culture, Washington, D.C., Vol. XIV., No. 10, pages 951-2 (1903). In these comparative experiments in cultivation the amounts used of superphosphate and bicalcic phosphate have been so determined, that equal weights were used, per superficial unit of soil, of phosphoric acid soluble by citrate from bicalcic phosphate and of phosphoric acid soluble by water from superphosphate.

The result of the experiments in cultivation is that the phosphoric acid soluble by citrate in the bicalcic phosphate proves to possess the same fertilizing value as the phosphoric acid soluble by water in the superphosphate, and consequently the same value as a trade product. The result might, indeed, have been foreseen, inasmuch as it is probable that the superphosphate in the soil is rapidly transformed into bicalcic phosphate through the agency of the compounds of lime present there. Retrogradation of soluble phosphoric acid in the bicalcic phosphate does not occur.

V.—Cost of Production.

In calculation of the cost of production per ton the following items are of importance:—

One electric horse-power produces in a year:

1.73 ton bicalcic phosphate of 36 per cent. soluble phosphoric acid;

Or, 1.95 ton bicalcic phosphate of 32 per cent. soluble phosphoric acid.

The percentage of soluble phosphoric acid will vary between 32 and 36 per cent., depending on the degree of dessication, etc. But under given circumstances a product of uniform composition will be obtained with a percentage of phosphoric acid from 32 to 36 per cent.; 95 per cent. of the total phosphoric acid will always be soluble by citrate.

The cost for chemicals is small, as they are regenerated.

As a by-product will be obtained about 1-3 ton of very good lime for every ton of bicalcic phosphate.

The capital needed amounts to something about $65 per electric horse-power used in the fabrication when a plant of at least 2,000 electric horse-powers is supposed. In manufacture on a larger scale the capital needed will be comparatively smaller. In this calculation it is supposed that the electric power is hired, and consequently the cost for the electric power plant is not included.

VI.—The Superior Advantages of the Electrolytic Method.

The merits of the electrolytic method are as follows:—

(*a.*) It admits of the use of cheap low-percentage raw phosphate, not suitable for the superphosphate industry.

(*b.*) By it a phosphate containing about 34 per cent. of soluble phosphoric acid is obtained, even from low percentage raw material.

(*c.*) Freightage for a given quantity of phosphoric acid in the finished article is only about half that in the case of ordinary superphosphate.

(*d.*) Retrogradation of soluble phosphoric acid when stored does not occur.

(*e.*) The raw phosphate need not be reduced to a finely powdered state.

(*f.*) Bicalcic phosphate can be employed as a fertilizer on all kinds of soil, even on sandy and boggy land, where superphosphate is out of the question

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ON THE EXAMINATION AND VALUATION OF MINES.*

By JOHN E. HARDMAN, S.B., MA.E., etc.

(Continued from June issue, 1905.)

But of all the precautions against salting and tampering with samples, none are known to be absolutely effective, and perhaps it is of equal value to the engineer to know whether tampering has been *attempted* at all. For this purpose a safeguard which I used over twenty years ago in Leadville, and recently mentioned by Mr. Rickard, is of value. This is to have a certain number of sample bags filled with waste, or with ore which has previously been accurately assayed out of reach of "salters," these bags are then mixed up with the regular sample bags. An assay from these dummy bags, made daily, or whenever suspicions arise, may reveal any attempt at extensive salting of samples. It is necessary to insist on the absolute exclusion from the assay office of every one but the assayer and his assistants.

The second system of sampling is to take out a large channel across the ore section by blasting it out with powder, subsequently trimming the edges of the channel with pick, or hammer and gad. It is used sometimes for ores that are so hard as to render the first method exceeding slow and laborious, or where the ore bodies present great and sudden variations in values, or where the deposit is very thick and contains thin streaks or layers of very high grade ore. The samples taken are necessarily large, varying from 100 lbs. to five tons, and the system cannot very well be applied to properties which are not fairly well equipped with crushing machinery for the reduction of bulk samples. It is unnecessary to say that the number of samples taken is very much smaller than by the first method, and that the approximation to the real value is not so close. The liability to salting is, perhaps, less.

A third system, applicable principally to milling ore, and to districts where an available mill is not

* Trans. Can. Soc. of C. E.