

>>> A PDF ABSTRACT CREATED 10-23-2013 <<<

THE VIRGINIA JAMESTOWN EXPOSITION COMMISSION

MINERAL RESOURCES

OF

VIRGINIA

BY

THOMAS LEONARD WATSON, Ph. D.

Professor of Economic Geology in the University of Virginia



LYNCHBURG, VA.:

J. P. BELL COMPANY, Printers and Binders

1907

Augusta County.

This is the most important manganese producing county in the country, because largely of the famous *Crimora* mines, which have produced more ore than all other mines in the United States combined. Numerous other mines have been operated in Augusta county, which have been opened up near and along the Shenandoah division of the Norfolk and Western Railway, near Lyndhurst, Stuart's Draft, Vesuvius, and Waynesboro.

The most important mine in this county and indeed in the United States, is the *Crimora*, located 2.5 miles southwest of Crimora, a station on the Shenandoah railroad, with which it is connected by a branch road. A stock company bought the land containing this mine in 1867 and mining was continued until 1869, when it was alternately idle and worked until 1882. In 1882, the mines were leased and systematic production of ore on a large scale was begun. The ore is localized in an elliptical-shaped basin about 500 feet wide and 800 to 900 feet long of Potsdam quartzite, which is a very hard and dense, light-colored rock.

Figure 40 shows the ground plan of the immediate vicinity of the mine. Figure 41 represents cross-sections along the lines marked in figure 40. On the east side the quartzite dips to the westward along the line AA in figure 40. CC marks the position of an anticline the beds of which dip both toward the west and the east, forming a syncline to the east, the axis of which is indicated by the line BB.

The basin is filled with a clay derived by decay from an overlying Cambrian shale. The clay has been preserved from erosion through sharp synclinal folds. The ore, which is largely psilomelane, is irregularly assembled in the clay in the shape of nodular lumps and masses from the size of a small pebble to those weighing a quarter of a ton or more. In places, the ore seems to be distributed through certain layers of the clay more than through others, but, wherever found, its distribution is irregular and it does not conform to the bedding. The mine is shown in plate XXXVII, figure 2.

The clay filling the basin, through which the ore is distributed, is covered with a variable depth of drift, derived by wash from the adjacent mountain slope. This drift is composed of admixed clay and large and small quartzite fragments, and has a probable depth of 15 feet, which requires to be stripped from the ore-bearing clays underneath, before working. In color, the ore-bearing clay is yellow, buff, and of lighter

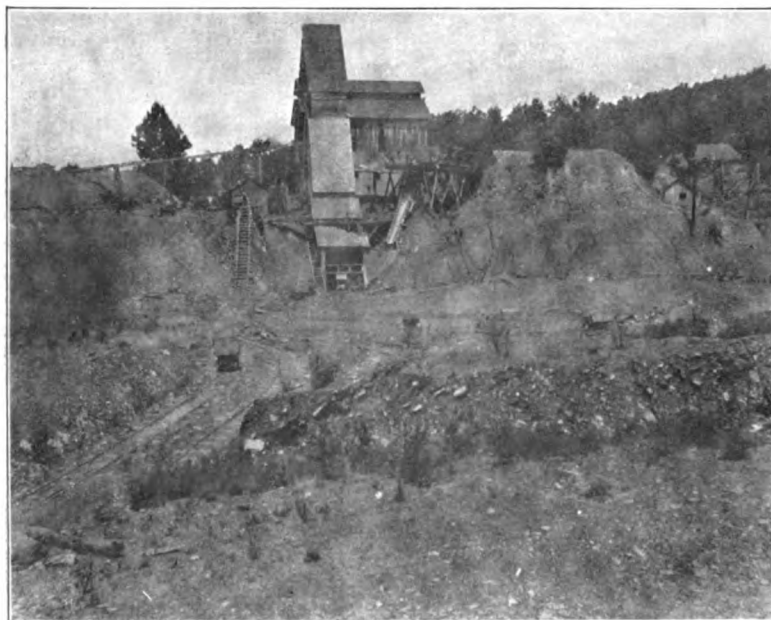


Fig. 1.—View of the Crimora manganese milling plant, Augusta county, Virginia.



Fig. 2.—Crimora manganese mines, Augusta county, Virginia.

CRIMORA MANGANESE MILLING PLANT AND MINES.

