face slopes that shed the meteoric water steepen. In some of the veins there still remains a fair reserve of this class of ore.

As the veins with increase in depth extend into the sulphide zone they must be expected to become more regular in tenor, but narrower and leaner than they are in the oxidized zone. Many of them probably extend to considerable depths, and some of these are probably workable. Most of them, however, are likely to become too narrow or too lean to be workable in depth, their silver and gold minerals giving way to practically barren pyrite. The outlook for deep mining in the district is therefore not regarded as encouraging.

Although active mining in the Jarbidge district will continue for several years, the fate of certain valuable unworked deposits in other remote districts of the West, from which after a prosperous period of activity expensive power lines were removed and the districts abandoned, should suggest to the Jarbidge owner the advisability of working his mine while power and transportation are so readily available as now.

CHARLESTON DISTRICT.

LOCATION.

The Charleston district, also called the Copper Mountain district, adjoins the Jarbidge district on the southwest. It was not examined in this work other than by meager observations made from the auto-stage on the Elko-Jarbidge road. The present description is based largely on information gathered from prospectors and engineers who have visited different parts of the district and accordingly is general in character.

The district is a somewhat indefinite area contained mostly in a north-south belt about 5 miles wide by 20 miles long, extending from about the latitude of the north edge of the Jarbidge district southward to Charleston, where it includes the Charleston district of early days. The natural boundary between the two districts is the high mountain ridge southwest of Jarbidge separating the Jarbidge River drainage, represented by Bear Creek and Pine Creek, on the east from the Bruneau River drainage, represented by Coon Creek and Copper Creek, on the west (Pl. I). The country east of the ridge is more accessible from the northeast or Idaho side, and that west of it from the south or Elko side.

The discovery of mineral deposits in the district must have at least preceded the rise of Charleston as an early-day camp, which is said to have been in 1885 but may have been in 1876, the year from which 76 Creek is said to take its name. At any rate, Charleston came into existence through gold-placer mining at a site 4 miles to the north, on 76 Creek, near the southwest base of Copper Mountain. It soon became a lively camp, with three schools, several stores, a hotel, ice house, saloon, and other buildings, some of which still remain. The site is in the midst of a wide hilly sagebrush basin, largely surrounded by mountains, which are mostly low and in part bare and which on the northeast slope up into the main range.

TOPOGRAPHY.

The district is strongly mountainous. It lies in the westward continuation of the Jarbidge Mountains and their west foothills, which slope down nearly to Bruneau River at an elevation of about 6,000 feet northwest of Charleston. It is drained chiefly by Coon Creek on the north and Copper Creek and 76 Creek on the south, all of which flow into Bruneau River. The most prominent topographic feature is Copper Mountain, near the center of the area. It rises to an elevation of about 10,000 feet and is separated from the main mass of the Jarbidge Mountains by the deep valley of Coon Creek and the Charleston saddle or pass, which has an elevation of about 8,500 feet and is traversed by the Elko-Jarbidge road.

Copper Mountain is a relatively compact domical mass about 4 miles long by 2 miles broad and trends a little west of north. On the east and north it is largely encircled by Coon Creek; on the south its surface slopes off rapidly into Copper Basin, a deep depression several miles in diameter drained by Copper Creek and its tributaries. On the west the surface declines 4,000 feet nearly to Bruneau River. Copper Basin is separated from 76 Creek on the southeast by a long sloping ridge, which the Elko-Jarbidge road ascends.

Beyond Coon Creek the axial uplift of Copper Mountain seems to be continued northward by a lower range locally known as the Buck Creek Mountains. This range is said by Mr. A. L. Rinearson to lie mainly in Tps. 40 and 47 N., R. 57 E., and to extend nearly to the Idaho State line.

GEOLOGY.

The country rocks of the district are principally the Paleozoic sedimentary series already described in connection with the Jarbidge district. They consist, in ascending order, of schist, quartzite, limestone, and shale. These beds have been considerably faulted and folded. They mostly dip to the north and exhibit a general thickness of several thousand feet. They rest upon gray, coarsely crystalline hornblende granite, which seems to be intrusive, and are cut by dikes of slightly younger granodiorite. Locally they are overlain or capped by thin flows of the Jarbidge old rhyolite.

