



NEVADA BUREAU OF MINES

VERNON E. SCHEID, DIRECTOR

REPORT 17

TURQUOISE DEPOSITS OF NEVADA

By FRANK R. MORRISSEY



MACKAY SCHOOL OF MINES
UNIVERSITY OF NEVADA

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FOREWORD

Frank R. Morrissey was for many years on the editorial staff of the Oakland Tribune, Oakland, Calif. One of his hobbies was mineral and rock cutting. He was particularly interested in turquoise, and whenever possible, explored the turquoise deposits in Nevada. Upon his retirement from the Oakland Tribune, he devoted even more time to the collecting, cutting, and polishing of turquoise.

During his many visits to Nevada, Mr. Morrissey became acquainted with most of the turquoise miners, and from them, learned the locations and history of virtually every turquoise deposit in the State that had produced. Much of the information on the history, production, and previous ownership of the turquoise deposits was acquired by Mr. Morrissey through personal interviews and correspondence and is not a matter of published record. Mr. Lee Hand of Tonopah, Nev., and Mr. Ted Johnson of Tonopah and Fernley, Nev., in particular, contributed much information. Because many of the persons who supplied information to Mr. Morrissey have since died, the Nevada Bureau of Mines has been unable to check certain data. Mr. Morrissey had, however, obtained additional information from data contained in the early volumes of "Mineral Resources of the United States," published annually by the United States Geological Survey.

Mr. Morrissey eventually assembled his findings in manuscript form, and requested the Nevada Bureau of Mines to review and field check his material and to consider it for publication. He died in 1962, and did not have the pleasure of seeing the fruits of his hobby appear as a finished publication.

The author was not a geologist, so it is not unexpected that the information on the geologic occurrences of the deposits and their exact locations were stated in general terms. In order to obtain more specific information on these subjects, Mr. James M. Prudden and Mr. Ronald L. Boatman, advanced students at the Mackay School of Mines, were employed to field check the manuscript during the summer of 1965. They visited virtually all of the deposits described by Mr. Morrissey, but a few of them could not be located. Some material from the Nevada Bureau of Mines Map 23, "Turquoise and

Variscite Occurrences in Nevada," by J. B. Murphy, and data on several previously undescribed mines were added to the manuscript.

Throughout the ages, turquoise has been a much sought-after semiprecious stone by peoples in many parts of the world. Archeological evidence proves that it was mined in Nevada by Indians before the advent of white man. Nevada has been the major producer of turquoise in the United States. It is difficult to obtain accurate figures, but there is good evidence to indicate that this State has produced more than \$30 million worth of turquoise in the raw state, which, of course, has a value many times that as a finished and polished-gem stone. Virtually all of the turquoise mined in Nevada has been shipped out of the State for processing. Much of it has gone to Arizona and New Mexico, where it has become part of the well-known turquoise and silver jewelry sold by the Indian tribes of those areas. Some is exported to foreign markets. In addition to its deposits of high-quality turquoise, Nevada has the distinction of having produced the largest single piece of turquoise on record.

This report is published in order to preserve information on many old and now caved or overgrown turquoise mines, whose location and other information are rapidly being lost with the passing of the older generation who owned and operated them. Another important reason for documenting Nevada's turquoise deposits is that they may serve the mineral industry as indicators of possible copper and molybdenum deposits at greater depth.

Despite the fact that much turquoise can be found in seemingly abandoned mines, persons interested in collecting turquoise should exercise care. Most of the mines described in this report are held under private ownership. The turquoise is not "free-for-the-taking," and the trespasser is liable for legal action. The mineral collector should obtain permission from mine owners before venturing on a collecting trip.

Vernon E. Scheid, Director
Nevada Bureau of Mines

April, 1968
Mackay School of Mines
University of Nevada

TURQUOISE DEPOSITS OF NEVADA

By
Frank R. Morrissey

ABSTRACT

Nevada has been an important source of turquoise since prehistoric time. The largest producing areas have been (1) the Copper Basin and Bullion districts in Lander County, (2) the Royston district on the border between Nye and Esmeralda Counties, and (3) the Crescent Peak area in Clark County.

The majority of known deposits lie in a belt that trends north-northeasterly across the central part of Nevada from Mineral and Esmeralda Counties on the south to central Elko County on the north. This belt coincides with a zone of strong tectonic activity that occurred in Late Devonian and Mississippian time. Host rocks for the deposits are limestone, shale, chert, intrusive bodies or metamorphosed volcanic and sedimentary rocks, but no deposits seem to occur in the ubiquitous Tertiary volcanic rocks. Turquoise normally forms narrow veinlets or small nodules along altered zones in the host rock, but, on rare occasions, large slabs and nodules have been recovered.

The present report briefly describes 68 separate turquoise mines or districts in Nevada. These may be of interest not only to the gemologist but also the exploration geologist searching for important deposits of copper, molybdenum, and precious metals, which in some cases appear related to the turquoise deposits.

INTRODUCTION

The antiquity of Nevada's turquoise industry is illustrated by aboriginal turquoise mines, artifacts found at turquoise sites, and archeological evidence of the use of turquoise by ancient cultures. The importance of modern turquoise mining is not generally realized, because turquoise

has a high unit value (up to \$125 per pound), and most turquoise has been mined from inconspicuous openings by no more than several miners working together at any one time. Turquoise mining has not been marked by thriving camps which boomed for a few short years or decades then died as the ore gave out. Rather it has been carried on intermittently and on relatively small scale even in modern times. Surprisingly, however, the turquoise mines of Nevada have produced perhaps \$30 million in raw material and much more than this in value of finished gems.

Most of the State's turquoise deposits appear to lie in a belt trending north-northeasterly across central Nevada from Mineral and Esmeralda Counties along the southwestern border to Elko County in the northeast. This belt coincides with a zone of strong tectonic activity that occurred in Late Devonian and Mississippian time.

The mineral turquoise is a hydrated phosphate of copper and aluminum, $\text{CuAl}_6(\text{PO}_4)_4(\text{OH})_8 \cdot 4\text{H}_2\text{O}$, with a sky-blue to greenish color; it probably forms an isomorphous series with the green mineral chalcocyanite in which ferric iron substitutes for aluminum. Phosphate minerals of the variscite group are also commonly associated with turquoise. No effort has been made in this report to identify positively the mineral species present; therefore, the term "turquoise" is used here as a field term to denote a bluish to greenish phosphate mineral that resembles turquoise in hand specimen.

Crystals of turquoise are rare; the mineral occurs instead as fine-grained to cryptocrystalline earthy veinlets and nodules that range up to 5 or 6 on the Mohs scale of hardness. The harder, sky-blue varieties are most desirable for use as gemstone. The various factors affecting hardness and color have not been studied; the color of some

turquoise fades with time and exposure to light.

Turquoise is generally believed to be a product of supergene processes and is probably the result of acids, derived from the oxidation of sulfide minerals, reacting with primary phosphate minerals such as apatite. Arid climates appear to favor the formation of turquoise.

Turquoise usually is not found in large masses, most of the ore occurring in pieces which can be cut into gems perhaps half an inch in diameter. Quantities of the gems no larger than the head of a match have been sold. Some of the mines nevertheless have produced ore in amazingly large sizes. A solid nodule weighing slightly more than 1,700 carats, possibly the largest piece of "pure" turquoise ever found (that is, without any matrix or other inclusions), was discovered at the Fox mine (sometimes known as the Cortez mine) in Lander County. The piece was subsequently sent to the Smithsonian Institution. At the Blue Matrix mine in the Tenabo (Bullion) district of Lander County, a slab of clear-blue turquoise nearly a foot square and three-quarters of an inch thick was found on the 40-foot level. The Super-X mine, in the same district, produced a nodule of "spider-web" turquoise, measuring about 4 by 8 inches and 2 inches thick, which weighed about 4.5 pounds. A nodule of high-grade spider-web turquoise weighing more than nine pounds was produced at the Number 8 mine, near Carlin. This specimen was sold to C.G. Wallace, Zuni, N. Mex., who is reported to have paid \$1,600 for it.

One of the largest pieces of turquoise and matrix in the modern world, perhaps the largest nodule ever uncovered, was discovered at the Number 8 mine on June 23, 1954, by T. G. Edgar, J. M. Edgar, and Marvin Symes. This specimen was 33 inches long, 18.5 inches wide, and 7 inches thick. Cleaned and polished it weighed 150 pounds. The nodule was of excellent texture, good color and hardness, and ranked with any turquoise of good commercial grade.

Aside from its use as a gem material, turquoise may be valuable to the mining industry in another, but less direct, way. It has been found in the leached cappings of many disseminated copper and molybdenum deposits, thus serving as a possible guide to even greater mineral wealth buried below.

The purpose of this paper is to record the known turquoise deposits in Nevada and to preserve information on location, production, and history on many older mines that are now caved or overgrown. Although much of the data herein recorded may be indefinite and only estimates by "old-timers," it is the best that can be obtained and should be preserved. It is hoped that the information will be useful to the professional gemologist and the exploration geologist alike. The list of mines has been made as complete as possible, but very likely some have been missed, others are yet to be discovered, and still others have been destroyed by larger mining operations for other commodities. Ely, Nev. is an example of the latter type of operation, where turquoise deposits that existed in the cap rocks have been removed by subsequent open-pit mining of the underlying copper. In 1966, deposits at Copper Basin in Lander County were also being removed by open-pit mining for copper.

CLARK COUNTY

The Sullivan or Yellow Diamond mine (no. 1, pl. 1) is in the SW1/4 sec. 25 and NW1/4 sec.36, T. 22 S., R. 64 E., on the south side of U. S. Route 93 about 4 miles east of Boulder City. The property was not visited by staff members of the Nevada Bureau of Mines, but specimens of the country rock sent to the Bureau indicate that the turquoise occurs in sheared and altered rocks. Workings reportedly consist of numerous prospect holes and at least two shafts.

The Simmons or Crescent Peak mine (no. 2, pl. 1) is mainly on two patented claims known as the Aztec and Right Blue. It is about 12 line miles west of Searchlight in the basin on the south and west flanks of Crescent Peak. The principal workings are in the SW1/4 sec. 26 and NW1/4 sec. 35, T. 28 S., R. 61 E.

Host rock for the deposits is sheared, argillized granite and quartz monzonite that locally contains abundant vuggy quartz veins. Turquoise occurs as veinlets and nodules, some of which are intimately associated with quartz veinlets.

Turquoise has been taken mainly from two groups of workings. The first of these, on the south flank of Crescent Peak, consists of an adit about 100 feet long, an open cut about 50 feet long and 20 feet deep, and an inclined shaft sunk from the open cut for about 200 feet at an angle of 50° NW. The shaft was caved in 1965. The second group of workings lies 300 to 500 feet southeast along the sides of a gulch. On the northwest side of the gulch there are two open cuts and an adit; the upper cut is about 20 by 40 feet long and 15 feet deep; the lower cut is about 50 feet long and 10 feet deep with short adits from it. Below the two cuts, there is an adit some 240 feet long driven northwesterly under the open cuts. On the southeast side of the gulch, a tunnel has been driven for about 150 feet with branching tunnels and stopes connecting to an open cut about 50 feet above. The open cut is about 60 feet long and 20 feet deep. Other smaller workings are scattered over the peak.

