There are no mills in the district, and the long freight haul greatly hindered development. In September, 1913, very little was being done. The mine workings at the Copper Basin, pro the most extensive at any one place, could not be entered.

TOPOGRAPHY.

The low hills in which the Bald Mountain district is situated the southern end of the Ruby Range. A low, even-crested d

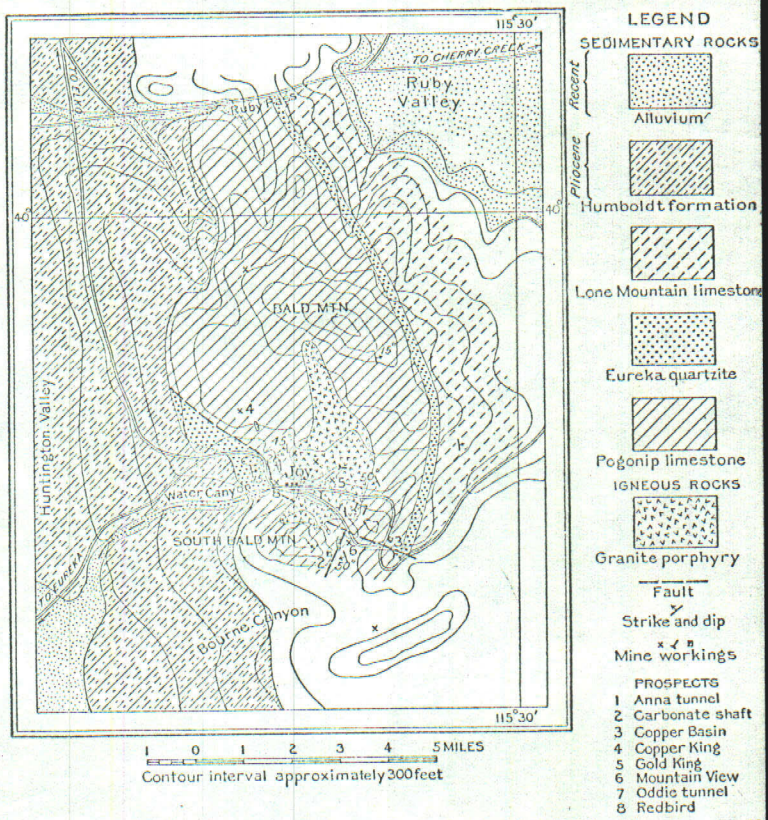

FIGURE 14.—Sketch map of the Bald Mountain district, White Pine County, N

continues southward for several miles to the White Pine R From Huntington Valley on the west side the mountains rise gradual even slope to Bald Mountain. The northeast flank of peak appears to be more abrupt, but eastward a moderately plateau country extends for some distance, joining the south e the Ruby Hills southeast and east of Ruby Lake. (See Pl. I.)

Barometric readings give the elevation of Joy as 7,400, S Bald Mountain as 9,000, Bald Mountains as about 9,400 feet Copper Basin Pass as approximately 7,800 feet above sea level.

county by way of Tippett, Schellbourne, and Cherry Creek. (See Pl. I.) The roads in this county are almost all good, and the numerous stage lines that radiate from Cherry Creek and Ely make all parts of the county easily accessible. Most of the mountains are of sufficient height to be well watered, and as a consequence the great majority of the valleys are under cultivation in many places.

Nine of the 12 mining districts in this county were visited in 1913, and are described in the following report by ranges. (See Pl. I and fig. 1, p. 18.) The most western district visited was the Bald Mountain, at the south end of the Ruby Mountains, in the northwest corner of the county. In the Egan Range the districts from north to south are Cherry Creek (Egan Canyon), Hunter, Granite (Steptoe), and Ward. In the Schell Creek Range, east of Steptoe Valley, the districts are Aurum (including Schellbourne, Siegel, Old Aurum, and Muncy Creek), Duck Creek, and Taylor. The most eastern district visited was the Kern, at the south end of Kern Mountains in the northeastern part of the county.

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BALD MOUNTAIN DISTRICT.

LOCATION AND ACCESSIBILITY.

