Pringleite $Ca_9B_{26}O_{34}Cl_4(OH)_{24}\cdot 13H_2O$

Crystal Data: Triclinic, pseudomonoclinic. *Point Group:* 1. Subhedral to anhedral crystals, to 2 mm, in platy aggregates. *Twinning:* Rarely observed, simple twinning.

Physical Properties: *Cleavage:* On {110}, good. *Fracture:* Even to slightly conchoidal. *Tenacity:* Brittle. Hardness = 3–4 D(meas.) = 2.22(1) D(calc.) = 2.11

Optical Properties: Transparent to translucent. *Color:* Colorless to very pale yellow; colorless in transmitted light; blue-gray in reflected light. *Streak:* White. *Luster:* Vitreous. *Optical Class:* Biaxial (+). *Orientation:* $X = c$; $Y \wedge a = 40°$; $Z \wedge b = 46°$. *Dispersion:* $r \ll v$, strong. $\alpha = 1.537(1)$ $\beta = 1.548(1)$ $\gamma = 1.570(1)$ 2V(meas.) = 77(1)° 2V(calc.) = 71.4°

Cell Data: *Space Group:* $P1$. $a = 12.746(2)$ $b = 13.019(3)$ $c = 9.693(2)$ $\alpha = 102.2(2)°$ $\beta = 102.1(2)°$ $\gamma = 85.6(1)°$ Z = 1

X-ray Powder Pattern: Potash Corporation of America mine, Penobsquis, Canada. 7.69 (100), 9.21 (70), 5.74 (60), 4.63 (40), 3.845 (35), 2.199 (30b), 2.058 (30)

Chemistry:

	(1)	(2)
B_2O_3	46.75	45.94
CaO	26.29	25.62
Cl	6.48	7.20
H_2O	[21.94]	22.86
$-O = Cl_2$	1.46	1.62
Total	[100.00]	100.00

(1) Potash Corporation of America mine, Penobsquis, Canada; by electron microprobe, average of five analyses, H_2O by difference; corresponds to $Ca_{9.27}B_{26.56}O_{34.98}Cl_{3.62}(OH)_{24.64}\cdot 11.76H_2O$. (2) $Ca_9B_{26}O_{34}Cl_4(OH)_{24}\cdot 13H_2O$.

Polymorphism & Series: Dimorphous with ruitenbergite.

Occurrence: Rare, in an evaporite deposit.

Association: Hilgardite-1A, halite, ruitenbergite, sylvite, anhydrite, quartz, clays.

Distribution: From the Potash Corporation of America mine, Penobsquis evaporite deposit, near Sussex, New Brunswick, Canada.

Name: To honor Gordon J. Pringle (1944–), mineralogist, Geological Survey of Canada, Ottawa, Canada.

Type Material: Geological Survey of Canada, Ottawa, 66920; Canadian Museum of Nature, Ottawa, Canada, 82047.

References: (1) Roberts, A.C., J.A.R. Sterling, J.D. Grice, P.C. Burns, B.V. Roulston, J.D. Curtis, and J.L. Jambor (1993) Pringleite and ruitenbergite, polymorphs of $Ca_9B_{26}O_{34}(OH)_{24}Cl_4\cdot 13H_2O$, two new mineral species from Sussex, New Brunswick. Can. Mineral., 31, 795–800. (2) (1995) Amer. Mineral., 80, 1011–1012 (abs. ref. 1). (3) Grice, J.D., P.C. Burns, and F.C. Hawthorne (1994) Determination of the megastructures of the borate polymorphs pringleite and ruitenbergite. Can. Mineral., 32, 1–14.