The mine was discovered in 1889 or 1890 by a George Simmons, who camped by a large Joshua tree near the deposit after a heavy rain. The next morning he found a number of the bright blue turquoise fragments but discarded them after they failed to give strong indications of copper. About two years later, while in New Mexico, Simmons visited a turquoise mine and recognized the material he had thrown away. He left at once for Nevada, found the former campsite and Joshua tree, and set about tracing the fragments of turquoise "float" to their source. Following a trail up the side of Crescent Peak, he came to the source which proved to be the abandoned remains of a mine worked by the aborigines. Larger fragments of turquoise lay scattered about, together with abandoned stone chisels, wedges, and hammers.

Below the mine workings Simmons found a leveled terrace on which there had apparently been workshops and quarters for the miners. Remains were found of rude dugouts with collapsed roofs of logs and brush. At one end of the site was a kitchen midden of broken pottery, at the other end was evidence of a lapidary shop with rubbing and polishing stones and a huge quantity of tiny turquoise fragments. From a study of the growth rings in the logs found in the fallen roofs, and a study of the implements, archaeologists estimated

the mine must have been worked and abandoned 200 years before Columbus reached America. There was no sign of rock carvings or pictographs such as those found at the great aboriginal mining sites in California, hence it would seem this mine had been worked by a different people.

The presence of the lapidary shop argued for an intelligence which realized the economy of transporting finished, or partly finished, turquoise from the site, rather than the rough ore with its waste rock. It is thought to indicate the miners may have been Aztecs or Toltecs.

Simmons cleared out the pits and found the vein of turquoise, which turned from the vertical and dipped at a considerable angle. The aboriginal miners had followed this vein until the overhanging roof became a menace. There was no provision for safety in aboriginal mining. The usual way of extracting the ore was to build a fire against the face of the rock, then throw water on the hot stone, causing it to crack. Wedges were then driven into the cracks until the mass broke away. Simmons dug a quantity of turquoise from the mine and took it to London for appraisal. Assured of the quality and the probable price he could expect, he returned and expanded operations. Some of his turquoise was shipped to William Kley, at Denver, Colo., through whom Simmons contacted William Petry, a German lapidary. Simmons hired Petry and ordered him to set up a fully equipped lapidary shop at the mine. After that, no more rough turquoise was sold. The bulk of the finished gems were sold to Woods & Lamont, wholesale gem dealers in New York City.

The quantity and quality of the gems resulted in an offer from J. R. Woods, senior partner, and in 1896 Simmons sold the mine to Woods, remaining for a time in charge of operations.

Woods patented the group of claims in the name of the Toltec Gem Mining Co. and continued operation for a number of years. Simmons left the mine after about a year, turning management over to Milton Mundy who was sent from New York by Woods. Mundy was not very successful, and Woods persuaded Simmons to return as manager.

Simmons, enroute to Barnwell, Calif., was met by W. L. Miller, whom Simmons had discharged as mine boss. Miller shot Simmons dead with a

borrowed Army rifle. Brought to trial in San Bernardino, Calif., Miller pleaded insanity and was acquitted.

The Turquoise mine, as Woods renamed his property, was abandoned when the ore dwindled to a point where it could no longer be mined profitably at decreased prices. Since then a number of miners have worked the veins and abandoned them. The last owner and operator was O. R. Spear who bought the original claims at a tax sale. Spear died in 1965.

The largest and most perfect stone found at the Simmons mine weighed slightly more than 200 karats when cut. Simmons had it set in a brooch, surrounded by diamonds, as a gift to his wife. There is no reliable estimate of the total value of turquoise produced from the Simmons mine, but it may have been in excess of \$1 million; turquoise prices were high during the peak production, finished stones selling for \$20 per karat. This estimate is also substantiated by the price Simmons is said to have received when he sold the mine.

During operation of the Simmons mine, numerous occurrences of turquoise were prospected for a radius of about a mile from the main mine area. Today the many prospects attest to the vigorous activity, but none appear to have yielded substantial amounts of turquoise.

The Morgan mine (no. 3, pl. 1) is in the SW1/4 sec. 29, T. 28 S., R. 61 E., about 3 miles west of Crescent Peak and 1 mile south from the former townsite of Crescent. Vanderburg in U. S. Bureau of Mines Information Circular 6964 (p. 25) reports that the mine was worked about 1906 by G. W. Morgan who produced several hundred pounds of gem-quality material from workings that consisted of several open cuts and an adit about 150 feet long. The turquoise forms narrow veinlets in quartz monzonite that is cut by rhyolite dikes.

ELKO COUNTY

The Stampede mine (no. 4, pl. 1) is about 9.5 line miles southeast of Tuscarora in the SE1/4 sec. 9, T. 38 N., R. 52 E. The mine workings are limited to an open pit about 70 feet long and 40 feet wide near the crest of a southerly trending ridge.

Turquoise occurs as nodules and seams along bedding planes in brecciated black chert and gray quartzite. Host rocks strike N. 65° E., dip 65° NW and are cut by numerous shears that strike N. 55° E. and dip 45° SE. Solid blue, matrix-marked, and spider-web varieties of turquoise have been found. The turquoise has good color and extreme hardness. Much of the turquoise produced has been found as float that washed down the gullies where Chinese mined for placer gold during the Tuscarora boom.

The mine was reportedly discovered by George Dillon, a government trapper.

The Carlin Black Matrix mine (no. 5, pl. 1) is reported to be in the Merrimac or Lone Mountain mining district. This mine could not be located during the field checking of the manuscript and therefore is located only approximately on plate 1. Geology and host rocks at the mine are not known.

ESMERALDA COUNTY

Turquoise has been reported at the Carl Riek mine (no. 6, pl. 1), but the occurrence could not be located during field checking of this manuscript.

The Miss Moffet mine (no. 7, pl. 1) has been known also as the Blue Boy, Blue, Persian Blue, and Los Angeles Gem Co. mine. It is in the southern part of sec. 7, T. 3 N., R. 36 E. about 4.5 line miles southeast of Candelaria.

The deposit is in a sheared, kaolinized shale. Shear zones strike N. 30° E. and dip 50° S., for the most part following the bedding. Minor zones of silicified breccia occur in the shears. The turquoise is of a good quality and occurs mainly within the narrow zones of strongest argillization.

Development consists of numerous short adits, pits, and trenches which were being worked intermittently in 1965. Variscite also is being recovered about a mile northeast of the property.

The variscite was discovered first in 1908 by L. A. Dees of Los Angeles and Edward Murphy of Goldfield who sold their claims to the Los Angeles Gem Co.

Turquoise was first discovered on the Pirate No. 3 claim, at the west end of the group of variscite claims; later, another deposit was found

on a small knob about a quarter of a mile south of the center line of the claim.

On Pirate No. 3 claim a seam of turquoise more than an inch thick was found in a dark gray, cherty rock. Part of this turquoise was fairly dark blue and very hard. A little greenish, variscite-like material also was found in the pit and is said to have come from the same veinlet as the turquoise.

At the other site small seams of dark blue, very hard turquoise were found in a dark jasperoid. These seams were not abundant and none over half an inch in thickness was found. The very dark brown and black matrix in this turquoise yielded very beautiful gems.

A considerable quantity of turquoise was shipped from the properties during several years of operation before the mines were closed down, but there is no estimate of the value produced.

The Monta Cristo or Monta Cris mine (no. 8, pl. 1) is in the Monte Cristo Range about 8 miles northeast of Coaldale in sec. 12, T. 3 N., R. 37 E. The mine was discovered by William Wilson of Tonopah in 1951.

Solid blue and spider web turquoise occur as nodules in calcareous shale. Production is estimated at about \$8,000.

The Carrie mine (no. 9, pl. 1) has also been known as the Hidden Treasure or the Myers and Bona mine. It is in the Monte Cristo Range in an unsurveyed area about 2.5 miles southeast of the old mining camp of Gilbert.

The country rocks are principally volcanic material and black slate. The volcanic rock is intensely altered, mostly to sericite, and some of the slate is very soft. Turquoise occurs as nodules, seams, and veinlets along the contact between the slate and volcanic rocks. The slate strikes about N. 20°W. and dips 30° - 50° SE; a silicified ledge cuts across it at right angles.

The turquoise nodules range up to about 2 inches in diameter, whereas the seams are up to half an inch thick. Black slate contains the best quality turquoise, generally in the softer, altered zones. Turquoise in the volcanic rocks is mostly soft with a poor color. The turquoise from this mine presents some peculiar features. The best material is hard, with a beautiful sky-blue color, although some specimens of the hard turquoise

have a greenish cast. Many of the nuggets, especially the larger ones, are pale blue and deficient in hardness, but these nuggets are very tough and difficult to break with a hammer. They appear to have a fine, felty, fibrous texture slightly resembling meerschaum when examined under a microscope. Iron stains are present with some of the turquoise, either along the walls of the seams or filling cracks; these stains add to the beauty of the gems. The best turquoise from this mine is equal to that produced in any mine for color and hardness, but the output of the deeper blue turquoise is not large compared with that of the poorer grades, and large specimens are scarce.

The mine workings consist of a shaft about 100 feet deep, a tunnel about 75 feet long, with about 40 feet of drifts and stopes, an open pit near the shaft, and several other smaller pits.

John B. Gilbert and H. P. Thompson discovered the mine in 1897. At the time of their discovery they could not find a market for the turquoise and in 1907 the mine was leased to H. M. Myers and Charles A. Bona as a silver-lead mine. Myers and Bona developed it as a turquoise producer. When production fell off they relinquished their lease. Fred, Herman, and Logan Gilbert, sons of John Gilbert, then returned from Utah to continue operation. Shortly afterwards, the Gilberts allowed the claim to lapse, and it was relocated by Emory Johnson, who sold it to The Rocky Mountain Gem Co., of Denver, Colo. in 1928. This company operated the mine for a time but abandoned operations and allowed their claim to lapse. Chris Hansen of Reno and Jack Hansen of Tonopah later relocated the claim.

Production of the mine is estimated at about \$300,000. It was not operating in 1965.

The Crow Spring, Blue Friday or William Petry mine (no. 10, pl. 1) is 1 mile southwest of Crow Spring on a small rounded hill in the SW 1/4 sec. 33, T. 5 N., R. 39 E.

Host rock for the deposit is a fine-grained quartzite containing tuffaceous (?) units. Turquoise occurs within bleached, argillically altered zones in which distinction of rock types is difficult. Bedding appears to strike N. 70° W. and dip 50° S.; the beds are cut by a shear zone that strikes about N. 20° W.

The turquoise occurs in seams cutting the host rock at all angles. Seams range from paper-thin to nearly half an inch thick. In some places there are several seams in the space of an inch, more or less parallel with each other, or branching out and cutting across one another. In other places the matrix is hardened by a siliceous cement. Such material, cut by turquoise seams an eighth of an inch in thickness, is especially adapted for cameos, and much of it has been used for such purposes. The turquoise ranges from pale blue to pure blue of a fairly dark color. Material that would yield gems of large size is scarce, though the best blue stones have good color and are very hard. Some matrix with brown and red markings has been obtained.

