at present. A 50-pound sample taken by the writer contained 10.3 percent manganese.

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REESE RIVER DISTRICT

(168) Item 13

The Reese River district is near the town of Austin on the west slope of the Toiyabe Range in southern Lander County. It lies in Pony Canyon between Lander and Union Hills, upon which the principal mines are situated. As originally organized, the district was 75 miles long by 20 miles wide, but in recent years the limits have been restricted to an area about 8 miles long

15/ Hill, J. M., Notes on Some Mining Districts in Eastern Nevada: Geol. Survey Bull. 648, 1916, pp. 105-113.

extending from Miguel Canyon on the south to Amador on the north, and about 1 mile in width. Within this area is a belt containing silver-bearing veins; the greater part of the ore, however, has been derived from an area about 1/2 mile square. Austin, the county seat of Lander County, is on the Lincoln Highway (United States Route 50), and it is in the geographical center of the State. The altitude of the mines ranges from 6,500 to 7,000 feet.

Silver ore was discovered on May 2, 1862, by William H. Talcott, an employee of the Overland stage stationed at Jacobsville, about 7-1/2 miles west of the present site of Austin. This discovery created considerable excitement, and a great many people flocked into the area. Lander County was organized December 19, 1862, and the first county seat was Jacobsville, which by 1863 had a population of 300, 2 hotels, 3 stores, post office, telegraph office, and 50 residences. There is nothing left at present to indicate that Jacobsville once was a thriving community. By a vote of the people of the county, Austin became the county seat in September 1863. Immigration to the district reached its height in 1863, when Austin had a population of over 6,000, 3 banks, 360 houses and a large number of squatter tents, 5 clergymen, 12 physicians, 33 lawyers, and several public and private schools.

During the first 2 years of the camp's history the greatest excitement prevailed regarding the richness of the mines; at least 6,000 claims were located on the public domain, hundreds of which were sold for fabulous prices when little or no work had been done on them. Many of these later proved to be worthless. The first mill was erected by D. C. Buel in the latter part of 1863, followed by numerous others, so that by 1866 there were 20 stamp mills in the district equipped with a total of 219 stamps. Most of these mills were like the mills of the gods, in that they ground slowly, but many of them were built before there was any ore to treat. The total production of the district up to January 1864 was about $100,000.

In 1865 the Manhattan Silver Mining Co. began to consolidate the principal mines in the district by purchasing adjoining properties, so that by 1870 it controlled nearly all the mines on Lander and Union Hills. This consolidation was essential, since endless litigation over apex rights would have retarded the development of the mines. This company also purchased custom ores, so that from 1870 to 1887 it produced most of the output. In 1873 the company owned the largest mining property in the State, which included 68 claims, a 20-stamp mill, a Stedefeldt furnace for chlorination with 8 pan amalgamators and 8 settlers, 10 hoisting and 2 Cornish pumping steam engines totaling 220 horsepower, with three 6-inch-column Cornish pumps. According to the original bullion record, this company produced $19,239,033 up to 1887, nearly all of which was silver. In 1886 the Manhattan Silver Mining Co. was reorganized under a new management and the capital stock was increased from 1,000,000 to 5,000,000 shares. The following year the property was attached by unpaid employees.

In 1888 an attempt was made to work the property by a company called the Manhattan Mining & Reduction Co. After working the dumps and mining some ore from the Union mine, the company closed in 1890. In 1891 the property was

acquired by the Austin Mining Co., controlled by the J. G. Phelps Stokes interests of New York. During the next 10 years this company acquired additional ground and drove the Austin-Manhattan drainage and haulage adit to explore the veins on Lander Hill at depth. This adit has its portal in Pony Canyon near the site of the former railroad station; it was 5,985 feet in length with a lateral crosscut 2,900 feet long branching off at a point 3,855 feet from the portal. A 40-stamp concentrating mill was also built near the portal of the Austin-Manhattan adit, in which some ore was milled. Several transfers of the property took place between 1904 and 1908, when the Austin Manhattan Consolidated Mining Co. obtained possession. This company rehabilitated some of the old mines and produced some ore. In 1910 a concentrating plant was erected at the lower end of Pony Canyon and was put in operation the same year. The mill equipment included six Huff electrostatic separators, two crushers, and two concentrating tables. The mill is said to have been unsuccessful, and in 1920 the company passed into the hands of a receiver.

