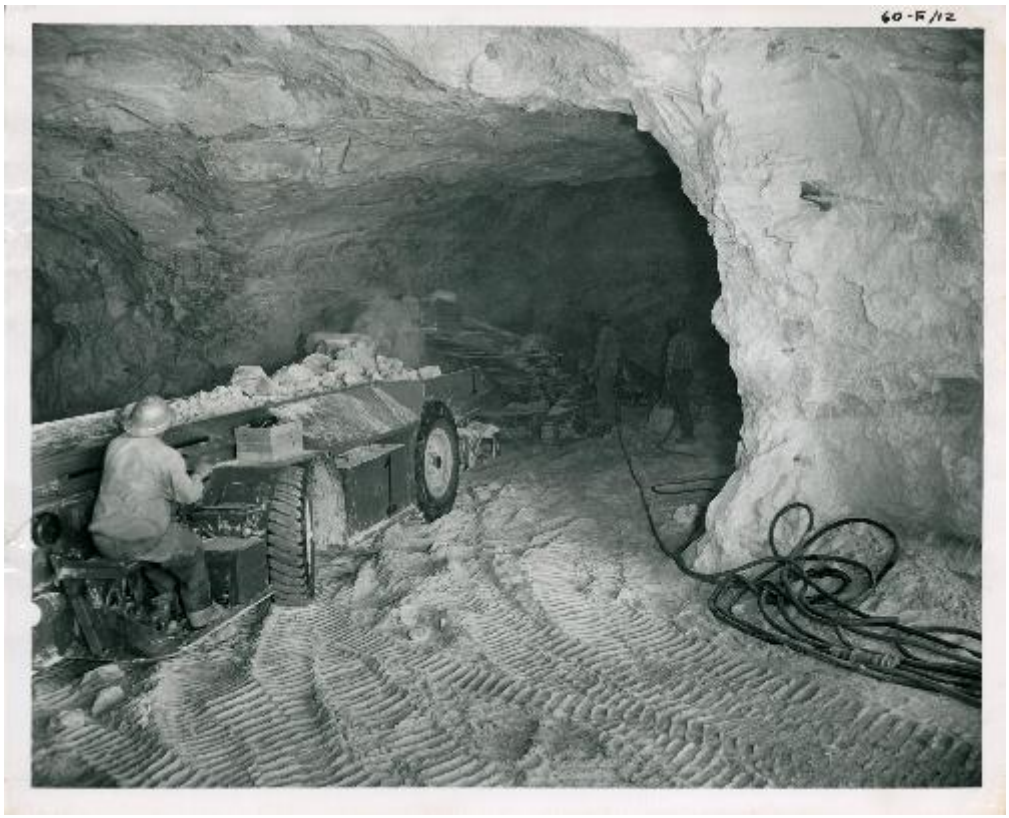


Figure 4. Blue Diamond Mine, from https://www.reviewjournal.com/uncategorized/southwest-of-las-vegas-village-of-blue-diamond-upholds-nevadas-legacy/ Open source for educational purposes, no copyright.

Figure 5. Blue Diamond Mill and Ore Loading Facility, from https://www.reviewjournal.com/uncategorized/southwest-of-las-vegas-village-of-blue-diamond-upholds-nevadas-legacy/ accessed Nov. 11, 2023. Open source for educational purposes, no copyright.

Figure 6. Blue Diamond Railway Terminus. From https://photo.abandonedrails.com/tn9b61ug.jpg accessed Nov. 11, 2023. Open source for educational purposes, no copyright.

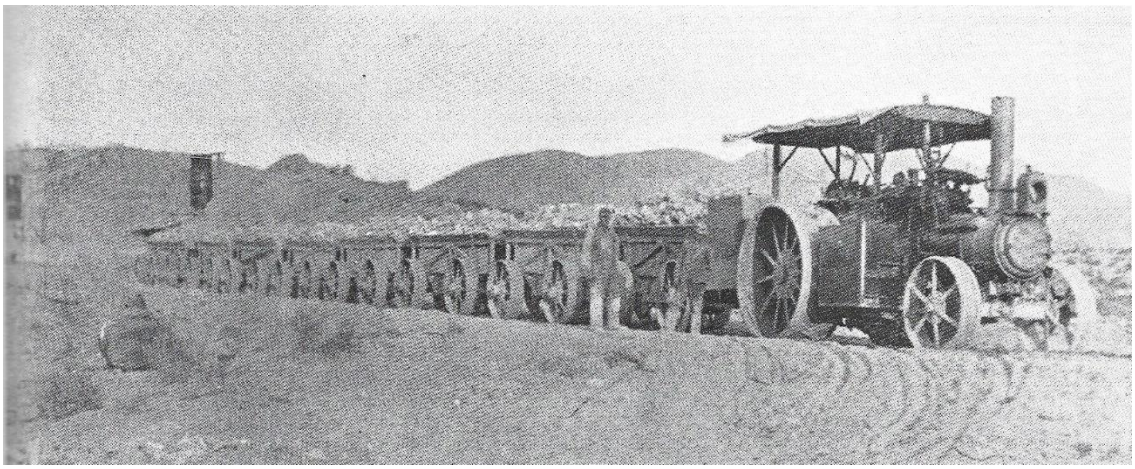


Figure 7. Blue Diamond steam tractor and cars circa 1912. From Myrick (1963:859); Garner A Beck Collection. Open source for educational purposes, no copyright.

