

Crystal Data: Cubic. *Point Group:* $4/m\bar{3}2/m$. Massive; as pebbles, grains and flakes; rare crystals, to 4 mm. In meteorites as rims or regular intergrowths with kamacite.

Physical Properties: *Tenacity:* Malleable and flexible. Hardness = 5.5–6 VHN = 320–380 (low Ni); 265–290 (high Ni) (50 g load). $D(\text{meas.}) = 7.8\text{--}8.65$ $D(\text{calc.}) = [6.37\text{--}8.53]$ Strongly magnetic.

Optical Properties: Opaque. *Color:* Silver-white to grayish white. *Luster:* Metallic. R: (400) 54.4, (420) 56.0, (440) 57.6, (460) 59.1, (480) 60.4, (500) 61.4, (520) 62.4, (540) 63.1, (560) 63.8, (580) 64.4, (600) 64.8, (620) 65.2, (640) 65.5, (660) 65.7, (680) 66.1, (700) 66.4

Cell Data: *Space Group:* $Fm\bar{3}m$. $a = 3.545\text{--}3.560$ $Z = 1$ [wehad4, ckICDD = 1??ckuseempprog??changednow]

X-ray Powder Pattern: Awarua Bay, New Zealand. 2.044 (10), 1.772 (6), 1.069 (4), 1.253 (3), 1.023 (1), 0.814 (1), 0.792 (1)

X-ray Powder Pattern: Oregon, USA. (“josephinite”). 2.06 (100), 1.073 (40), 1.783 (30), 1.259 (20), 1.027 (10)

Chemistry:	(1)	(2)	(3)	(4)
Ni	76.60	67.63	67.77	75.93
Fe	21.45	31.02	32.23	24.07
Co	1.19	0.70		
Cu	0.66			
S	0.06	0.22		
P	0.04			
SiO ₂	0.00	0.43		
Total	100.00	100.00	100.00	100.00

(1) South Fork, Smith River, California, USA. (2) Gorge River, New Zealand. (3) Ni₂Fe. (4) Ni₃Fe.

Occurrence: In river placers, from serpentinized peridotites and ophiolites; rare in meteorites.

Association: Gold, magnetite (placers); copper, heazlewoodite, pentlandite, violarite, chromite, millerite (peridotites); kamacite, allabogdanite, schreibersite, graphite (meteorites).

Distribution: From the Red Hills and the Gorge River draining them, near Awarua Bay [TL], south Westland, New Zealand. At Coolac, New South Wales, and in the Lord Brassey mine, Tasmania, Australia. From the Bobrovka River, Nizhni Tagil, Ural Mountains, Russia. In the Feragen ultramafic body, Sør-Trøndelag, Norway. From Vadu Dobrii, Poiana Ruscă Mountains, Romania. In the Elvo River, Piedmont, Italy. From Poschiavo, Bergell, Switzerland. In the USA, from Josephine and Jackson Cos., Oregon; South Fork, Smith River, Del Norte Co., California; and in the Line Pit mine, Cecil Co., Maryland. From the Lillooet district, Fraser River, British Columbia; and at Holle Canyon, Pelly River, Yukon Territory, Canada. From Oko, Kochi Prefecture, Japan. In the Sakhakot-Qila complex, Malakand Agency, Pakistan. A number of additional localities are known, many as widely dispersed occurrences in large ultramafic bodies.

Name: For the locality near Awarua Bay, New Zealand.

Type Material: Geological Survey of New Zealand, Lower Hutt, New Zealand, P21969.

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 117–119. (2) Ramdohr, P. (1969) The ore minerals and their intergrowths, (3rd edition), 356–357. (3) Challis, G.A. (1975) Native nickel from the Jerry River, south Westland, New Zealand; an example of natural refining. *Mineral. Mag.*, 40, 247–251. (4) Ahmed, Z. and J.C. Bevan (1981) Awaruite, iridian awaruite, and a new Ru–OsIr–Ni–Fe alloy from the Sakhakot-Qila Complex, Malakand Agency, Pakistan. *Mineral. Mag.*, 44, 225–230. (5) Berry, L.G. and R.M. Thompson (1962) X-ray powder data for the ore minerals. *Geol. Soc. Amer. Mem.* 85, 13. (6) Williams, K.L. (1960) ??title?? *Amer. Mineral.*, 45, 450–453. (7) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 31.

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