Except for sporadic leasing operations, there was very little activity in the district between 1911 and 1935. In 1935 nearly all of the old productive mines adjacent to the town of Austin were acquired by the Austin Silver Mining Co., which has since been operating in the district.

In addition to the Austin Silver Mining Co. holdings, a number of other groups of claims are owned chiefly by individuals. During the past 40 years a number of small companies have been organized from time to time to work mines in the district, but all of these were short-lived.

The production of the district from 1862 to 1903 is estimated by the writer, from the data available, to have been about $26,000,000. The production from 1902 to 1936, inclusive, was $332,097, chiefly silver, with some gold and a little lead and copper. The annual production for the district from 1902 to 1936 is shown in table 7.

The geology of the Reese River district has been described by Emmons[16/] and by Hill[17/].

Early-Day Metallurgy and Mining

In the early days of the Reese River district attempts were made to treat the ores by the Washoe process as developed on the Comstock lode, but, as the ores were refractory, the results were generally unsuccessful. The Washoe process consisted of wet-crushing in stamps followed by amalgamation in various types of iron pans. As more information on the character of the ores was obtained, the Reese River process was developed. This consisted of dry-crushing with stamps and a chloridizing roast, followed by amalgamation as in the Washoe process. Chlorination was not essentially new, since the extraction of gold by leaching with chlorine gas was first used by Plattner at Freiberg, Germany, some years previous; it was first introduced into the United States by G. W. Deetken at the Eureka and Idaho mills of Grass Valley, Calif., in 1857. The Reese River process was applicable to silver ores containing arsenical and antimonial sulphides, and the object of roasting was to convert the sulphides into chlorides, so that precious metals could be recovered by amalgamation.

16/ Emmons, S. F., Geology of the Toiyabe Range: Geological Exploration of the Fortieth Parallel, Washington, D. C., 1870, pp. 320-348.
17/ Hill, James M., Some Mining Districts in Northeastern California and Northwestern Nevada: Geol. Survey Bull. 594, 1915, pp. 95-114.

TABLE 7. - Gold, silver, copper, and lead production from Reese River District, 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	-	-	-	-	-	-	1	50	26.60	$550
1903-04	-	-	-	-	-	-	-	-	-	-
1905	-	-	-	-	-	-	3	205	77.64	1,605
1906	-	-	-	-	-	-	4	193	54.71	1,131
1907	-	-	-	-	-	-	2	586	32.26	667
1908	-	-	-	-	-	-	10	161	65.55	1,355
1909	-	-	-	-	-	-	3	618	158.28	3,272
1910	-	-	-	-	-	-	6	674	182.11	3,765
1911	-	-	-	-	-	-	7	3,043	1,054.61	21,801
1912	-	-	-	-	-	-	8	86	76.25	1,576
1913	-	-	-	-	-	-	8	3,952	199.44	4,123
1914	-	-	-	-	-	-	4	3,015	12.22	253
1915	-	-	-	-	-	-	4	63	12.79	264
1916	-	-	-	-	-	-	2	78	.20	4
1917	-	-	-	-	-	-	7	101	7.50	155
1918	-	-	-	-	-	-	9	107	54.96	1,136
1919	-	-	-	-	-	-	4	55	2.54	53
1920	-	-	-	-	-	-	5	121	33.13	685
1921	-	-	-	-	-	-	3	18	2.79	58
1922	-	-	-	-	-	-	2	52	32.07	663
1923	-	-	-	-	-	-	2	9	1.35	28
1924	-	-	-	-	-	-	2	231	9.66	200
1925	-	-	-	-	-	-	1	1	1.01	21
1926	-	-	-	-	-	-	2	40	18.20	376
1927	1	1.71	$35	2	$1	$36	4	42	6.65	137
1928-29	-	-	-	-	-	-	-	-	-	-
1930	-	-	-	-	-	-	2	28	14.25	295
1931	-	-	-	-	-	-	-	-	-	-
1932	-	-	-	-	-	-	1	36	40.14	830
1933	1	1.56	40	-	-	40	3	7	12.25	313
1934	-	-	-	-	-	-	5	12	7.92	277
1935	-	-	-	-	-	-	8	966	33.51	1,173
1936	-	-	-	-	-	-	8	7,682	79.50	2,783
Total	-	3.27	75	2	$1	76	-	22,232	2,310.09	49,549