The accompanying sketch map (fig. 19), by Mr. Frank Erno, of Jarbidge, is introduced to show the relative position of the principal rock formations and places of metallization, in the belief that it will be helpful to the prospector visiting the district in the near future. On the map have been added a few notes from other sources.

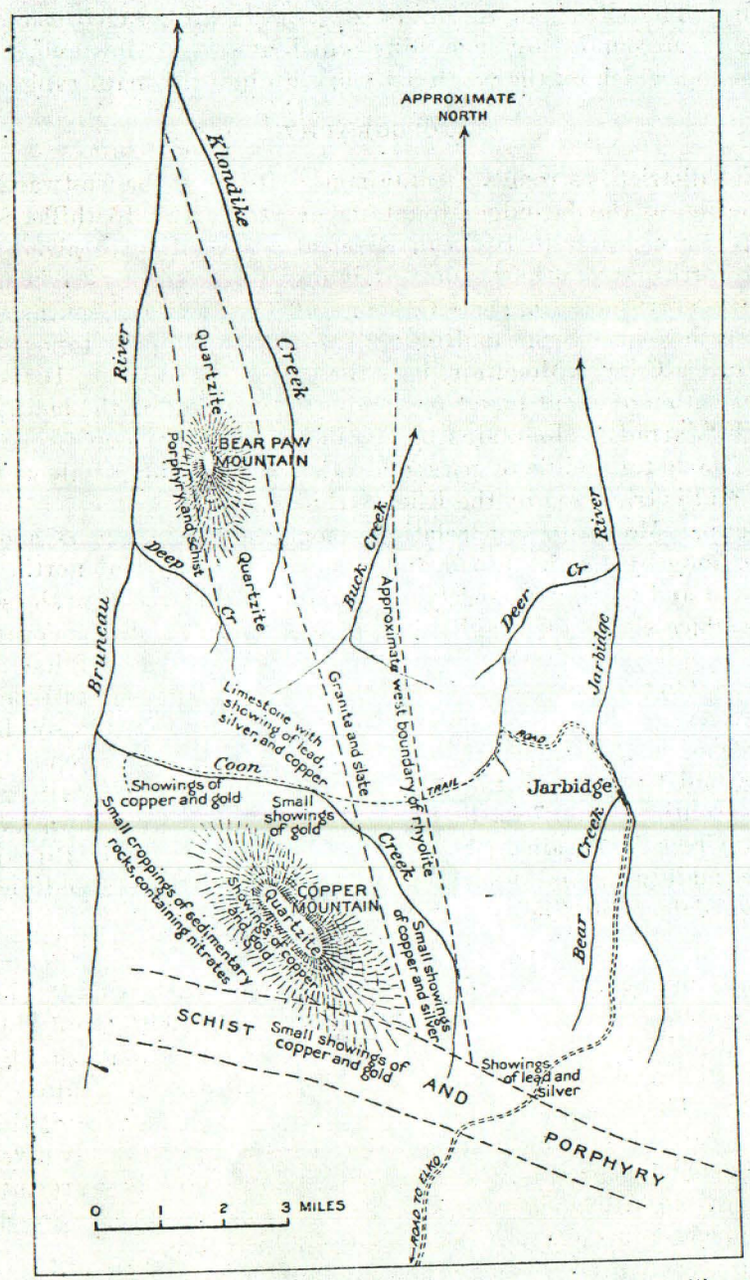

FIGURE 19.—Sketch map of part of Charleston district, showing relative position of principal rock formations and areas of mineralization. By Frank Erno.

In the Buck Creek Mountains the rocks are said to be block faulted on a large scale. Near the head of Buck Creek they dip to the southwest, and at the north end of the mountains they dip to the northwest.

Some of the quartzite, as seen in the gravels of 76 Creek, a few miles above Charleston, and in place at the head of Copper Basin, is a hard gray to brownish-gray rock and seems to be relatively very old. A specimen collected by Mr. Erno at Bear Paw Mountain, in the northern part of the district, is a black fine-grained rock that somewhat resembles slate but is hard, siliceous, heavy, and slightly laminated or cleaved.

