Helium in Tanzania – Overview

- North Rukwa Project
- North Nyasa Project
- Eyasi and Manyara Projects

Helium in Tanzania

Why Tanzania? Is this the right place to dedicate our time, resources, talent and experience toward exploring for a large, primary helium reserve, capable of delivering security and stability to the global helium supply chain?

Tanzania is safe, stable and has beautiful beaches and world-renowned wildlife. It has also traditionally been one of the best countries in Africa to do business.

But, it's the geology that has brought us here. In 2012, two of the world's most respected helium geoscience academics identified the rift basins of Tanzania as having a unique geology for helium, evidenced by the globally anomalous helium concentrations emanating from the ground in more than a dozen rift-associated hot springs.

Geological Setting

The East African Rift System (EARS) is the only major developing continental plate boundary on earth, extending for nearly 3,800km from Ethiopia to Mozambique (approximately the width of Australia). Along its length, the rift intersects some of the oldest continental crust on earth - the Archean-aged Tanzanian Craton (~3 billion years old) and its surrounding Paleo-Proterozoic metamorphic belts (~2 billion years old).

This is where it gets geologically interesting because for helium, age is important – the older the crust the better, as the helium is generated within the crust from radioactive decay of Uranium, with its half-life of 4.5 billion years. There's also a demonstrable relationship between continental rift systems and the helium producing regions of the world, with continental rifting being "helium release on steroids" (Dr. Chris Ballentine, pers comm). Helium concentrations of up to 17.9% in Tanzanian hotsprings were documented more than half a century ago by the then Tanganyika Geological Survey, demonstrating this anomalous helium flux into the rift basins.

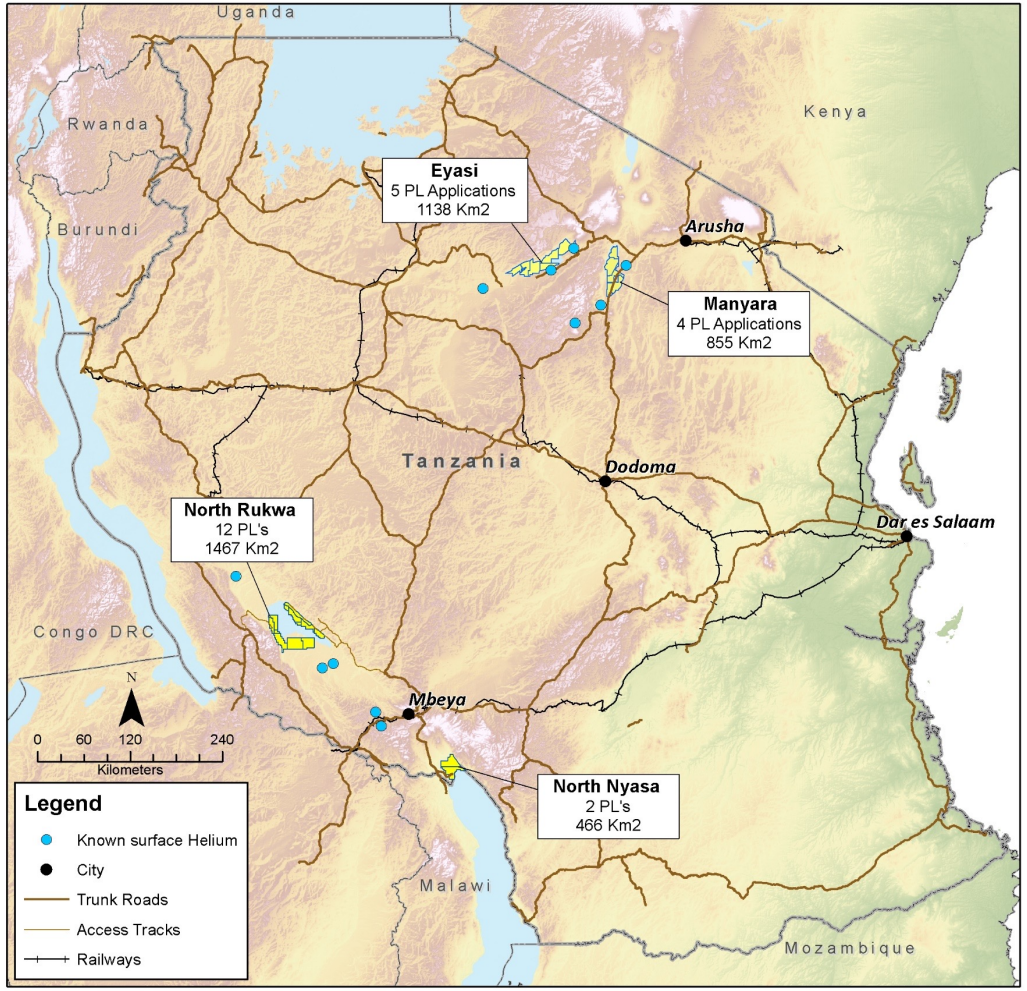
Danabalan (2017) has estimated 5.7 Trillion cubic feet (Tcf) of helium to have been generated beneath the Rukwa basin, just within the upper 10km of basement. As a result of the heating and fracturing through the EARS, that accumulated helium is now being liberated into the overlying basin. We model both of the known mechanisms for the exsolution of helium from groundwater into gas phase to be present in the northern Rukwa Basin. Noble Helium's independently estimated unrisked mean Prospective Helium Resource of 176 Billion cubic feet (Bcf) represents only 3% of the generated volume, which for context, represents 30 times the global annual industrial use of helium of circa 6 Bcf.