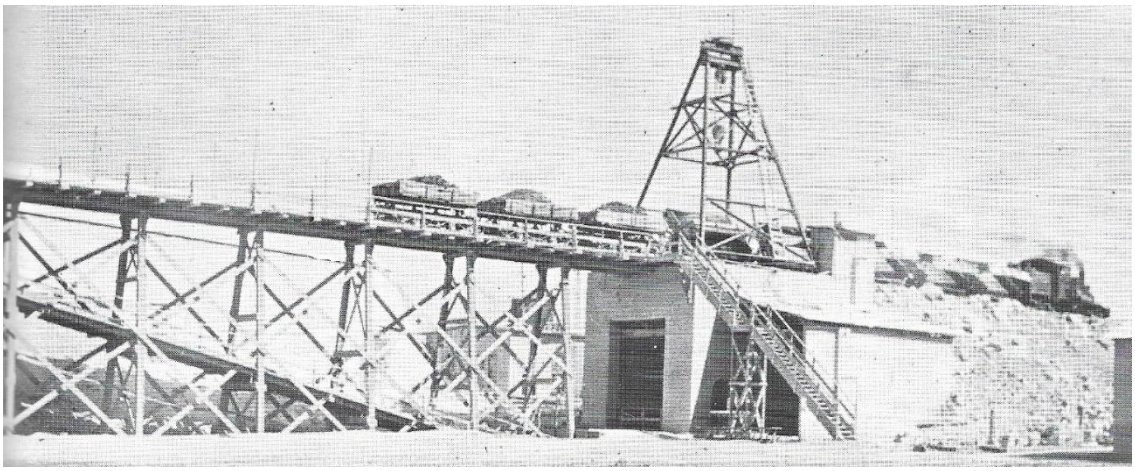
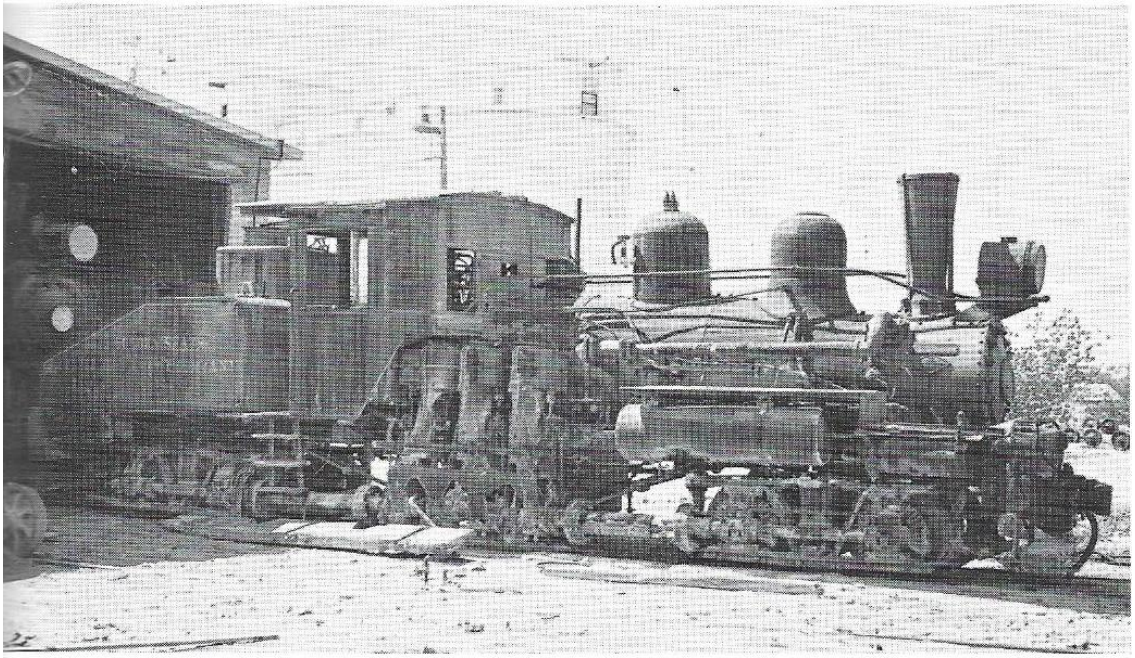


Figure 8. Blue Diamond mill 1915 to 1928. From Myrick (1963:859); Garner A Beck Collection. Open source for educational purposes, no copyright.



Blue Diamond standard gauge Shay locomotive 1915-1928. From Myrick (1963:859); Allan Youell Collection. Open source for educational purposes, no copyright.

REGIONAL GEOLOGY

The regional geology of the central Spring Mountains is described in the overview paper for this report series. It can be accessed at

http://www.greggwilkerson.com/spring-mnts-central.html

MINE GEOLOGY

1920

Mining was originally room and pillar underground operation. It later became an open pit quarry

An oval-shaped hill, approximately 500 feet high and three-quarters of a mile in length, the longer axis trending northwest, is underlain by gypsum. The following section is exposed at the southern end of the hill (Jones and Stone, 1920:155):

Geologic section exposed at Arden, Nevada

> *Limestone, massive, dull gray, cherty, the chert in thin bands and lenses forming one-third of the mass; both chert and limestone with abundant poorly preserved*

fossils, the greater number being fragments of Productus and Athyris, bryozoans, and corals. 125± feet (Jones and Stone, 1920:155).

Shales, red and green, gypsiferous, with thin beds of gray limestone in places and including a bed of gypsum ranging from 25 to 80 feet in thickness.: 85 ± feet (Jones and Stone, 1920:155).

Limestone, gray massive with rare chert nodules; thickness unknown.

The strata dip gently to the east, and there probably is a fault along the eastern side of the hill. A transverse fault about a quarter of a mile northwest of the quarry apparently has cut off the gypsum. The gypsum ranges from 20 to nearly 90 feet thick, the upper surface being very irregular, as shown in figure 11 (Jones and Stone, 1920:155).