As exposed on 76 Creek along the Elko-Jarbidge road, 3 to 6 miles above Charleston, where limestone and black or dark shale form the mountains that rise 600 to 1,000 feet on either side, the limestone is mostly bluish lead-gray to buff and is in part heavy bedded. It extends northwestward, seemingly into Copper Mountain.

The gravels of 76 Creek, which are mostly rhyolite, contain also several varieties of limestone—fine-grained noncrystalline, blue semicrystalline, blackish medium-grained crystalline, and white crystalline calcite or marble. The different degrees of crystallinity probably represent different phases of contact metamorphism due to the intrusion of the igneous rocks rather than large bodies of these several varieties of limestone.

The upper parts of Copper Basin and 76 Creek valley contain a considerable deposit of whitish volcanic ash, locally called "limestone." In the northeastern part of the basin the deposit is eroded into low rounded hills and mounds of fairly regular shape and uniform slope. It seems to have a thickness of several hundred feet and to rest mainly on the sedimentary rocks, but on the north above the road, at an elevation of 8,100 feet, it locally extends up onto the rhyolite.

The intrusion of the limestone and other sedimentary strata by granite and allied igneous rocks renders conditions in the district peculiarly favorable for the occurrence of mineral deposits. The useful minerals known or reported to occur there are gold, silver, copper, lead, antimony, manganese, nitrates, and oil shale. They are about all in or near Copper Mountain (fig. 19).

METALLIFEROUS DEPOSITS.

LODES.

The metalliferous lode deposits occur in the sedimentary Paleozoic rocks and their associated granitic intrusives. They occur chiefly as tabular fissure veins having a quartz gangue, but they may include

also contact-metamorphic and replacement deposits in the limestone, such as occur in the Contact and other neighboring districts. From their association with the granitic intrusive rocks the deposits are regarded as probably of Cretaceous age. A few of them are credited with a small production.

GRAHAM MINE.

The Graham mine, owned by Charles and Edgar Graham, of Charleston, is on a quartz lode in limestone in the hillside a few hundred feet west of 76 Creek, in the same general vicinity as the gold placers above noted, 4 miles north of Charleston. It is said to contain 1,600 feet of underground workings, most of which have been opened in recent years. The tunnel drift, 900 feet long, is on a good vein, which in 1914, when examined by Mr. Erno, is said to have contained an 18-inch ore shoot of $16 ore. The ore when hand sorted ran 24 per cent in copper and $6 in gold to the ton.

PRUNTY MINE.

The Prunty mine, owned by the Messrs. Prunty, of Charleston, is on 76 Creek about one-third of a mile above the Graham mine. It has been worked intermittently since 1905, and the ore was treated in a hydraulic 5-stamp mill, water being brought to the mill in a ditch around the side of the mountain. The production has been small. The metals produced are silver, gold, copper, and antimony. Antimony seems to be present in the ore in considerable quantity, as it alone is said to be nearly sufficient to pay for operating the mine.

PROSPECTS.

Prospects of one or more of the metals above listed occur at various places in the district, most of which are indicated on figure 19.

A lead-silver prospect in the northeast rim of Copper Basin along the wagon road is in limestone and quartzite, which crops out through the Jarbidge old rhyolite at or near its western margin. A little work has been done on this prospect.

At several points 1 to 2 miles northwest of this prospect, in the east slope of Copper Mountain, there are showings of copper and silver, and in the northeast slope of the mountain showings of gold.

On the upper west slope of the mountain copper and gold have been found, and at about the middle of the west slope is an old tunnel, the Carlton tunnel, 700 feet long, driven on copper deposits which are said to average about 2 per cent in copper but which were of too low grade to be workable at the early-day time of exploitation.

At about the middle of the northwest slope of the mountain are traces of manganese. A specimen of the mineralized rock at this place received by the writer from Mr. Vukovich, of Jarbidge, was found to contain considerable rhodonite (manganous silicate).

In the limestone area to the north of Copper Mountain and north of Coon Creek are said to occur good showings of lead, silver, and copper.

In the Buck Creek Mountains small quartz veins containing free coarse gold are said to occur in the slate and dark quartzite.

PLACERS.