See footnote on page 72

TABLE 7. - Gold, silver, copper, and lead production from Reese River District, 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	-	-	-	-	-	-	$550	$11.00	$550
1903-04	-	-	-	-	-	-	-	-	-
1905	22,321	$13,482	-	-	-	-	15,087	73.60	15,087
1906	54,634	36,605	3,109	$600	14,000	$798	39,134	202.77	39,134
1907	27,788	18,340	2,640	528	-	-	19,535	33.34	19,535
1908	15,953	8,455	212	28	6,691	281	10,119	62.85	10,119
1909	9,127	4,746	1,562	203	19,837	853	9,074	14.68	9,074
1910	27,159	14,665	6,797	863	72,076	3,172	22,465	33.33	22,465
1911	101,592	53,844	1,972	246	29,067	1,308	77,199	25.37	77,199
1912	3,390	2,085	12	2	47	2	3,665	42.62	3,665
1913	18,246	11,021	348	54	922	40	15,238	3.86	15,238
1914	12,783	7,069	104	14	4,076	159	7,495	2.49	7,495
1915	4,745	2,406	96	17	-	-	2,687	42.65	2,687
1916	3,707	2,439	121	30	-	-	2,473	31.71	2,473
1917	3,455	2,847	284	78	10,476	900	3,980	39.41	3,980
1918	7,638	7,638	181	45	3,227	229	9,048	84.56	9,048
1919	4,013	4,495	35	7	43	2	4,557	82.85	4,557
1920	8,810	9,603	153	28	3,754	300	10,616	87.74	10,616
1921	2,575	2,575	225	29	1,563	70	2,732	151.78	2,732
1922	4,972	4,972	39	5	124	7	5,647	108.60	5,647
1923	984	807	-	-	-	-	835	92.78	835
1924	2,571	1,723	-	-	3,009	241	2,164	9.37	2,164
1925	1	1	-	-	-	-	22	22.00	22
1926	1,300	811	-	-	-	-	1,187	29.68	1,187
1927	7,134	4,045	652	86	3,934	248	4,516	107.52	4,552
1928-29	-	-	-	-	-	-	-	-	-
1930	1,647	634	-	-	-	-	929	33.18	929
1931	-	-	-	-	-	-	-	-	-
1932	384	108	-	-	363	11	949	26.36	949
1933	223	78	-	-	56	2	393	56.14	433
1934	4,554	2,944	101	8	311	12	3,241	270.08	3,241
1935	16,179	11,629	647	54	14,702	588	13,444	13.92	13,444
1936	51,504	39,890	1,869	172	5,897	271	43,116	5.61	43,116
Total	419,389	269,957	21,159	3,097	194,175	9,494	332,097	14.94	332,173