Bald Mountain district (No. 22, fig. 1, p. 18) is in a pass between North and South Bald mountains, the former peak being 7 miles south of Ruby Pass (formerly called Hastings Pass) and 12 miles south-southwest of old Fort Ruby, a station on the Overland Stage route at the south end of Ruby Lake. (See Pl. I.) The center of the district is about 6 miles south of latitude 40° and 4 miles west of longitude 115° 30′. (See fig. 14.) It is at the south end of the Humboldt, or, as it is now called, the Ruby Range.

Joy post office, in Water Canyon, is served biweekly from Eureka, 56 miles southwest of the camp. Freight is usually brought into this country from Elko or Halleck on the Southern Pacific, about 80 miles north of Joy, though some supplies are obtained from Currie, Cherry Creek, and Ely on the Nevada Northern Railway, 40 to 50 miles to the east.

ECONOMIC CONDITIONS.

Springs are not numerous in the district, though water rises in Water Canyon above Joy, below the Copper Basin mine on the east side of the divide and in a number of small seeps at various places in the gulches north of Joy. Most of the shallow shafts, particularly in the area of intrusive rock near Joy, are under water, and it would seem that a fair water supply could be obtained by pumping from any of them. Wood is fairly abundant and some of the piñon trees in the vicinity are of sufficient size for mining timbers. It is said that good timber can be obtained a few miles southwest of the mines.

There are no mills in the district, and the long freight haul has greatly hindered development. In September, 1913, very little work was being done. The mine workings at the Copper Basin, probably the most extensive at any one place, could not be entered.

TOPOGRAPHY.

The low hills in which the Bald Mountain district is situated form the southern end of the Ruby Range. A low, even-crested divide

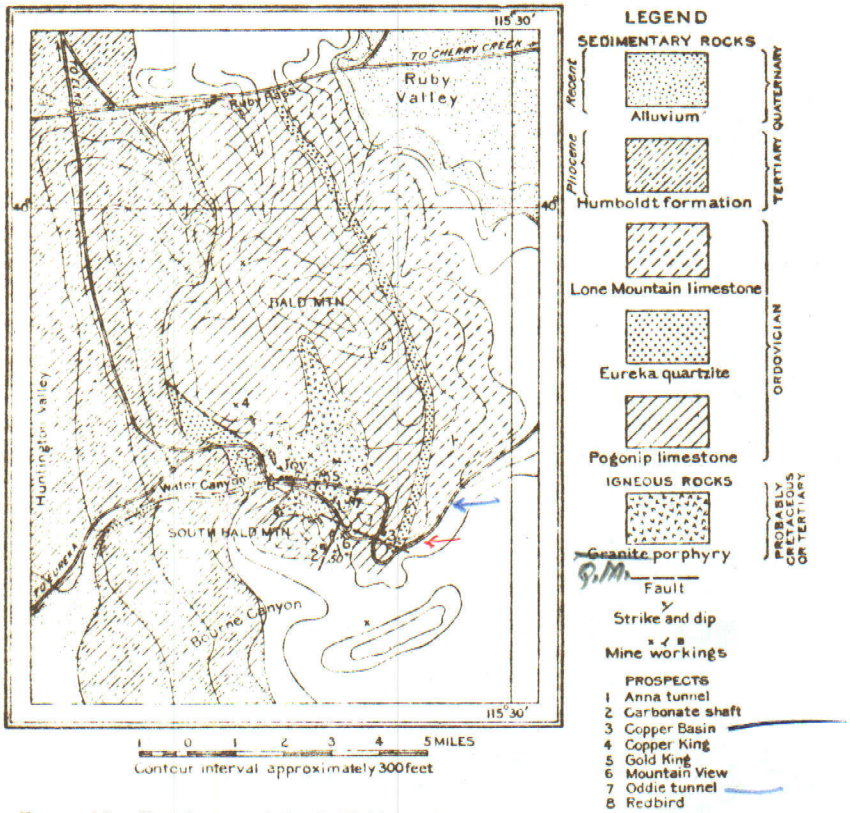

FIGURE 14.—Sketch map of the Bald Mountain district, White Pine County, Nev.

See Gold Creek Ranch quad.

continues southward for several miles to the White Pine Range. From Huntington Valley on the west side the mountains rise in a gradual even slope to Bald Mountain. The northeast flank of that peak appears to be more abrupt, but eastward a moderately high plateau country extends for some distance, joining the south end of the Ruby Hills southeast and east of Ruby Lake. (See Pl. I.)

