

Goldquarryite**CuCd₂Al₃(PO₄)₄F₃·10H₂O**

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. As acicular to bladed crystals elongated along [100] to 1.5 mm, showing {010} and {001}, with {100} terminations in isolated radiating or parallel clusters to 3 mm. *Twining:* Multiple on {001} by 180° rotation about *c**.

Physical Properties: *Cleavage:* None. *Fracture:* Irregular. *Tenacity:* Brittle. Hardness = 3-4
D(meas.) = 2.78(1) D(calc.) = 2.81

Optical Properties: Transparent to translucent (aggregates). *Color:* Blue to blue-gray.
Streak: White. *Luster:* Vitreous.

Optical Class: Biaxial (+). $\alpha = 1.570$ $\beta = 1.573$ $\gamma = 1.578$ $2V(\text{meas.}) = \sim 30^\circ$ $2V(\text{calc.}) = 76^\circ$
Dispersion: Strong, $r < v$. *Pleochroism:* Deep blue || elongation, pale blue normal to it.

Cell Data: *Space Group:* $P\bar{1}$. $a = 6.787(1)$ $b = 9.082(2)$ $c = 10.113(2)$ $\alpha = 101.40(1)^\circ$
 $\beta = 104.27(1)^\circ$ $\gamma = 102.51(1)^\circ$ $Z = 1$

X-ray Powder Pattern: Gold Quarry mine, near Carlin, Eureka County, Nevada, USA.
9.433 (100), 2.820 (50), 4.726 (30), 3.700 (30), 3.173 (30B), 3.010 (30), 2.896 (30)

Chemistry:	(1)
K ₂ O	0.17
CaO	1.25
CuO	5.33
NiO	0.23
ZnO	0.05
CdO	26.24
Al ₂ O ₃	15.22
V ₂ O ₃	0.05
P ₂ O ₅	28.04
F	3.63
H ₂ O	[22.19]
- O = F	1.53
Total	100.87

(1) Gold Quarry mine, near Carlin, Eureka County, Nevada, USA; average of 4 electron microprobe analyses, H₂O calculated from stoichiometry and presence confirmed by IR and structure analyses; corresponding to [(Cu_{0.66}Ni_{0.03}Zn_{0.01}) $\Sigma=0.70$ □_{0.30}] $\Sigma=1.00$ (Cd_{2.00}Ca_{0.22}K_{0.04}) $\Sigma=2.26$ (Al_{2.92}V_{0.01}) $\Sigma=2.93$ (PO₄)_{3.88}F_{1.87}·(H₂O)_{12.06}.

Occurrence: A supergene product on and between brecciated and hydrothermally rounded jasperoid fragments lightly cemented by late-stage silicification in a Carlin-type gold deposit.

Association: Opal, carbonate-fluorapatite, hewettite.

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

Name: For the quarry where the first specimens were collected.

Type Material: National Mineral Collection, Geological Survey of Canada, Ottawa, Ontario (68084).

References: (1) Roberts, A.C., M.A. Cooper, F.C. Hawthorne, R.A. Gault, M.C. Jensen, and E.E. Foord (2003) Goldquarryite, a new Cd-bearing phosphate mineral from the Gold Quarry mine, Eureka County, Nevada. *Mineral. Record*, 34(3), 237-240. (2) (2003) *Amer. Mineral.*, 88(11), 1837 (abs. ref. 1). (3) Cooper, M.A. and F.C. Hawthorne (2004) The crystal structure of goldquarryite, (Cu²⁺,□)(Cd,Ca)₂Al₃(PO₄)₄F₂(H₂O)₁₀{(H₂O),F}₂, a secondary phosphate from the Gold Quarry mine, Eureka County, Nevada, U.S.A. *Can. Mineral.*, 42(3), 753-761.