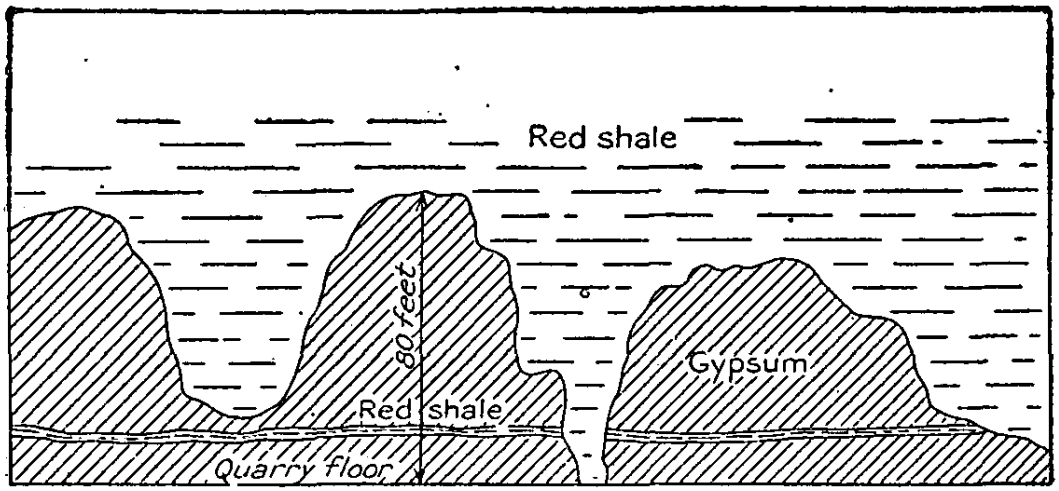


FIGURE 11.—Diagram of gypsum bed at entries of mine at Arden, Nev.

Figure 9. From Jones and Stone, 1920, p. 156. Open source for educational purposes, no copyright.

The impression given is that an original deposit about 90 feet thick was subjected to rapid and deep erosion, or solution, which cut channels across and in places nearly through it. This very irregular surface was engulfed in a mud now which carried blocks of gypsum and partly consolidated mud beds. This mud filled the channels and worked down into narrow cracks in the gypsum. As the mud dried and hardened, water descending from it opened small solution cavities in the upper surface of the gypsum. The hardened mud or shale was strong enough to bridge the few inches of open 'space

thus formed. The relation of the shale and gypsum near the east entry of the mine is shown in figure 12 (Jones and Stone, 1920:156)

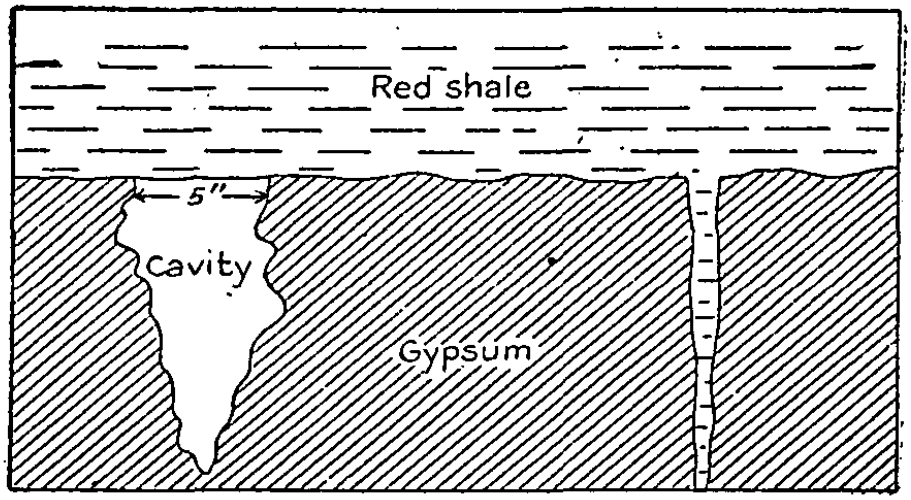


FIGURE 12.—Diagram showing relation of shale and gypsum in mine at Arden, Nev.

Figure 10. From Jones and Stone, 1920, p. 156. Open source for educational purposes, no copyright.

In the face of the east quarry 3 feet of shale is interbedded in the gypsum. It contains numerous stringers of selenite of secondary origin (Jones and Stone, 1929:156).

After quarrying on the east and south side of the hill until the removal of overburden became excessive, the company drove several entries and opened large chambers in the gypsum. Thousands of tons of gypsum were removed from an upper level, and work was begun and continued on a lower level as well. The whole body of gypsum is being removed except necessary pillars; but as the hard shale that fills the old channels penetrates nearly to the bottom of the gypsum and the bed contains here and there large masses of anhydrite, these impurities are left as pillars, thereby reducing the waste of gypsum. The pillars are 25 to 50 feet in diameter. The change from the masses of pure gypsum to the gypsiferous shale that fills the channels is abrupt, the boundary being nearly vertical and somewhat undulatory (Jones and Stone, 1929:156).

The gypsum is massive, pure, with a reddish tinge near the surface that changes to bluish underground, translucent, medium grained, and crystalline. Masses of anhydrite, the largest of which weigh 100 tons, are found in the midst of the gypsum. The anhydrite is similar in appearance to the gypsum and can be recognized by its 'greater hardness and tendency to break in rectangular blocks (Jones and Stone, 1929:156).

About a mile west of the quarry hill is a long ridge which shows a similar geologic section. The beds dip about 30° SW; A quarry was opened by the Arden Plaster Co. in this ridge, but work in it has been discontinued. The gypsum thins down the dip and

does not appear on the other side of the ridge. It is evidently the edge of a lens of gypsum, of which that in the detached hill is a part (Jones and Stone, 1929:157). 1936

1936

Arden: The United States Gypsum Co. and the Blue Diamond Co. have mined large quantities of gypsum from beds that lie in the Supai formation and overlying Kaibab limestone 8 to 12 miles west of Arden. Locally the beds may reach 75 feet in thickness but are commonly 5 to 15 feet. The gypsum passes into anhydrite at distances of 50 to 100 feet from surface croppings. The principal deposit of the United States Gypsum Co. appears to be exhausted, and the company has removed part of the tracks leading from the deposit to the mill at Arden (Moore, 1936:167).

The Blue Diamond Co. is mining a 14-foot bed of gypsum that crops out around the sides of several small hills near the summit of a ridge in sec. 32, T. 21 S., R. 59 E., and sec. 5, T. 22 S., R. 59 E. The gypsum is gently folded and passes into anhydrite at distances of 50 to 200 feet from croppings on the hillsides. The annual production in

recent years has been about 50,000 to 70,000 tons, which is shipped to Los Angeles. The reserves are large (Moore, 1936:167).