Barometric readings give the elevation of Joy as 7,400, South Bald Mountain as 9,000, Bald Mountains as about 9,400 feet, and Copper Basin Pass as approximately 7,800 feet above sea level.

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sericite in the feldspars and the alteration of the biotite to masses of chlorite and carbonates. Most of the quartz and apatite crystals in these altered zones have remained unaltered. At the Oddie tunnel this type of alteration is further advanced than at any other place seen in the district. In a belt about 40 feet wide and of undetermined length the quartz monzonite porphyry is altered to a soft white mass which still retains the texture of the original rock. It consists of sericite, calcite, and kaolinite set with little-altered quartz crystals. Some pyrite is disseminated throughout this body and occasional stains of iron oxide and copper carbonates give it somewhat the appearance of the leached portions of some of the "porphyry copper" deposits.

ORE DEPOSITS.

HISTORY.

So far as could be learned, the earliest discoveries in the Bald Mountain district were the silver deposits about 4 miles southeast of Joy. The State mineralogist of Nevada[1] says that the Nevada claim was located August 20, 1869. He describes the mine as being between two peaks 8 miles south of the Overland Stage Road, in the vicinity of two mineral belts, one of free metal 600 yards wide and 4 miles long east of the south peak, and one of base metal 500 yards wide and 2 miles long near the summit of the south peak. He adds that the ore of the Nevada claim carries iron, antimony, lead, and a trace of copper, besides silver chloride that gives it a value of $128 a ton. Between $16,000 and $20,000 is said to have been taken from the surface works in this deposit.

It seems probable that some of the ore bodies at Water Canyon were known in the early days, but it appears doubtful if they were worked much before 1876. The Copper Basin and the old shaft on the Carbonate group were probably exploited in the late seventies or early eighties.

The camp is still in the prospecting stage, and little real development has been done, owing in part to the great distance to mills or transportation. At the Copper Basin property there has been more concentrated work than at any other place in the district, and it is reported that during 1905 and 1906 some copper carbonate ore was shipped from that ground.

TYPES OF DEPOSITS.

So far as development shows all ore deposits of the Bald Mountain district are closely connected with the intrusion of the quartz monzonite porphyry. Ores occur in veins in the igneous rock, as replace-

[1] White, A. F., State Mineralogist of Nevada Third Biennial Rept., for 1869–70, p. 78, [1871].

ments in limestone, and in small bodies associated with the lime silicate contact minerals. So far as could be determined, none of these types are strongly mineralized.

Veins in igneous rocks.—In the main stock east of Joy a large number of small white quartz veins cut the quartz monzonite porphyry, usually parallel to a well-defined nearly vertical sheeting that strikes N. 20° E. Some veins strike N. 60° W. to east-west and dip south. The veins are for the most part frozen to the walls, which have been sericitized for short distances on both sides of the quartz. The metallization of these veins is not strong. The principal metallic mineral is pyrite, some of which is cupriferous, although stibnite and marcasite are commonly present in minor quantities. These minerals are more abundant near the walls of the vein and are also seen in the altered wall rocks adjacent to the vein. The central parts of the veins are composed of white quartz, and vugs lined with druses of clear quartz crystals are common. Gold is said to be the only valuable constituent of the veins. Sulphides are found at the surface, and as the water table is very near the surface there is little hope of finding better-grade ores with depth.

Deposits in limestone.—In the limestone areas several deposits of oxidized copper ores occur, either as replacements along simple fractures which usually trend N. 20° E. or N. 60° W., or in zones of brecciation following the same general courses. Their chief value is in copper, though gold and silver are said to be present in varying amounts. The ores are limonitic but contain chrysocolla, malachite, copper pitch ore, and occasionally cuprite and pyrolusite. So far as known no copper sulphides have been found in any of the workings in deposits of this type. In the massive limestones the replacement rarely extends for more than 8 inches from the fissure along which the solutions moved, but where the ores occur in zones of brecciated limestone mineralization may extend over 30 to 40 feet.

Contact-metamorphic deposits.—On the western side of the main stock some copper carbonates were noted in a very small mass of lime silicate rock. A few pits have been sunk.

PLACERS.

