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RECONNAISSANCE OF MINING DISTRICTS IN LANDER COUNTY, NEVADA[1/]

By William O. Vanderburg[2/]

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FOREWORD

This is one of a series of circulars dealing with mining and milling operations in various mining districts of the western United States. Data on operating costs, grades of ore treated, wage scales, haulage and trucking rates, and freight and treatment charges, together with other information on mining properties, are obtained from the operators and other local sources during the course of field inspections. The data are believed to be substantially correct as of the dates when the districts were visited, but later disclosures resulting from further exploration and development may have changed the economic picture appreciably.

Charles F. Jackson,
Chief engineer,
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INTRODUCTION

This report3/ gives the results of a reconnaissance of the mining districts in Lander County, Nev., made from March 29 to April 20 and from May 9 to May 21, 1938, during which virtually all of the mining districts in the county were visited. No attempt has been made to include in this report all the mines and prospects in the various mining districts, and it should be stated that whether or not a property is mentioned herein has no bearing on its merits. The report covers the situation of the various districts, types of ore deposits, ownership and description of mines and prospects, information on past and current activity, and other information of economic interest likely to be useful to those interested in the development of our mineral resources.

The names of the various districts mentioned are those generally used when they were organized for purposes of record and regulation. When originally organized, the districts embraced large areas with no well-defined boundaries, so that the names have little geographical significance.

Mining was begun in Lander County in the early sixties as the result of the discovery of silver ore in the Reese River district. Following this discovery numerous others ensued, which caused mining stampedes in various parts of eastern Nevada. These mining "rushes" were primarily responsible for the occupation and settlement of the greater part of Nevada, for without them large areas would have remained unexplored and their development postponed many years.

3/ Manuscript completed July 15, 1938.

From the viewpoint of past production, the silver deposits at Austin have been the most important, followed by the copper, silver, and placer-gold deposits of the Battle Mountain area. The greatest mining activity in Lander County took place from 1862 to 1880, when the Reese River district was one of the leading mining areas in the State.

In recent years mining activity within the county has been largely in the hands of lessees; the writer estimates that during 1937 an average of 120 men were gainfully employed in the mineral industry of the county. The Battle Mountain region has been one of the principal leasing areas in the State for many years. Most of the ores produced by lessees are shipped to smelters near Salt Lake City, Utah.

With the present outlook, future production of metals from Lander County will depend largely on further exploration in the known mineralized areas and the rehabilitation of old mines to work ores that were uneconomical to mine and treat in former years. In the industrial mineral group, barite is the only mineral that has been commercially important.

ACKNOWLEDGMENTS

The author wishes to thank the owners, lessees, and mine operators, too numerous to mention individually, who wholeheartedly provided information and assistance during the course of the field work.

B. F. Couch, secretary of the Nevada State Bureau of Mines, Reno, Nev., made available to the writer published data pertaining to early mining activities in Lander County; and Charles White Merrill, of the Mineral Production and Economics Division, Bureau of Mines, compiled the figures for the mineral-production tables in this report. Credit for such data as were used is given in the text.

LANDER COUNTY

Political History

The region within the present boundaries of Nevada originally comprised part of the territory purchased by the United States from Mexico under the treaty of Guadalupe Hidalgo consummated in 1848. Prior to its alienation from the Republic of Mexico, it was included in the department of "Alta California." After its acquisition by the United States, it constituted the western part of the Territory of Utah, from which it was separated by an Act of Congress approved March 2, 1861, to form the Territory of Nevada. The Territorial status was maintained until October 31, 1864, when by proclamation of President Lincoln it was admitted into the Union as the thirty-sixth State.

Lander County was created and organized by an Act of the Territorial Legislature approved December 19, 1862. The temporary county seat was Jacobsville (Jacobs Springs), a station on the Overland Mail and Pony