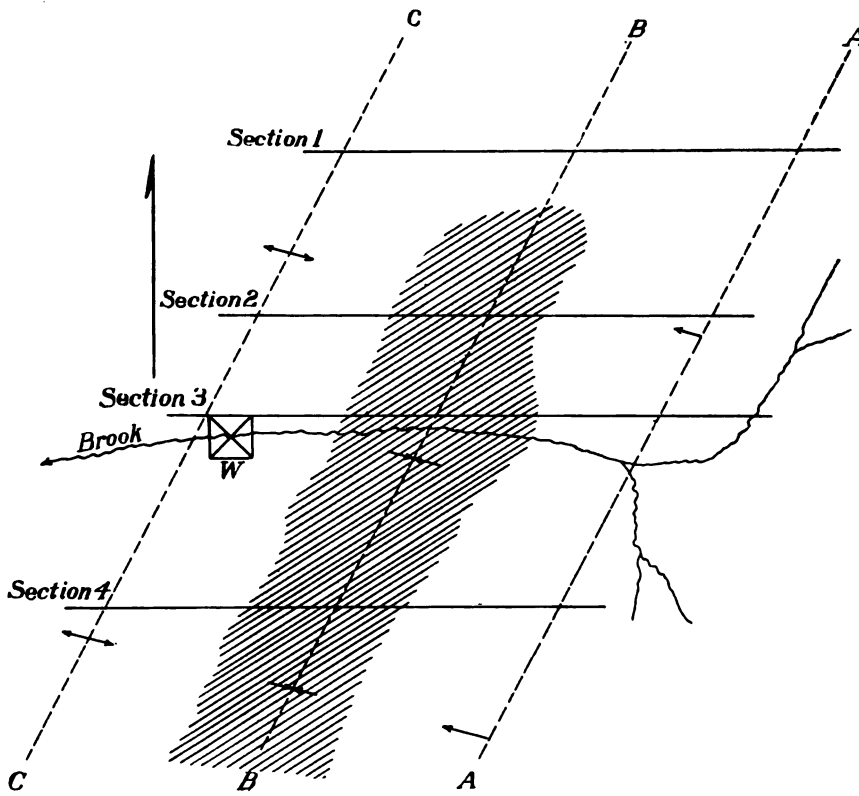


Fig. 40.—Ground plan of manganese deposits, Crimora. (After C. E. Hall.)

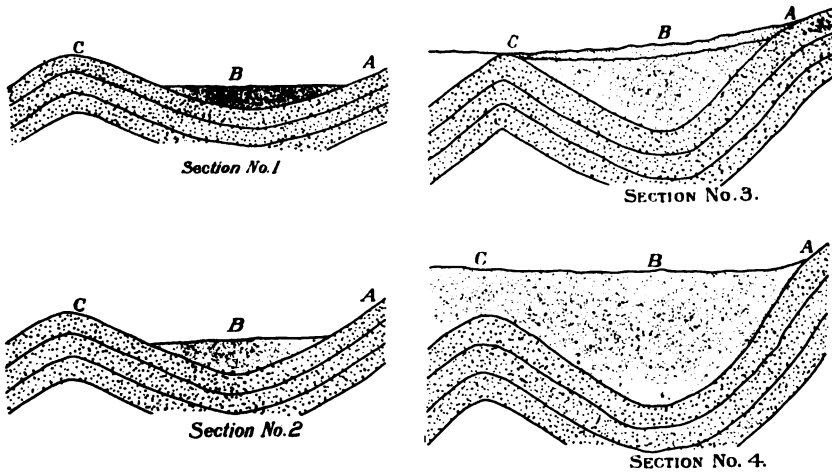


Fig. 41.—Sections through Crimora manganese deposits. (After C. E. Hall.)

shades. The ore is further assembled in this clay in the form of nests, pockets, and stringers, which may or may not be connected.

The ore is principally psilomelane, with some pyrolusite, and wad. Quite a good proportion of it is crystalline in texture. A commodious mill for preparing the ore for shipping is operated at the mine and is shown in plate XXXVII, figure 1. At present, about 15 per cent. of the ore requires jiggling and practically all of it is washed to free it from adhering clay. The ore, mined to date, will probably average 48 per cent. of metallic manganese, 1.5 to 2 per cent. metallic iron, phosphorus 0.05 per cent., and silica 7 to 8 per cent. The ore is characterized by uniformly low phosphorus, the highest not exceeding .112 per cent. In the jiggled ore, silica will give a higher average than quoted above, sometimes exceeding the limit, 10 per cent.