Workings consist of several open pits, the largest about 50 feet long, 10 feet wide, and 15 feet deep, and a short adit.

William Petry discovered the deposit in 1909. In 1939 Ann Cooper-Hewitt, heiress to the Cooper-Hewitt fortune, filed claim to the mine and built a home there which she called the "AnnJax." She did little work on the property and subsequently abandoned it. Mrs. Ed Slavin apparently filed claim to the property after it was dropped by the Cooper-Hewitt interests. Last owner of record was Paul R. Brown of San Jose, Calif.

The Marguerite, Star or Copper Queen mine (no. 11, pl. 1) is 2 miles east of Crow Spring on the east edge of sec. 35, T. 5 N., R. 39 E.

Turquoise deposits occur in quartz monzonite where it has been argillically altered along easterly trending shear zones. Gem-grade material is in the form of nodules or slabs with an unfading, uniform blue color.

Workings consist of numerous open cuts, short adits, and shallow shafts. Most turquoise appears to have come from a glory hole about 40 feet deep.

Ted Johnson of Fernley, Nev. discovered the deposit in 1928. Johnson owned the mine for some time, but last owner of record was Lee Hand, now deceased, of Tonopah.

Production to date has not been very large, probably not more than \$10,000 to \$12,000.

Exact location of the Blue Bell prospect (no. 12, pl. 1) is unknown. It was an undeveloped occurrence of turquoise on the variscite claims of

Carl Riek and W. K. Botts, presumably about four miles north of Coaldale on the west side of the Monte Cristo Range.

The turquoise occurs in veinlets, seams, and small nodules ranging up to an inch in thickness. It is very hard and has a deep, sky-blue color rarely excelled. Specimens with matrix have delicate brown cobweb markings and have yielded beautiful gems.

The prospect was reportedly covered by a flash flood several years ago.

Because of the extremely rugged nature of the country, workings have been confined to a few pits and surface diggings.

The Carr-Lovejoy mine (no. 13, pl. 1) is in the Monte Cristo Range about 9 miles northeast of Blair Junction, but the exact location is not known. According to the 1910 edition of "Mineral Resources of the United States," the country rock is a dull-gray, slaty rock cropping out in rough rocky ledges. A few small porphyry dikes cut the slaty rock, and the turquoise is found in these dikes in small veinlets and seams, with botryoidal, lumpy surfaces. The exposed veinlets range up to one-fourth of an inch in thickness and show a tendency to occur as streaks of lenticular or nodular masses. Some of the turquoise is of a very fine blue color and is especially hard.

The Blue Silver mine (no. 14, pl. 1) is on the east flank of the low hills bordering the east side of Paymaster Canyon. It is in the NW1/4 sec. 7, T. 1 N., R. 41 E. about 1 mile north of the Lone Mountain mine.

Discontinuous nodules and veinlets of turquoise are contained within an altered diorite. The diorite is cut by limonitic quartz veinlets in fractures striking N. 50° E. and dipping 55° W. Minor amounts of secondary copper minerals and galena are associated with the turquoise.

The Lone Mountain or Blue Jay mine (no. 15, pl. 1) is about 1 mile east of Paymaster Canyon in the NW1/4 sec. 18, T. 1N., R. 41 E.

Turquoise occurs as nodules in a thinly bedded calcareous shale. The shale is complexly folded and faulted with the general strike being easterly. Numerous shears are concentrated within a zone about 40 feet wide that trends N. 20° - 45°E. and dips 40° - 50° NW. Most turquoise is within this

zone and is associated with minor silicification and argillization.

Both solid blue and spider-web turquoise have been produced from the Lone Mountain mine in colors ranging from pale to dark blue without green tints. Clear blue turquoise is found in the hard shales, and the spider-web variety is in the softer argillaceous zones; the two types are not found together. The best of the hard blue turquoise has a hardness of 7 on the Mohs scale. No turquoise from the mine has been known to fade or change its original color. During operations in 1956, a unique find was made at the Lone Mountain mine. Nuggets of clear blue, upon being split revealed dendrites of the sort commonly found in moss agate. These are entirely distinct from the inclusions normally found in turquoise and closely resemble those found in moss agate, if they are not actually identical. There has been no explanation for them, nor is there record of any similar occurrence.

The mine was worked through a 60° inclined shaft 200 feet deep. There were five levels in the mine, about 40 feet apart, and subsequently the mine was deepened another 50 feet. There are more than 1,500 feet of workings in the mine. Most work since 1929 has been confined to a 100-foot zone along the course of the vein. The mine was equipped with a gallows frame hoist, skip, compressor, jackhammers, and stopers. The ore was drilled and blasted down into chutes, trammed to the shaft, and hoisted to the surface where it was screened and hand sorted in the sorting house. There it was sacked for shipment to San Gabriel.

The Lone Mountain mine was discovered by Lee Hand in 1920; Hand, however, disclaimed credit for finding the vein, declaring he only “rediscovered” it. A man who owed Hand for a bill of goods offered to show him the vein outcropping if Hand would forgive the debt. Hand agreed, and they went to Lone Mountain where several days’ searching failed to find the vein. Several weeks later Hand went back alone and found the vein several miles from where they previously had searched.

From indications at the site someone had prospected the outcropping for copper. A small trench, less than a foot deep, had been dug along

the vein until the unknown prospector decided he had not found copper and abandoned the work. In the debris taken from the trench, Hand found a few pieces of high-grade turquoise which the original finder evidently had not recognized.

Hand located and filed claim to the discovery as the Blue Jay Mining Lode. Later, four other claims were filed: Blue Jay No. 1, Blue Jay No. 2, Blue Jay No. 3, and Blue Jay No. 4. In the early years of its operation the mine was known as the “Blue Jay Mine on Lone Mountain” and finally just as “Lone Mountain.”

Hand hired two miners, Jack Montgomery and Al Stevens, to open up the vein. In 1927 Hand leased the property to Bert Kopenhaver, who sank a shaft on the 60° inclined vein. At a depth of about 40 feet, Kopenhaver found the first spider-web turquoise for which the mine has become famous. In 1928 Hand sold a half interest in the mine to “Doc” Wilson. The shaft was deepened to about 85 feet, with more spider-web turquoise being found. In 1935 Hand sold his remaining half interest to Wilson, who thus became sole owner.

All of the turquoise from Lone Mountain, from the smallest pieces (the size of a match head) to the largest, was saved and used. Stones were cut at a plant in San Gabriel, Calif. The largest nugget ever taken from the mine was clear blue, 4 inches long, 3 inches wide and three-quarters of an inch thick.

The Smith Black Matrix mine (no. 16, pl. 1) is on the Owa claim on the east side of a small dark hill, about three-quarters of a mile east of Klondyke Peak and 1 mile south of Klondyke, in the SW1/4 sec. 29, T. 1 N., R. 43 E.

The turquoise forms veinlets, seams, and breccia fillings in limonite-stained, cherty limestone and slate. Seams of turquoise range up to three-quarters of an inch thick and turquoise-cemented breccia masses are more than an inch across. The thicker seams of turquoise generally contain breccia fragments. Seams are not uniform but show marked pinching and swelling as well as complex branching. The limonite of the host rock is in places integrated with the turquoise.

The mine workings are small, consisting of a short adit and several shallow pits.

The turquoise from this mine, little of which

is sufficiently large to be cut into pure turquoise gems, owes its beauty to the striking contrast between the blue turquoise and the black chert in the innumerable patterns exhibited. In some of the cut stones, turquoise predominates; in some, the black matrix. Brown stains are present in some gems and lend contrast, in others there are patches or seams of gray quartz which blends well with the other colors. The turquoise ranges from blue of fairly pure color to a very light blue and to greenish blue. The greenish turquoise is very difficult to distinguish from variscite and may occur in seams in the same specimen with blue turquoise. When tested in a flame, the greenish turquoise does not react readily for copper, and some of it appears to contain very little of that metal.

A quantity of black-matrix turquoise was shipped from the mine in 1910 by the California Gem Co. Shortly afterwards work at the mine was abandoned and has been renewed only sporadically since then.

The Livesly mine (no. 17, pl. 1) is about 15 line miles northwest of Goldfield on the east side of the ridge that forms the east side of Paymaster Canyon. It is in an unsurveyed strip in T. 1 S. between R. 40 and 41 E. about 2.7 miles N. 30° W. from the SW cor. sec. 31, T. 1 S., R. 41 E.

A small quantity of high-grade turquoise was produced from seams and nodules in metamorphosed shale that strikes N. 50° E. and dips 45° N. The turquoise is mainly within clay gouge along shears that strike N. 80° E. and dip 60° N.

Development consists of a tunnel and lower adit connected by an inclined winze.

Turquoise has been reported in the area of Lida, Nev. (no. 18, pl. 1), but no occurrence was found during the field checking of this manuscript.

EUREKA COUNTY

Two deposits of turquoise occur in the Lynn mining district (no. 19, pl. 1) in northern Eureka County. They are known as the Number 8 and August Berning mines.

The Number 8 mine is on the west side of the Tuscarora Range in the NW1/4 sec. 4, T. 35 N., R. 50 E., 18 to 19 miles north-northeast of Dunphy.

Host rocks for the Number 8 deposit consist of intensely altered quartz monzonite shale, and thinly bedded black chert, which are complexly folded, faulted, and much altered. Turquoise is concentrated along quartz veins in the intrusive rock and along faults in the sedimentary rocks. The turquoise is mainly in a nodular form, but only about 10 percent has been rated as good quality gem material .

The mine was presumably discovered about 1925 by a barber from Carlin whose name has been forgotten; he made no attempt to mine the property, confining his work instead to gathering and shipping pieces of float. The mine was rediscovered by Earl Buffington and Lawrence Springer in 1929. They filed formal claim to the property and proceeded to mine turquoise in serious fashion, producing about 1800 pounds of good stone the first year. In 1930 Ted Johnson bought Buffington's interest and during the next four years produced about 5,000 pounds of commercial stone. In 1935 Doc Wilson bought the mine from Johnson but did nothing with the property and the claim lapsed. Myron Clark relocated the claim and, after working it for a while, sold it to Lee Hand. Hand operated the mine for a short time, but dissatisfied with the quality of the stone, sold it to the five Edgar brothers who now own it. The Edgars extended operations and produced a considerable amount of fair-to-good turquoise.

In 1950, as most of the visible turquoise had been taken from the workings, the Edgars hired a contractor with bulldozer equipment to remove overburden from another part of the claim. A deposit of copper had been found on the property, and the Edgars thought they might mine copper if they did not find more turquoise. The bulldozer, after digging a pit about 8 feet deep and 80 feet long, uncovered a deposit of some of the finest spider-web turquoise ever found in Nevada. The deposit was mostly in nodules, some of gigantic size. One nodule, perhaps the largest, weighed more than 9 pounds (fig. 1). It was sold to C. F. Wallace, of Zuni, New Mexico, for \$1,600. The discovery proved to be a rather large pocket and produced more than 1,600 pounds of the very highest grade turquoise before being worked out.



FIGURE 1. Nodule of fine gem-quality spider-web turquoise from the Number 8 mine, Eureka County. The nine-pound specimen was sold in New Mexico for \$1,600. Photo is about one-half actual size.