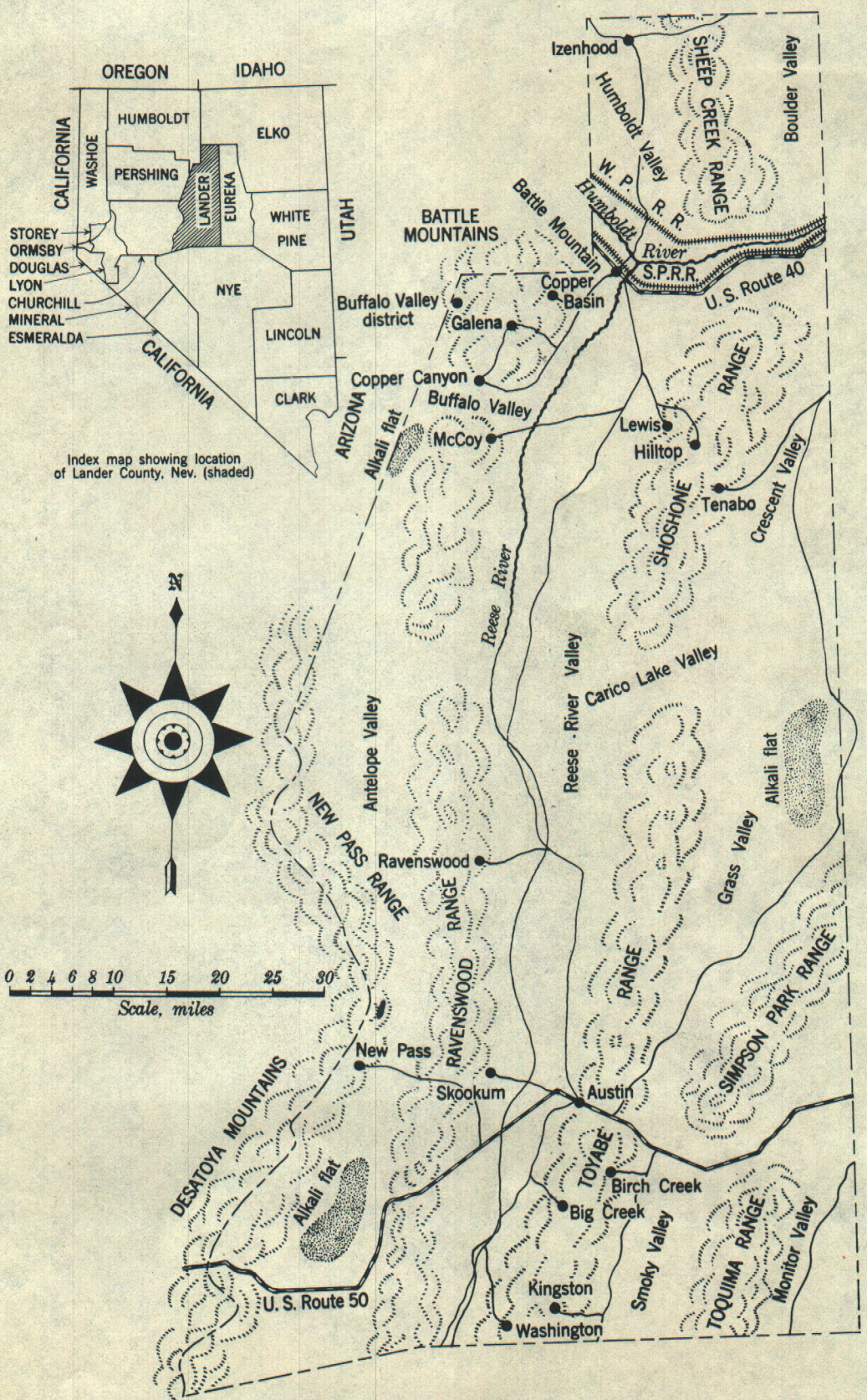
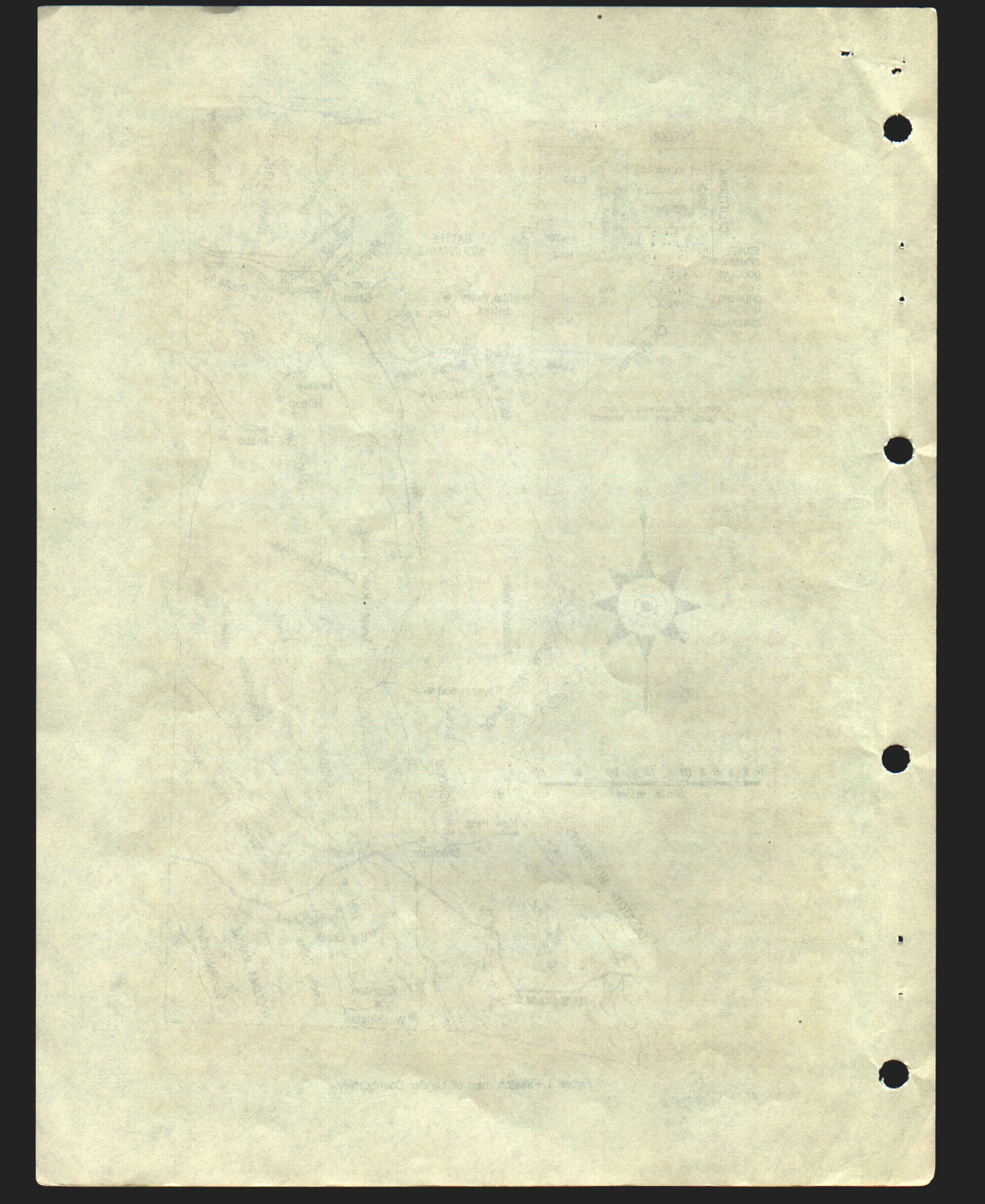


Figure 1.—Sketch map of Lander County, Nev.



Express routes situated on the Reese River 7-1/2 miles west of the present site of Austin. By a general vote in September 1863, Austin was made the permanent county seat. The name of the county was bestowed in honor of Gen. Frederick W. Lander, who played an active part in the Indian War of 1860 and who was in charge of the construction, by the United States Government, of a wagon road across Nevada.

As originally organized, Lander County was a vast, largely unexplored region comprising about one-third of the area of Nevada as its boundaries then existed. Subsequently White Pine County (March 2, 1869), Elko County (March 5, 1869), and Eureka County (March 1, 1873) were created from this large area, giving Lander County the title of "Mother of Counties."

The early boundaries between the various counties were sometimes vague and indefinite, so that numerous controversies arose over the position of county boundaries. Lander County had a number of boundary adjustments, so that at present it comprises 5,721 square miles. Figure 1 is a sketch of the county.