Croppings of the formations carrying gypsum beds may be followed many miles in this district, and exploration along known horizons should reveal very large reserves (Moore, 1936:167). .

1965

The geology of the Arden gypsum district was described by Longwell and others (1965: 152-153):

FIGURE 20. Blue Diamond gypsum plant in foreground, mine in center background. Strata dip west. Permian red beds in lower slopes; Toroweap and Kaibab Formations in cliffs above. Gypsum mined from upper member of Kaibab is brought to plant by aerial tram.

Figure 11. Photo of Blue Diamond mine, train and tramway in 1965. From Longwell and others, 1965, p. 153. Open source for educational purposes, no copyright.

The following references from Longwell and others (1965:154) describe various details of the Blue Diamond Gypsum operations: Bradley (1932), Jones and Stone (in Stone and others, 1920), (Lincoln 1923, p. 17-18), Moore (in Hewett and others, 1936, p. 167) and Vanderburg (1937, p.13-15).

West of Arden, on the east side of the Spring Mountains, the gypsum is in the Permian red beds and the overlying Toroweap and Kaibab Formations (Moore, in Hewett and others, 1936, p. 167). The gypsum beds are commonly 5 to 15 feet thick, but locally may reach 75 feet in thickness. At a depth of 50 to 1oo feet from the surface the gypsum passes into anhydrite. Gypsum has been mined since 1925 in the hills near and east of Blue Diamond (fig. 20). Present production is chiefly from the upper (Harrisburg) member of tbc Kaibab Formation. Recent production is estimated to be more than 300,000 tons of gypsum annually. The reserves are large and exploration will probably reveal other large deposits. The Blue Diamond Co., a division of the Flintkote Co.,

operates a quarry, a plaster mill, and a gypsum lath and wallboard plant (Longwell and others, 1965:143-154).

MAPPING

1:250,000

Longwell and others (1965) mapped the area of the Blue Diamond Gypsum mine as being in the Permian Kaibab, Toroweap and Coconino Formations (Kpt).

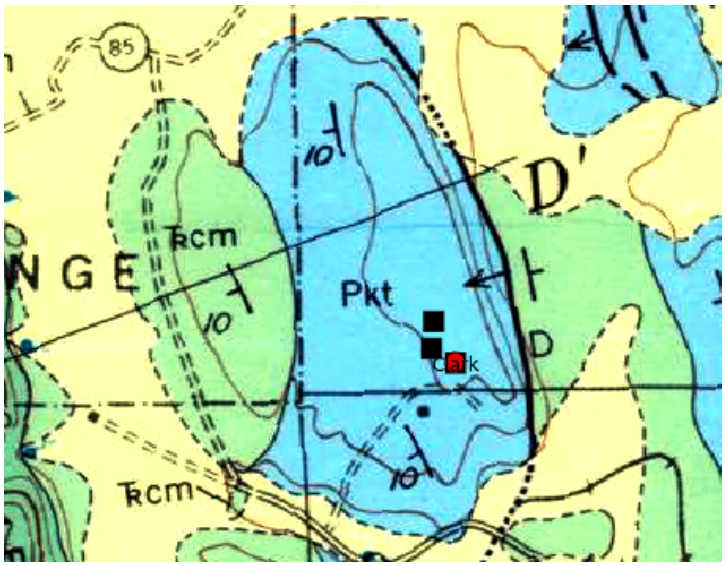
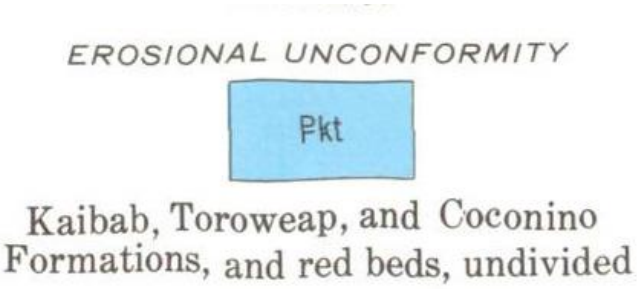


Figure 12. Geologic map of the area of the Blue Diamond Gypsum Mine. Clipped from Longwell and others, 1965. Open source for educational purposes, no copyright.



1:100,000

Page and others (2005) mapped the area of the Blue Diamond Gypsum mine as a place where undivided Kaibab, Toroweap and Coconino Group formations (Pkt) are folded into an anticline. 360 meters southeast of the mine is a small thrust sheet exposure of Mississippian Monte Cristo Group rocks (Mm) at the crest of the anticline.

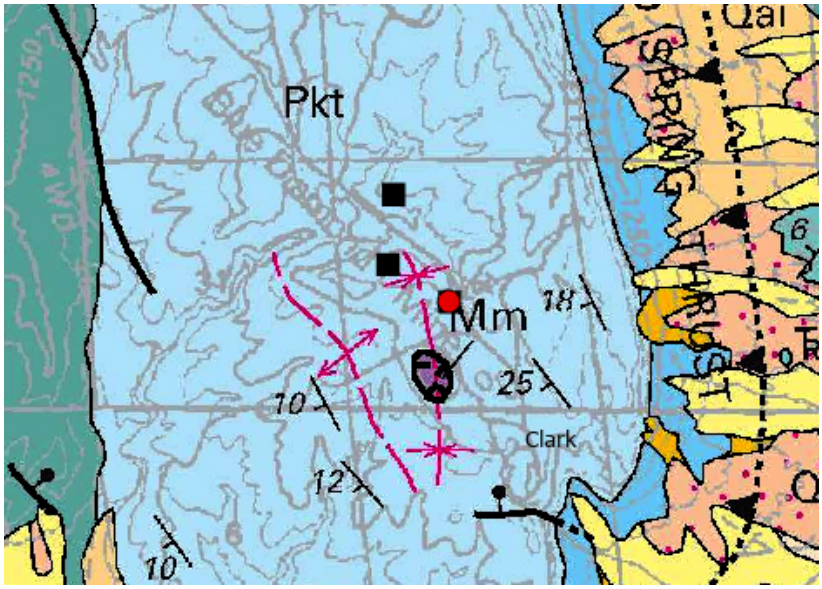


Figure 13. Geologic map of the area of the Blue Diamond Gypsum mine. Clipped from Page and others, 2005. Open source for educational purposes, no copyright.