Spurred by this find, the Edgars further explored the property, without finding any more spider-web turquoise of notable quantity. Other turquoise was discovered, however, of good commercial grade, sufficient to keep the mine in operation.

On June 23, 1954, T. G. Edgar, J. M. Edgar, and Marvin Symes uncovered one of the largest turquoise nodules ever found (fig. 2). This specimen weighed about 150 pounds. The nodule was of excellent texture and color, good hardness, and classified as gem quality.

Total production of the Number 8 mine is estimated at more than \$1,400,000. In addition, the property has produced copper and gold.

The August Berning mine is about 1,000 feet southwest of the Number 8 mine and 700 feet below it on the east side of a north-south ridge.

Turquoise occurs within black shale and along the contact between the shale and intrusive quartz

monzonite(?). The intrusive rock has a dike-like form, striking about N. 10° E. and dipping 65° W., nearly parallel to bedding in the shale. The turquoise forms seams along bedding planes in the shale and nuggets along brecciated shear zones. High-grade turquoise, slightly greenish blue in color, has been found both as clear pieces and as the black-matrix, spider-web variety.

The mine was first discovered by August Berning in 1927 and was subsequently leased to E. M. Daniels who worked it together with Lee Hand and G. Bustamente. Last known owner was Pete Edgar of Elko, Nev.

The mine reportedly yielded \$10,000 worth of turquoise during its first year, and Ted Johnson is supposed to have recovered a similar amount during a period in 1929 when he leased the mine.

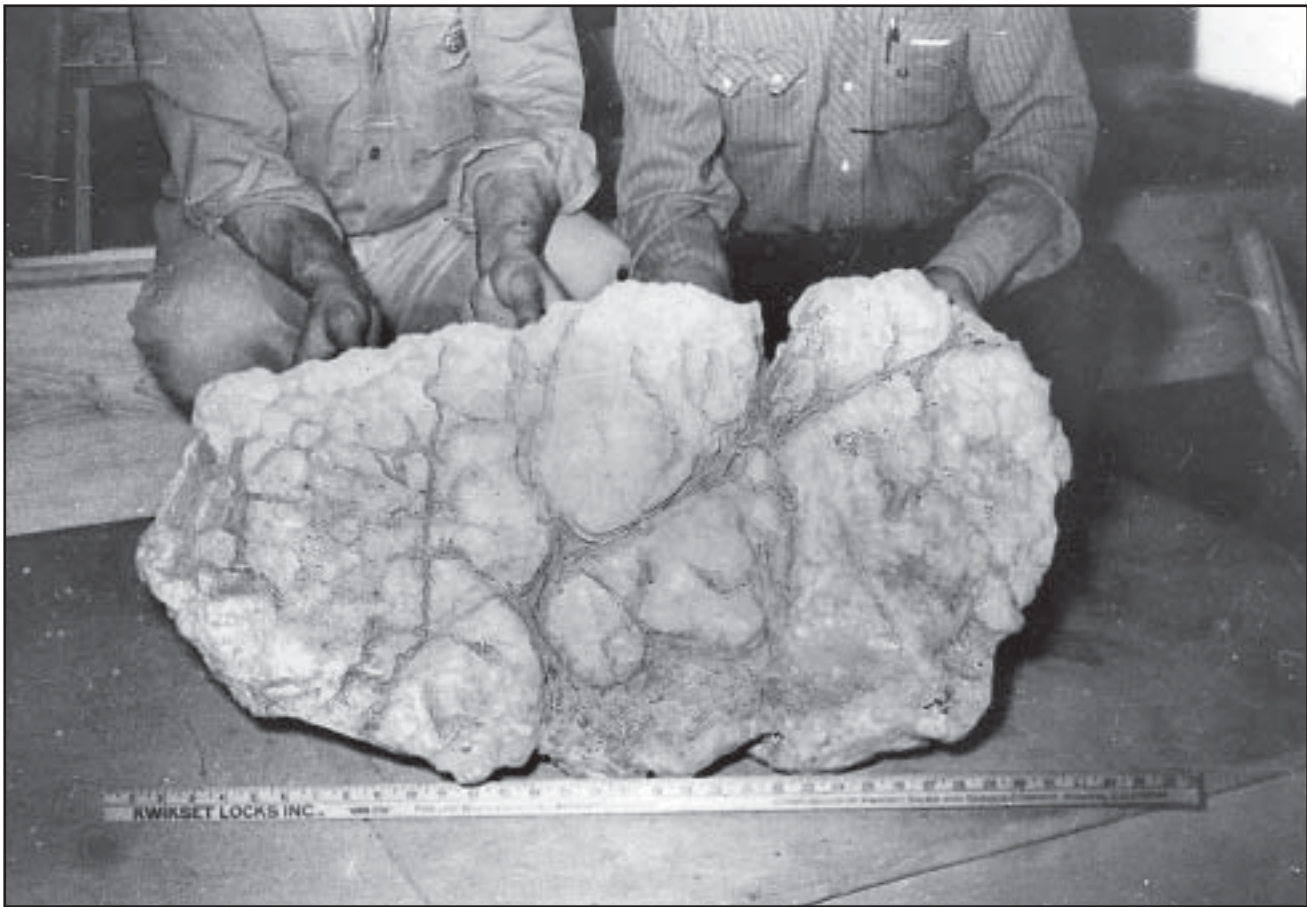


FIGURE 2. Believed to be one of the largest ever found, this turquoise nodule recovered from the Number 8 mine in 1954 measured about 31 inches long, 17 inches wide, and 7 inches thick. Cleaned and polished it weighed 150 pounds.

LANDER COUNTY

Lander County is Nevada's most important producer of turquoise, with mines scattered throughout the County. Some deposits are concentrated around Copper Basin (no. 20, pl. 1) on the east slope of Battle Mountain, but the most important production has come from the Bullion district (no. 21, pl. 1) in the vicinity of Tenabo and Gold Acres.

Copper Basin Area

The Turquoise King mine (no. 20-1, pl. 1) is half a mile west of Copper Basin near the west side, center, of sec. 32, T. 32 N., R. 44 E. The mine is marked by extensive bulldozer cuts on the east side of a small, rounded hill.

The deposit is in an altered quartz monzonite containing limonitic seams, quartz veinlets, and minor fractures oriented in several directions. Alteration products are mainly argillic and siliceous with local concentrations of sericite. Turquoise occurs in the veinlets and fractures.

The Myron Clark mine (no. 20-2, pl. 1) is in the north-central part of sec. 32, T. 32 N., R. 44 E., on the southwest side of a high hill about half a mile north of Copper Basin. The position of the mine is marked by numerous bulldozer cuts.

As with the other turquoise mines in the Copper Basin area, the host rock is altered quartz monzonite. Limonitic shear zones that strike N. 10° W. and dip 35° E. cut the quartz monzonite and contain turquoise as thin veinlets and small nodules. Pyrite-bearing quartz veinlets also occur within the shear zone. Alteration has resulted in the formation of silica and clay.

The deposit was first discovered by Myron Clark who staked four claims, the Turquoise, Blue Stone, Jane, and Homestead. The mine reportedly yielded a large quantity of high-grade turquoise, but there is no reliable estimate of the total value produced.

The Blue Gem Lease mine (no. 20-3, pl. 1) has been staked also as the Turquoise Tunnel and the Contention, and at one time it was on the Pedro Lode claim belonging to the Copper Canyon Mining Co. The mine is in the SE1/4 sec. 29, T. 32 N., R. 44 E., about 4,000 feet north-northeast of Copper Basin. It is surrounded by the copper workings of the Copper Canyon Mining Co.

The turquoise occurs in argillized quartz monzonite cut by two limonite-stained shear zones, one trending N. 35° W. and dipping 75° NE., the other trending N. 25° E. and dipping 55° NW. An extensive breccia zone about 10 feet wide is developed between the two bounding shears. Exceptionally good quality turquoise forms veinlets up to three-quarters of an inch thick along the shears. Pyrite-bearing quartz veins are closely associated with the turquoise.

The mine has been developed in extensive underground workings and open stopes. An adit several hundred feet long on the main structure connects to numerous shorter tunnels and several open stopes. Directly above the main adit is a glory hole some 100 feet long.

The deposit was first noted by Duke Goff in 1934. It was subsequently leased from the Copper Canyon Mining Co. by the American Gem Co. of San Gabriel, Calif., owned by Doc Wilson and his sons, Del and William. The company operated the property until 1941 when the outbreak of the war caused a shortage of experienced miners. Both Del and William Wilson were called into the Army for the duration of the war, and this compelled closing of the mine. The lease was allowed to lapse and work was abandoned. In 1950 the mine was leased by Lee Hand and Alvin Layton of Battle Mountain.

Production of turquoise at the Blue Gem lease in the early days of its operation was enormous. Although there is no exact information, it is reported that the output amounted to nearly \$1 million in rough turquoise. The mine is still active,

although it is currently in the center of a major copper deposit being developed by Duval Corp.

Bullion District

The Bullion district (no. 21, pl. 1), on the east side of the Shoshone Range, includes the mines in the vicinity of Gold Acres, as well as those in the vicinity of Tenabo, 4 to 8 miles farther north. The district constitutes the most extensive turquoise-mining area in the State.

The existence of turquoise in the vicinity had long been known to the Indians, and by an odd quirk only to them, since they had gathered practically all the float on the surface, thus leaving no signs to guide prospectors.

In 1910 Bill Mahoney, owner of the T-S Ranch at Dunphy, found turquoise float north of the Indian Creek Ranch, but casual prospecting failed to show any deposit.

In 1935 Ted Johnson, of Tonopah, prospected the area around Indian Creek for three or four days, finding some samples of clear blue turquoise but nothing more.

In 1937 an Indian brought some float from Indian Creek to Earl Buffington at the Bauman Ranch near Cortez and gave a vague description of the location. Buffington related the discovery to Harold Johnson, and Johnson, with William Van Alder, made a trek into the district to make the first genuine discovery. Johnson and Van Alder discovered the Badger claim in 1938 (see p. 17). After working the deposit enough to prove it was a genuine strike, they prepared to file for possession only to learn their strike had been made on land owned by the Southern Pacific Railroad. Johnson and Van Alder refused to file claim and moved on to make other discoveries.

The turquoise appears in all forms—nodules, veinlets, and seams. Most of the turquoise is solid ore, but there is a large proportion of spider-web. In fact, some of the most beautiful spider-web turquoise ever mined in Nevada come from this district.

The Turquoise 50 mine (no. 21-1, pl. 1) is near the center of sec. 12, T. 27 N., R. 46 E., on the south slope of Squaw Butte, about 2 miles south-southwest from Gold Acres.

Turquoise occurs as seams and veinlets in shale and a thin, highly altered unit that may represent an intrusive sill. The shale strikes about N. 20° W. and dips 30° NE.

Development consists of several small prospect holes with an open cut about 40 feet long. An adit about 15 feet long has been driven from the north side of the open cut. Last owner of record was John Saxon of Battle Mountain, Nev.

