has resulted in closing most of the small independent furnaces and a concentration of the iron business in a few large companies. The larger companies found so many objections to the local brown iron ores that mining continued to decline until all were closed.

Perhaps the chief objection to the local brown iron ores is the variability of the supply. In winter the severe weather prevented open-cut mines from operating, and the conditions of the roads at times interfered with the delivery of the ore. No concern that uses a large quantity of ore wishes to contract for a supply that is so uncertain.

The variation in composition was also a drawback to the utilization of the local limonite ores. Both the iron content and the amounts of silica and phosphorus were extremely variable and hence objectionable. The ore averaged too high in phosphorus for Bessemer ore, and none of it was high in iron. The average limonite ores of the district contained only a little more than 40 percent of iron. Under such conditions it was inevitable that high-grade iron ores low in phosphorus, such as the Lake Superior ores, should replace the local ores when improved transportation facilities permitted competition.

The mine operators also encountered difficulties in the profitable operation of their properties because of the increased cost of labor and the additional cost of pumping the water as the mines became deeper. The result was that many firms hesitated to open new mines when it became necessary to abandon their old ones and decide to disband. Conditions are not now sufficiently favorable to attract new capital to the iron-mining industry.

The future of the mining of brown iron ore in this region is problematic, yet there is reason to believe that at some time mining will be actively resumed, although this will be brought about only by the exhaustion of richer ore deposits of other regions which now supply the local demand. Thus the mining of brown iron ore will not be an important industry in this region for many years, as the Lake Superior, New Jersey, and foreign ores will long continue to replace the local ores. The local operations were necessarily small on account of the manner of occurrence of the ore and so could not compete with operations in those regions where mining can be done on a very extensive scale.

### Descriptions of Individual Limonite Iron Mines*

**By Albert J. Getz**

All of the iron mines of the county have long been closed and very little information can be obtained by visiting the localities. On the dumps and in the mud-dam deposits one can see the character of the matrix, generally vari-colored clays, and occasional pieces of ore and associated rocks. In a few places the wall rocks are visible. Around most of the limonite ore mines in the Hardyston formation are numerous fragments, or even large masses, of taffy-yellow or brown ferruginous jasper or jasperoid.

*The quoted descriptions are from Prime's published reports of 1875, 1878, and 1883, and McCreath's reports of 1875, 1879 and 1881. In 1938-39 Mr. Getz made extensive field investigations and the additional descriptions are by him, but supplemented by material supplied by B. L. Miller.*