Greenlizardite $(NH_4)Na(UO_2)_2(SO_4)_2(OH)_2 \cdot 4H_2O$

Crystal Data: Triclinic. *Point group*: $\bar{1}$. As bladed crystals, to 0.3 mm, flattened on {001} and elongated along [100], that exhibit {010}, {001}, {$\bar{1}$ 00}, {0$\bar{1}$ 0}, {00$\bar{1}$ }, {$\bar{1}$ 10}, {$\bar{1}$ $\bar{1}$ 0}, {$\bar{1}$ 20}, and {2$\bar{1}$ 0}. *Twinning*: By reflection on {001}, probable.

Physical Properties: *Cleavage*: Perfect on {100}, good on {2$\bar{1}$ 0}. *Tenacity*: Brittle. *Fracture*: Irregular. Hardness = ~2 D(meas.) = n.d. D(calc.) = 3.469-3.507 Fluoresces greenish under 405 nm laser light. Easily soluble in water.

Optical Properties: Transparent. *Color*: Light green-yellow. *Streak*: White. *Luster*: Vitreous. *Optical Class*: Biaxial (+). α = 1.559(1) β = 1.582(1) γ = 1.608(1) 2V(meas.) = 88(1)° 2V(calc.) = 87.8° *Dispersion*: *r* < *v*; moderate. *Orientation*: *X* ≈ *c*, *Y* ≈ *a*, *Z* ≈ *b**. *Pleochroism*: Weak, *X* = very pale yellow-green, *Y* = pale yellow-green, *Z* = light yellow-green. *Absorption*: *X* < *Y* < *Z*.

Cell Data: *Space Group: P*$\bar{1}$. *a* = 6.83617(17) *b* = 9.5127(3) *c* = 13.8979(10) α = 98.636(7)° β = 93.713(7)° γ = 110.102(8)° Z = 2

X-ray Powder Pattern: Green Lizard mine, Red Canyon, San Juan County, Utah, USA.
6.80 (100), 5.75 (62), 3.126 (60), 3.404 (56), 6.06 (36), 2.988 (34), 4.41 (32)

Chemistry:	(1)	(2)
$(NH_4)_2O$	2.75	2.96
Na_2O	2.34	3.52
SO_3	17.70	18.21
UO_3	60.45	65.07
H_2O	[9.76]	10.24
Total	93.00	100.00

(1) Green Lizard mine, Red Canyon, San Juan County, Utah, USA; average of 6 electron microprobe analyses, supplemented by Raman spectroscopy, H_2O calculated from structure, low analytical total ascribed to Na lower than expected from stoichiometry; corresponds to $(NH_4)_{0.98}Na_{1.00}U_{1.96}S_{2.04}O_{18.00}H_{10.02}$. (2) $(NH_4)Na(UO_2)_2(SO_4)_2(OH)_2 \cdot 4H_2O$.

Occurrence: A secondary mineral on the walls of mines in U-V deposits that replaced wood and other organic material in sandstones and conglomerate (roll-front type U-V deposits).

Association: Ammoniozippeite, boussingaultite, dickite, beshtauite, calcite, gypsum, fermiite, johannite, natrozippeite, oppenheimerite, plášilite, rozenite, shumwayite, sulfur, wetherillite.

Distribution: From the Green Lizard mine, Red Canyon, White Canyon mining district, San Juan County, Utah, USA.

Name: For the *Green Lizard* mine, the locality that provided the first specimens.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (66558 and 66559).

References: (1) Kampf, A.R., J. Plášil, B.P. Nash, and J. Marty (2018) Greenlizardite, $(NH_4)Na(UO_2)_2(SO_4)_2(OH)_2 \cdot 4H_2O$, a new mineral with phosphuranylite-type uranyl sulfate sheets from Red Canyon, San Juan County, Utah, USA. Mineral. Mag., 82(2), 401-411. (2) (2018) Amer. Mineral., 103, 2041 (abs. ref. 1).