Pkt Kaibab and Toroweap Formations, undivided (Lower Permian)

Mm Monte Cristo Group (Upper and Lower Mississippian)

MINERALOGY

Thin sections of the anhydrite show a network of slender crystals of anhydrite, the largest of which are 5 millimeters in length, and have a decided tendency to radiate from common centers. The interstices are filled with a mosaic of smaller rounded grains of anhydrite. The anhydrite is transparent and has well-developed rectangular cleavage, that parallel to the longer axes of the crystals being best. A few patches composed of very minute opaque dustlike particles of kaolin and iron oxide are arranged parallel to the longer axes of some of the larger crystals. In a few isolated areas gypsum has developed as single large crystals containing many elongate bubbles and inclusions arranged parallel to the principal cleavage. Minute fragments of anhydrite included in the gypsum crystals suggest that the gypsum has developed at the expense of the anhydrite. If this is so, the absence of veinlets of gypsum shows that the replacement is proceeding from isolated centers rather than along fractures (Jones and Smith, 1920:157)

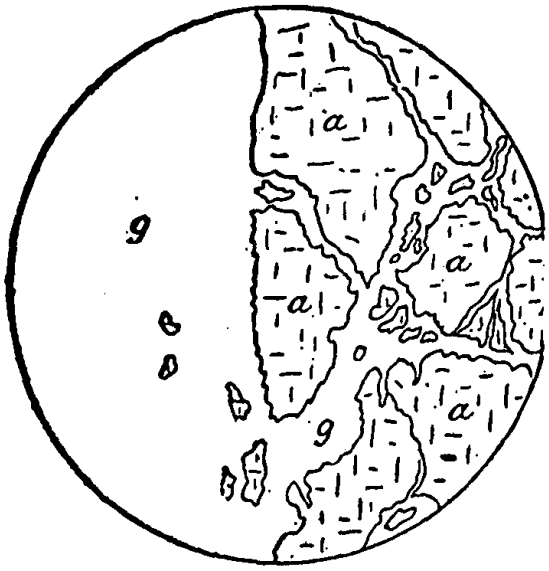


FIGURE 13.—Gypsum and anhydrite from Arden, Nev., as seen under petrographic microscope. g, Gypsum; a, anhydrite.

Figure 14. From Johes and Smith, 1020, p. 157. Open source for educational purposes, no copyright.

Thin sections of the gypsum have little resemblance to the texture of the anhydrite from which it may have originated. Clear crystals of gypsum with very irregular outlines, intimately intergrown, are the chief constituent. The crystals contain numerous elongate bubbles, largely filled with a whitish pulverulent clay, which are usually arranged parallel to the principal cleavage cracks. A few minute rounded fragments of anhydrite are scattered through the gypsum (Jones and Smith, 1920:157)

A hand specimen from this mine shows on the weathered face a sharp line between anhydrite on one side and gypsum on the other. Close examination reveals small stringers of gypsum penetrating the anhydrite. A thin section cut from this specimen along the contact between the two minerals discloses only a few minute grains of anhydrite in the massive gypsum, but anastomosing veinlets of gypsum are abundant within the anhydrite on the other side of the contact. The width of the veinlets tends to become narrower as the distance from the contact increases. This evidence of the microscope and the shape and relation of the anhydrite masses to the gypsum' bed are strongly conclusive that a large part of the gypsum at least is derived from the anhydrite. Fracturing of the anhydrite along the contact, as shown under the microscope, is evidently due to increase in volume by hydration (Jones and Smith, 1920:157).

DEVELOPMENT

The older Arden and newer Blue Diamond quarries were both served by railroads that connected to the Los Angeles and Las Vegas railroad. The ores from the Blue Diamond quarry are transported to the mill by a tramway. The Blue Diamond mine and mill are still in operation.

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U.S. Bureau of Mines (USBOM), 1950, Information Circular 7555, 21 p.