The Blue Fern mine (no. 21-2, pl. 1) is in sec. 35, T. 28 N., R. 46 E., about 1.5 miles west-southwest from Gold Acres. Turquoise appears to be associated with a highly altered dike that cuts silicified shale. A great number of other prospects are scattered throughout the general area.

The Steinich mine (no. 21-3, pl. 1) is near the south side, center, of sec. 19, T. 28 N., R. 47 E. 1 mile north-northeast of Gold Acres.

Gently folded, nearly horizontal beds of gray shale and chert contain nodules of turquoise concentrated in the darker shale layers. Some turquoise occurs in thin interbedded, tuffaceous lenses. The turquoise grades from blue to greenish blue and is mostly in the form of small nuggets known to the trade as "Zuni" nuggets.

Several open pits constitute the development work at the mine, which has reportedly produced about \$50,000 worth of turquoise.

August Steinich discovered the mine in 1929. Last owner of record was J. W. Edgar.

The Rufan mine (no. 21-4, pl. 1) is 4 miles north of Gold Acres, near the SE corner of sec. 1, T. 28 N., R. 46 E., and 3.5 miles west of Tenabo.

Exceptionally hard turquoise occurs as veinlets in brown and gray shale that strikes N. 50° W. and dips 30° N.

A small bulldozer cut, together with an adit and open stope, constitute the limited development.

The Tom Cat mine (no. 21-5, pl. 1) is 1,000 feet east of the Rufan mine in the extreme NW corner of sec. 7, T. 28 N., R. 47 E.

Host rock for the deposit is a granular, thinly bedded black quartzite that strikes N. 5° W. and dips 30° W. Turquoise occurs in a kaolinized layer that marks a bedding-plane fault. The greenish-blue color of the turquoise distinguishes it from the bluer material found elsewhere in the district, and the material produced is relatively hard.

Older stopes and adits; on the property have caved, and more recent work consists of several bulldozer cuts.

The deposit was discovered in 1942 by Charles C. Poe. Production has been estimated at about \$15,000.

The Little Gem or Cracker Jack mine (no. 21-6, pl. 1) is on the crest of a southerly trending ridge 1.5 miles west of Tenabo. The deposit is along the NE side of sec. 7, T. 28 N., R. 47 E.

Turquoise occurs in both gray shale and white tuff which strike about N. 40° W. and dip 20° E. with intense folding in local areas. The shale contains both greenish and blue turquoise. The tuff, on the other hand, contains blue turquoise which coats particles and acts locally as a cementing agent. Black fragments of the shale form inclusions in the tuff.

Development consists of numerous prospect pits, bulldozer cuts, and shallow underground workings along the crest of the ridge.

The Blue Nugget prospect (no. 21-7, pl. 1) is on the north side of Indian Creek Canyon, 2 miles north-northwest of Tenabo, in the NW1/4 sec. 33, T. 29 N., R. 47 E.

The prospect consists of two shallow pits in thinly bedded black chert and quartzite that strike easterly and dip 45° N. Turquoise is contained in a limonitic breccia zone about 2 feet wide.

The Little Chief mine (no. 21-8, pl. 1) is on top of a hill in the extreme NE corner of sec. 31, T. 29 N., R. 47 E., about 3 miles northwest of Tenabo. A prospect pit and several adits (now caved) have been dug to recover turquoise from argillized, brecciated shale and quartzite.

The Super-X mine or Arrowhead mine (no. 21-9, pl. 1) is about 2.5 miles north-northwest of Tenabo in the NE1/4 sec. 32, T. 29 N., R. 47 E.

Host rock for the deposit is strongly folded and faulted chert that strikes generally to the east. Turquoise occurs in a breccia and gouge zone, where it forms nodules in the gouge together with veinlets in the gouge and breccia.

The Super-X mine was discovered in 1941 by Ted and Harold Johnson, and Dick Edgar while on a prospecting trip. They found some good turquoise float about a quarter of a mile from Indian Creek and soon located the outcropping of

the vein. Work had hardly begun when Harold Johnson was called into the armed services. The war had taken apparently all other available miners, and supplies were almost impossible to obtain, so Ted Johnson sold his share of the property to Lee Hand, J. W. Edgar, Willis Edgar, and J. M. Edgar.

Hand and the Edgars sank a shaft about 40 feet and at that depth encountered spider-web turquoise in the hanging wall. Cut with golden-colored lines, instead of the usual black, the turquoise was probably the most beautiful ever found in America. Some pieces were cut into stones weighing more than 200 karats. Hand later sold his share in the mine to Pete Edgar, another brother.

The Super-X mine has produced more than \$200,000 worth of high-grade, spider-web turquoise. The Edgar brothers now own and operate the mine. In more recent years, mining has been carried out in relatively extensive open cuts.

The House Rock mine (no. 21-10, pl. 1) is in the south-central part of sec. 29, T. 29 N., R. 47 E. about 2,000 feet northwest of the Super-X mine. Mine workings, which consist of two open cuts, several prospect holes, and rather extensive underground workings, are on the east side of a high hill.

A fault along the east side of the property displaces quartzite on the east against shale on the west. The quartzite contains minor pyrite and turquoise, but most of the turquoise is in the somewhat sheared and altered shale.

The No Name Number 1 prospect (no. 21-11, pl. 1) is in the south-central part of sec. 28, T. 29 N., R. 47 E., on the southeast end of a flat-topped ridge, about 2.5 miles north of Tenabo.

A series of reddish and white volcanic rocks, interbedded with black chert and quartzite, caps the ridge. Maximum thickness of the volcanic layers is about 10 feet, and the entire sequence strikes about N. 70° W. and dips 45° N.

Development consists of a small prospect pit and a short adit. There appears to have been no important production of turquoise.

The Badger mine (no. 21-12, pl. 1) is 3 miles northwest of Tenabo, in the SE1/4 sec. 29, T. 29 N., R. 47 E.

The turquoise is in thinly bedded, silicified, and iron-stained shale that strikes about N. 70° E. and dips 20° N. The shale is overlain by quartzite. The two most productive deposits are about 500 feet apart, one on the north side and the other on the south side of a small hill. Along the crest of the hill, a fault exposes shale below the quartzite. Turquoise cements some of the quartzite breccia along this fault. Turquoise in the northern and southern areas forms veinlets cutting the shale.

Workings in the northern and southern areas consist of open stopes about 100 feet along the strike of the shale. Numerous prospect pits have been dug along the fault on the top of the hill.

The mine was first discovered in 1938 by Harold Johnson and William Van Alder, but because it was on land belonging to the Southern Pacific Railroad, it was not worked until several years later when Lee Hand and several of the Edgar brothers bought the land outright from Southern Pacific. In 1949 Hand sold his interest to the Edgars, who had other properties in the vicinity and who proceeded to press development of the Badger. Using a bulldozer to clean off the overburden they uncovered several seams and found very good, blue turquoise, some in slabs but mostly in nodules, evenly matched in color, which found ready market with the Zuni silversmiths.

The other Edgar brothers eventually sold their interests to Mr. and Mrs. W. L. Edgar.

Production of the Badger mine is estimated at not less than \$100,000.

The Color Back or Turquoise Boy mine (no. 21-13, pl. 1) is near the SE corner of sec. 20, T. 29 N., R. 47 E., about half a mile north of the Badger mine and 3.5 miles north-northwest of Tenabo.

Turquoise is associated with an argillized and opalized sill, about 4 feet thick, that strikes N. 15° E. and dips 40° W. intruding block chert. Chert adjacent to the sill is brecciated and contains most of the turquoise.

Development on the property consists of a short inclined shaft along the intrusive and an elongate, partly caved open stope.

The deposit was discovered by Mrs. Bessie Long and William G. Newbury in 1939. Shortly

after the discovery, Newbury conveyed his share of the claim to Mrs. Long. The claim lay close to other turquoise-producing properties and at first showed so little promise that most activity was concentrated on adjoining properties.

Charles Haig, a miner employed by Gale Peer at the New Blue mine, accidentally found an exposure of turquoise on the Color Back claim, which was adjacent to the Turquoise Boy claim and also was owned by Mrs. Long. Haig, who was courting Mrs. Long's daughter, revealed the find to the daughter and work was at once begun on the new find. The Color Back was incorporated into the Turquoise Boy, and Mrs. Long and her sons drove a shaft about 40 feet deep on the vein, taking out about 1,500 pounds of good turquoise.

Mrs. Long died shortly after the mine had been so developed, and the probate court ordered the mine sold as part of her estate. The property was bought by J. W. Edgar, who still owns it.

The New Blue or Blue Gem mine (no. 21-14, pl. 1) is about 500 feet north of the Color Back mine.

Turquoise here, as at the Color Back mine, is associated with the same intrusive sill, although the sill is more altered at the New Blue mine and most of the turquoise is within the sill. The turquoise found at the New Blue mine was almost exclusively in clear blue slabs, some of relatively large size.

The deposit was discovered in 1940 by Gale Peer, who staked four claims, the New Blue, Big Blue, Wee Nugget, and Missing Link. Peer, after proving the mine and producing about 2,000 pounds of turquoise, sold it to B. A. Buchanan. Production is estimated at nearly \$50,000.

The Blue Eagle or Blue Sky mine (no. 21-15, pl. 1) is on a small hill in the extreme SW cor. sec. 21, T. 29 N., R. 47 E., about 1,000 feet northeast from the Color Back and New Blue mines, The mine is about 4,000 feet north-northeast of the Badger mine.

On the property an argillized quartz monzonite dike intrudes dark, thinly bedded chert; the dike strikes N. 20° W. and dips 80° E, whereas the chert beds strike N. 35° W. and dip 35° E. The dike is up to 300 feet wide. Turquoise occurs as veinlets along bedding planes and fractures in the chert

adjacent to the dike, but no turquoise appears to have been taken from the dike.

An open cut, estimated to be about 150 feet long, 25 feet wide, and 50 feet deep, along the edge of the dike marks the site of the former mining operations. Several other glory holes are scattered over the property.

The mine was discovered in 1939 by Harold Johnson and William Van Alder who, after abandoning the Badger claim, decided there must be other turquoise deposits in the district and went back for a second look. A short distance from their original discovery they found a new deposit, which they located under the name of Campsite. Later, two other claims were located, which were named Blue Eagle One and Blue Eagle Two. The name of the three claims was then changed to Blue Eagle, by which the mine became known.

In the first year of operation three pits were opened along the vein, which produced about 500 pounds of turquoise, about evenly divided between spider-web and clear-blue slab varieties.

In 1940 a partnership in the claims was sold to J. M., J. W., and Willis Edgar. A bulldozer was brought in to clear off the overburden and production was boosted to \$600,000 that year. Later, the Edgars bought out the Johnson and Van Alder interests and in ten years increased the production of the Blue Eagle mine to more than 50,000 pounds. Five glory holes were opened on the property, each of which produced about \$100,000 in turquoise. Some 25 percent of this amount was the spider-web variety and the balance was clear-blue slab.

The Old Campground mine (no. 21-16, pl. 1) is in the south-central part of sec. 20, T. 29 N., R. 47 E., about half a mile west of the Color Back, New Blue, and Blue Eagle mines.

Turquoise is found in limonitic lenses within a flat-lying zone of brecciated chert and shale. Minor amounts of turquoise occur also within silicified shale beds.