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

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At first, reverberatory furnaces having either one or two hearths, imported from Europe, were used. Because of their limited capacity and the skill required in their manipulation, a number of mechanical roasters were invented, including the White, Bruckner, Howell, and Stetefeldt. The last was an important contribution to the metallurgy of refractory silver ores, not only at Reese River but in other districts in the West. C. A. Stetefeldt discovered that silver ores mixed with salt are completely chloridized if they fall against a current of hot air rising in a shaft with no obstructions whatever to check or retard the fall of the ore particles. Instead of requiring from 4 to 8 hours to chloridize the ore, as in the reverberatory furnaces, it was done in the Stetefeldt furnace in a few seconds. The first experiments with this furnace were made in the Murphy mill, Ophir Canyon, Nev., in 1867, and in 1870 a Stetefeldt furnace was erected by the Manhattan Silver Mining Co. at Austin. This company had the exclusive right to the use of the furnace in the district and paid a royalty of $2 per ton. It was so superior in economy and operation to others then used that it gave the company a virtual monopoly on the milling of ores in the district. The gain in the treatment of rich ore amounted in some cases to as much as $20 per ton.

The Stetefeldt furnace was heated by gases produced from charcoal in two gas generators. A third generator produced gases for heating and chloridizing the dust, which was drawn by a strong draft into the main flue. The height of the furnace from cooling floor to the hopper was 30 feet; and the pulverized ore mixed with salt fell against the flame for a distance of 18 feet. A description of the furnace used by the Manhattan Silver Mining Co. is given by Raymond[18].

> The flame from the generators enters the furnace a little over 6 feet above the cooling floor, and the bottom of the flue above is 4-1/2 feet below the top. The inside size of the shaft at its lower end is 5 feet square. The bottom inclines toward the discharge door and tapers toward the top, where the size of the shaft is 3-1/2 feet square. The finely divided ore sifts into the furnace in a continual shower by a special feeding arrangement.
>
> A very expensive system of dust chambers is connected with the furnace. As the dust has to pass the fireplace in the main flue before it can reach them, the ore found here is the most perfectly roasted. From the dust chambers the waste heat passes under the large dry kiln and thence into the chimney. For the first month the cost of roasting was $6.48 per ton as compared with $15.34 per ton in the reverberatories previously used.

After being roasted, the ore was fed to amalgamating pans holding a charge of about 1,000 pounds. Sufficient water was added to the charge to bring the pulp to the desired consisteney; each pan was equipped with an iron muller, which revolved at a speed of about 40 revolutions per minute to break up the lumps and agitate the material. Quicksilver was added after the pulp had been stirred enough, the amount depending on the grade of the ore. The stirring continued for about 6 hours, when the charge was run into a settler similar in design to the amalgamating pan, but with stirrers made of wood. The fluid

18/ Raymond, Rossiter W., Mineral Resources in States and Territories West of the Rocky Mountains (1870): Washington, D. C., 1872, p. 119.

amalgam was collected from the settlers, strained to eliminate the excess mercury, and the amalgam was retorted. The bullion averaged about 700 fine; the loss of quicksilver was approximately 1-1/2 pounds per ton of ore worked. The power for milling was furnished by steam engines. Wood for fuel was chiefly pinon pine obtained locally.

The Manhattan mill had 20 stamps, which operated dry. By chloridizing roasting in the Stetefeldt furnace and amalgamation, about 90 percent of the assay value was recovered on ore averaging about $230 per ton.

The annual report by the Board of Trustees of the Manhattan Silver Mining Co. for the year 1873 contained the following interesting data on mining and milling costs.

From Oregon and North Star mines:

2,287.25 tons ore, producing $224.50 per ton		$513,487.63
Milling expenses ($34.99 per ton)	$80,030.88	
Mining expenses ($78.26 per ton)	179,010.19	259,041.07
		254,446.56

From other mines:

696.75 tons, producing $212.72 per ton		148,212.66
Milling expenses ($34.99 per ton)	24,379.28	
Mining expenses ($137.31 per ton)	95,670.74	120,050.02
		28,162.64
Profit on custom ores:		
1,674.5 tons at $27.74 per ton		46,450.63
Profit for 1873		329,059.83

The cost per ton for reduction of the ores during 1874 was distributed as follows:

Labor	$9.35
Fuel	10.12
Supplies	2.06
Quicksilver	2.75
Salt	2.72
Official labor	1.17
Castings	1.99
Hauling	1.35
Total per ton	31.51