MAPS

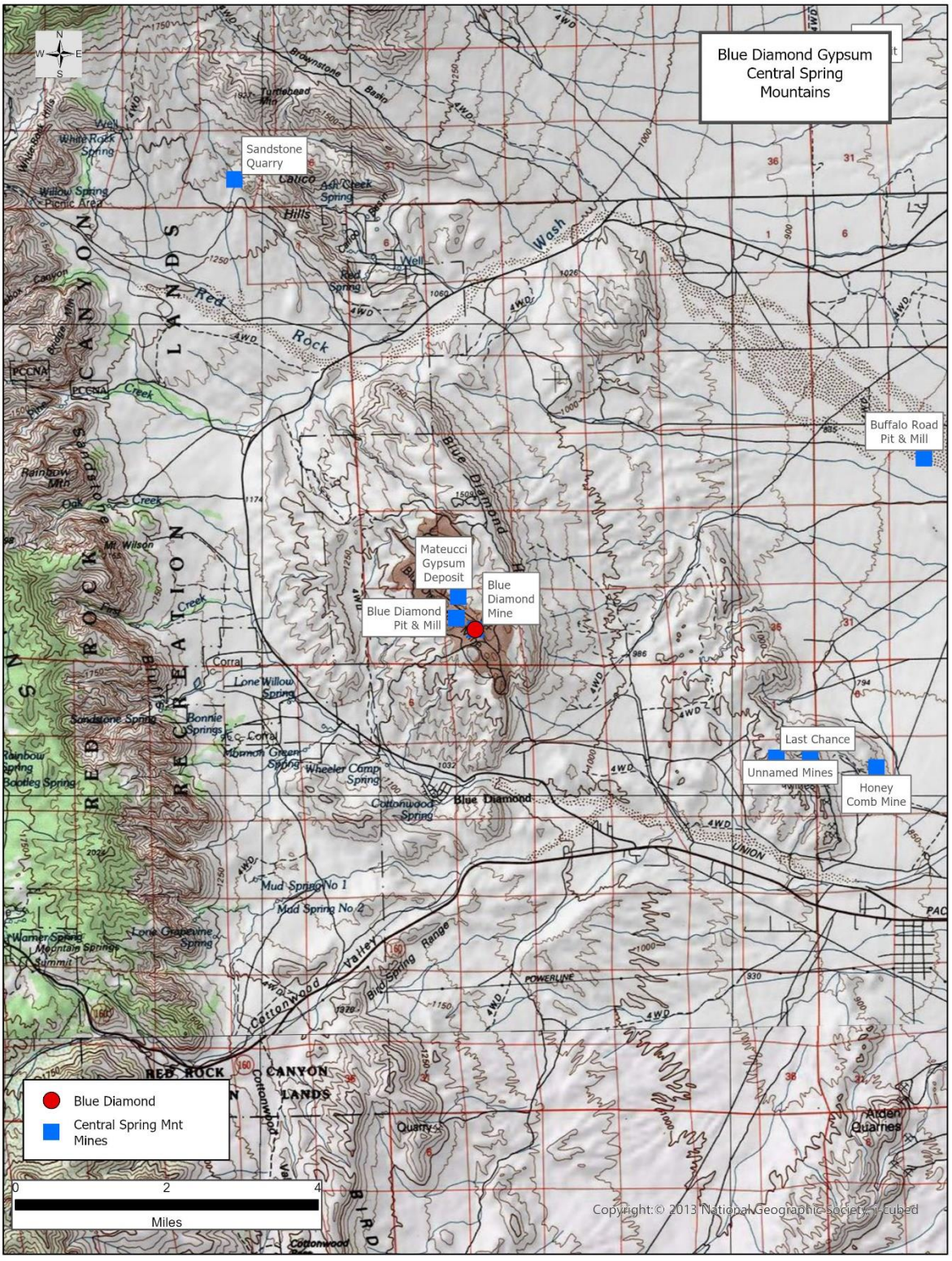

Figure 15. Regional topographic map of the Blue Diamond Mine.

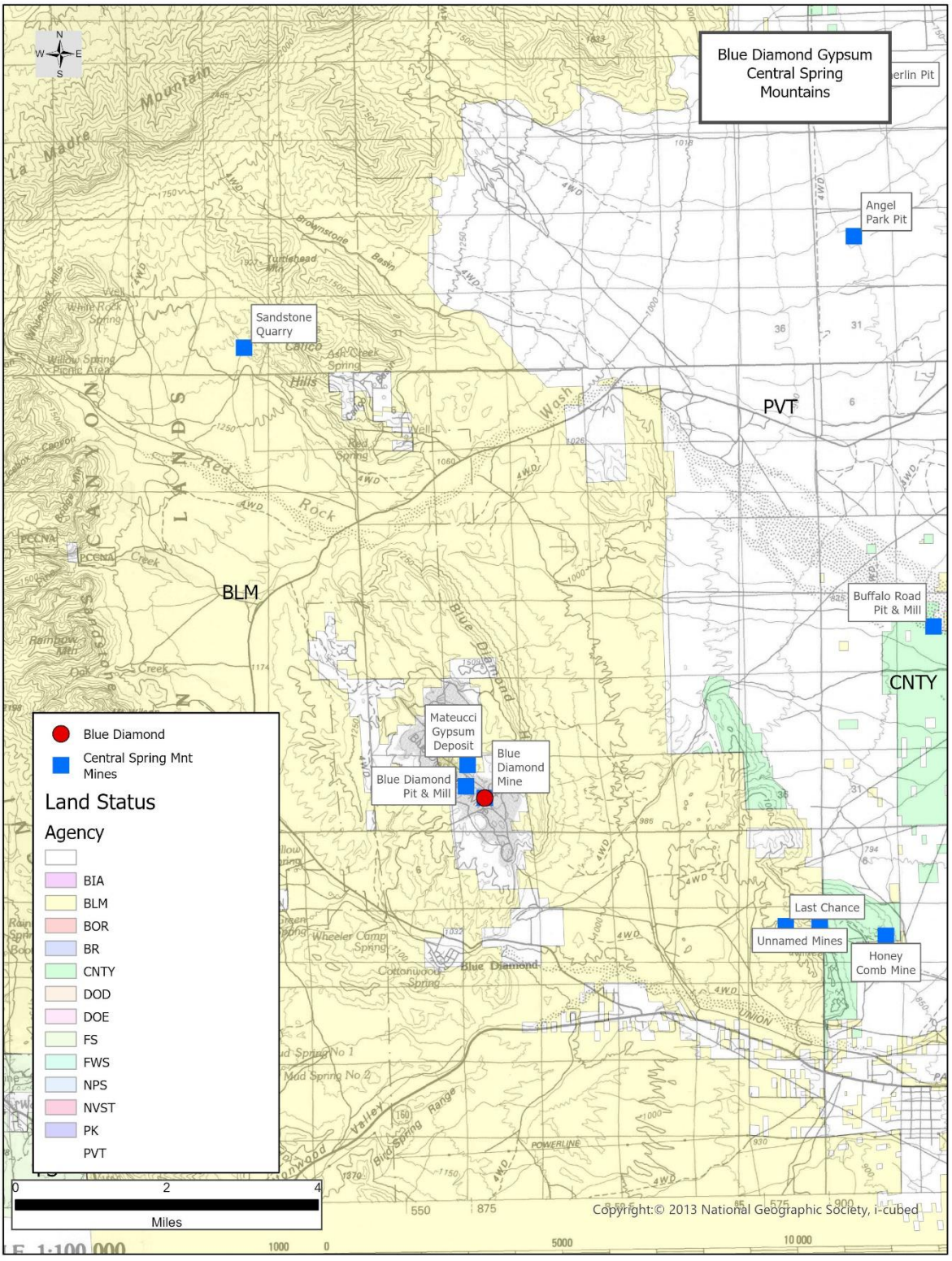

Figure 16. Land status map of the Blue Diamond Mine.

