

The deposit is 1,000 feet above Walker River at Schurz and 5,100 feet above sea level. The summits of the adjacent mountains rise about 500 feet higher. The region is very arid, the average rainfall being about 5 inches a year.

Stringers and small masses of manganese oxides crop out more or less abundantly for 3,000 feet along the course of a shear zone 50 feet wide that cuts rhyolite and rhyolite tuff of Tertiary age. They consist mainly of psilomelane and pyrolusite that have replaced sheared rhyolite. The greatest depth attained in the workings is 6 feet. The depth to which the oxides extend is not known, but it is probably as much as 25 feet. Although manganese oxides extend along the zone for 3,000 feet, only parts of it may be workable. The largest body of this description, which is 300 feet long and from 5 to 8 feet wide, was estimated to contain 10 per cent of manganese and more than 20 per cent of silica. The associated minerals are quartz and a small quantity of iron oxides, and the zone as a whole was estimated to contain from 50,000 to 100,000 tons of material that will run from 5 to 15 per cent of manganese. The manganiferous material is amenable to concentration, and a high-grade product can be made, but the lack of water precludes treating the material at the deposit by hydraulic gravity processes.

The manganese deposit is associated with manganiferous silver veins, but the parent mineral from which the manganese oxides were derived is not shown.

HOT CREEK DISTRICT.

SURPRISE PROSPECT.

The Surprise claim of T. L. Wiswall and others is about 2 miles north of Tybo and 70 miles northeast of Tonopah, the nearest railway point.

The deposit consists of narrow veins along faults in travertine of Pleistocene or Recent age. The veins are composed of psilomelane and pyrolusite, with more or less calcite, quartz, and limonite. They were formed mainly by an incomplete replacement of the travertine. So far as disclosed by an open pit 5 feet deep the veins are from 1 to 2 feet wide and not very persistent. The material that fills them is estimated to average about 20 per cent of manganese and to be low in silica. Probably 10 per cent of it could be selected to run 40 per cent or more of manganese.

No shipments from this claim are reported.

SODAVILLE DISTRICT.

BLACK JACK PROSPECT.

The Black Jack prospect of C. W. Ward, a small manganese deposit 1 mile southwest of Sodaville, is of special interest because

it contains a small 1917, by E. S. Lan addition to tungst tin. Samples obt strong reaction for

W. S. Palmer¹ this deposit that c 3.25 per cent of iron

The country ro tion. In a zone 5 of manganese oxide there. As shown feet. The largest long and 18 inch chalcedony, and g per cent of mang may be selected in and 10 to 15 per c

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A claim owned ern slope of the which it is reached deposit developed from it at the time is 5,500 feet, and climate is arid, the

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faults in travertine composed of psilomelane, quartz, and limonite. replacement of the feet deep the veins cent. The material per cent of manganese of it could be

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it contains a small amount of tungsten. It was visited in August, 1917, by E. S. Larsen and again in July, 1918, by J. C. Jones. In addition to tungsten the ore is said to assay a small percentage of tin. Samples obtained by Mr. Larsen, however, though giving a strong reaction for tungsten, did not show any tin.

W. S. Palmer¹ reports 2.4 per cent of tungsten in a sample from this deposit that contained in addition 28.25 per cent of manganese, 3.25 per cent of iron, and 4.4 per cent of insoluble residue.

The country rock is quartzite of the Triassic Star Peak formation. In a zone 50 feet wide and 1,000 feet long streaks and veins of manganese oxides and chalcodony replace the quartzite here and there. As shown by a shaft they extend to a depth of at least 20 feet. The largest mineralized mass is a tabular body about 20 feet long and 18 inches thick. It consists of psilomelane, pyrolusite, chalcodony, and gypsum and is estimated to contain from 20 to 25 per cent of manganese and 15 to 40 per cent of silica. Material may be selected in mining to carry 35 to 40 per cent of manganese and 10 to 15 per cent of silica.

No shipments from this prospect are reported.

GOLCONDA REGION

MAJOR MINE.

A claim owned by Tom Major is situated near the base of the eastern slope of the Sonoma Range, 12 miles south of Golconda, from which it is reached by a good wagon road. It contains a manganese deposit developed by a 40-foot shaft, but no ore had been shipped from it at the time of visit (June 20, 1918). The altitude at the shaft is 5,500 feet, and the maximum local relief is about 2,000 feet. The climate is arid, the average annual rainfall being about 8 inches.

The country rock consists of shale and dolomitic limestone of the Triassic Star Peak formation, which strike N. 55° W. and dip 45° SW. The manganiferous body occupies a circular area 100 feet in diameter between the shale and the limestone. It consists of a mixture of limonite and manganese oxides, chiefly psilomelane and pyrolusite, together with quartz, calcite, and a little galena and rhodonite. The oxides are known to persist to a depth of at least 40 feet. The depth to water level is not known. The deposit is derived from the weathering of manganiferous lead-silver veins in which the parent manganese mineral was probably rhodonite.