According to the 1930 census, the population at that time was 1,714, and the population in 1938 is nearly the same. The major part of the population resides in Battle Mountain, the principal mining center, situated in the northern part of the county, and at Austin, the county seat and supply center for mining districts and ranches in the southern portion of the county. The principal industries are stock raising, agriculture, and mining.

According to the annual report of the county auditor,[4/] the assessed value of real property in the county at the end of the fiscal year 1937 was $5,364,707, and the tax rate for the same period was $2.64 per $100 of assessed valuation, exclusive of special taxes but including the State tax of $0.68 per $100.

Topography

Lander County is a part of the Great Basin; it has the characteristic basin topography, a semidesert plateau traversed by a succession of narrow mountain ranges with intervening valleys approximately parallel and having a northward trend. Most of the valleys are independent basins hemmed in by mountains; none have drainage to the sea. The general altitude of the valleys is about 4,500 feet, the mountains rising from 4,000 to 5,000 feet higher. Through nearly all the ranges are passes, and open plains surround their termini, affording easy routes of travel.

The principal valleys in Lander County are Antelope, Buffalo, Crescent, Grass, Reese River, Smith Creek, Smoky, and Humboldt. The principal mountain ranges are Toiyabe, Battle Mountain, Shoshone, Toquima, Desatoya, New Pass, and Ravenswood.

4/ Acree, Bert, Auditor, Annual Report of the County Auditor of Lander County for the Fiscal Year Ended June 30, 1937.

The Humboldt River, the largest stream wholly within the State, flows westerly across the northern part of Lander County through the valley of the same name.

Water Resources

The principal streams in Lander County are the Humboldt and Reese Rivers. The latter rises in the Toiyabe Range in the southern part of the county and flows northward to join the Humboldt River near Battle Mountain. Near its source the volume of water is considerable, but most of the water is either lost by evaporation or utilized for irrigation, so that the water seldom reaches the Humboldt.

The higher mountain ranges are traversed by numerous V-shaped canyons, in which flow small mountain streams. Only a few such streams are perennial.

A large number of hot and cold springs are scattered throughout the county. The town of Battle Mountain is supplied with artesian water from wells near the town.

The long, narrow valleys intervening between parallel mountain ranges form receptacles for the accumulation of underground water, so that if not otherwise available, water for milling purposes generally can be developed by sinking wells in the valleys, usually within convenient distances of most of the districts mentioned in this report.

Climate and Vegetation

The precipitation in Lander County, largely in the form of snow, varies according to the altitude and ranges from 5 to over 20 inches per year. According to data compiled by the Nevada Agriculture Experiment Station, approximately 39 percent of the area of Lander County (5,721 square miles) has a precipitation of 5 to 8 inches per year, 49 percent has 8 to 15 inches per year, and the remaining 12 percent, comprising the higher mountainous areas, has 15 to over 20 inches. In the summer an occasional cloudburst may occur, which, though of short duration, may be exceptionally severe. A cloudburst in the vicinity of Austin on August 18, 1874, partly destroyed the town.

During the summer hot, cloudless days prevail, but since the atmosphere is dry the heat is seldom oppressive. The diurnal range in temperature is considerable, and a hot day may be followed by a frosty night. Winds are frequent, and they may have sufficient velocity to send sand and dust clouds high into the air. A peculiar phenomenon during the summer months is the whirlwinds or miniature tornadoes of sand and dust that twist and gyrate in huge columns, majestically traveling through the valleys for miles.

Some sort of vegetation, although limited as to variety, is prevalent over the entire county, with the exception of the valley depressions covered with deposits of alkaline salt. On the mountain ranges above a

general altitude of 7,000 feet, the greater precipitation favors sparse forest growths; the dwarf juniper (Juniperus occidentalis), foxtail pine (Pinus balfouriana), Utah juniper (Juniperus utahensis), locally called cedar, piñon pine (Pinus monophylla), limber pine, (Pinus flexilix), native cottonwood (Populus fremonti), western redbirch (Betula fontinalis), and mountain mahogany (Cerocarpus lediforius) are the most common. The piñon pine is the most prevalent, exceeding in quantity all the other conifers combined. It is bushlike, rarely exceeding 20 feet in height. All timber is small, except the limber pine, which may attain a diameter of 3 feet and a height of 50 feet. It is found in scattered stands at altitudes above 9,000 feet in the Toiyabe Range. In pioneer days it was logged and was the only local source of saw-timber. The only hardwood tree is the mountain mahogany. The mahogany and piñon pine are generally used for fuel.

The lower country is generally covered by the common sage (Artemesia tridentata), which grows vigorously. White sage, bunch grass, and other varieties of nutritious grasses furnish excellent forage for cattle and sheep.

Power Facilities

In the early days, power for mining was generated in steam plants, wood from the mountain slopes being used for fuel. At present all the mining districts in Lander County depend upon internal-combustion engines for power, since purchased electric power is not available.

Transportation Facilities

The main lines of the Southern and Western Pacific Railroads traverse the northern part of Lander County, roughly paralleling the course of the Humboldt River. The Southern Pacific passes through Battle Mountain and the Western Pacific several miles north of the town. The Nevada Central narrow-gage railroad connecting Austin with Battle Mountain was abandoned in 1937 and the equipment sold.

The Southern Pacific freight rates per ton of ore from Battle Mountain, the principal shipping point, to Utah smelters are as follows:

Value of ore per ton 1/	$10	$15	$20	$30	$40	$50	$60
20-ton	3.96	3.96	5.06	5.61	6.16	6.71	7.26
40-ton	-	3.30	3.52	4.18	4.84	5.23	5.78

Value	$70	$80	$90	$100	$110	$120	$150	$200	$400
20-ton	7.81	8.36	8.58	8.91	10.01	10.29	10.34	11.00	11.00
40-ton	6.60	7.43	8.14	8.80	-	-	-	-	-

1/ The railroad value per ton is the smelter value, less treatment charge, divided by the total number of tons (wet weight) in the shipment.

The town of Battle Mountain is on United States route 40 (Victory Highway), and Austin, in the southern part of the county, is on United States route 50 (Lincoln Highway), both roads connecting Salt Lake City, Utah, with Reno, Nev., and places west. These two highways are hard-surfaced; all others in the county are either natural or gravel. Virtually all the districts mentioned in this report are accessible by automobile.

