Mccrillisite $NaCs(Be,Li)Zr_2(PO_4)_4 \cdot 1-2H_2O$

Crystal Data: Tetragonal. *Point Group:* $4/m\ 2/m\ 2/m$. As dipyramidal crystals, to 1.2 mm, dominated by {111}, minor {001}; crystal surfaces typically "crackled".

Physical Properties: *Fracture:* Conchoidal. Hardness = 4–4.5 D(meas.) = 3.125(5) D(calc.) = 3.30

Optical Properties: Translucent to transparent. *Color:* White to colorless. *Streak:* White. *Luster:* Vitreous.
Optical Class: Uniaxial (+); some grains anomalously biaxial. $\omega = 1.634(2)$ $\epsilon = 1.645(2)$ 2V(meas.) = 5°

Cell Data: *Space Group:* $I4_1/amd$. $a = 6.573(2)$ $c = 17.28(2)$ Z = 2

X-ray Powder Pattern: Mt. Mica, Maine, USA; close to gainesite.
3.060 (100), 6.159 (90), 4.326 (80), 3.281 (80), 4.099 (40), 2.896 (30), 1.849 (30)

Chemistry:

	(1)		(1)
P_2O_5	38.3	CaO	< 0.1
SiO_2	0.1	SrO	0.2
Zr_2O	31.6	Li_2O	0.6
HfO_2	2.5	Na_2O	4.2
Al_2O_3	< 0.1	K_2O	0.3
FeO	< 0.1	Rb_2O	< 0.1
MnO	< 0.1	Cs_2O	15.3
ZnO	0.5	F	0.5
BeO	2.9	H_2O	3.0
MgO	0.1	$-O = F_2$	0.2
		Total	99.9

(1) Mt. Mica, Maine, USA; by electron and ion microprobe, average of five analyses; corresponding to $Na_{1.00}(Cs_{0.80}Li_{0.18}K_{0.05})_{\Sigma=1.03}(Be_{0.86}Li_{0.12}Mg_{0.02})_{\Sigma=1.00}(Zr_{1.90}Hf_{0.09}Zn_{0.05})_{\Sigma=2.04}P_{1.00}(O_{3.95}F_{0.05})_{\Sigma=4.00} \cdot 1.23H_2O$.

Occurrence: A rare product of late-stage hydrothermal alteration of primary zirconium-bearing minerals, in a complex granite pegmatite.

Association: Zircon, kosnarite, roscherite, moraesite, eosphorite, löllingite, uraninite, albite, quartz, manganoan almandine, muscovite, siderite, fluorapatite, elbaite, lepidolite, beryl, montebrasite, rhodochrosite, cassiterite, manganocolumbite.

Distribution: From Mt. Mica, near Paris, Oxford Co., Maine, USA.

Name: Honors the McCrillis family, principally Dean (1931–1989) and his son, Phillip, pegmatite miners from Oxford Co., Maine, USA.

Type Material: National Museum of Natural History, Washington, D.C., USA, 170853.

References: (1) Foord, E.E., M.E. Brownfield, F.E. Lichte, A.M. Davis, and S.J. Sutley (1994) Mccrillisite, $NaCs(Be,Li)Zr_2(PO_4)_4 \cdot 1-2H_2O$, a new mineral species from Mount Mica, Oxford County, Maine, and new data for gainesite. Can. Mineral., 32, 839–842. (2) (1995) Amer. Mineral., 80, 1074 (abs. ref. 1).