Lakebogaite **$NaCaFe_2H(UO_2)_2(PO_4)_4(OH)_2 \cdot 8H_2O$**

Crystal Data: Monoclinic. *Point Group*: *m*. As blocky to short prismatic crystals elongated along [010] to 0.4 mm. Crystal-structure solution demonstrated the presence of racemic twinning.

Physical Properties: *Cleavage*: Indistinct normal to [010]. *Tenacity*: Brittle. *Fracture*: Even to conchoidal. Hardness = ~3 D(meas.) = n.d. D(calc.) = 3.485

Optical Properties: Transparent. *Color*: Bright lemon-yellow. *Streak*: Pale yellow. *Luster*: Vitreous.
Optical Class: Biaxial (+). α = 1.650(2)-1.652(2) β = 1.660(4)-1.664(3) γ = 1.681(3)-1.686(2) 2V(meas.) = 80°-85° 2V(calc.) = 70°-74° *Pleochroism*: Very weak; X = yellow, Y = grayish yellow, Z = grayish yellow. *Absorption*: *X* slightly stronger than *Z*. *Dispersion r > v*, strong. *Orientation*: *Y = b*, straight extinction.

Cell Data: *Space Group*: *Cc*. *a* = 19.6441(5) *b* = 7.0958(2) *c* = 18.7029(5) β = 115.692(1)° Z = 4

X-ray Powder Pattern: Lake Boga quarry, northern Victoria, Australia.
6.60 (100), 3.16 (40), 4.07 (20), 3.80 (20), 3.56 (20), 3.31 (20), 2.797 (20)

Chemistry:

	(1)	(2)
Na_2O	2.01	2.43
CaO	4.55	4.40
SrO	0.87	
Fe_2O_3	11.98	12.54
Al_2O_3	1.23	
P_2O_5	23.44	22.28
UO_3	41.74	44.91
H_2O	[14.18]	13.44
Total	100.00	100.00

(1) Lake Boga quarry, northern Victoria, Australia; average of 9 electron microprobe analyses, H_2O by difference and confirmed by the crystal-structure solution; corresponding to $(Ca_{1.00}Na_{0.80}Sr_{0.10})_{\Sigma=1.90}(Fe^{3+}_{1.85}Al_{0.30})_{\Sigma=2.15}(UO_2)_{1.80}(PO_4)_{4.07}(OH, H_2O)_{10.12}$. (2) $CaNaFe^{3+}_2H(UO_2)_2(PO_4)_4(OH)_2(H_2O)_8$; an excess negative charge in the formula was compensated by adding a hydrogen atom.

Occurrence: In miarolitic cavities and on joint surfaces in a weathered uranium and fluorapatite-bearing pegmatitic granite.

Association: Meurigite-Na, torbernite, saléeite.

Distribution: From Lake Boga quarry, northern Victoria, Australia.

Name: For the nearest township, *Lake Boga*, whose name was derived from the Bogan tribe of Australian aboriginal people, who were the original inhabitants of the region.

Type Material: Museum Victoria, Melbourne, Australia (M46722, M47678 and M50194).

References: (1) Mills, S.J., W.D. Birch, U. Kolitsch, W.G. Mumme, and I.E. Grey (2008) Lakebogaite, $CaNaFe^{3+}_2H(UO_2)_2(PO_4)_4(OH)_2(H_2O)_8$, a new uranyl phosphate with a unique crystal structure from Victoria, Australia. Amer. Mineral., 93, 691-697.