

VANADIUM

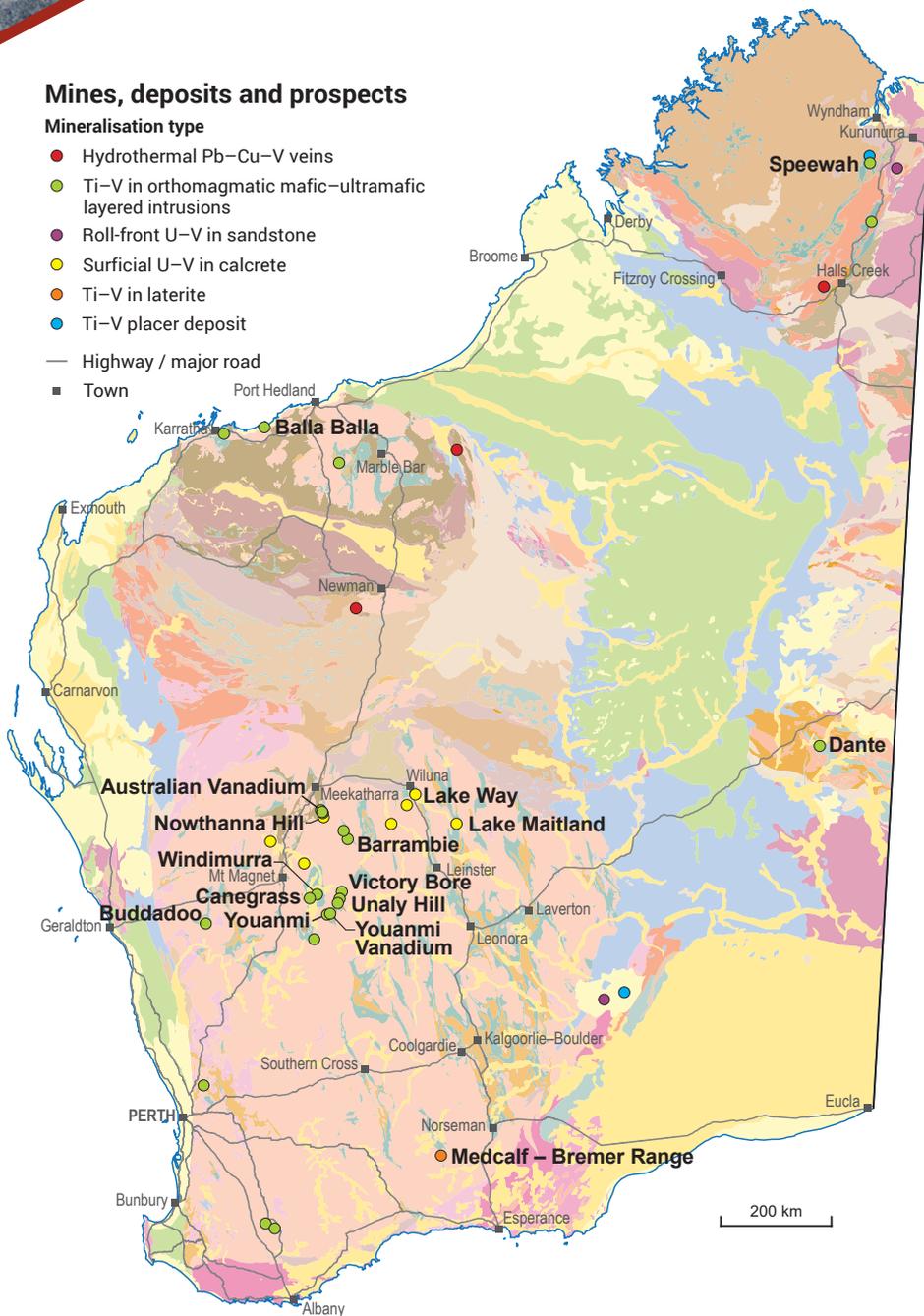
INVESTMENT OPPORTUNITIES

**WORLD-CLASS RESOURCE PROVINCE | SECURE INVESTMENT LOCATION
WORLD-LEADING GEOSCIENTIFIC DATA | GLOBAL MINING SERVICES INDUSTRY**

Mines, deposits and prospects

Mineralisation type

- Hydrothermal Pb–Cu–V veins
- Ti–V in orthomagmatic mafic–ultramafic layered intrusions
- Roll-front U–V in sandstone
- Surficial U–V in calcrete
- Ti–V in laterite
- Ti–V placer deposit
- Highway / major road
- Town



Western Australia continues to grow into a global vanadium hub

- There is no current vanadium production in the state, but total historical production in 2000–04 and 2012–14 was 14,100 t of V_2O_5 from Windimurra
- Vanadium, along with other critical minerals, is being used for clean energy technologies vital to decarbonisation efforts to reach net zero emissions

Project stages

- Several projects are at Pre-Feasibility and Feasibility stages: Speewah (Tivan), Balla Balla (BBI Group), Australian Vanadium (Australian Vanadium), Victory Bore (Surefire Resources), Barrambie (Neometals), Windimurra (Atlantic), and Medcalf – Bremer Bay (Audalia Resources) projects
- Australian Vanadium secured Environmental Protection Authority approval for their project in January 2025. The project was also selected as a lead agency advice and support project under Western Australian Government's Lead Agency Framework

Resources

- Updated Mineral Resource Estimates were released for the Australian Vanadium project (Australian Vanadium) of 395.5 Mt at 0.77% vanadium in May 2024
- A maiden Mineral Resource Estimate of 148 Mt at 0.54% V_2O_5 was released in August 2025 for the Dante Project (Terra Metals)

