20 MINERALOGY OF THE H. B. MINE, SALMO, B.C.

repeat here some of the principal findings of Professor Phillips.¹

"The combination of forms, the crystal angles and axial ratios are very near that of hopeite as given by J. L. Spencer².

"Chemical Composition-Several crystals were ground, combined in one sample and analyzed with the following results:

•	No. 1	No. 2	Theoretical
7n0	57.51	57.60	57.625
P ₄ O ₅	28.77	28.88	28.721
Η ₀ Ο	13.74	13.68	13.653
1	00.02	100.16	99.999

"The above represents the results arrived at from the analysis of the airdried sample. The sample dissolved readily in dilute acids to a perfectly clear solution leaving no residue and qualitative tests revealed no other elements present, except in traces. The analysis yields the ratios of $7\text{ZnO} \cdot 2P_2O_5 \cdot 7\frac{1}{2}H_2O$ or $2(\text{Zn}_3(\text{PO}_4)_2) \cdot \text{Zn}(\text{OH})_2 \cdot 6\frac{1}{2}H_2O_1$, a formula which is very satisfactory, with the possible exception of the water. The water is somewhat variable with the condition of the sample. The crystals are filled with small cavities which contain water as shown under the microscope. Water was determined in another sample which had not been exposed to the air as long as the first sample, with the result that it yielded 13.90 per cent. Then a crystal was picked out of the matrix, ground, and the water determined at once with 14.8 per cent, as the result. A portion of this crystal weighing .348 gms. was then tested for loss of water at different temperatures, for comparison with that of spencerite.

llostat	110°	1.30°	210°	250°	275°	Red Heat
liborat	5.74%	7.24%	7.93%	10.05%	11 35%	14.71

The crystals are basic, as is shown both by the high temperature at which a considerable part of the water is given off and by the yellow colour of the hot sample, due to the presence of zinc oxide.

"Physical Properties—There are three cleavages parallel to the three pinacoids. Of the three, the brachypinacoidal cleavage is perfect, that parallel to the macropinacoid less so, and the basal cleavage is imperfect. The specific gravity, as determined on small fragments with methylene iodide, varied but little from 3.213. It fuses easily and becomes yellow while hot: decrepitates strongly in the closed tube, yielding much water. Hardness is about 3.75, scratching calcite easily.

"Optical Properties—Hibbenite is a pale yellow, almost white, translucent with a vitreous, though somewhat pearly lustre. The double refraction is very weak. Extinction is parallel on all three pinacoidal sections, with the plane of the optic axis parallel to the base. The macroaxis *b* is the acute bisectrix. Optically negative."

Phillips, A. H., Loc. cit.

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²Mineralogical Magazine, Vol. xv, p. 1.