The placer diggings, the first mineral deposits found in the district, were chiefly on the west side of 76 Creek about 4 miles above Charleston. Of the two ditches visible from the Elko road that lead the water from the creek around the steep mountain side, the lower one was used for placer mining and the upper one supplies power to the Prunty quartz mill, above described. The placers were doubtless derived from lode deposits, probably from lodes that now occur near by, as above described. But they may have been derived from lodes that have since been eroded away. Their occurrence and origin are of more than passing interest, as the adjoining Jarbidge district, with its numerous gold veins, has not yielded any placers.

NONMETALLIFEROUS DEPOSITS.

Down the west slope of Copper Mountain from the Carlton tunnel occur small croppings of sedimentary rocks that are said to contain nitrates.

Oil shale in float or talus is reported to have been found a few miles southeast of Charleston. As the formations of that locality apparently continue northward into the mountains on 76 Creek, it is probable that oil shale is contained in the limestone-shale series on and near the creek, in which the quantity of dark shale is large.

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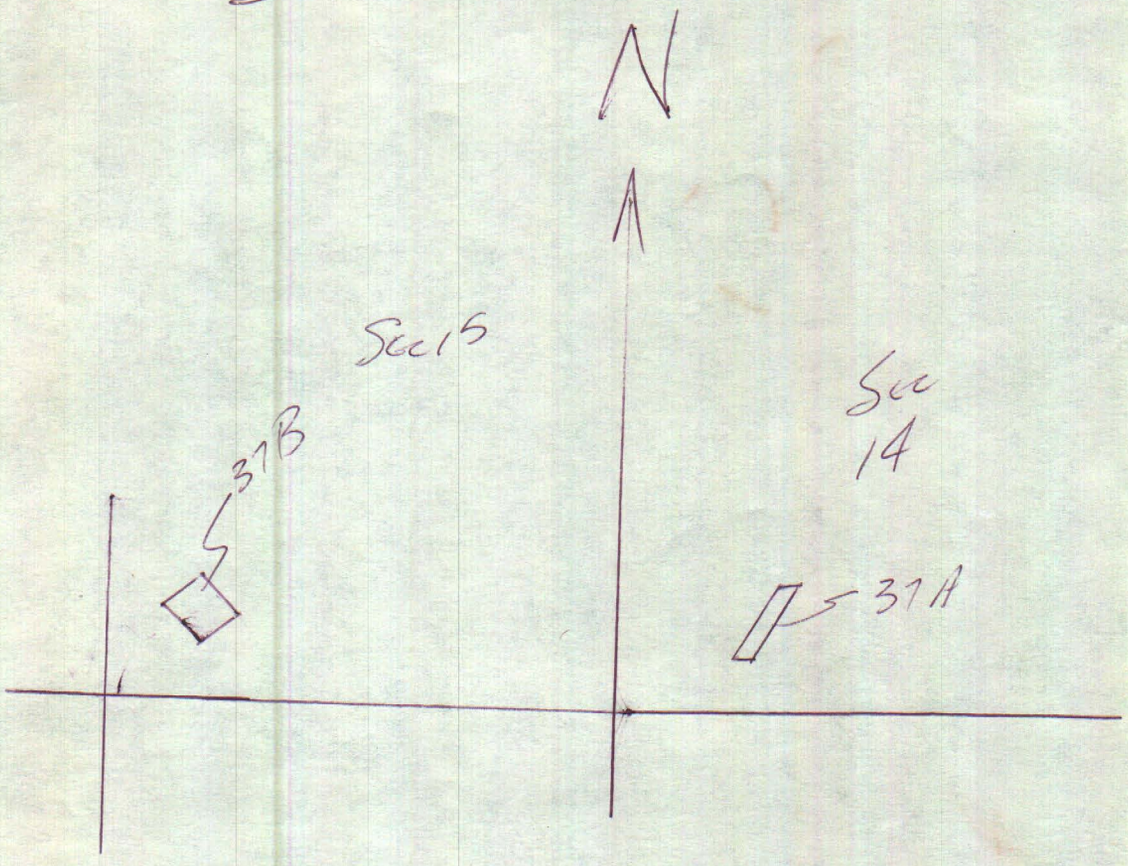
P9

T44N, R57E



0 30

1" = 30 CHAINS