Rosemaryite $(Na, Ca, Mn^{2+})(Mn^{2+}, Fe^{2+})(Fe^{3+}, Fe^{2+}, Mg)Al(PO_4)_3$

Crystal Data: Monoclinic. *Point Group:* $2/m$. Granular, massive, to 1 cm.

Physical Properties: *Cleavage:* Observed. Hardness = [> 4] (by analogy to ferrowyllieite). D(meas.) = n.d. D(calc.) = [3.63]

Optical Properties: Semitransparent. *Color:* Dark green, deep brown to reddish brown. *Luster:* Resinous.
Optical Class: Biaxial (–). *Pleochroism:* $X = Y$ = pale brownish yellow; Z = pale greenish yellow. $\alpha = 1.723(2)$ $\beta = 1.742(2)$ $\gamma = 1.758(2)$ 2V(meas.) = –80°

Cell Data: *Space Group:* $P2_1/n$. a = 11.977(2) b = 12.388(2) c = 6.320(1) $\beta = 114°27(1)'$ Z = 4

X-ray Powder Pattern: Buranga, Rwanda.
3.024 (100), 2.693 (100), 2.726 (85), 3.487 (70), 2.842 (60), 2.062 (55), 5.451 (50)

Chemistry:

	(1)	(2)		(1)	(2)
P_2O_5	43.84	43.27	Li_2O	0.04	
Al_2O_3	6.90	8.13	Na_2O	3.40	3.69
Fe_2O_3	14.58	16.81	K_2O	0.00	0.03
FeO	11.64	2.13	H_2O^+		2.31
MnO	13.62	19.79	H_2O^-		0.19
ZnO	0.02		H_2O	1.73	
MgO	0.47	0.68	insol.	1.78	1.84
CaO	1.81	1.10	Total	99.83	99.97

(1) Rock Ridge pegmatite, South Dakota, USA; corresponds to $(Na_{0.47}Ca_{0.04})_{\Sigma=0.51}(Mn^{2+}_{0.20}Ca_{0.15}Na_{0.15})_{\Sigma=0.50}(Mn^{2+}_{0.69}Fe^{2+}_{0.31})_{\Sigma=1.00}(Fe^{3+}_{0.45}Mg_{0.06}Zn_{0.02}Li_{0.01})_{\Sigma=0.54}(Al_{0.63}Fe^{3+}_{0.37})_{\Sigma=1.00}(PO_4)_{3.00}$. (2) Buranga, Rwanda; corresponds to $(Na_{0.59}Ca_{0.02})_{\Sigma=0.61}(Mn^{2+}_{0.42}Ca_{0.08})_{\Sigma=0.50}(Mn^{2+}_{0.95}Fe^{2+}_{0.05})_{\Sigma=1.00}(Fe^{3+}_{0.82}Fe^{2+}_{0.10}Mg_{0.08})_{\Sigma=1.00}(Al_{0.78}Fe^{3+}_{0.22})_{\Sigma=1.00}(PO_4)_{3.00}$.

Polymorphism & Series: Forms two series, with ferrowyllieite, and with wyllieite; $Mn^{2+} > Fe^{2+}$ in M(1); Fe^{3+} dominant in M(2a).

Occurrence: In zoned complex granite pegmatites.

Association: Trolleite, alluaudite, montebrasite, scorzalite, strengite (Buranga, Rwanda).

Distribution: From the Rock Ridge pegmatite, near Custer, Custer Co., South Dakota, USA. At the Buranga pegmatite, near Gatumba, Rwanda.

Name: To honor Mrs. F. Rosemary Wyllie, wife of Professor Peter J. Wyllie, namesake of wyllieite, q.v.

Type Material: National Museum of Natural History, Washington, D.C., USA, 162559.

References: (1) Moore, P.B. and J. Ito (1979) Alluaudites, wyllieites, arrojadites: crystal chemistry and nomenclature. Mineral. Mag., 43, 227–235. (2) (1980) Amer. Mineral., 65, 810–811 (abs. ref. 1). (3) Fransolet, A.-M. (1995) Wyllieite et rosemaryite dans la pegmatite de Buranga, Rwanda. Eur. J. Mineral., 7, 567–575 (in French with English abs.).