Hydroxylellestadite $Ca_{10}(SiO_4)_3(SO_4)_3(OH,F)_2$

Crystal Data: Monoclinic, pseudohexagonal. *Point Group:* $2/m$. As cleavable aggregates, to 2 cm.

Physical Properties: Hardness = 4.5 D(meas.) = 3.01(8) D(calc.) = ∼3.080

Optical Properties: Translucent. *Color:* Pale purplish. *Luster:* Vitreous.
Optical Class: Uniaxial (–). $\omega = 1.654(1)$ $\epsilon = 1.650(1)$

Cell Data: *Space Group:* $P2_1/m$, pseudo-$P6_3/m$. $a = 9.476(2)$ $b = 9.508(2)$ $c = 6.919(1)$ $\beta = 119.53(2)^\circ$ Z = [2]

X-ray Powder Pattern: Chichibu mine, Japan.
2.839 (100), 2.739 (60), 2.655 (45), 2.801 (44), 1.853 (43), 3.462 (40), 1.484 (20)

Chemistry:

	(1)		(1)
SiO_2	17.30	P_2O_5	0.66
Al_2O_3	trace	F	0.28
Fe_2O_3	0.21	Cl	0.91
MnO	0.04	H_2O^+	2.04
MgO	trace	H_2O^-	0.72
CaO	54.51	CO_2	1.65
SrO	0.28	SO_3	21.56
Na_2O	0.34	$-O = (F,Cl)_2$	0.32
K_2O	0.07	Total	100.25

(1) Chichibu mine, Japan; corresponds to $(Ca_{9.66}Na_{0.11}Sr_{0.03}Fe_{0.03}K_{0.02})_{\Sigma=9.85}[(SiO_4)_{2.86}(SO_4)_{2.68}(CO_3OH)_{0.37}(PO_4)_{0.09}]_{\Sigma=6.00}[(OH)_{1.88}Cl_{0.26}F_{0.15}]_{\Sigma=2.29}$.

Polymorphism & Series: Forms a series with fluorellestadite.

Mineral Group: Ellestadite group.

Occurrence: In pre-ore contact metamorphic skarns.

Association: Diopside, wollastonite, xanthophyllite, vesuvianite, calcite.

Distribution: In the Chichibu mine, Saitama Prefecture, Japan.

Name: For *hydroxyl* in the chemical composition and analogy to *ellestadite*.

Type Material: National Science Museum, Tokyo, Japan, M15761.

References: (1) Harada, K., K. Nagashima, K. Nakao, and A. Kato (1971) Hydroxylellestadite, a new apatite from Chichibu mine, Saitama Prefecture, Japan. Amer. Mineral., 56, 1507–1518.
(2) Sudarsanan, K. (1980) Structure of hydroxylellestadite. Acta Cryst., 36, 1636–1639.
(3) Rouse, R.C. and P.J. Dunn (1982) A contribution to the crystal chemistry of ellestadite and the silicate sulfate apatites. Amer. Mineral., 67, 90–96.