Sudburyite (Pd, Ni)Sb

Crystal Data: Hexagonal. *Point Group:* $6/m\ 2/m\ 2/m$. As small inclusions, typically elongated, to 100 μm, commonly in cobaltite or maucherite.

Physical Properties: Hardness = n.d. VHN = 281–311 (25 g load). D(meas.) = 9.37 (PdSb) D(calc.) = 9.41 (PdSb)

Optical Properties: Opaque. *Color:* In polished section, white with a yellow tint. *Luster:* Metallic. *Anisotropism:* Weak to moderate, in pale grayish yellow and dark grayish brown.
R_1–R_2: (400) 49.1–45.0, (420) 50.9–46.9, (440) 52.9–49.2, (460) 54.7–51.5, (480) 56.6–53.8, (500) 58.6–55.8, (520) 60.7–57.7, (540) 62.8–59.3, (560) 64.4–60.4, (580) 65.7–61.4, (600) 66.9–62.2, (620) 67.8–62.8, (640) 68.6–63.4, (660) 69.3–63.6, (680) 70.0–63.9, (700) 70.5–64.2

Cell Data: *Space Group:* $P6_3/mmc$. $a = 4.083$ $c = 5.602$ $Z = 2$

X-ray Powder Pattern: Synthetic PdSb.
2.18 (100), 0.7790 (100), 0.8237 (90), 1.202 (80), 2.03 (70), 0.9006 (70), 1.489 (60)

Chemistry:

	(1)	(2)	(3)
Pd	36.1	40.8	46.0
Ni	7.6	3.2	
Sb	55.5	51.3	53.3
Bi	0.77	4.5	
As	0.71	0.5	< 0.01
Te	0.79	0.1	
Total	101.47	100.4	99.3

(1) Copper Cliff South mine, Sudbury, Canada; by electron microprobe, corresponding to $(Pd_{0.71}Ni_{0.27})_{\Sigma=0.98}(Sb_{0.96}Bi_{0.01}As_{0.02}Te_{0.01})_{\Sigma=1.00}$. (2) Do.; by electron microprobe corresponding to $(Pd_{0.85}Ni_{0.12})_{\Sigma=0.97}(Sb_{0.93}Bi_{0.05}As_{0.02})_{\Sigma=1.00}$. (3) Witwatersrand, South Africa; by electron microprobe, corresponding to $Pd_{0.99}Sb_{1.01}$.

Mineral Group: Nickeline group.

Occurrence: As tiny inclusions, commonly in cobaltite or maucherite, in mechanical concentrates of platinum-group minerals (Sudbury, Canada).

Association: Cobaltite, maucherite, gersdorffite, breithauptite, chalcopyrite, nickeline, galena (Sudbury, Canada); pyrrhotite, pentlandite, chalcopyrite, violarite, cubanite, bornite, sphalerite, galena, linnaeite, magnetite, testibiopalladite, sperrylite, omeiite, gold (Danba, China).

Distribution: In Canada, from the Copper Cliff South [TL] and Frood mines, Sudbury, Ontario; and in the Wellgreen Cu–Ni–Pt–Pd deposit, Yukon Territory. At Danba, Sichuan Province, China. From the Baula complex, Orissa, India. From Kambalda, 56 km south of Kalgoorlie, Western Australia. In the Onverwacht and Tweefontein pipes, on the Merensky Reef, Bushveldt complex, and from the Witwatersrand, Transvaal, South Africa.

Name: For the localities at Sudbury, Canada.

Type Material: Royal Ontario Museum, Toronto, Canada, M32841.

References: (1) Cabri, L.J. and J.H.G. Laflamme (1974) Sudburyite, a new palladium–antimony mineral from Sudbury, Ontario. Can. Mineral., 12, 275–279. (2) (1976) Amer. Mineral., 61, 178 (abs. ref. 1). (3) Ping-Chiu Fu, Yu-Hua Kung, and Liu Chang (1979) Crystal structure of sudburyite. Ti Ch'iu Hua Hseuh, 72–75 (in Chinese). (4) (1979) Chem. Abs., 90, 213618 (abs. ref. 3). (5) Cabri, L.J., Ed. (1981) Platinum group elements: mineralogy, geology, recovery. Can. Inst. Min. & Met., 141, 158. (6) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 542.