History of Mining

Prior to 1848, the only white inhabitants within the present limits of Nevada were a few itinerant trappers and hunters. The aboriginal tribes, principally Shoshones and Paiutes, numbering perhaps between 10 or 12 thousand people, roamed this vast region, but they were not versed in the art of mining metals. The first white man known to have crossed the Great Basin, lying between the Wasatch Mountains on the east and the Sierra Nevada Range on the west, was Jedediah Strong Smith, with a company of 40 trappers. The route probably taken by Smith in 1825 on his trip from the Yellowstone River to California led through the southeastern portion of the State following, for part of his journey, the course of the Humboldt River, which he named Mary's River. Other exploration and emigration parties crossed the northern part of the State from east to west following the route along the Humboldt River; among these were the Peter S. Ogden expedition sent out by the Hudson Bay Co. in 1831; Milton Sublette's expedition for the Rocky Mountain Fur Co. in 1832; Capt. B. L. E. Bonneville and Joseph Walker's expedition in 1833; Thomas McCoy-Christopher (Kit) Carson's expedition also in 1833; the John Bidwell-J. B. Bartelson emigration party in 1841; and Gen. John Fremont's expedition in 1843-1844. All of these expeditions followed closely the course of Mary's River (renamed the Humboldt by Fremont), the safest and most natural travel route across the Great Basin. Due to the forbidding character of the country, the Great Basin region outside of the narrow strip along the Humboldt was the last portion of the United States to be explored. Even the route along the Humboldt was not accurately mapped as late as the Bidwell-Bartelson expedition in 1841. At that time it was the general belief that a great river flowed westward across the Great Basin from Great Salt Lake and through the Sierra Nevada Mountains to the Pacific Ocean. Amusing as it may seem today, Bidwell was advised to take tools to construct boats for traveling by water to the Pacific Coast.

The discovery of placer gold in California in January 1848 by James Marshall precipitated a rush to the coast in 1849 and 1850, and numerous settlers and adventurers crossed Nevada along the course of the Humboldt River. The early pioneers crossed the arid stretches of the State with a minimum of delay, and none of them left any impression on eastern Nevada as far as mineral discoveries are concerned.

Prior to 1862, the greater portion of eastern Nevada remained unexplored. The lodestone that first attracted attention to Nevada was the discovery of silver in the Washoe district (Comstock) in 1859. With this discovery, an army of prospectors, miners, and adventurers flocked to western Nevada. This discovery resulted in the improvement of communication and transportation facilities across the State; in the spring of 1860, the

celebrated Pony Express was established by Jones Russel & Co. The Pony Express operated only about a year, being supplanted by the transcontinental telegraph line completed by the Overland Telegraph Co. on October 24, 1861. The route used by the Pony Express across the State was known as the Overland route, first surveyed by Captain (later Colonel) J. H. Simpson for the United States Government in 1859. The Overland Mail & Stage Co. began operating in July 1861, following the route surveyed by Simpson. This route remained the principal line of travel across the State until the completion of the Central Pacific Railroad in July 1869.

The first mineral discovery in eastern Nevada was made in what is now Lander County in 1862. The history of this discovery, according to Angel5/ is as follows:

> Early in the month of May 1862, William H. Talcott, an attache of the stage station at Jacob's Springs (Jacobsville), a post on the transcontinental stage route, while hauling wood from the hillside, now within the limits of the city of Austin, discovered a vein of metal-bearing quartz and carried a small quantity with him to the Station. The rock proving to contain silver, the ledge was located as a mining claim, named the Pony, as the discoverer had formerly been a rider of the Pony Express. On the tenth day of May 1862, a mining district was formed, including an area 75 miles in length east and west, and 20 miles north and south, and named the Reese River mining district. A code of laws was adopted after the custom of miners, and William H. Talcott, the discoverer, was elected recorder, and the claims already discovered were recorded.

The present law under which mining rights are acquired on the public mineral domain was passed by Congress on May 10, 1872. Prior to this time the customs and laws of Nevada permitted miners to organize a district, designate its boundaries, and pass a code of laws regulating the tenure of mining property. The validity of such rules and regulations was acknowledged by Congress, and they are historically interesting for they formed a connecting link in the evolution of our present mining laws. The first regulations in the Reese River district were adopted in July 17, 1862, but the district was reorganized on June 4, 1864. The mining regulations of the Reese River district adopted on June 4, 1864, were as follows:

> SECTION 1. The district shall be known as the Reese River mining district, and shall be bounded as follows, to wit: On the north by a distance of 10 miles from the overland telegraph line, on the east by Dry Creek, on the south by a distance of 10 miles from the overland telegraph line, and on the west by Edward's Creek, where not conflicting with any new districts formed to date.

5/ Angel, Myron, History of Austin and Reese River Region, published in Harrington's Directory, 1866. Cited by Browne, J. Ross, Mineral Resources of the States and Territories West of the Rocky Mountains: D. Appleton & Co., New York, 1869, p. 395.

SECTION 2. There shall be a mining recorder elected on the first day of June next for this district, who shall hold office for 1 year from the 17th of July next, unless sooner removed by a new election, which can only be done by a written call, signed by at least 50 claimholders, giving notice of a new election to be held, after said notice shall have been posted and published for at least 20 days in some newspaper published in or nearest this district; and the recorder shall be a resident of this district.

SECTION 3. It shall be the duty of the recorder to keep in a suitable book or books a full and truthful record of the proceedings of all public meetings; to place on record all claims brought to him for that purpose, when such claim shall not interfere with or affect the rights and interests of prior locators, recording the same in the order of their date, for which service he shall receive one dollar ($1) for each claim recorded. It shall also be the duty of the recorder to keep his books open at all times to the inspection of the public; he shall also have the power to appoint a deputy to act in his stead, for whose official acts he shall be held responsible. It shall also be the duty of the recorder to deliver to his successor in office all books, records, papers, etc. belonging to or pertaining to his office.

SECTION 4. All examinations of the record must be made in the full presence of the recorder or his deputy.

SECTION 5. Notice of a claim of location of mining ground by any individual, or by a company, on file in the recorder's office, shall be deemed equivalent to a record of the same.

