

**Fluornatrocoulsellite**

**Crystal Data:** Hexagonal. *Point Group:*  $\bar{3} 2/m$ . As pseudo-octahedral crystals, to 2 mm.  
*Twining:* Multiple about threefold axes of the pseudocubic cell observed in diffraction patterns.

**Physical Properties:** *Cleavage:* None. *Tenacity:* Brittle. *Fracture:* Conchoidal. Hardness = 4.5  
*D(meas.)* = 2.99(1) *D(calc.)* = 3.011

**Optical Properties:** Transparent to translucent. *Color:* Colorless to white. *Streak:* White.  
*Luster:* Vitreous.  
*Optical Class:* Isotropic. *n(average)* = 1.40

**Cell Data:** *Space Group:*  $R\bar{3} m$ . *a* = 7.1620(1) *c* = 17.5972(3) *Z* = 1

**X-ray Powder Pattern:** Cleveland tin mine, Luina, western Tasmania, Australia.  
 2.926 (100), 1.791 (66), 2.325 (33), 1.528 (20), 1.949 (19), 5.86 (12), 3.054 (8)

<b>Chemistry:</b>	(1)	(2)	(3)
Al	5.93	6.21	5.67
Ca	8.41	8.71	8.43
Mg	14.9	15.09	15.4
Na	14.2	14.12	14.5
F	54.8	49.27	56.0
O	1.81	5.25	
H		[0.18]	
P	0.49	0.53	
Total	100.54	99.25	100.00

(1) Cleveland tin mine, Luina, western Tasmania, Australia; average of 12 electron microprobe analyses; corresponds to  $\text{Na}_{2.88}\text{Ca}_{0.98}\text{Al}_{1.03}\text{Mg}_{2.86}\text{P}_{0.07}\text{F}_{13.47}(\text{OH})_{0.53}$ . (2) Do.; electron microprobe analysis, H calculated; corresponds to  $(\text{Na}_{1.47}\text{Ca}_{0.52})(\text{Mg}_{1.49}\text{Al}_{0.55}\text{P}_{0.04})\text{F}_6[(\text{OH})_{0.43}\text{O}_{0.36}\text{F}_{0.21}]$ .  
 (3)  $(\text{Na}_{1.5}\text{Ca}_{0.5})(\text{Mg}_{1.5}\text{Al}_{0.5})\text{F}_6\text{F}$ .

**Mineral Group:** Pyrochlore supergroup, coulsellite group.

**Occurrence:** In replacement lenses formed during greisenization.

**Association:** Morinite, gearsutite, vivianite, siderite, K-rich feldspar (adularia), fluorite, quartz.

**Distribution:** From the Cleveland tin mine, 14 km southwest of Waratah, Luina township, western Tasmania, Australia.

**Name:** Prefixes indicate the dominant cation in the X site, *fluor*, and B site, *natro*, the base name honors Ruth Elise *Coulsell* (1912-2000), a foundation member and honorary life member of the Mineralogical Society of Victoria.

**Type Material:** Museum Victoria, Melbourne, Victoria, Australia (M41450).

**References:** (1) Birch, W.D. and A. Pring (1990) A calcian ralstonite-like mineral from the Cleveland Mine, Tasmania, Australia. *Mineral. Mag.*, 54, 599-602. (2) Birch W.D., I.E. Grey, W.G. Mumme, and A. Pring (2009) Coulsellite, a new mineral from the Cleveland mine, Luina, Tasmania. *Australian J. Mineral.*, 15, 21-24. (3) Mumme, W.G., I.E. Grey, W.D. Birch, A. Pring, C. Bougerol, and N.C. Wilson (2010) Coulsellite,  $\text{CaNa}_3\text{AlMg}_3\text{F}_{14}$ , a rhombohedral pyrochlore with 1:3 ordering in both A and B sites, from the Cleveland Mine, Tasmania, Australia. *Amer. Mineral.*, 95, 736-740. (4) Atencio, D., M.B. Andrade, A.C. Bastos Neto, and V.P. Pereira (2017) Ralstonite renamed hydrokenoralstonite, coulsellite renamed fluornatrocoulsellite, and their incorporation into the pyrochlore supergroup. *Can. Mineral.*, 55, 115-120.