A short inclined stope and several bulldozer cuts constitute the mine workings.

The Blue Matrix mine (no. 21-17, pl. 1) is on a high hill in the SE cor. sec. 19, T. 29 N., R. 47 E., about 1 mile due west of the Old Campground mine and 4 miles northwest of Tenabo. This is the highest turquoise mine in the Tenabo area.

Here, too, an argillized sill intrudes dark, cherty beds; the sill and beds strike northerly to N. 60° E. and dip 20° - 30°. Turquoise forms veinlets along bedding planes and filling fractures in the chert.

Development is limited to several open cuts and a caved adit.

The deposit was discovered in 1939 by "Buddy" Williams of Hollywood, a motion picture cameraman in search of "adventure," who had accompanied Harold Johnson and William Van Alder on a prospecting trip.

Williams, Johnson, and Van Alder produced about 100 pounds of very good turquoise and sold the mine to Ted Johnson, a brother of Harold Johnson. Ted Johnson located three other claims adjacent to the discovery, Campground One, Campground Two and Tungsten (later renamed Barium).

The turquoise found in these claims was very similar to that found in the nearby Blue Eagle mine, clear-blue slab and spider-web. An amazing feature of the property was that boulders lying on the surface, with no indication of turquoise, when broken to pieces, revealed high-grade turquoise in seams up to a quarter of an inch thick. A matched set of stones from this boulder turquoise, fashioned into a necklace, took first prize for five consecutive years at the Indian Ceremonial at Gallup, N. Mex.

In 1950 Ted Johnson leased the Campground One claim to Marvin Symes. Symes and his father opened a pit along the vein and produced about 5,000 pounds of "Indian blue" turquoise. Some of this turquoise was in slabs three-quarters of an inch thick and a foot square.

In 1951 Johnson sold the Blue Matrix mine to J. M., J. W., and Willis Edgar. The mine is estimated to have produced about \$100,000 of high-grade turquoise.

The Pinto or Watts mine (no. 22, pl. 1) is on a precipitous ridge near the SW cor. sec. 16, T. 26 N., R. 44 E., near the crest of the Shoshone Range some 37 line miles south of Battle Mountain. Access to the mine is extremely difficult.

Excellent-quality turquoise is found in thinly bedded brown and black shale that strikes N. 45° W. and dips 55° NE. Turquoise forms seams and

nodules along bedding planes and in close association with limonitic and carbonaceous zones, but the host rocks are little altered. There is a well-defined, vertical fault striking N. 65° E. along the southern margin of the main pit.

Development work consists of an open pit some 230 feet long and 120 feet wide.

The deposit was discovered by Jim Watts in 1901. Watts, soon after proving the mine, sold the property to Frank J. Burnham, C. A. Joseph, and George R. Dyer who obtained about 1,000 pounds of high-grade turquoise from a number of pits about 6 feet deep, at a number of places on the claim. The present pit was excavated by Dean Kirk who owned the property in 1965.

The Cortez or Fox mine (no. 23, pl. 1) is in the bottom of a canyon in the NE1/4, sec. 34, T. 27 N., R. 47 E. about 1.5 miles southwest from the mouth of Cortez Canyon. The mine is accessible over a well-graded road.

The mine is in a faulted, argillized block of chert in which the beds strike predominantly N. 60° E. and dip about 45° SE. Pseudomorphs of limonite after pyrite attest to the former presence of pyrite in the argillized zone. Greenish and blue turquoise occur in silicified, limonitic veinlets that follow the bedding. Smaller veinlets; form flat-lying units in the chert.

Development work in 1965 consisted of extensive open pits and numerous smaller prospect pits.

George Schmidlein visited the deposit about 1910 or 1912; the location of the mine was revealed to Schmidlein by a servant in his household. It had been known to the Indians for years and almost everyone in the vicinity had some of the turquoise in one form or another. In 1912 Schmidlein and his wife made a trip east, taking some of the turquoise to the C. D. Peacock Jewelry Co., in Chicago. Peacock agreed the turquoise was "very pretty," but knew of no market for it, so Schmidlein dropped the matter.

In 1914, Charles Schmidlein, son of George, and Johnnie Francis filed an official notice of location on the property under the name of "Fox Lode Mining Claim." Other mines had been developed in Nevada at that time, and a definite market for the ore had been established.

Schmidlein and Francis worked the claim until they had established its value and, in 1915, sold the property to William R. McGaw for \$3,000.

McGaw put a crew of miners to work extending the development. The mine has been developed as an open cut. Another cut was opened along the face of the vein and production expanded. Following the death of McGaw, Edward C. Smith, a relative, assumed management of the mine. When Smith died, his son Charles E. Smith became manager.

The mine has probably produced more turquoise than all the other mines in the State put together; a conservative estimate of the total production has been put "not less than 500,000 pounds." For years the mine produced more than 2,000 pounds of turquoise a month. The bulk of the turquoise is only of fair quality, being deficient in color, but it is quite hard and excellently suited to artificial coloring. For this purpose, most of the mine production for years was sold to factories in Idar-Oberstein, Germany. Much excellent ore was, however, processed in the United States.

The turquoise was found in nodules of all sizes; hundreds were as large as a man's fist, many even larger.

The largest true-blue nugget without matrix inclusions found at the mine weighed slightly more than 1 pound (a Troy weight pound is about 1,866 carats) and was presented to the Smithsonian Institution in Washington, D. C. Another huge nugget, almost as large, was presented to Tiffany & Co., New York City. Mrs. Clara L. McGaw had a nugget which weighed about 1 pound but this had a slight amount of matrix in it.

The Lone Pine or John Boitano mine (no. 24, pl. 1) is near the center of sec. 35, T. 27 N., R. 47 E., on the east side of Copper Canyon about 3 miles northwest of Cortez and 1 mile east-southeast of the Fox mine.

Veinlets of turquoise cut altered quartzite and a four-foot-thick breccia layer. The quartzite strikes N. 60° W. and dips 75° NE; faults with small displacement strike N. 30° W. and dip 50° SW cutting the turquoise deposit.

Development on the property consists of an open pit about 20 feet across, two smaller prospect pits, and a caved adit.

Production from the mine has not been large,

but the turquoise has been of very good quality.

The White Horse mine (no. 25, pl. 1) is about half a mile north of the Cortez (or Fox) mine. Veinlets of turquoise are associated with a highly altered dike where it intrudes chert.

The X-15 prospect (no. 26, pl. 1) is in the NW1/4 sec. 11, T. 25 N., R. 45 E., toward the south end of the Red Mountains. Turquoise occurs as veinlets along fractures and bedding planes in brown to black shale. Surface work consists of two bulldozer cuts; the deposit can be considered as hardly more than a prospect. In 1965 the property was owned by J. W. Edgar and J. D. Edgar.

The Jimmy Allen or Blue Goose mine (no. 27, pl. 1) is on the southern tip of Hot Springs Point in sec. 9, T. 24 N., R. 47 E. about 6 miles south of Bald Mountain in the Toiyabe Range.

Thinly bedded, black and brown chert and shale constitute the host rock for turquoise deposits; the beds trend generally about N. 10° E. Turquoise is closely associated with quartz veins in the chert and shale, but the host rocks are not strongly altered.

Development work includes several cuts and pits, the original inclined shaft and open stope having been filled during a flash flood.

In 1933 a shepherd who had found some turquoise float gave the specimens to Jimmy Allen, the present owner, with a description of where he found them. Allen went to the district and after an extensive search located the exposure.

The mine has not been a large producer, but its output has been of the very highest quality, the rough ore selling at a price of \$75 to \$80 per pound.

The Antler prospect (no. 28, pl. 1) is in the Toiyabe Range, 6.5 miles south of Hall Creek Ranch in sec. 9, T. 22 N., R. 45 E.

The country rock is massive black quartzite and thin-bedded shale. Numerous quartz veins, dipping westerly, cut the sedimentary rocks. Hard, deep-blue turquoise occurs in the shale and quartzite, and some greenish turquoise is associated with a single metamorphosed tuff (?) bed. The enclosing rocks, unlike many turquoise deposits, are little altered.

A single shallow pit marks the prospect.

The Ralph King prospect (no. 29, pl. 1) is on the east side of the Shoshone Range in sec. 4, T. 20 N., R. 42 E., about 14 miles northwest of Austin.

In the vicinity of the mine tightly folded shale beds strike about N. 15° E., forming the host for veinlets and nodules that occur along bedding planes in the thinly bedded rock.

A small prospect pit and some bulldozer cuts constitute the only development work on the property.

The McGinness or Gem mine (no. 30, pl. 1) is 10 line miles northeast of Austin near the center of sec. 17, T. 20 N., R. 45 E.

Turquoise occurs in three parallel, brecciated zones, each about two feet wide, that trend N. 70° W. cutting cherts and siliceous shales. Development consists of an adit and open stope together with several small prospect pits.

Frank Schmidlein discovered the deposit in 1930 and subsequently sold it to George McGinness; of Oakland, Calif. who worked the property for a number of years. At one time the mine was leased to Allen Russel.

The bulk of the turquoise produced at the McGinness mine has been of only fair quality. Some of it has been rated good, and a quantity has been rated as high-grade ore. Total production of the mine is estimated at about \$40,000.

The Green Tree or Cold Day mine (no. 31, pl. 1) is on the north side of Vigus Canyon, half a mile north of the McGinness mine, in the NE1/4 sec. 17, T. 20 N., R. 45 E.

The mine comprises an open pit about 10 feet deep and 20 feet in diameter with two other small prospect holes along a fault that strikes N. 40° E. and dips 75° SE. The fault, in quartzite, is marked by a brecciated quartz zone about 10 inches wide in which much turquoise is found.

The Green Tree mine was discovered in 1937 by Joe Norman and Rudolph Rundberg who subsequently sold it to Walter Godber. The property was later staked by W. L. Luttrell, Paul Medley, and J. W. Killinger who named it the Cold Day.

The mine has yielded large, heavy nuggets of good quality, but production has not been high.

The Dry Creek or Godber mine (no. 32, pl. 1) is on a hill in the SW1/4 sec. 13, T. 19 N., R. 46 E., about 5 miles north of U.S. Highway 50 at Hickison Summit. The mine has also been staked under the names Last Chance, Blue Stone, and Homesite.

Host rock for the deposit is a light brownish-gray to grayish-black shale, with maroon interbeds, that strikes N. 5° E. and dips 40° W. A dike cuts the shale southwest of the turquoise deposit, and farther southwest, light grayish-brown, brecciated quartzite crops out. Turquoise is mainly confined to argillized zones in the shale but some coatings have been found in the dike. The seams and nuggets of turquoise range from medium to dark blue, mostly of high-quality, spider-web variety.

Three large glory holes and two adits have been dug on the north side of the hill at an elevation of about 6,900 feet.

The mine was discovered in 1932 by Bob Burton and Joe Potts who first filed claim to it under the name "Last Chance," adding later the "Blue Stone" and "Homesite" claims. Burton and Potts later sold their claims to Frank Burnham who worked it extensively and is reported to have taken out more than \$100,000 worth of turquoise. In 1934 Burnham sold the mine to Walter Godber of Los Angeles who further developed and operated the mine under the corporate title of Western Gem & Jewel Co. Since then the mine is reported to have produced more than \$300,000 worth of very high-grade turquoise.

