(limonite and clay).[1] Evidence that the deposits contained little combined silica, clay, confirmed the titles of those who had denounced the deposits as iron ores against those who had denounced them as ochres.

The following table shows the character of the ore at various depths, in the Mayari area:

**TABLE No. 4**

Chemical Analyses Showing Alteration of Serpentine Rock to Iron Ore in the Mayari District, Cuba.[2]

Analyses supplied by Spanish-American Iron Co.

| Depth, Feet | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | Fe | MgO | Cr | Ni+Co | P | S | $H_2O+$ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0- 1 | 2.58 | 15.71 | 66.20 | 46.37 | ..... | 0.92 | 0.38 | 0.016 | 0.12 | 10.20 | 96.126 |
| 1- 2 | 2.38 | 20.81 | 64.70 | 45.34 | ..... | 0.96 | 0.33 | 0.022 | 0.12 | 10.63 | 99.952 |
| 2- 3 | 1.60 | 17.43 | 68.40 | 47.81 | ..... | 0.96 | 0.42 | 0.018 | 0.14 | 9.15 | 98.118 |
| 3- 4 | 1.42 | 14.23 | 68.70 | 48.09 | ..... | 1.04 | 0.76 | 0.019 | 0.16 | 9.50 | 95.429 |
| 4- 5 | 1.56 | 8.47 | 70.60 | 49.46 | ..... | 1.27 | 0.61 | 0.016 | 0.17 | 10.14 | 92.836 |
| 5- 6 | 2.90 | 10.24 | 72.35 | 50.56 | ..... | 1.66 | 0.84 | 0.016 | 0.20 | 10.96 | 99.166 |
| 6- 7 | 2.20 | 8.29 | 72.90 | 51.00 | ..... | 2.19 | 1.09 | 0.007 | 0.19 | 11.35 | 98.217 |
| 7- 8 | 2.68 | 4.92 | 71.85 | 50.28 | ..... | 2.19 | 1.15 | 0.006 | 0.14 | 11.57 | 94.506 |
| 8- 9 | 3.50 | 7.25 | 71.55 | 50.15 | ..... | 2.39 | 1.14 | 0.006 | 0.16 | 12.12 | 97.916 |
| 9-10 | 2.44 | 6.91 | 72.40 | 50.63 | ..... | 2.08 | 1.21 | 0.005 | 0.16 | 12.35 | 97.555 |
| 10-11 | 2.42 | 6.31 | 71.40 | 49.94 | ..... | 2.00 | 1.36 | 0.005 | 0.14 | 12.40 | 96.035 |
| 11-12 | 2.72 | 7.05 | 70.55 | 49.46 | ..... | 2.08 | 1.31 | 0.004 | 0.15 | 12.40 | 96.264 |
| 12-13 | 2.56 | 6.77 | 70.20 | 40.08 | ..... | 1.62 | 1.37 | 0.004 | 0.10 | 13.50 | 96.124 |
| 13-14 | 2.52 | 6.23 | 70.55 | 49.46 | ..... | 1.85 | 1.41 | 0.005 | 0.14 | 13.12 | 95.825 |
| 14-15 | 2.76 | 6.58 | 71.85 | 50.22 | ..... | 1.89 | 1.38 | 0.007 | 0.21 | 12.45 | 97.127 |
| 15-16 | 2.78 | 6.53 | 70.00 | 48.98 | ..... | 2.16 | 1.33 | 0.007 | 0.19 | 12.35 | 95.347 |
| 16-17 | 2.98 | 6.43 | 69.80 | 48.84 | ..... | 2.19 | 1.42 | 0.007 | 0.19 | 12.57 | 95.587 |
| 17-18 | 3.20 | 5.53 | 70.45 | 49.32 | ..... | 2.00 | 1.35 | 0.007 | 0.15 | 2.90 | 95.587 |
| 18-19 | 3.66 | 6.51 | 69.20 | 48.42 | ..... | 2.43 | 1.34 | 0.005 | 0.06 | 2.73 | 95.935 |
| 19-20 | 6.84 | 8.49 | 63.35 | 44.32 | ..... | 2.51 | 1.36 | 0.004 | 0.08 | 12.80 | 95.434 |
| 20-21 | 7.44 | 5.13 | 66.55 | 46.58 | ..... | 2.27 | 1.57 | 0.003 | 0.09 | 12.45 | 95.503 |
| 21-22 | 8.46 | 4.99 | 57.80 | 40.47 | 0.00 | 2.16 | 1.47 | 0.006 | 0.08 | 12.71 | 87.676 |
| 22-23 | 11.04 | 8.38 | 67.30 | 43.49 | 0.00 | 1.85 | 1.74 | 0.002 | 0.09 | 14.07 | 99.272 |
| 23-24 | 15.86 | 4.70 | 63.90 | 44.62 | 0.00 | 2.19 | 1.57 | 0.003 | 0.09 | 11.73 | 100.043 |
| 24-25 | 17.40 | 4.00 | 62.90 | 40.00 | 0.50 | 1.85 | 1.43 | 0.003 | 0.12 | 11.64 | 99.843 |
| 25-26 | 22.54 | 4.57 | 50.25 | 35.12 | 6.49 | 1.89 | 1.80 | 0.002 | 0.06 | 13.65 | 101.252 |
| 26-27 | 28.60 | 4.18 | 32.85 | 23.00 | 18.23 | 1.12 | 1.43 | 0.003 | 0.09 | 13.45 | 99.953 |
| 27-28 | 35.64 | 2.33 | 18.25 | 12.78 | 27.35 | 0.77 | 1.35 | 0.001 | 0.06 | 14.23 | 99.981 |
| 28-29 | 39.80 | 1.39 | 10.14 | 7.10 | 35.69 | 0.20 | 0.97 | 0.001 | 0.06 | 13.31 | 99.561 |

## Manganese Ores

Lateritic manganese ores of India, although of much less importance than ores of the metal of other origin, are of much interest. Their mode of occurrence is similar to that of the cobalt ores of New Caledonia.

Fermor says: . . . . manganese, when present in laterite, usually renders itself conspicuous by segregating into forms, as a rule black nodules or veins of psilomelane or pyrolusite, that one would without any hesitation call manganese-ore. It rarely seems, except in very small quantity (or in proper manganese-ores), to become blended with the other constituents of laterite, so as to form intimate mixtures similar to those that the oxides of iron, aluminum, and titanium, so commonly form with one another. Indeed, many large masses of laterite can be found . . . . that seem to be completely free from manganese. As it cannot be supposed that the rocks from which the iron and alumina of the laterite were derived contained no manganese, it is necessary to suppose that with solutions containing manganese, iron, and aluminum, a selective precipitation can take place in nature.[3]

[1] The Mayari and Moa Iron-Ore Deposits of Cuba, A.I.M.E., Vol. XLII, pp. 109-115. Characteristics and Origin of the Brown Iron-Ores of Camaguey and Moa, Cuba, Ibid., pp. 116-137.

[2] Additional data on origin of Lateritic Iron Ores of Eastern Cuba, C. K. Leith and W. J. Mead, A.I.M.E., Vol. LIII, 1915, p. 76.

[3] Memoir, Geol. Surv. India, Vol. XXXVII, p. 381.