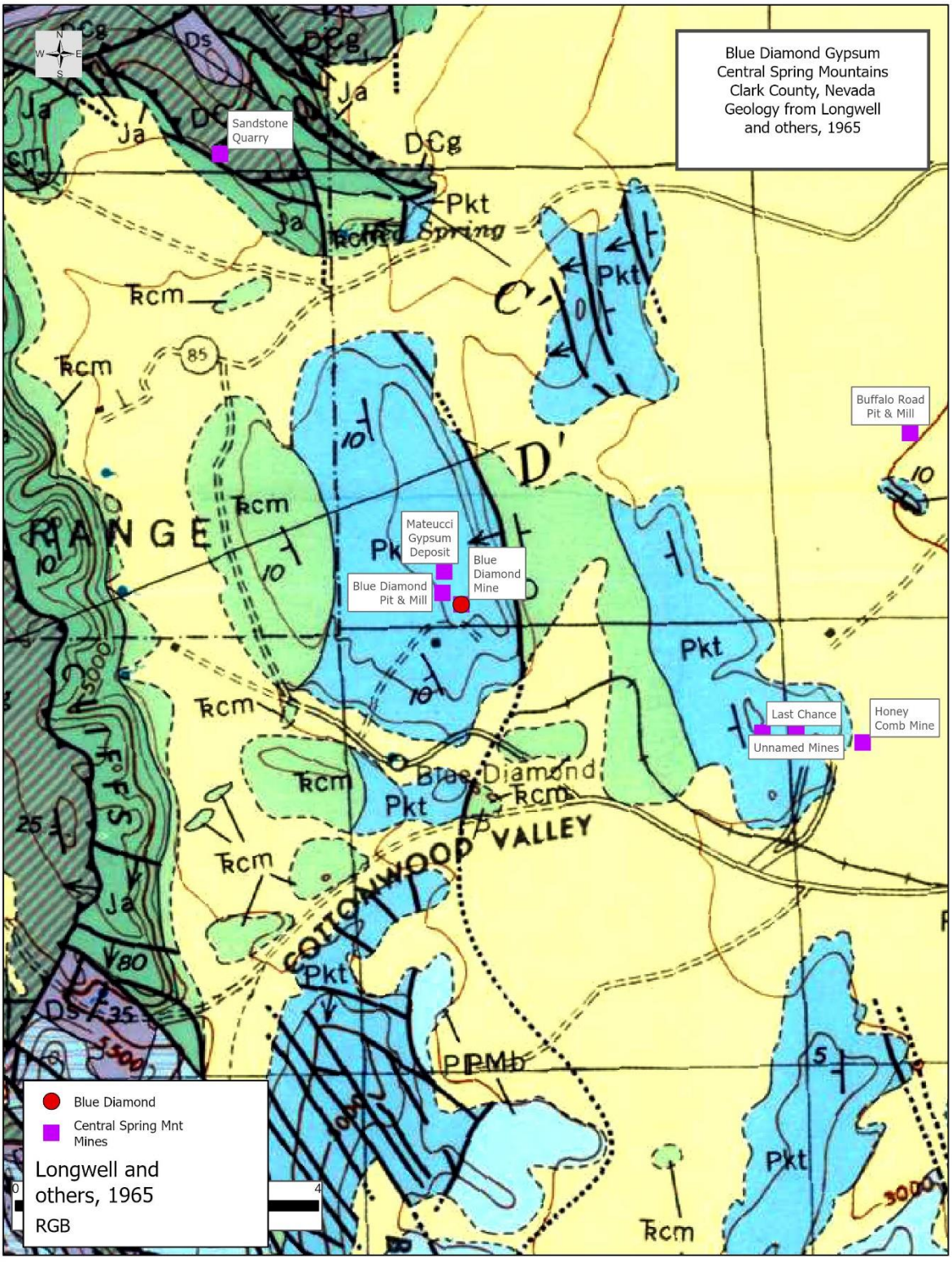

Figure 17. Regional geologic map of the Blue Diamond Mine.

