



INVESTMENT OPPORTUNITIES NICKEL

Ni

Year 2018

Sales value	Tonnes sold	Exports	Direct employees	Investment projects	Production world ranking
\$2610 m	149 642 t	\$2615 m ¹	5698	\$2847 m ^{2 3}	6th

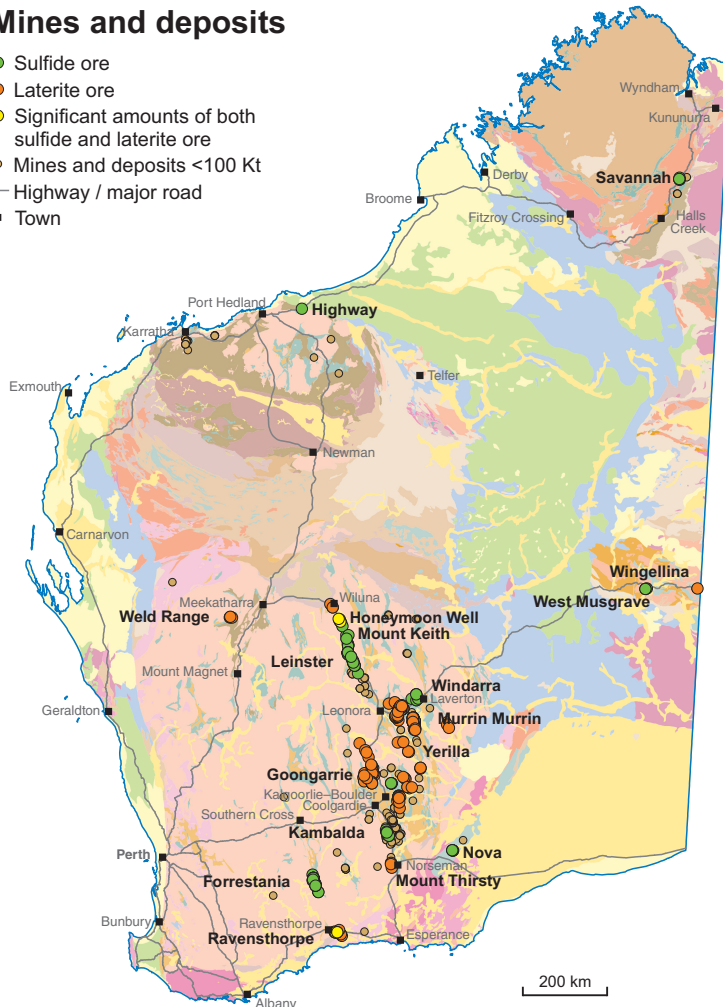
¹ may include Ni mined <2018

² Ni, Cu, Zn

³ includes projects 'possible' to 'under construction'

Mines and deposits

- Sulfide ore
- Laterite ore
- Significant amounts of both sulfide and laterite ore
- Mines and deposits <100 Kt
- Highway / major road
- Town



Western Australia hosts world-class nickel deposits

- Current resources for Western Australia of 34 million tonnes contained nickel
- Production of 149 642 tonnes of nickel (metal and concentrate) in 2018
- Improving nickel prices have encouraged the reopening and further development of several nickel mines, such as Savannah (Panoramic Resources) and Cosmos (Western Areas)
- Exploration continues across the State, with updated mineral resource estimates reported for Quicksilver (Golden Mile Resources), Nebo-Babel (Oz Minerals Ltd / Cassini Resources Ltd) and Mt Thirsty (Barra Resources Ltd / Conico Ltd).

