Beaverite-(Zn) $Pb(Fe_2Zn)(SO_4)_2(OH)$

Crystal Data: Hexagonal. *Point Group*: $\bar{3}$ 2/*m*. As a powdery coating of hexagonal plates.

Physical Properties: *Cleavage*: None. *Fracture*: n.d. *Tenacity*: Brittle. Hardness = n.d.
D(meas.) = n.d. D(calc.) = 4.25

Optical Properties: Transparent. *Color*: Brownish yellow to yellow. *Streak*: Yellow ochre.
Luster: Vitreous to subadamantine.
Optical Class: n.d. $n > 1.800$ *Pleochroism*: Pale to dark yellow.

Cell Data: *Space Group*: $R\bar{3}\,m$. $a = 7.3028(2)$ $c = 17.0517(4)$ Z = 3

X-ray Powder Pattern: Mikawa mine, Niigata Prefecture, Japan.
5.930 (100), 3.072 (61), 3.110 (43), 3.651 (39), 2.273 (39), 2.273 (33), 1.826 (33)

Chemistry:

	(1)
PbO	31.94
Fe2O3	22.46
ZnO	10.15
CuO	3.59
l2O3	0.78
SO3	23.95
H2O	[7.22]
Total	100.00

(1) Mikawa mine, Niigata Prefecture, Japan; average of dozens of electron microprobe analyses, H_2O by difference, OH and SO_4 confirmed by FT-IR spectroscopy; corresponding to $Pb_{0.95}(Fe_{1.88}Al_{0.10})(Zn_{0.83}Cu_{0.30})(SO_4)_2[(OH)_{5.36}O_{0.38}]$.

Mineral Group: Alunite group.

Occurrence: A secondary mineral in the oxidized zone of a hydrothermal Cu-Pb-Zn ore deposit.

Association: Anglesite, galena, pyrite, sphalerite, quartz.

Distribution: At the Mikawa mine, Mikawa, Aga-machi, Higashikanbara-gun, Niigata Prefecture, Japan.

Name: As the Zn-analogue of *beaverite*-(Cu), $[Pb(Fe_2Cu)(SO4)_2(OH)_6]$.

Type Material: National Museum of Nature and Science, Tokyo, Japan (NSM-M28910).

References: (1) Sato, E., I. Nakai, , Y. Terada, Y. Tsutsumi, K. Yokoyama, R. Miyawaki, and S. Matsubara (2011) Beaverite-(Zn), $Pb(Fe_2Zn)(SO_4)_2(OH)$, a new member of the alunite group, from Mikawa Mine, Niigata Prefecture, Japan. Mineral. Mag., 75, 375-377. (2) (2012) Amer. Mineral., 97, 1525 (abs. ref. 1).