Recent project information

- In March 2024, Australian Vanadium Limited successfully commissioned its vanadium electrolyte manufacturing facility with the production of its first high purity electrolyte, ready for use in vanadium flow batteries. The capability to produce greater than 99.9% ultra-high purity V_2O_5 was also demonstrated at pilot-scale using ore from the project
- In January 2024, Surefire Resources developed a breakthrough process for vanadium processing achieving an extraction of 91% of vanadium and 88% of titanium directly from Victory Bore magnetite concentrate. This new application alleviates the requirement for standard pre-treatment processes currently in use. The process is expected to be more environmentally acceptable with low emissions
- In January 2025, Tivan Limited achieved high-purity vanadium specification at the Speewah project. A salt roast testwork program successfully produced high-purity V_2O_5 with a grade of 99.86% without the use of solvent extraction

Western Australia vanadium statistics data (2023–24 financial year)

\$1,584 m*
Investment projects



5%‡
Royalty rate



* Includes projects planned, possible, committed or under construction as of October 2024
‡ 5% – concentrate, 2.5% – metal



Department of Mines,
Petroleum and Exploration

dmpe.wa.gov.au



Geological Survey of
Western Australia

Vanadium projects with resources, ranked by contained V₂O₅ as at September 2025

Mineral Resource Estimates reported in accordance with JORC (2012) unless otherwise stated

Project	Status	Owner	Resources (Mt)	Av. grade V ₂ O ₅ (%)	Contained V ₂ O ₅ (kt)	Resource date
Speewah	Pre-Feasibility	Tivan	4 711.0	0.30	14 180.1	01/04/2019
Balla Balla*	Feasibility	BBI Group	446.0	0.66	2 923.1	09/02/2022
Australian Vanadium [^]	Feasibility	Australian Vanadium	395.5	0.77	3 036.0	07/05/2024
Victory Bore	Pre-Feasibility	Surefire Resources NL	464.6	0.29	1 363.9	05/12/2023
Barrambie	Feasibility	Neometals	280.1	0.44	1 234.4	17/04/2018
Windimurra	Feasibility	Atlantic	209.7	0.50	1 045.0	30/11/2019
Canegrass	Exploration	Viking Mines	145.8	0.70	1 014.0	20/11/2023
Dante	Exploration	Terra Metals	148.0	0.54	794.0	11/08/2025
Buddadoo ^A	Exploration	CZR Resources	204.7	0.30	613.0	16/09/1991
Youanmi	Exploration	Diversity Resources	185.0	0.33	610.5	22/05/2019
Youanmi Vanadium	Scoping	Venus Metals Corporation, Legendre Bruce Robert	134.7	0.34	459.0	18/03/2019
Unaly Hill [#]	Exploration	Surefire Resources	86.2	0.42	362.0	21/11/2011
Medcalf – Bremer Range	Pre-Feasibility	Audalia Resources	25.7	0.52	133.0	15/03/2022
Lake Way	Scoping	Toro Energy	91.8	0.03	26.3	07/03/2024
Lake Maitland	Scoping	Toro Energy	50.0	0.03	14.3	24/09/2024

Resource estimates have been rounded

* Mineral Resource is reported in accordance with JORC 2004 and JORC 2012

Mineral Resource is not reported in accordance with JORC 2012 but is CRIRSCO compliant

A Mineral Resource is not reported in accordance with JORC 2012 and is not CRIRSCO compliant

^A Combined Australian Vanadium and Technology Metals Australia Gabanintha Projects

Spatial and resource estimate data sourced from WA Mines and Mineral Deposit database (MINEDEX)

■ Ti-V in orthomagmatic mafic-ultramafic layered intrusions
■ Ti-V in laterite

■ Surficial U-V in calcrete

Summary of vanadium uses

- Vanadium can be used to make steel alloys, for use in space vehicles, nuclear reactors, aircraft carriers, etc.
- Use in batteries – the vanadium flow battery (VFB) uses a different method of storing energy than Lithium-ion (Li-ion) batteries. VFBs use a circulating electrolyte solution of vanadium pentoxide to store the charge in tanks, while Li-ion batteries store all the charge inside the battery cell itself. VFBs have lower energy density compared to Li-ion and have the ability to store a lot more total energy. VFBs are energy batteries and therefore very suitable for storing large amounts of energy for later use. Because flow batteries can cycle more often and to greater depths of discharge (100%), they have a longer life than Li-ion batteries, which eventually become less efficient when cycled too frequently. Vanadium flow batteries are safer than Li-ion since they are not prone to the thermal runaway known to occur with Li-ion batteries
- Vanadium can be utilised in ceramics as a pigment
- Vanadium pentoxide can be used as a catalyst in the manufacture of dyes and printing fabrics
- In the medical sphere, vanadium is used to treat a number of ailments, including diabetes, heart disease and high cholesterol. It has also been used in the cathodes of batteries for implantable cardioverter defibrillators



The Windimurra vanadium pit, looking south (Image courtesy T Ivanic)

For more information

MINEDEX is a spatial and textual database of mining and exploration activity

MINEDEX

www.dmpe.wa.gov.au/minedex

GeoVIEW.WA is a free GIS-based spatial viewer

GeoVIEW.WA

www.dmpe.wa.gov.au/geoview



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DMPE'S MINEDEX, Statistics, and Title and Geoscience Services teams have contributed to the production of this flyer

All data extracted as at: September 2025



Department of Mines,
 Petroleum and Exploration

Published Feb2025



Geological Survey of
 Western Australia