LYON COUNTY

The Taubert Number 1 mining area (no. 33, pl. 1) is about 7 miles west-northwest of Yerington, and 1 mile west-southwest of Mason Pass, near the center of the boundary between secs. 9 and 10, T. 13 N., R. 24 E., in Lyon County. In September of 1965 the main mining area was claimed by F. B. Cross and J. J. Harrison as the Harcross group of claims. Other claims noted in the area include the Peanut group, the Pam group, and the Second Chance claim.

Host rock for the deposits is a porphyritic quartz monzonite that is weakly altered to sericitic, argillaceous, and siliceous products throughout the area. Limonite is ubiquitous as disseminated specks and fracture coatings. Turquoise occurs in more highly fractured zones that tend to show strong to moderate argillic alteration. These altered zones are mostly no more than a few tens of feet across and appear to be somewhat elongated in an easterly, northeasterly, or northerly direction. Trenches, pits, and shallow shafts are scattered over an area of less than one-quarter square mile; minor secondary copper minerals stain the rocks peripheral to the central area.

Turquoise forms veinlets and rare nodules along the joints; veinlets are up to one-half inch thick. Some specimens of rock contain several branching or intersecting veinlets of turquoise. The turquoise ranges from dark blue to bluish green to green. Much of it is very hard; the pure-blue variety is slightly translucent and yields fine gems. Part of the turquoise, especially that with greenish cast, has patches and dendritic markings of limonite through it, giving a very pretty matrix stone.

The Taubert Number 2 prospect (no. 34, pl. 1) is in a group of low hills about 1.5 miles north-northwest from Yerington. The prospect consists of shallow pits in altered quartz monzonite where turquoise forms seams and nodules. According to reports, there was a fair amount of soft, pole-blue turquoise and some darker, pure-blue material. Some nuggets of good turquoise were found.

Both the Number 1 and the Number 2 mines were reportedly discovered by Otto Taubert in 1908. The Number 2 deposit was found while he was prospecting for gold. After developing his discoveries into proven properties, Taubert sold the two groups of claims to Walter Godber of Los Angeles, then a newcomer to Nevada. These were the first claims owned by Godber in Nevada. Later, as an extensive operator with a number of turquoise properties throughout the State, he developed the mines into paying concerns.

The two mines are reported to have produced more than \$50,000 worth of turquoise before active work was stopped, when other mines required all of Godber's attention and resources.

MINERAL COUNTY

Turquoise has reportedly been produced from the Rand district (no. 35, pl. 1), but the precise location of the mine is not known.

The Turquoise Bonanza mine (no. 36, pl. 1) is on the east side of the Pilot Mountains, about 5 miles N. 65° E. from Pilot Peak, 2.5 miles north of the Moqui-Aztec mine, and not far south from the Gunmetal tungsten mine.

The turquoise occurs as cementing material and veinlets in an altered, brecciated zone within quartzite. The turquoise produced was mainly of an excellent blue color, but some showed a slight greenish tinge.

Development work is limited to a single short adit and several small open pits.

Carl House discovered the deposit in 1943; low-grade turquoise had been found below the mine as early as 1908, but the small quantity and inferior quality did not stimulate any activity. House sold his discovery to Ted Johnson and Morgan Smith, a jeweler from Reno, who opened the mine under the name of "Turquoise Bonanza." After operations were started, Johnson discovered that the turquoise became better as it was followed up the mountainside. An open pit at the apex of the deposit then disclosed turquoise of excellent quality. Smith later sold his interest to Johnson who is the last known owner of the mine.

Production has been estimated at about \$40,000.

The Halley's Comet or Clara mine (no. 37, pl. 1) is on the Dunwoody-Pritchard group of claims, 8 miles southwest of Sodaville on the east end of the Excelsior Mountains.

Small amounts of turquoise have been recovered from veinlets in altered, metamorphosed rhyolite. Much of the material is probably variscite.

The Moqui-Aztec or S. Simmons mine (no. 38, pl. 1) is at the southern end of the Pilot Mountains, about 1.5 miles west of the Montezuma or Troy Spring mine.

Turquoise is associated with irregular bodies of quartz monzonite up to 1,000 feet long and 200 feet wide, generally elongated to the northwest and intruding quartzite that dips 35° to 50° SE.

The quartz monzonite is altered to argillic products in the vicinity of the turquoise deposits. The turquoise forms veinlets and nodules marked with limonite stains. A large amount of pale-blue turquoise has been mined, although some of it is deficient in hardness. Some excellent light-blue stones with delicate brown markings have been cut, but dark, pure-color material is scarce.

The mine workings consist of three adits about 30 feet long and one open pit 20 feet long, 15 feet wide, and 8 feet deep.

The mine was reportedly discovered about 1905 by Sam Simmons. There is no available estimate of production.

The Montezuma or Troy Springs mine (no. 39, pl. 1) is at the southern end of the Pilot Mountains about 14 miles east-southeast from Mina and 4 miles southwest from the site of the old Dunham mill.

Small intrusive bodies of argillized quartz monzonite are the host rocks for turquoise. The turquoise occurs in seams, veinlets, and nodules up to an inch or more in thickness. It is variable in color, ranging from a hard, very dark blue, to dark blue with a greenish cast, to a pale-blue, softer material. There is much dark-brown to yellow limonite stain associated with and filling the fractures in the turquoise. The best colored and hardest stones generally were found in the hard, iron-stained portions of the intrusive, and the softer, pale-blue stones were in the light-colored, soft parts of the intrusive. The best cut gems from this mine resemble some of those from the Royal Blue mine in Nye County in marking and color. Strong contrasts in brown and blue with mottled patterns were obtained and yielded beautiful gems. The bulk of the ore, however, was low grade, producing gems which retailed at about 50 cents a karat.

Development at the mine consists of three adits, each about 20 feet long, and numerous small open pits.

The deposit was discovered in 1905 by William Miller of Tonopah. Miller subsequently sold the property to the German-American Turquoise Co. of Los Angeles which did most of the development work.

The Blue Jay Gem mine (no. 40, pl. 1) is 5 miles north of Basalt in the NW1/4 sec. 35, T. 3 N., R. 33 E., not far east of State Highway 10.

Turquoise is found in fractures and along bedding planes in shale and limestone. The mine workings are composed of two prospect pits and an inclined shaft 15 to 20 feet deep.

The Blue Gem Number 1 or Basalt mine (no. 41, pl. 1) is on the west side of State Highway 10, about 1.5 miles southwest from the Blue Jay Gem mine, in the NW1/4 sec. 3, T. 2 N., R. 33 E.

Turquoise forms nodules and veinlets along bedding planes and fractures in a sequence of shale and limestone that strikes N. 55° W. and dips 57° NE.

The mine was discovered by Lee Hand in 1931, but has undergone little development.

NYE COUNTY

The Indian Blue mine (no. 42, pl. 1) is on the east slope of the Toquima Range about 1.7 miles south of the northern boundary of Nye County. The mine lies on the west side of a hill near the head of Trail Canyon in the SE1/4 sec. 16, T. 15 N., R. 46 E.

Turquoise occurs as nuggets, without associated veinlets, along bedding planes in gray to brown fossiliferous shale that strikes N. 70° W. and dips 30° NE. Two faults of apparently minor displacement transect the turquoise-bearing area; one fault strikes N. 75° E. and dips 60° NW.; the other fault, marked by a gouge zone 6 to 12 inches wide, strikes N. and dips 40° W. The mine site is marked by an open pit.

George Schmidlein visited the deposit in 1925. An Indian servant working in Schmidlein's household told him she could show him an old Indian mine high up in the mountains and led him to the site. Schmidlein found a quantity of turquoise chips on the ground, and scattered about were a number of crude stone tools. A shaft had been sunk in the rock to a depth of 12 to 15 feet; its diameter was so small that Schmidlein could not enter. How the shaft was sunk remains a mystery, unless the worker, a very small man or a boy, was lowered into it head first and worked in that position. Schmidlein staked the property and subsequently sold it to Lee Hand.

The mine has reportedly produced somewhat under \$10,000 worth of high-quality turquoise, exceptionally brilliant blue and very hard.

The Tom Molly mine, previously the Train prospect, (no. 43, pl. 1) is about 1.5 miles west-northwest of Manhattan, on the north side of Black Mammoth Hill, along the east side of sec. 13, T. 8 N., R. 43 E. in December of 1965, the mine was owned and operated by Mr. T. E. Colligan of Manhattan. Turquoise, together with other phosphate minerals and some secondary copper minerals, occurs along shear zones in Ordovician shale and slate. At the mine, the shale strikes nearly due east and dips 65°N.; shear zones containing the turquoise are steep and strike northeasterly.

The No Name Number 2 mine (no. 44, pl. 1) is 2 miles south of Belmont in the NW1/4 sec. 2. T. 8 N., R. 45 E.

Greenish-blue turquoise has been recovered from short inclined shafts in somewhat silicified, black, silty limestone that strikes N. 40° W. and dips 55° N. The turquoise forms veinlets along bedding planes.

The Copper Blue mine (no. 45, pl. 1) is about 5 miles south-southwest from Belmont and half a mile west of the ruins of Monarch Ranch in unsurveyed T. 8 N., R. 45 E.

Host rock for the deposit is a strongly silicified shale that strikes N. 45° W. and dips 60° NE. The shale is cut by brecciated shear zones that strike N. 20° W. and dip 75° E. These shear zones are cemented by iron oxide minerals, but locally they are argillized and devoid of the iron oxides. Soft turquoise occurs within the argillized zones.

Mine workings consist of a small open pit and a trench on top of a small hill.

The Zabrisky mine (no. 46, pl. 1) is about half a mile east of the No Name Number 2 mine.

Turquoise was discovered here, in the abandoned copper workings, by Mrs. Eva S. Weber of Belmont in 1909. The best grade of the turquoise found consisted of a dark blue material with a small amount of white mineral in a dark-gray and chocolate-colored matrix. The white mineral occurs as a fringe around the turquoise in many specimens and beautifully sets off the blue gem in its chocolate-colored matrix. Along with this variety of turquoise was found a larger

quantity of ordinary blue and greenish turquoise with brown matrix.

Total production from the mine has been estimated at about \$15,000.

The Easter Blue, Blue Mountain, or Blue Gem mine (no. 47, pl. 1) is in sec. 27, T. 7 N., R. 39 E., about 8 miles northwest from the Royston district.

Turquoise occurs as thin veinlets along altered shear zones in a fine-grained, white quartzite. About half a mile north of the mine, there is a tungsten prospect at the contact between limestone and quartz monzonite.

Development work on the property consists of a glory hole above a haulage adit, and numerous small cuts.