SECTION 6. Each claimant shall be entitled to hold by location 200 feet on any lead in the district, with all the dips, spurs, and angles, offshoots, outcrops, depths, widths, variations, and all the mineral and other valuables therein contained, the discoverer of and locater of a new lead being entitled to one claim extra for discovery.

SECTION 7. The locater of any lead, lode, or ledge in the district shall be entitled to hold on each side of the lead, lode, or ledge located by him or them 100 feet; but this shall not be construed to mean any distinct or parallel ledge within the 200 feet other than the one originally located.

SECTION 8. All locations shall be made by a written notice, posted upon the ground, and boundaries described, and all claimants' names posted on the notice.

SECTION 9. Work done on any tunnel, cut, shaft, or drift, in good faith, shall be considered as being done upon the claim owned by such person or company.

SECTION 10. Every claim (whether by individual or company) located shall be recorded within 10 days after the date of location.

SECTION 11. All miners locating a mining claim in this district shall place and maintain thereon a good and substantial monument or stake, with a notice thereon of the name of the claim, the names of the locaters, date of location, record, and extent of claim. It is hereby requested that owners in claims already located do comply with the requirements of this section.

SECTION 12. The recorder shall go upon the ground with any and all parties desiring to locate claims, and shall be entitled to receive for such service 1 dollar for each and every name in a location of 200 feet each.

SECTION 13. It is hereby made the duty of the mining recorder, upon the written application of 25 miners, to call a meeting of the miners of the district by giving a notice of 20 days through some newspaper published in the Reese River district, which notice shall state the object of the meeting and the place and time of holding the same.

SECTION 14. The laws of this district passed July 17, 1862, are hereby repealed.

The name of Reese River was first given to the large stream bearing this name by Captain Simpson in honor of John Reese, a Mormon pioneer, who was one of the first to cross the State by the Overland route.

The news of the discovery of silver in the Reese River district spread rapidly, and thousands of people flocked to the locality, since it was situated on the line of the Overland stage and telegraph. This discovery opened at one bound the vast unexplored regions of eastern Nevada that hitherto contained no single permanent settlement. A great army of prospectors, miners, adventurers, along with a few home seekers, began a trek from California, Virginia City on the Comstock, and from the Eastern States. By the fall of 1863 the boom had reached its peak. One observer at that time counted 274 freight teams, 19 passenger wagons, 3 pack teams, 69 horsemen, and 31 people on foot on a trip between Austin and Virginia City.6/ Probably nearly again as much traffic could have been observed coming from the East along the route between Austin and Salt Lake City, Utah. During the summer of 1863, 366 houses were erected in Austin and the population numbered over 6,000 people.

Following the organization of the Reese River district, prospecting was carried on with great vigor, first north and south along the Toiyabe Range, in which Austin is situated, and later to other portions of eastern Nevada as far south as the Colorado River. At the close of 1865, at least 60 mining districts had been organized, in which it has been estimated fully

6/ Farrell, M. J., Address before Society of Reese River Pioneers: Published in the Reese River Reveille, Aug. 27, 1874.

20,000 mining claims had been recorded. From the discovery of the Comstock in 1859 to 1870 was the period of the greatest prospecting activity Nevada ever experienced. Austin was the nucleus from which sprang most of the settlements of eastern Nevada. With Austin as a base for prospecting, a number of prominent districts were discovered, including Reveille, Northumberland, Hot Creek (Tybo), Silver Bend (Philadelphia), Belmont, Mammoth, Twin River, and Union in Nye County; Eureka, Mineral Hill, and Cortez in Eureka County; Tuscarora (first known as Goose Creek) in Elko County; Egan Canyon (Cherry Creek) and White Pine (Hamilton) in White Pine County; and Battle Mountain in Lander County. Numerous other districts were organized, many of which excited great hopes by promises of unbounded wealth, only to lapse into obscurity after a brief period of activity. It was a period when anything new in mining had tremendous possibilities, and the only fear was that the enormous quantity of silver believed to be present in the mountains of Nevada would destroy the value of that metal and upset the monetary stability of the world.

During the greater part of the summer of 1863 the number of incorporations of mining companies in the Reese River district averaged 10 per day, many days being as high as 60. It is reported that there were 1,500 mining offices in San Francisco, a large proportion of which were opened by Reese River companies. Anything that resembled quartz or a seam that had even a remote possibility of leading to ore was located and a company immediately incorporated. In the early days of Nevada mining, locations were made in "feet" and either sold or traded in the same manner as mining stocks are today. "Feet" were staple currency, and an original claim 200 feet in length was speedily incorporated and reduced to fractions of 5, 10, 20, or 50 feet or other denominations, depending upon the locater's valuation of the claim. Such fractional parts of a claim were either sold for cash or exchanged for other feet of greater or less value, according to the business acumen of the parties involved. If the property developed into a promising mine under such an incorporation, the stock (feet) was frequently so scattered as to prohibit advantageous action.

One of the greatest drawbacks to intelligent development of mining properties in the Reese River and other districts was the lack of experience in mining and milling. Generally the locaters knew nothing of practical mining, and many false estimates were made on the value of properties without any intentional deception on the part of the owners. The results of the silver discoveries on the Comstock, at Aurora (Esmeralda) and in the Reese River district were so flattering that not a few arrived at the illogical conclusion that all quartz veins must contain silver, and a single piece of ore yielding a high assay value was deemed sufficient to establish the value of a claim. The primary rule "follow the vein" was often disregarded in prospecting, shafts and adits were projected in country rock to cut the veins at depth on the strength of a few pounds of ore taken from the outcrops, or, if the surface material failed to assay, it was argued that in a "true" fissure vein the rich ore would be found at depth. Considerable capital was thus wasted, and much of the work done made less impression on the veins than on the pockets of the men who financed the operations.

Another common error in judgment by the early miners was the erection of mills before sufficient ore was available or before investigating whether or not the milling process was adapted to the ore. As an illustration - in the Reese River district alone at least 11 mills operated by steam and ranging in size from 5 to 20 stamps were erected prior to 1868. As later work demonstrated, two mills would have sufficed to treat the entire output of the district. However, experience was acquired gradually, and the miners eventually realized that silver mines could not be brought to the productive stage solely by speculation, but only by a combination of capital, economy, and system under the direction of skilled workmen. Although much of the wild excitement and speculation of early mining in Nevada may be deprecated, the net results were beneficial, as numerous important mineral discoveries were made, and the region was explored and opened for settlement.