What are our chances of success?

We also now know many of the EARS basins possess a unique clay mineralogy that is capable of retaining billions of barrels equivalent of oil and gas, something that was thought unlikely for over 70 years, because of the active rifting. The first oil discoveries in the EARS were only 15 years ago in western Uganda, something in which our team was intimately involved. With the benefit of the learnings from the billions of dollars of investment and 30+ oil and gas discoveries that have since been made in the EARS, at an overall 80% success rate, we can confidently explore the EARS basins of Tanzania for a different type of gas: helium.

Over the last 5 years, leveraging decades of exploration experience in the East African Rift, we believe Tanzania may indeed host the best untested helium system on the planet. We believe Tanzania has the potential to emerge as one of the world's largest helium producers, and the world's largest primary helium resource ("green helium", meaning independent of natural gas from which 95% of today's helium is sourced as a by-product).

Core Assets: 3,926km2 of premium Tanzanian helium prospecting licences



- In early 2017, Noble hand-selected 4 Tanzanian Rift Basins for their helium prospectivity:
  - North Rukwa
  - North Nyasa
  - Eyasi
  - Manyara
- Northern Rukwa Basin Licences:
  - 12 PLs for 1,467km2
  - 6 PLs awarded July 2019, 6 more in Nov 2021
  - Valid up to 11 years
  - Certified Summed Pmean Helium Prospective Resource of 176 Bcf (NSAI)
- North Nyasa Basin Licences:
  - 2 PLs awarded Nov 21 for 466km2
  - Potential Prospective Resource Estimate in 2022
- Eyasi and Manyara Basin Applications:
  - 9 PL Applications over 1,992km2
  - Award anticipated Q2 2022
- Good road/rail access to port in Dar es Salaam

