Nevadaite $(Cu^{2+},\square,Al,V^{3+})_6[Al_8(PO_4)_8F_8](OH)_2(H_2O)_{22}$

Crystal Data: Orthorhombic. *Point Group: mm*2. Crystals prismatic on [001] in radiating clusters to 1 mm.

Physical Properties: *Cleavage:* None. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 3 D(meas.) = 2.54 D(calc.) = 2.55

Optical Properties: Translucent. *Color:* Turquoise-blue, pale green. *Streak:* Pale powder-blue. *Luster:* Vitreous.
Optical Class: Biaxial (-). $\alpha = 1.540$ $\beta = 1.548$ $\gamma = 1.553$ 2V(meas.) = 76° 2V(calc.) = 76°
Orientation: $X = c$; $Y = a$; $Z = b$. *Pleochroism:* Moderate, X = pale greenish blue; Y = very pale greenish blue; Z= blue. *Absorption:* $Z >> X > Y$.

Cell Data: *Space Group:* $P2_1mn$, $a = 12.123(2)$ $b = 18.999(2)$ $c = 4.961(1)$ $Z = 1$

X-ray Powder Pattern: Gold Quarry mine, Carlin, Nevada, USA.
6.077 (100), 5.618 (90), 9.535 (80), 2.983 (60), 3.430 (40), 2.661 (40), 1.844 (40)

Chemistry:

	(1)
CuO	9.24
ZnO	0.11
Al_2O_3	27.07
Fe_2O_3	0.07
V_2O_3	4.24
P_2O_5	32.54
H_2O	23.48
F	9.22
-O = F	3.88
Total	102.09

(1) Gold Quarry mine, Carlin, Nevada, USA; electron microprobe analysis, H_2O calculated from structure, H_2O and OH^- confirmed by IR and structure analysis; corresponding to $(Cu^{2+}_{2.00}Zn_{0.02}V^{3+}_{0.98}Fe^{3+}_{0.01}Al_{1.15})_{\Sigma=4.16}Al_8P_{7.90}O_{32}[F_{8.37}(OH)_{1.63}]_{\Sigma=10}(H_2O)_{21.65}$.

Occurrence: A weathering-derived mineral above a low grade, disseminated gold deposit in hydrothermally altered sedimentary rocks.

Association: Intermediate members of the strengite-variscite series, fluellite, hewettite, and more rarely anatase, kazakhstanite, leucophosphite, tinticite, torbernite, tyuyamunite, wavellite.

Name: For the US state from which the first specimens were collected.

Distribution: From the open-pit Gold Quarry mine, near Carlin, Eureka County, Nevada, USA.

Type Material: Systematic Reference Series, National Mineral Collection of Canada, Geological Survey of Canada, Ottawa, Ontario, Canada; NMCC68091.

References: (1) Cooper, M.A., F.C. Hawthorne, A.C. Roberts, E.E. Foord, R.C. Erd, H.T. Evans Jr., and M.C. Jensen (2004) Nevadaite, $(Cu^{2+},\square,Al, V^{3+})_6[Al_8(PO_4)_8F_8](OH)_2(H_2O)_{22}$, a new phosphate mineral species from the Gold Quarry mine, Carlin, Eureka County, Nevada: description and crystal structure. Can. Mineral., 42, 741-752. (2) (2005) Amer. Mineral., 90, 521 (abs. ref. 1).