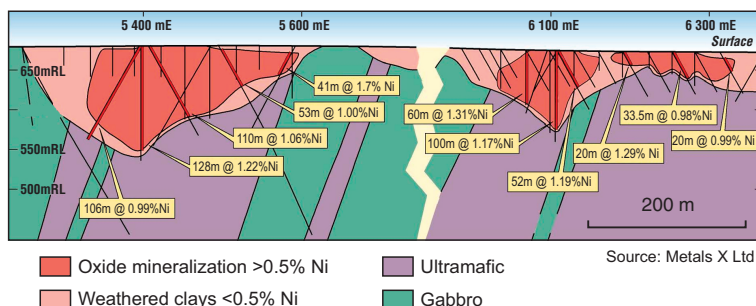
Areas in Western Australia prospective for nickel

Ultramafic rocks (komatiite and peridotite): examples include Kambalda, Mount Keith, and Leinster. This mineralization style dominates historic production

Mafic-ultramafic intrusions: (similar to Voisey's Bay in Canada, Bushveld Complex in South Africa and the Thomson mine in the Cape Smith belt of Canada): Archean examples occur in the Pilbara and Yilgarn Cratons. Proterozoic examples occur in the Fraser Range area (Albany-Flaser Orogen), Lamboo Province (Halls Creek Orogen) and in the Musgrave Province

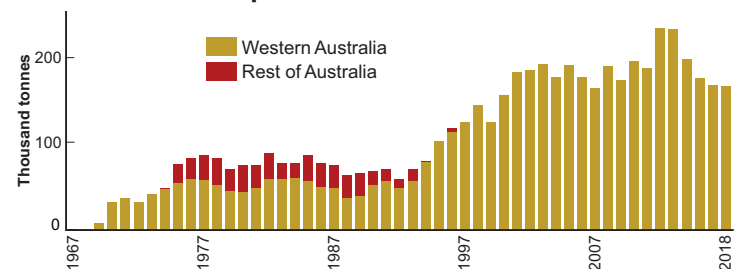
Mafic intrusives related to Large Igneous Provinces (LIP): similar to Noril'sk-style mineralization. Potential areas include dolerite sills in the Edmund, Collier, Officer, Kimberley, Speewah, and Hamersley Basins, as well as large areas of flood basalt in the East Kimberley

Lateritic deposits in regolith (residual and supergene): developed over weathered mafic-ultramafic rocks of the Archean Yilgarn Craton and Proterozoic Musgrave Province (Wingellina)



Weathering profile and geological cross-section, Wingellina nickeliferous laterite, Musgrave Complex

WA nickel production vs rest of Australia



Source: Department of Mines, Industry Regulation and Safety (DMIRS) and Department of Industry Innovation and Science (DIIS)



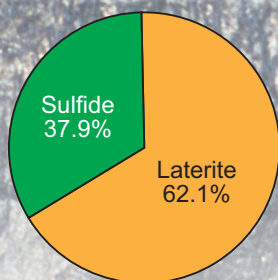
Government of Western Australia
Department of Mines, Industry Regulation
and Safety

www.dmir.s.wa.gov.au

Geological Survey of
Western Australia



Nickel resources by mineralization style*



* calculated from projects in table below

Top producers 2018 (% of total production in Western Australia)

