Honessite $Ni_6Fe_2^{3+}(SO_4)(OH)_{16}\cdot 4H_2O$

Crystal Data: Hexagonal. *Point Group:* n.d. As "obscurely" fibrous, powdery coatings.

Physical Properties: Hardness = n.d. D(meas.) = n.d. D(calc.) = n.d.

Optical Properties: Semitransparent. *Color:* Green or brown.
Optical Class: [Uniaxial.] $n = 1.615$ ω = n.d. ϵ = n.d.

Cell Data: *Space Group:* n.d. $a = 3.083(4)$ $c = 26.71(9)$ Z = n.d.

X-ray Powder Pattern: Unst, Scotland.
8.84 (100), 4.43 (40), 2.62 (20), 1.54 (15), 1.52 (15), 2.65 (10), 2.39 (10)

Chemistry:

	(1)	(2)	(3)
SO_3	10.8	3.4	8.86
Fe_2O_3	10.5	15.3	17.66
FeO	2.4		
CoO	3.6		
NiO	42.6	37.5	49.57
CaO	2.7		
H_2O^+	19.7		
H_2O^-	4.7		
H_2O			23.91
insol. + SiO_2	0.9		
Total	97.9		100.00

(1) Linden, Iowa, USA. (2) Unst, Scotland; by electron microprobe, $(SO_4)^{2-}$ confirmed by IR, low amount may be due to $(CO_3)^{2-}$ in reevesite admixture; corresponds to $Ni_{5.8}Fe_{2.2}(SO_4)_{0.5}(OH)_{16}\cdot 4H_2O$. (3) $Ni_6Fe_2(SO_4)(OH)_{16}\cdot 4H_2O$.

Occurrence: A rare oxidation product of nickel sulfide minerals.

Association: Millerite, violarite, bravoite (Linden, Wisconsin, USA); reevesite, hydrohonessite, theophrastite (Unst, Scotland).

Distribution: In the USA, from the Linden Pb–Zn deposit, near Linden, Iowa Co., and at Hall's Gap, Lincoln Co., Wisconsin. At the Kamariza mine, Laurium, Greece. In the Hagdale quarry, Unst, Shetland Islands, Scotland.

Name: Honors Professor Arthur Pharoah Honess (1887–1942), American mineralogist, Pennsylvania State University, State College, Pennsylvania, USA.

Type Material: National Museum of Natural History, Washington, D.C., USA, 117698.

References: (1) Heyl, A.V., C. Milton, and J.M. Axelrod (1959) Nickel minerals from near Linden, Iowa County, Wisconsin. Amer. Mineral., 44, 995–1009. (2) Bish, D.L. and A. Livingstone (1981) The crystal chemistry and paragenesis of honessite and hydrohonessite: the sulphate analogues of reevesite. Mineral. Mag., 44, 339–343.