IRON MASK GROUP AND ADJOINING CLAIMS.

Some small deposits of manganese oxides about 3 miles east of Golconda that have received more or less notice because of their late geologic age and the fact that they contain tungsten were visited by

¹Tungsten in manganese ore: Eng. and Min. Jour., vol. 105, p. 780, 1918.

E. S. Larsen in August, 1917, and by J. T. Pardee early in June, 1918. The known deposits are within the Iron Mask group of claims, belonging to the Noble Electric Steel Co.; the Surprise claim, of Louis Navarine; and the claims of Lee Swartz and Sam Casper.

Manganiferous deposits in an area at present covered by the Iron Mask claims were discovered in 1885 and explored a little in the expectation of finding gold or silver. A few years later they were visited by Penrose,¹ who wrote a description including an analysis of the ore that shows among other things the presence of 2.20 per cent of tungsten. Still later they were examined and described by Harder.² In 1916 the known area of the deposits was extended southward as the result of a search by J. D. Leonard and others for tungsten and manganese ores. Late in 1917 manganese oxide ore was mined on the Iron Mask claims by the Noble Electric Steel Co., and in the spring of 1918 Louis Navarine made a shipment from the Surprise claim. The total production does not exceed 100 tons. No recovery of tungsten is reported. In July, 1918, the workings were idle.

The area surrounding the deposits is underlain by shale of Triassic age and calcareous tufa deposited by the Quaternary Lake Lahontan. The shale strikes northeastward and is steeply tilted and indurated or rendered somewhat like a hornfels by metamorphism. The tufa extends southward a mile or more from two small knolls mentioned by Harder.³ It forms a thin, somewhat patchy horizontal sheet that lies on the upturned eroded edges of the shale. As a rule the areal boundaries of the tufa are irregular, but along the west of the knolls a straight line having a direction of N. 25° E. separates tufa for a short distance from shale on the west. As shown by one of the mine workings described on page 237, this line is the trace of a fault that runs parallel to the bedding of the shale and has cut the tufa and downthrown the block on the east.

Most of the known deposits are along a course about three-quarters of a mile in length that coincides with the line mentioned and its southward extension. At the south several small pits expose a thin layer of manganese and iron oxides beneath a few feet of soil and tufa. Northward from these is a pit on the Surprise claim, from which manganese ore was shipped in 1918. Here a layer of ore from 6 to 18 inches thick rests on clay and dips 20° NW., passing beneath the tufa. It is composed chiefly of soft, sooty manganese oxides, with streaks and bunches of iron oxides along the margins. Here and there stringers of the oxides pass upward into the tufa.

¹ Penrose, R. A. F., Jr., Manganese, its uses, ores, and deposits: Arkansas Geol. Survey Ann. Rept. for 1890, vol. 1, p. 479, 1893.

² Harder, E. C., Manganese deposits of the United States: U. S. Geol. Survey Bull. 427, pp. 153-157, 1910.

³ Idem, p. 154.

The composition in the laboratory follows:

Partial analysis

Silica (SiO₂) ---
Manganese oxide ---
Oxygen (O) ---
Ferric oxide (Fe₂O₃) ---
Lime (CaO) ---
Baryta (BaO) ---
Tungstic oxide ---

Manganese (Mn) ---
Tungsten (W) ---

Sample
Tungstic oxide ---
Tungsten (W) ---

The car sample
32.5 per cent of manganese
0.056 per cent of tungsten

Northward from the open cut, a 20-foot claim. In the vicinity moved by erosion a veinlets. A vertical width is shown by which there are iron oxides and a 6-inch with manganese ore laboratory of the tungsten trioxide.

The shaft is situated N. 25° E. and, for the west from tufa composed of shale bedding. A 1-foot along this fault to surface and passes this deposit, which rods in extent and

The large open iron oxides form

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... Surprise claim, of
... and Sam Casper.

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U. S. Geol. Survey

U. S. Geol. Survey Bull. 427,

The composition of this body as shown by partial analyses made in the laboratory of the United States Geological Survey is as follows:

Partial analyses of material from the Surprise mine.

[Chase Palmer, analyst.]

Sample G 71, average of 10-inch streak.

| | |
|--|-------|
| Silica (SiO ₂) | 4.70 |
| Manganese oxide (MnO) | 48.96 |
| Oxygen (O) | 6.95 |
| Ferrie oxide (Fe ₂ O ₃) | 12.00 |
| Lime (CaO) | 1.99 |
| Baryta (BaO) | 4.73 |
| Tungstic oxide (WO ₃) | 1.54 |
| | 80.87 |
| Manganese (Mn) | 37.92 |
| Tungsten (W) | 1.22 |

Sample G 72, material showing much iron oxides.

| | |
|-----------------------------------|------|
| Tungstic oxide (WO ₃) | 1.90 |
| Tungsten (W) | 1.50 |

The car sample of a 30-ton shipment made in June, 1918, shows 32.5 per cent of manganese, 5.2 per cent of iron, 6.2 per cent of silica, 0.056 per cent of phosphorus, and 1.5 per cent of tungsten.