BHP Billiton	43%
Glencore	25%
Independence Group	18%
Western Areas	13%

Nickel projects with resources >100 Kt contained metal

Project	Project owner	Ore (Mt)	Av. Grade (%Ni)	Contained metal (Kt)
Honeymoon well	Noril'sk	524.20	0.764	4005.26
Mt Keith	BHP Billiton (Nickel West)	682.00	0.581	3960.10
Weld Range – Range Well	Ausinox	385.30	0.64	2465.92
Kalgoorlie Nickel Project – West	Ardea Resources	349.90	0.687	2404.04
Murrin Murrin	Glencore	230.90	0.995	2298.29
Leinster	BHP Billiton (Nickel West)	228.36	0.882	2013.00
Wingellina ^M	Metals X	215.84	0.905	1952.49
Ravensthorpe	First Quantum Minerals	307.30	0.583	1792.05
Avalon	Wingstar Investments	169.80	0.826	1403.02
Cawse	Wingstar Investments	176.49	0.691	1219.51
Kalgoorlie Nickel Project – East	Ardea Resources	145.70	0.809	1178.70
Siberia JV	Eastern Goldfields / Ardea Resources	163.30	0.67	1089.79
West Musgrave ^M	Oz Minerals / Cassini Resources	239.00	0.351	838.50
NiWest	GME Resources	67.10	1.039	696.89
Yerilla	Ardea Resources	90.80	0.76	689.91
Wilconi	A-Cap Resources / Blackham Resources	80.50	0.77	619.85
Cosmos	Western Areas	63.34	0.946	599.04
Forrestania	Western Areas	26.02	1.717	446.60
Carlingup – Nindilbillup	Australasian Mining	51.01	0.572	291.57
Nova-Bollinger ^A	Independence Group	13.24	2.05	271.36
Savannah ^H	Panoramic Resources	13.21	1.65	218.34
Canegrass	Nickelore	29.60	0.71	209.28
Julia	Wingstar Investments	25.93	0.743	192.66
Black Hills	Western Resources / Zetek Resources	30.00	0.64	192.00
Silver Swan – Black Swan	Poseidon Nickel	30.84	0.621	191.57
Jericho	BHP Billiton (Nickel West) / Noril'sk	31.00	0.59	182.90
Quicksilver	Golden Mile Resources	26.30	0.645	169.65
Pardoo–Highway ^P	Caeneus Minerals	50.00	0.3	151.70
Windarra	Poseidon Nickel	9.68	1.53	147.61
Kalgoorlie Nickel Project – Siberia – Black Range	Ardea Resources	26.92	0.544	146.53
Mt Thirsty	Barra Resources / Conico	26.60	0.52	139.03
Mt Edwards	Neometals	7.40	1.691	125.02
Norseman	Galileo Mining	25.10	0.488	122.41
Kurnalpi – Grey Dam	Carnavale Resources	14.60	0.75	110.12
Pyke Hill	Cougar Metals	10.50	0.99	103.74

Resource reporting codes vary

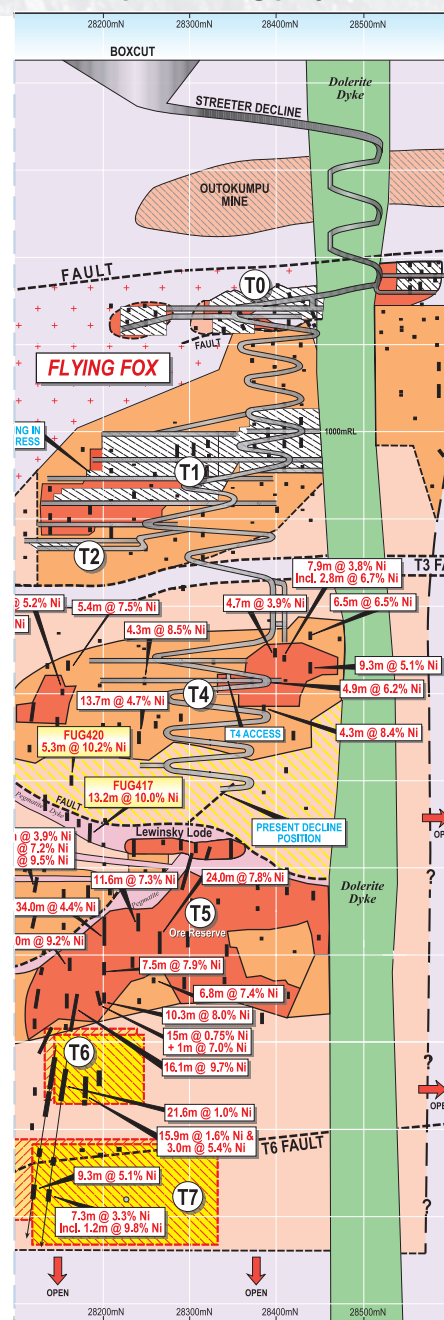
Tectonic unit is Yilgarn except: ^A Albany–Fraser Orogen, ^H Halls Creek Orogen, ^M Musgrave Province, ^P Pilbara Craton

Laterite

Sulfide

Laterite + sulfide

Flying Fox, Forrestania Interpreted long projection



Source: Western Areas NL