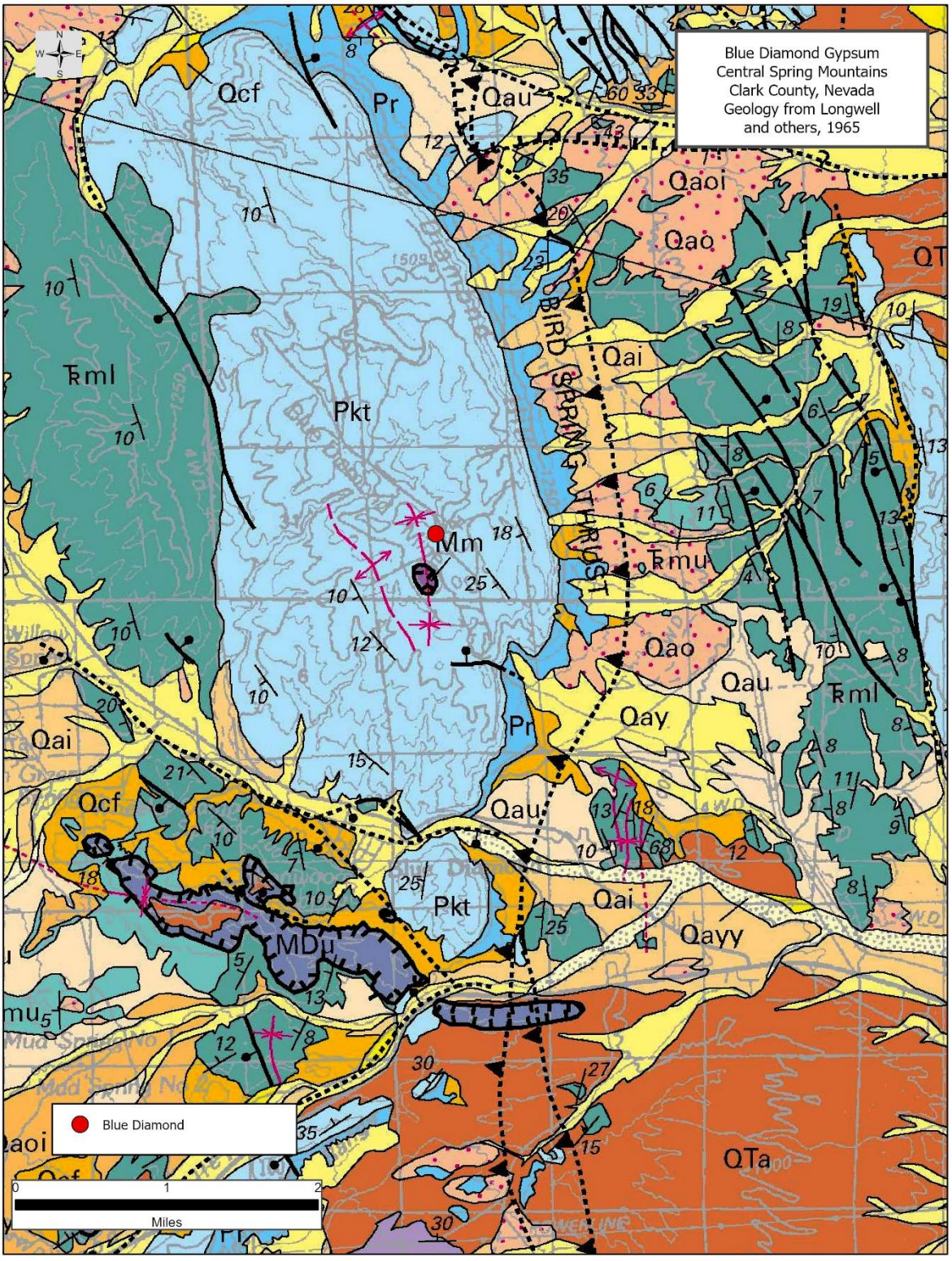

Figure 18. Area geologic map of the Blue Diamond Mine.

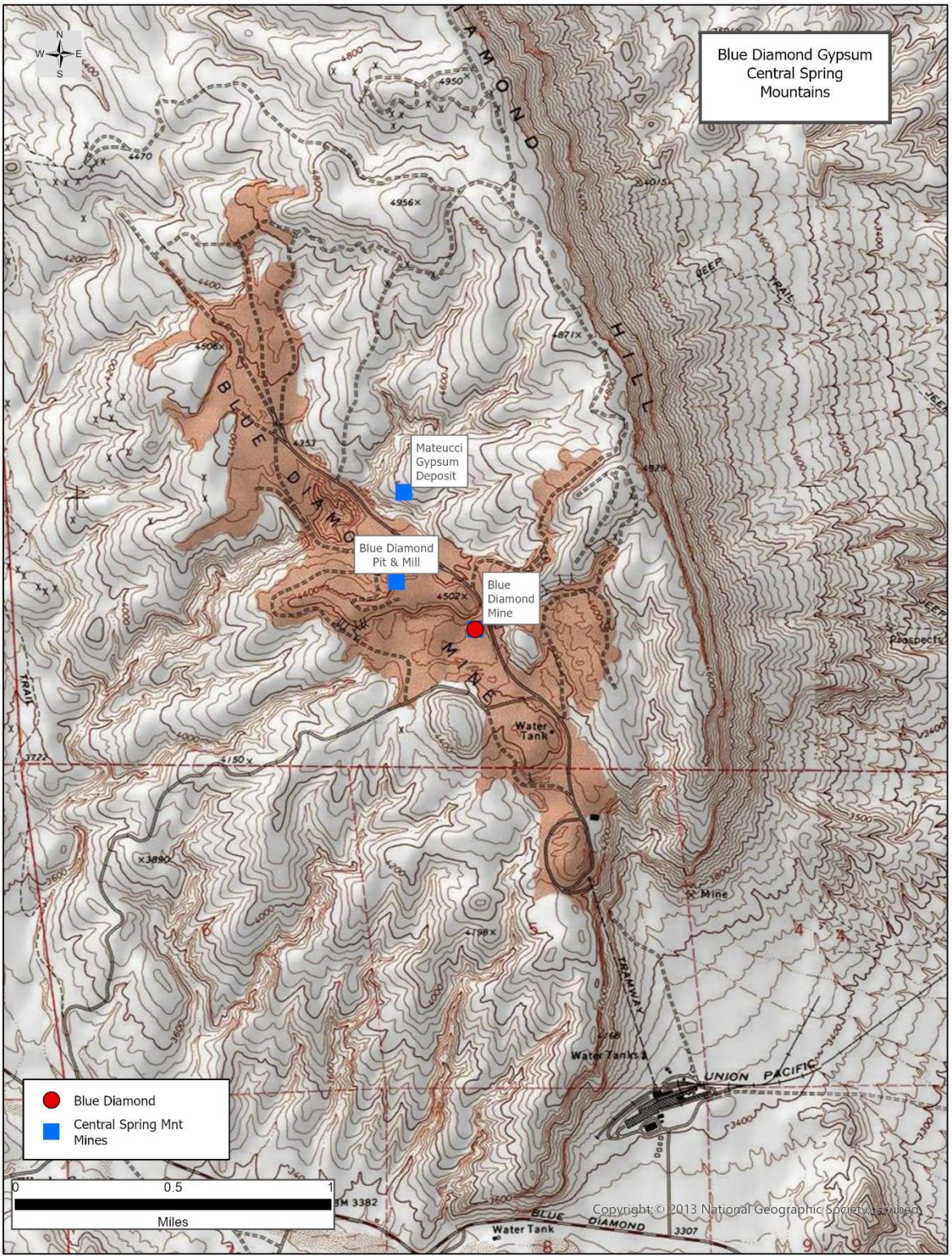

Figure 19. Area topographic map of the Blue Diamond Mine.

Figure 20. Aerial photograph of the Blue Diamond Mine.