The cost of labor and supplies was not particularly high, considering the isolation of the region and the poor transportation facilities, and in the light of present-day metallurgical knowledge it is difficult to justify such extremely high mining and milling costs. Some data on the cost of labor in 1870, as given by Raymond[19], were as follows:

Wages for first class miners.....	$4 per day.
Wages for surface laborers.....	$4 per day.
Cost of lumber.....	$120 per M.
Cost of mining timber.....	$0.75 for post 6 inches diameter by 6 feet long.
Cost of common powder.....	$22 to $26 per 100 pounds.
Cost of giant powder.....	$1.40 to $1.40 to $1.50 per pound.
Cost of quicksilver.....	$0.67 per pound.
Cost of freight from Argenta.....	$0.02 per pound.
Cost of fuel (locally cut).....	$9 to $11 per cord.
Cost of 10-stamp mill, California pattern, including freight, erection, etc.	$40,000 to $50,000
Cost of 20-stamp mill, California pattern, including freight, erection, etc.	$75,000 to $100,000

Salt was an essential item in the reduction of the Reese River ores, and fortunately it existed in great abundance within convenient distances from the mines. The salt was obtained from the desert playas, the principal source of supply being Spaulding Salt Marsh in Smoky Valley 35 miles south of Austin. Here the salt was gathered from the surface, and it required no purification before use. Laid down at Austin, the cost ranged from $30 to $40 per ton. The salt required for chlorination amounted to about 10 percent of the weight of the ore.

A large proportion of the ore in the district was milled on a custom basis. In the first years of the camp's history the milling cost was $75 per ton, but this cost was reduced in 1866 to $45 per ton. A contemporary newspaper[20] contained the following editorial on milling costs:

> One of the greatest drawbacks to the development of a large number of mines in this and other districts has been the excessively high rate of reductions. Ore that was worth $50 to $75 per ton would not pay the owner for extraction, and the miners generally concluded that it had better be allowed to remain in its native matrix. In today's issue, Capt. A. L. Page, general superintendent of the Keystone mill and mines, agrees to reduce ores in lots of 20 tons and upwards at $45 per ton, and smaller lots at the rate of $50 per ton; and he guarantees to pay 80 percent of the assay value of the pulp on each particular lot of ore. This will be stirring news to our miners and will cause many an idle mine to bring forth fair fruit of silver.

19/ Raymond, Rossiter W., Mines and Mining in States and Territories West of the Rocky Mountains (1870): Washington, D. C., 1871, pp. 139-140.
20/ Reese River Reveille, Apr. 21, 1866.

> Hitherto miners have complained, we think justly, that the mill charges were excessively high and completely absorbed the values of their ores, and as their labor was unremunerative they were forced to close their mines. Captain Page has proposed a handsome proposition, and if the miners will reopen their claims and work earnestly and systematically a better state of mining will be brought about and something like a proper spirit of co-operation will pervade the relation of mine and mill.

The Keystone mill, erected in 1865, was equipped with 20 750-pound stamps, 8 reverberatory furnaces with hearths 11 by 13 feet, 14 pan amalgamators 5 feet in diameter, and 6 settlers 6 feet in diameter.

After the Manhattan Silver Mining Co. obtained a milling monopoly in the district by the exclusive use of the Stetefeldt furnace, the custom milling charges were reduced to $35 per ton; 80 percent of the assay value was allowed on ores assaying $400 or less, and 82 percent on ores assaying over $400 per ton. These rates remained in effect during the period when the district made its greatest production.

A Krom dry concentrator was installed by the Manhattan Co. in 1875 as an adjunct to milling operations but was unsuccessful. Subsequently the Wren process, discovered and patented by Thomas Wren, one of the pioneers of the district, was installed. This process was based largely upon a separation by screening, on the principle that the metallic particles in the ore were reduced by crushing to a finer state of division than the gangue, so that a rough concentration could be effected. Gravity concentration with water also constituted part of the process.

Although the Reese River process was very inefficient compared with modern metallurgical practice, it constituted an important advance in metallurgy.