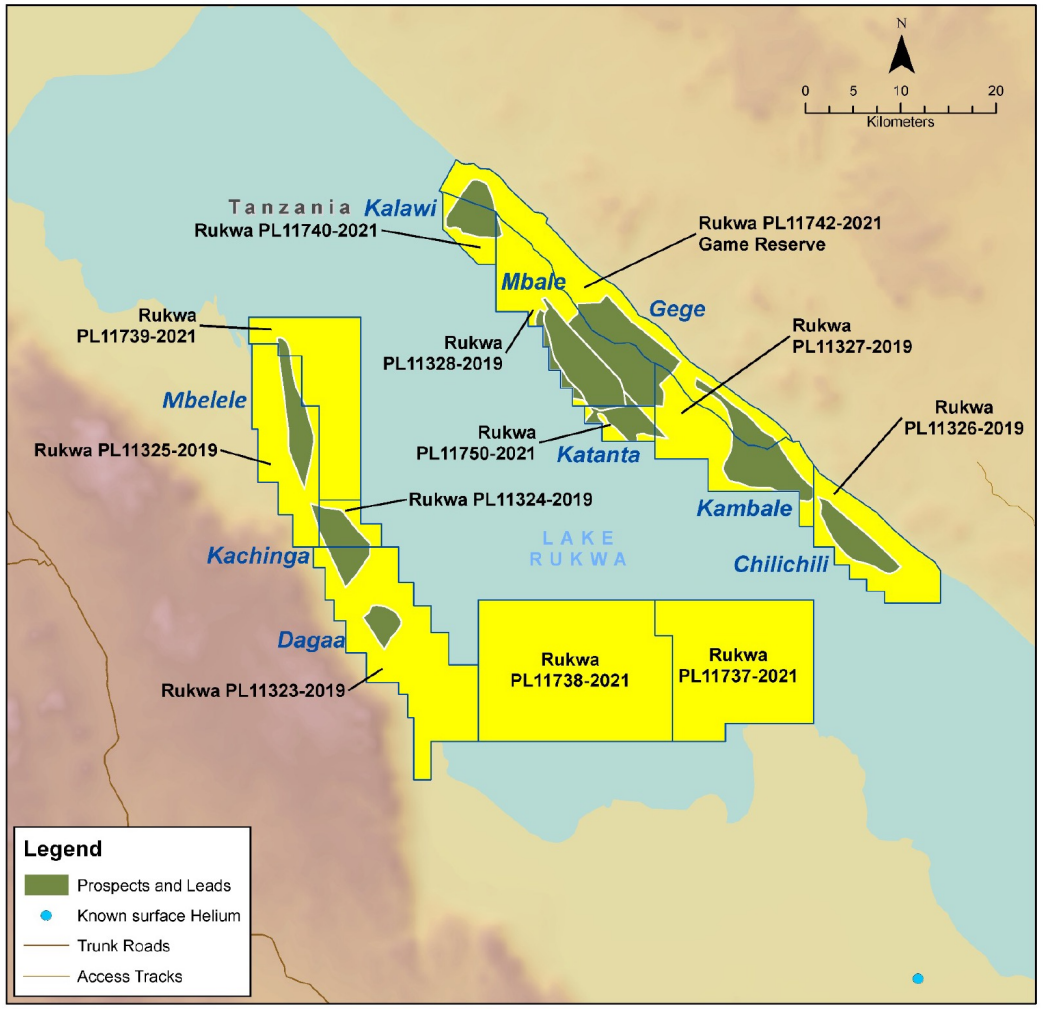
North Rukwa Project

Noble Helium holds 12 helium Prospecting Licences covering 1,468km2 in the North Rukwa basin.

The northern Lake Rukwa Basin area is accessible by road using the TANZAM highway from Dar es Salaam to Mbeya at the southern end of Lake Rukwa, followed by regional roads to Sumbawanga on the western side of the lake and to Gua on the eastern side of the lake. Mbeya is a major regional centre in southwest Tanzania that is also serviced by daily flights to Dar es Salaam.

Legacy oil and gas exploration seismic and well data from the 1980s has accelerated exploration for helium and enabled Noble Helium to attain an independently certified, probabilistic Prospective Helium Volume estimates by Netherland Sewell and Associate of Houston, summarised as follows:

Low Estimate	Best Estimate	High Estimate	Mean
19.6 Bcf	100.7 Bcf	405.7 Bcf	175.5 Bcf



Lead Name	^Summed Mean Unrisked Prospective Helium Volumes (Bcf)
Chilichili *	10.5
Kambale *	20.7
Gege *	87.2
Katanta	23.2
Mbale	4.7
Kalawi *	10.2
Mbelele *	10.0
Kachinga *	7.9
Dagaa *	1.1
Summed Total - North Rukwa	175.5
*BMFC totals	147.6