The deposit was discovered in 1907 by Lew Cirac who sold it to Lee Hand in 1915. Hand in turn leased the property to W. R. Gilbert during World War 1, and Gilbert produced about 100 pounds of fine turquoise from the surface. Later, Hand sold the mine to A. L. Stephenson of Durango, Colo., who then sold it to Paul Kley of Denver. Kley set to work to develop the mine and produced at the rate of 300 pounds of turquoise a month for nearly four years. The mine was worked steadily until 1930 when the deposit showed signs of dwindling. Ted Johnson leased the mine in 1932 and took out about 700 pounds of good turquoise. Kley sold the mine to Doc Wilson, who operated the property for a while but allowed his assessment to lapse. Hand relocated the mine and later sold it to Peter King, of Manassa, Colo., who last owned and operated the mine as the "Easter Blue" mine.

Royston District

The Royston district (no. 48, pl. 1) lies on the Nye-Esmeralda County line about 24 miles northwest of Tonopah. Mines are scattered for nearly a mile east and west along a shallow canyon. In the canyon, altered quartz monzonite complexly intrudes fine-grained quartzite.

The district is one of the better known turquoise-producing areas in Nevada, and it involves many small producers. Three of the more important mines are the Royal Blue, the Bunker Hill, and the Oscar Wehrend.

The Royal Blue mine constitutes the main turquoise workings in the Royston district. The turquoise occurs in a fine-grained, altered porphyry which is soft in places, but much of it has been hardened by silicification. A few hundred yards west of the turquoise workings is an outcrop of breccia stained green with malachite. The turquoise is found principally in veinlets and seams, with minor lenses and nodules. The veinlets and lenses range from a small fraction of an inch to more than an inch in thickness. Masses of turquoise, filling brecciated matrix, have been found more than 5 inches thick. Lense-shaped pieces of turquoise weighing an ounce or two were not uncommon and one piece weighing nearly a pound and a half was found.

The turquoise ranges in color from dark sky blue to a pale light blue. Some of the dark blue has a slightly greenish cast and some has a nearly pure-blue color. The dark-blue turquoise and that with a greenish cast are very fine grained and hard. The lighter colored ore is generally softer. The best turquoise is generally found in limonite-stained rock and the pale-blue and softer turquoise is found in light-colored, softer porphyry. The quality of the best pure-blue turquoise from the Royal Blue mine is equal to that found in any American mine, and the matrix is especially fine. The hard turquoise veins and nuggets are coated with a crust or stain of dark to light and even yellow limonite. This stain penetrates the turquoise along seams and branching cracks, producing attractive patterns and contrasts of color. One large specimen measured about 8 by 3 by 2 inches and consisted of a patchwork of dark-blue turquoise with slight greenish tint, marked in places with a very dark red-brown matrix. The cut gems were of different shades and the contrasts exhibited by the matrix stones were very beautiful. The better grade matrix stones retailed at \$1 a karat, the solid-blue stones much higher.

The mine was discovered in 1902 by two prospectors named Workman and Davis who later sold the mine to William Petry for \$3,000. Petry developed the mine to where its production was assured, and in 1907 sold to The Himalaya Mining Co., owned by Julius Tannenbaum of Los Angeles and New York. Tannenbaum owned a number of

other mines in Nevada and California. During 1908 and 1909 the property was systematically and actively worked under the direction of Julius Goldsmith, a son-in-law of Tannenbaum. Tannenbaum died suddenly about 1910 and Goldsmith hurried east to settle the estate. Shortly afterwards he ordered operations abandoned and about 1911 sold the mine back to Petry. Petry and W. I. Miller, who had been Petry's mine boss, operated the mine for a time, then leased it to Lee Hand and Bert Kopenhaver. Hand and Kopenhaver worked the mine dumps for a time, then bought the mine outright from Petry. Kopenhaver later sold his share to Charley Bona. Hand and Bona worked the mine periodically and in 1936 Bona sold his half interest to Ted Johnson. In 1940 Johnson sold his share to Lee Hand. The mine is still a part of the Hand estate.

The mine was worked by 5 tunnels, 3 shafts, 3 open pits, and some smaller pits. The tunnels were about 200, 115, 60, 50, and 30 feet long respectively and the shafts were 40, 25, and 20 feet deep respectively. The open cuts were up to 60 feet long, 25 feet wide, and 40 feet deep. Most of the shafts eventually were destroyed by open-pit operations.

The Royal Blue mine has been one of the major turquoise producers in the State. For a time, the mine produced as much as 1,250 pounds of turquoise a month and several times it exceeded this amount. Petry, at the time he sold to Hand and Kopenhaver, declared the Royal Blue had produced more gem turquoise than any mine in the United States. He placed the value of cut stones taken from the mine at more than \$5 million. There is no adequate estimate of the value of the gems produced from the mine in the years since that time, but one man, working alone, is reported to have produced \$3,000 worth of ore in three weeks.

The Bunker Hill mine is about half a mile north of the Royal Blue. Turquoise occurs in altered quartzite and ranges from royal blue to greenish blue with brown and white matrix. Turquoise is mainly in the form of slabs from one-sixteenth to 1 inch thick.

The mine was discovered in 1927 by Roy Palfreyman and Bert Kopenhaver and was originally opened as a small shaft about 20 feet

deep. As the turquoise was uncovered the shaft was widened along the seam into a long stope, which was eventually opened into a glory hole. Palfreyman and Kopenhaver took out about \$30,000 worth of turquoise, then sold to the owners of the Royal Blue mine who produced about \$75,000 worth.

The mine eventually was incorporated into the Royal Blue group of claims, now part of the Lee Hand estate.

The Oscar Wehrend mine, in the Royston district, is about one-third of a mile from the main workings of the Royal Blue.

The turquoise is in highly altered rocks where it forms seams, coatings, and nodules as much as 2 inches thick. It is mostly soft, pale, and not of very good quality, but its color and hardness can be improved by artificial means.

Oscar Wehrend discovered the deposit in 1909, but much of the work was conducted by Lee Hand.

The mine workings consist of two open cuts 20 to 30 feet long and 15 feet deep, as well as a shallow shaft and a short adit. Production from the property has been small.

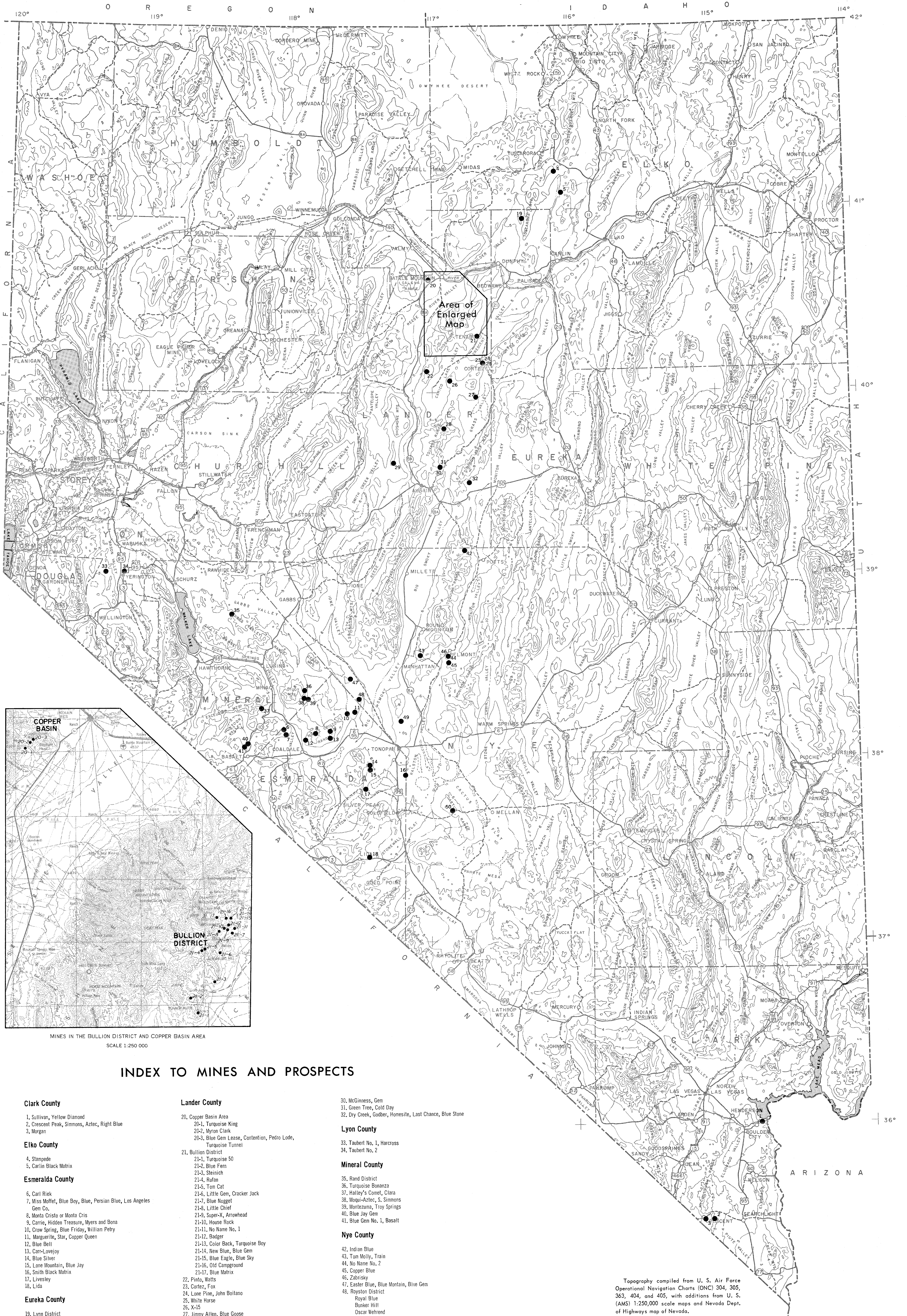
The Little Cedars mine (no. 49, pl. 1) is reported to be 6 miles north of Tonopah. No information is available, and because the mine was not visited, the location shown on plate 1 is approximate.

Numerous turquoise diggings are scattered on the southwest slope of the Cactus Range (no. 50, pl. 1), in sec. 6, T. 3 S., R. 46 E., about 5.5 miles south of Cactus Peak. Turquoise occurs as nodules and veinlets in altered quartz monzonite porphyry, but the area has received little or no attention during recent years because it is within the boundary of the Las Vegas Bombing and Gunnery Range, and is thus withdrawn from prospecting and mining activity. Previous production has reportedly amounted to about \$25,000 worth of turquoise.

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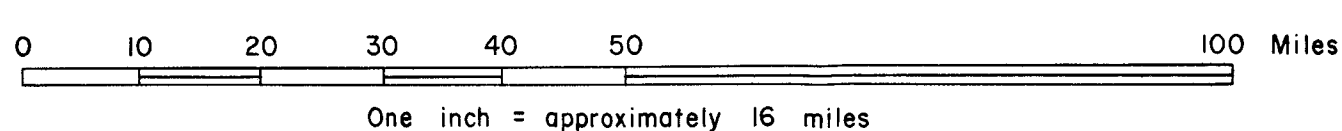
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TURQUOISE DEPOSITS IN NEVADA

Compiled By F. R. Morrissey

1968

Scale 1:1,000,000



Topography compiled from U. S. Air Force Operational Navigation Charts (ONC) 304, 305, 363, 404, and 405, with additions from U. S. (AMS) 1:250,000 scale maps and Nevada Dept. of Highways map of Nevada.

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