The original source of the manganese is in the crystalline rocks where it exists as one of the constituents in several of the complex silicate minerals. The gneisses and schists of the pre-Cambrian rocks, such as those in South Mountain, probably contained the manganese originally. The weathering of such rocks frees much of the manganese which is carried off by both surface and subterranean waters. By precipitation in the ocean waters it entered into the composition of the sedimentary rocks so that it is now found in the sandstones, shales, and limestones. Here it may be so evenly disseminated through the rocks that it is not evident or it may be concentrated to such an extent as to be recognizable or even to form ore deposits of commercial importance.

The original minerals that carry manganese usually contain more iron than manganese. Under the influence of atmospheric alteration both are converted to hydrous oxides that are dissolved and precipitated under practically the same conditions. The result is that the hydrous oxides of iron and manganese usually occur in close association. In this region probably all of the limonite ores previously described contain manganese normally ranging from 0.1 to 3 percent. This is generally in the form of pyrolusite or wad but may be psilomelan. The manganese darkens the ore; the more manganese, the darker the limonite. The conditions requisite for the precipitation of pyrolusite and limonite are not identical, consequently the two may be and in some cases are segregated. Instances have been cited where the limonite miners picked out and discarded the pieces of black pyrolusite under the assumption that they were detrimental impurities. However, in other cases those limonite ores with larger percentages of manganese commanded higher prices.

If the manganese was present in the soft or pulverulent form, known as wad, it was carried away with the clay in the washing process and lost.

Where the manganese was precipitated with little or no limonite it occurred in pockets, bands, or lenses of varying dimensions. Some of these deposits were of sufficient size to justify separation.

Manganese was particularly noted in several of the limonite mines of Lehigh County described on previous pages. These are mines 5, 6, 7, 94, 138, and 182. The superior quality of pig iron produced by some blast furnaces was believed to be due to the presence of manganese in appreciable quantity. It seems to explain why the Ironton ore was preferred by some. The Ironton mines contained more manganese than any of the other limonite mines. Several hundred tons of manganese oxide are reported to have been shipped from them.

When Dr. Hartzell was operating a mine in the Ironton region about 1906 a lens of manganese ore about 4 feet thick was encountered. It was followed for some distance with the hope that it might develop into a larger body but this did not materialize. The following two analyses have been published by Prime (Report DD, p. 42).