^Independent assessment by Netherland Sewell and Associates Inc, March 2022

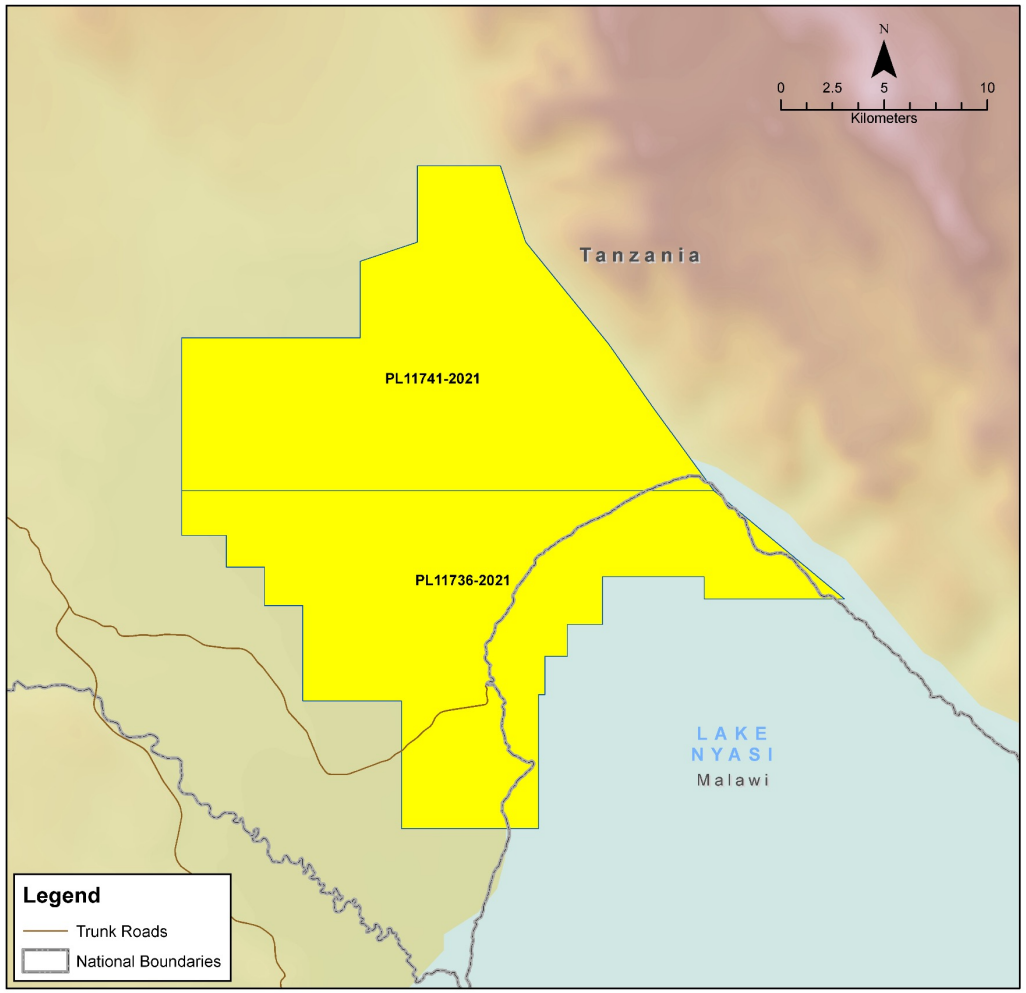
North Nyasa Project

Noble Helium was awarded two helium Prospecting Licences in the onshore component of the North Nyasa basin in November 2021, for a total area of 466km2.

The North Nyasa licence area is accessible by road using the TANZAM highway from Dar es Salaam to Mbeya, at the southern end of Lake Rukwa, followed by regional roads south, directly to Noble Helium's PLs.

Legacy oil and gas exploration data acquired in the previous decade provide modern insight into the geological and structural configuration of the North Nyasa licences.

Noble Helium plans to source these data and acquire new surface geochemistry surveys, with a view to a Prospective Resource estimate for these licences in 2022.



Extension Projects – Eyasi and Manyara Basins

Noble Helium has applied for 9 helium Prospecting Licences covering 1,993km2 for master positions in the Eyasi and Manyara Basins.

Road Access to these areas from Dar es Salaam is through the Tanzanian capital of Dodoma, located in the centre of the country. Air access is through Arusha, the major tourist centre in northern Tanzania, followed by road access west toward Ngorongoro for approximately 100km to the Manyara Basin area and 160km to the Eyasi Basin Area.

While no legacy oil and gas exploration data exists over these basins, they evidence the requisite base helium geology that warrant exploration, including measured helium concentrations in hotsprings at up to 4.6% (James 1967)

Noble Helium is progressing these PLs to award in Q2/3 2022, and undertake geotechnical studies to better understand their resource potential.