

# STUDYING THE GROUNDWATER RECHARGE PATTERNS AFTER 30 YEARS OF DISPOSAL AT THE VAALPUTS FACILITY FOR ENVIRONMENTAL PROTECTION, SUSTAINABILITY

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## ABSTRACT

Vaalputs Radioactive Waste Site is the only authorised disposal facility in South Africa that disposes Low and Intermediate Level Radioactive Waste. The facility is located on the Bushmanland/Namaqualand Plateau. The Vaalputs disposal concept is a near surface multi-barrier disposal which takes into account both the engineering (man-made) and natural barriers. What makes the facility environmentally sound is its ability to have low to nonexistence groundwater recharge. The groundwater aquifer at the disposal facility is bounded in the west by Kamiebes shear zone and in the south by a Platbakkies shear zone which further illustrates groundwater compartmentation. Previous studies indicated that in an unlikely event where the engineering barrier potentially fails resulting in radioactive leakage, flow paths in deep aquifers, conversely, would be less influenced due to recharge rate. Recharge plays a crucial role in demonstrating the safety of a disposal facility and further quantifies the groundwater patterns. The paper reports on the recharge studies conducted at Vaalputs using chloride mass balance (CMB) and radioisotope methods. The CMB method is the principle that a portion of the chloride in rainfall and from dry atmospheric deposition infiltrates the zone of saturation zone. Radioisotopes method can be used to reveal the occurrence of modern groundwater recharge. This study demonstrates that the recharge parameter at Vaalputs remains unchanged after 30 years of operations.