By 1872, Austin was the second largest town in Nevada in point of numbers and taxable property, ranking next to Virginia City on the Comstock lode.

In 1865, the Manhattan Silver Mining Co. began to consolidate the various mines in the Reese River district, and by 1871 this company controlled nearly all the mines. This consolidation was desirable, as the ore is present in a number of narrow veins cut by faults, and this condition would have caused much litigation if the mines were held by different companies. The Manhattan Silver Mining Co. discontinued operations in 1887, following which several unsuccessful attempts were made to rehabilitate the mines.

The Nevada Central Railroad between Austin and Battle Mountain was built in 1880.

The Battle Mountain district, next in importance to Reese River, was organized in 1866, and by 1870 32 mines were in operation. The principal activity during the seventies and eighties was confined largely to the mining of silver ores. Exploiting of the placer-gold deposits in this area was begun about 1912, and the copper deposits attained considerable prominence during the World War, when they were intensively worked.

Other mining districts of less importance in Lander County include the Lewis and the Bullion, in which the predominant metal is silver. In recent years, mining in Lander County has been characterized by considerable mining under the leasing system, particularly in the districts tributary to the town of Battle Mountain.

Mineral Production

No accurate data are available on the gross production of minerals from Lander County prior to 1902. Production for the Reese River district in the early days is commonly estimated at $40,000,000 to as high as $60,000,000, but such estimates are not substantiated by the data available. The net annual production of gold and silver from 1870 to 1903, as compiled from the quarterly reports of the Lander County assessor for bullion tax

purposes, is shown in table 1. The amended revenue act of 1867 provided that the value of the ore for tax purposes was to be estimated on the dumps before milling, $18 per ton being deductable on ores treated by the Washoe process (amalgamation without roasting) and $40 per ton on ores treated by the Freiberg process (roasting followed by amalgamation). Revisions of the bullion-tax law in 1871 allowed the mine owners to deduct the actual expenses of mining and reduction. Nearly all the ores produced in Lander County in the early days required roasting which entailed a high reduction cost. Assuming the net value of the ore was 60 percent of the gross, the production of gold and silver from 1870 to 1903, according to table 1, would be about $31,339,000. Of this amount, the Reese River district produced about $22,000,000, the silver deposits in the Galena area of the Battle Mountain district $3,000,000, and the rest was chiefly from the Lewis, Bullion, and Eureka districts. The latter district began production in 1869, and it remained in Lander County until March 1, 1873, when Eureka County was formed. Production for the Eureka district for this period was approximately $3,500,000, which should be credited to Eureka County.

The production of Lander County from 1862 to 1870, not accounted for in table 1, is estimated at $4,000,000, nearly all of which was derived from the Reese River district. According to the original records of the Manhattan Silver Mining Co., the production of bullion up to 1887 was $19,239,033. This company made nearly all the production from the Reese River district from 1870 to 1887. A recapitulation of the estimated total production of gold and silver of Lander County from 1862 to 1903 is as follows:

Reese River district.....	$26,000,000
Battle Mountain district.....	3,000,000
Lewis, Bullion, and other districts.....	1,839,000
	30,839,000

TABLE 1. - Net annual production of gold and silver from Lander County, 1870-1903

(Compiled from quarterly assessment rolls of the county assessor.)

Year	Tons	Value
1870	11,325	$ 1,104,590.32
1871	25,995	2,099,013.91
1872	40,895	1,871,378.43
1873	23,167	1,569,052.63
1874	6,044	799,829.03
1875	7,133	917,036.65
1876	7,059	882,820.74
1877	5,911	618,905.60
1878	6,746	692,802.76
1879	7,642	784,611.83
1880	4,966	463,619.45
1881	7,036	959,419.05
1882	4,672	749,532.49
1883	5,336	751,696.04
1884	4,100	779,397.76
1885	2,616	582,266.51
1886	4,856	375,994.99
1887	8,581	290,548.93
1888	8,699	158,477.71
1889	23,417	225,410.36
Total	216,196	16,676,405.19

Year	Value of gold	Value of silver	Total value
1890	$ 10,000.00	$ 130,000.00	$ 140,000.00
1891	10,000.00	110,000.00	120,000.00
1892	15,000.00	20,000.00	35,000.00
1893	22,000.00	238,000.00	260,000.00
1894	(No figures given)		
1895	12,548.00	67,028.00	79,576.00
1896	72,144.00	114,420.00	186,564.00
1897	50,046.00	159,860.00	209,906.00
1898	61,075.00	66,039.00	127,114.00
1899	87,170.00	33,000.00	120,170.00
1900	80,075.00	127,190.00	217,265.00
1901	90,212.00	135,207.00	225,419.00
1902	80,650.36	143,273.84	223,924.20
1903	81,550.16	152,327.14	233,877.30
Total	672,470.52	1,496,344.98	2,178,815.50

Year	Tailings tons	Value
1875	20	$ 274.26
1889	8,203	46,389.36
Total	8,223	46,663.62

In addition to gold and silver, small amounts of copper and antimony ores also were produced in the early days. The production of metals in Lander County from 1902 to 1936, had a total value of $11,886,634. This annual production is shown in table 2. Other minerals that have been produced in commercial quantities are antimony, arsenic, barite, and a small amount of turquoise for gem purposes.