McCreath gives the following complete chemical analysis of lump manganese ore, comprising 228 pieces from which the sample was prepared, from the Crimora mine:

	Per cent.
Binoxide of manganese.....	81.703
Protoxide of manganese.....	7.281
Sesquioxide of iron.....	.533
Cobalt oxide.....	.354
Nickel oxide.....	.096
Zinc oxide.....	.623
Alumina.....	.896
Baryta.....	.829
Lime.....	.880
Magnesia.....	.630
Phosphoric acid.....	.171
Alkalies.....	.467
Water.....	3.405
Silica.....	2.132
Manganese (metallic).....	57.291
Iron (metallic).....	.373
Phosphorus.....	.075

Weeks reports the following analyses of manganese ore from the Crimora mines:

	Per cent.	Per cent.	Per cent.	Per cent.
Manganese (metallic).....	48.530	50.541	48.162	44.541
Iron (metallic).....	1.985	1.957	4.568	3.263
Phosphorus.....	0.103	—	0.095	0.087
Silica.....	10.20	10.12	10.30	14.00

According to McCreath an analysis of the best grade of ore from the Crimora mine gave as above:

	Per cent.
Manganese (metallic).....	57.291
Iron (metallic).....	.373
Phosphorus.....	.075

Fifty-six acres of ground have been tested by 700 drill-holes put down to a depth of 150 feet. The underlying quartzite is reached by drilling at a depth of 212 feet. The greatest depth reached in working the ore is 198 feet. The total area of worked ground is about 12 acres. Of this acreage, the American Manganese Company worked about $8\frac{1}{4}$ acres; the additional 3 acres have been worked by the Crimora Manganese Company of New Jersey, which is operating at present. The worked area has been stripped to a considerable depth and is further developed by numerous pits, entries, and shafts.

Adjoining the Crimora mine on the south, is the mine of the *Old Dominion Manganese Company*. A number of openings were worked many years ago close to the line of the Crimora mine, but these are now entirely filled in and hardly any indication of them remains. A shaft has recently been sunk in a reef of hard quartzite near the old openings and near the line, from which both the Crimora Manganese Company and the Old Dominion Manganese Company are working. The former company is operating a drift from this shaft at the 186-foot level which passed through 2,800 feet of the quartzite before penetrating the clays. The Old Dominion Manganese Company is operating a drift from the same shaft at the 176-foot level.

In 1859, Sibert opened a mine on Bear creek, 2 miles southeast of Lyndhurst station, and close up to the western base of the Blue Ridge. A shaft was sunk which struck the ore at a depth of 45 feet. A drift 20 feet long was run from the bottom of the shaft and it is reported that 250 tons of ore were mined from the drift and shaft and shipped to London. Analyses of the ore taken from this mine made by J. Blodgett Britton, gave:

	Per cent.	Per cent.
Manganese peroxide	93.06	86.77
Iron peroxide	trace	2.98
Silica18	3.98
Alumina91	2.81
Baryta	2.81	.31
Water	2.75	2.93

A new shaft was sunk in 1885 and 1886.

Manganese ores were mined by Sibert before the War on the *Kennedy tract* at the foot of the Western Blue Ridge, 3 miles from Stuart's Draft, a station on the Shenandoah Valley railroad. It is reported that 100 tons of ore were mined here in 1859. Both manganese and manganiferous

iron ores are reported on this property. An analysis of the manganese ores made by Professor F. P. Dunnington from the *Kennedy tract* gave:

	Per cent.
Manganese (metallic).....	43.30
Iron (metallic).....	3.88
Sulphur083
Phosphorus52
Barium	6.93
Silica, water, etc.....	17.69

Manganese and manganiferous iron ores have been mined from a number of places in the vicinity of the old Cotopaxi and Vesuvius furnaces, near the line between Augusta and Rockbridge counties, and close to the Shenandoah Valley railroad. The principal mines are, the *Blue*, *Fauber*, *Newton*, *Kelly*, and several others, on Big Mary creek. It is reported that Sibert mined 75 tons of nodular masses and lumps of psilomelane at the *Fauber mine*. Weeks reports an analysis made by McCreath of a sample of ore comprising 143 pieces, taken from along the face of the open-cut at the *Newton mine*, as follows:

	Per cent.
Iron (metallic).....	41.125
Manganese (metallic).....	8.221
Phosphorus265
Siliceous matter.....	14.830

The *Kelly mine* is in Rockbridge county and is a part of the old Vesuvius furnace property. Both iron and manganiferous ores are found, the latter occurring nearer the Potsdam than the former.

In the summer of 1906, the *Raymond Mining Company* was operating a property 4 miles east of Stuart's Draft on the Shenandoah Valley railroad. Manganese mining near Lyndhurst station was also in progress in 1906 by Kendall and Flick.

The above mines at Vesuvius and Lyndhurst have recently been acquired by the *Manganese Corporation of Virginia* and preparations are being rapidly made for the extensive mining and shipping of ore. The ore is reported to be of excellent quality, that from the *Vesuvius mines* showing from 45 to 47.72 per cent. manganese, and as low as 0.065 per cent. of phosphorus.

Rockingham County.

In 1894, the *Kendall and Flick mine*, near Elkton, in Rockingham county, is reported to have produced the largest amount of ore in the State. The production is given at 1,190 tons and the ore averaged from 48 to 49 per cent. of metallic manganese. It contained a small excess of silica