The gravels of Water Canyon are said to be auriferous for about 4 miles west of Joy and have been worked to some extent about half a mile west of the settlement, but no washing was under way in September, 1913. Pay dirt 18 to 24 inches thick is said to rest on bedrock and to have an overburden of 6 to 13 feet of wash, in which a little gold is irregularly distributed. The gold is said to be rather coarse, and nuggets worth from $2.50 to $10 have been found. The present water supply is not sufficient to wash these gravels, but they might be worked by dry processes.

THE PROPERTIES.

Anna tunnel (*No. 1, fig. 14*).—The Anna tunnel in the south fork of Water Canyon about a mile east-southeast of Joy is owned by W. A. Smith. It runs N. 20° E. for 60 feet on a fracture in quartz monzonite porphyry, along which there has been some movement. No quartz is shown by this work, but the iron-stained bleached country rock on either side of the fissure is said to carry a little gold.

Carbonate group (*No. 2, fig. 14*).—The Carbonate group of seven claims on the east side of South Bald Mountain belongs to August Munter and Jacob Mayer, of Joy. The No. 1 tunnel is an irregular incline 100 feet long that reaches a depth of about 30 feet along a vertical fracture that strikes N. 25° E. in fine-grained, nearly black dolomite interbedded with quartzite. The wall rocks from 8 to 12 inches on either side of the fissure have been replaced to a small extent by copper carbonates. The small pockets of ore are irregularly distributed, and the mineralization does not appear to be strong.

The Carbonate claim, an old abandoned patent, is in a saddle which marks a zone of faulting that trends N. 25° E. The old shaft is caved at the mouth. What ore remains on the dump is a mixture of limonite and copper carbonate. The zone of brecciated limestone 50 feet wide is all more or less iron stained and shows copper carbonates at several pits. Northeast of the shaft some obscure croppings of quartz monzonite porphyry appear on the line of this fault.

Copper Basin group (*No. 3, fig. 14*).—The Copper Basin group of 25 claims covers the divide at the head of the south fork of Water Canyon. It is the property of Simonson & Hannon, of Skelton, Nev., but is known as the Scaggs property. The development, which was inaccessible at the time of visit, consists of two crosscut tunnels driven to the ore zone from the main gulch east of the divide and a large open cut with shaft on the divide. The ore makes along a breccia zone of light-colored limestone and quartzite, which strikes N. 60° W. and is thought to mark the largest fault in the camp. Some of the material on the dump is a very highly altered quartz monzonite porphyry impregnated with copper carbonates. The ore on the dumps consists of limonite, copper pitch ore, chrysocolla, malachite, and pyrolusite, and seems to be entirely a replacement of the brecciated rock. It is said that small shipments of ore were made from this property in 1905–6, which carried better than 4 per cent copper and $11 in gold a ton. On the surface the altered and somewhat mineralized zone seems to be about 20 feet wide, but it is said that underground good ore was found throughout a width of 40 feet.

Copper King group (*No. 4, fig. 14*).—The Copper King group of nine claims, owned by Robert Raffize, of Joy, is 1½ miles northwest

of the camp. Development work in shallow shafts and tunnels has been done on several claims. One shaft 50 feet deep to water is in a nearly vertical, north-striking 50-foot zone of crushed iron-stained limestone that carries irregular pockets of limonitic gold-copper ore. A small exposure of porphyry is near the shaft, and about one-fourth mile to the northwest there is a dikelike mass of jasperoidal breccia, striking N. 50° E., which in some places is stained with copper carbonates. At the east end of this breccia a north-south dike of much-altered quartz monzonite porphyry carries a little pyrite.

Gold King group.—The Gold King claims (No. 5, fig. 14), 21 in number, controlled by Munter, Mayer, and Ziege, of Joy, Nev., cover the central portion of Water Canyon in the quartz monzonite porphyry area.

A number of shallow workings have been sunk on different small quartz veins. The Gold King No. 1 incline one-half mile east of Joy is 30 feet deep on a vein that strikes N. 29° W. and dips 75° WSW. Two to three inches of white quartz is frozen to the walls, which are sericitized for a few inches on either side. The quartz looks rather barren, though occasionally small bunches of pyrite and marcasite are seen. Some black quartz, lining vugs, proves to be an intergrowth of stibnite and quartz. The owners say that gold tellurides have been determined in this ore. No telluride minerals were noted by the writer, but traces of tellurium were found by qualitative chemical tests in some of the material collected by him.