TABLE 2. - Gold, silver, copper, and lead production from Lander County, Nevada, 1902-1936, in terms of recovered metal

(Compiled by Charles White Merrill, Mineral Production and Economics Division, Bureau of Mines)

Year	Placer						Lode			
	No. of mines	Gold		Silver		Total value	No. of mines	Ore	Gold	
		Fine ounces	Value	Fine ounces	Value			Short tons	Fine ounces	Value
1902	-	-	-	-	-	-	4	9,538	1,266.54	$ 26,182
1903	-	-	-	-	-	-	3	9,045	1,369.98	28,320
1904	-	-	-	-	-	-	7	1,068	171.35	3,542
1905	-	-	-	-	-	-	7	425	220.64	4,561
1906	-	-	-	-	-	-	8	703	538.27	11,127
1907	-	-	-	-	-	-	10	4,463	4,211.38	87,057
1908	-	-	-	-	-	-	27	1,998	510.45	10,552
1909	-	-	-	-	-	-	16	2,080	1,926.19	39,818
1910	10	272.21	$ 5,627	46	$ 25	$ 5,652	16	12,484	1,735.98	35,886
1911	11	343.07	7,092	67	36	7,128	20	16,170	3,017.50	62,377
1912	9	513.02	10,605	87	54	10,659	32	18,653	3,899.26	80,605
1913	12	1,313.96	27,162	188	113	27,275	35	27,709	3,615.25	74,734
1914	14	4,571.58	94,503	626	346	94,849	15	6,473	972.05	20.094
1915	19	7,777.05	160,766	1,189	603	161,369	23	17,700	1,160.42	23,988
1916	11	7,435.14	153,698	1,050	691	154,389	30	16,099	2,329.88	48,163
1917	33	3,228.84	66,746	460	379	67,125	47	23,848	1,470.11	30,390
1918	6	3,690.00	76,279	490	490	76,769	48	25,432	3,874.35	80,090
1919	8	2,379.23	49,183	319	357	49,540	25	4,863	1,187.99	24,558
1920	5	1,190.89	24,618	176	192	24,810	22	3,730	351.55	7,267
1921	12	3,470.91	71,750	509	509	72,259	18	3,659	1,309.36	27,067
1922	8	2,887.74	59,695	429	429	60,124	10	6,360	181.80	3,758
1923	5	320.20	6,619	44	36	6,655	16	53,286	1,003.63	20,747
1924	6	194.90	4,029	27	18	4,047	15	66,692	1,097.53	22,688
1925	7	193.84	4,007	31	22	4,029	18	65,034	1,233.03	25,489
1926	8	254.74	5,266	36	22	5,288	21	75,349	2,515.07	51,991
1927	7	225.81	4,668	30	17	4,685	25	32,846	1,019.80	21,081
1928	6	303.89	6,282	51	30	6,312	21	37,514	766.65	15,848
1929	3	213.14	4,406	29	15	4,421	25	27,159	1,129.14	23,341
1930	9	204.29	4,223	33	13	4,236	24	9,752	1,531.07	31,650
1931	16	899.29	18,590	115	33	18,623	17	6,748	3,379.58	69,862
1932	9	1,203.56	24,880	165	47	24,927	20	4,667	4,121.94	85,208
1933	17	1,441.17	36,836	234	82	36,918	24	3,765	3,565.68	91,139
1934	27	1,129.36	39,471	174	112	39,583	55	10,725	5,960.97	208,336
1935	22	1,424.58	49,860	219	157	50,017	65	16,332	5,174.31	181,101
1936	23	1,817.00	63,595	231	179	63,774	58	26,092	7,185.00	251,475
Total	-	48,899.41	1,080,456	7,055	5,007	1,085,463	-	648,461	75,003.70	1,830,092

See footnote on page 17

TABLE 2. - Gold, silver, copper, and lead production from Lander County, Nevada, 1902-1936, in terms of recovered metal (Continued)

(Compiled by Charles White Merrill, Mineral Production and Economics Division, Bureau of Mines)

Year	Lode						Total value	Average recoverable value of ore per ton 1/	Total value (lode and placer)
	Silver		Copper		Lead				
	Fine ounces	Value	Pounds	Value	Pounds	Value			
1902	217,521	$115,286	5,907	$721	12,564	$515	142,704	14.96	$142,704
1903	242,196	130,786	3,100	391	11,620	399	159,896	17.68	159,896
1904	19,664	11,405	3,200	448	112,969	4,510	19,905	18.64	19,905
1905	27,291	16,484	3,000	468	-	-	21,513	50.62	21,513
1906	86,564	57,998	3,404	657	90,506	5,158	74,940	106.60	74,940
1907	143,535	94,733	615,544	123,109	701,312	37,169	342,068	76.65	342,068
1908	52,238	27,686	11,144	1,471	169,857	7,134	46,843	23.44	46,843
1909	61,521	31,991	4,939	642	53,116	2,284	74,735	35.93	74,735
1910	79,086	42,706	11,383	1,446	81,068	3,567	83,605	6.70	89,257
1911	160,613	85,125	6,058	757	66,142	2,976	151,235	9.35	158,363
1912	94,962	58,401	53,341	8,801	239,344	10,770	158,577	8.50	169,236
1913	121,821	73,580	119,640	18,544	121,466	5,344	172,202	6.21	199,477
1914	191,822	106,078	7,772	1,034	66,132	2,579	129,785	20.05	224,634
1915	129,941	65,880	6,760	1,183	76,686	3,604	94,655	5.35	256,024
1916	209,489	137,844	576,493	141,817	199,039	13,734	341,558	21.22	495,947
1917	125,610	103,503	2,480,602	677,204	308,388	26,521	837,618	35.12	904,743
1918	163,779	163,779	2,261,246	558,528	227,971	16,186	818,583	32.19	895,352
1919	73,464	82,280	277,699	51,652	387,370	20,531	179,021	36.81	228,561
1920	60,018	65,419	92,077	16,942	262,045	20,963	110,591	29.65	135,401
1921	25,964	25,964	28,401	3,664	70,844	3,188	59,883	16.37	132,142
1922	85,110	85,110	10,982	1,483	122,107	6,716	97,067	15.26	157,191
1923	896,520	735,146	90,830	13,352	758,625	53,104	822,349	15.43	829,004
1924	946,059	633,860	73,704	9,655	531,919	42,554	708,757	10.63	712,804
1925	975,826	677,223	80,090	11,373	334,302	29,084	743,169	11.43	747,198
1926	1,125,536	702,335	241,271	33,778	465,237	37,219	825,323	10.95	830,611
1927	801,908	454,682	1,367,637	179,161	402,496	25,357	680,281	20.71	684,966
1928	604,102	353,399	3,113,822	448,390	375,791	21,796	839,433	22.38	845,745
1929	234,684	125,087	2,457,290	432,483	135,891	8,561	589,472	21.70	593,893
1930	31,393	12,086	1,316,572	171,154	33,740	1,687	216,577	22.21	220,813
1931	4,143	1,202	142,437	12,962	5,972	221	84,247	12.48	102,870
1932	5,745	1,620	12,466	785	1,952	59	87,672	18.79	112,599
1933	16,335	5,717	62,770	4,017	4,690	174	101,047	26.84	137,965
1934	106,955	69,143	125,170	10,014	69,868	2,585	290,078	27.05	329,661
1935	136,843	98,356	114,711	9,521	68,665	2,747	291,725	17.86	341,742
1936	149,612	115,874	122,000	5,612	338,000	31,096	404,057	15.49	467,831
Total	8,407,870	5,567,768	15,903,462	2,953,219	6,907,694	450,092	10,801,171	16.66	11,886,634

1/ Not to be confused with average assay value of ore.