The earliest mining in the district appears to have been more a random hit-or-miss proposition than a well-directed effort at practical mining. Prior to the acquisition of the principal properties in the district by the Manhattan Silver Mining Co. in 1870, the mines were worked by a number of individual owners. The large number of small claims and the faulted condition of the network of narrow but rich veins in a limited area were fruitful sources of litigation. Speaking of this condition of affairs, Raymond[21] states:

> One of the greatest obstacles in the way of successful mining in the Reese River district is the great number of small veins claimed by different individuals. Each mine is generally worked by itself, and sometimes there is hardly room on the surface for the necessary buildings and dumps. On Lander Hill, there is one place where, within a space of about 1 acre, there are five different hoisting works belonging to different owners. This is obviously a very expensive and inconvenient way of working mines. Again, it is not always practicable to keep reserves ahead with

21/ Raymond, Rossiter W., Mines and Mining in the States and Territories West of the Rocky Mountains (1870): Washington, D. C., 1871. p. 132.

one small vein, especially in cases where mine and mill are owned by the same party. Ore must be obtained for the mill; and if, in prospecting ahead, a barren spot is reached, the known reserves must be attacked to supply the deficiency. In working large veins or many small veins this difficulty is not felt. If one vein is temporarily barren, there are others to fall back upon. Much better work at much less expense could be done on Lander Hill if one company owned a large number of parallel or contiguous claims and worked them through one or two shafts or through a deep tunnel.

With reference to mining costs, Raymond22/ states:

> The mining cost per ton of ore varies excessively according to the width of the vein and the hardness of the ground. In the Manhattan, I believe, it has been as high as $50 per ton; and, indeed, the average cost per ton for the year ending July 1, 1869, at that mine (all expenses except dead work included) was over $51. Other mines on Lander Hill are not likely to have been much better off.

Part of the high mining costs is attributable to the fact that the veins were narrow and the ores were generally hand-sorted twice - once in the mine and again at the surface. The veins were so narrow that the early miners facetiously referred to them as "razor blades", "shoe strings", or "paper cutters". After 1870 most of the ore was mined by the leasing system with general satisfaction to both the mine owners and contractors. In regard to the introduction of the tribute or leasing system, a report written in January 1873 by J. E. Clayton for the Manhattan Silver Mining Co. contains the following:

> During the years 1868-1869, the company had much difficulty in procuring efficient labor. This was owing to two causes: (1) The discovery of the White Pine and Pioche mines drew off a large portion of the best miners, leaving a very indifferent class of workmen in this district; and (2) the veins being small and the underground work being much spread out and scattered, it was found to be impossible to get faithful, honest work done. These difficulties appeared at one time to be almost fatal to the success of the enterprise, but they were overcome by a radical change in the labor management. This was effected by the adoption of the contract and tribute system for all underground work. This change could not be made suddenly without a large falling off of the production of the mines, but the company contented itself with doing custom work in their mill and allowing the work on its own mines to lie comparatively idle. The miners, however, gradually became reconciled to the change, and the work of development and consequent yield of the mines were gradually increased during the last two years. The present tribute system has become established, and a good supply of Cornish miners is now settled in the district.

22/ Work cited, page 140.

In stoping ore, lessees or tributers were paid a percentage of the values recovered. Some leases were let with a royalty as low as 7 percent of the gross yield, and the ores were so rich that the lessees were able to realize large profits for their labor. In unproductive ground the lessees were paid a stipulated price per foot, which was regulated according to the character of the ground and working conditions. The rate for drifts was generally $1.50 per foot and for crosscuts $2, the workmen furnishing all supplies and receiving 50 percent of the net value of any ore mined during the progress of the work. The system was undoubtedly a good one, as the contractors became interested in the workings and carried on operations with greater vigor and economy than would have been possible under company account. The veins were worked by resuing.