Northward from the Surprise pit in the order named are a small open cut, a 20-foot shaft, and a large open cut on the Iron Mask claims. In the vicinity of the small open cut the tufa has been removed by erosion and the shale exposed contains a network of quartz veinlets. A vertical northeastward-trending lode 3 feet or more in width is shown by the open cut. It is made up of altered shale in which there are irregular streaks and bunches of manganese and iron oxides and a 6-inch vein of quartz that is brecciated and recemented with manganese oxides. A sample of this vein analyzed in the laboratory of the Geological Survey yielded 0.70 per cent of tungsten trioxide.

The shaft is sunk along a nearly vertical fault plane that strikes N. 25° E. and, for a few feet below the surface, separates shale on the west from tufa on the east. At greater depths both walls are composed of shale and the fault plane appears to coincide with the bedding. A 1-foot vein of manganese and iron oxides that comes up along this fault turns to a horizontal position before reaching the surface and passes eastward into the tufa. The horizontal part of this deposit, which consists largely of iron oxides, is several square rods in extent and ranges from 1 foot to 4 feet in thickness.

The large open cut exposes a flat-lying body of manganese and iron oxides formed along the surface of the shale beneath the tufa.

As exposed the body is at least 150 feet long, 20 feet wide, and 3 feet or more in maximum thickness. It is composed mainly of the softer oxides of manganese, together with some psilomelane. A moderate amount of calcite is intergrown with these minerals. The iron oxides as a rule form separate streaks and patches. Ore shipped by the Noble Electric Steel Co. is said to have contained the characteristic small percentage of tungsten.

The body in general is somewhat cavernous and friable. The shale beneath is quartzose and contains several vertical stringers of manganese that pass into the main ore body.

Specimens from the margin of the deposit show that manganese and iron oxides have replaced the calcium carbonate of the tufa but not the fragments of shale that are commonly embedded in it. The top of the deposit is very irregular because of chambers and chimneys that project into the tufa. Altogether the evidence seems to indicate to the writer that the deposit was formed almost wholly by replacement.

The origin of the deposits is ascribed by Penrose¹ and Harder² to hot springs that were contemporaneous with the Quaternary Lake Lahontan. According to these authors the springs supplied manganese in solution to a lagoon temporarily cut off from the lake. From the lagoon the manganese was precipitated, forming a lenticular bed that was covered by tufa during a subsequent stage of high water. The facts set forth are believed to show, however, that the deposit is later than the tufa and was introduced into it through a quartz lode that had been reopened by faulting. The sequence of events was apparently as follows:

A quartz lode formed along a N. 25° E. fracture along a bedding plane in the steeply tilted Triassic shale was exposed by erosion. Subsequently the outcrop of the lode and the adjacent surface of the shale were covered by tufa deposited by Lake Lahontan. Movements between the walls of the fracture brecciated the quartz lode and caused a dislocation of the tufa. Solutions rising through the reopened quartz lode spread out horizontally as soon as the surface between the shale and the tufa was reached and, by replacing the tufa, deposited the flat-lying bodies of manganese and iron oxides.

HANSEN & KNUDSEN CLAIMS.

The Hansen & Knudsen claims, situated in the northern part of the Battle Mountain Range, 11 miles southwest of Iron Point, on the Southern Pacific Railroad, produced a few carloads of manganese ore prior to June 22, 1918.

¹ Penrose, R. A. F., jr., op. cit., p. 476.

² Harder, E. C., op. cit., p. 156.

DEPOSITS

The deposits lie at or near sea level, and the surface is

The manganiferous lenses that stand out from the Star Peak formation are lenslike bodies that are up to 10 feet thick with rhodonite and pyrite. The greatest diameter of the ore occurs which are 10 feet thick.

Unoxidized lenses of ore occurs as rhodonite. The largest lenses are 10 feet thick.

The deposits are composed of 5 tons of the ore per cent of manganese. There is material of this grade.

The oxide ore is composed of rhodonite and pyrite. It is deposited as part of the same formation similar in origin to the Black Diamond formation.

The Black Diamond Co. and Frank O'Connell are visible from Stonch. The range is 100 feet long, respectively 100 feet, caps a small range. Hills in the range above it, and the River, the nearest reported.

The country rock is a quartzite which dips 10°-20°.

In one place material is not known. The material is estimated to be 12 per cent of iron, 12 per cent of phosphorus. By means of 45 to 50 per cent silica. There are large as the one