BATTLE MOUNTAIN DISTRICT

The Battle Mountain district is in a short, rugged range of the same name in northeastern Lander County. As originally organized, it included all of the Battle Mountain Range, an area about 15 miles long and 12 miles wide bounded by Reese River Valley on the east, Summit Springs Valley on the west, Humboldt Valley on the north, and Buffalo Valley on the south. The district includes a number of mining camps, the more prominent of which are Copper Canyon, Copper Basin, Galena, Iron Canyon, and several others of less importance. The town of Battle Mountain, near the junction of the Reese and Humboldt Rivers, is the supply center and shipping point. The town is served by the Southern Pacific and Western Pacific Railroads.

The first mineral discovery in the Battle Mountain Range was copper ore and was made by Shoshone Indians. In 1866 Sinclair, Pickett, Heath, and others located a number of copper claims, among them the Virgin, Mary Louise, and Troy (now part of the Copper Canyon Mining Co. holdings). The district was organized the same year and called Battle Mountain, from a battle fought in the vicinity in 1857 between a large force of Shoshone Indians and a Government expedition under the command of John Kirk, which was engaged in surveying the Fort Kearney wagon road, Pacific Division.

According to early reports of the Nevada State mineralogist, the Little Giant silver mine was located in 1867 and the silver deposits at Galena shortly after. By 1870, 33 mines were in operation, and two smelters of 12 and 20 tons capacity, respectively, were built at Galena.

About 1868 the copper mines were acquired by an English company called the Battle Mountain Mining Co., and for a number of years hand-sorted copper ores and concentrates were shipped to Swansea, Wales, via train to the Pacific coast and thence in sailing vessels around the Horn to England. The ore was carried as ballast, and the cost of freight from the mines to England was $35 per ton.

In 1875, the Battle Mountain Mining Co. erected a 30-ton concentrator at Willow Creek, about 3 miles from the Copper Canyon mine. The ore was crushed in a Blake-type crusher and further reduced by wet Cornish rolls. The crushed ore was separated by screening into five different sizes, and the various products were concentrated in jigs hand-operated by Chinese.

The copper mines were inactive from 1885 until 1897, when they were acquired by the Glasgow Western Exploration Co., controlled by J. & P. Coates, the thread manufacturers. This company made a small production for several years to supply its smelter at Golconda, Nev. About 1910, the company erected a leaching plant at Copper Canyon to treat the low-grade oxidized copper ores, but it was metallurgically unsuccessful, as an extraction of only 47 percent was obtained. In 1914 the Glasgow & Western Co. shut down, and in 1916 the Copper Canyon Mining Co. was formed to take over the Copper Canyon mines. In 1917 this company acquired additional mineral acreage in the Copper Basin area.

L Ander County

I. C. 7043

Consolidated Copper Co. by George L. Brandt and Peter Dory in June 1937 furnished the following data:

Metal quotation:	Silver	$0.766 per ounce	
		Ounces	
Settlement assay:	Silver	49.69	
		Percent	
	Silica	90.6	
	Alumina	4.8	
	Iron	1.1	
	Lime	.1	
		Pounds	
Net weight:		14,320	
Moisture, 1.07 percent		153	
Dry weight		14,167 or 7.083 tons	
Metal payment:	Silver, 90 percent at $0.766 per ounce		$34.26
Treatment charge:	Base charge	$6.00	
	Credit (silica)	.765	
	Net treatment charge.....	5.235	5.235
	Value per ton		29.025
	7.083 tons at $29.025		205.58
Deductions:	Hauling 7.16 tons at $8	$57.28	
	Sampling	5.00	62.28
	Net proceeds		143.30

FUTURE OF MINING IN LANDER COUNTY

From the viewpoint of past production, silver has been the most important metal mined in Lander County, the principal period of production having been between 1862 and 1880. With the exhaustion of the richer ore bodies, silver mining declined and the mining of gold and copper ores became increasingly important. At present, mining activity is confined largely to leasing operations, chiefly in the districts tributary to Battle Mountain. For many years Battle Mountain has been one of the prominent leasing areas in the State, and during the past 4 years the production of shipping ores, mainly gold with some copper, has averaged between 700 and 800 tons per month. The production of copper ores is dependent on market conditions; with a better price for copper, an appreciable increase in the production of such ores can be expected. In general, the gold ores of the Battle Mountain region vary considerably in character, and it is because of the metallurgical difficulties involved that they are not treated in a local custom mill.

Future production of metals in Lander County appears to depend largely upon the rehabilitation of old mines and additional prospecting in the known mineralized areas. In regard to further prospecting, a recent development in mining in the northern part of the State has been the discovery and exploitation of a number of gold deposits in sedimentary rocks. Among such discoveries

may be mentioned the Getchell mine in Humboldt County, the Standard mine in Pershing County, and the Goldacres mine, Buffalo Valley Mines Co., Copper Canyon mine, and Johnson-Dolezal lease in Lander County. It is often stated that Nevada has been thoroughly prospected, and while it is true that most of the mineral deposits with prominent surface features have been found, other deposits, such as the sedimentary gold deposits, which are not so conspicuous, have been overlooked. In general, the sedimentary gold deposits do not possess easily recognizable surface indications, and consequently they were passed over in former years. Moreover, the gold in such deposits usually cannot be detected by panning, so that the early prospectors, who depended largely on panning, were misled. No doubt, deposits similar in character to those already found remain to be discovered in Lander County and other areas in the State, where sedimentary formations, like shale and limestone lying in proximity to acidic intrusives, are common.