The Essex tunnel, just across the gulch from the Gold King incline, runs S. 20° E. for 146 feet along a series of subparallel quartz veins 4 to 6 inches wide. Two rather persistent quartz stringers about 18 inches apart are the most mineralized. The quartz monzonite porphyry between them is sericitized and contains some disseminated pyrite and is said to assay $19 a ton in gold. Postmineral movement along the hanging wall of this vein is evidenced by grooves which dip 50° to 65° S.

A tunnel one-half mile northeast of Joy runs due east for 160 feet through quartz monzonite along two slip planes, which dip steeply south and are a fraction of an inch to 2 feet apart. The wall rock is slightly altered along them, and a little pyrite is seen in the softened bleached quartz monzonite. On the hill east of the tunnel mouth there are a number of white quartz veins that strike N. 20° E.

A mile northwest of Joy a short tunnel follows a vein that strikes N. 40° W. and dips 85° SW. and is 10 to 16 inches wide. Stibnite and pyrite are sparingly distributed in the otherwise barren white quartz.

The western claims of the Copper King group are on the contact of the limestone and the quartzite, which is marked by a zone of

light greenish-gray lime silicate rocks. Some jasperoid has been developed outside of the contact zone, and a few small irregular pockets of copper carbonate ores are present within it.

Mountain View group (*No. 6, fig. 14*).—The Mountain View group west of the Copper Basin consists of seven claims owned by J. W. West, of Joy. A number of prospect pits have opened small bodies of copper carbonate ore near fractures in a dark-blue crystalline dolomite. At the time of visit, Mr. West was starting to sink a shaft which was to be equipped with a whim.

Oddie tunnel (*No. 7, fig. 14*).—The Oddie tunnel is the principal development on the Blue Bell group of 20 claims belonging to August Munter, Jacob Mayer, and Max Ziege, of Joy. It is in the south fork of Water Canyon, a little over a mile east-southeast of Joy. The tunnel runs N. 61° E. for 120 feet through iron-stained sericitized quartz monzonite porphyry. Its last 40 feet is in a zone of intensely altered rock in which there is a minor amount of disseminated pyrite and some small barren quartz veinlets. This mass of highly sericitized and calcitized quartz monzonite porphyry is approximately 40 feet wide on the surface. So far as noted underground it does not carry copper minerals, but on the surface at the east side of the zone a little copper carbonate ore is shown in some shallow workings. It may represent the leached croppings of a mineralized mass of porphyry.

Redbird group (*No. 8, fig. 14*).—The Redbird group of six claims, the property of J. G. Merritt, is in Water Canyon, one-fourth mile west of Joy. A 40-foot breccia of limestone and white quartzite, heavily iron stained and in places containing small irregular pockets of copper carbonate ore, strikes N. 40° W. and dips 20° SW. Numerous open cuts, shallow shafts, and tunnels have been driven into the mass over a distance of 300 feet. The bottom of one shaft 25 feet deep has reached what seems to be very much altered monzonite porphyry.

Crown Point mine.—The Crown Point mine, about 4 miles southeast of South Bald Mountain, was not visited. It is said to have been worked in 1876. The rich silver ores are said to occur in small pockets irregularly distributed through a width of 20 feet in the vicinity of a vertical fissure trending N. 60° W. and cutting fossiliferous limestone. Parallel to this vein there is said to be a porphyry dike which in places forms the southwest wall of the ore. Stibnite and gray copper are present in some of the ore seen at Joy, though most of it is a soft copper-stained material carrying silver, probably in the form of silver chloride.

Other prospects.—Mr. Albert Dees has a group of six claims about 4 miles north of Joy on the northwest side of Bald Mountain. Some good stibnite ore reported to have come from this property was seen in the settlement. It is said that the ores occur in rather small, irregular pockets in limestone and that little development has as yet been done on any of the claims.

A group of eight claims on the south side of South Bald Mountain, controlled by G. Brant and Max Arnold, of Hilton, Nev., is reported to have small bodies of copper carbonate ore irregularly distributed along fissures in the dark dolomitic limestone.