

Crystal Data: Monoclinic; rarely metamict. *Point Group:* 2/*m*. As anhedral grains, may be flattened on {100}, to 0.2 mm.

Physical Properties: *Cleavage:* Distinct on {001}; another poor cleavage is of unspecified orientation. *Fracture:* Conchoidal. Hardness = [4.5] VHN = 318 (150 g load). D(meas.) = 7.1 D(calc.) = 7.18 Fluoresces dull white with a pink tinge under SW UV; radioactive.

Optical Properties: Transparent to translucent. *Color:* Colorless to very pale cream. *Optical Class:* Biaxial (+). *Orientation:* $Y = b$; $Z \simeq c$. *Dispersion:* $r < v$, moderate. $\alpha = 1.898(3)$ $\beta = [1.900]$ $\gamma = 1.922$ $2V(\text{meas.}) = 25(1)^\circ$

Cell Data: *Space Group:* $P2_1/n$. $a = 6.80(3)$ $b = 6.96(3)$ $c = 6.54(3)$ $\beta = 104^\circ 55(10)'$ $Z = 4$

X-ray Powder Pattern: Gillespie's Beach, New Zealand.
3.09 (100), 2.89 (90), 4.23 (75), 3.29 (75), 4.71 (60), 4.08 (50), 3.53 (50)

Chemistry:	(1)	(2)	(3)
SiO ₂	19.7	12.8	18.54
ThO ₂	76.6	69.9	81.46
UO ₂	0.0	1.0	
RE ₂ O ₃	2.6	4.5	
Fe ₂ O ₃	1.2		
FeO		< 0.09	
MnO	trace		
CaO	0.0	2.5	
MgO	0.0		
F		1.0	
OH		[1.8]	
H ₂ O	0.0	[0.0]	
P ₂ O ₅	trace	7.1	
Total	100.1	[100.6]	100.00

(1) Gillespie's Beach, New Zealand. (2) Bogatynia area, Poland; by electron microprobe, RE₂O₃ = La₂O₃ 0.9%, Ce₂O₃ 2.7%, Pr₂O₃ 0.15%, Nd₂O₃ 0.9%; corresponds to Th_{0.78}Ca_{0.13}RE_{0.09}U_{0.01}[(Si_{0.63}P_{0.22}) $\Sigma=0.85$ O₄](OH)_{0.31}F_{0.16}. (3) ThSiO₄.

Polymorphism & Series: Dimorphous with thorite.

Mineral Group: Monazite group.

Occurrence: In beach sands (New Zealand).

Association: Scheelite, titanian cassiterite, uranothorite, ilmenite, gold (New Zealand); cheralite, thorogummite, thorian ningyoite (Bogatynia area, Poland).

Distribution: From Harihari, Saltwater Creek, Okirito, Five Mile Beach, Bruce Bay, north and south of the mouth of the Waikukupa River, and Gillespie's Beach, South Westland, New Zealand. From the Bogatynia area, Lower Silesia, Poland. On Mont Most, Great St. Bernard, Val d'Aosta, Italy. In the Holiday mine, Hawthorne, Fitting district, Mineral Co., Nevada, USA. From Kuttankuli (Kuttakuzhi), about 42 km east-southeast of Trivandrum, Kerala State, India.

Name: For Colin Osborne Hutton (1910–1971), New Zealand-American mineralogist of Stanford University, Palo Alto, California, USA.

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