Chinese workers were brought into the district in the seventies. The experience of the Central Pacific Railroad, which employed many Chinese in the construction of the road across Nevada, first called attention to the qualifications of the Chinese as miners. A number of attempts were made to employ Chinese labor but the results were generally unsuccessful due to the hostility of other miners or to the difficulty of managing the Chinese.

The hoisting plants at the mines were steam-driven. Water found in the mines at a depth of about 75 feet from the surface was handled by steam-driven Cornish pumps.

Austin Silver Mining Co.

The Austin Silver Mining Co., a Nevada corporation with a capitalization of 1,000,000 shares, par value $1, controls a large group of patented and unpatented claims in the heart of the Reese River district. The company holdings include nearly all of the principal producing mines of former years. Operations were begun about 3 years ago, and up to May 1938 about 25,000 tons of ore had been treated in the company-owned mill. In May 1938 mining operations were discontinued temporarily, except for a little development work in the Camargo workings and several leasing operations at the Jack Pot mine.

Development includes a number of shafts, inclines, and lateral workings totaling about 15 miles. Many of the workings are caved and inaccessible. The Austin-Manhattan adit cuts the Frost shaft on Lander Hill at a depth of 660 feet below the collar. The deepest workings attain a depth of about 700 feet. Equipment includes a 100-ton flotation mill erected in 1935 near the portal of the Austin-Manhattan adit. The mill is equipped with two crushers, an Eimco Ball mill (5 by 6 feet), duplex classifier, seven Fagergren flotation cells, filter, oil-fired pans and rotary drier for concentrates, and an assay office. The Camargo workings are equipped with a 25 horsepower Fairbanks-Morse geared hoist, a Gardner single-stage compressor belt driven by a gasoline engine, blacksmith shop, and necessary mining tools. Power for milling is furnished by a 4-cylinder Busch-Sulzer Diesel engine and a 125-horsepower caterpillar Diesel engine both connected to alternating-current generators. The company also owns other mining equipment, a partly equipped machine shop near the mill, and an office building at Austin.

The principal rock in the most productive portion of the district is quartz monzonite, which is cut by a series of basic dikes. The ore is in shoots in a number of quartz fissure veins frequently displaced by faults. While there are a number of other small veins in the district, the principal production has been derived from a series of parallel veins having a northwest-southeast strike and a dip to the northeast. The veins are narrow, ranging in width from a few inches to 3 feet. The average width mined in former years was probably about 15 inches. The ores, however, were unusually rich, which in a great measure compensated for the narrowness of the veins. From the old records the grade of the ore mined in the early days apparently ranged from $100 to as high as $400 per ton and averaged about $175 per ton. Silver chloride was the principal economic mineral in ores from the surface to a depth of about 75 feet. At that depth water was present, and the mineralization changed. Below water level the ore minerals are ruby silver (both light and dark), polybasite, enargite, stephanite, ibnite, silver glance (?), galena, sphalerite, copper glance, pyrite and marcasite, arsenopyrite (pyragyrite and proustite), tetrahedrite, and chalcocite.

Barite deposit

Barite occurs in the Reese River district 9-1/2 miles southeast of Austin and 1 mile north of the Lincoln Highway. A group of three unpatented claims owned by Gus Laurent of Austin covers the principal veins. Although the deposits have been known for a number of years, their exploitation is handicapped by their distance from consuming centers; Battle Mountain, the nearest rail shipping point, is 100 miles northward.

The barite occurs in a series of veins, variable in strike, with a general flat dip averaging about 20° and ranging from 1 foot to 5 feet in width, averaging about 4 feet. The country rock is a decomposed monzonite. Deposits have been opened by a number of surface cuts and short adits totaling not more than 100 feet in length. The barite is of good quality, crystalline in character, easily crushed, and virtually free of any impurities except a small amount of oxide. Judging from the wide distribution of barite float found in the locality, a number of other veins probably are present, in addition to those already found. The veins are covered with a mantle of sandy detritus to a depth of 1 to 6 feet, and prospecting could be done easily by trenching with tractor and scraper, if such work were warranted.

SKOOKUM DISTRICT