

# SEG 2024 Conference: Sustainable Mineral Exploration and Development

---

## Vanadium Distribution in Soil of Okahandja Map Sheet (2117 DA – DD) in Otjozondjupa Region, Namibia

Wilka Embula

Geological Survey of Namibia, Ministry of Mines and Energy, Windhoek, Namibia

The 2116-Okahandja Map Sheet (1:250,000) was sampled in 2003-2004 as part of the Regional Geochemical Sampling Project. A total of 2,700 soil and stream sediment samples were collected on 32 small-scaled map sheets at 1:50,000. This study was undertaken on four of these map sheets, namely 2117 DA-DD, comprising 192 soil samples. Sampling was done at a density of 1 sample/10 km<sup>2</sup>, with a composite sample obtained from a minimum of five sample pits at a depth of 25 cm and screened through for coarse fraction (<2 mm) and fine fraction (<180 µm) samples. Wooden and plastic digging tools were utilized to avoid contamination during the survey. Concentrations of elements including vanadium were determined using the handheld Niton energy dispersive X-ray fluorescence spectrometer for 150 seconds at the Geological Survey of Namibia laboratory. A homogenized portion of each 180-µm fine fraction sample was milled to <64-µm size before analysis, and QAQC duplicates and standards were routinely inserted into batches every 20<sup>th</sup> interval.

Spatial distribution patterns of vanadium were generated using ESRI ArcGIS software and interpreted in conjunction with geological maps and sample site description data recorded. Natural and anthropogenic activities such as rock weathering, soil erosion, and agrochemical usage contributes to vanadium content in soil. Vanadium in this area ranges from 57.67 to 243.49 ppm, where the presence of amphiboles, gneiss, granites, pegmatites, marble, magnetite, quartzites, and schists played a role. High V concentrations were observed in association with structures such as basins and fold hinges, whereas low V values are concentrated within the domes. The mean (115.07 ppm) and median (111.12 ppm) were found to be higher than the world soil average (90 ppm) and crustal abundance (97 ppm).